DCN 1635

DEFENSE BASE CLOSURE AND REALIGNMENT (BRAC)

COMMISSION VISIT

A. Cornella, Commissioner

Friday, 19 May 1995

NSWCCD Annapolis, MD

Defense Base Closure and Realignment (BRAC)
Commission Visit
Friday, 19 May 1995
NSWCCD Annapolis, MD
Agenda

1000	Arrive (Melville Room)	
1000	Welcome	CAPT Baskerville
1010	Joint Spectrum Center	COL Flock
1015	Overview	Tim Doyle
1025	CFC Program Introduction	Tim Doyle
1030	Site Tour	CDR Walker
1032	Non-CFC Elimination R&D	Jim Hanrahan
1048	Deep Ocean Vehicle Facility	John Sasse
1101	Propulsion Shaftline Facility	Phil Hatchard
1104	CFC Compressor Lab	Dick Helmick
1117	Electrical Power Technology	Howard Stevens/ Chester Petry
1129	Machinery Acoustic Silencing	Fred Flickinger
1142	Submarine Fluid Dynamics	Dave Larrabee
1156	Magnetics Field Lab	Bruce Hood
1205	Advanced Electrical Machinery	Mike Superczynski
1218	Wrap-Up/Discussion	Tim Doyle
1230	Depart	

NAVAL SEA SYSTEMS COMMAND

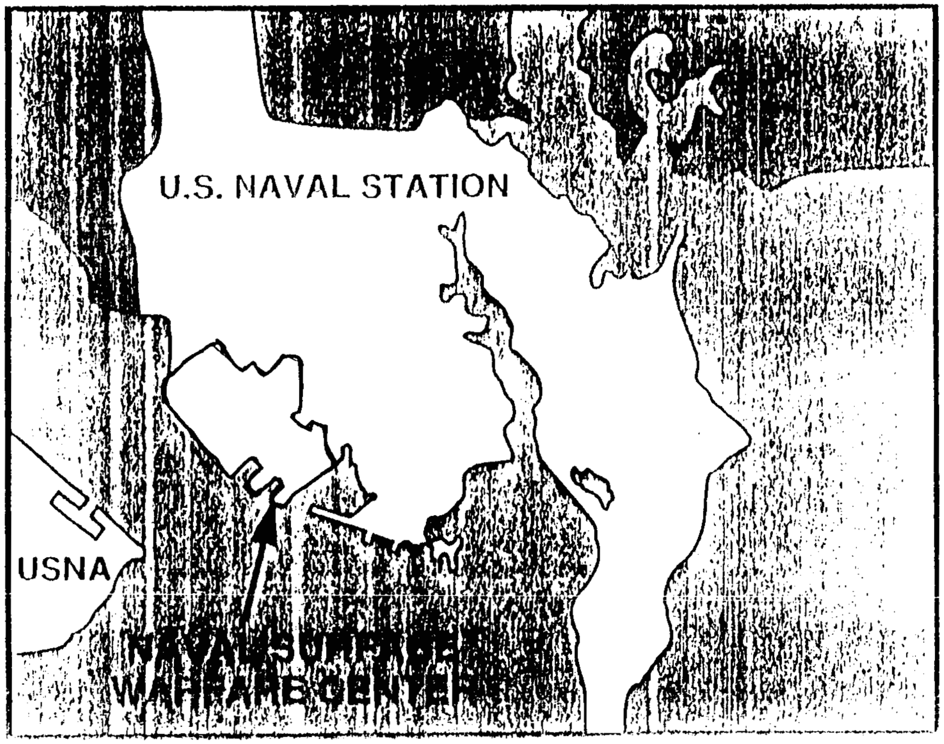
NSWC

Naval Surface Warfare Center

CARDEROCK DIVISION

NAVAL SEA SYSTEMS COMMAND
NSWC
Naval Surface Warfare Center
CARDEROCK DIVISION

ANNAPOLIS NAVAL COMPLEX



NAVAL SEA SYSTEMS COMMAND
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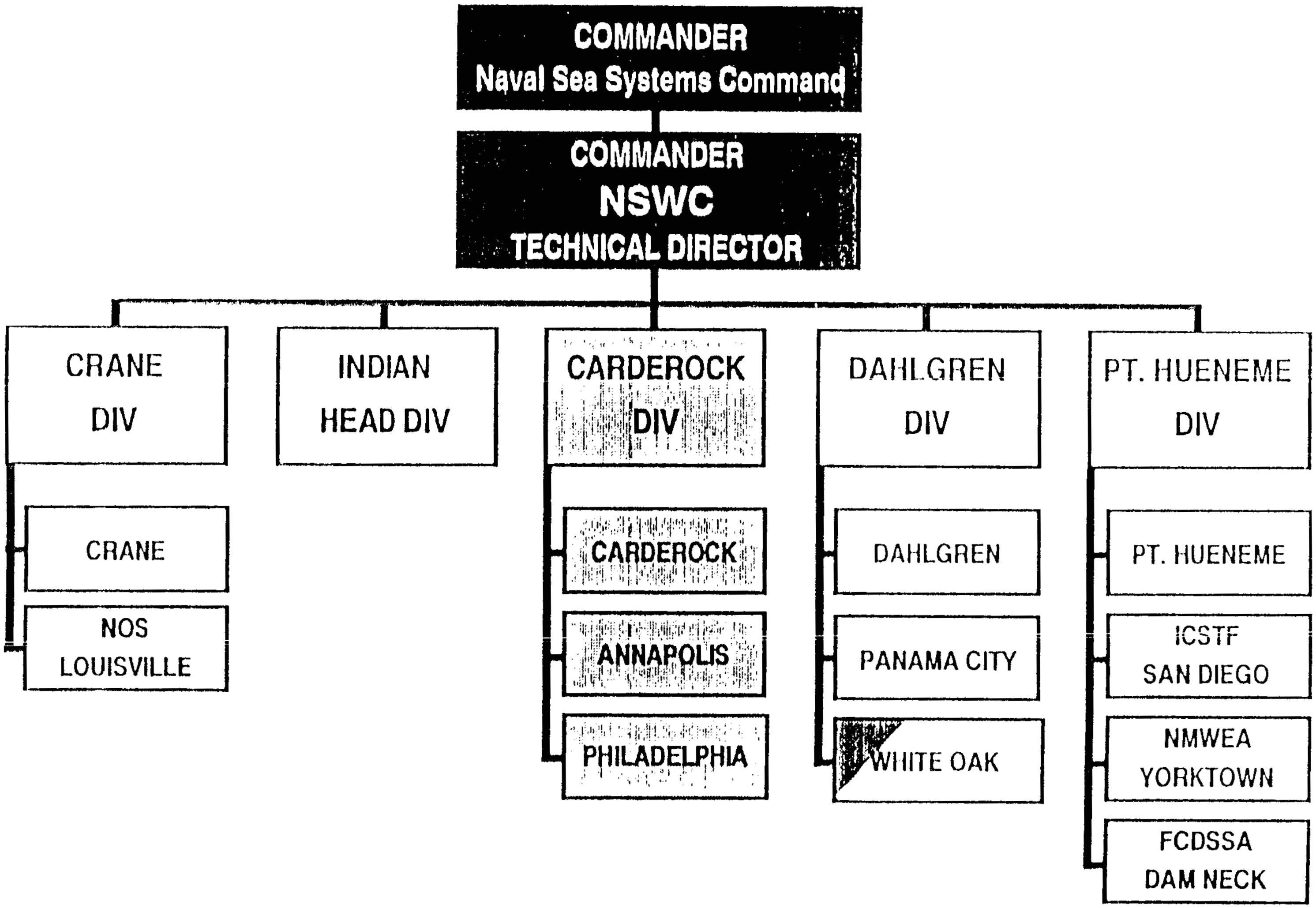
NSWC ORGANIZATION

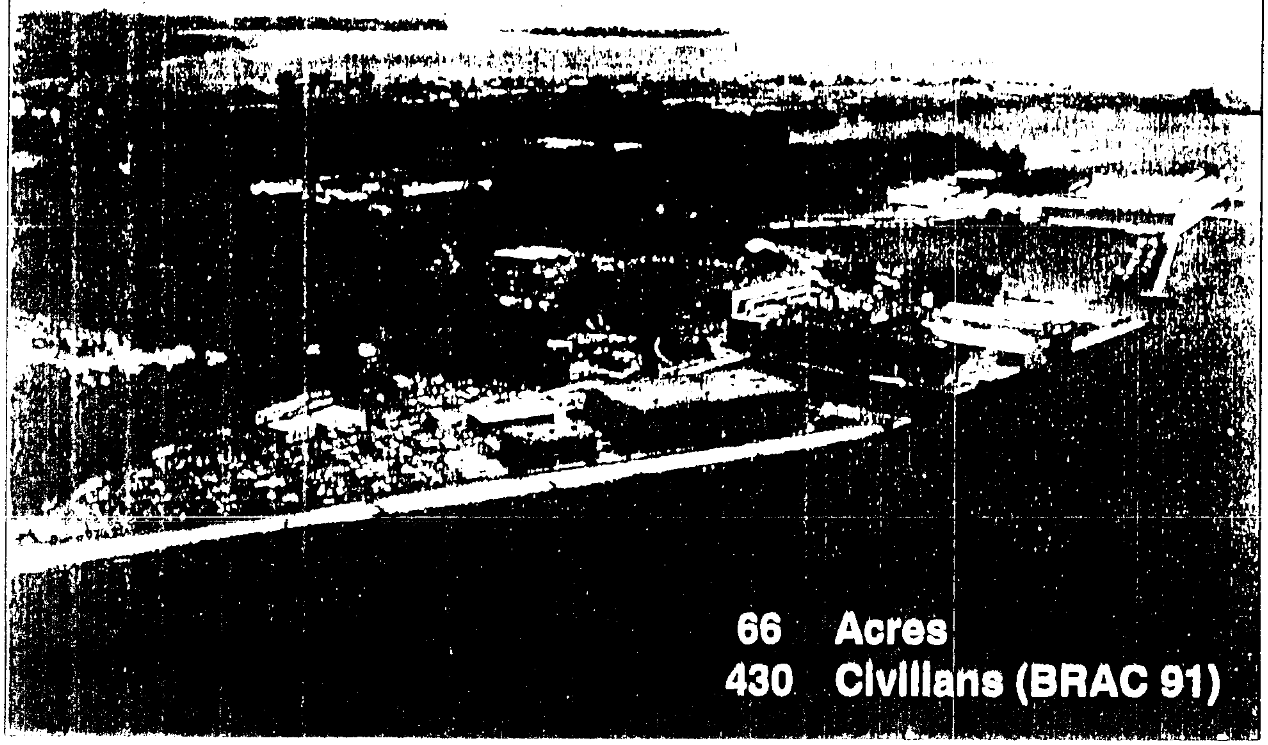


NSWC Naval Surface Warfare Center CARDEROCK DIVISION

ANNAPOLIS DETACHMENT

of the Naval Surface Warfare Center, Carderock Division

Sole Navy provider of Shipboard Machinery Systems R&D and Concept Integration for ships and submarines including machinery acoustic & electromagnetic signatures control.



NSWC Naval Surface Warfare Center CARDEROCK DIVISION

BRAC 91

Annapolis Site Functional Realignments

Machinery ISE Functions → *36 Billets* → **Carderock Division Philadelphia Site**

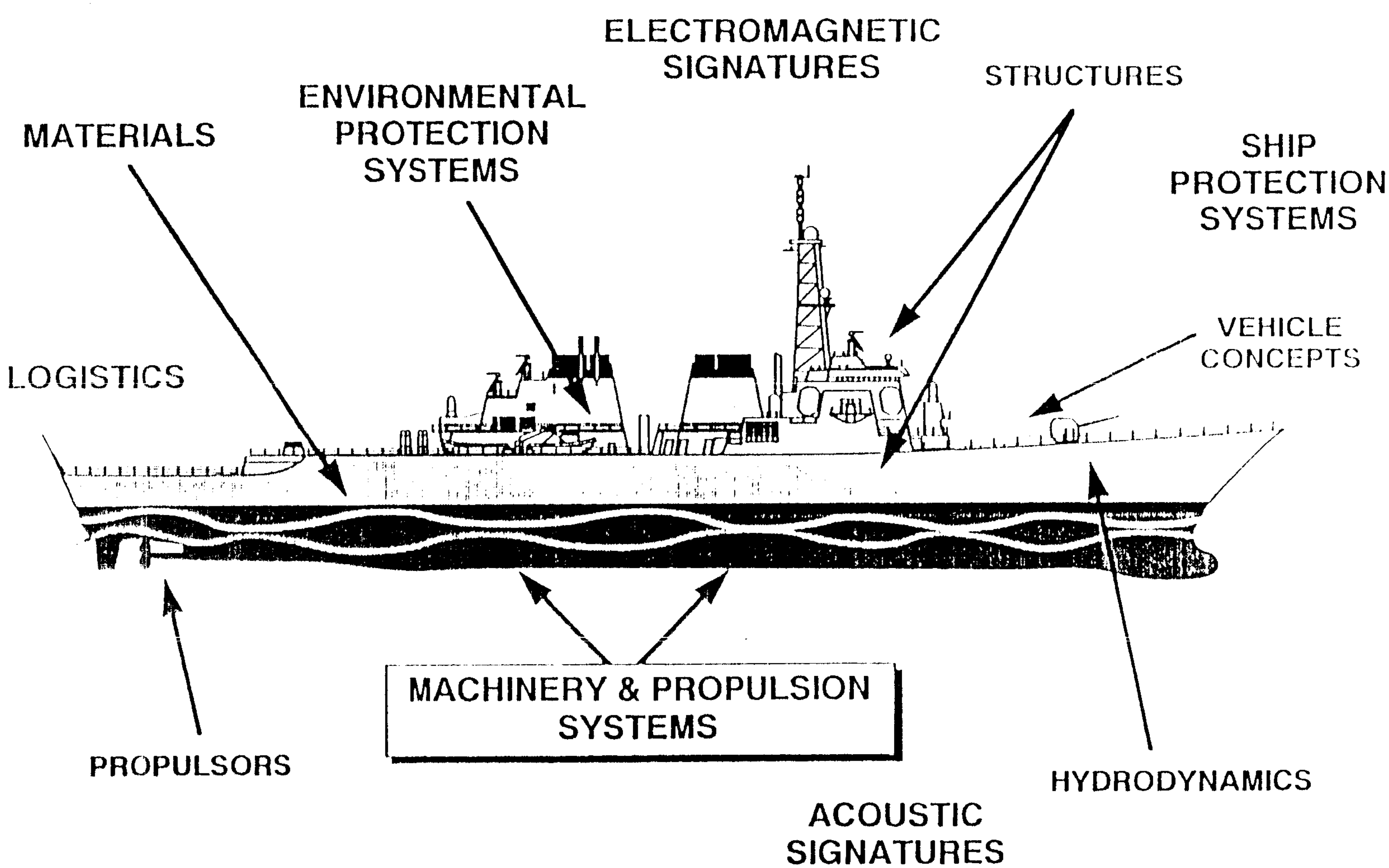
Machinery R&D Facilities → *374 Billets + 56 Base Ops* → **Remain at Annapolis Site**

Materials and Other R&D Functions
Non-Redundant Division Infrastructure → *315 Billets* → **Carderock Division Carderock Site**

430 BILLETS REMAIN AT ANNAPOLIS

NAVAL SEA SYSTEMS COMMAND
NSWC Naval Surface Warfare Center CARDEROCK DIVISION

LEADERSHIP AREAS



NAVAL SEA SYSTEMS COMMAND
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Naval Surface Warfare Center
CARDEROCK DIVISION

BRAC 93 – ANNAPOLIS DETACHMENT

DOD Proposal:
- Disestablish Annapolis Detachment
- Retain facilities in operational state
- Relocate most staff principally to NSWCCD, Philadelphia
- USAF tenant stays

BRAC Decision:
- Reject proposal

BRAC 95 - DoD RECOMMENDATIONS

NSWC CARDEROCK DIVISION
ANNAPOLIS and WHITE OAK DETACHMENTS

ATTACHMENT X-1
RECOMMENDATION FOR CLOSURE
NAVAL SURFACE WARFARE CENTER, CARDEROCK DIVISION
DETACHMENT, ANNAPOLIS, MARYLAND

RECOMMENDATION: Close the Naval Surface Warfare Center, Carderock Division Detachment, Annapolis, Maryland, including the NIKE Site, Bayhead Road, Annapolis, except transfer the fuel storage/refueling sites and the water treatment facilities to Naval Station, Annapolis to support the U.S. Naval Academy and Navy housing. Relocate appropriate functions, personnel, equipment and support to other technical activities, primarily Naval Surface Warfare Center, Carderock Division Detachment, Philadelphia, Pennsylvania; Naval Surface Warfare Center, Carderock Division, Carderock, Maryland; and the Naval Research Laboratory, Washington, D.C. The Joint Spectrum Center, a DoD cross-service tenant, will be relocated with other components of the Center in the local areas as appropriate.

NAVAL SEA SYSTEMS COMMAND
NSWC
Naval Surface Warfare Center
CARDEROCK DIVISION

BRAC IV 1995 Recommendations

Annapolis Detachment Realignments

FACILITIES:

Facilities	Action
Advanced Shipboard Aux Machinery Electric Power Technology Advanced Electric Propulsion Dev Pulse Power Advanced Propulsion Machinery Machinery Acoustics Silencing Sea Survival Life Saving Systems Non-CFC Laboratory	Carderock Division Philadelphia Site
Magnetic Fields Laboratory Information Systems R&D Functions	Carderock Division Carderock Site
Intermediate Scale Fire Test Facility	Navy Research Lab Chesapeake Division
Fresh Water Supply Fuel Refueling Plant Accounts	Annapolis Naval Station
Deep Ocean Pressure Facility: Machinery & Vehicles Submarine Fluid Dynamics Laboratory	CLOSE
Joint Spectrum Center (DOD Tenant)	RELOCATE

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BRAC Site Visit 5-19-95
Annapolis Detachment
Commissioner Al Cornella

Overview

Tim Doyle

Overview

- Machinery is a Major Contributor to Ship Cost & Mission Capability
- Annapolis Machinery Technologies Improve Fleet Affordability & Sustain Capability

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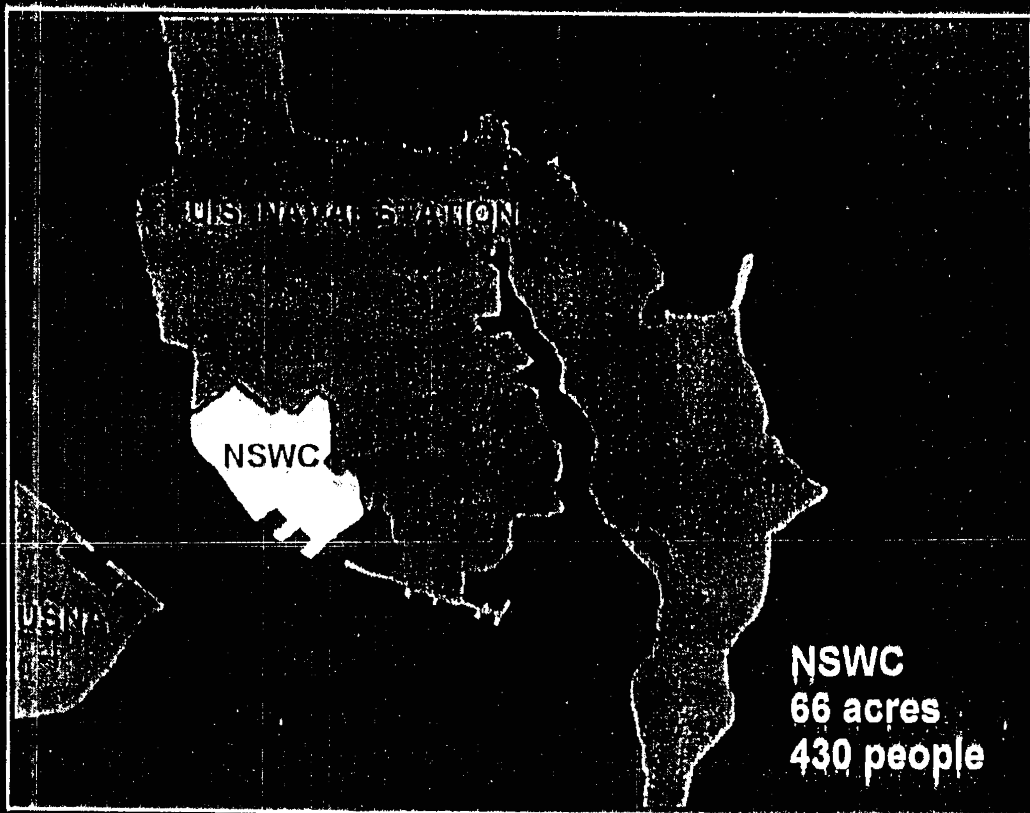
NAVAL SURFACE WARFARE CENTER
CARDEROCK DIV., ANNAPOLIS DET.
ANNAPOLIS, MD

ANNAPOLIS NAVAL COMPLEX



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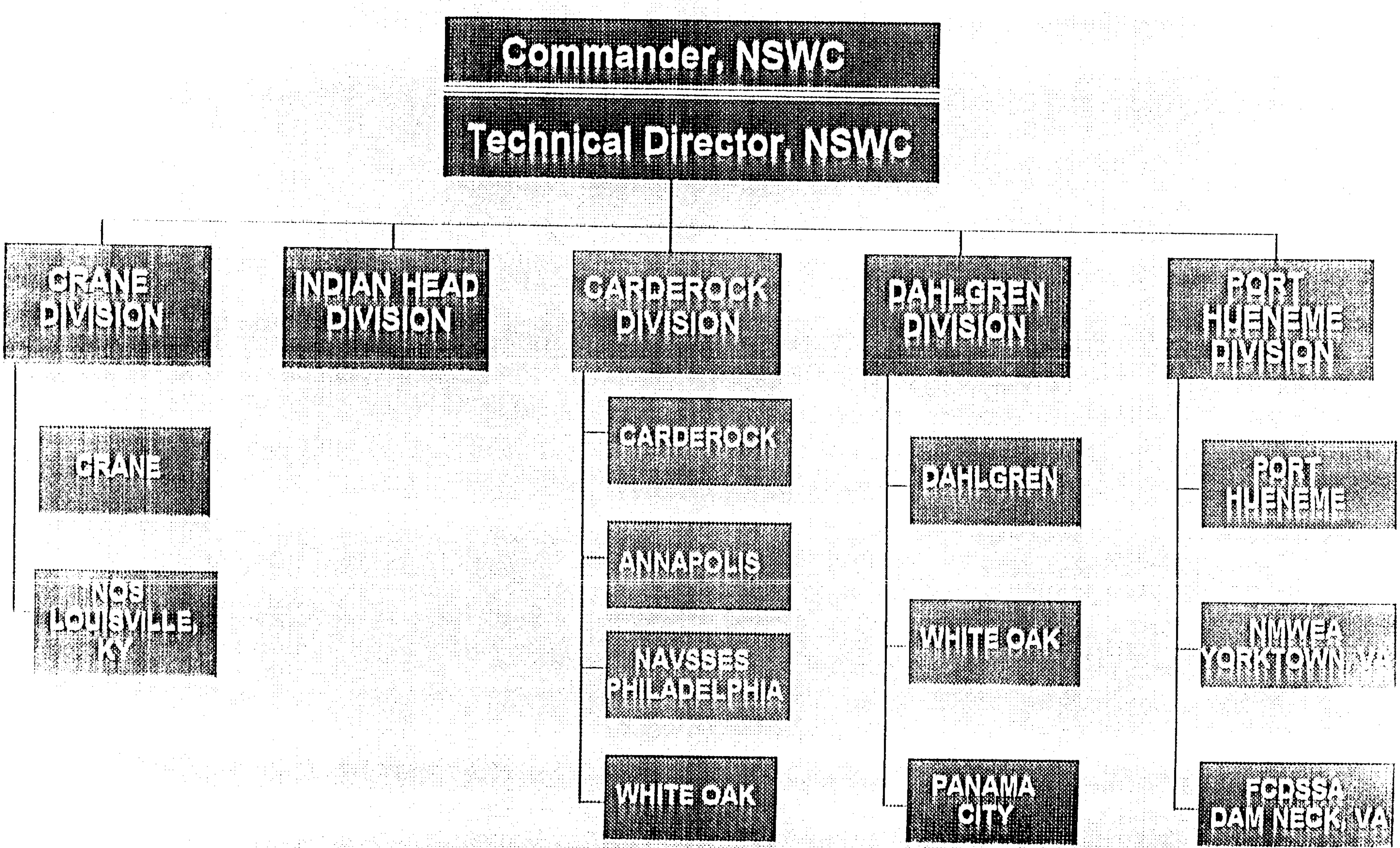
NSWC ORGANIZATION



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CARDEROCK DIVISION TECHNICAL DIRECTORATES

CODE 10	LOGISTICS AND MACHINERY PROGRAMS
CODE 20	SHIP SYSTEMS AND PROGRAMS
CODE 50	HYDROMECHANICS
CODE 60	SURVIVABILITY, STRUCTURES, AND MATERIALS
CODE 70	SIGNATURES
CODE 80	*MACHINERY RESEARCH AND DEVELOPMENT*
CODE 90	MACHINERY IN-SERVICE ENGINEERING

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MACHINERY R & D DIRECTORATE

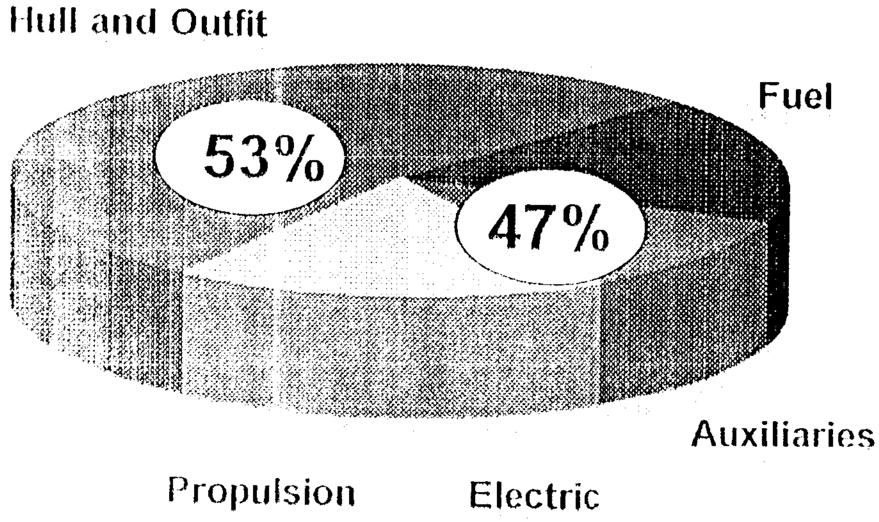
- Mission

  Perform Research and Development of Naval Shipboard Machinery
  Including Stealth and Energy Conservation
  (Annapolis Detachment is the only activity performing this mission)

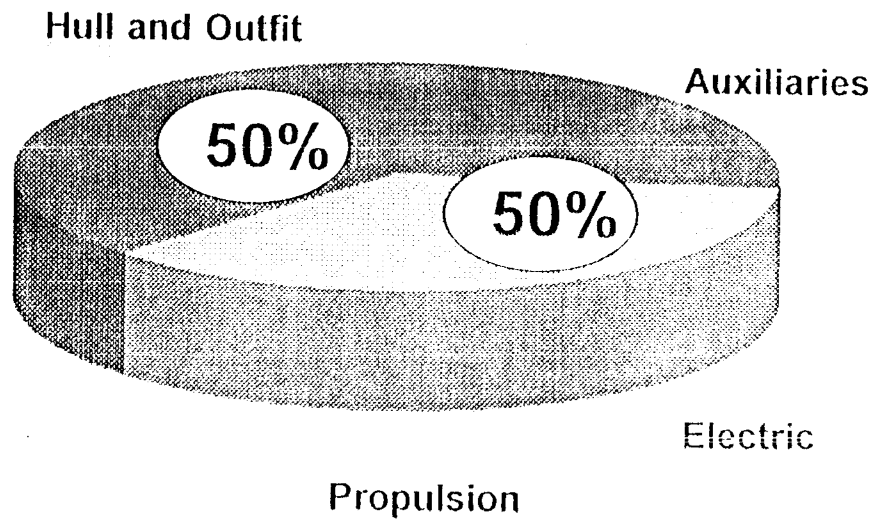
- Functions
  - Technology & Hardware Development
  - System Tradeoffs & Integration
  - Specification & Qualification
  - Technology Assessments

US NAVY SURFACE COMBATANT
(DDG 51, FLT 1 WITHOUT COMBAT SYSTEMS)

SHIP WEIGHT



SHIP BUILDING COST



MAJOR MACHINERY IMPACTS

- Ship building cost
- Ship operating cost
  - Fuel
  - Crew size and skill level
- Speed and Maneuverability
- Range and Endurance
- Noise, IR, and Magnetic Signatures
- Combat System Operation

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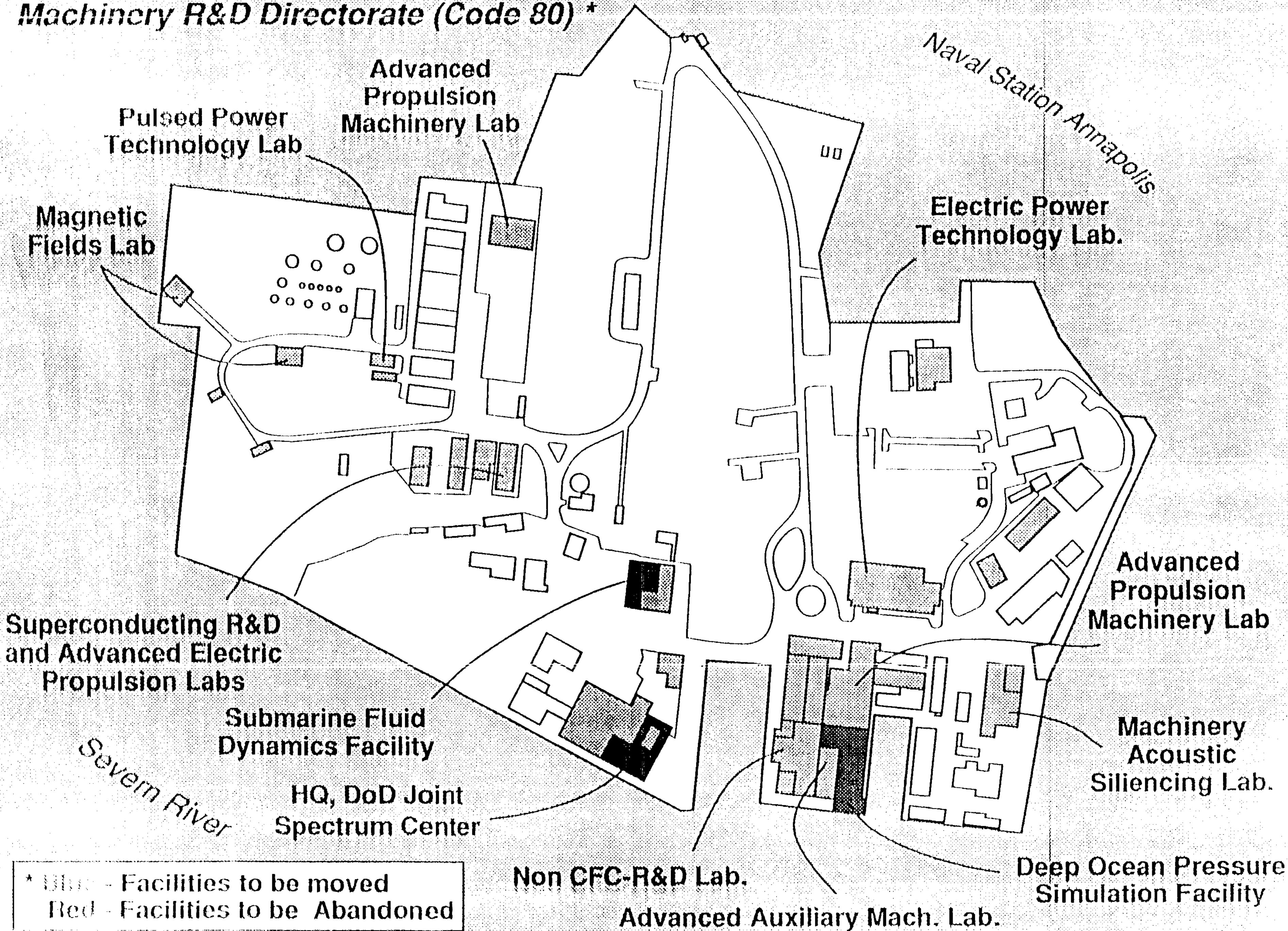
MACHINERY R&D PRODUCTS

Machinery Specialities	Focus	Users
Electrical & Mechanical Equipment	Affordability - Procurement & Maintenance - Manning Reduction - Fuel Economy	Future Ships & Subs Existing Fleet
Propulsion & Power Generation Systems	Environmental Compliance - CFC Substitutes - Waste Processing - Emission Controls	U.S. Industry U.S. Maritime Other DOD
Auxiliary Systems	Stealth - Noise - Magnetic	Other Navies
	Safety & Survivability - Life Support - Damage Control	

CARDIV, Naval Surface Warfare Center, Annapolis Detachment

Machinery R&D Directorate (Code 80) *



* Blue - Facilities to be moved
Red - Facilities to be Abandoned

NON - CFC

R&D

PROGRAM

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BACKGROUND

- Montreal Protocol (1987)
  - Industrialized nations agree to curtail CFC production
  - London Amendments (1990) require CFC production end by 2000

- Clean Air Act (1990) codified London Agreement

- President Bush (1992) ordered complete production ban by January 1, 1996. Subsequently, by the Copenhagen Amendments (1992) the Protocol members endorsed the accelerated U.S. position.

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NAVY STRATEGY

- Convert all shipboard units to environmentally acceptable refrigerants in an aggressive “backfit” program
- Establish mission-critical reserve to service fleet until units converted
- Design new generation of shipboard AC plants and refrigeration plants using HFC-134a for all forward fit applications

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FLEET
AIR CONDITIONING AND REFRIGERATION

APPLICATIONS:	Combat System Cooling
	Crew Comfort
	Food Storage
REQUIREMENTS:	Quiet
	Reliable
	Efficient
	Tolerate: Ship Motions
	Shock Conditions
	Salt Environments
	Compatible: Sub Atmospheric Control Equipment

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CURRENT FLEET

Up to 100 ton Plants (with reciprocating compressors)	CFC 12	FFG, LST small auxiliary
100 to 400 ton Plants (with centrifugal compressors)	CFC 11	Pre 1970 ships
	CFC 114	Post 1970 ships: SSN, SSBN, CV, CVN, DD, DDG, CG Large auxiliary

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CFC-114 BACKFIT PROGRAM

NEED:
- Mission Critical
- Schedule Critical

⬇

NAVY PROGRAM:
- Aggressive & Success Oriented
- Simultaneous R&D for 12 Fleet Designs
- Products Immediately Transition to:
  - Quantity Production
  - Fleet Implementation

⬇

R&D AT ANNAPOLIS:
- Inplace since 1988
- Major Acceleration Since 1992:
  - Facilities more than Doubled
  - In-house Staff 30+ (40 in '96)
  - Contractor Staff (more than 50)

KEY POINTS

- ENVIRONMENTAL COMPLIANCE REQUIRED
  CFC PRODUCTION IS BANNED AFTER 1995
- MISSION CRITICAL COOLING OF COMBAT SYSTEMS
  COMBAT SYSTEMS CANNOT FUNCTION WITHOUT COOLING
  SHIP'S SAFETY IS AT RISK
- ANY DELAY WILL GREATLY RISK DEPLETING THE CFC STOCKPILE
- INDUSTRY IS BEING UTILIZED TO THEIR CAPACITY
  ANNAPOLIS LABORATORY IS THE ONLY FACILITY WITH
  THE CAPACITY AND EXPERTISE TO MEET SCHEDULE
- CFC-114 IS UNIQUE TO NAVY AC PLANTS, COMMERCIAL
  SOLUTIONS DO NOT APPLY

WHAT IS AN AC PLANT?

- NOT A COMFORT AIR CONDITIONER
- MISSION CRITICAL APPLICATION
  PRODUCES CHILLED WATER FOR COMBAT SYSTEMS:
  i.e., RADAR, SONAR, COMMUNICATIONS,
  WEAPONS FIRE CONTROL COMPUTERS
- NAVY AC PLANTS ARE DIFFERENT THAN COMMERCIAL PLANTS
  UNIQUE ACOUSTIC REQUIREMENTS
  SHOCK AND VIBRATION RESISTANCE
  LIMITED SPACE AVAILABLE ON SHIPS AND SUBMARINES
  SUBMARINE ATMOSPHERIC CONTROL SYSTEM COMPATIBILITY
- NAVY SHIPS USE A DIFFERENT REFRIGERANT THAN INDUSTRY
  INDUSTRY IS BEING UTILIZED, BUT THEY ARE AT CAPACITY

NAVAL COMBATANTS USING CFC-114

- AIRCRAFT CARRIERS
  - USS NIMITZ CLASS
  - USS KITTY HAWK CLASS
  - USS KENNEDY CLASS
  - USS ENTERPRISE CLASS
  - USS INDEPENDENCE CLASS
- SUBMARINES
  - USS OHIO CLASS (TRIDENT)
  - USS LOS ANGELES CLASS
  - USS SEAWOLF CLASS
- DESTROYERS
  - USS ARLEIGH BURKE CLASS
  - USS SPRUANCE CLASS
  - USS KIDD CLASS
- CRUISERS
  - USS TICONDEROGA CLASS
- HELO/LANDING CRAFT CARRIERS
  - USS WASP CLASS
  - USS TARAWA CLASS

TOTAL NUMBER OF AIR CONDITIONING PLANTS: 860
TOTAL FLEET INSTALLED COST: $1.0 BILLION

ANNAPOLIS DET.
CDNSWC MAR 1995

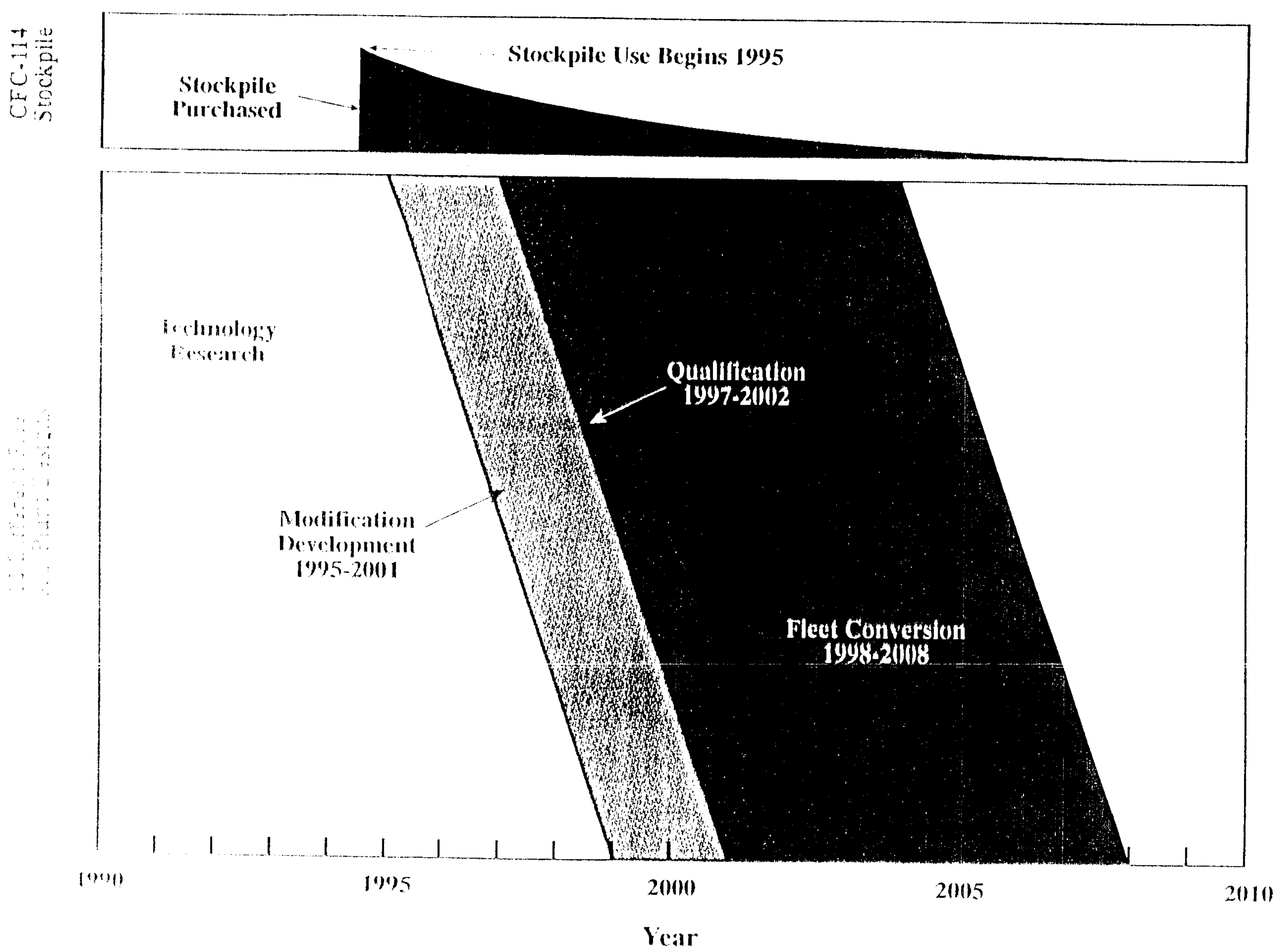
ENVIRONMENTAL COMPLIANCE

- INTERNATIONAL AGREEMENTS TO BAN CFCs i.e., MONTREAL PROTOCOL
- EPA CLEAN AIR ACT REGULATIONS
- PRODUCTION OF ALL CFCs ARE BANNED AFTER 1995
- ORIGINAL REGULATIONS (1989) ONLY CALLED FOR A 50% REDUCTION IN PRODUCTION, THIS RAPID ACCELERATION AND PHASEOUT CAUSED A TIME CRITICAL SCHEDULE.

NAVY UNIQUE REFRIGERANT CFC-114

- COMMERCIALLY CFC-114 IS NOT USED
  NO EQUIVALENT CHEMICAL EXISTS, MODIFICATIONS REQUIRED
  INDUSTRY IS INVOLVED, BUT THEY ARE AT CAPACITY
- SUBMARINE ATMOSPHERIC CONTROL SYSTEM COMPATIBILITY
- POSITIVE PRESSURE REQUIRED TO MINIMIZE MAINTENANCE AND REPAIR PROBLEMS, i.e., IMPROVED READINESS
- ACOUSTIC SILENCING TECHNOLOGY DEVELOPED FOR CFC-114

NON-CFC AIR CONDITIONING SCHEDULE



PROGRAM SCHEDULE IS CRITICAL

- FLEET CONVERSION OF CFC-114 AC PLANTS BEGINS FY 1998.
- DEVELOPMENT AND QUALIFICATION FOR OTHER DESIGNS CONTINUES INTO FY 2002. REMAINING CLASSES WILL BE BACKFIT AS EACH MODIFICATION KIT IS QUALIFIED IN THE ANNAPOLIS FACILITIES.
- CONVERSION OF THE ENTIRE FLEET WILL REQUIRE UNTIL 2008.
- THE NAVY MISSION CRITICAL STOCKPILE OF CFC-114 WAS SIZED FOR THE ABOVE AGGRESSIVE CONVERSION SCHEDULE.
  PRODUCTION OF CFCs ARE BANNED AFTER 1995.
  USE OF THE NAVY STOCKPILE HAS ALREADY BEGUN.
- ANY DELAY WILL GREATLY RISK DEPLETING THE CFC STOCKPILE.
  EXAMPLE:
  1 YEAR DELAY WOULD EFFECT THE FOLLOWING:
  70 SHIPS (268 AC PLANTS) IN 2005
  120 SHIPS (465 AC PLANTS) IN 2006, ETC.
  THESE ARE OUR NEWEST AND MOST CAPABLE SHIPS IN THE FLEET.

ANNAPOLIS DET.
CDNSWC MAR 1995

CENTRIFUGAL COMPRESSOR REFRIGERANT COMPARISON

	CURRENT	POTENTIAL ALTERNATIVES		
DESIGNATION	CFC-114	HCFC-124	HFC-236ea	HFC-236fa
CHEMICAL FORMULA	$C_2Cl_2F_4$	C_2HClF_4	CF_3CHFCF_2H	$CF_3CH_2CF_3$
EVAPORATOR PRESSURE (PSIA)	15.13	27.89	13.67	18.76
CONDENSER PRESSURE (PSIA)	46.14	80.92	45.54	59.15
FLOWRATE (ft^3/min/ton)	9.31	5.06	9.22	7.19
POWER (kW/ton)	0.518	0.499	0.499	0.507
DISCHARGE SUPERHEAT (°F) or QUALITY (%)*	96%	99%	95%	95%
DIMENSIONLESS HEAD	1.08	0.965	1.17	1.11
SPEED OF SOUND at SUCTION (ft/sec)	381	423	404	403
OZONE DEPLETION POTENTIAL	0.7	0.02	0	0
GLOBAL WARMING POTENTIAL	3.7	0.07	0.08 est	?
ATMOSPHERIC LIFETIME (YRS)	200	8	9	62
ACUTE TOXICITY (1 = High, 6 = Low)	6	6	5-6	6
FLAMMABLE	NO	NO	NO	NO

100% quality is dry saturated vapor

Data based on: 40°F Evaporating temperature
100°F Condensing temperature
100% Efficient motor and compressor

JAN 1995

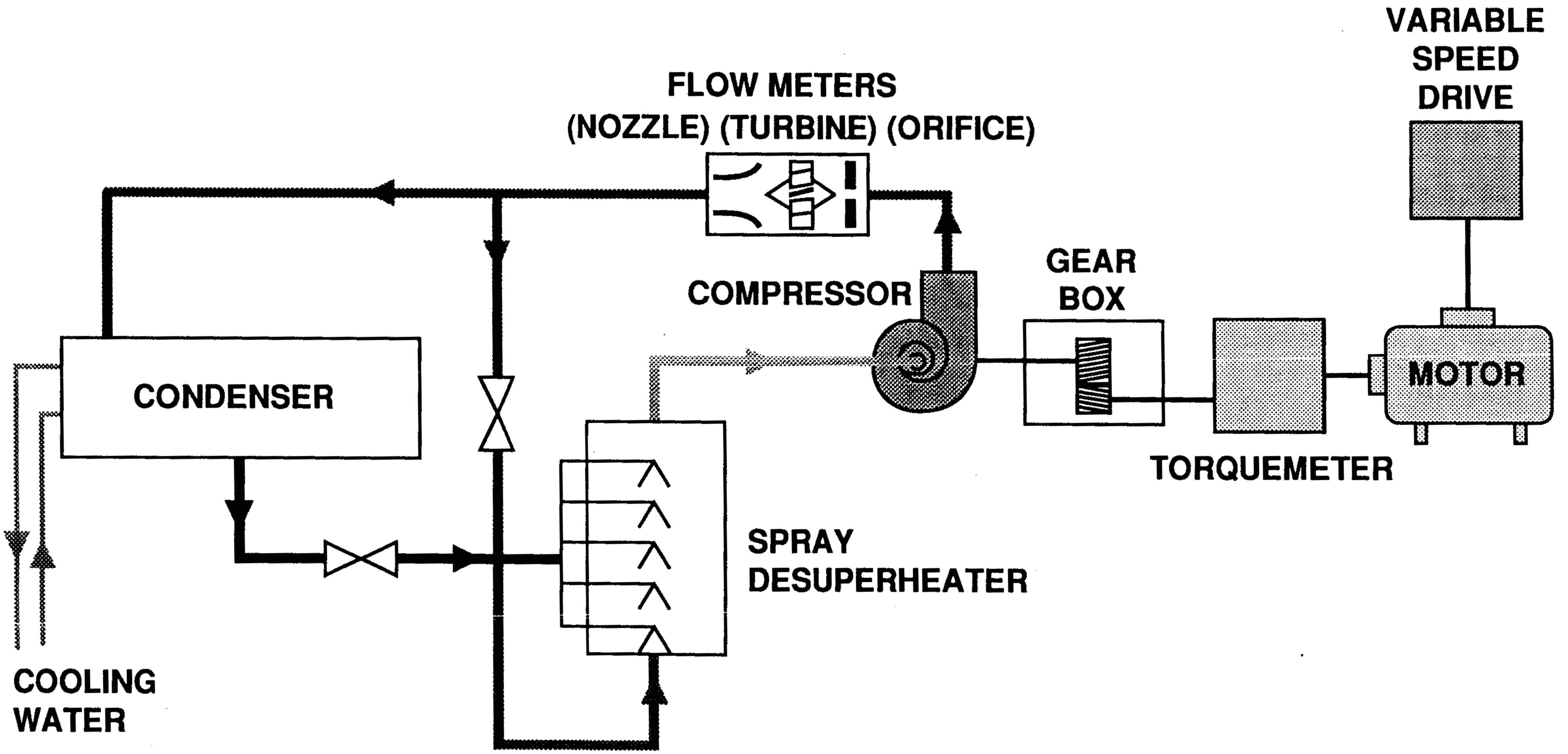
Fleet CFC-114 AC Plants to be Backfitted

844 Total Plants (includes submarines)

Compressor Size	Plant Capacity	Ship Class	Total by Ship Class	Total by Capacity	Total by Compressor
T-53	125	Trainer	1	41	328
		LSD 44/52	40		
	150	SSN 683	2	283	
		DD 963/992	84		
		SSN 688/773	196		
		SSN 688 Trainer	1		
	175	MTS 626	2	4	
		MTS 635	2		
T-59	200	ARDM 1	1	2	2
		Stock	1		
T-63	225	SSN 21/22	8	8	8
T-67	200	SSBN 726/743	72	328	363
		SSBN Trainer	1		
		CG 47/73	108		
		DDG 993/997	19		
		DDG 51/82	128		
	250	MCS 12	3	35	
		LCC 19/20	4		
		AD 43/44	6		
		AOE 6/10	16		
		AS 39&41	6		
T-76	300	CV 63/64&67	3	59	59
		CVN 65	1		
		LHA 1/5	20		
		LHD 1/6	35		
T-86	363			84	84
		CV 63/64&67	17		
		CVN 65	6		
		CVN 68/75	61		

ANNAPOLIS DET.
CDNSWC MAY 1995

CENTRIFUGAL COMPRESSOR DEVELOPMENT FACILITY SCHEMATIC



A WORLD CLASS FACILITY

PROVIDING

HYDROSTATIC PRESSURE TESTING SERVICES

TO

GOVERNMENT AGENCIES

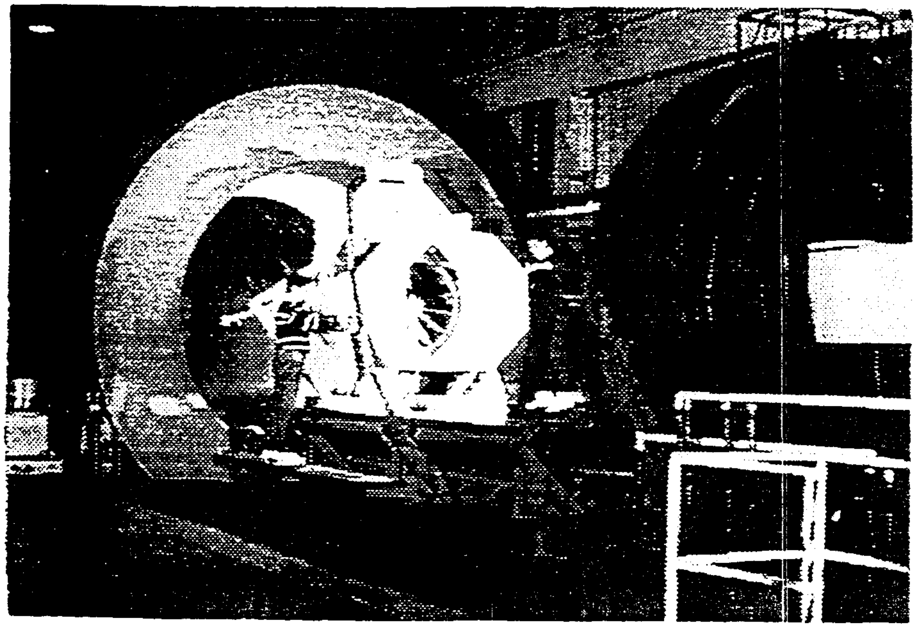
AND

PRIVATE INDUSTRY

DEEP OCEAN PRESSURE SIMULATION FACILITY

ANNAPOLIS DETACHMENT
NAVAL SURFACE WARFARE CENTER
ANNAPOLIS, MD

DEEP OCEAN PRESSURE SIMULATION FACILITY



APPLICATION

A national asset, the only facility of its kind in the world, capable of simulating ocean depths to 27,000 feet (12,000 psi) for submersibles and their crew and equipment up to 10 feet in diameter and 27 feet long while oriented in the horizontal position.

IMPORTANCE

This facility represents the most advanced tool available to the Navy to develop large scale composite submarine structures and small undersea manned and unmanned vehicles to meet the Navy undersea missions of surveillance, bottom mapping, search, salvage, recovery and swimmer delivery.

DESCRIPTION

This facility contains four horizontal pressure vessels which use salt or freshwater as the pressurizing fluid. The water temperature can be controlled to a specified temperature within the range from 35°F to 120°F in these vessels. The largest pressure vessel in the world with a static pressure capability of 12,000 psi is the centerpiece of the facility. Its length of 27 feet and diameter of 10 feet are of sufficient size to accommodate full-scale deep ocean vehicles. Numerous manned and unmanned submersibles have made simulated deep test dives in this vessel. Other pressure vessels, ranging in size from 30 inches to 4 feet in diameter, are used to test undersea equipment like submersible electric motors, piping and fittings, electrical connectors, and pressure compensated electrical and electronic equipment.

THE FOLLOWING TYPES OF TESTS WERE PERFORMED IN THE DEEP OCEAN MACHINERY SIMULATION FACILITY WHICH COULD NOT HAVE BEEN PERFORMED ELSEWHERE.

Vehicles

Qualifying and evaluating vehicles such as CURV, ORION, OROV, etc. requires high pressure (10,000 - 12,000 psi), large size (10 ft diameter, 27 ft length) and horizontal orientation.

Deep Ocean Machinery Systems

Qualifying and evaluating deep ocean machinery systems such as the SSN-21 Secondary Propulsion Unit, Deep Submergence Electrical Power Distribution System, etc. requires a horizontal orientation, heat removal capability and large size (10 ft diameter, 27 ft length).

Cable Systems

Evaluation of cable designs such as the Advanced Tethered Vehicle Cable and an assortment of fiber optic cables requires high pressure (10,000 - 12,000 psi), large size (10 ft diameter, 27 ft length) and horizontal orientation.

Materials

Evaluation of composite materials such as ceramic and titanium pressure vessels and ceramic compaction processes requires high pressure (10,000 - 12,000 psi), large size (10 ft diameter, 27 ft length).

Special Testing

Evaluation of sonar aperture and hydrophone array panels requires a low noise hydrostatic pressure environment. Due to its unique fabrication, the tank is inherently acoustically quiet.

Tests Requiring Special Capabilities Of The Large A-Tank Pressure Vessel		
Date	Test	Sponsor
1-89	Ceramic Compaction (size and pressure required A tank)	Coors Ceramics
9-89	ORION Cable (size and pressure required A tank)	Oceaneering
4-90	CURV (size and pressure required A tank)	Oceaneering
6-90 Thru 7-90	Noise Test (test required a quiet vessel)	NSWC Carderock
11-90	ATV Cable (size and pressure required A tank)	NRaD
11-90	Rubber Panels (size requirement and required quiet tank)	NSWC Carderock
10-91	AT&T/ SPAWAR - Special Test (size and pressure required A tank)	U.S. Navy
10-91	Fiber Optic Cable (size and pressure required A tank)	AT&T Bell Labs
11-92	Fiber Optic Cable (size and pressure required A tank)	AT&T Bell Labs
11-92	Westinghouse Ceramic (size, orientation, and pressure required A tank)	Westinghouse
11-92	SSN-21 Secondary Propulsion Unit (size and orientation required A tank)	Westinghouse
1-93	Fiber Optic Cable (size and pressure required A tank)	Simplex
4-93	NCEL Plow Test (orientation required A tank)	NCEL
4-93	SSN-21 Secondary Propulsion Unit (orientation required A tank)	Westinghouse
5-93	DSV Sea Cliff Electrical Distribution (size required A tank, manned submersible components)	Lockheed

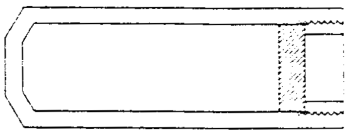
Tests Requiring Special Capabilities Of The Large A-Tank Pressure Vessel		
6-93	Fiber Optic Cable (size and pressure required A tank)	AT&T Bell Labs
8-93	ISMS System (orientation required A tank)	Oceaneering
9-93	AT&T/ SPAWAR (test pressure required A tank)	US Navy
9-93	ISMS System (orientation required A tank)	Oceaneering
10-93	Ceramic Vessel Technology (size and pressure required A tank)	Westinghouse
1-94	Fiber Optic Cable (size and pressure required A tank)	Rochester Cable
5-94	Fiber Optic Cable (size and pressure required A tank)	Rochester Cable
6-94	Fiber Optic Cable (size and pressure required A tank)	AT&T Bell Labs
7-94	Holding Tank (test pressure required A tank)	Westinghouse
1-95	DSV Sea Cliff Manipulators (size required A tank, manned submersible components)	U.S. Navy
3-95	ORION & ORION ROV (size and pressure required A tank)	U.S. Navy

LARGE PRESSURE VESSELS OF THE DEEP OCEAN PRESSURE SIMULATION FACILITY

ANNAPOLIS, MD

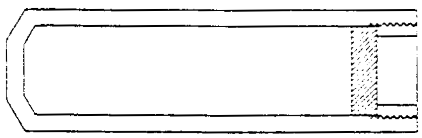
H-TANK PRESSURE VESSEL

DIAMETER = 30 INCHES
USABLE LENGTH = 7 FEET
MAX PRESSURE = 7,000 PSI

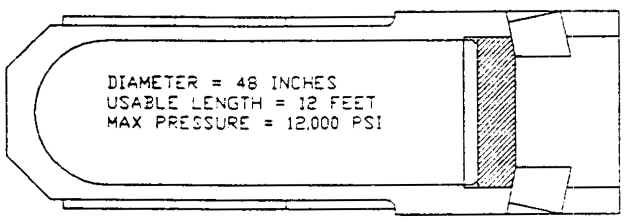


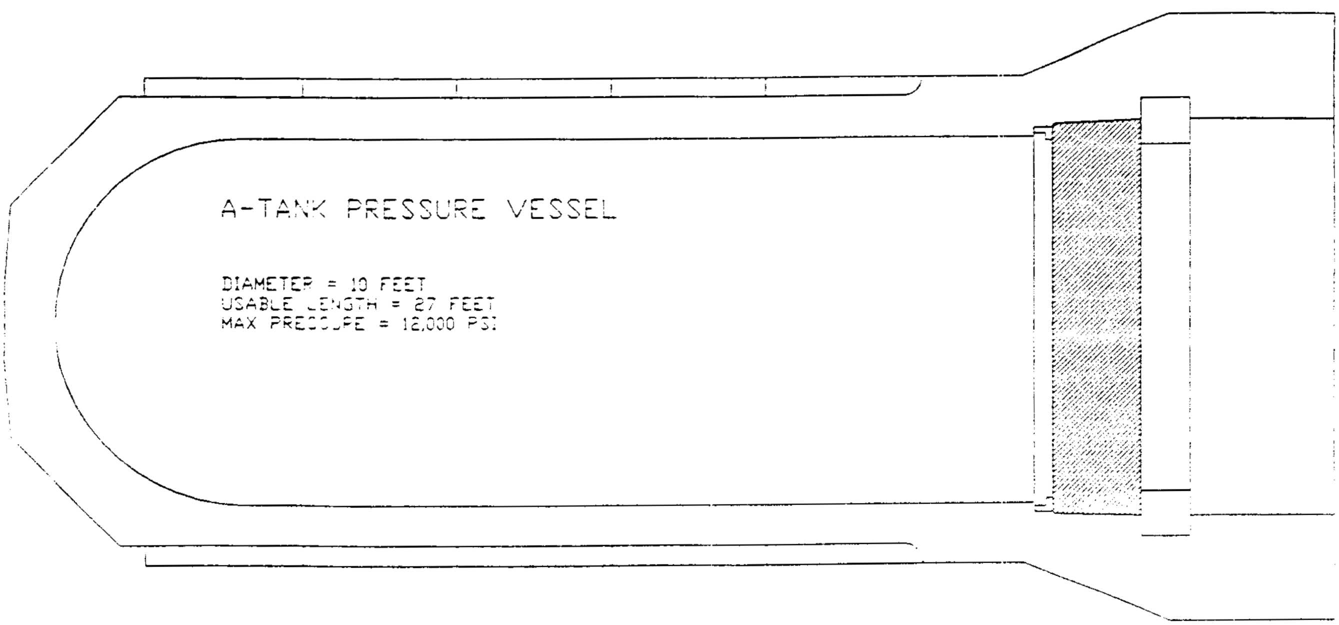
J-TANK PRESSURE VESSEL

DIAMETER = 30 INCHES
USABLE LENGTH = 9 FEET
MAX PRESSURE = 10,000 PSI



B-TANK PRESSURE VESSEL





HOW TO CONDUCT BUSINESS WITH THE

NAVAL SURFACE WARFARE CENTER

GENERAL: The Deep Ocean Pressure Simulation Facility is a unique national asset for the purpose of conducting hydrostatic pressure tests for the Navy, other government agencies and private industry.

The facility is operated as a "cost center" . This means the customer will be charged the actual labor and material cost to setup and operate their test plus a usage fee for the pressure vessel to be set aside for the maintenance and upkeep of the facility.

FIRST STEP: Contact the Deep Ocean Pressure Simulation Facility at the Naval Surface Warfare Center in Annapolis, MD by phone at 410-267-2844 (FAX 410-267-3866) or write to: Officer in Charge, Annapolis Detachment, Carderock Division, Naval Surface Warfare Center, Attention: Code 8520, 3A Leggett Circle, Annapolis, MD 21402-5067. Give the Facility your test requirements so that a cost estimate can be generated.

DEPARTMENT OF DEFENSE: In preparation for testing, the DoD customer should forward their Work Request or Military Interagency Purchase Request to the Center at the above address so an account can be setup for this work. Once the account and job order number have been arranged, work can begin.

GOVERNMENT AGENCIES: Other government agencies should send their work authorization and financial documents to the Center at the above address so an account can be setup for this work. Once the account and job order number have been arranged, work can begin. A surcharge of 2.1% will be assessed all non-DoD Federal customers.

PRIVATE INDUSTRY: Work for private industry customers will be undertaken on a cost-reimbursement type contract. Private parties should forward their authorization specifying the scope of work to be performed along with their check in the amount of the initial cost estimate so an account and job order number can be arranged.

Under a cost-reimbursement type contract the cost including labor, material, and usage fee will be charged against your initial deposit as the services are performed. If the scope of work increases during the test program, the customer will be asked to deposit funds to cover the revised estimate. In the event that the actual cost is less than the funds deposited, the balance will be refunded at the time the program is considered complete.

Before work can be undertake for any private organization, a signed original of a standard indemnity agreement must be received from the customer indemnifying the Government from suits or actions that may arise from damage to the customers property as a result of testing.

Private parties will be charged a 3.7% surcharge. However, if the customer's work pertains to a DoD cost-reimbursement type contract the surcharge will be waived if the contract number is specified.

DEEP OCEAN PRESSURE SIMULATION FACILITY
ANNAPOLIS, MD

FACILITY COST IMPACTS

COMPARATIVE COSTS FOR THE LAST 24 TESTS THAT REQUIRED THE SPECIALIZED CHARACTERISTICS OF THIS FACILITY

NSWC FACILITY TEST COST (24 ITEMS TESTED)	LESS THAN $0.6 MILLION

-- IF FACILITY WERE CLOSED --

COSTS FOR AT SEA TESTING (10 ITEMS REQUIRING TESTING PRIOR TO USE)	MORE THAN $5 MILLION
EQUIPMENT AND PROGRAMS PUT AT RISK BY NOT TESTING (14 ITEMS NOT TESTED PRIOR TO DEPLOYMENT)	$200 MILLION PLUS ($50M FOR ONE SYSTEM ALONE)

COST AND RISK TO THE NAVY

IF

DEEP OCEAN PRESSURE SIMULATION FACILITY

IS CLOSED

The added cost or risk to a program or system if testing in the Deep Ocean Pressure Simulation Facility were not available is a very difficult commodity to measure. The following sampling of tests performed in the facility are presented to demonstrate the typical financial benefit to the Navy achieved through testing in the facility over the alternatives:

SSN 21 SEAWOLF Secondary Propulsion Unit - The secondary propulsion unit is a 350 horsepower electric outboard motor for limp home propulsion capability on submarines. This unit required a large pressure vessel with sufficient cooling capacity to remove the heat generated during the test so that conditions could be maintained for the 500 hour (20 day) test. The only alternative to testing in the facility would be to test at sea using a submarine as the testbed.

Facility Testing	At-Sea Testing
Controlled Environment	Equipment at Risk
Cost - $130K	Submarine Availability
	Cost - $1.3 Million

Fixed Distributed Undersea Surveillance System - This is a fiber optic undersea surveillance system utillizing as many as 50 repeaters and 50 cluster units for each installation. Each unit has a value of approximately $500K. The size of these units, the bend radius of the fiber optic cables and the required hydrostatic pressure dictated that the large A-Tank pressure vessel be used. The only alternative to testing in this facility would be to do smaller component testing inplace of full size unit testing.

Facility Testing	No Facility
Full Size Unit Testing	Component testing only
Cost - $140K	$50 Million Program at Risk

Remotely Operated Undersea Work Vehicles - The Supervisor of Salvage maintains a fleet of undersea remotely operated work vehicles to support the Navy's world wide interests in subsea search and recovery. Testing of these sophisticated systems saves money and improves system and project performance by insuring that the work system will perform as expected once mobilized on a ship at the work site. The only other alternative to testing in the facility would be to test these systems at sea. Ships are expensive and availability of Navy ships for these purposes are being reduced through downsizing.

<u>Facility Testing</u>	<u>At-Sea Testing</u>
Controlled Environment	Equipment at Risk
Cost - $30K	Additional cost per vehicle:
	Navy Ship - $250K
	Commercial ship - $450

TABLE OF TESTS REQUIRING THE SPECIAL CAPABILITIES OF THE LARGE A-TANK PRESSURE VESSEL AT ANNAPOLIS INCLUDING IMPACT TO PROGRAMS IF FACILITY IS CLOSED			
DATE	TEST	SPONSOR	IMPACT TO PROGRAM
4-90	CURV (size and pressure required A tank)	Oceaneering	Increased Cost - Component Testing Only - No Full Scale System test.
6-90 Thru 7-90	Noise Test (test required a quiet vessel)	NSWC Carderock	Reduced quality of Test - No Other Facility as Quiet
11-90	ATV Cable (size and pressure required A tank)	NRaD	Increased Cost - At Sea Testing
11-90	Rubber Panels (size requirement and required quiet tank)	NSWC Carderock	Reduced quality of Test - No Other Facility as Quiet
10-91	AT&T/ SPAWAR - Special Test (size and pressure required A tank)	U.S. Navy	No Full Scale Component testing - $50 Million System at Risk
10-91	Fiber Optic Cable (size and pressure required A tank)	AT&T Bell Labs	Increased Cost - At Sea Testing
11-92	Fiber Optic Cable (size and pressure required A tank)	AT&T Bell Labs	Increased Cost - At Sea Testing
11-92	Westinghouse Ceramic (size, orientation, and pressure required A tank)	Westinghouse	Increased Cost - At Sea Testing
11-92	SSN-21 Secondary Propulsion Unit (size and orientation required A tank)	Westinghouse	At Sea Testing - Cost Increase Estimated at $1 Million
1-93	Fiber Optic Cable (size and pressure required A tank)	Simplex	Cost Increase - At Sea Testing
4-93	NCEL Plow Test (orientation required A tank)	NCEL	Cost Increase - At Sea Testing

Table Continued Page 2			
DATE	TEST	SPONSOR	IMPACT TO PROGRAM
4-93	SSN-21 Secondary Propulsion Unit (orientation required A tank)	Westinghouse	At Sea Testing - Cost Increase Estimated at $1 Million
5-93	DSV Sea Cliff Electrical Distribution (size required A tank, manned submersible components)	Lockheed	Cost Increase - At Sea Testing - Manned Submersible at Risk
6-93	Fiber Optic Cable (size and pressure required A tank)	AT&T Bell Labs	Increased Cost - At Sea Testing
8-93	ISMS System (orientation required A tank)	NSWC, Code 19	Increased Cost - At Sea Testing
9-93	AT&T/ SPAWAR (test pressure required A tank)	US Navy	At Sea Testing - Cost Increase Estimated at $1 Million
9-93	ISMS System (orientation required A tank)	NSWC, Code 19	Increased Cost - At Sea Testing
10-93	Ceramic Vessel Technology (size and pressure required A tank)	Westinghouse	Increased Cost - At Sea Testing
1-94	Fiber Optic Cable (size and pressure required A tank)	Rochester Cable	Increased Cost - At Sea Testing
5-94	Fiber Optic Cable (size and pressure required A tank)	Rochester Cable	Increased Cost - At Sea Testing
6-94	Fiber Optic Cable (size and pressure required A tank)	AT&T Bell Labs	Increased Cost - At Sea Testing
7-94	Holding Tank (test pressure required A tank)	Westinghouse	Increased Cost - At Sea Testing
1-95	DSV Sea Cliff Manipulators (size required A tank, manned submersible components)	U.S. Navy	At Sea Testing Not Effective - Manned Submersible at Risk
3-95	ORION & ORION ROV (size and pressure required A tank)	U.S. Navy	Increased Cost - At Sea Testing

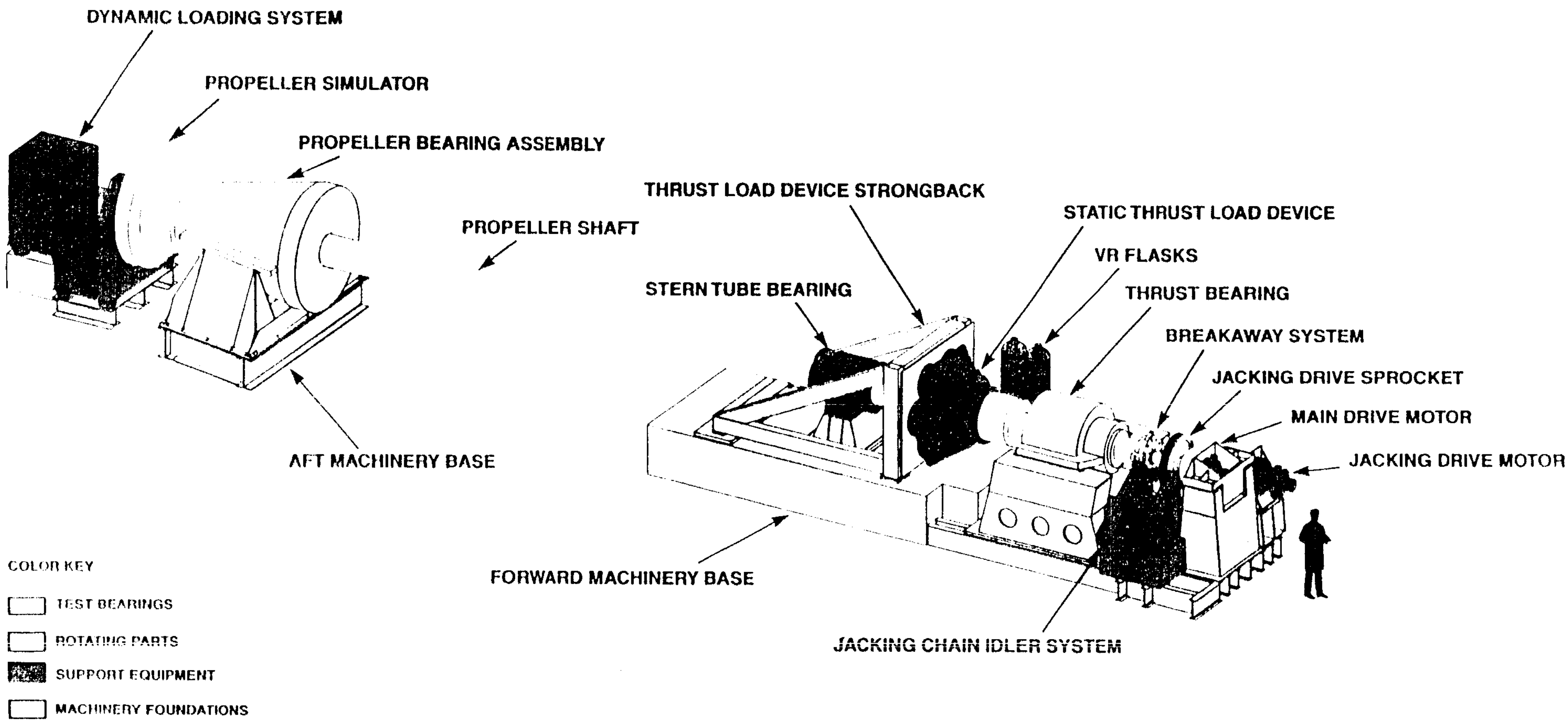
Table Continued Page3			
Future Dates of Scheduled Test			
DATE	TEST	SPONSOR	IMPACT TO PROGRAM
95	DSRV III Pressure Hull (Size requires A-tank, Manned Submersible Support)	U.S. Navy	Increased Cost
96	SSN-21 Secondary Propulsion Unit (orientation required A tank) -Three separate Tests-	Westinghouse	At Sea Testing - Cost Increase Estimated at $1 Million
96 & 97	Spicial Test Program (Size and Pressure requires Atank) -Several Separate Tests-	Westinghouse	Increased Cost - At Sea Testing

DEEP OCEAN PRESSURE SIMULATION FACILITY

CUSTOMER CONTACT LIST

CUSTOMER	POC	PHONE
NAVSEA - OOC US Navy Undersea Vehicles	Tom Salmon	703-607-2758
NAVSEA PMS 395 US Navy Undersea Vehicles	Steve Walsh	703-602-6636
Westinghouse,Cheswic, PA SSN 21 Secondary Propulsion	Bob Dickinson	412-963-5124
Westinghouse, Annapolis, MD Classified Test	Ed Greenspan	410-260-5107
Oceaneering Technology Comercial Deep Sea work	Craig Mullen	301-249-3300

SHAFTLINE COMPONENT DEVELOPMENT FACILITY



CARDEROCK DIVISION
NAVAL SURFACE WARFARE CENTER
ANNAPOLIS DETACHMENT

NSWC
Naval Surface Warfare Center
CARDEROCK DIVISION
ANNAPOLIS DETACHMENT

SHAFTLINE COMPONENT DEVELOPMENT FACILITY

OBJECTIVE

DEVELOPMENT AND QUALIFICATION TESTING

OF SUBMARINE PROPELLER SHAFTLINE COMPONENTS

NSWC
Naval Surface Warfare Center
CARDEROCK DIVISION
ANNAPOLIS DETACHMENT

SHAFTLINE COMPONENT DEVELOPMENT FACILITY

APPROACH

DUPLICATE ATTACK SUBMARINE DRIVE TRAIN FROM THRUST BEARING TO PROPELLER LOCATION

UTILIZE MASSIVE FLOOR TO ACOUSTICALLY ISOLATE COMPONENTS FROM EACH OTHER

SIMULATE CONSTANT AND VIBRATIONAL LOADS USING EXTERNAL DEVICES

NSWC
Naval Surface Warfare Center
CARDEROCK DIVISION
ANNAPOLIS DETACHMENT

SHAFTLINE COMPONENT DEVELOPMENT FACILITY

BACKGROUND

SUBMARINES HAVE ONE MAIN PROPULSION SHAFT

COMPONENTS AND SYSTEMS ALONG THE SHAFT MUST BE HIGHLY RELIABLE FOR SHIP AND CREW SAFETY

LAND BASED DEVELOPMENT AND QUALIFICATION REQUIRED TO OVERSTRESS NEW COMPONENTS WITHOUT EXPOSING CREW TO HIGH RISK

NSWC
Naval Surface Warfare Center
CARDEROCK DIVISION
ANNAPOLIS DETACHMENT

SHAFTLINE COMPONENT DEVELOPMENT FACILITY

CDNSWC ANNAPOLIS CONTRIBUTION

TECHNICAL TEAM EXPERIENCED IN ALL VITAL AREAS

- THRUST BEARING QUALIFICATION
- THRUST BEARING COMPONENT DEVELOPMENT
- MACHINERY VIBRATION
- VIBRATION REDUCER DEVELOPMENT
- SHAFT AND COUPLING DESIGN
- WATERBORNE BEARING DEVELOPMENT
- ACOUSTIC DESIGN OF FACILITIES

COST EFFECTIVE SOLUTION VERSUS HAVING THE FACILITY CONSTRUCTED AT A VENDOR'S SITE

NSWC
Naval Surface Warfare Center
CARDEROCK DIVISION
ANNAPOLIS DETACHMENT

SHAFTLINE COMPONENT
DEVELOPMENT FACILITY

PAYOFF

SYSTEM DESIGN IS REFINED WITHOUT ENDANGERING SHIP OR CREW

NAVY OBTAINS INDEPENDENT VERIFICATION OF VENDOR PERFORMANCE

FACILITY REMAINS AS NAVY ASSET FOR FUTURE USE

NAVY COMPOSITE PROPULSION SHAFTING PROGRAM

OBJECTIVE

DEVELOP THE TECHNOLOGY BASE REQUIRED TO DESIGN, MANUFACTURE, AND QUALIFY ADVANCED COMPOSITE PROPULSION SHAFTING FOR SURFACE SHIPS AND SUBMARINES

BENEFITS

ADVANCED COMPOSITES OFFER THE POTENTIAL TO IMPROVE NAVY PROPULSION SHAFTING BY

- REDUCING GENERAL AND GALVANIC CORROSION EFFECTS
- INCREASING PAYLOAD AND STABILITY DUE TO SIGNIFICANT WEIGHT SAVINGS
- INCREASING ALLOWABLE FATIGUE STRESSES IN THE SEA WATER ENVIRONMENT
- OPTIMIZING SHIP SHAFT-LINE DESIGN PARAMETERS BY TAILORING COMPOSITE PROPERTIES TO MEET PERFORMANCE REQUIREMENTS
- DECREASING U.S. RELIANCE ON STRATEGIC MATERIALS
- REDUCING SHIP SIGNATURES THUS DETECTABILITY
- REDUCING ACQUISITION AND LIFE CYCLE COSTS
- IMPROVING AVAILABILITY THROUGH AUTOMATION AND STANDARDIZATION

APPROACH

CHARACTERIZE MATERIAL PROPERTIES, EVALUATE THE PERFORMANCE LIMITS, AND VERIFY THE DESIGN OF ANALYTICALLY-OPTIMIZED COMPOSITE LAMINATES, TITANIUM EXTRUSIONS, AND JOINING SYSTEMS VIA SMALL-SCALE LABORATORY INVESTIGATIONS, FULL-SCALE LAND-BASED TESTING, AND AT-SEA DEMONSTRATIONS.

NAVY COMPOSITE PROPULSION SHAFTING PROGRAM

CDNSWC DET. ANNAPOLIS CONTRIBUTIONS:

- CDNSWC ORIGINATED THE NAVY'S COMPOSITE PROPULSION SHAFT PROGRAM AND ANNAPOLIS DETACHMENT ENGINEERS DEVELOPED PATENT RIGHTS ON LAMINATED SHAFT CONSTRUCTION FOR THE NAVY (NOTICE OF ALLOWABILITY GRANTED 8/14/93).

- ANNAPOLIS DETACHMENT PERSONNEL HAVE DESIGNED, SPECIFIED, FABRICATED AND EVALUATED THE FOLLOWING COMPOSITE PROPULSION SHAFT SYSTEMS FOR THE NAVY:

  - 335 HP, 900 RPM, 2 1/2" DIA. COMPOSITE PROPULSION SHAFT 26 FOOT LONG
  - 275 HP, 900 RPM, 2 1/2" DIA. COMPOSITE PROPULSION SHAFT 23 FOOT LONG
  - 50,000 HP, 150 RPM, 33" DIA. COMPOSITE PROPULSION SHAFT 11 FOOT LONG

- THE CURRENT COMPOSITE PROPULSION SHAFT PROGRAM IS A MULTI MILLION DOLLAR PER YEAR (DOD INVESTMENT) ~~PROGRAM~~ AND THE NAVY IS DEPENDING UPON THE ANNAPOLIS DETACHMENT TO:

  - DESIGN, FABRICATE, & OPERATE UNIQUE FACILITIES TO CONDUCT MECHANICAL EVALUATIONS
  - DEVELOP MECHANICAL PROPERTY DATABASE FOR THE COMPOSITE SHAFT MATERIAL SYSTEM "BASE LAMINATE".
  - DEFINE TECHNICAL PROBLEMS, DEVELOP SOLUTIONS, AND IMPLEMENT INVESTIGATIONS TO RESOLVE MARINE TECHNICAL ISSUES RELATED TO THE COMPOSITE PROPULSION SHAFT PROGRAM.

- IN 1995 THE ANNAPOLIS DETACHMENT WILL INITIATE AN EXTENSIVE YEAR LONG EVALUATION OF A COMPOSITE/TITANIUM JOINT DESIGN. THE RESULTS WILL HELP VALIDATE ANALYTICAL MODELS GENERATED BY THE DESIGN AGENT. THE FULL-SCALE JOINT DESIGN IS BASED ON PREVIOUS DEVELOPMENTS AT THE ANNAPOLIS DETACHMENT WITH SMALL-SCALE MODELS.

- IN 1997 THE ANNAPOLIS DETACHMENT WILL INITIATE A TWO YEAR EVALUATION OF A 60 FOOT LONG, FULL-SCALE COMPOSITE PROPULSION SHAFT IN A LAND BASED TEST FACILITY (LBTF) PRIOR TO SHIPBOARD INSTALLATION SCHEDULED IN 1999.

COMMERCIAL/MARINE STANDARD FAMILY OF COMPOSITE PUMPS

FLEET PROBLEMS

Proliferation of 7.588 different pump configuration created serious problems in: supply, support. technical documentation, training, and maintenance

High shipboard **Failure Rates** caused by corrosion, erosion, galvanic imcompatibility, and pitting under stagnant conditions

SOLUTIONS

Standardize a family of close-coupled, centrifugal pumps that will maximize the commonality of parts between pumps and facilitate the dual use of standard commercial or militarized motors as service conditions demand

Construct the standard pumps of **Advanced Composite Materials** that eliminate corrosion and galvanic effects while reducing weight, cost, and magnetic signatures

PAYOFFS

Affordabilty through:

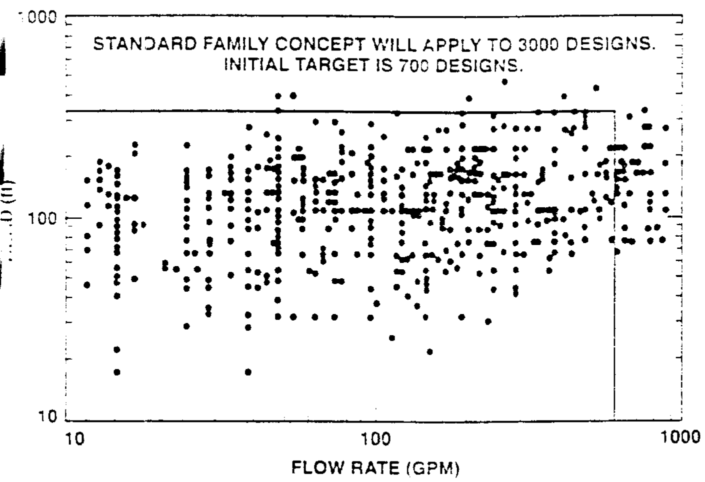
- One basic Navy owned design for all pumps in the standard family
- Maximum interchangeability of components between pump sizes
- Minimum number of family components
- Improved pump performance/reliability
- Maintenance savings
- Improved logistics support
- Stopping the proliferation of APLs and NSNs

"We absolutely cannot afford to continue to introduce large numbers of unique components into the Navy or the commercial sector. The infrastructure cost will kill us."

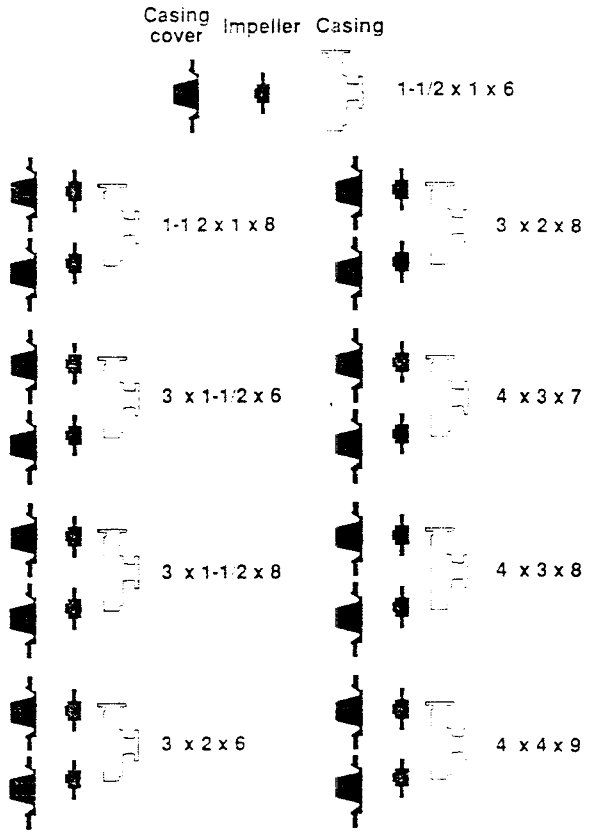
Vice Admiral Kenneth Malley, USN
1992 ASNE Day Presidents Club
Luncheon Address

SURFACE COMBATANT CENTRIFUGAL PUMP DISTRIBUTION

All Major Services



STANDARD FAMILY COMPOSITE CENTRIFUGAL PUMPS



Family of 9 Sizes Replaces 700 Designs

END RESULT:

- $1.7M annual savings in logistic support
- $8.0M annual savings on acquisition cost

"We absolutely cannot afford to continue to introduce large numbers of unique components into the Navy or the commercial sector. The infrastructure cost will kill us."

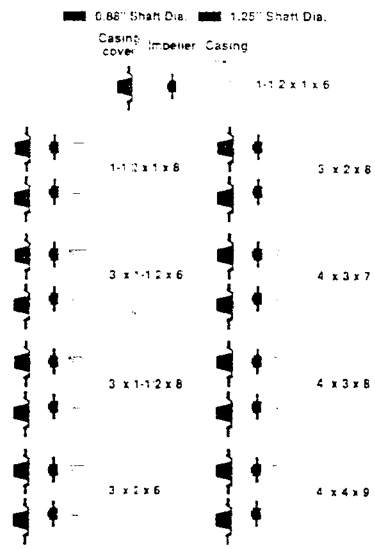
Vice Admiral Kenneth Malley, USN
1992 ASNE Day Presidents Club
Luncheon Address

FAMILY COMPONENTS

Casings	9
Impellers	17
Casing Covers	17
Motor Support Castings	5
Motor Support Machinings	15
Impeller Nuts	2
Impeller Studs	2
Shaft Sleeves	2
Box Bushings	2
Drain/Vent Plug	1
Casing Rings	8
Wear Rings	2
Mechanical Seals	2

79 Replacement Parts Vice Current Inventory 11,152

STANDARD FAMILY COMPOSITE CENTRIFUGAL PUMPS



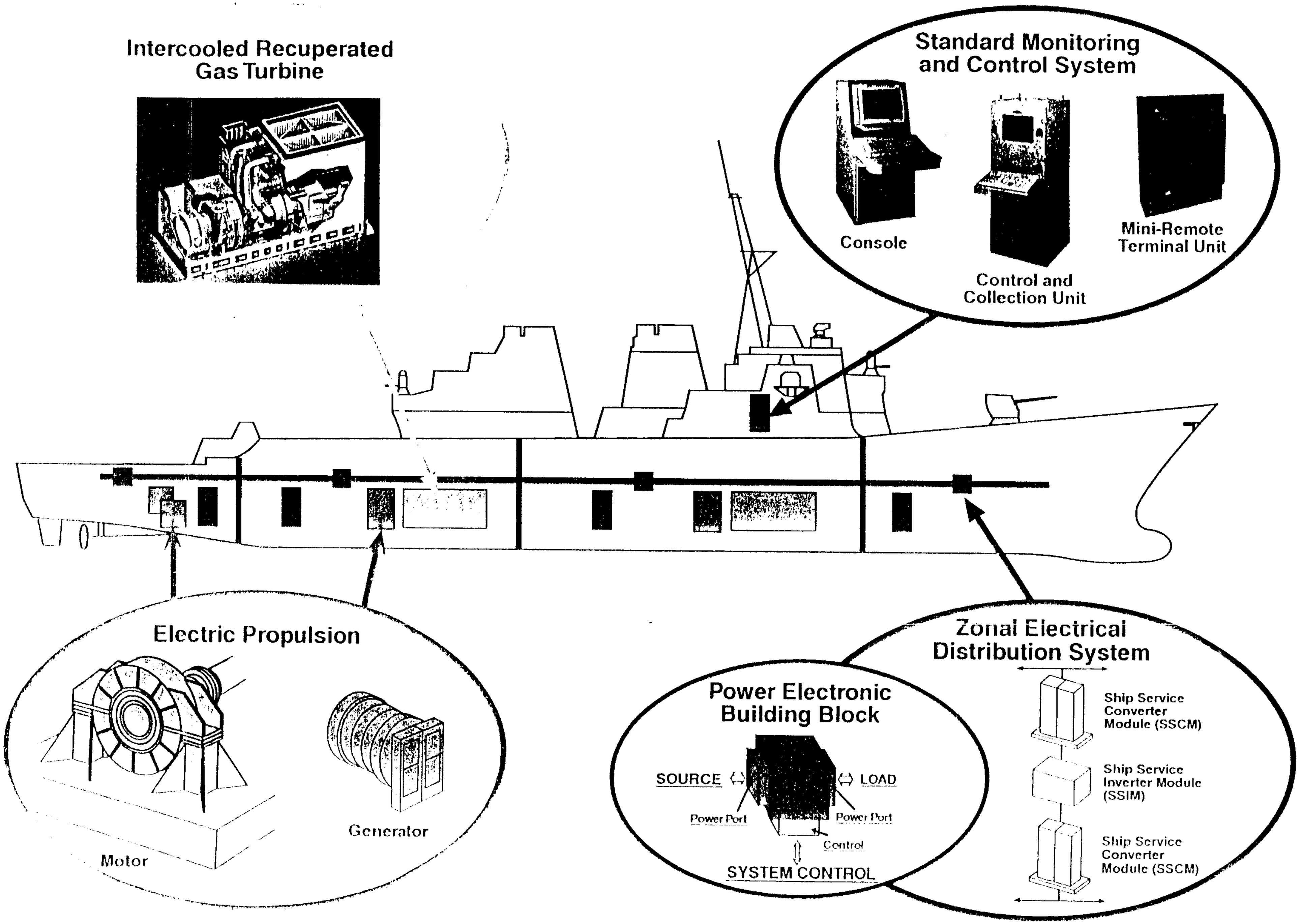
CDNSWC DET., ANNAPOLIS CONTRIBUTIONS

The Annapolis Detachment has served as the Navy's chosen technical agent in the development of the family of composite material pumps. Taking advantage of the expertise in machinery, materials, testing, and analytical methods located in Annapolis, the Detachment has been an independent, and unbiased resource for the Navy which has:

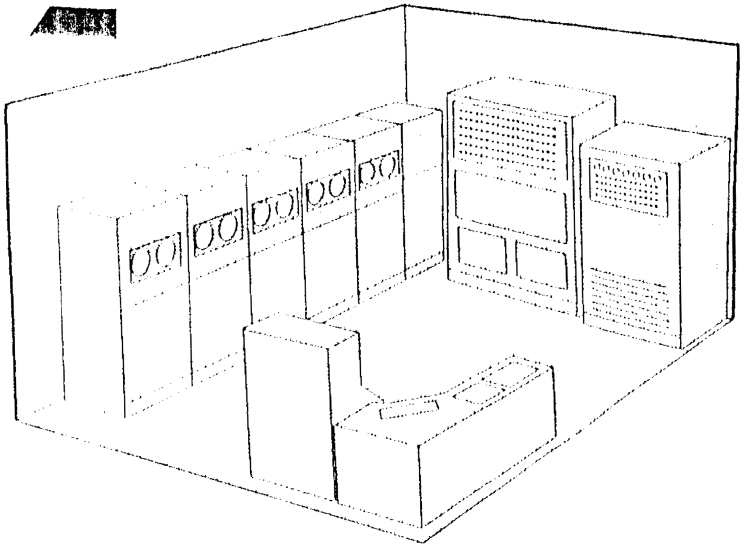
- Defined the problems and solutions related to centrifugal pumps through surveys of shipboard and composite pumps
- Evaluated commercial composite pumps to quantify their performance as related to Navy requirements
- Developed the specifications and requirements for a composite pump design that meets Navy needs and is suitable for use in the commercial market
- Awarded and administered a contract with a major pump manufacturer for the design of the standard pump family, and the manufacture and test of prototype pumps

Current plans call for the Detachment to continue in it's roll in administering the contract for the development of the Commercial/Marine Standard Family Composite Pumps through completion of the contract in FY 96. Additionally the Detachment is to serve as the Test Director for the Technical Evaluation of the prototype pumps and will prepare the final report for this effort.

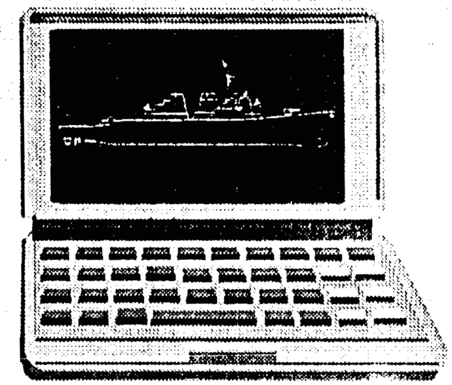
ADVANCED SURFACE MACHINERY PROGRAMS



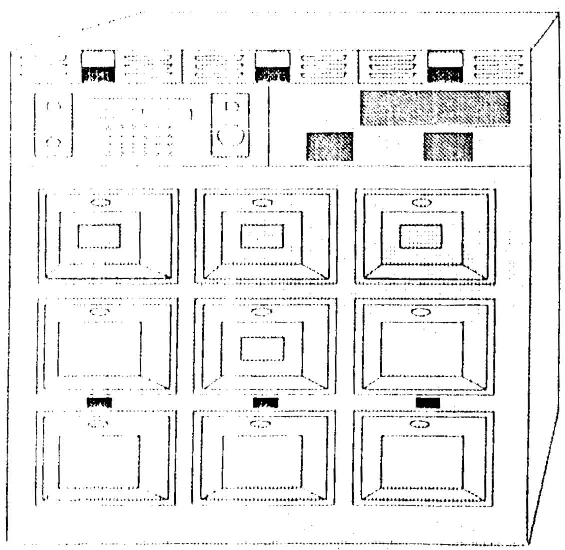
The "First Electronic Revolution"



- Transistors
- Integrated Circuits
- The Information Age



The "Second Electronic Revolution"



- *MOS Controlled Thyristor*
- *Power Electronic Building Blocks*
- *The Electric Age*

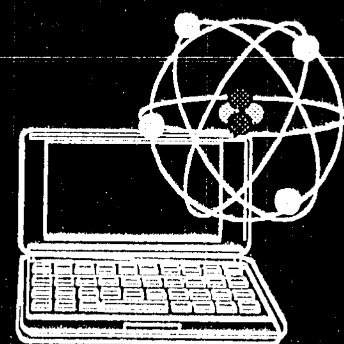
PEBB

PEBB

In forty years the combined improvement in computers equals 30 orders of magnitude
(based on size, mass storage, reliability, cost, power consumption and processing speed).

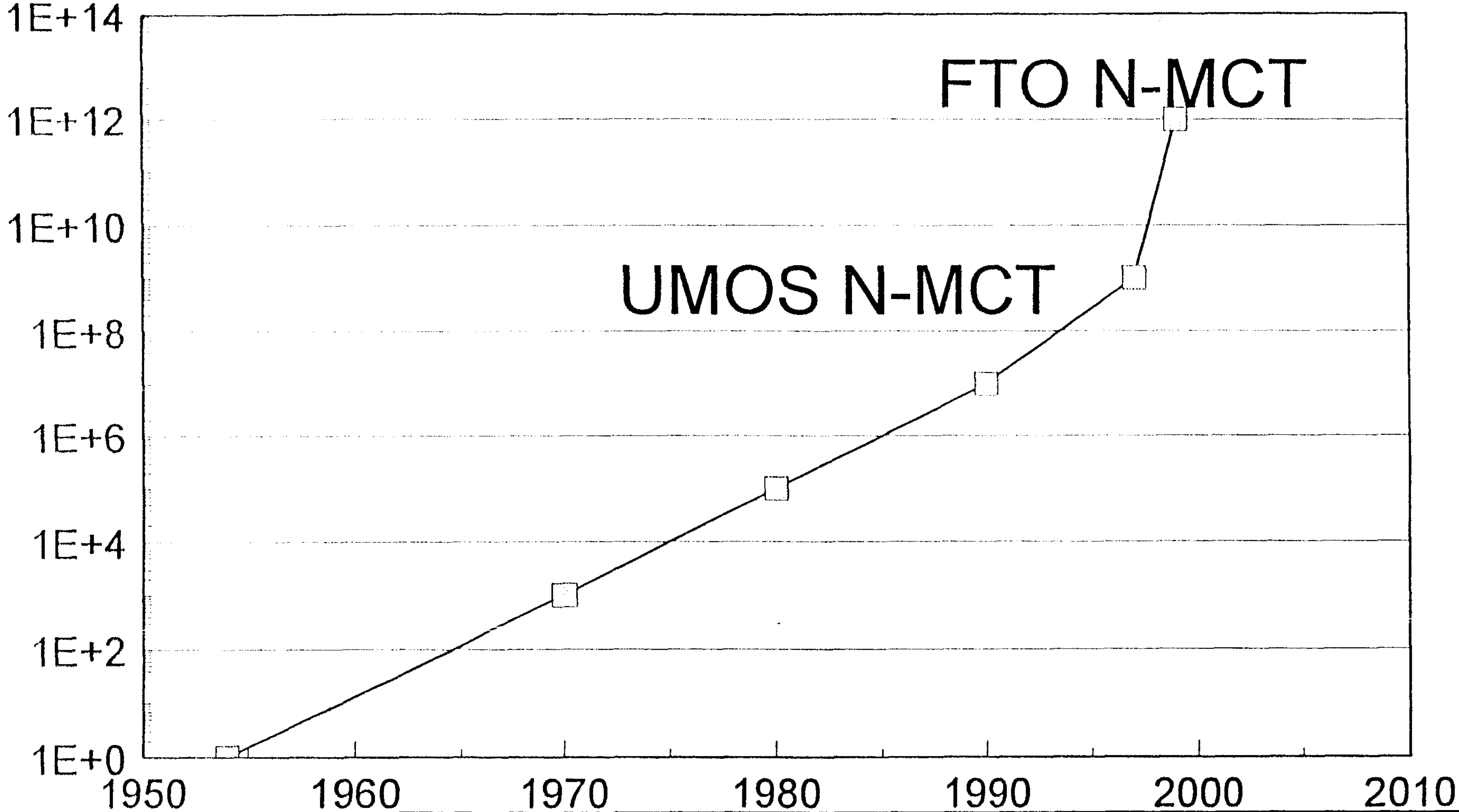
The Milky Way galaxy diameter is about [illegible] orders of magnitude greater than that of an atom...

Davi[illegible]
The Virtual Corporation



Power Semiconductor Device Improvement

(current density, voltage, speed, reliability, and cost)



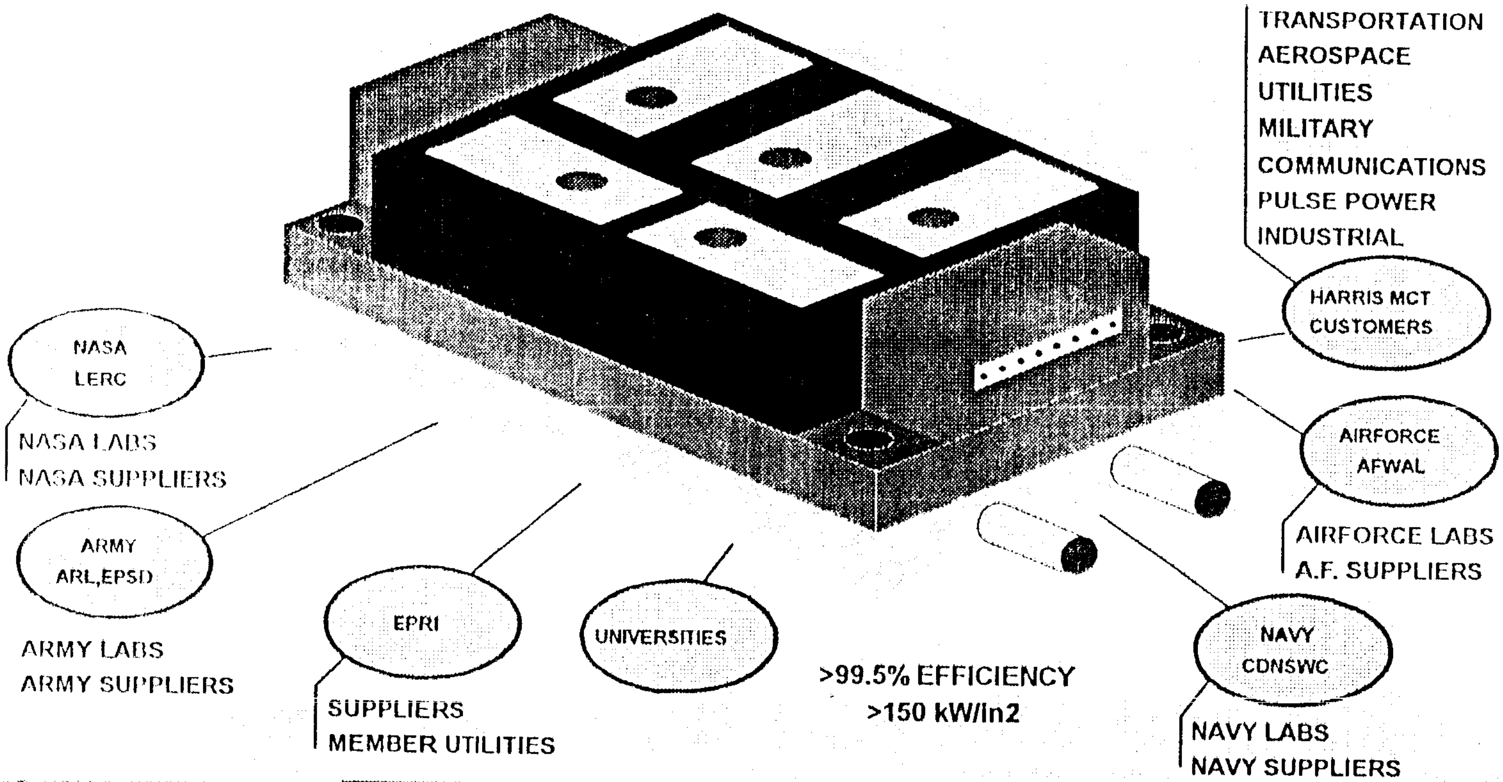
7 orders of magnitude over the last 40 years

5 orders of magnitude over the next 5 years

Market

- Market Size
  - Power Semiconductors $3B/year
  - System Application $300B/year
  - System Application (2000) $1T/year
- Market Share
  - Japan 45% (rising)
  - US 10% (falling)
- PEBB market = $0.3-1T of the Year 2000 System Market

PEBBs ARE A NEW UNIT OF MANUFACTURE



TECHNOLOGY INSERTION

DEVICES, DRIVERS AND PEBB'S FOR TEST AND FOR CONCURRENT BETA SITE ACCELERATED TECHNOLOGY INSERTION PROGRAM

Material, Device, and Equipment are Merged into a New System Level Component

COMMERCIAL APPLICATIONS OF POWER ELECTRONIC BUILDING BLOCKS

UTILITIES:
- HIGH VOLTAGE DC DISTRIBUTION
- DC/AC POWER CONVERSION
- POWER FACTOR CONTROL ELECTRONICS

INDUSTRIAL:
- INDUCTION MOTOR DRIVES
- AIR CONDITIONING & HEATING
- ELEVATOR DRIVES
- EXCAVATOR DRIVES
- PAPER MILL DRIVES
- COMPUTER POWER SUPPLIES

TRANSPORTATION:
- LOCOMOTIVES
- TRANSIT CARS
- ELECTRIC AUTOS
- GOLF CARTS

AEROSPACE:
- AIRPLANES
- SATELLITES

ALTERNATE ENERGY SOURCES:
- WIND MILLS
- SOLAR PANELS
- FUEL CELL PLANTS

DUAL USE TECHNOLOGY

NAVY PEBB APPLICATIONS

POWER SUPPLIES & AMPLIFIERS:

ADVANCED DC DISTRIBUTION*

INTEGRATED POWER CONVERSION CENTER*

- SONAR, RADAR, COMPUTERS
- OXYGEN GENERATORS
- FREQUENCY CHANGERS
- INVERTERS

VERY HIGH POWER ELECTRONICS:

ELECTRIC DRIVE FOR SHIPS & SUBS*

PROPULSION DERIVED SHIP SERVICE*

- HIGH ENERGY PULSE POWER*
- ELECTROMAGNETIC LAUNCH*

SWITCHGEAR:

- INTEGRATED ELECTRICAL DISTRIBUTION
- INTEGRATED MONITORING & CONTROL

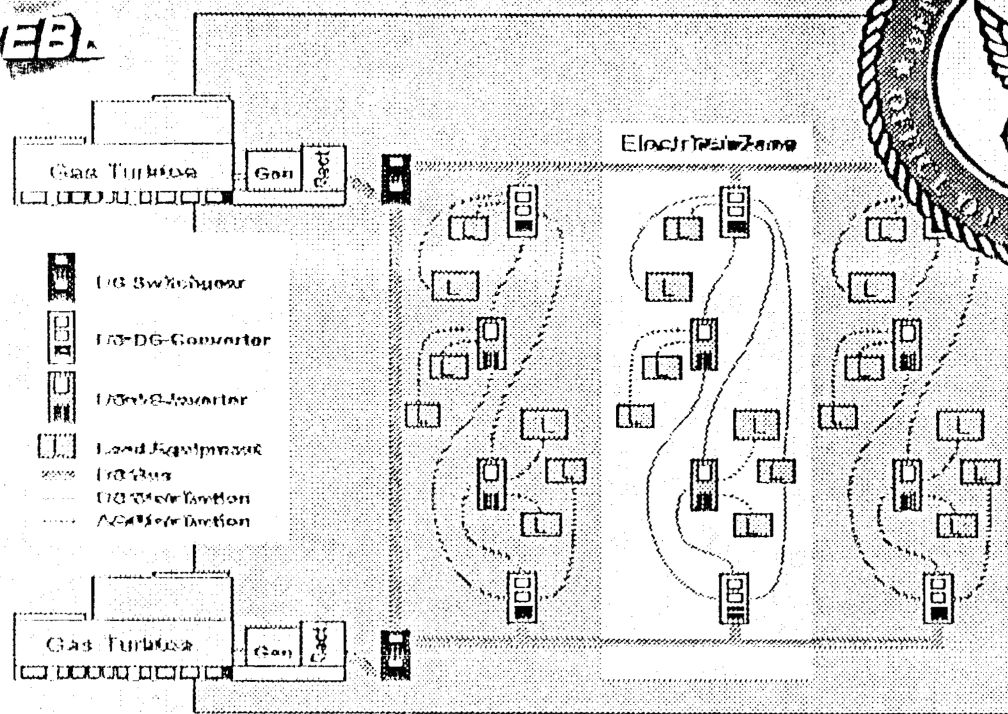
CONTROLLERS & MOTOR DRIVES:

ACTUATORS*

VARIABLE FLOW HYDRAULICS*

- AUXILIARIES -- DISTRIBUTED/ SMART*
- ALL MOTORS -- REDUCED IN-RUSH CURRENT
- AIR CONDITIONING
- TRIM & DRAIN
- SEA WATER & FRESH WATER COOLING
- TORPEDOES
- MAGNETIC BEARINGS

*FUTURE SURFACE SHIP & SUBMARINE APPLICATIONS

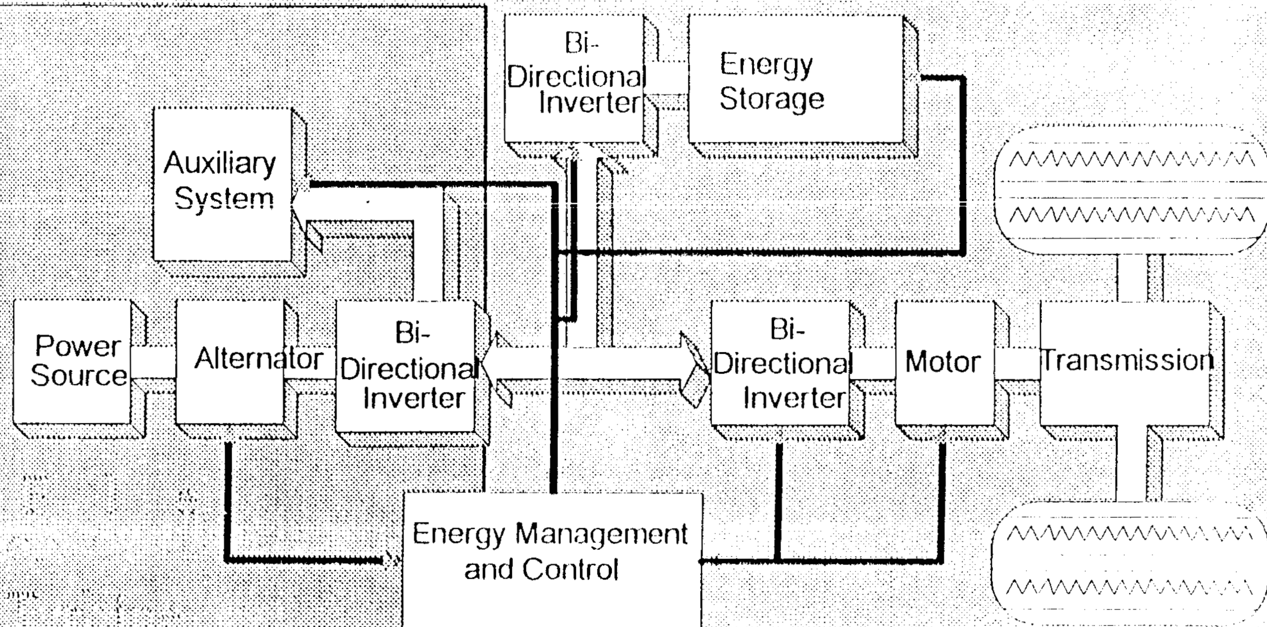


- Advanced Shipboard Machinery
- Integrated Power System
- DC Zonal Electrical Distribution System

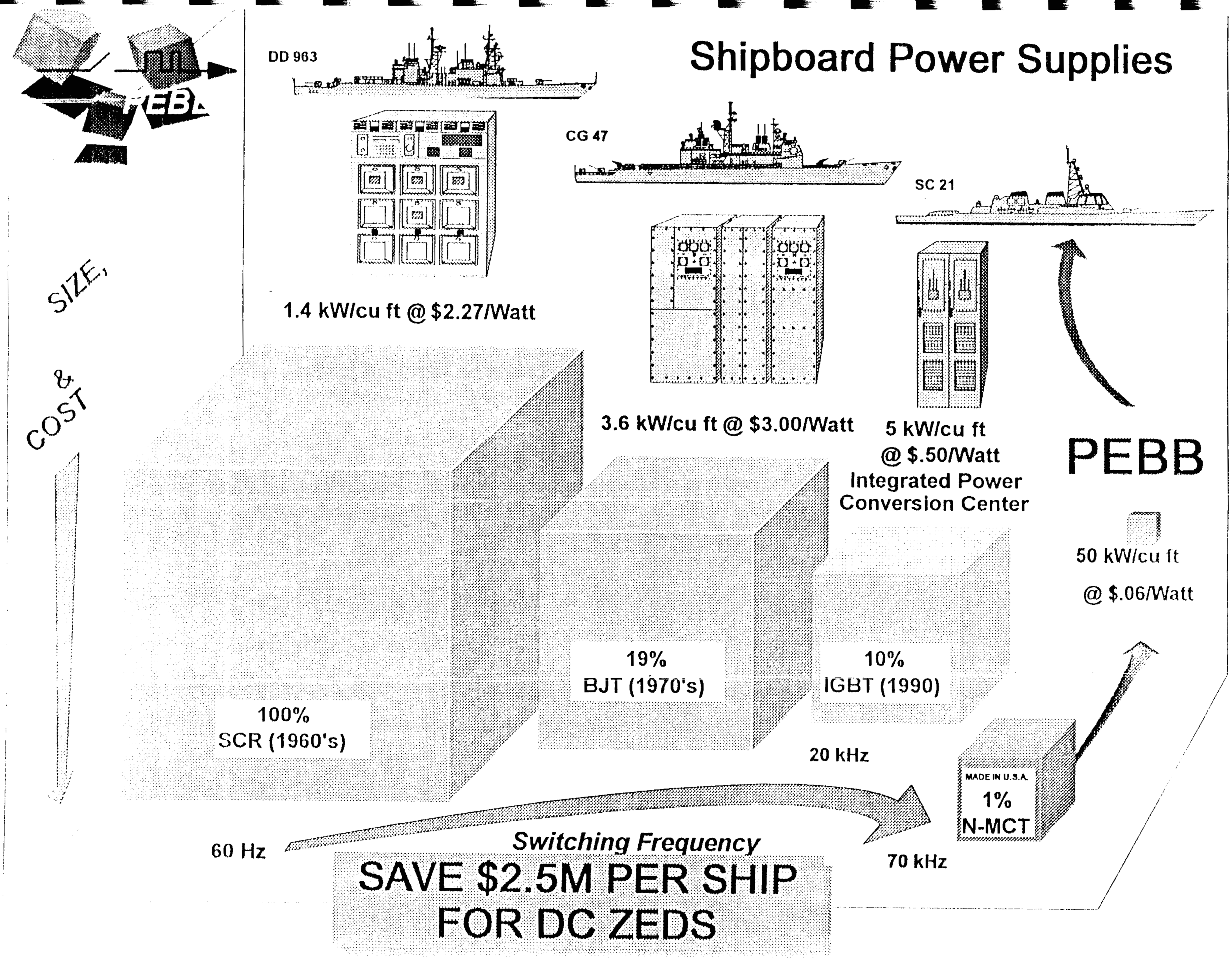
Chip for a New
eration Vehicle -

by Light, Power by
Air Force &

Tank - Army

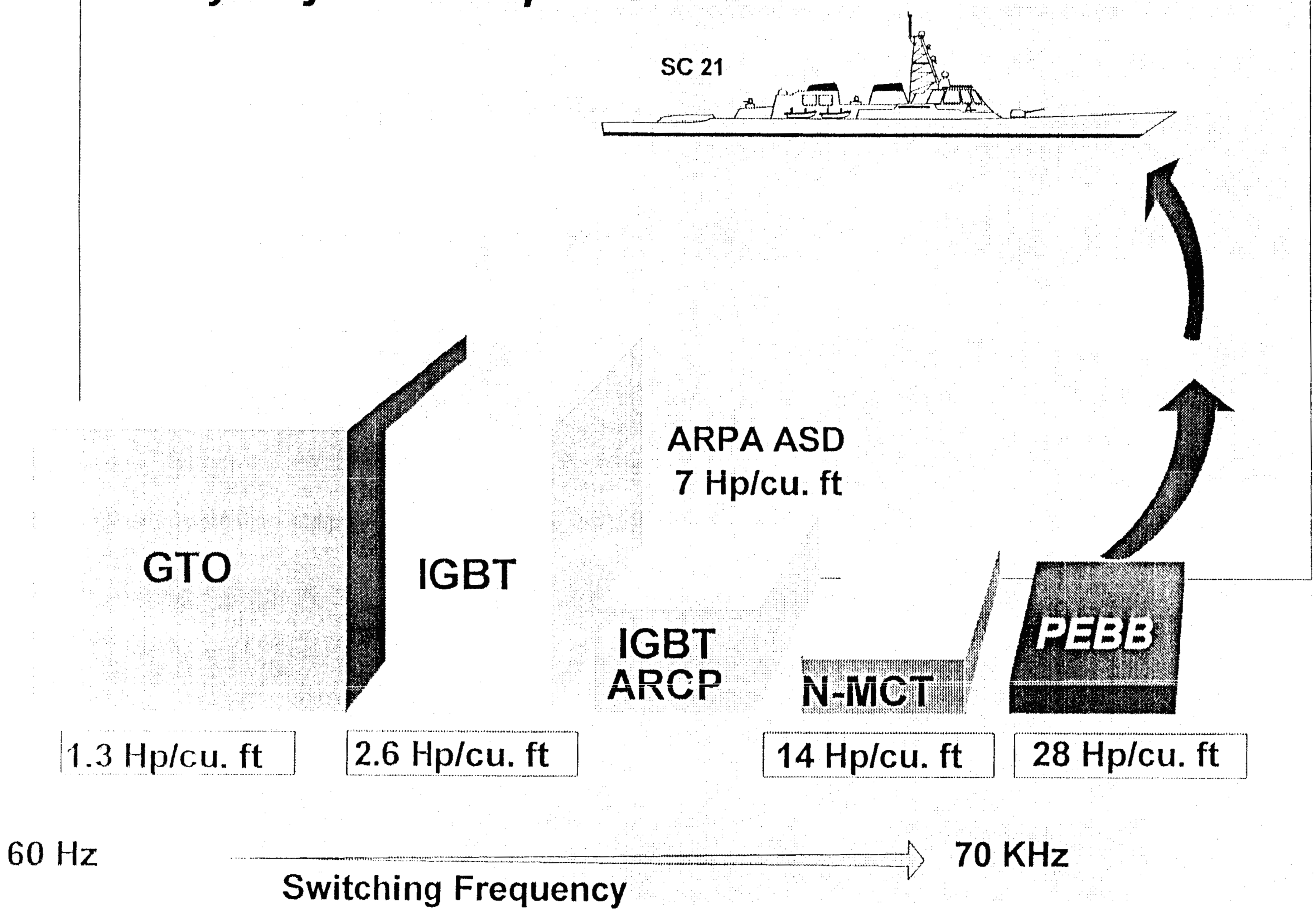


Shipboard Power Supplies



SAVE $2.5M PER SHIP
FOR DC ZEDS

Navy Adjustable Speed Drives



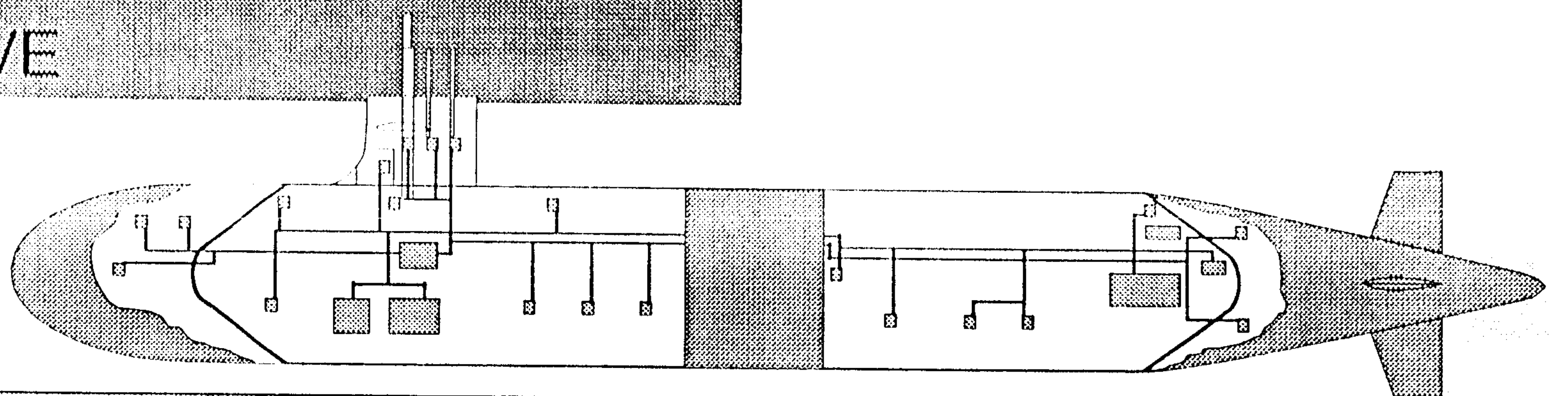
SAVE $2.6M PER SHIP FOR IPS

DISTRIBUTED ACTUATION SYSTEM

PEBB

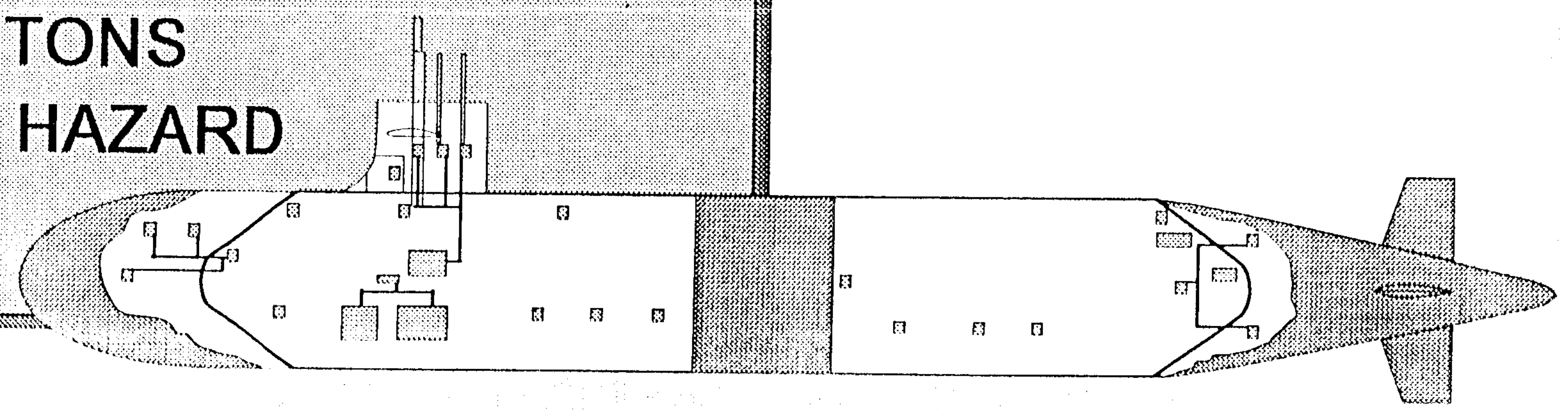
CENTRALIZED HYDRAULIC:

- HEAVY
- EXPENSIVE

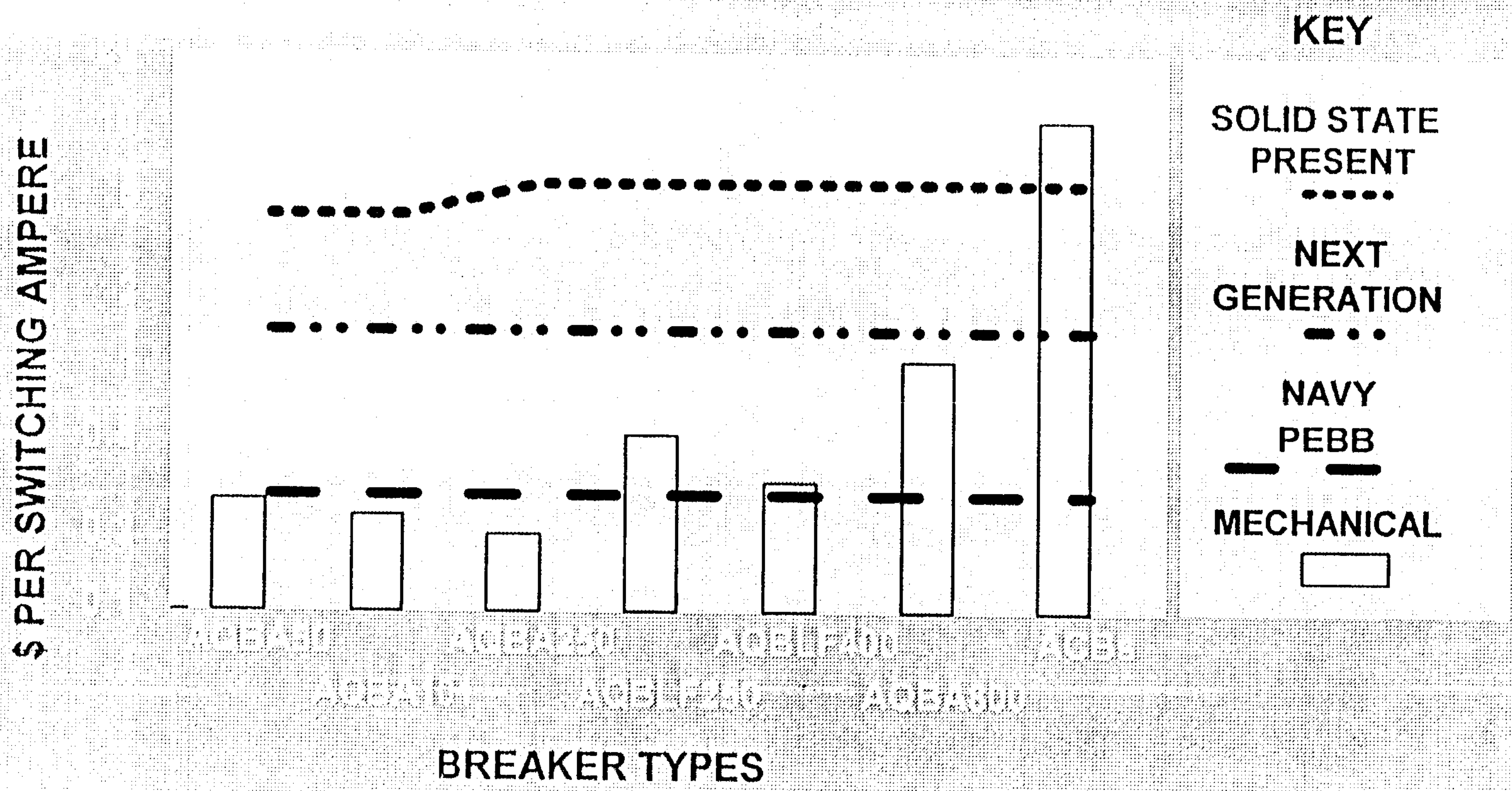


DISTRIBUTED ACTUATION:

- SAVE 70 TONS
- REDUCE HAZARD
- QUIET



PROTECTION DEVICES

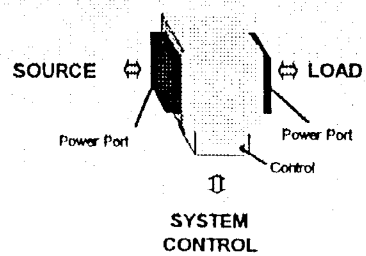


"Second Electronic Revolution"

THE POWER ELECTRONIC BUILDING BLOCK (PEBB)

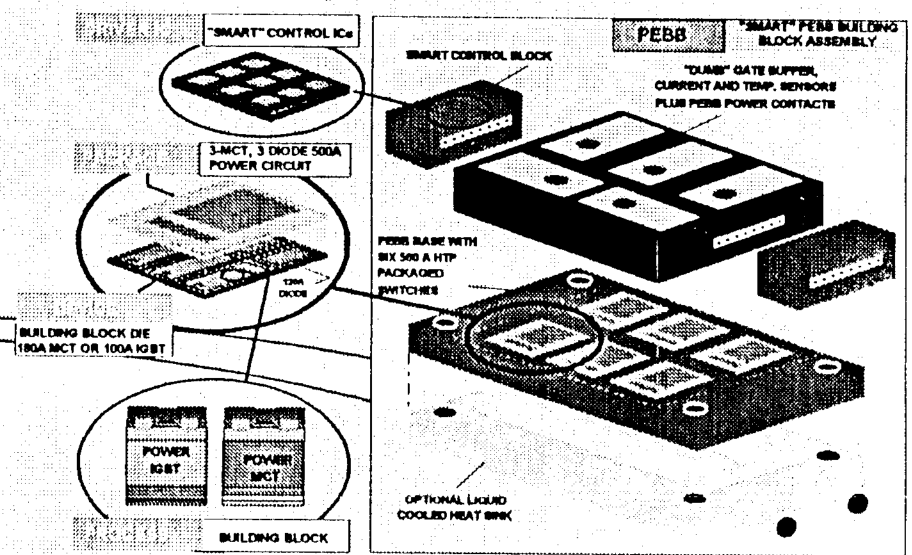
The "IC" of POWER CIRCUITS

- A single package multi-functon controller that:
  - Replaces complex power electronic circuits with a single device
  - Reduces development and design costs for complex power circuits
  - Simplifies development and design of large electric power systems



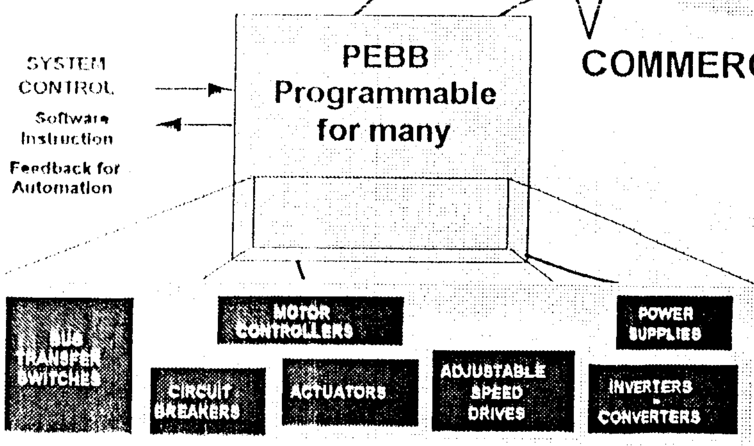
SHIFT POWER ENGINEERING FROM CIRCUIT DESIGN TO SYSTEMS DESIGN

PEBB HARDWARE



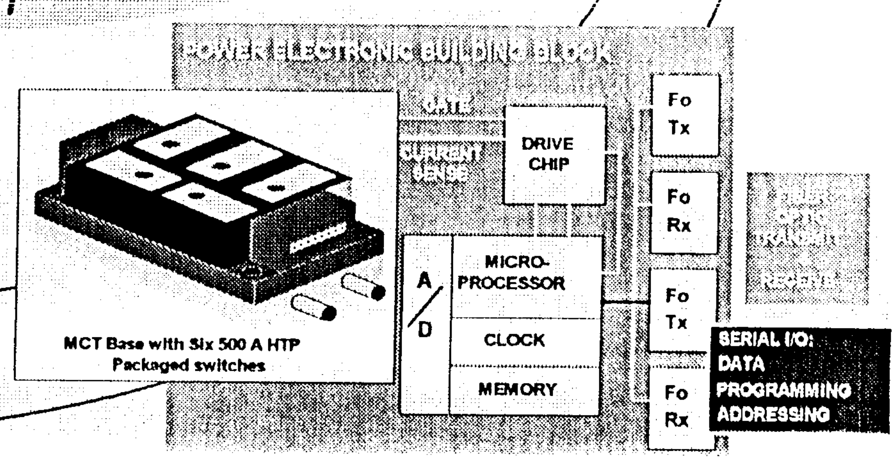
- DIGITALLY CONTROLLED POWER
- FLEXIBLE SYSTEM ARCHITECTURE
- AUTOMATED MANUFACTURE
- LOW COST

PEBB APPLICATIONS & DEVELOPMENT



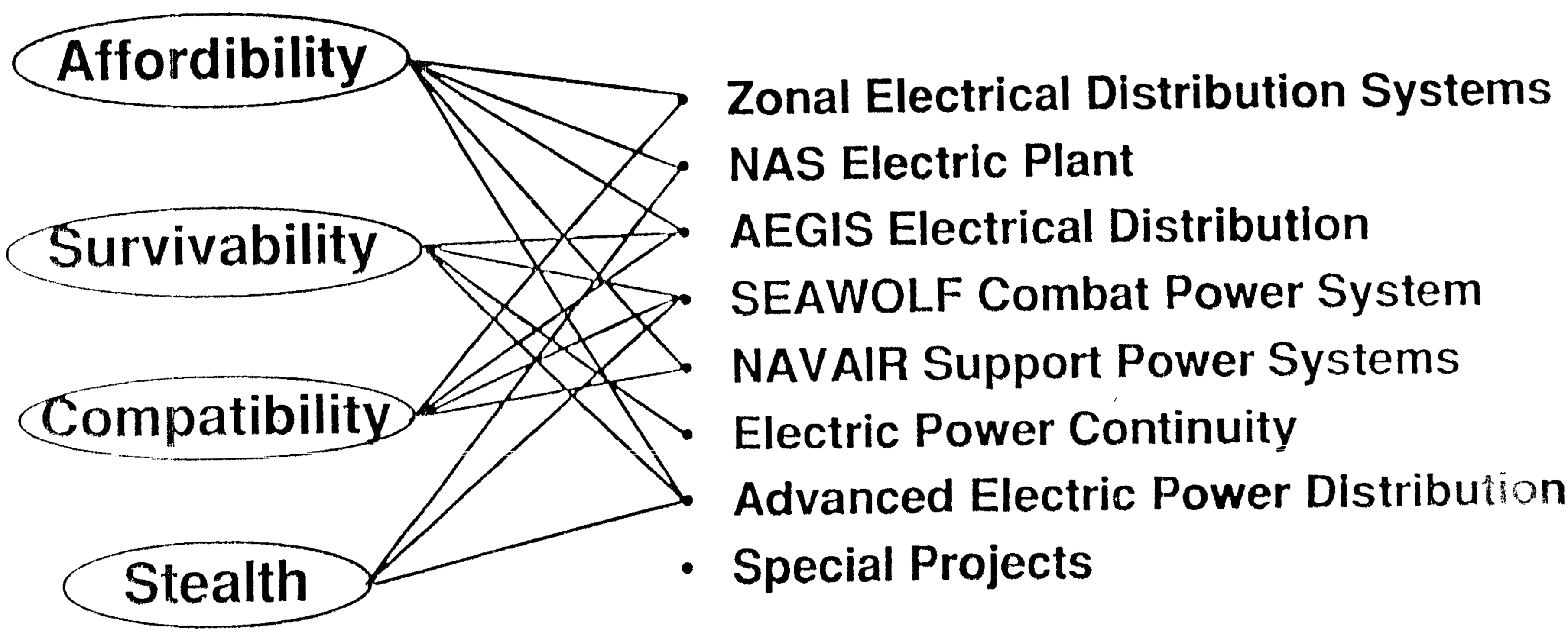
COMMERCIALIZATION

PEBB FUNCTIONS



ELECTRIC POWER DISTRIBUTION R&D

THRUSTS



Networked Facilities "Behind the Scenes"

POWER ROOM (BLDG. 3)

- (2) 500 kW Motor-Generator Sets (DC/60 Hz)

MACHINERY SYSTEMS LABORATORY (BLDG. 100)

- 500 kW Turbine Emulator (DC/60 Hz)
- 100 kW Propulsion Derived Ship Service Generator (60 Hz)

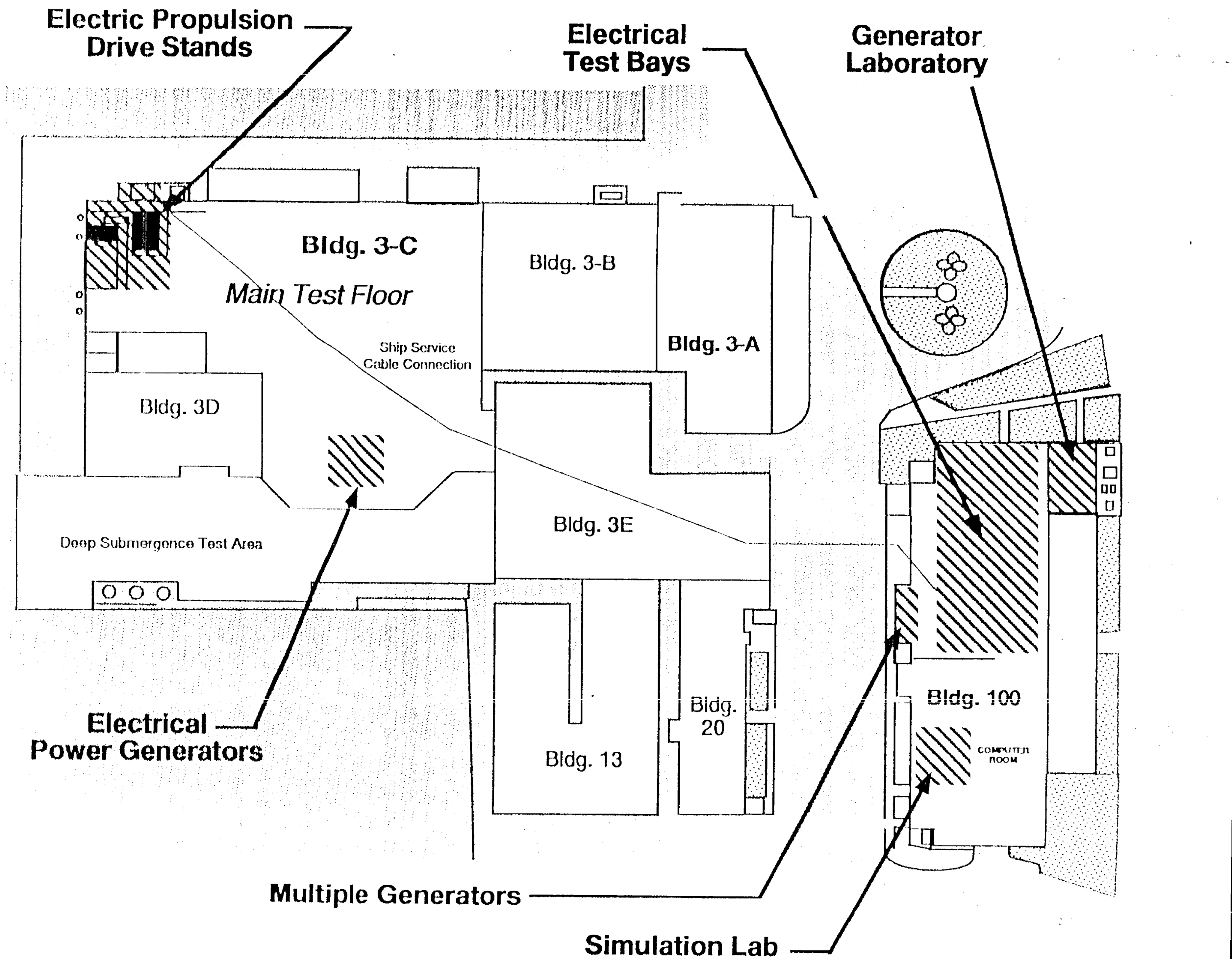
GENERATOR ROOM

- (2) 300 kW Matched Submarine Motor-Generators (DC/60 Hz)
- (3) Various kW Motor-Generator Sets (DC/400 Hz)

TEST FLOOR

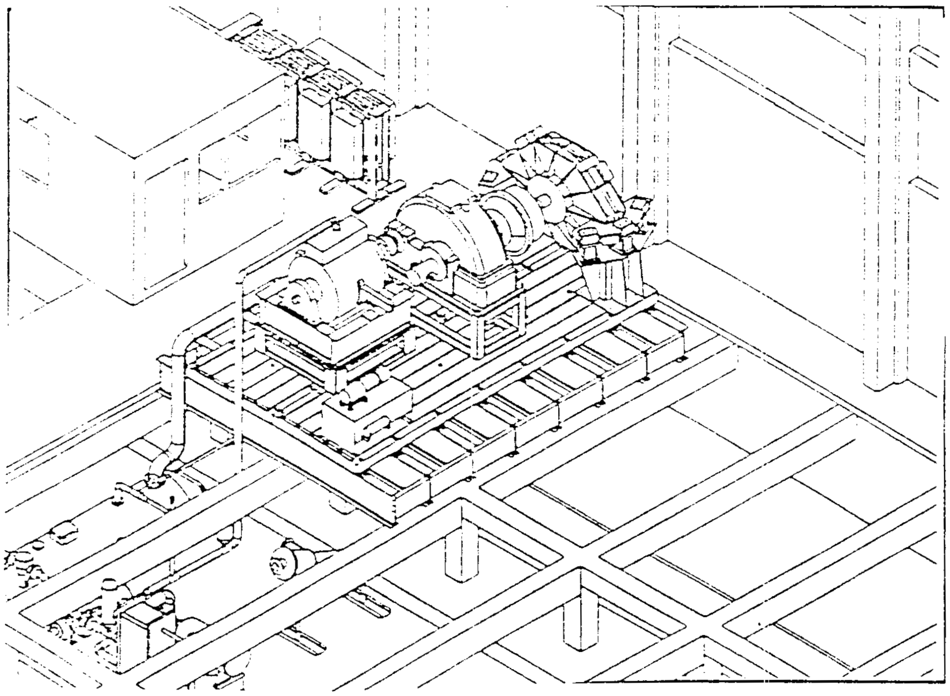
- (3) Solid-State Frequency Changers (60/400 Hz)
- 250 kW Battery Energy Storage System
- INTEGRATED Switchboard

ELECTRICAL SIMULATION LABORATORY

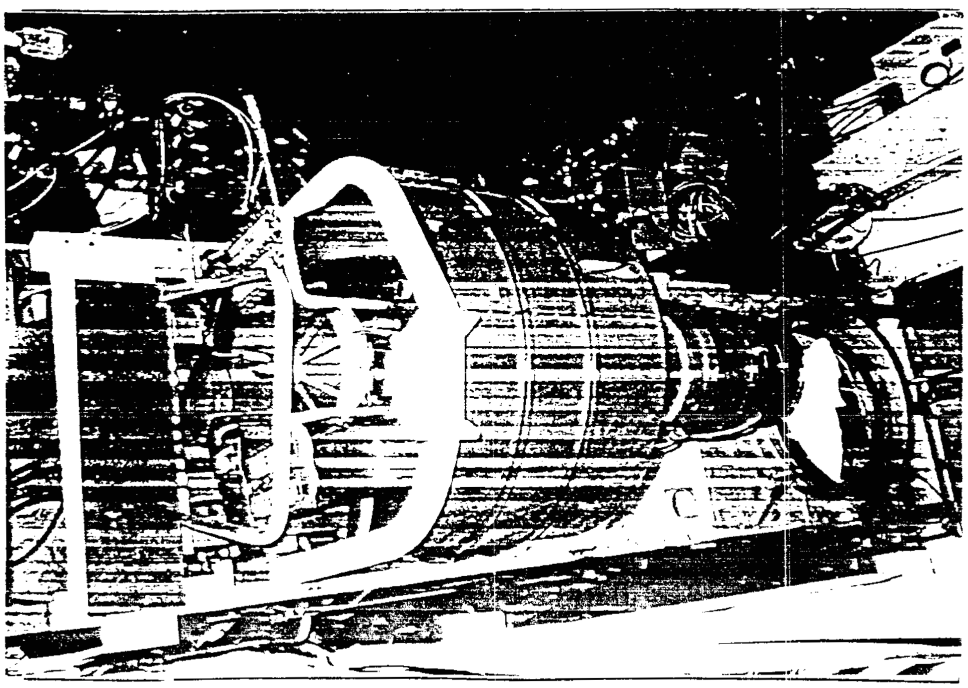

Electric Propulsion Drive Stands
Electrical Test Bays
Generator Laboratory
Bldg. 3-C
Main Test Floor
Bldg. 3-B
Bldg. 3-A
Ship Service Cable Connection
Bldg. 3D
Bldg. 3E
Deep Submergence Test Area
Bldg. 100
COMPUTER ROOM
Bldg. 20
Bldg. 13
Electrical Power Generators
Multiple Generators
Simulation Lab

3000 Hp Drive Test Rig

PM Electric Drive

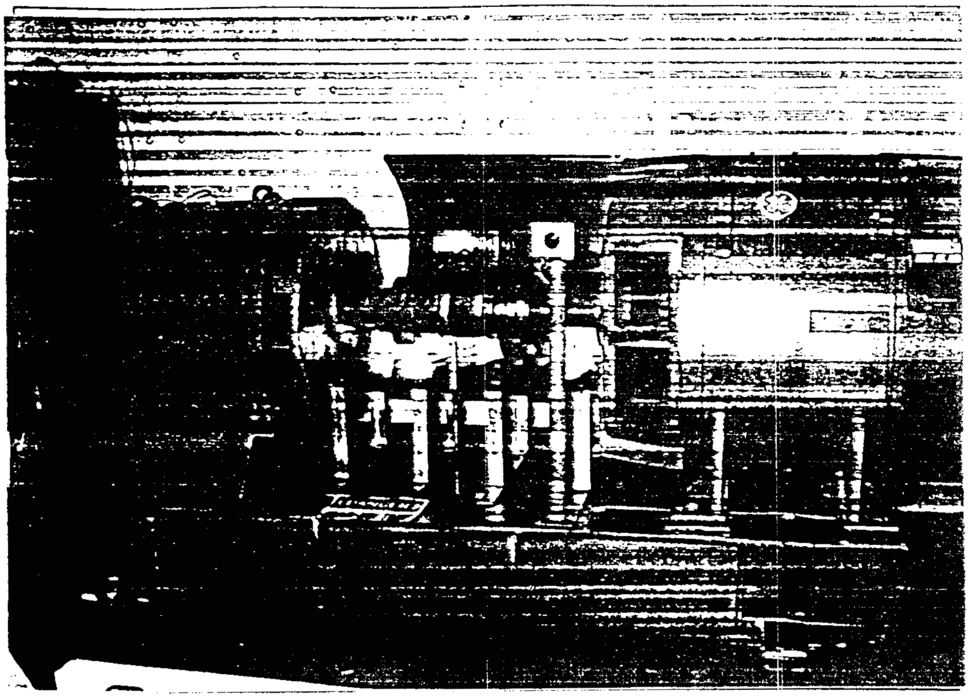


Turbine Drive & Water Brake

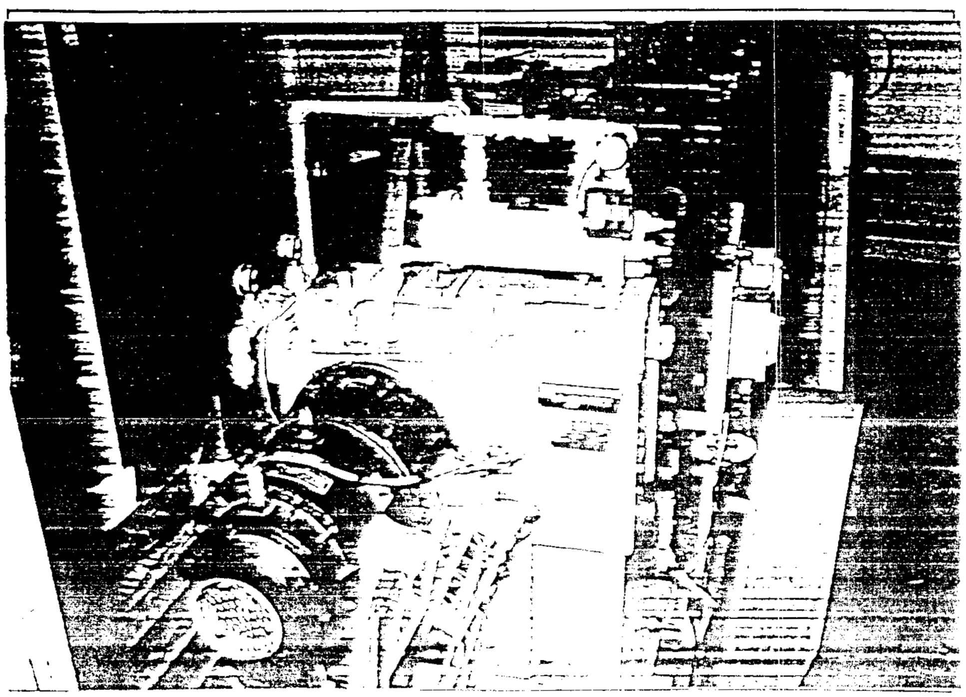


Machinery Systems Laboratory

500 kW Turbine Emulator

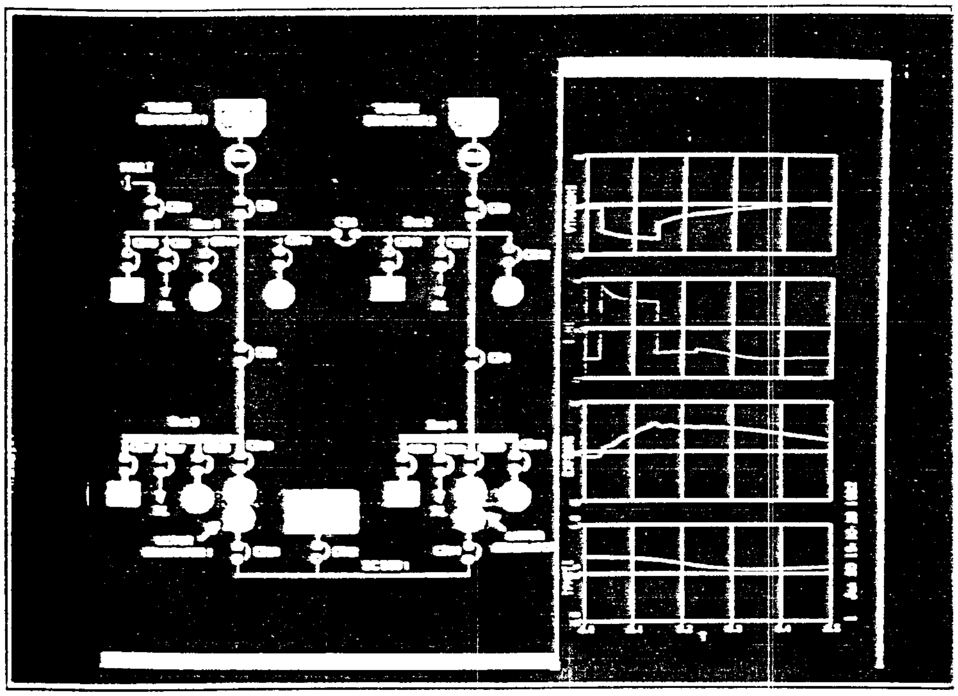


100kW Propulsion Derived Ship Service

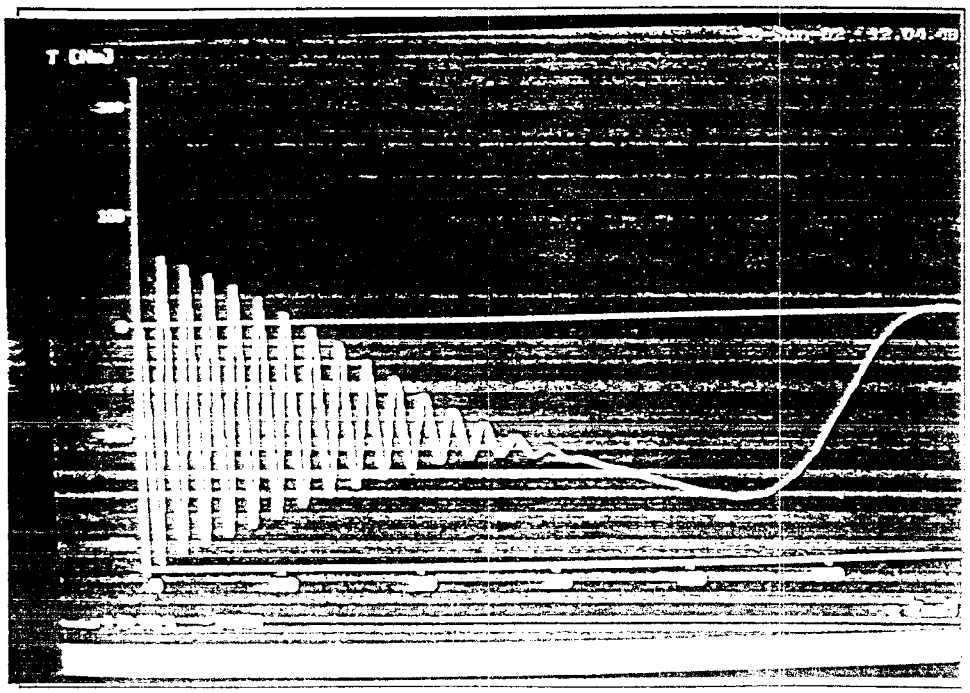


Simulation Laboratory

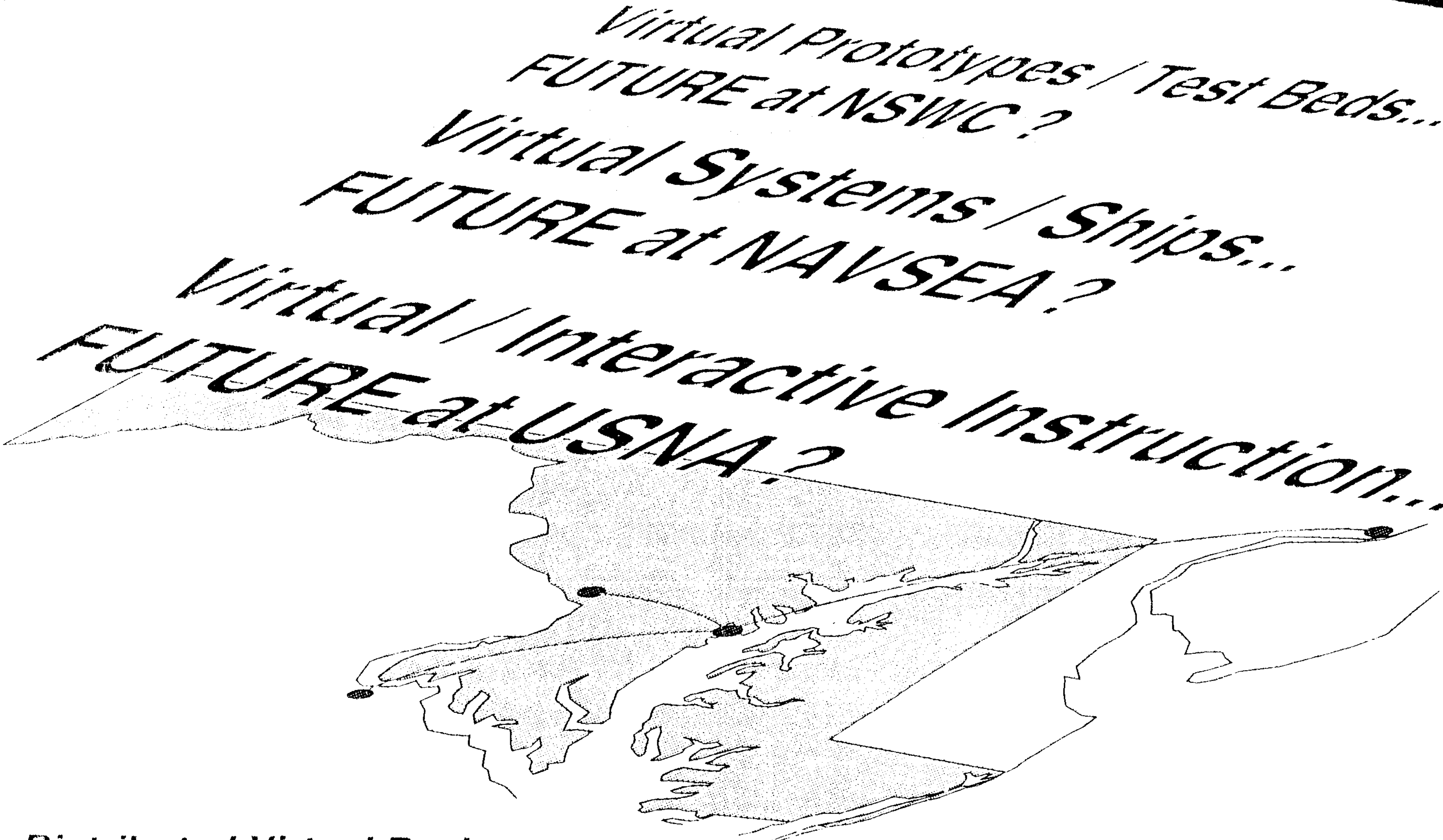
Electrical Systems & Equipments



Equipment Components & Response



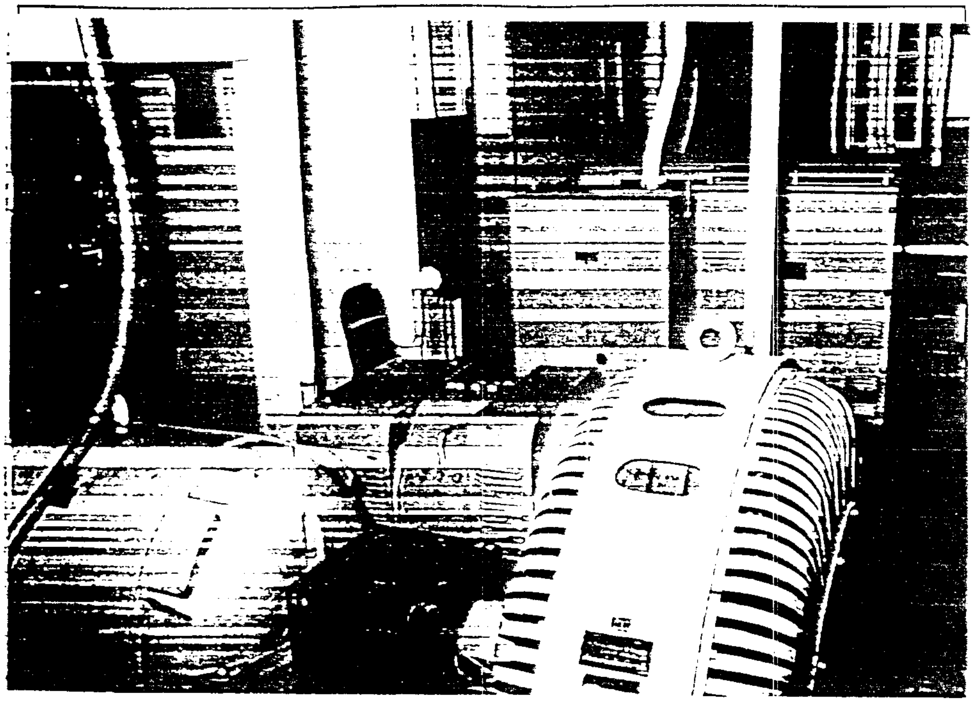
The Navy and Technology - BEYOND 2000?



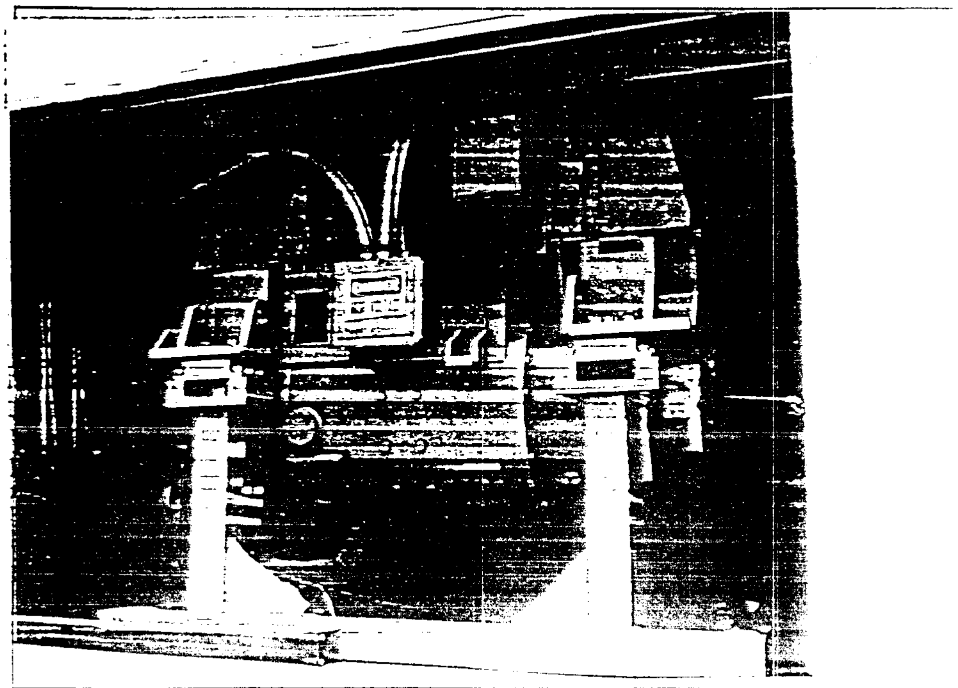
Distributed Virtual Design: Linked by High Speed Network!

Generator Room

Multiple 60 Hz, 400 Hz and DC Generators

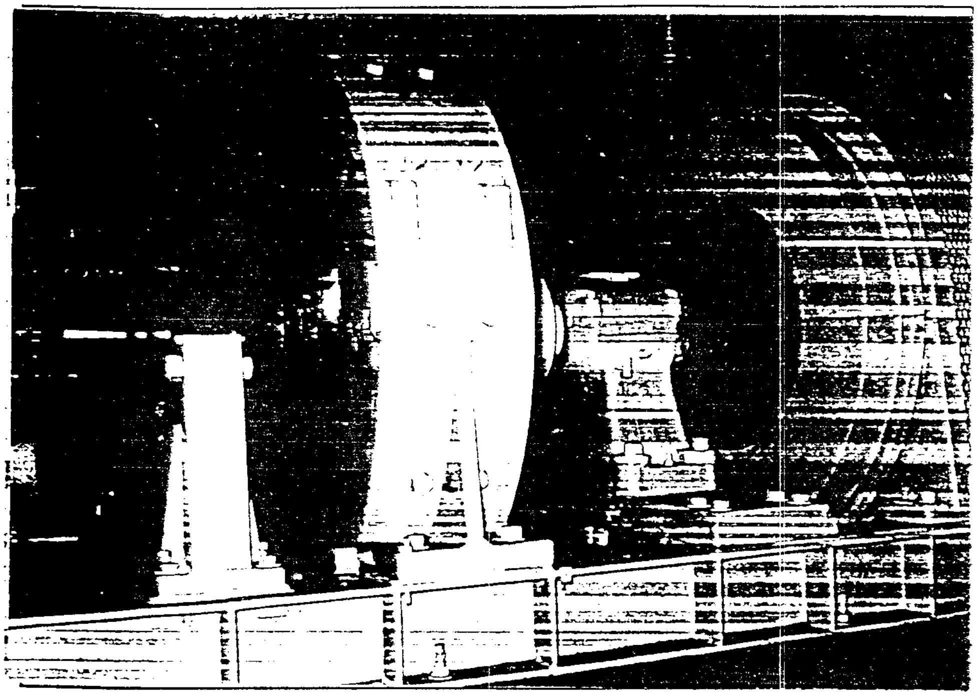


300 kW Motor-Generators (Matched Pair)

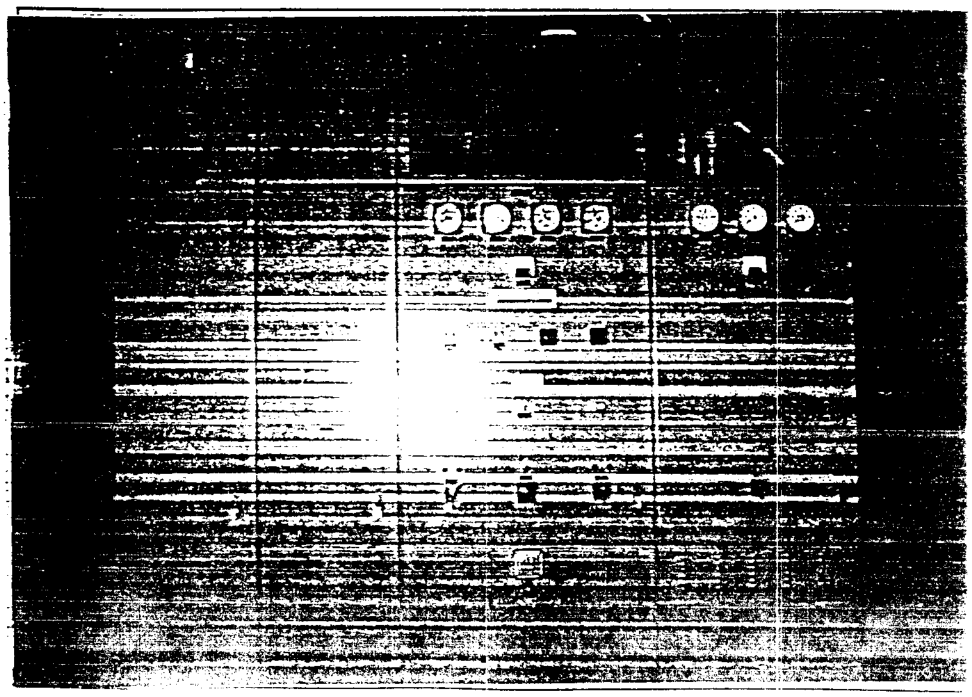


Electrical Power Supplies

500 kW Motor - Generator Sets

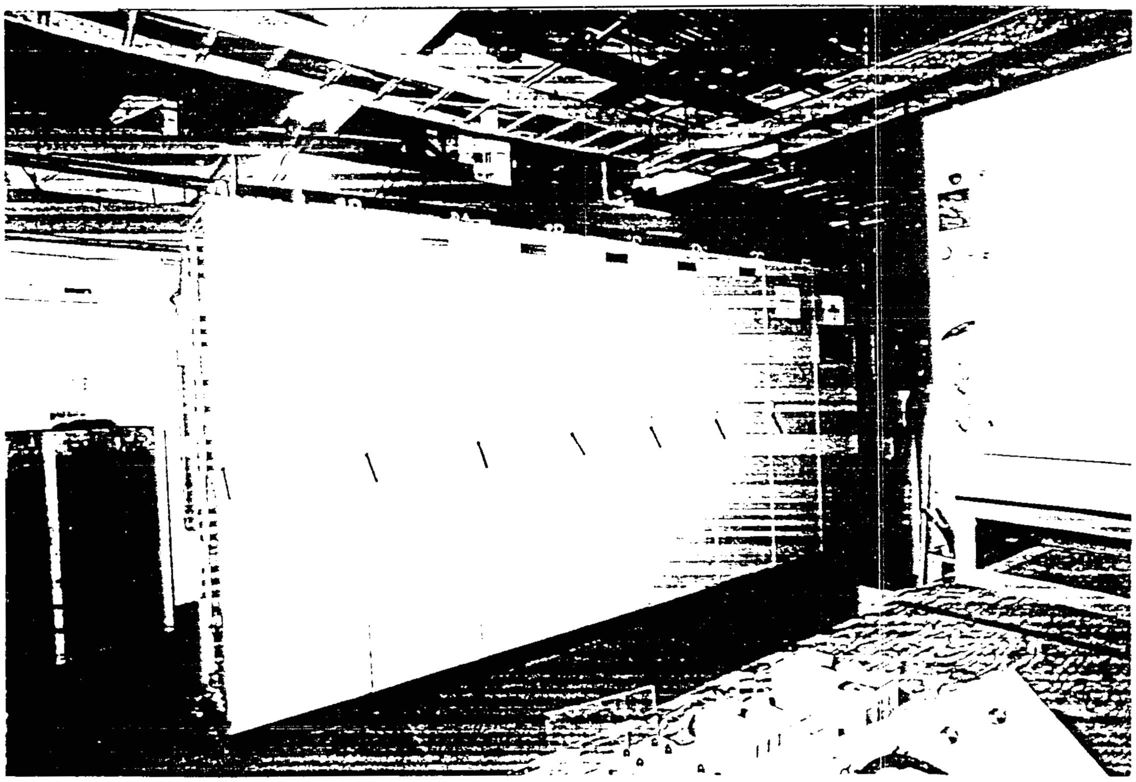


500 kW Switchboard

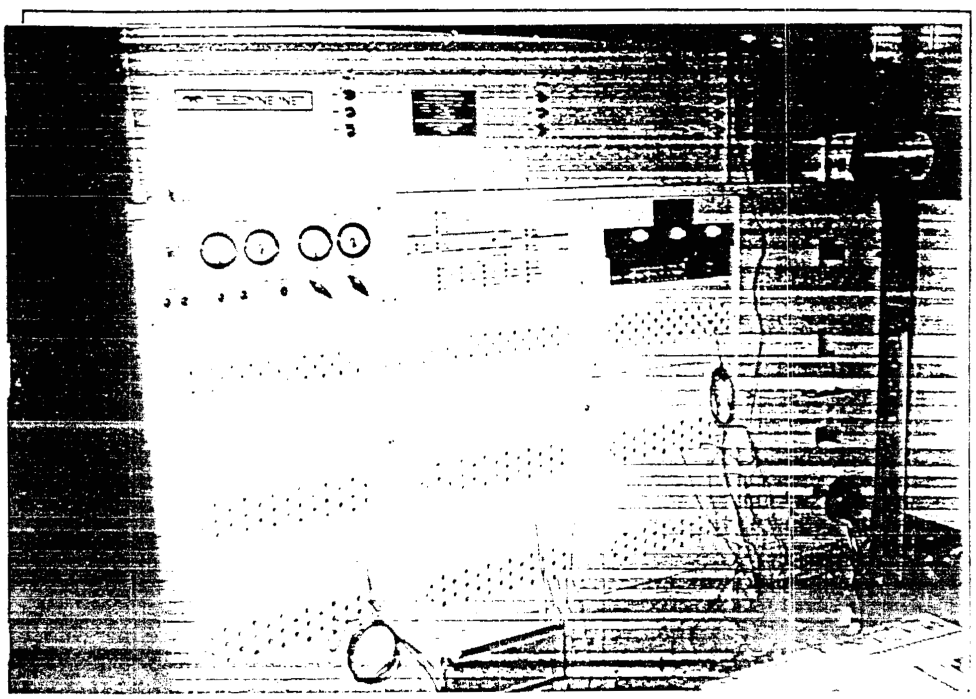


Laboratory & Test Bays

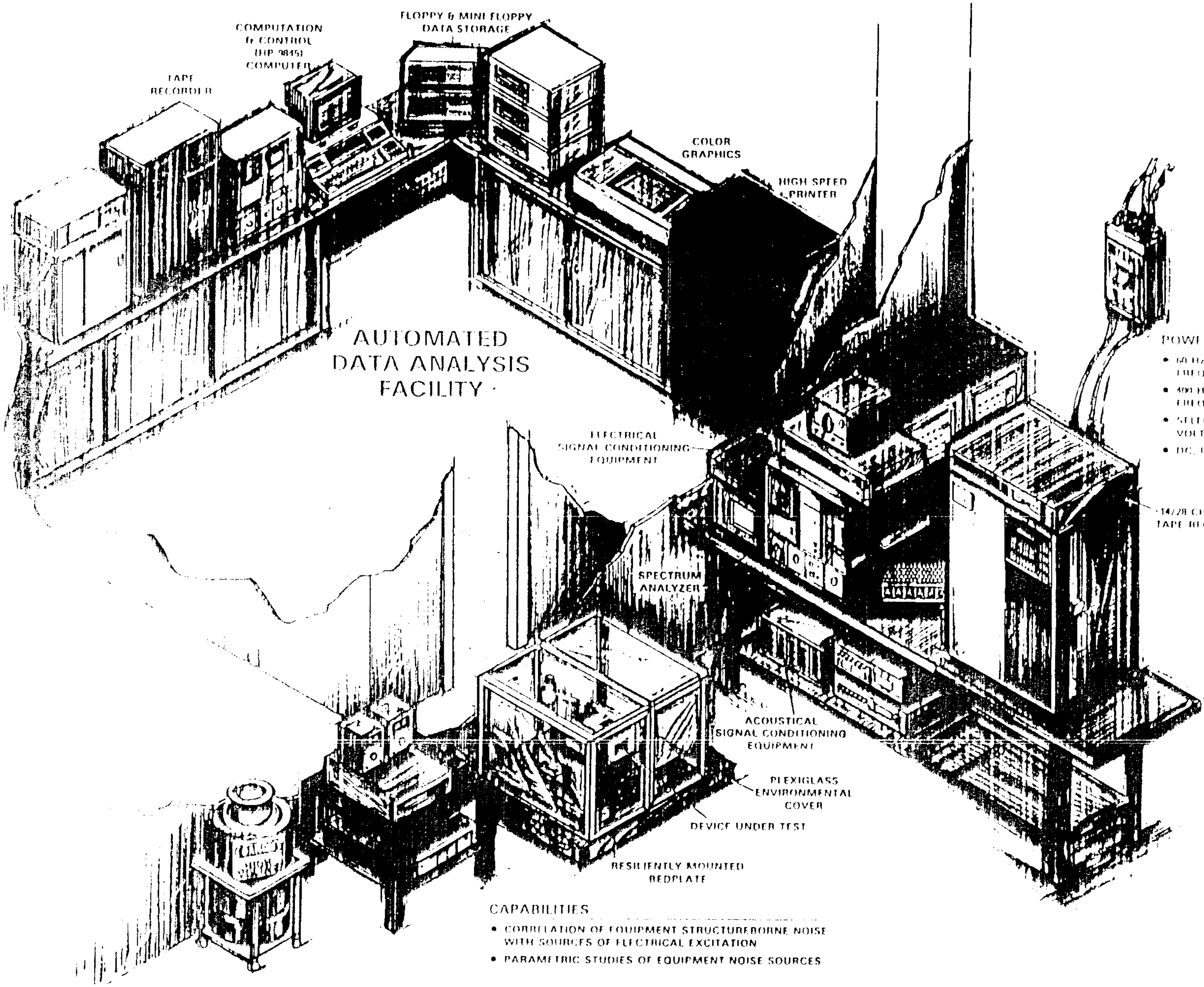
Integrated Switchboard



Battery Storage System



ELECTROACOUSTIC NOISE EVALUATION FACILITY



POWER SOURCES AVAILABLE

- 60 Hz, 3Φ, VARIABLE VOLTAGE ... FREQUENCY, UP TO 90 kW
- 400 Hz, 1Φ, VARIABLE VOLTAGE ... FREQUENCY, UP TO 100 kW
- SELECTABLE FREQUENCY, 3Φ ... VOLTAGE UP TO 90 kW
- DC, UP TO 300 VOLTS, UP TO ...

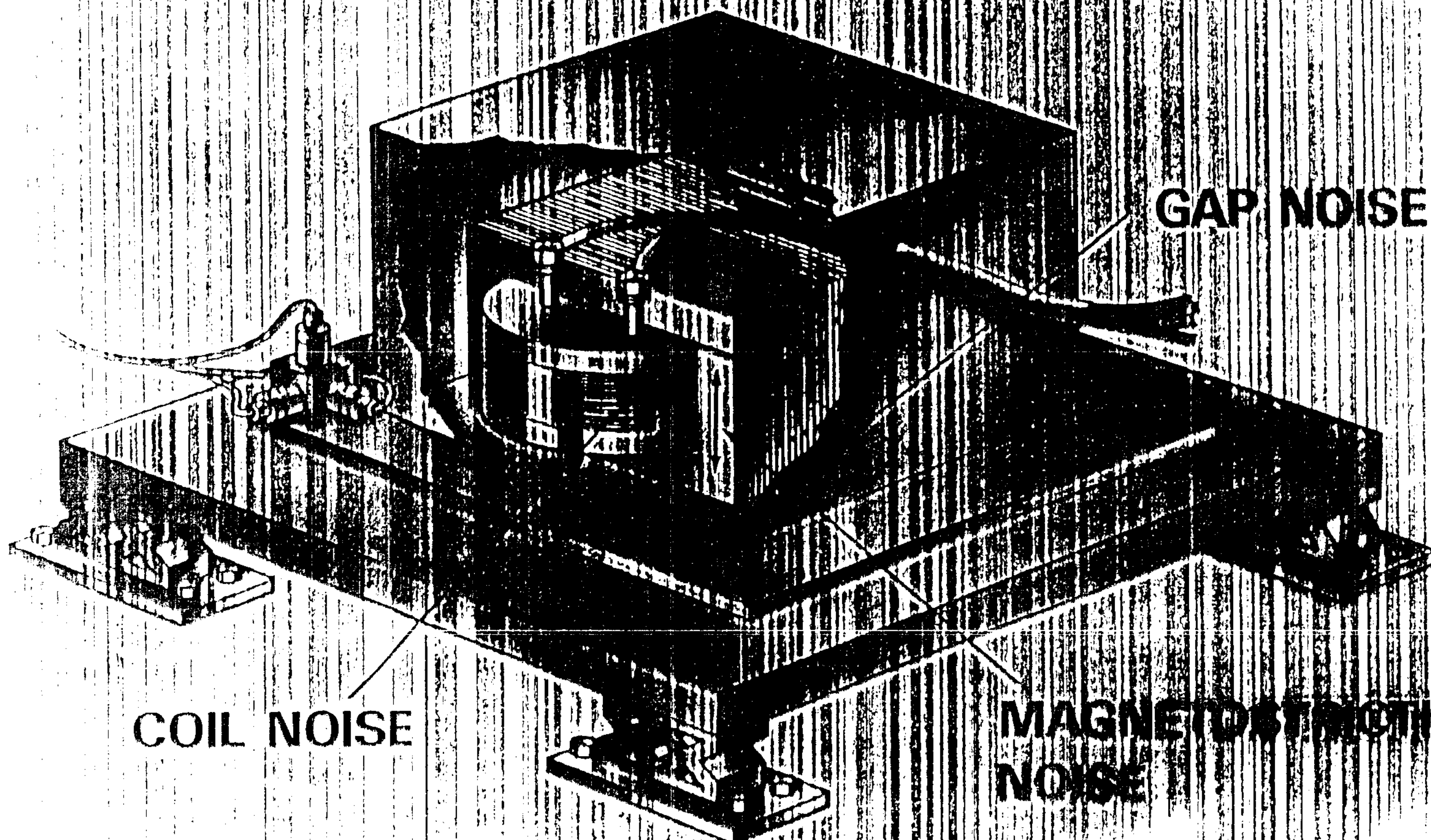
CAPABILITIES

- CORRELATION OF EQUIPMENT STRUCTUREBORNE NOISE WITH SOURCES OF ELECTRICAL EXCITATION
- PARAMETRIC STUDIES OF EQUIPMENT NOISE SOURCES

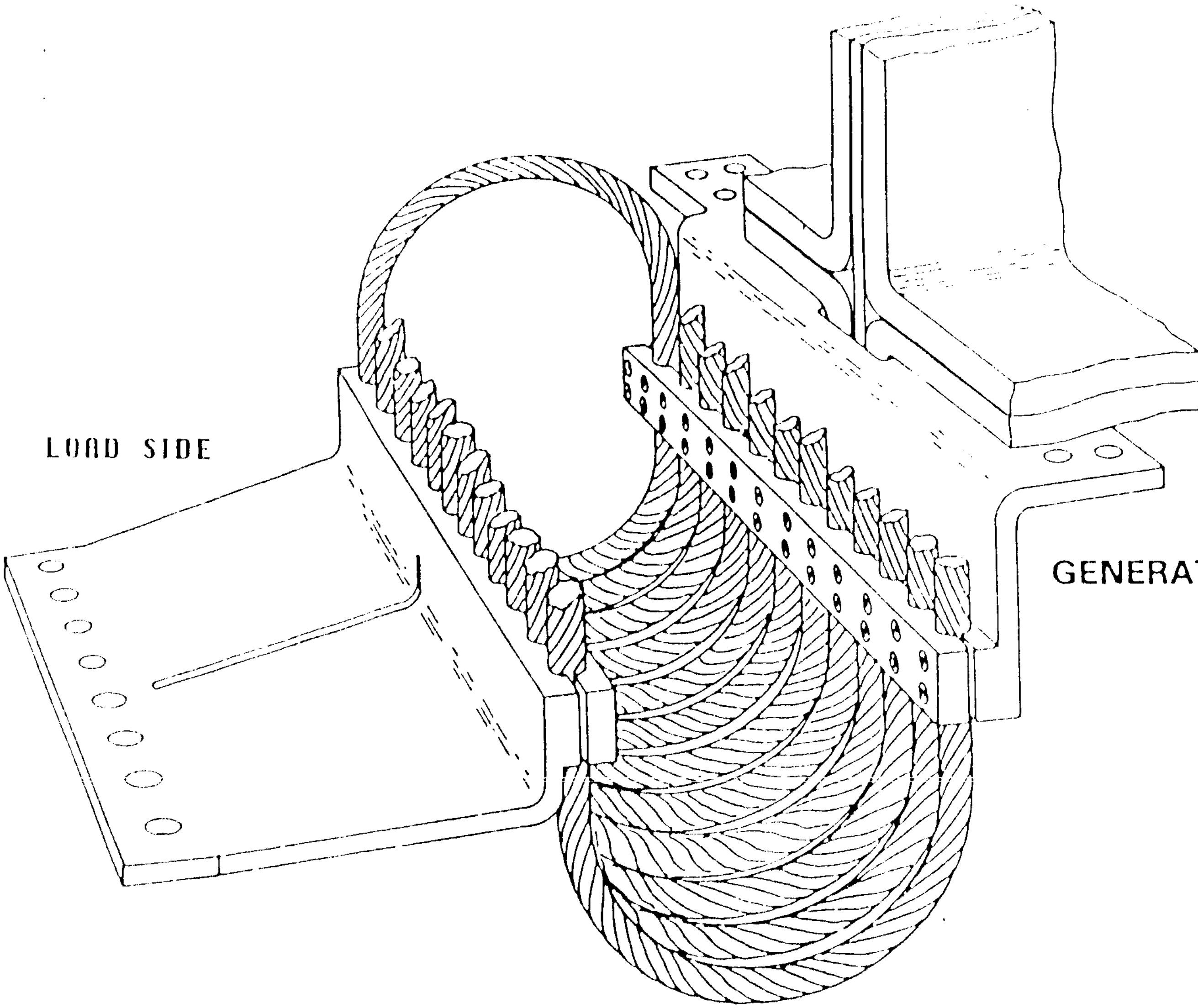
ELECTROACOUSTIC PROGRAM

OBJECTIVE: CONDUCT R&D, DEVELOP, INSTALL, AND EVALUATE EQUIPMENT TO REDUCE DISCRETE RADIATED NOISE GENERATED BY SHIPBOARD ELECTRICAL SYSTEMS

SSN 21 QUIET
COMPONENT STUDY
TRANSFORMER NOISE SOURCE

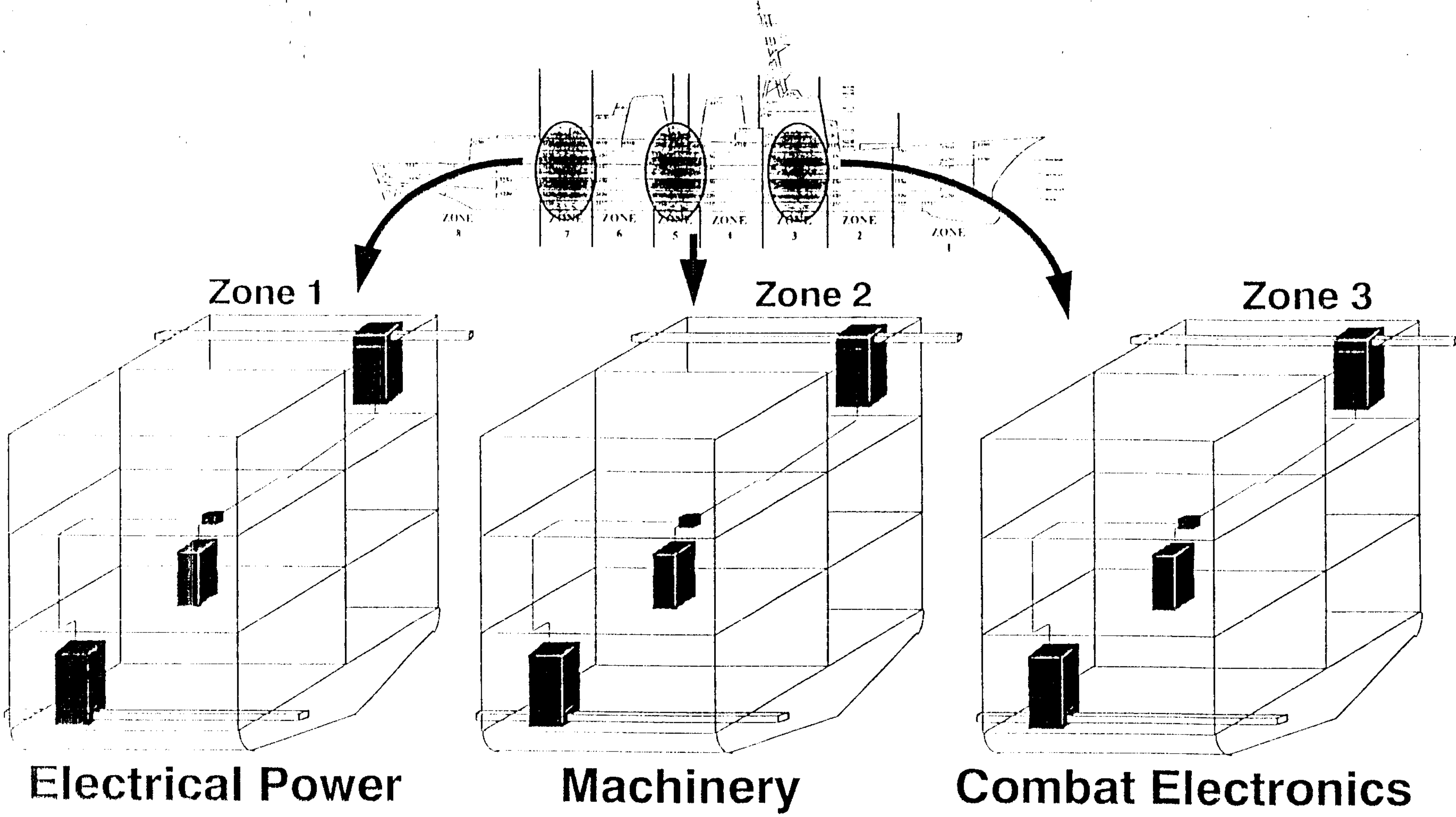


PROTOTYPE ISOLATOR/CONNECTOR FOR SSTG APPLICATION



Electrical connector provides good electrical conductivity as well as acoustical isolation

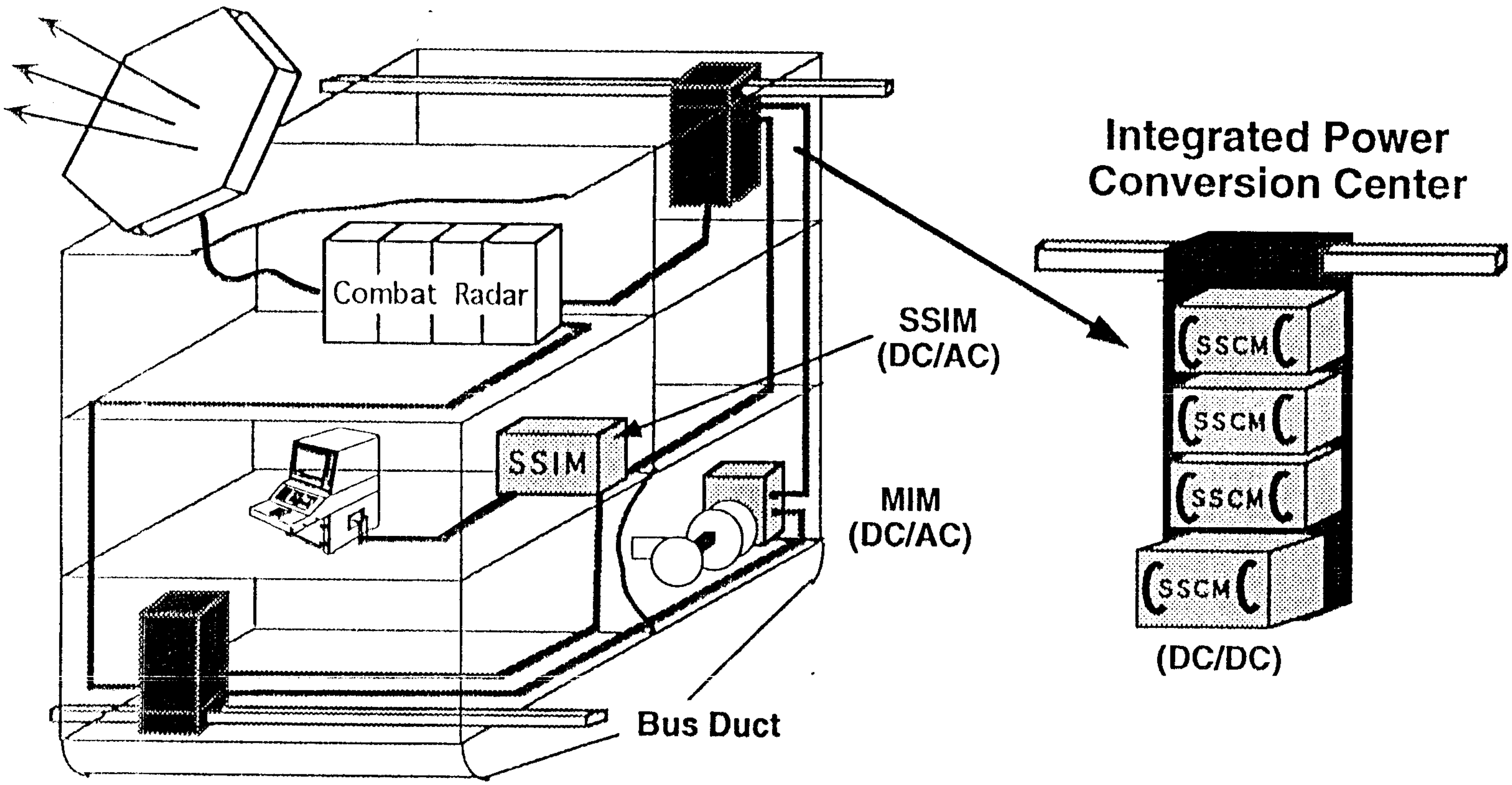
Zonal Electrical Distribution System



Reduced Scale Shipboard System

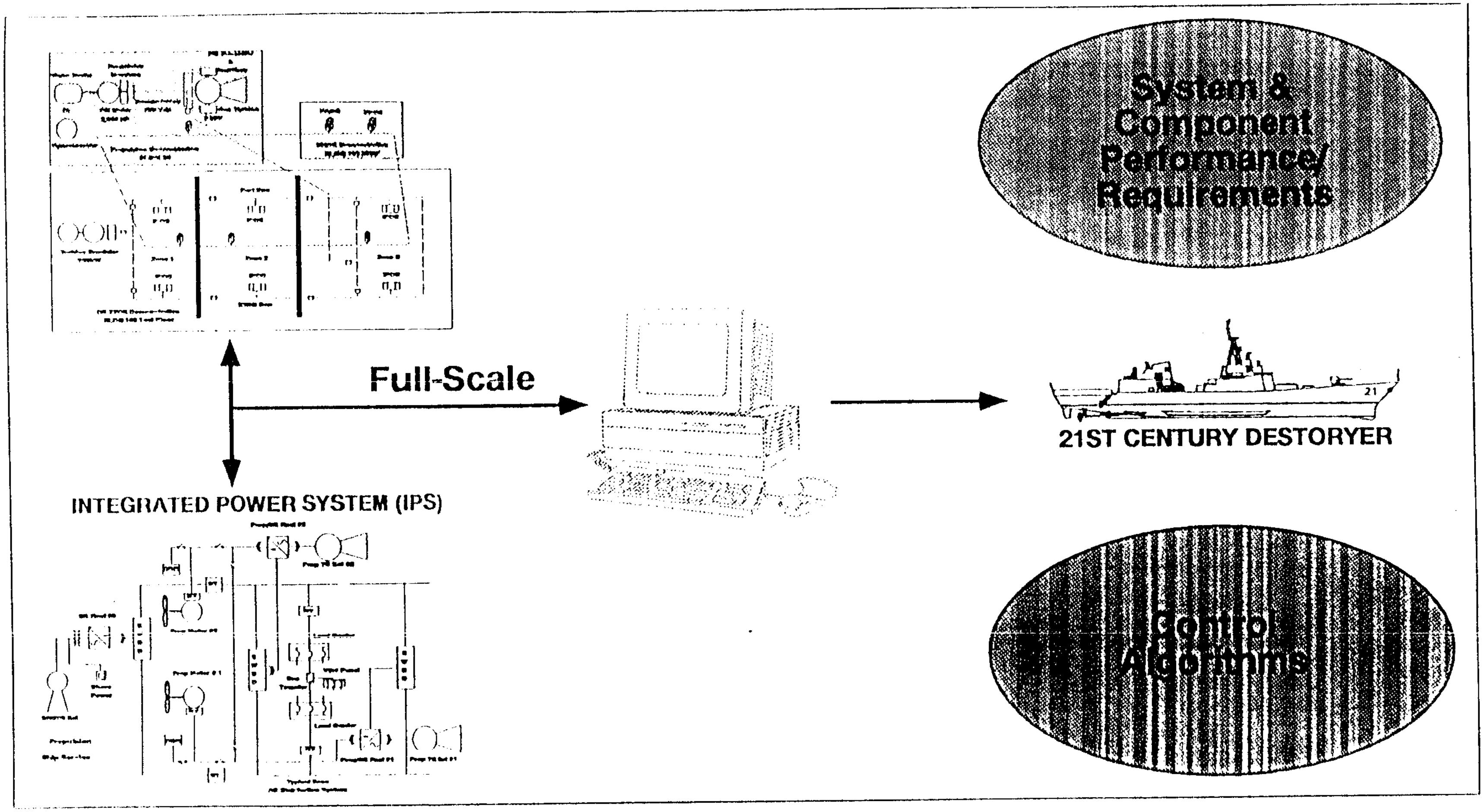
ZONAL Electrical Distribution Systems

Integration with Combat & Auxiliaries



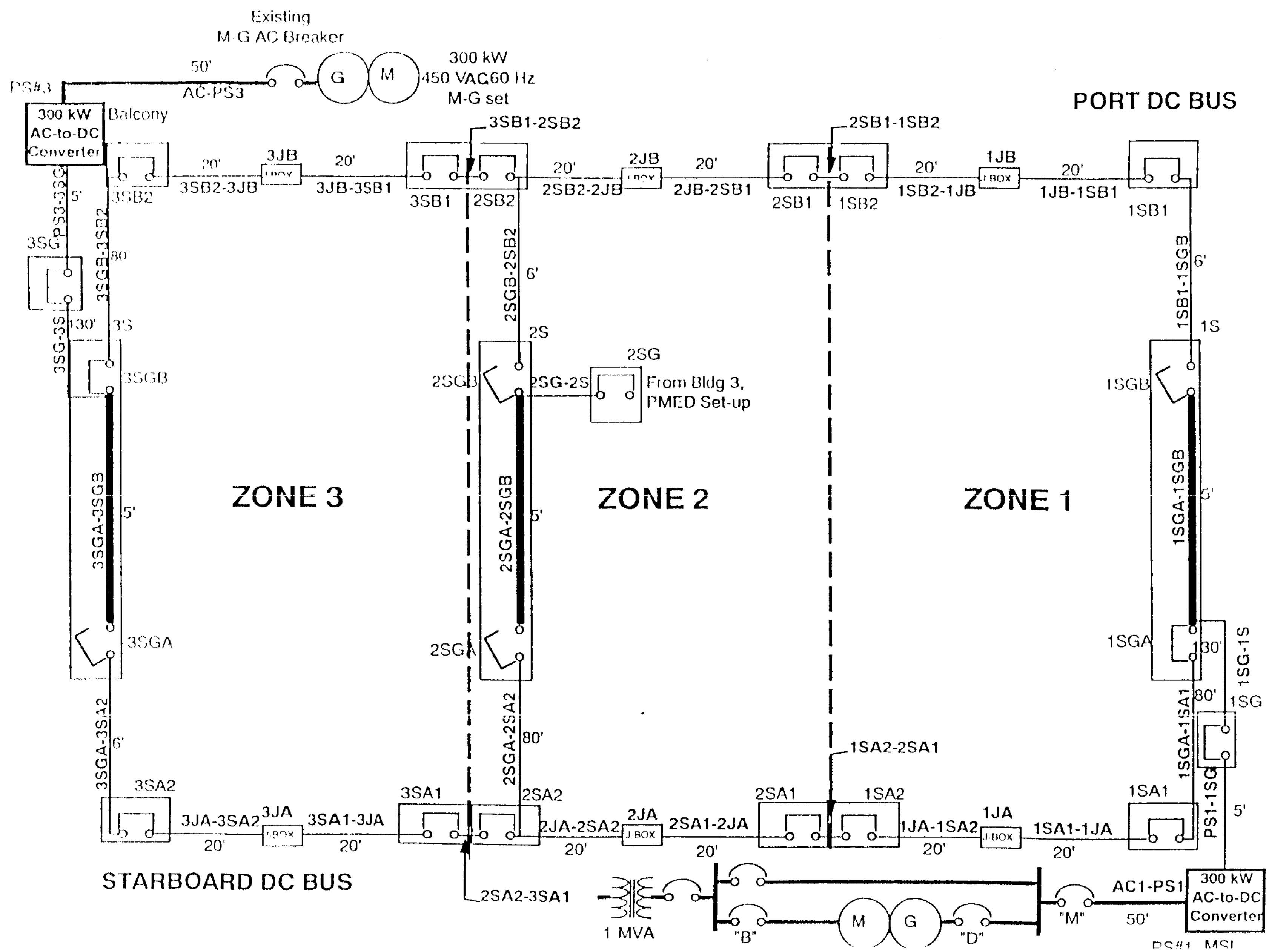
Integrated Protection, Regulation & Management = FEWER PARTS

IPS SYSTEM INTEGRATION



21 DS TEAM
HQ/NAVSEA 05Z
2/11/93

DC ZEDS 3-Zone Test Facility



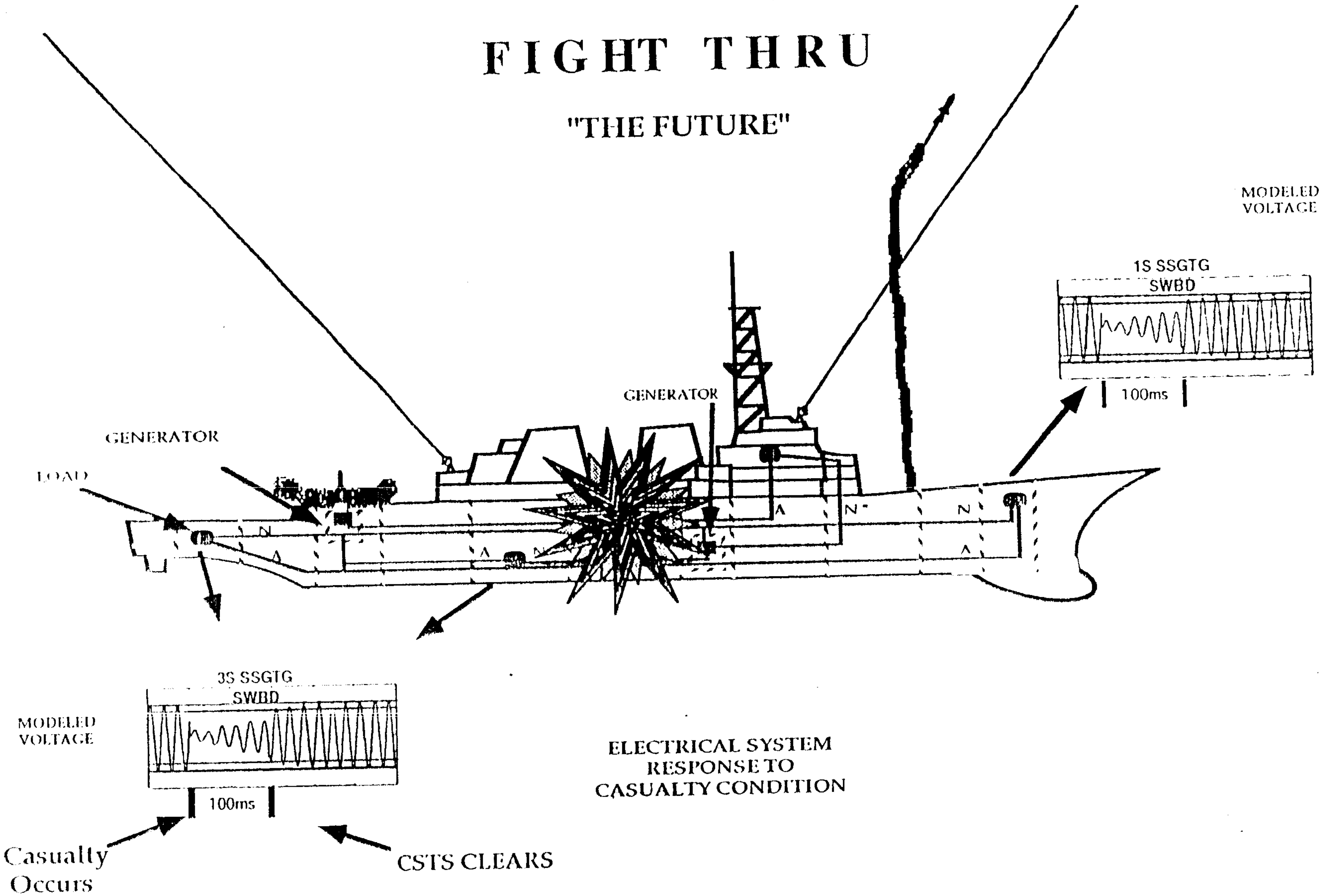
Propulsion Derived Ship Service (PDSS)

- Ship service power derived from the propulsion drive train rather than a stand alone generator set.

- PDSS BENEFITS
  - FUEL SAVINGS - 10% TO 15% IMPROVEMENT
  - LONGER RANGE OR INCREASED TANKAGE
  - ARRANGEMENT FLEXIBILITY
    - LESS SPACE AND WEIGHT
  - ELIMINATES GAS TURBINE OR DIESEL ENGINES

FIGHT THRU

"THE FUTURE"



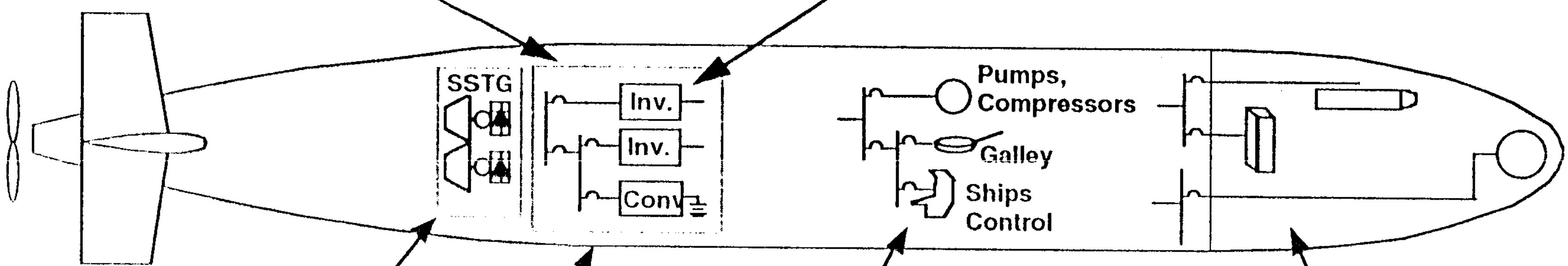
ELECTRICAL SYSTEM RESPONCE TO CASUALTY WITHIN 100ms TO KEEP UNDAMAGED COMBAT EQUIPMENT FIGHTING THRU

NSWC
Naval Surface Warfare Center
CARDEROCK DIVISION

NSSN
AREAS OF SUPPORT

DC Electric Plant System Design
- Design Review
- Specification Review
- Computer Simulation.

700VdcCircuit Breakers
- Design Review
- Computer Simulation



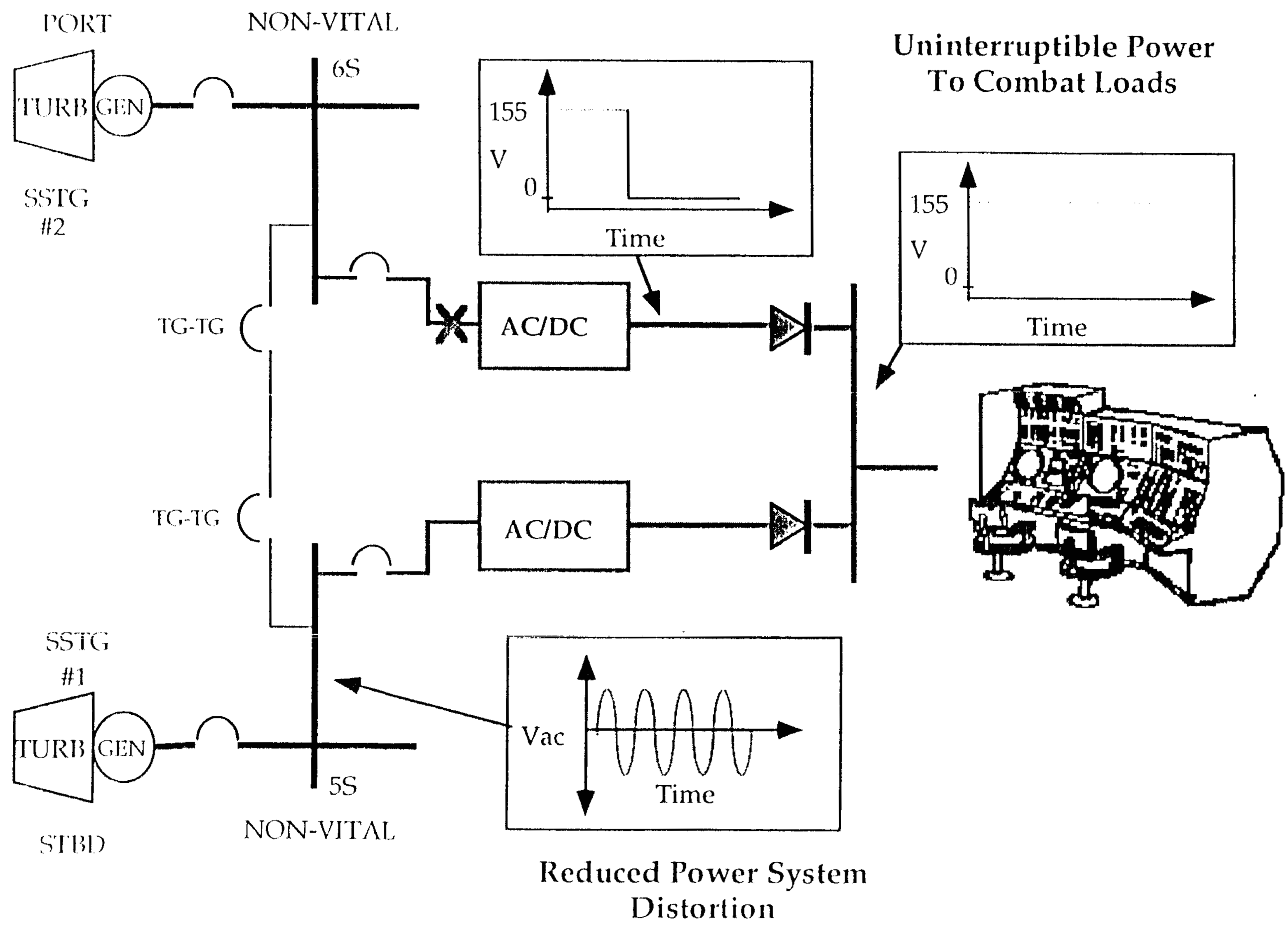
SSTG
- Design Review
- Computer simulation

AQB Circuit Breakers
- Improving Breaker Trip Characteristics

700VdcCircuit Breakers
- Modification of Navy ACB-4000 Breaker.

Combat System Electrical Power
- Compatibility with AMP Modules

PRIMARY PERFORMANCE REQUIREMENTS

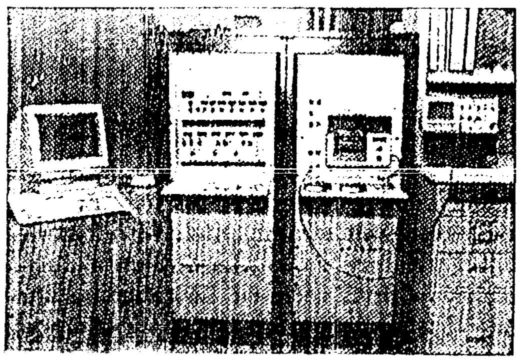


especially i[illegible] allow water, which will allow effective and safe landing operations. Superconductive machinery, because of its small size and high performance, will increase capability and has the potential for significant cost savings. There is a close working relationship with industry and universities which makes possible accelerated developments, quick commercialization and an improved American competitiveness in this technology area.

ELECTRICAL EQUIPMENT AND CABLE TECHNOLOGY BRANCH

Mr. Gene Dadin
(410) 267-2260

The Electrical Equipment and Cable Technology Branch (Code 813) executes research and development programs for electrical system components. The goal is to obtain performance that is affordable to the Navy. Emphasis is on power electronics including application guidance on power semiconductors and high frequency synthesis power conditioners controlled by microprocessors. The branch also conducts research on system protection components such as solid-state circuit breakers and ramp motor starters.

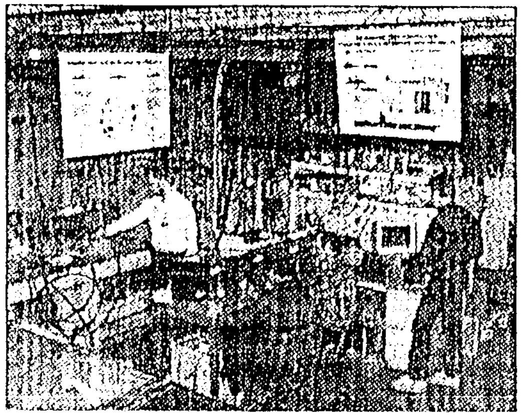


In-house capabilities include: industry-standard equipment for characterizing power semiconductors, electrical hardware simulators, the design and fabrication of solid-state power [illegible] conversion equipment, and [illegible] power equipment.

POWER DISTRIBUTION SYSTEMS BRANCH

Mr. David Clayton
(410) 267-2467

The Power Distribution Systems Branch (Code 814) provides design and analysis of shipboard electrical power systems to improve the system affordability while equaling or improving performance. Branch expertise includes power continuity, power quality, system control, and stability.

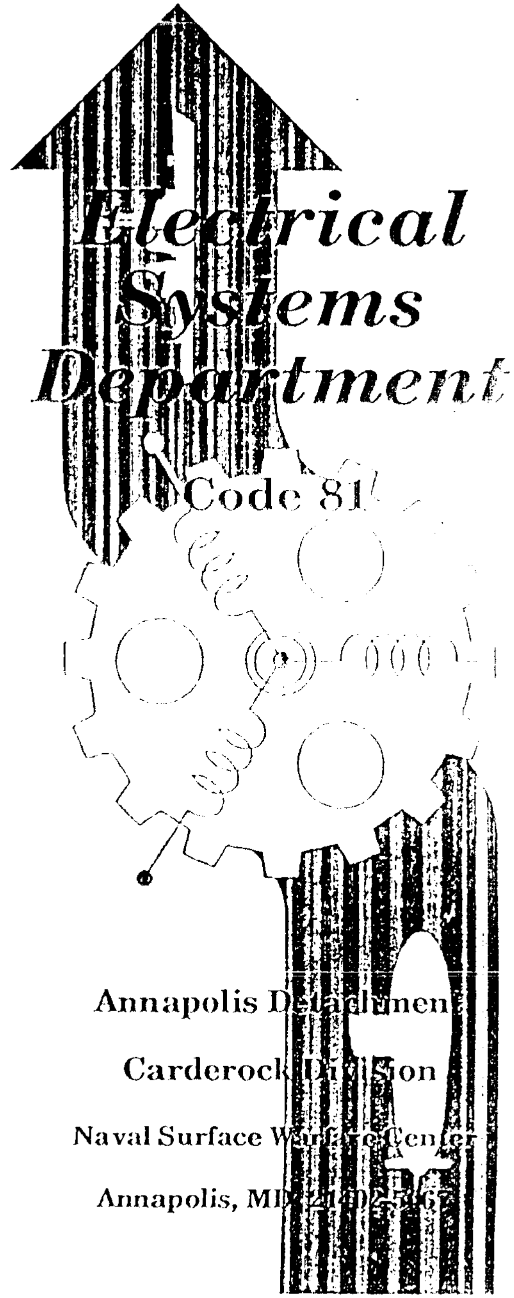


The branch supports the integration of high-efficiency power-dense electric sources, converter-fed distribution systems, and sensitive load equipment. Component and systems testing up to approximately 2 megawatts is accomplished in the Power Distribution Laboratory. Laboratory and shipboard testing is augmented by an extensive and flexible computer simulation environment to predict performance and develop requirements for conceptual systems and components.

Approved for public release
July 1993
Distribution unlimited

L.R. Walker

Commander L.H. Walker
Officer in Charge
Carderock Division, NSWC



Annapolis Detachment
Carderock Division
Naval Surface Warfare Center
Annapolis, MD [illegible]

ELECTRICAL SYSTEMS DEPARTMENT

Mr. Howard O. Stevens, Jr.
(410) 267-2857
FAX (410) 267-2571

The Electrical Systems Department (Code 81) is the Navy's primary internal resource for the conduct of research and development in electrical power systems for surface ships and submarines. Efforts ongoing include development of electrical propulsion systems, electrical power generation and distribution systems, and the individual machines, control components, and supporting equipment for such systems. The focus of our work is to introduce new technology and design approaches which improve the affordability of Navy ships while maintaining or enhancing performance. The Department's primary customers include the Naval Sea Systems Command for new system/ship design support and some fleet problem solving, the Office of Naval Research for research and exploratory development, and the Advanced Research Projects Agency. A small but increasing percentage of our work is conducted for private industry.

The Department employs approximately 100 electrical and mechanical engineers, physicists, technicians, and support personnel, over 20% of whom have advanced degrees. These personnel have an average of over 15 years of experience in electrical power technology. Over 30,000 square feet of fully equipped laboratory and test facilities are available for the research, development, and testing of electrical power equipment and systems. Extensive capability also exists for computer modeling and simulation of electrical systems and components. This capability can be augmented through contracts to accomplish tasks requiring resources beyond those available in-house.

Technologies under investigation include new solid state power devices, applications of superconductivity to electrical machines and minesweeping, solid state power converters, new electrical system architectures, permanent magnet machinery, cryogenic refrigeration systems, new designs for circuit breakers, and electrical system coordination.

Following are summaries of the capabilities of the Department's four branches, which are available to help solve your problems.

ELECTRICAL PROPULSION AND MACHINERY SYSTEMS BRANCH

Mr. Robert C. Smith
(410) 267-2868

The Electrical Propulsion and Machinery Systems Branch (Code 811) designs, analyzes, and evaluates new concepts in electrical propulsion systems and electrical machinery. Optimum machine and system designs are established through parametric analyses, experimental machine development, and hardware testing.

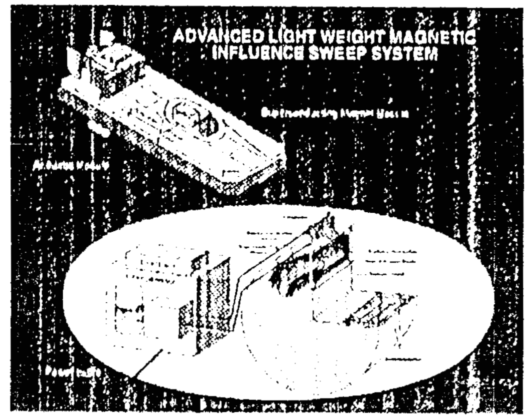
The branch can also provide thermal, magnetic and electro-mechanical modeling of conventional AC motors and generators as well as homopolar, permanent magnet, and superconducting machines. The branch has designed, built, and tested machinery up to 3000 hp capacity in-house and has access to this capability at virtually any power level.

Specific capability is available to do integrated system design and provide assessments of affordability and technical risk. The branch also has over 20 years of experience in analyzing and correcting causes of electrically generated acoustic noise in electrical equipment and has developed low noise equipment for shipboard use.

ELECTRICAL MACHINERY TECHNOLOGY BRANCH

Mr. Michael Superczynski
(410) 267-2149

The Electrical Machinery Technology Branch (Code 812) provides research and development for systems and components that use superconductive technology. These include electric motors and generators, energy storage, and magnetic minesweeping systems.



The technologies for which extensive R&D are conducted include superconductive wire and magnets, cryogenic systems, helium refrigerators and compressors, current collectors, transmission lines, electric switchgear, and controls that are required for applications of superconductivity. Other applications for these technologies are also of interest.

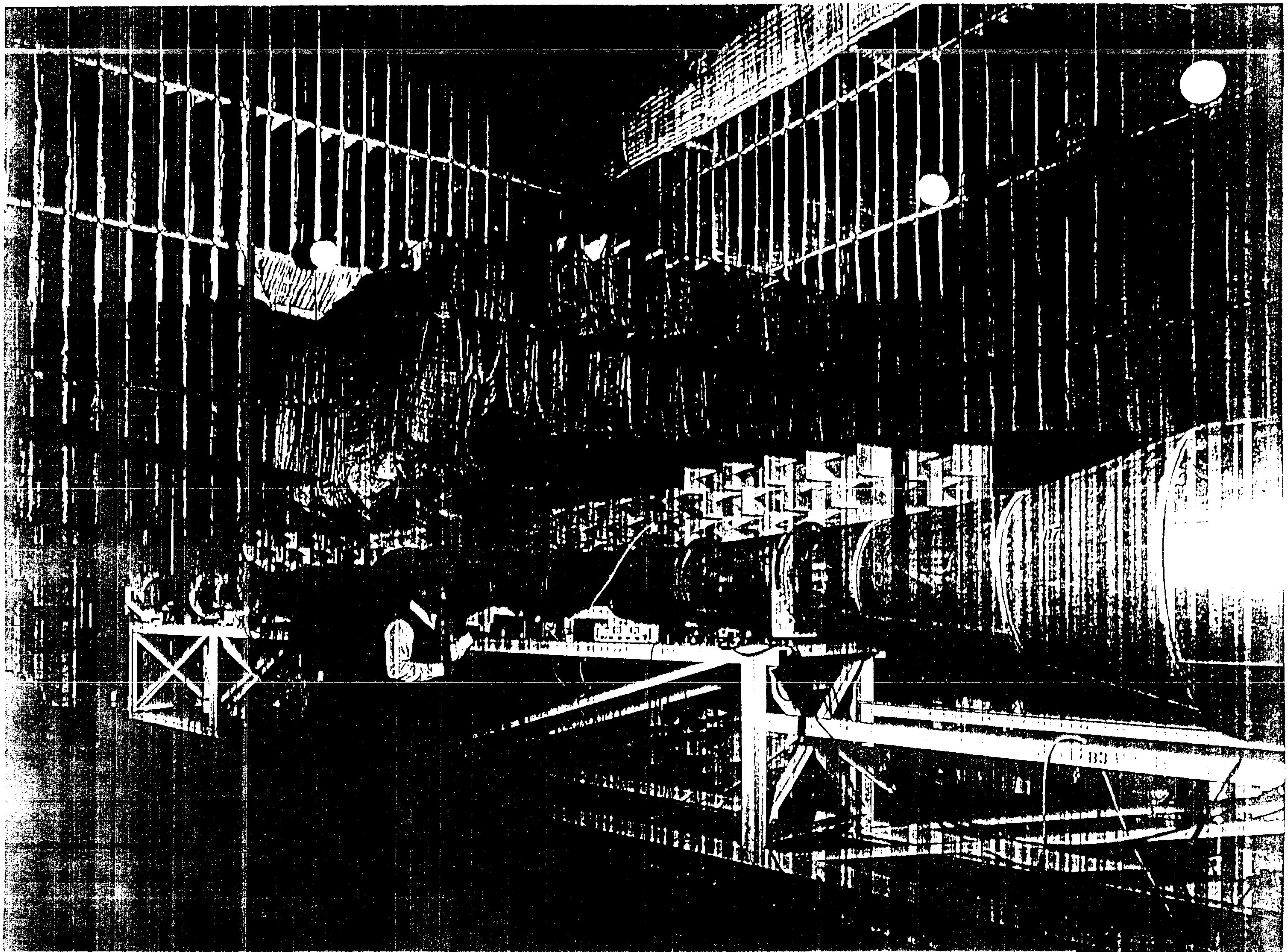
Successful development and application of superconductive technology can enhance the operational capability of the Navy and Marines. The magnetic minesweeping system will greatly assist in clearing mine fields,

MACHINERY ACOUSTIC SILENCING

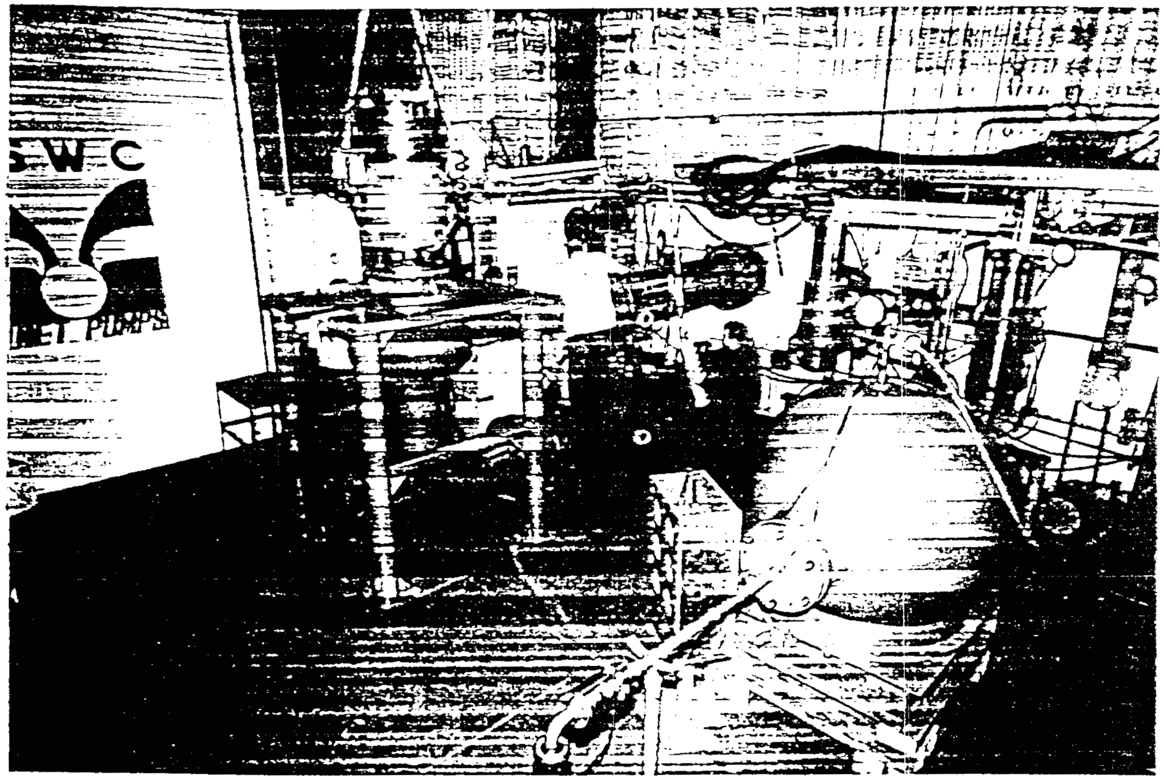
(Submarine Acoustic Signature Reduction)

Facilities Provide Essential Low Background Noise Levels To Duplicate Submarine Operating Conditions

- Anechoic Chambers
- Isolating Walls & Floor
- Located Far From Noise (i.e. Industry)



NSWC MACHINERY ACOUSTIC SILENCING LABORATORY (ANNAPOLIS)



NSWC
MACHINERY ACOUSTIC SILENCING LABORATORY
(Annapolis. MD)

SUBMARINE FLUID DYNAMICS FACILITY

A world class facility that permits full-scale acoustic and operational evaluations of submarine and surface ship fluid system components.

SIGNIFICANT CAPABILITIES - long time duration, full scale testing of piping system components at real pressures and flows without the influence of test system background noise (alternative - use operational submarines)

FULLY UTILIZED - in demand by Navy sponsors, ship designers and builders, and private industry.

FUTURE DEMAND - support current and planned submarine design and development, address changing submarine and surface ship missions (special forces support, shallow water operations) and evaluate the introduction of new materials (composites) the central contr   nel to facilitate communications and assure test data correlation with system fluid dynamic conditions.

Since 1969, the Submarine Fluid Dynamics Facility has been used to perform noise and vibration tests and evaluations of air and water system components for shipboard applications. This work has resulted in the development of numerous quiet fluid system components.

Data Acquisition and Analysis

An integral part of the facility is the data acquisition and analysis center. Instrumentation is provided to obtain up to 14 channels of noise and vibration data simultaneously and perform narrowband, one third octave band, and transient spectral analyses from 0 to 50,000 Hertz. The data system is designed to obtain structureborne and airborne noise measurements as well as fluidborne sound pressure levels.

A 486/66 computer controls the system and provides on line data analysis, hard copy printouts, analog signal storage

by a multi track precision magnetic tape recorder and digital storage on high capacity disks. Suitable signal conditioners, filters, and amplifiers included in the sytem assure that data is accurate and only represents the noise characteristics of the component being tested.

The Submarine Fluid Dynamics Facility is unique in that its services and capabilities are available to qualified vendors for conducting tests and evaluations of proposed shipboard fluid system components. The facility is certified by the Naval Engineering Facilities Command for conformance with the current "System Certification Procedure and Criteria Manual for Deep Submergence Systems" (NAVSEA TP 9290).

Specifications of   e Submarine Fluid Dynamics Facility

Air System		
Maximum Flow Rate	35,000	scfm
Maximum Pressure	4,500	psig
Storage Capacity	960	cu. ft
Maximum Test Item	4	inches*
Water System		
Maximum Flow Rate	3,500	gpm
Maximum Pressure	1,000	psig
Storage Capacity	56,000	gallons
Maximum Test Item	8	inches*
Data Acquisition and Analysis		
Measurements	structureborne, airborne, and fluidborne noise	
No. Data Channels	14	
Analysis Bandwidths	narrowband, 1/3-octave band, and transient	
Frequency Range	0 to 50,000 Hz	

Larger sizes can be tested with modifications.

Interested vendors should contact the
Fluid Systems Acoustics Branch
Carderock Division, Naval Surface Warfare Center
Annapolis Detachment
3A Leggett Circle
Annapolis, Maryland 21402-5067

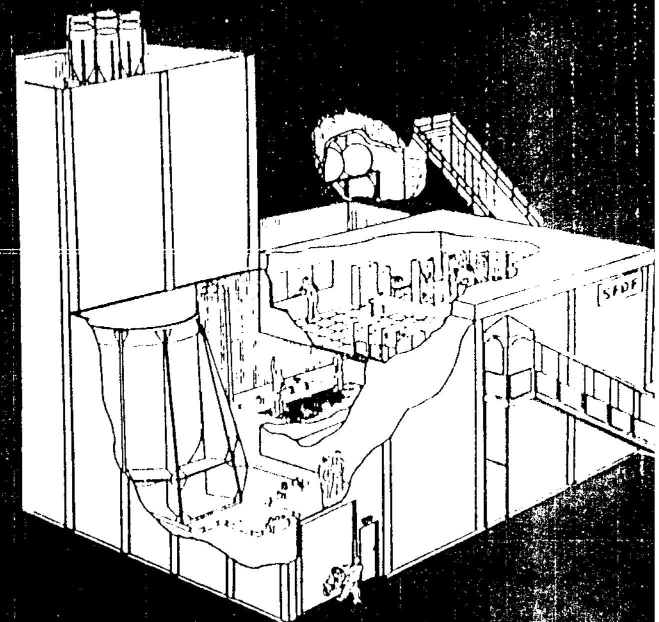
Approved for public release October 1993; distribution unlimited.

LRWalker

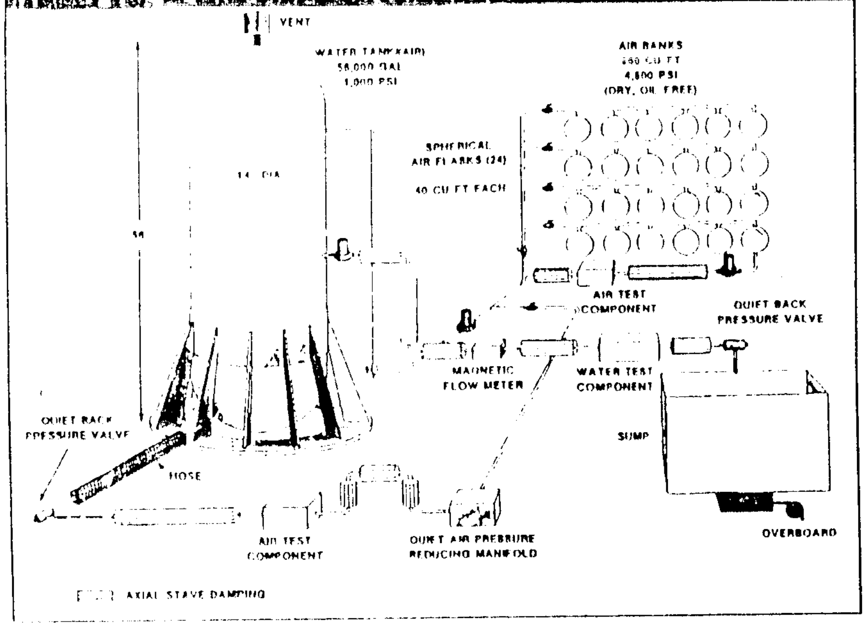
CDR L.R. Walker, USN

Naval Surface Warfare Center
Carderock Division
Annapolis Detachment

Submarine Fluid Dynamics Facility



Submarine Fluid Dynamics Facility



The Submarine Fluid Dynamics Facility at the Annapolis Detachment of the Carderock Division, Naval Surface Warfare Center, is maintained and operated by the Fluid Systems Acoustics Branch in the Machinery Silencing Department. The facility is designed to produce air and water fluid dynamic conditions (flow rate, pressure, temperature, et imilar to actual shipboard air and water machinery systems. The facility provides a test-bed for mechanical and acoustic investigations of prototype Navy valves, manifolds, and other air and water components for shipboard use, and is also used extensively to evaluate and qualify components that are designed and manufactured by commercial industry and proposed for shipboard applications. Tests are conducted in accordance with designated military noise and vibration specifications.

The development of quiet components for air and water shipboard systems is required as part of the Navy's ongoing ship silencing efforts to reduce the structureborne and radiated noise levels of surface ships and submarines. Noise levels generated by air and water system components contribute to the overall radiated noise signature of the ship and directly affect mission performance. Not only is a noisy ship more easily detected, the noise generated by the ship itself hinders its ability to detect others.

Quiet High Pressure Air Test Facility

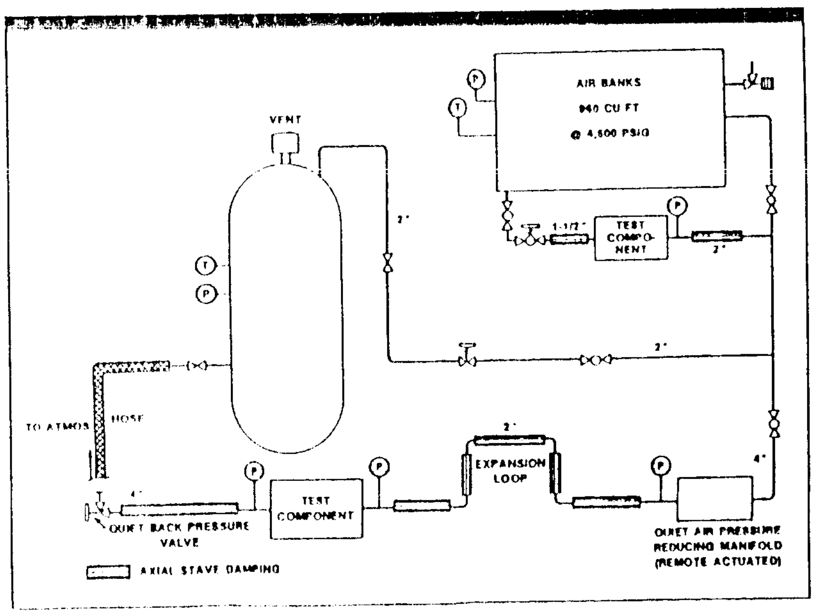
The air system provides dry, oil-free air at flow rates to 35,000 scfm and pressures to 4500 psig for evaluating the mechanical and acoustic performance o otoype or proposed shipboard system components. Air is stored in 24 high pressure HY-80 spheres located in an underground bunker for safety purposes. The total air capacity is 960 cubic feet, which allows endurance as well as steady-state and transient flow tests. The endurance tests are performed to study icing potential and long term regulation characteristics of a particular air system component. The air spheres, interconnecting piping, and control valves are arranged so that any or all of the spheres can be used to achieve required flow conditions for a test.

State-of-the-art noise reduction methods are applied to the facility's piping system and control valves to reduce flow induced vibrations and thus minimize background noise. Ambient sound pressure levels as low as 30 Adb have been observed.

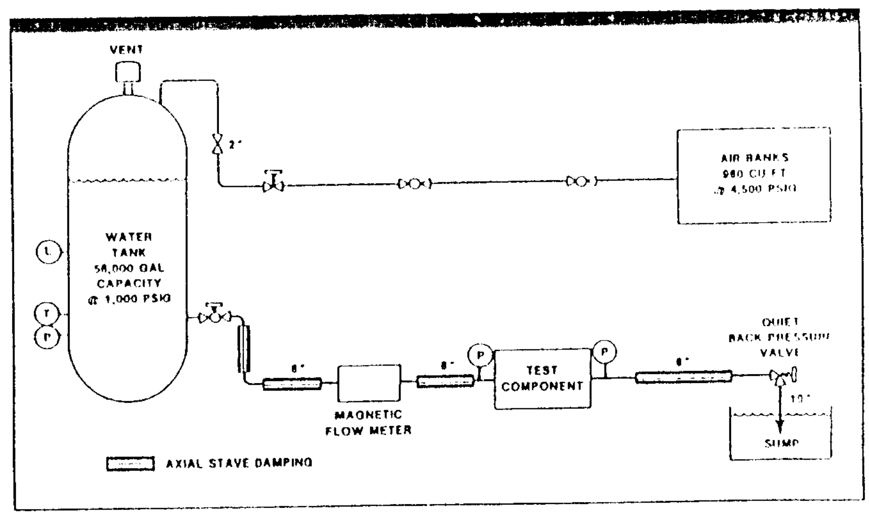
Quiet Water Test Facility

The water section provides water flow rates to 3500 gpm and pressures to 1000 psi. This fluid dynamic capability allows simulation of actual shipboard water system conditions. The water is stored in a 56,000 gallon pressure vessel constructed of HY-80 steel and rated at 1000 psig. A single test station is provided to conduct tests and evaluations of water system components. Components up to eight inches can be routinely installed and tested. Special provisions are made to accommodate larger test items.

Most system fluid flow conditions are controlled remotely from a central control panel. Flow rate is controlled by remotely operated valves, while the control panel provides monitors and displays for system flow rate(s), pressure, and temperature. Data acquisition and analysis is located near



(Left)
Test configuration
for components
in the Quiet
High Pressure Air
Test Facility



(Right)
Test configuration
for components
in the Quiet Water
Test Facility

MAGNETIC FIELDS LABORATORY
ANNAPOLIS, MD
NSWC, CARDEROCK DIVISION

TECHNOLOGY

- STEALTH
- ELECTROMAGNETIC SIGNATURE REDUCTION/SHIPS AND SUBMARINES

MILITARY VALUE

- REDUCED VULNERABILITY TO MINES
- SUPPORTS MULTIPLE JOINT MISSION AREAS
  - LITTORAL WARFARE
  - SURVEILLANCE
  - READINESS/MAINTAIN FLEET ASSETS

FACILITY

- UNIQUE
- HIGH COST TO REPLACE/RELOCATE

PROGRAMS/FUTURE PROSPECTS

- $50M IN FUNDS PLANNED THROUGH FISCAL YEAR 1999
- OVER 60% OF FUNDS TO PRIVATE SECTOR

PRODUCTS

- SHIP AND SUBMARINE STEALTH DESIGN
- IMPROVED MINESWEEPER EQUIPMENT

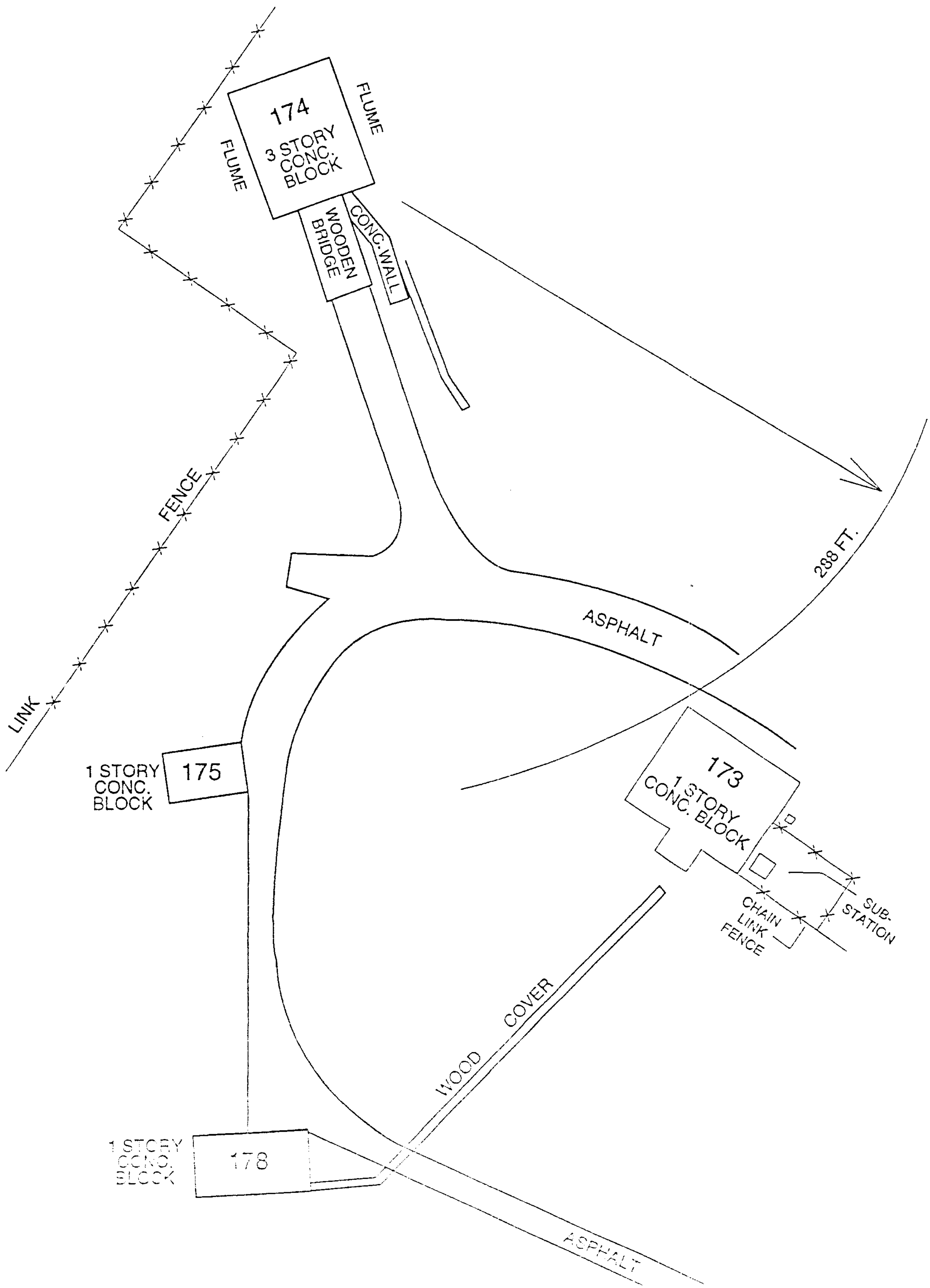
MISSION

DEVELOP THE NECESSARY METHODS, PROCEDURES, SOFTWARE, AND HARDWARE FOR REDUCING SHIP ELECTROMAGNETIC FIELD SIGNATURES TO ACCEPTABLE LEVELS. THE TECHNOLOGY DEVELOPED APPLIES TO SURFACE SHIPS, MINESWEEPERS, SUBMARINES, AND MAGNETIC SILENCING FACILITIES.

EM MAGNETIC SIGNATURE AND SILENCING AT THE NAVAL SURFACE WARFARE CENTER CARDEROCK DIVISION

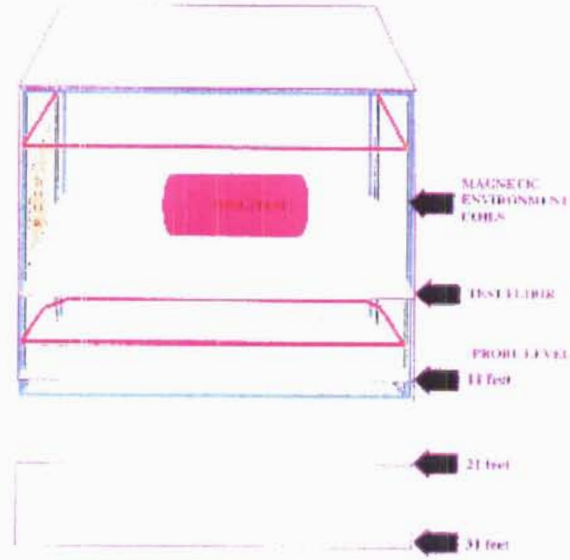
THE CARDEROCK DIVISION OF THE NAVAL SURFACE WARFARE CENTER IS THE NAVY'S CENTER OF EXCELLENCE IN SIGNATURE AND SILENCING. THERE ARE COMPLEMENTARY FACILITIES AT THE ANNAPOLIS AND WHITE OAK SITES. AS A RESULT OF BRAC 95 DELIBERATIONS, BOTH SITES ARE RECOMMENDED FOR CLOSURE. THE ANNAPOLIS SITE HAS A FULL-SCALE ITEM TEST FACILITY AND IS CURRENTLY UPGRADING ITS CAPABILITY TO TEST LARGE MAGNETIC MODELS. THE MAGNETIC SILENCING COMPLEX AT WHITE OAK CONSISTS OF THREE COMPLEMENTARY MAGNETIC TEST FACILITIES. THE ANNAPOLIS AND THE WHITE OAK TEST FACILITIES ARE USED TO CONDUCT MAGNETIC RESEARCH IN THE AREAS OF MAGNETIC SILENCING, MAGNETIC SENSOR DEVELOPMENT AND WEAPONS DEVELOPMENT. THE RESEARCH AT BOTH SITES IS A CRITICAL PART OF THE NEWLY STRUCTURED DOD STRATEGY FOR RESTRICTED CONFLICTS IN LITTORAL WATERS.

MAGNETIC FIELDS LABORATORY SITE PLAN

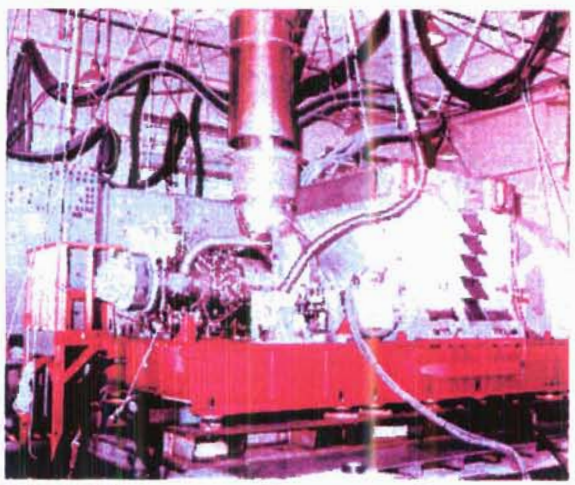


Magnetic Fields Laboratory

Magnetic Fields Measurement Building

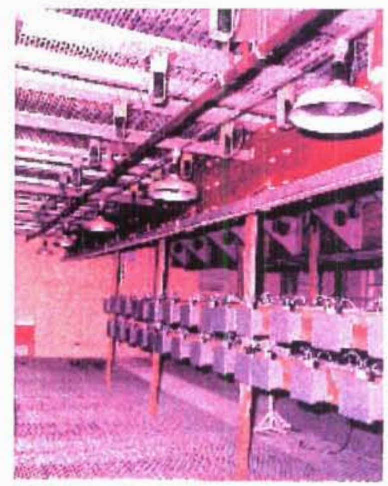


Internal Representation of
Measurement Building



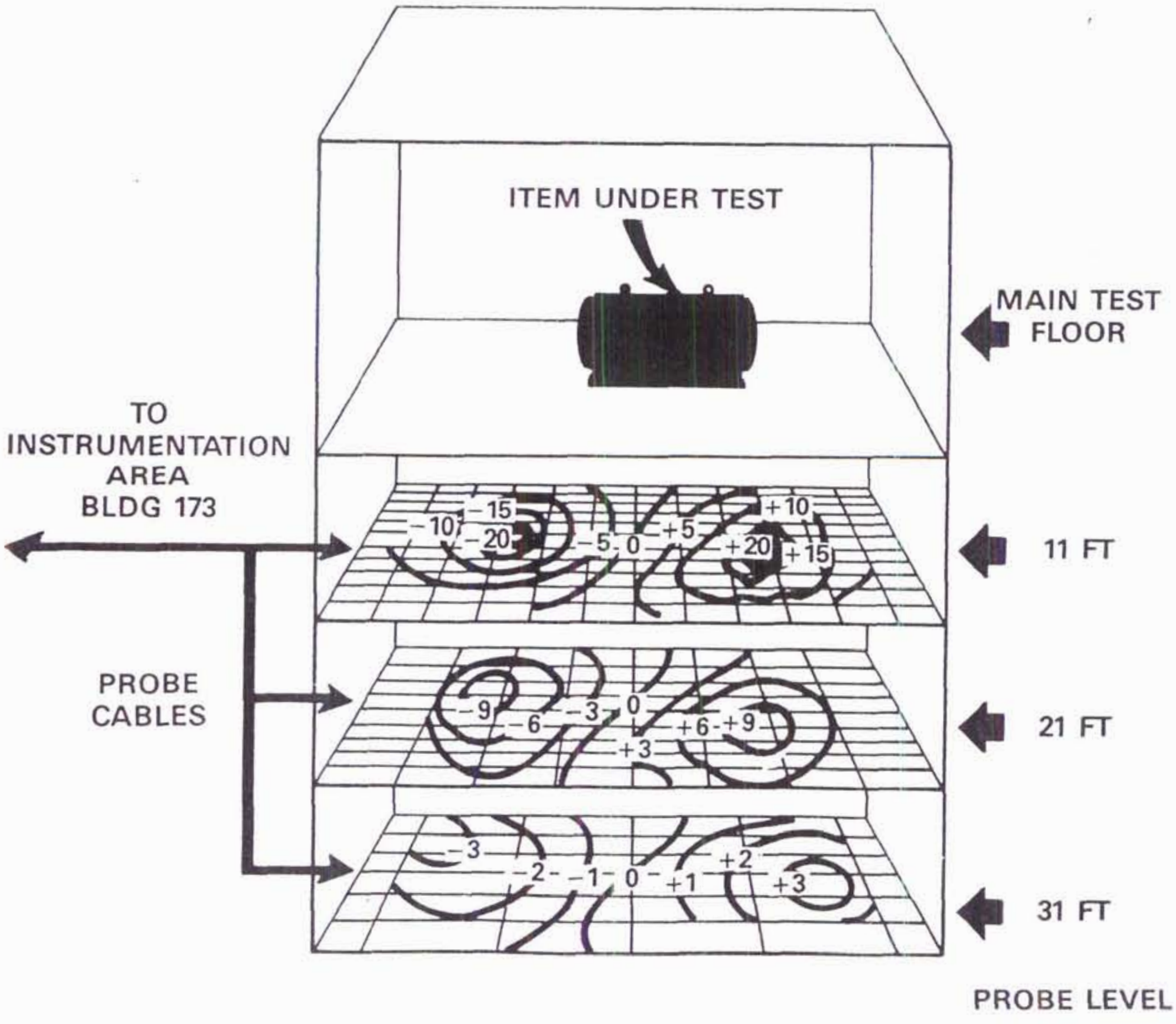
Minesweep Generator Stray
Magnetic Field Measurements

Data Acquisition and Analysis Room,
Control Building



Sensors and Magnetometers
Measurement Building Lower Levels

MAGNETIC FIELDS LABORATORY TEST BUILDING



Magnetic Fields Laboratory

CAPABILITIES

- Supports submarine and surface ship programs focused on the reduction of vulnerability to mines and hostile detection systems.
- Constructed entirely of nonmagnetic materials and physically located in a low noise environment.
- Only facility in the United States that provides accurate measurement of magnetic field signatures beneath full-size operating electrical machinery.
- Powering and loading capabilities include rectified power sources from 200A to 2500A, a 1200A motor starter/controller, a 5000A load bank, three 900A water rheostats, and two water brake dynamometers.
- Capable of simulating actual shipboard machinery environments over the 50 ft. long, 42 ft. wide, and 20 ft. high testing area, weighing up to 44 tons.
- Upgrade of facility in progress to include capability of measuring scaled physical models of submarines and surface ships up to 12 ft. long and weighing up to 1,000 pounds.

PROGRAMS & FUNDING

- $50M IN FUNDS PLANNED THROUGH FISCAL YEAR 1999

- PROGRAMS PRIMARILY SUPPORT THE NEW ATTACK AND SEAWOLF SUBMARINES IN ADDITION TO EXPLORATORY DEVELOPMENT FOR SURFACE SHIP SILENCING

- FUNDING SOURCES ARE FROM THE NAVY (OFFICE OF NAVAL RESEARCH, NAVAL SEA SYSTEMS COMMAND AND OFFICE OF NAVAL OPERATIONS) IN ADDITION TO PRIVATE FUNDS

- THE WORK IS CARRIED OUT BY THE NAVY, INDUSTRY AND UNIVERSITIES AND INCLUDE INTERNATIONAL EXCHANGE PROGRAMS (UNITED KINGDOM, JAPAN, GERMANY, ETC)

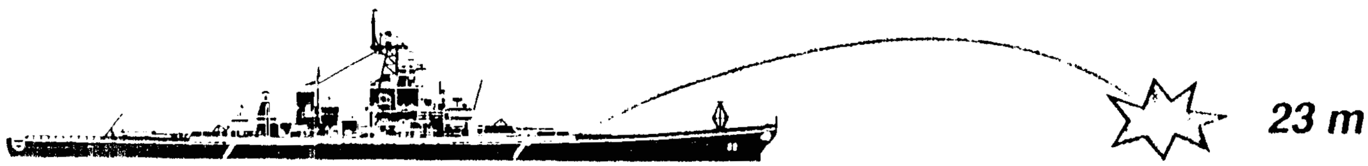
- THE APPROACH TAKEN IN STEALTH DESIGN INCLUDE MEASUREMENTS AT SEA AND IN THE LABORATORY IN ADDITION TO COMPUTER MODELING. LOSS OF LABORATORY MEASUREMENTS WOULD ADD RISK AND HIGH COSTS (MORE SEA TRIALS)

Pulsed Power Systems R & D

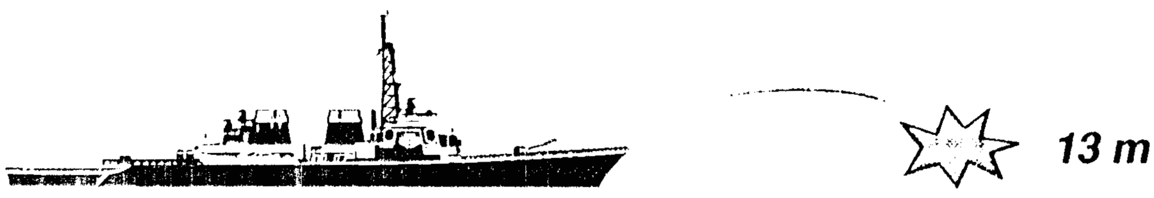
- Primary sponsor is ETC Gun Technology
- Fully coordinated under PROJECT RELIANCE, Navy lead
- Teaming effort with NSWC Dahlgren and Indian Head
- Also supports:
  Electromagnetic Aircraft Launchers
  Advanced Mine Countermeasures
  Environmental Remediation Efforts
- 2 and 4 MVA prime power sources
- 8.5 MJ US Army Pulsed Power Module
- EMI shielded control and data acquisition

NAVAL FIRE SUPPORT

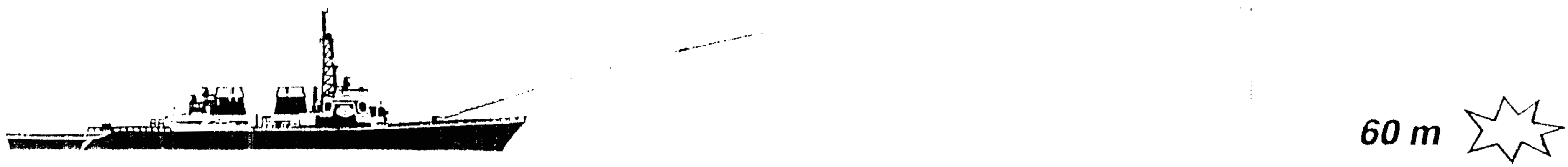
BATTLESHIPS – 16" GUNS



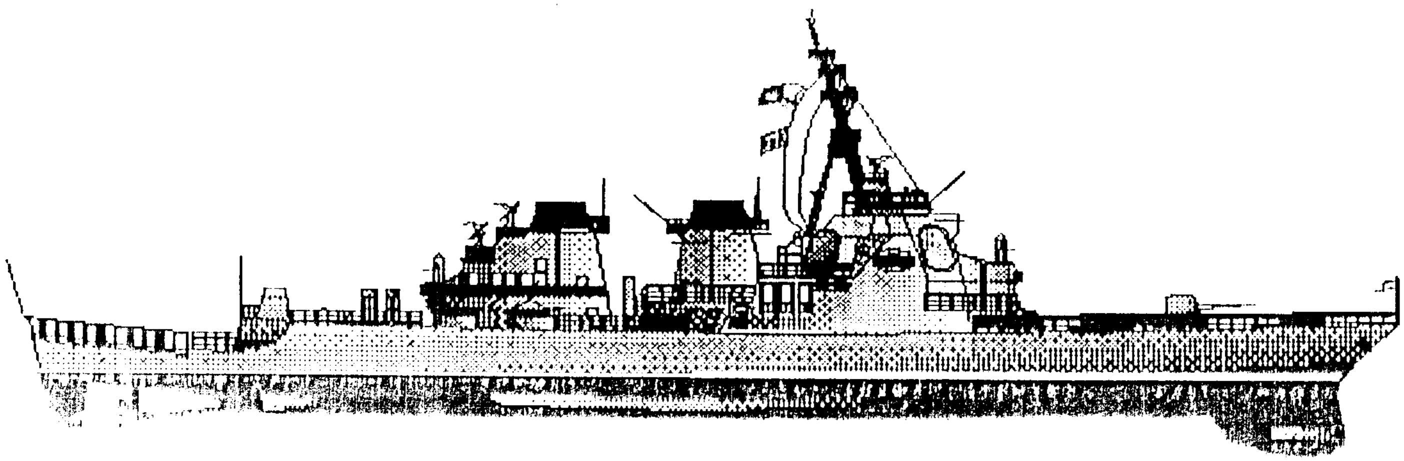
CRUISERS AND DESTROYERS– 5" GUNS

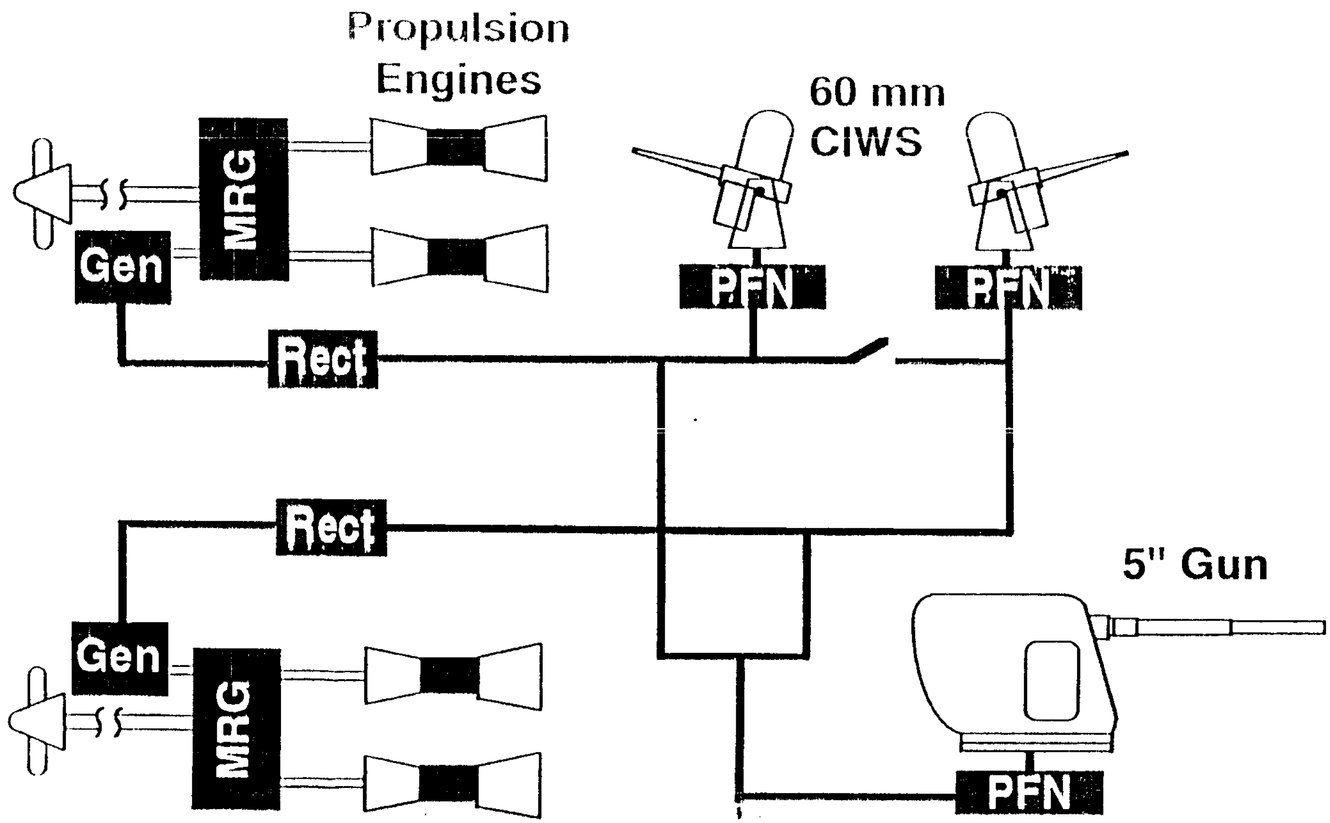


CRUISERS AND DESTROYERS– 5" ETC GUNS



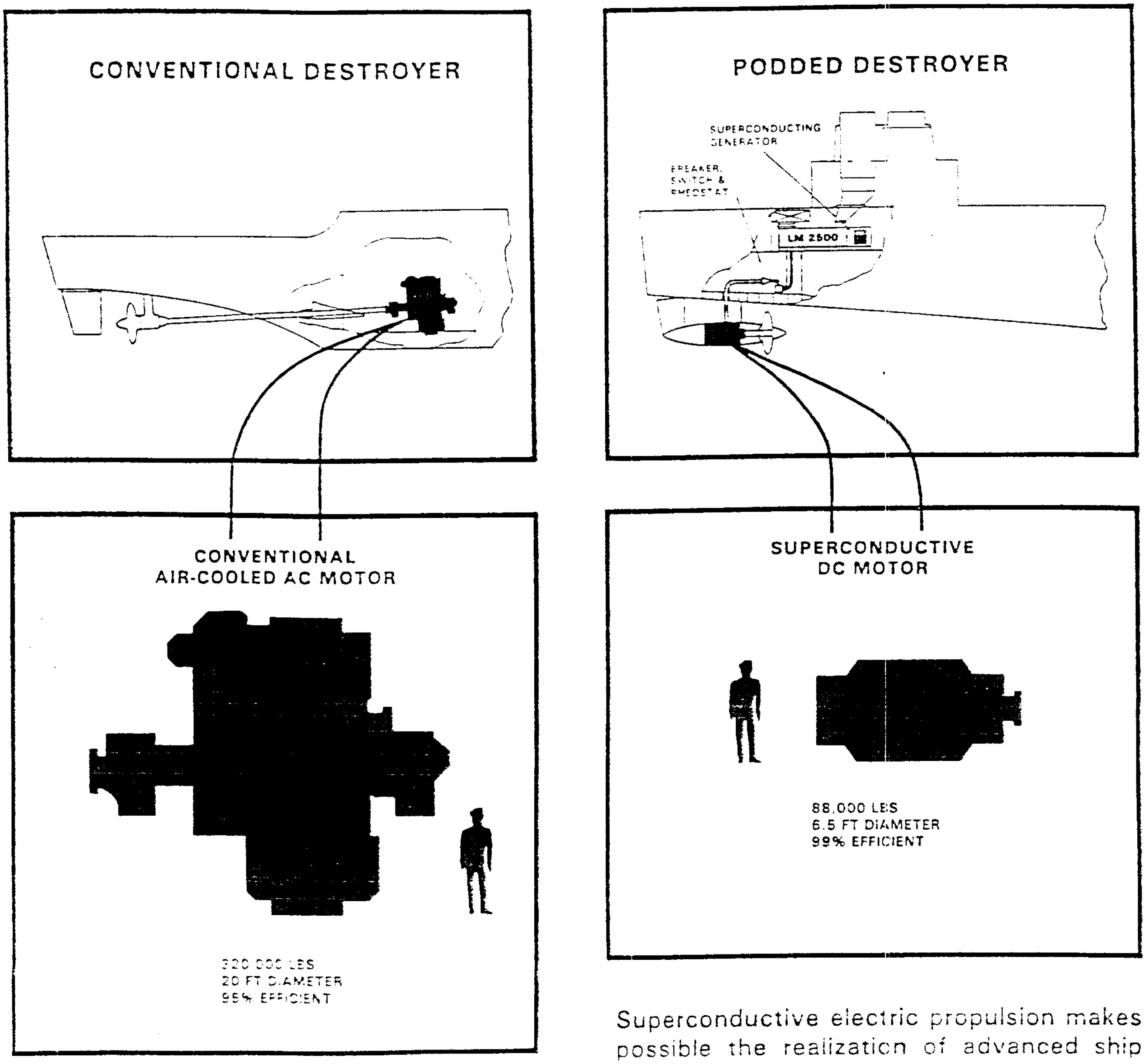
Electric Gun Equipped Surface Combatant





NAVY ELECTRIC PROPULSION

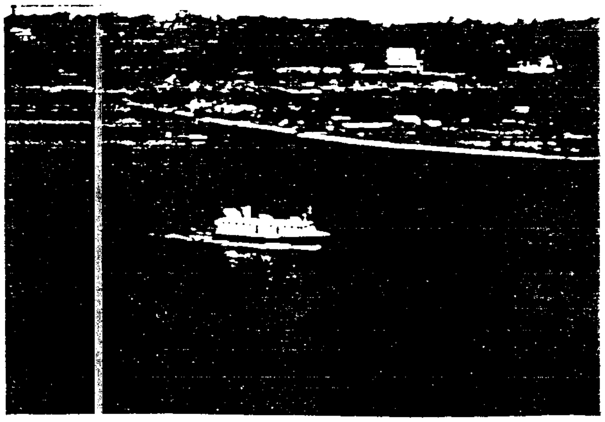
40,000 HP 180 RPM



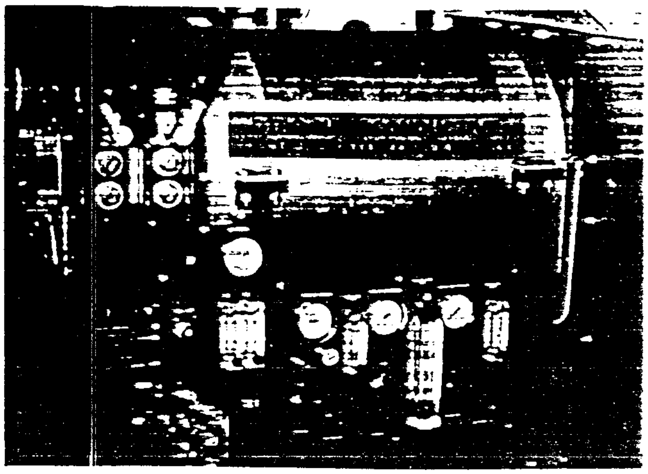
Superconductive electric propulsion makes possible the realization of advanced ship concepts due to its significant increase in power density. This will result in improved ship performance (acoustic signature and energy efficiency) and reduced ship size and cost.

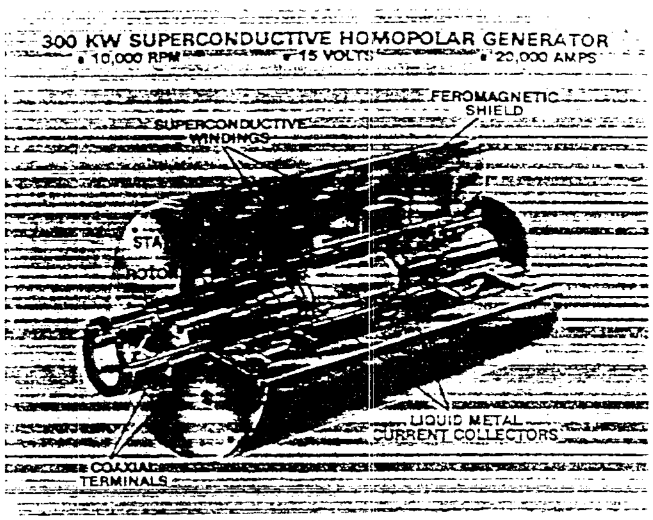
400 HP ELECTRIC DRIVE SYSTEM

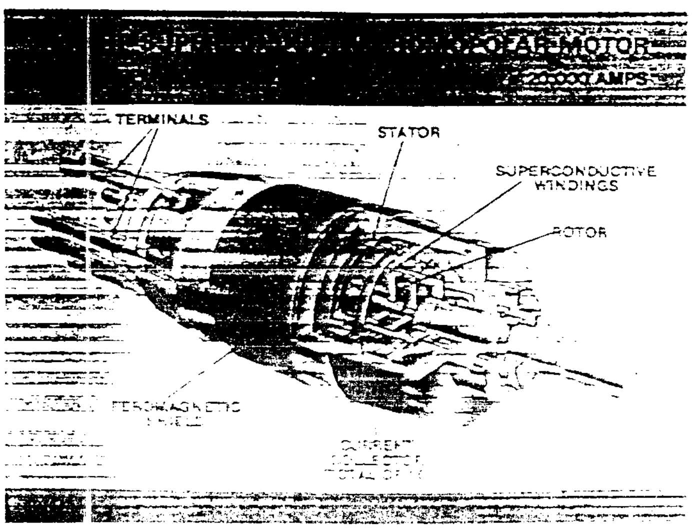
The David Taylor Research Center, Annapolis, MD., began development of superconductive electric propulsion systems in 1969. The first complete system, consisting of a turbine driven 300 KW superconductive homopolar generator supplying power to a 400 HP superconductive homopolar motor, was constructed in the early 1970's. The system was installed on the test craft Jupiter II. On September 23, 1980 the vessel became the first in history to be propelled by a completely superconductive electric drive. In 1980 there were 12 other at-sea demonstrations. The machines now serve as lab test rigs to explore more advanced concepts in machine design.

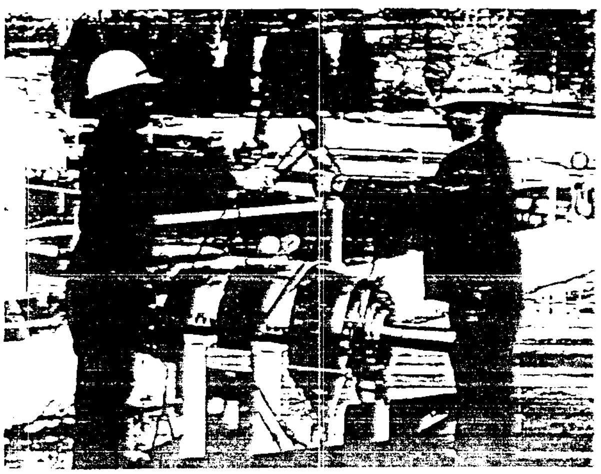


Jupiter II underway with electric drive



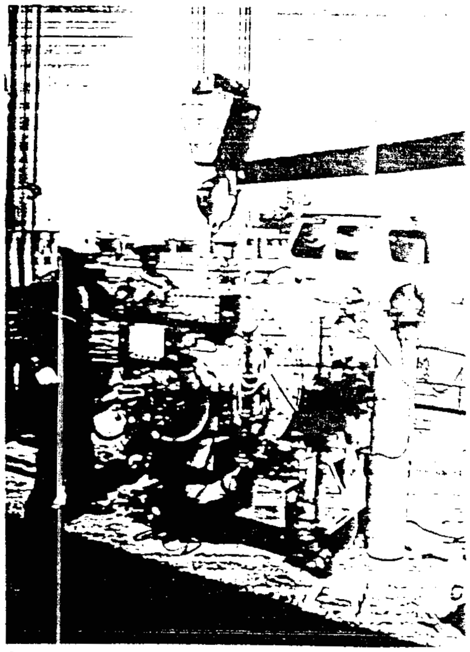




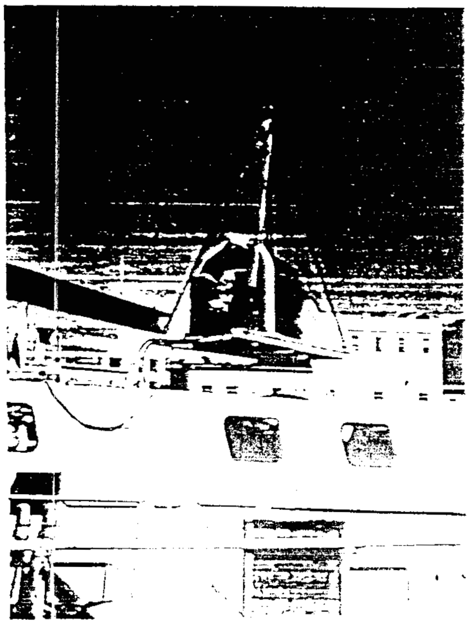


The superconductive motor being installed on Jupiter II

3000 HP ELECTRIC DRIVE SYSTEM

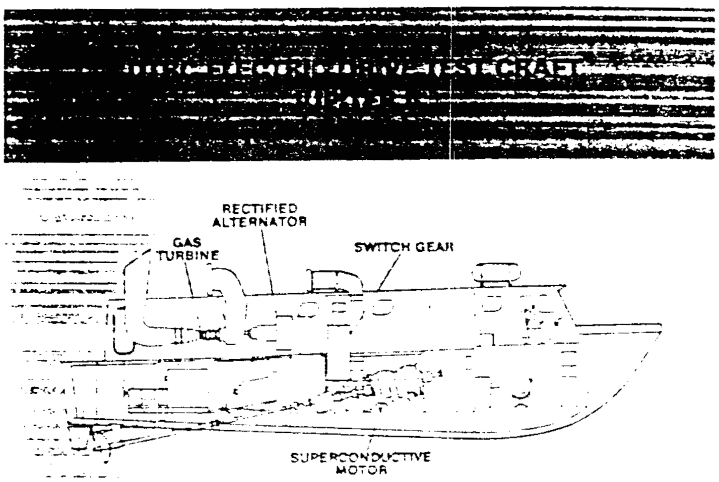


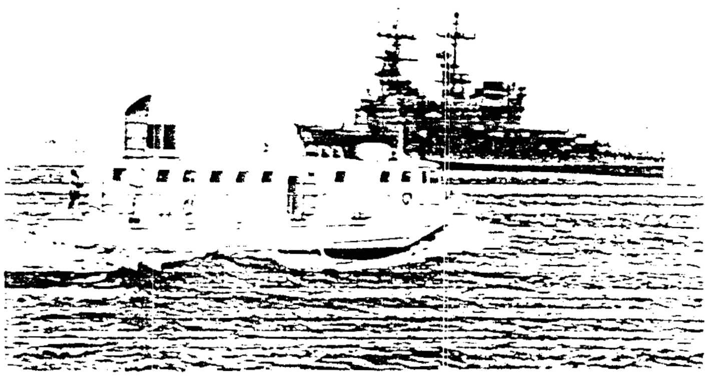
General Electric 3000 HP superconductive motor is installed on Jupiter II. Motor characteristics: 1200 rpm, 100 volts, and 22,500 amps.



Normally [illegible] tor built [illegible] installed on Jupiter [illegible] acteristics [illegible] 22,500 amp[illegible]

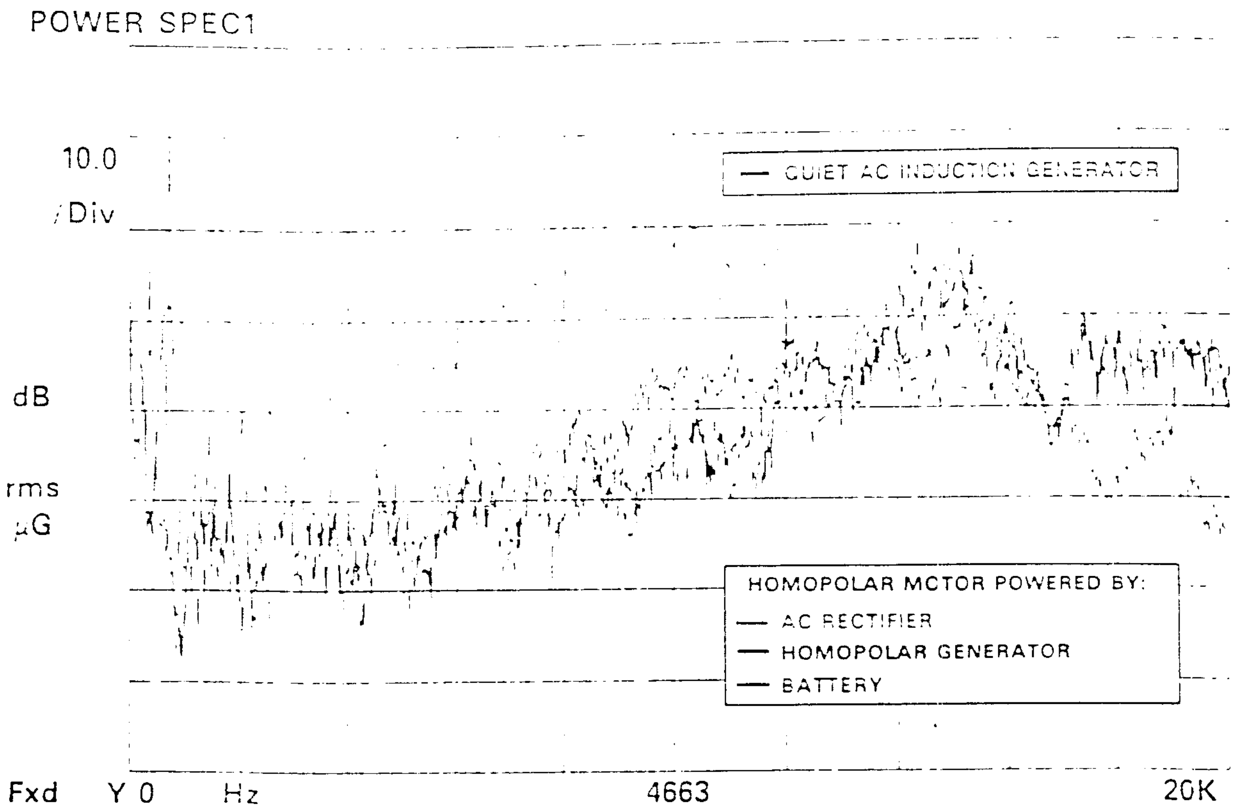
Following the success of the Navy-developed 400 HP superconductive propulsion system, a contractor-built 3000 HP system was installed aboard Jupiter II in 1983. Several at-sea demonstrations were conducted. This system consists of a gas turbine driven rectified alternator supplying power to a 3000 HP superconductive homopolar motor.

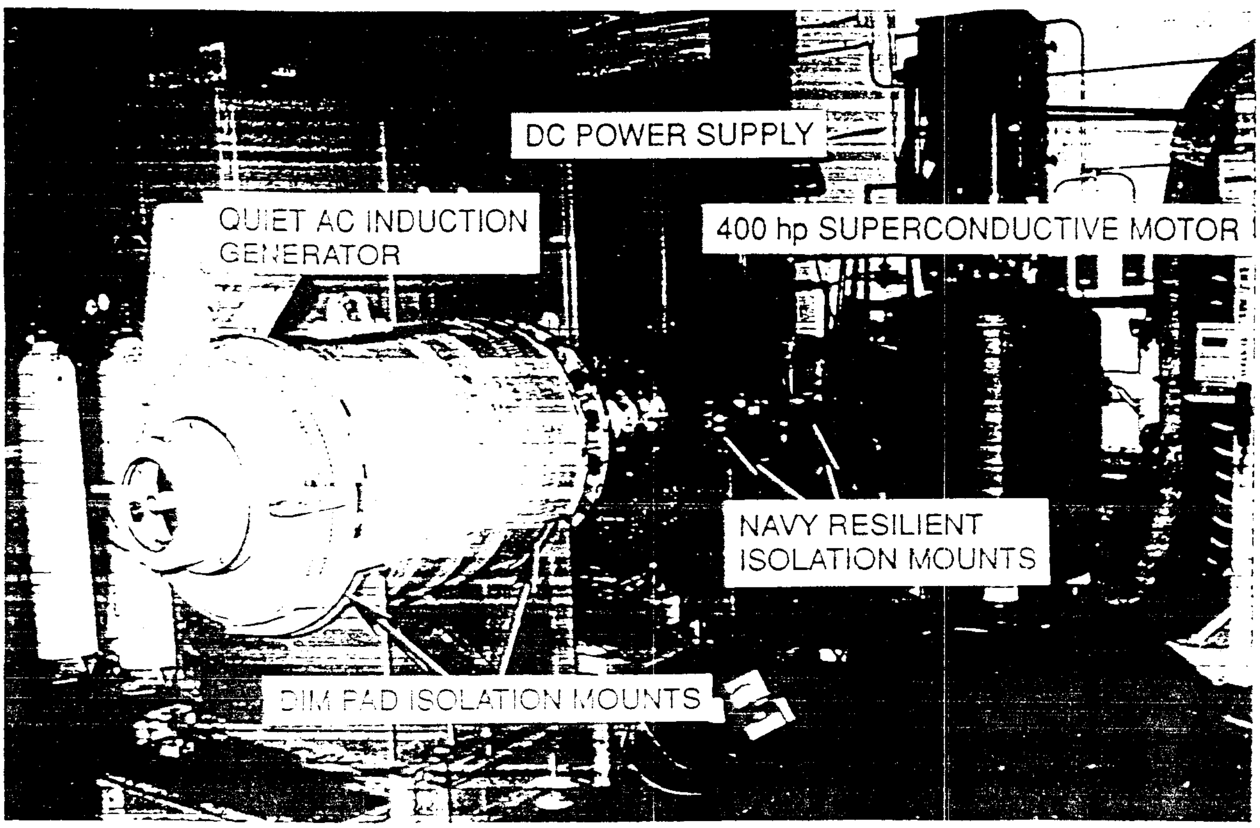




Jupiter II with the destroyer USS DEYO (DD 970)

HOMOPOLAR ACOUSTIC PERFORMANCE

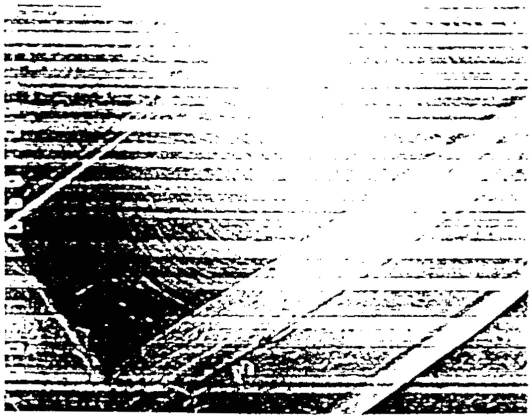




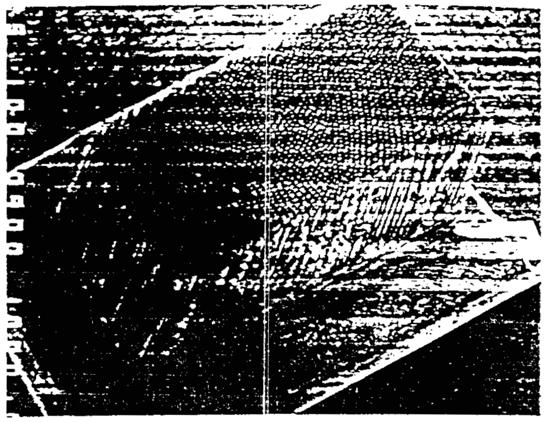
CURRENT COLLECTOR TECHNOLOGY

Fiber Brush Current Collector

Unetched Cu Matrix Nb Fiber



Etched Brush Sample

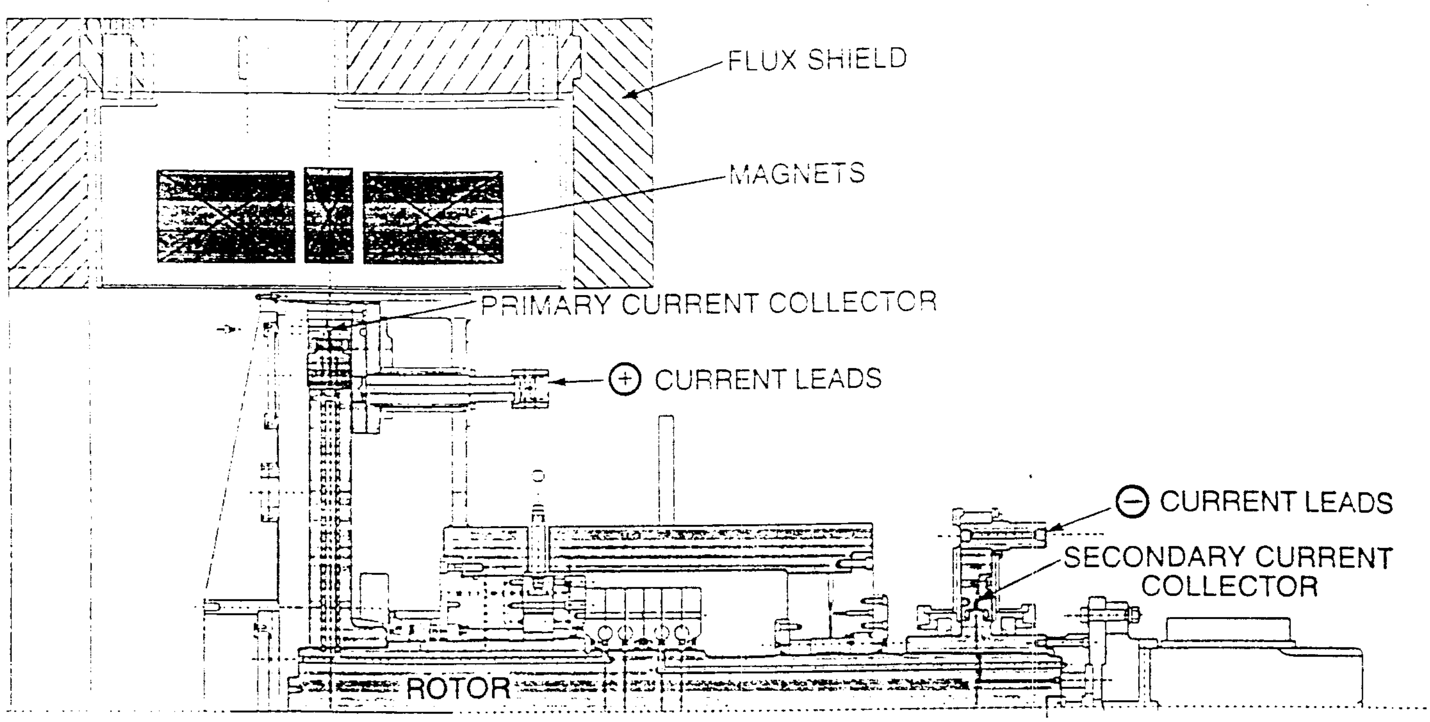


Fiber Brush Current Collector Parameters

Fibers per Brush	2000
Fiber Diameter	.002 in
Material	Niobium Fibers in Copper Matrix
Packing Fraction	75%
Orientation	40 degrees Trailing
Load	130 g/brush

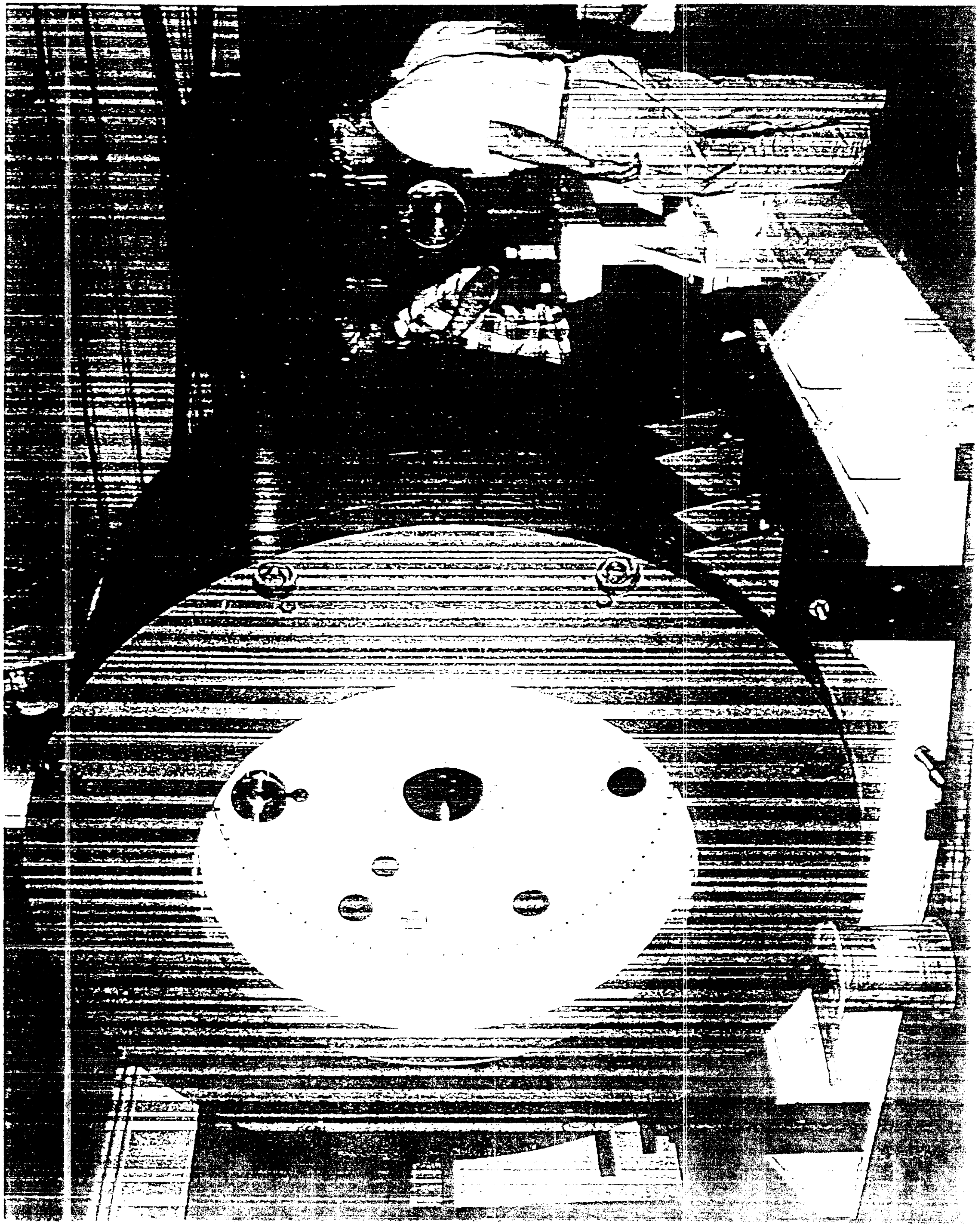
Fiber Brush Current Collector Assembled Into Holder

30 MW MOTOR MODEL TEST RIG

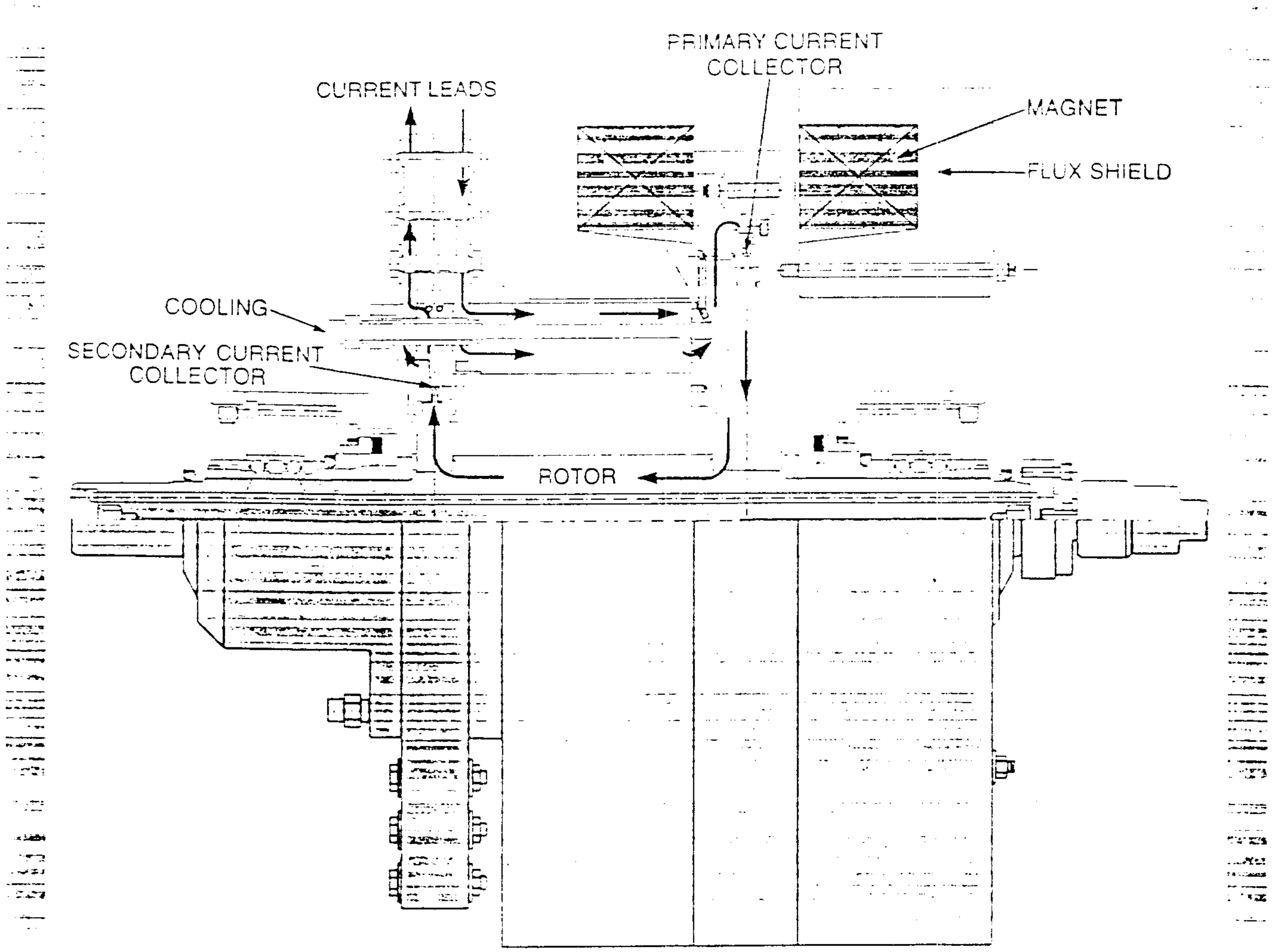


CAPABILITIES:

Speed:	**180 rpm**
Current:	**180 kA**
Mag Field:	**2.3T**



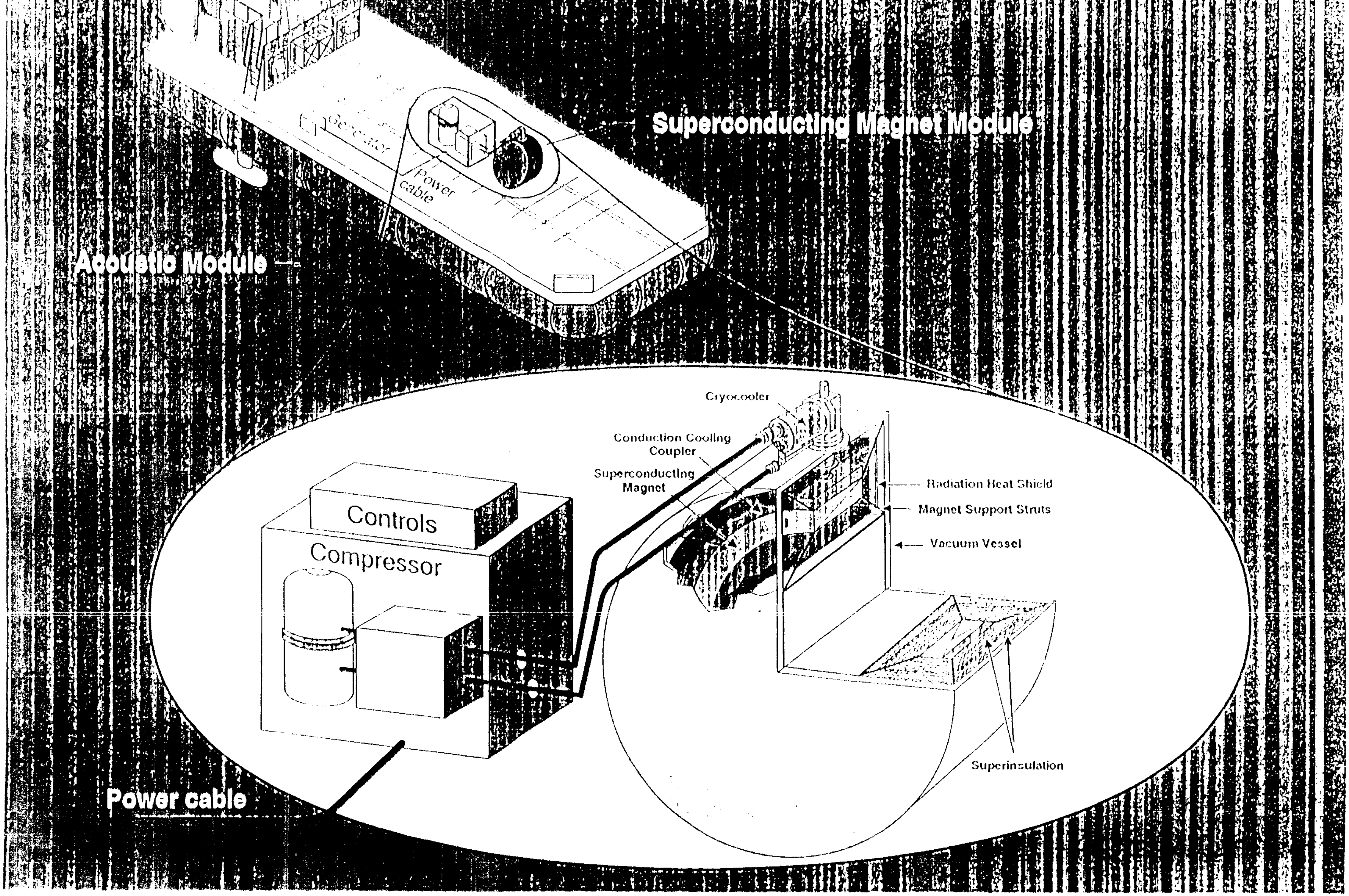
15 MW GENERATOR MODEL TEST RIG



CAPABILITIES:

Speed:	**6000 rpm**
Current:	**90 kA**
Mag Field:	**0.5T**

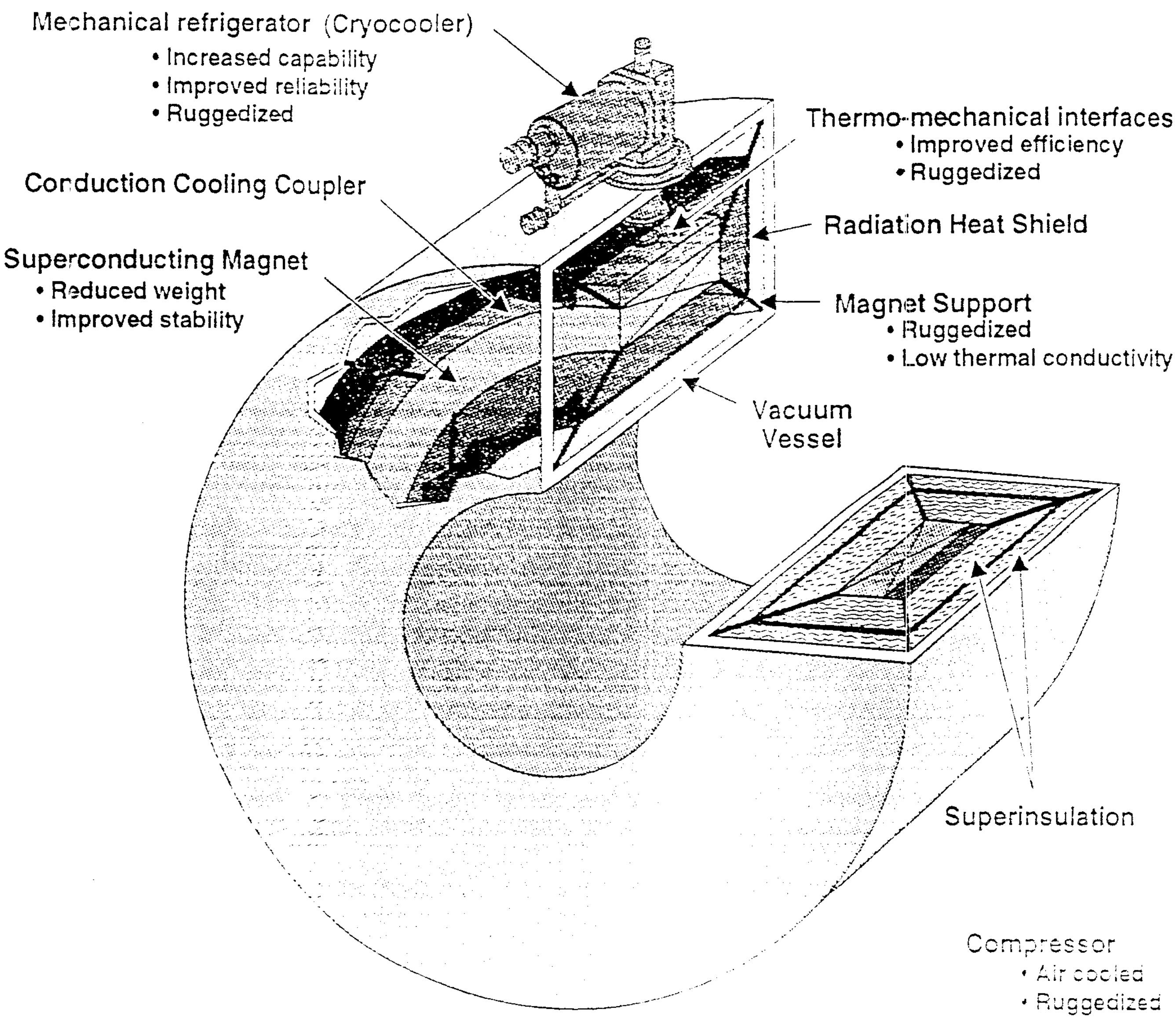
ADVANCED LIGHT WEIGHT MAGNETIC INFLUENCE SWEEP SYSTEM



Advanced Lightweight Influence Sweep System (ALISS)

GOAL: Demonstrate conductively cooled superconducting technology to provide high speed influence sweep system for over-the-horizon amphibious assault.

Component Development Required for Conductively Cooled, Superconducting Magnet System

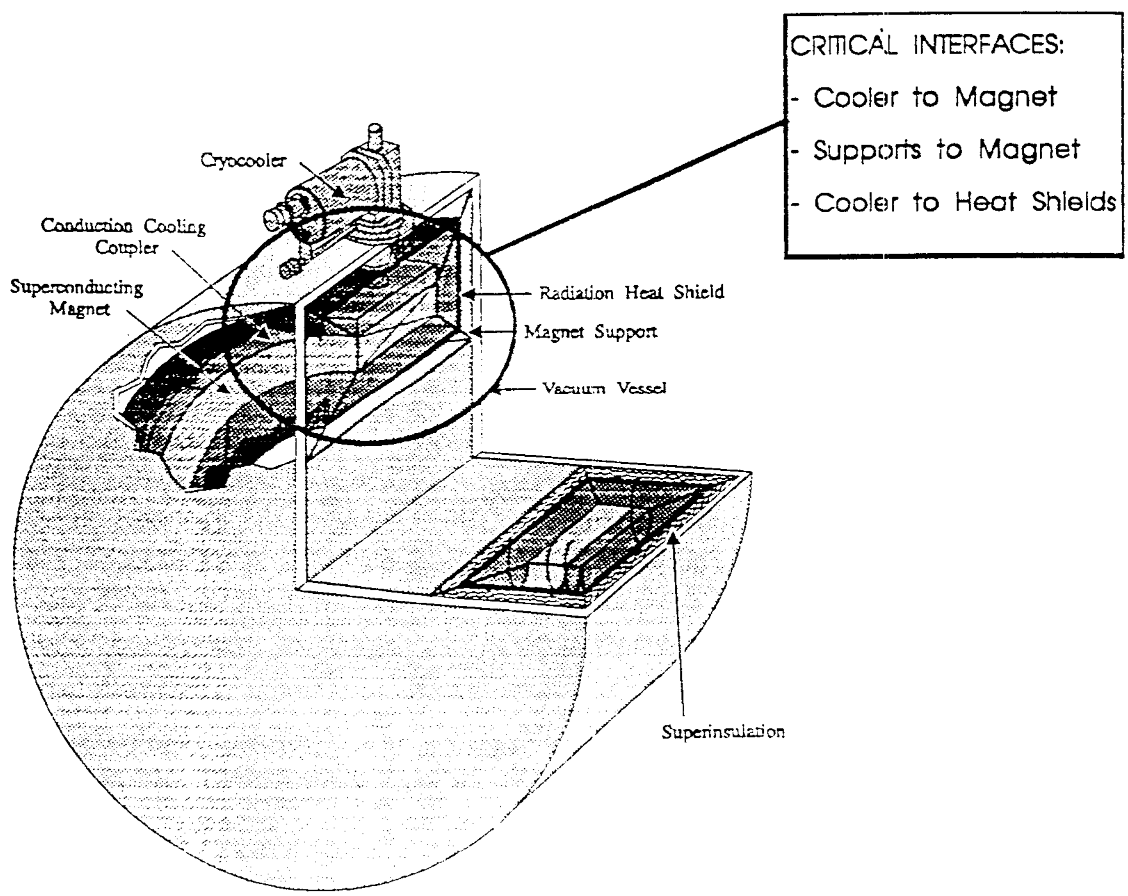


ADVANCED LIGHTWEIGHT INFLUENCE SWEEP SYSTEM (ALISS) THERMAL AND MECHANICAL MAGNET INTERFACES

SUMMARY: Conductively cooled superconducting magnet systems are cooled directly by very low temperature cryogenic refrigerators. In these conductively cooled systems the connections, or interfaces, between for example the superconducting magnet and refrigerator are critically important. If the interfaces do not have very low resistance to the flow of heat, then increased refrigeration capacity is necessary. Therefore, thermally efficient, shock and vibration tolerant thermal and mechanical interfaces are critical for conductively cooled superconducting magnet systems.

TECHNOLOGY DEVELOPMENT:

- Designed and fabricated only full scale interface measurement apparatus in U.S.A.
- Full-scale interface concepts are designed, fabricated, and tested.
- Full scale interface evaluations conducted for industry because of the uniqueness of this apparatus.



THERMAL INTERFACE EVALUATION

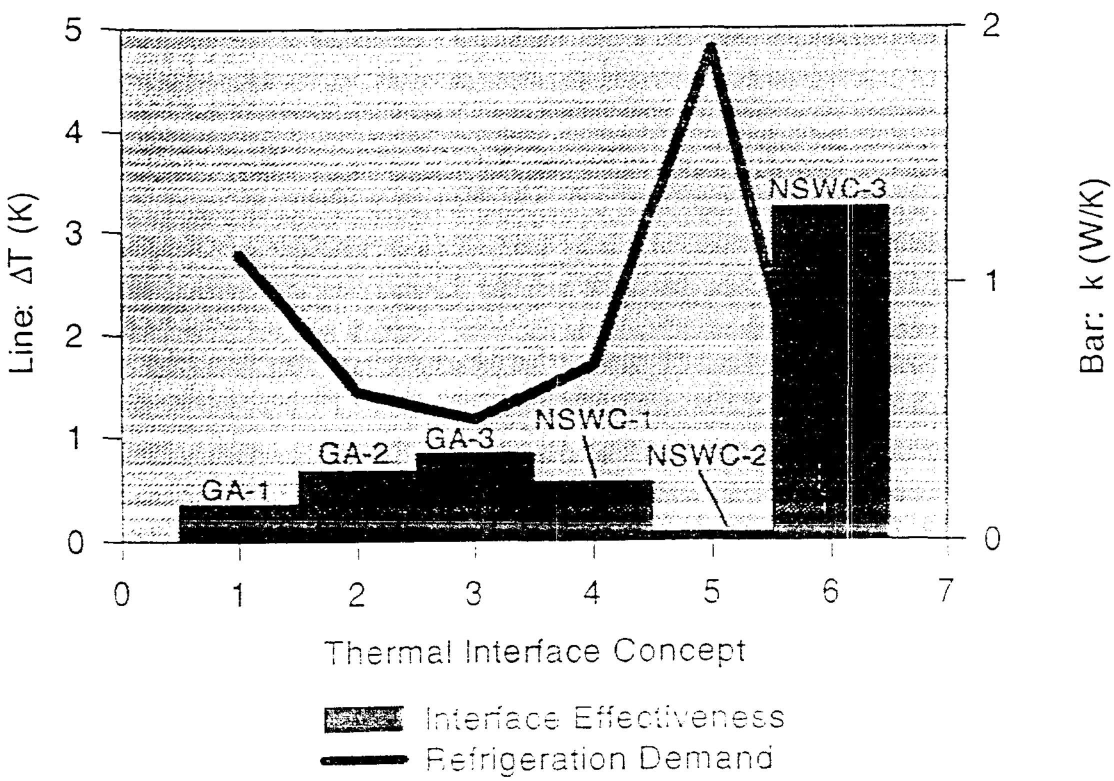
A test apparatus has been designed and fabricated at the Annapolis Detachment, NSWC for evaluating the thermal effectiveness of full-scale ALISS interface concepts. This apparatus has been used to evaluate novel concepts of NSWC and industrial partners. Example results from some of these tests are shown below in Fig. 1. Industry is beginning to use this apparatus because an interface evaluation system like this is not available any where else in the United States.

Industrial Customers:

- General Atomics: Interface concepts for ALISS.
- General Electric: Performance of high temperature superconducting current lead.

Dual Use: Industrial superconducting magnet manufacturers have recognized the need to transition to conductively cooled magnet systems. For example, manufacturers of magnetic resonance imaging systems have already begun to fabricate systems derived in part from ALISS interface technology. Most importantly, new possibilities for using superconducting magnet technology are emerging because of the development conductively cooled magnets

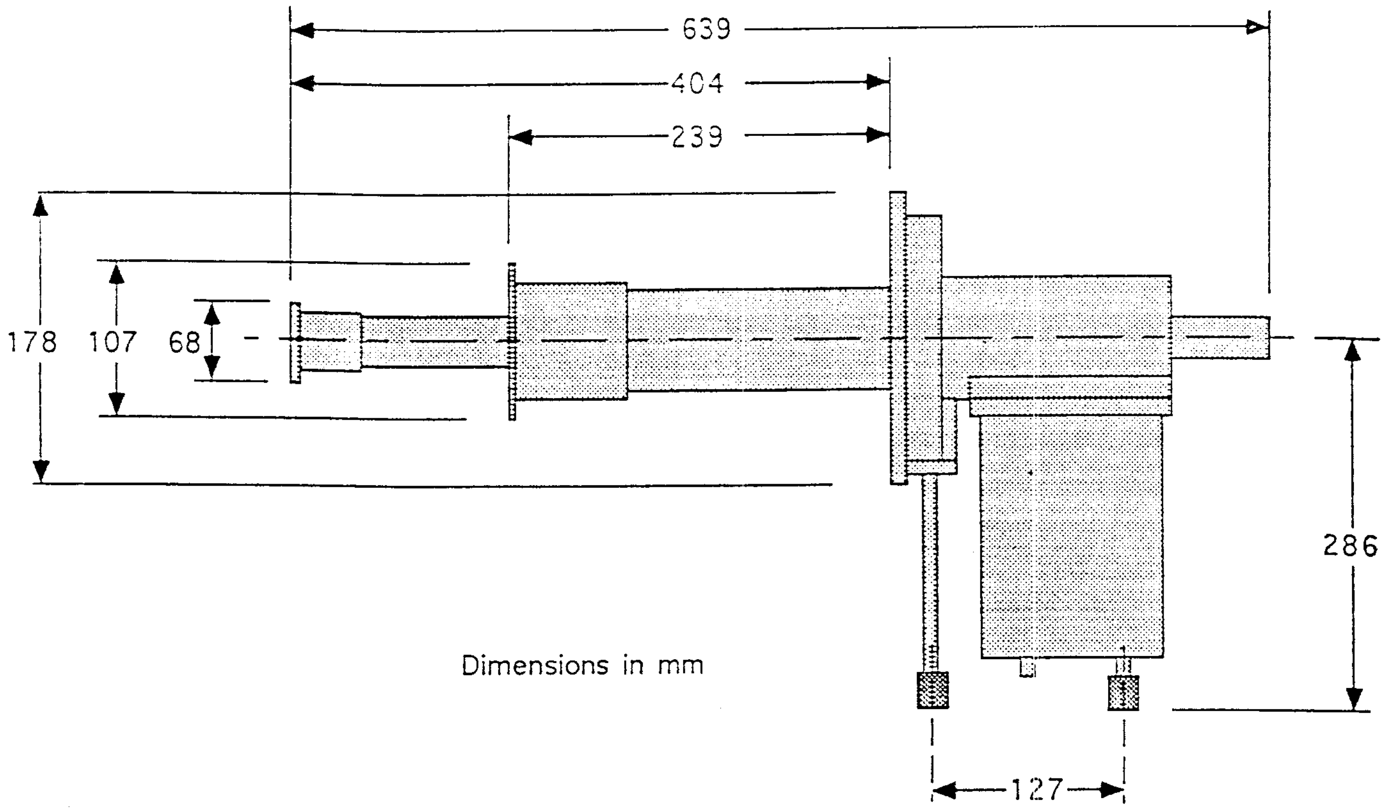
Figure 1. Industry and NSWC Interface Performance



NAVAL SURFACE WARFARE CENTER
ANNAPLOIS, MD

CRYOGENIC REFRIGERATION

NSWC Developed G-M Cryocooler

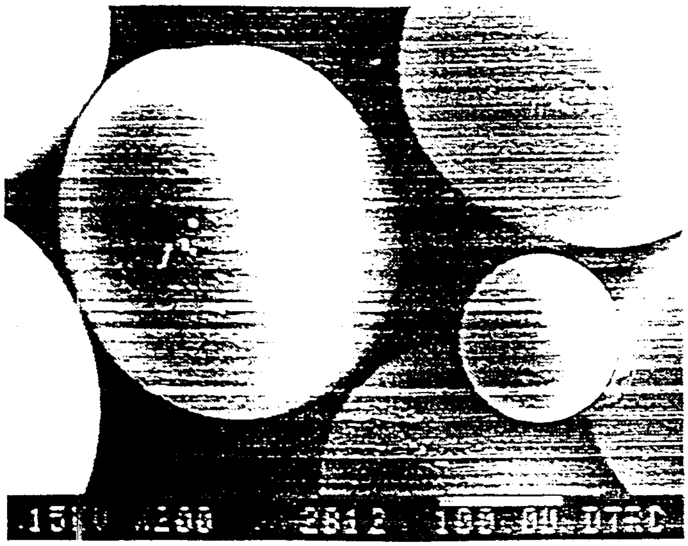


- First commercialization of a 4.2K G-M cryocooler modified by NSWC
- Cryocooler utilizes NSWC neodymium regenerator
- First cryogenic cooler to meet mil-spec for shock and vibration after modification by NSWC
- NSWC modified cooler used to demonstrate conductive cooling of a magnet at 4.2 K

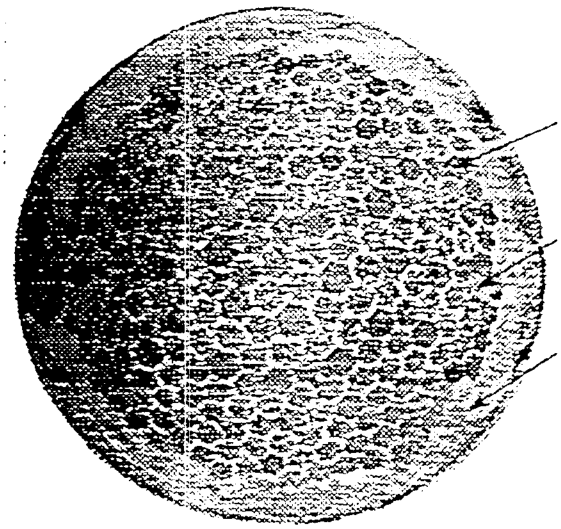
NAVAL SURFACE WARFARE CENTER
ANNAPOLIS MD

CRYOGENIC REFRIGERATION

LOW TEMPERATURE REGENERATOR GEOMETRIES



SPHERES



PERFORATED PLATE

0.002" RIBBON, 0.002" RIDGE, 0.100" WIDTH

EMBOSSED RIBBON

MAGNETOHYDRODYNAMIC DRIVE (MHD)

PROPELLERLESS PROPULSION

SUMMARY. Magnetohydrodynamic drive was invented in the United States in 1961. MHD is at its essence a water pump or water jet drive. As apposed to a typical industrial pump, an MHD pump takes advantage of the interaction between magnetic fields and electric currents to produce a pumping effect that can propel a submarine or surface ship as shown below. Magnetic fields necessary for MHD are extremely high, and are achievable only by using superconduciting magnets. Because MHD thrusters have no moving parts, MHD has the potential to be an extremely quit drive system without loss of maneuverability or speed. Recently, an MHD program has been initiated that will result in a demonstration of an MHD driven 8.5m long unmanned underwater vehicle. This demonstration will take place in FY97. Finally, a conceptual rendering of a Los Angeles class submarine outfitted with an MHD thruster is shown on the following page.

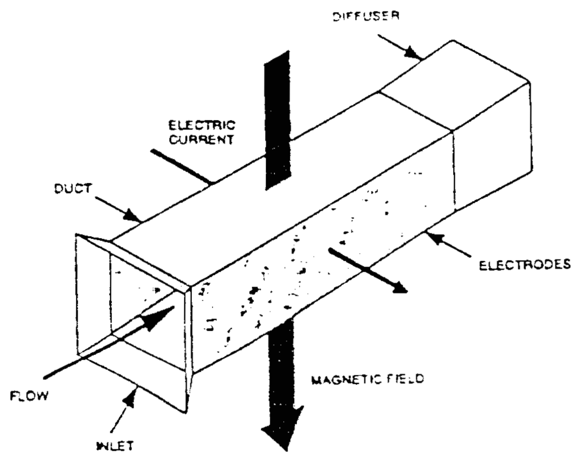


Fig. 1. Basic magnetohydrodynamic drive duct.

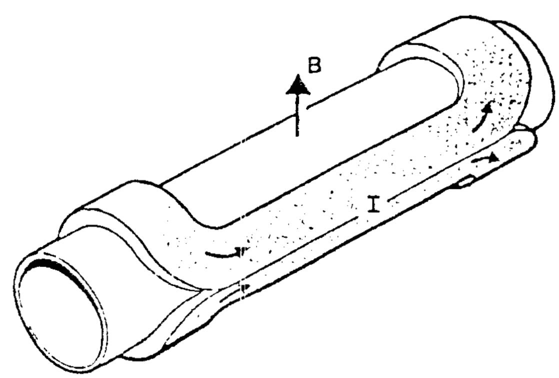
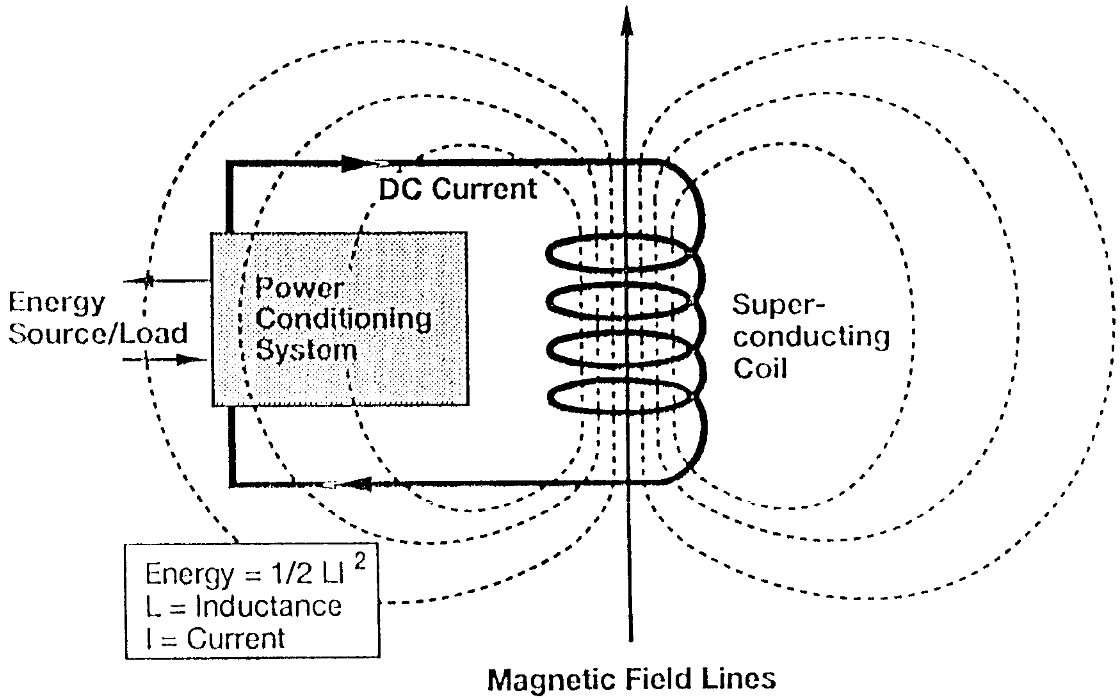


Figure 2. Saddle configuration duct.


ARTIST'S CONCEPT OF LOS ANGELES
PROPELLED BY A MAGNETO
DERIVED FROM
U.S. NAVY PHOTOGRAPH
BY CHRIS OXLEY
N8088-1
TEXTRON Defense Systems

SUPERCONDUCTIVE MAGNETIC ENERGY STORAGE (SMES)



SMES Principles of Operation

SUPERCONDUCTING MAGNETIC ENERGY STORAGE (SMES)
ENERGY TRANSFER BETWEEN SUPERCONDUCTING MAGNETS

SUMMARY. The U.S. Navy has developed an efficient means to transfer magnetic stored energy from one superconducting magnet to another as shown in Figs. 1 and 2 below. Fleet systems and procedures benefiting from this work include superconducting electric drive and mine sweeping. Commercial industries benefiting from SMES technology include for example electrical utilities for load leveling and diurnal storage, and specialty space applications for high precision magnetic balancing. SMES technology is a rapidly growing and maturing technology, and the Navy will continue to be a world leading active partner.

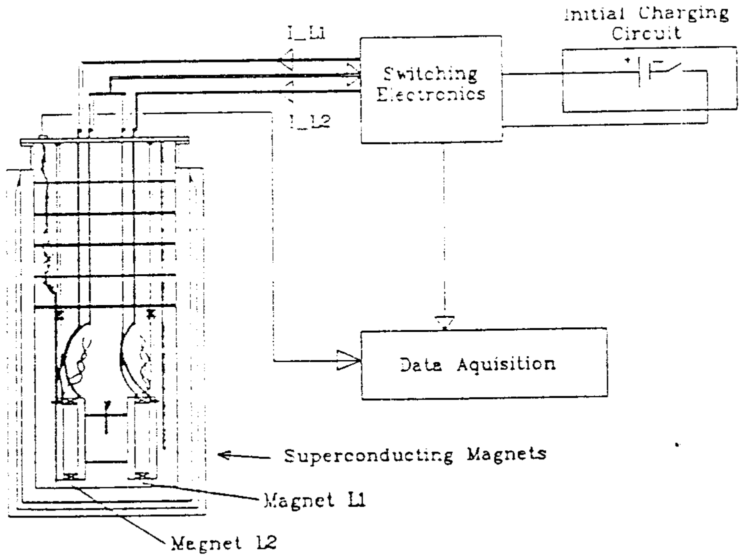


Figure 1. Superconducting magnetic energy transfer control circuitry and superconducting magnets.

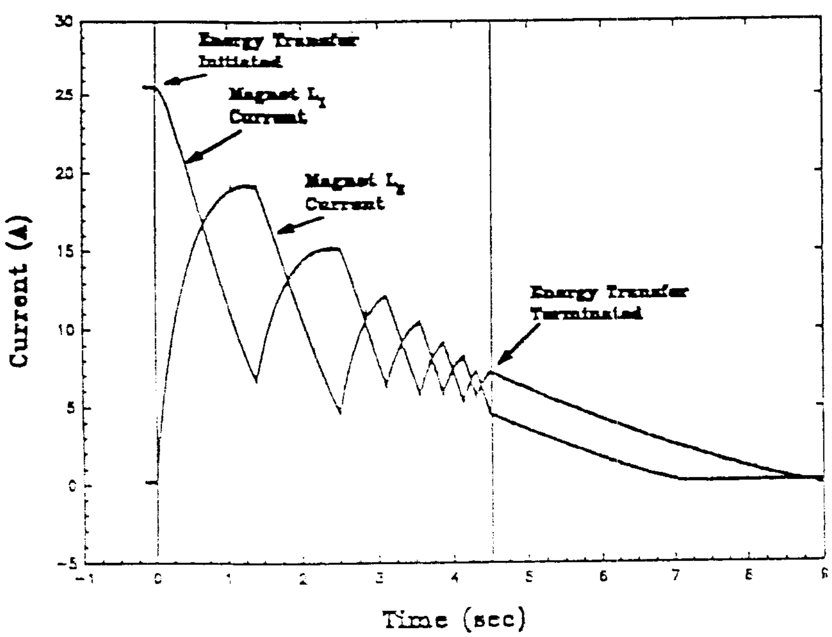


Figure 2. Energy transfer back and forth between two superconducting magnets. In this system the rat of energy transfer and the characteristics, shape of the curves, of how the energy is transferred can be tailored to an applications needs.

NSWC
Naval Surface Warfare Center
A tradition of excellence!

BRAC Site Visit 5-19-95
Annapolis Detachment
Commissioner Al Cornella

Wrap Up

Tim Doyle

Wrap Up

- Machinery R&D is Necessary
- Machinery Programs are and Will Remain Healthy
- Annapolis R&D Capabilities are Excellent

MACHINERY R&D HAS A FUTURE IN A DOWNSIZED NAVY

- Compliance with Environmental Initiatives
- Pressure to Reduce Fleet Costs
  - Procurement
  - Operating and Support
- Need to Maintain Qualitative Advantage
  - Stealth
  - Survivability
- Support of Dual Use and Defense Conversion Initiatives

Naval Surface Warfare Center
A tradition of excellence!

MACHINERY R&D PRODUCTS PROVIDE IDEAL CANDIDATES FOR DUAL USE AND DEFENSE CONVERSION

Annapolis teaming with Industry and Academia

Examples

- Fuel Cells for Electrical Power
- Composite Material Application
- Applications of Superconductivity
- Low Noise Machinery
- Reduced Cost Pumps, Compressors
- Fault Tolerant Electrical Power Systems
- Advanced Power Electronics
- Ozone-Safe Machinery
- Advanced Electrical Machinery
- Pulsed Power Systems

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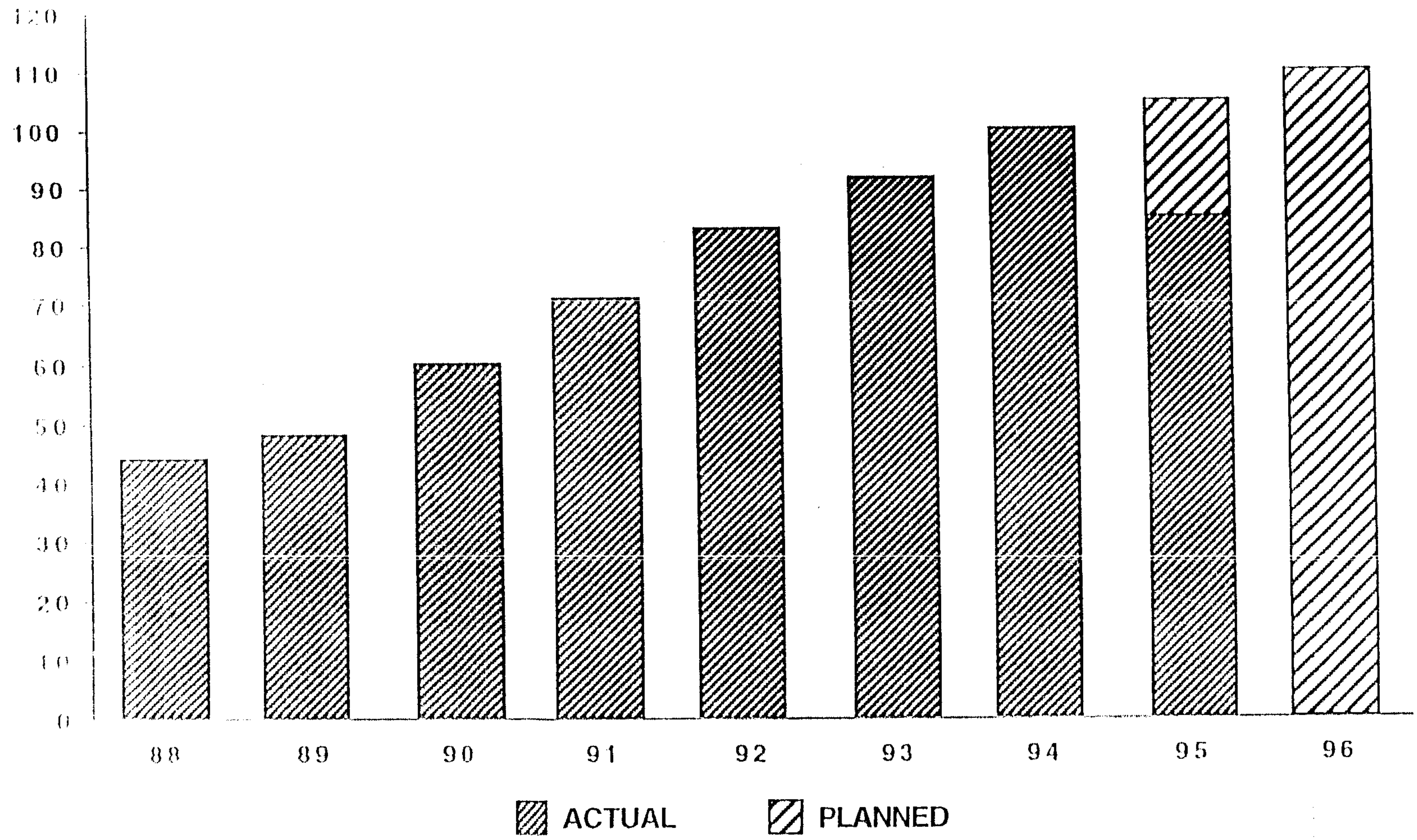
MACHINERY R&D DIRECTORATE FUNDING TREND



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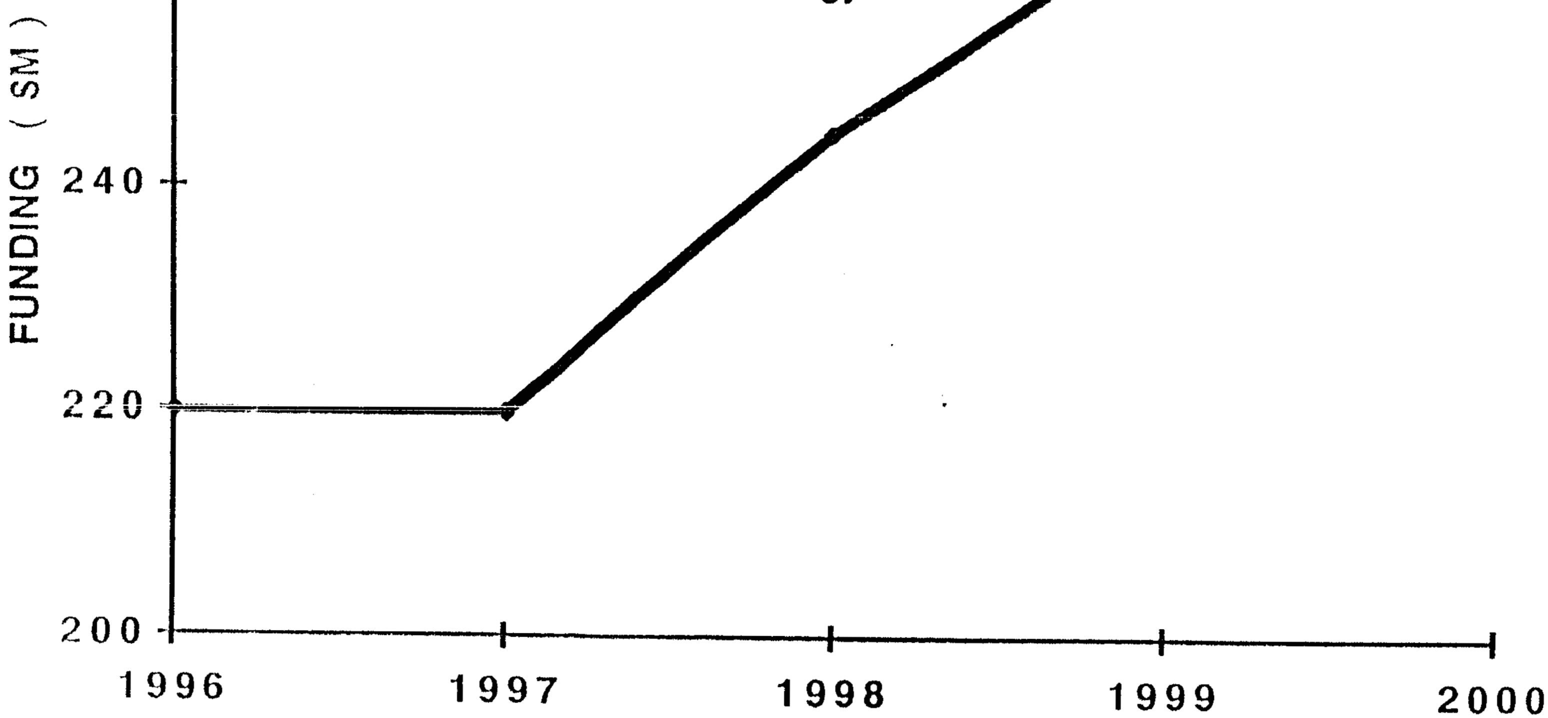
MACHINERY R & D
CUSTOMER PROGRAMS

MAJOR PROGRAMS
- Ship Propulsion System
- Environmental Protection
- Auxiliary Machinery
- Advanced Surface Machinery Program
- Surface Ship Science & Technology



NSWC Naval Surface Warfare Center A tradition of excellence!

CARDEROCK DIVISION
STRATEGIC PLANNING PROCESS

- *Technical Directorates projected manpower cost of future programs considering benefit in:*
  - *War Fighting*
  - *Readiness*
  - *Dual Use*
- *Directorate models were combined into a Division Manpower Allocation Model*
- *For any Division Propulsion the model identified the distribution which maximizes benefit*

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CARDEROCK DIVISION
STRATEGIC PLANNING PROCESS

- *Technical Directorates projected manpower cost of future programs considering benefit in:*
  - *War Fighting*
  - *Readiness*
  - *Dual Use*

- *Directorate models were combined into a Division Manpower Allocation Model*

- *For any Division Propulsion the model identified the distribution which maximizes benefit*

Model Results for Reduced End Strength

Division Population	*-18%*
Machinery R&D	*+4%*

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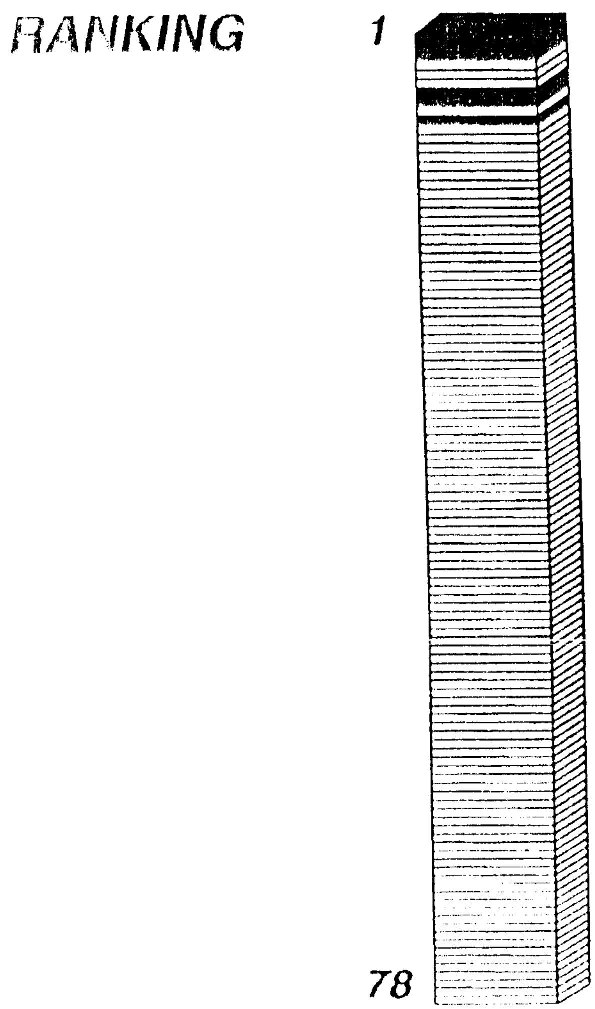
NSWC STRATEGIC PLANNING PROCESS

- 78 Technical Capabilities (TC's) identified for NSWC's five Divisions
- 20 TC's represent the Carderock Division
- Machinery R&D is a principle contributor to 3 (Propulsion, Electrical and Auxiliary Machinery)
- The Military Value of each TC was evaluated by NSWC's Board of Directors considering:
  - Technical Functions
  - Expertise
  - Business Base
  - Jointness
  - Location & Facilities

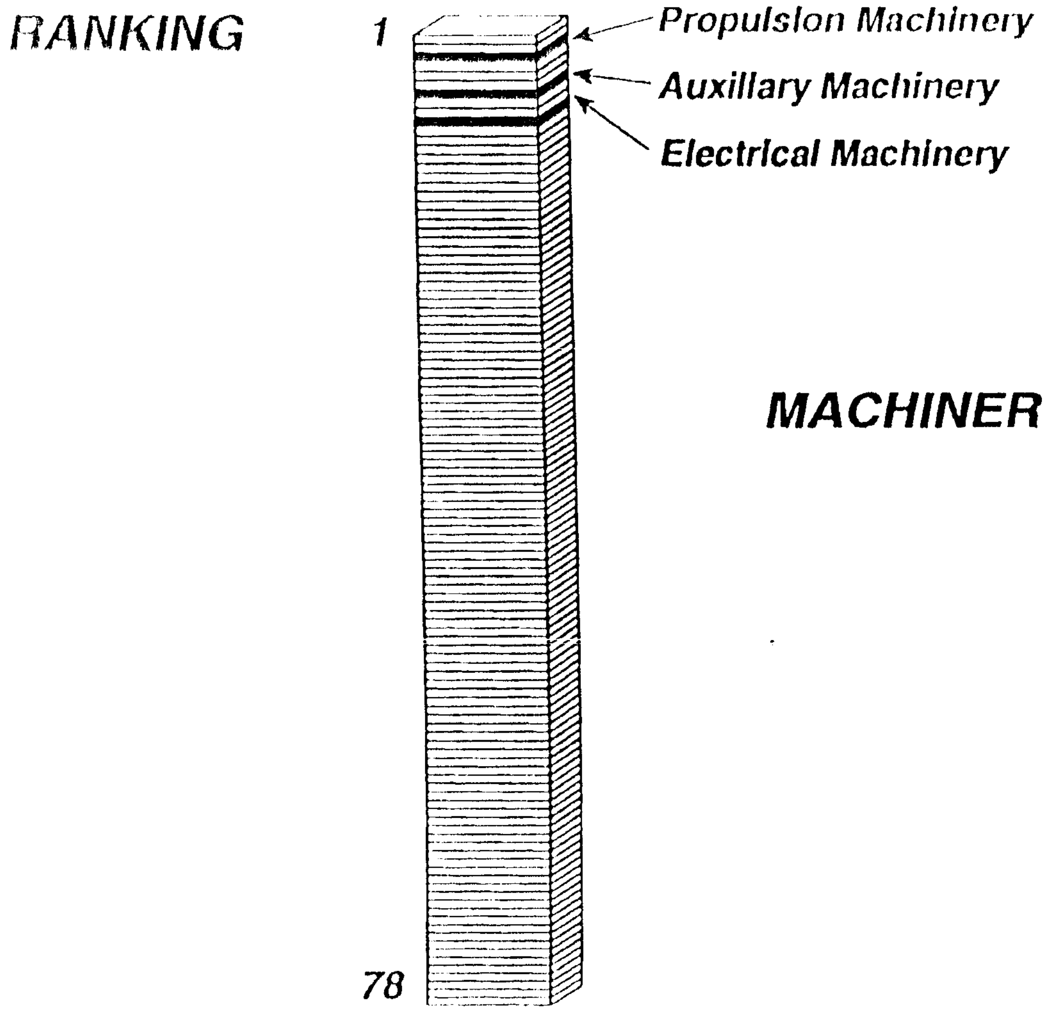
RESULTS – TECHNICAL CAPABILITIES



CARDEROCK DIVISION HAS 6 OF TOP 10

#1, 2, 3, 7, 8, 10

RESULTS – TECHNICAL CAPABILITIES



MACHINERY TC's ARE #3, 7, 10

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MACHINERY RESEARCH AND DEVELOPMENT FACILITIES SPRING 1993

Operational Facilities

- Advanced Electrical Machinery Systems Facility
- Electrical Power Technology Facility
- Environmental Non-CFC Facility
- Advanced Propulsion Machinery Facility
- Machinery Acoustic Silencing Laboratory
- Submarine Fluid Dynamics Facility
- Shock and Vibration Facility
- Deep Ocean Vehicle and Machinery Pressure Simulation Facility
- Magnetic Fields Laboratory
- Fiber Optics Technology Laboratory
- Electric Power Laboratory

NSWC
Naval Surface Warfare Center
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MACHINERY RESEARCH AND DEVELOPMENT FACILITIES SPRING 1995

Operational Facilities

- Advanced Electrical Machinery Systems Facility
- Electrical Power Technology Facility
- Environmental Non-CFC Facility *(expanding)*
- Advanced Propulsion Machinery Facility
- Machinery Acoustic Silencing Laboratory
- Submarine Fluid Dynamics Facility *(upgrading)*
- Shock and Vibration Facility
- Deep Ocean Vehicle and Machinery Pressure Simulation Facility
- Magnetic Fields Laboratory *(expanding)*
- Fiber Optics Technology Laboratory
- Electric Power Laboratory

New Facilities Construction

- *Pulsed Power Systems Test Facility - Completed March 1995*
- *Shaft Line Component Development Facility - April 1995 Completion*
- *Integrated Power Systems Facility - June 1995 Completion*

NSWC
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MACHINERY RESEARCH AND DEVELOPMENT
SITES VISITED 3-27-1995

Operational Facilities

- Advanced Electrical Machinery Systems Facility
- Electrical Power Technology Facility
- Environmental Non-CFC Facility *(expanding)*
- Advanced Propulsion Machinery Facility
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- Shock and Vibration Facility
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- Magnetic Fields Laboratory *(expanding)*
- Fiber Optics Technology Laboratory
- Electric Power Laboratory

New Facilities Construction

- Pulsed Power Systems Test Facility - Completed March 1995
- *Shaft Line Component Development Facility - April 1995 Completion*
- Integrated Power Systems Facility - June 1995 Completion

NSWC
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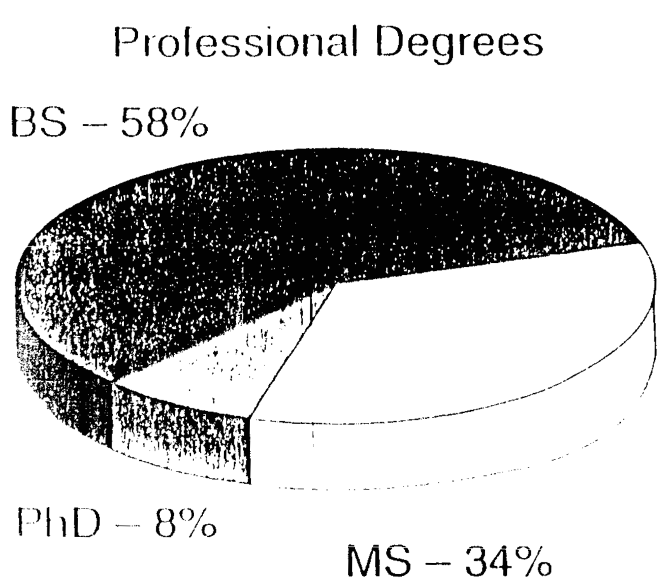
MACHINERY RESEARCH AND DEVELOPMENT BRAC 95 PROPOSALS

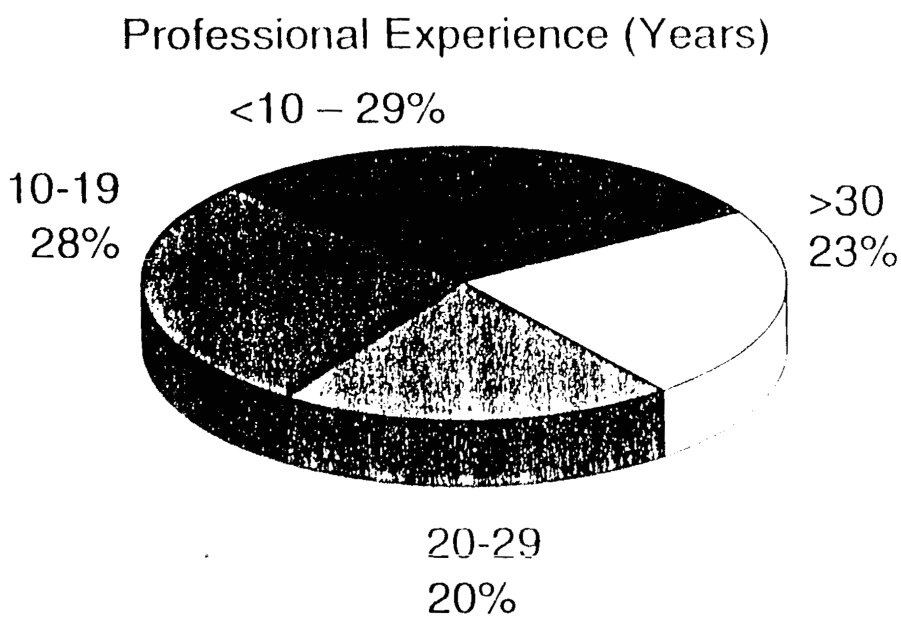
Facility	Proposal
• Advanced Electrical Machinery Systems Facility	- Relocate
• Electrical Power Technology Facility	- Relocate
• Environmental Non-CFC Facility	- Relocate
• Advanced Propulsion Machinery Facility	- Relocate
• Machinery Acoustic Silencing Laboratory	- Relocate
• Submarine Fluid Dynamics Facility	- Abandon
• Shock and Vibration Facility	- Relocate
• Deep Ocean Vehicle and Machinery Pressure Simulation Facility	- Abandon
• Magnetic Fields Laboratory	- Replicate
• Fiber Optics Technology Laboratory	- Relocate
• Electric Power Laboratory	- Relocate
• Pulsed Power Systems Test Facility	- Relocate
• Shaft Line Component Development Facility	- Relocate
• Integrated Power Systems Facility	- Relocate

Machinery R&D Directorate

PROFESSIONAL PROFILE

Scientists and Engineers – 308 People



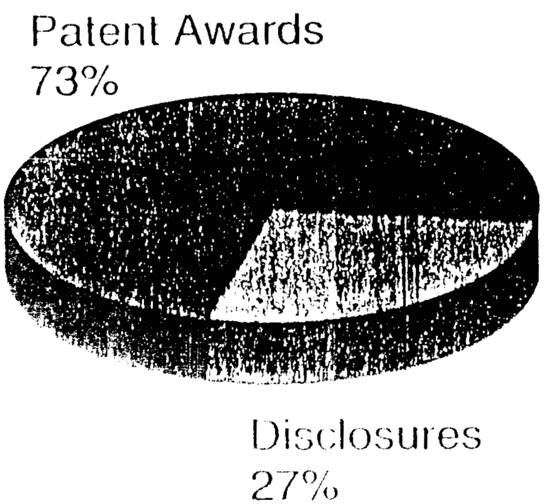


Machinery R&D Directorate

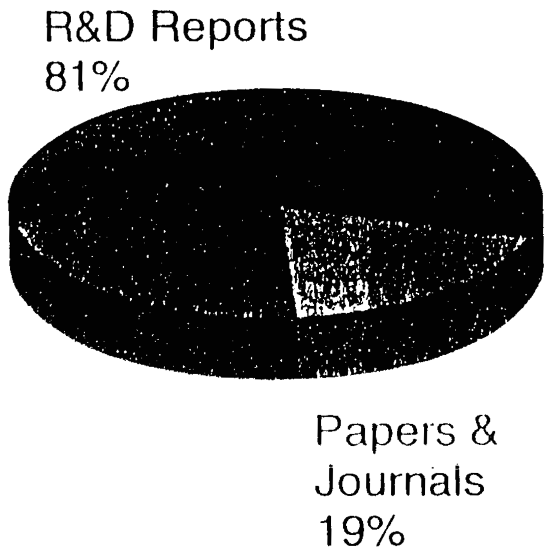
PROFESSIONAL ACTIVITIES

CY 1993

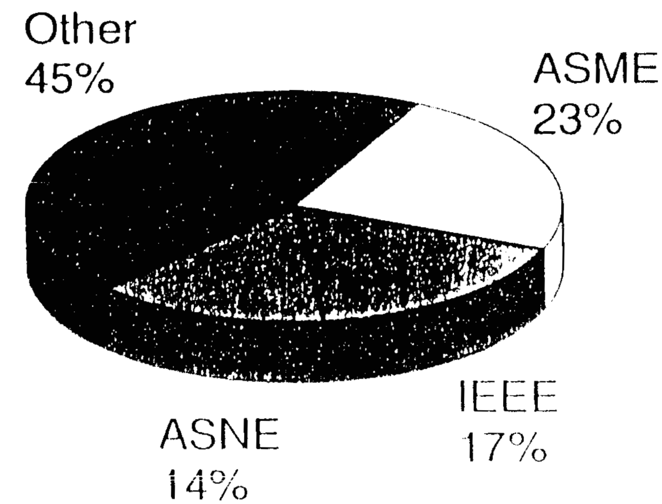
>35 INVENTIONS



>200 PUBLICATIONS



>200 PROFESSIONAL SOCIETY MEMBERSHIPS



NSWC
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CONCLUSIONS

- Machinery R & D is Healthy and Must Remain So:
  - Responsive to Need
  - Growing Business Base
  - Top Marks in Strategic Assessments

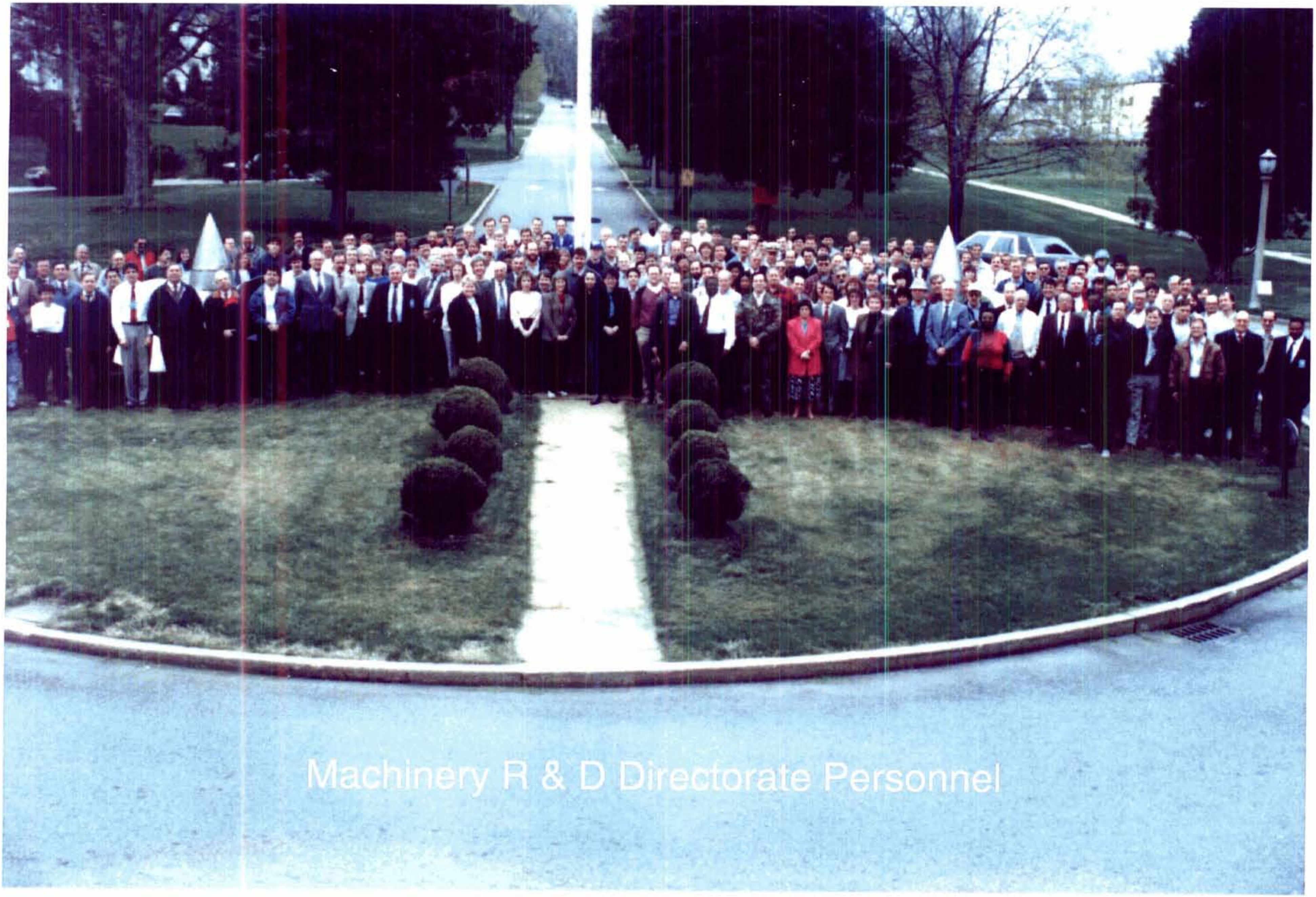
- Directorate Capabilities are Excellent
  - Experienced, Competent, Dedicated Professional Staff
  - World Class, Growing Lab Facilities

Document Separator

The Annapolis Detachment
of the Carderock Division,
Naval Surface Warfare Center

Capabilities of the Machinery Research and Development Directorate

CY 1995 Q1


Machinery R & D Directorate Personnel

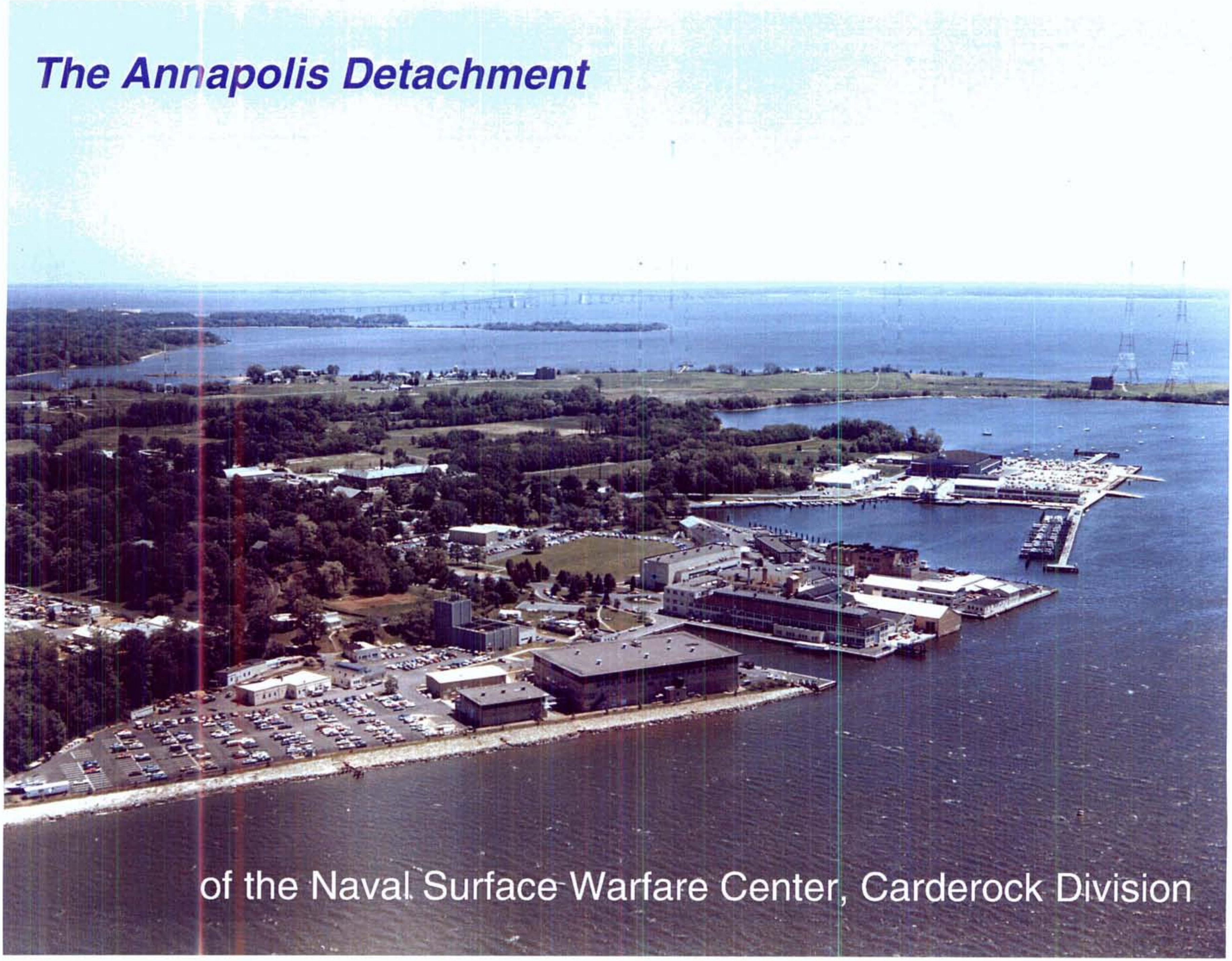
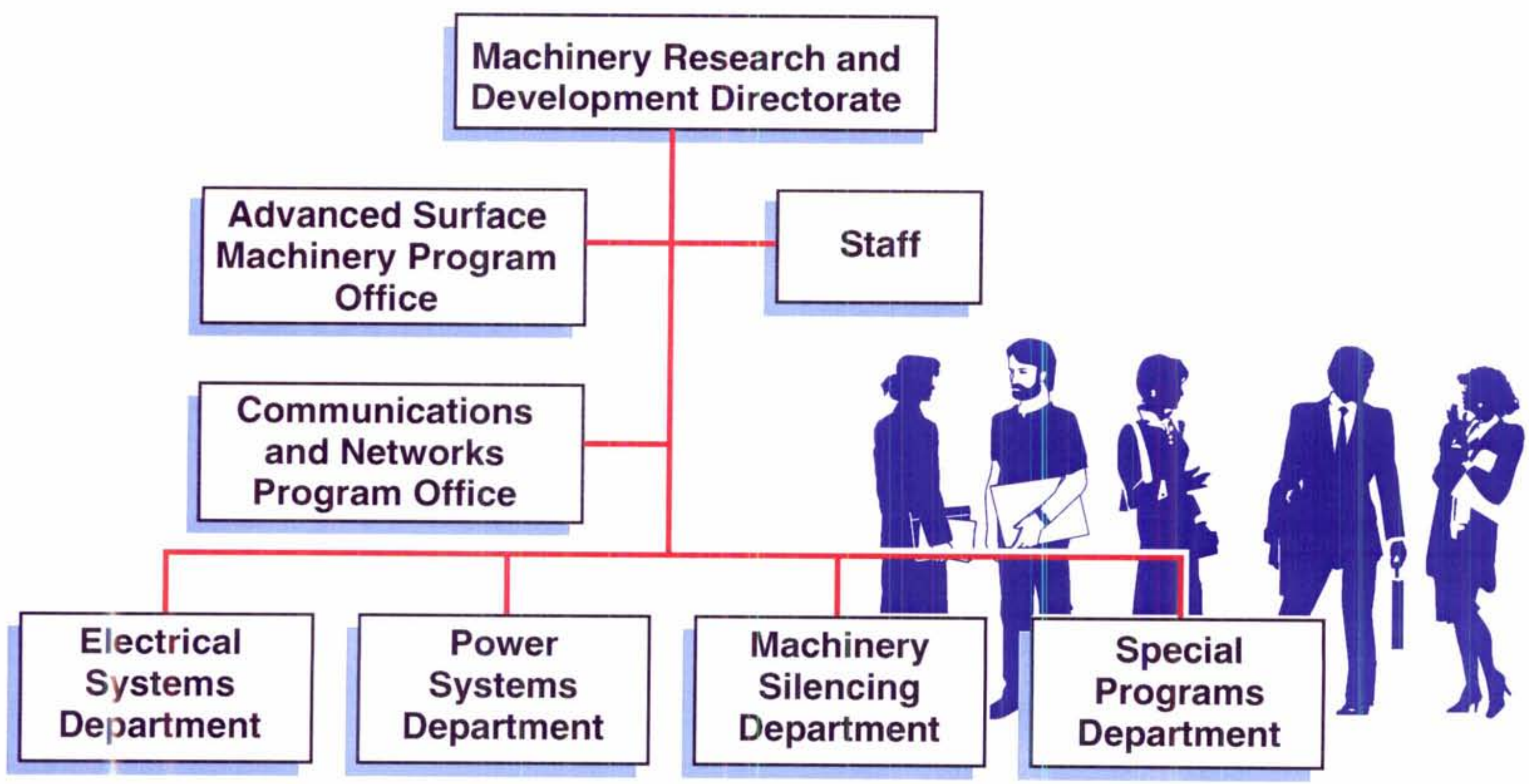

The Annapolis Detachment
of the Naval Surface Warfare Center, Carderock Division

Table of Contents

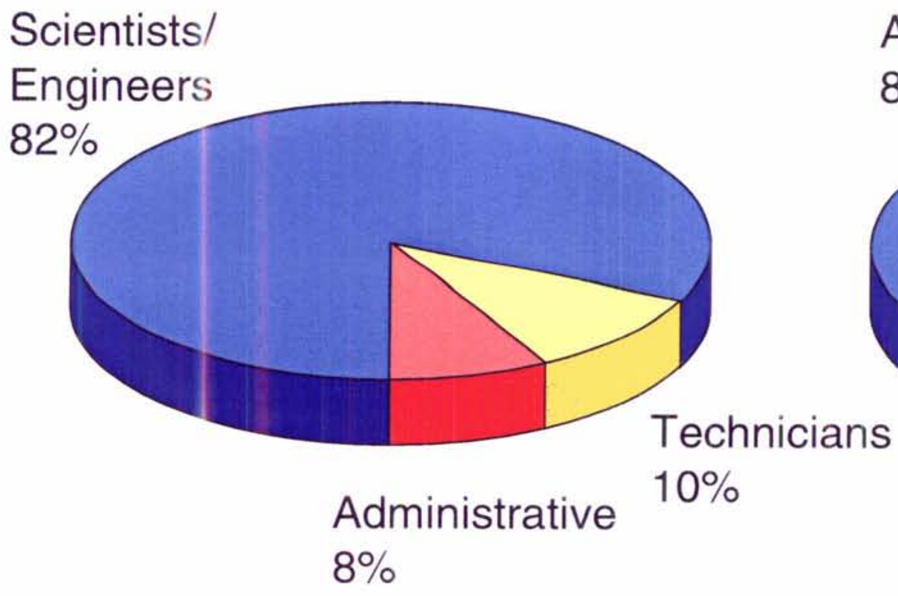
Mission

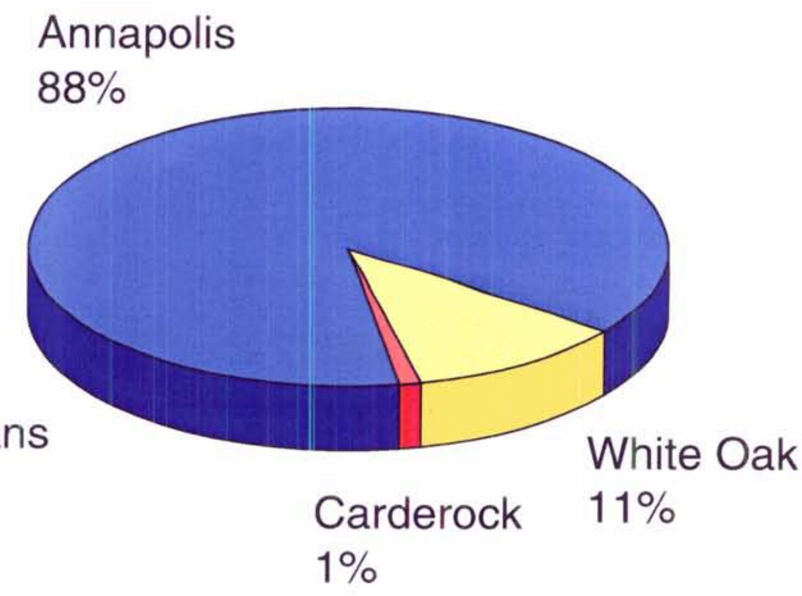
The principal organization for R&D of Naval Shipboard Machinery Systems including Acoustic Silencing, Ships' Electric and Magnetic Silencing, and Shipboard Energy Conservation.

ORGANIZATION



Machinery R&D Directorate



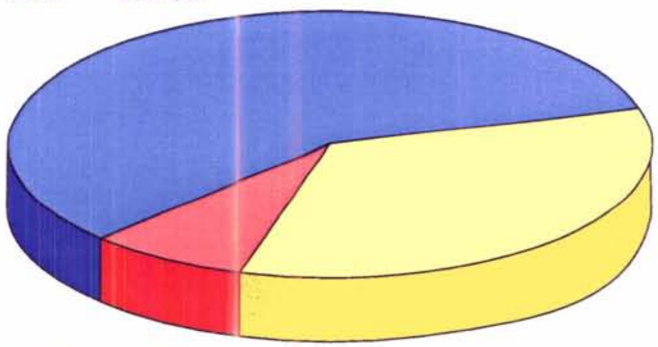


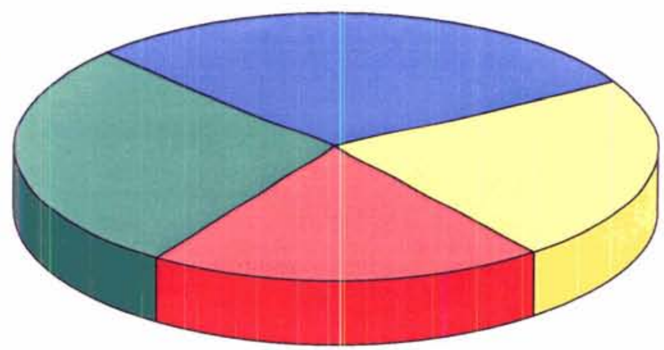
This Directorate is also associated closely with the U.S. Naval Academy faculty and midshipmen through a formal agreement to conduct R&D on Naval Machinery.

Machinery R&D Directorate

PROFESSIONAL PROFILE

Scientists and Engineers – 308 People



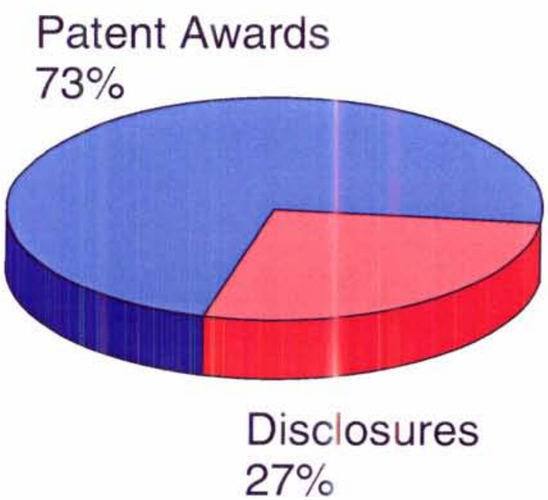


Machinery R&D Directorate

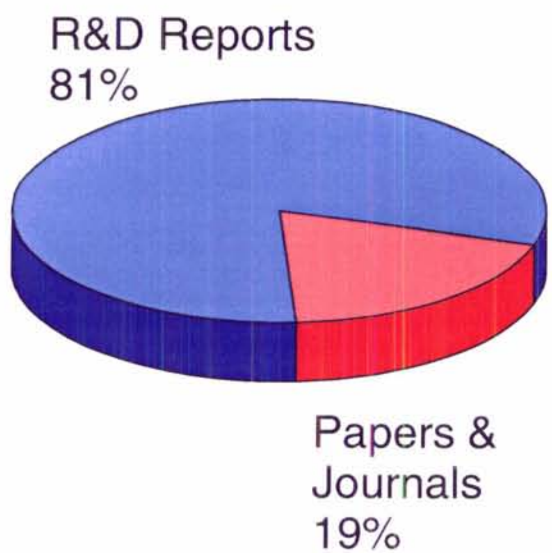
PROFESSIONAL ACTIVITIES

CY 1993

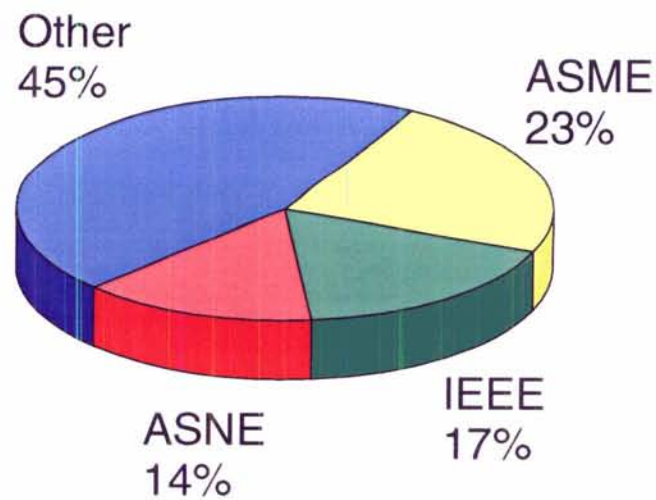
>35 INVENTIONS



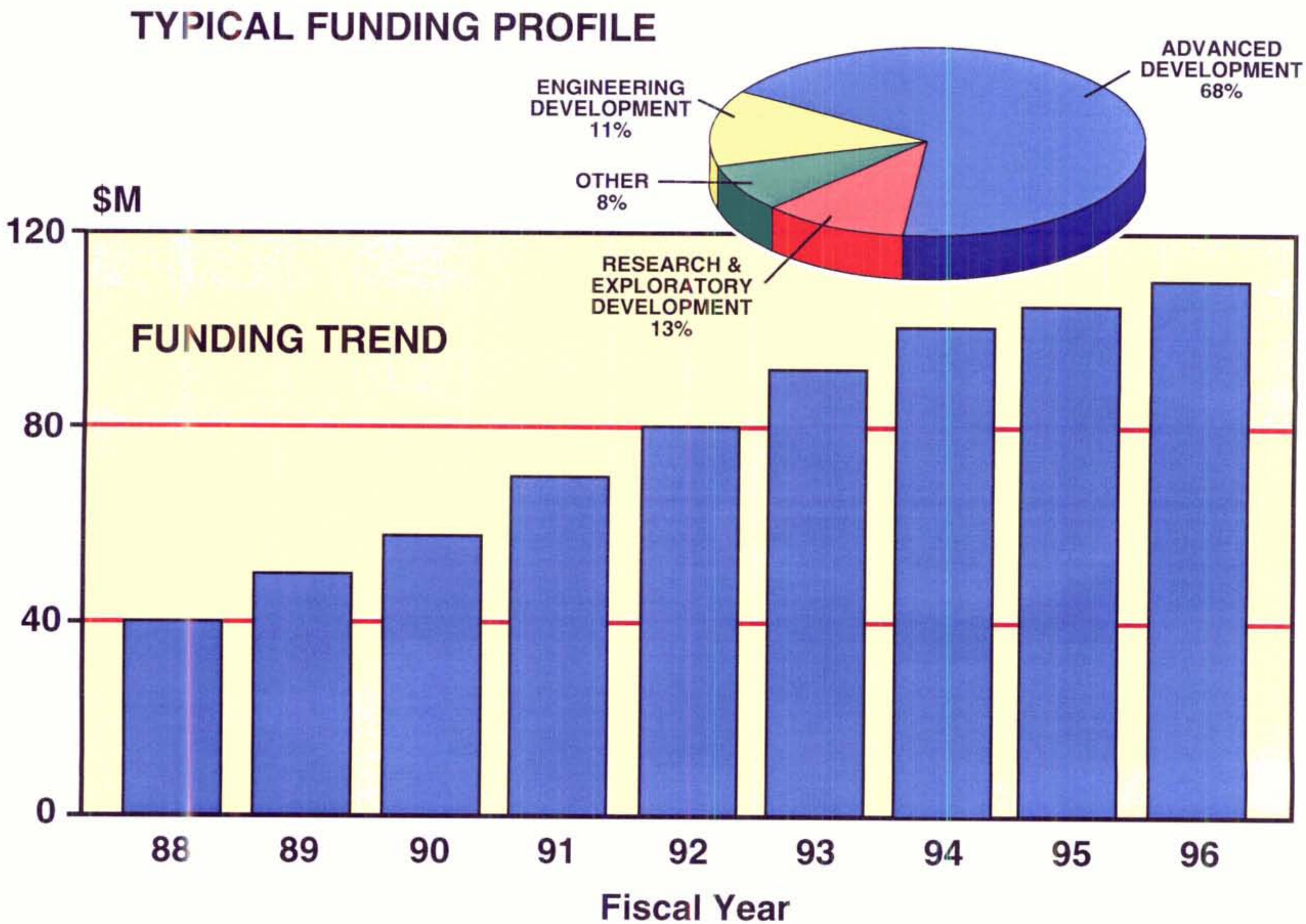
>200 PUBLICATIONS



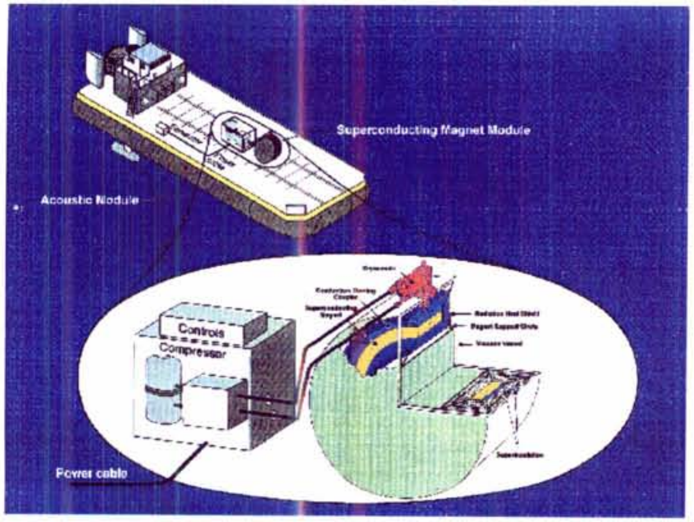
>200 PROFESSIONAL SOCIETY MEMBERSHIPS



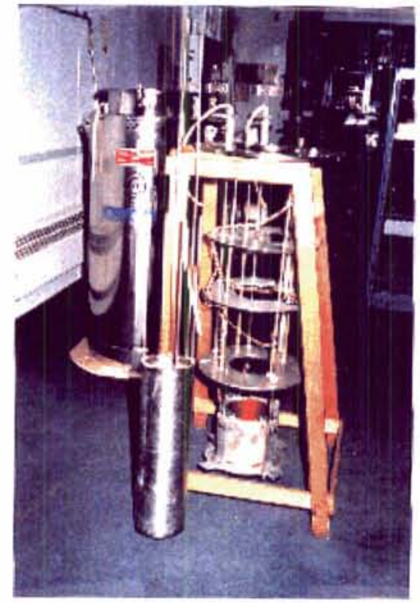
Machinery R&D Directorate



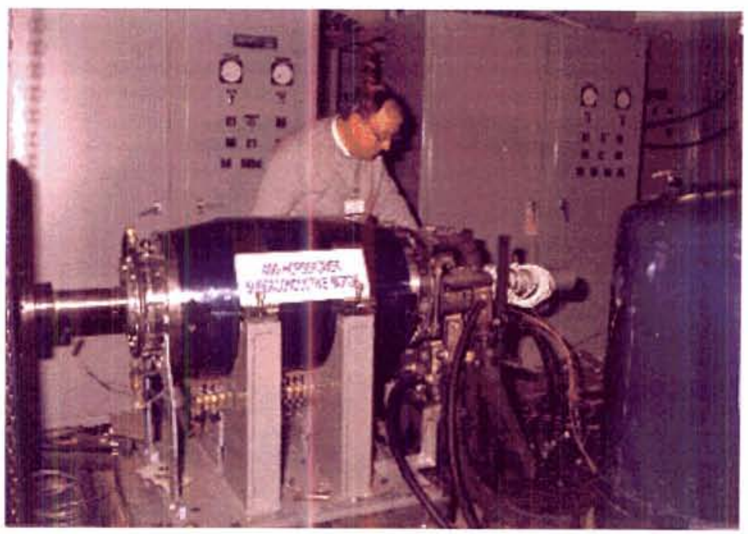
Advanced Electrical Machinery Systems Facility



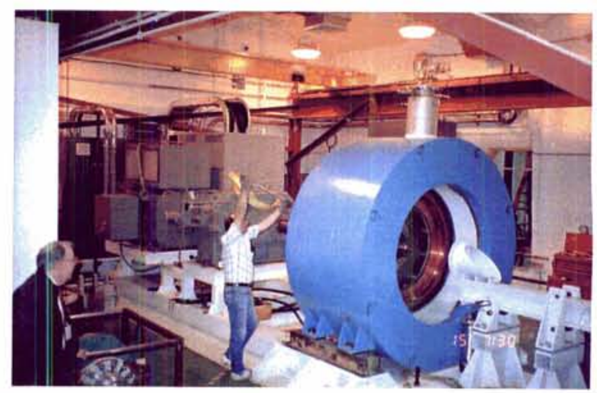
Advanced Lightweight
Magnetic Influence
Sweep System



Superconductive
Magnet Variable
Temperature
Measurement
Facility



400 HP Superconductive Motor



Superconducting Current Collector Laboratory

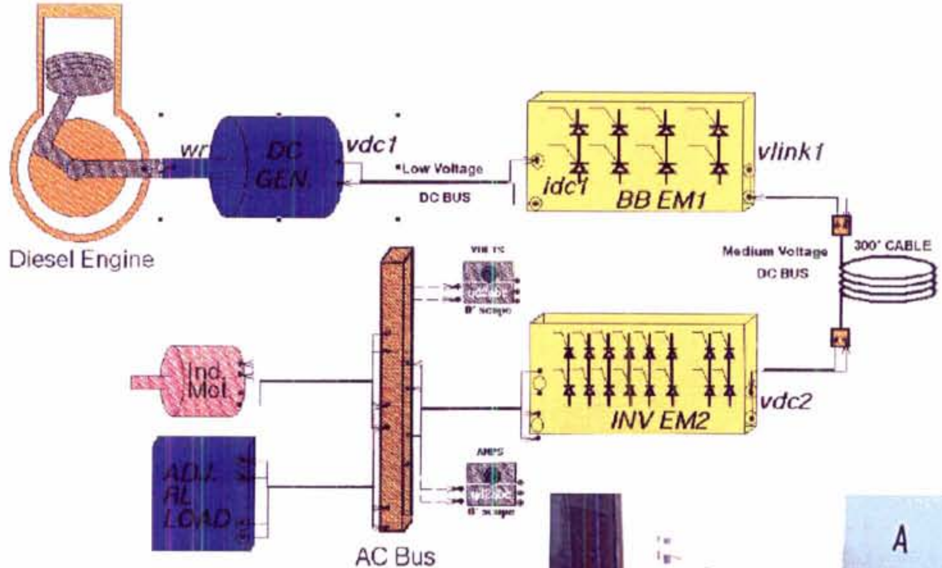
Advanced Electrical Machinery Systems Facility

CAPABILITIES

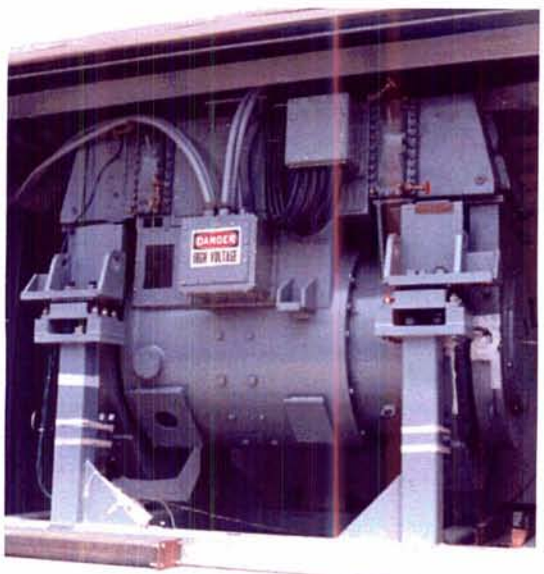
- World's only facility for ship electric drive with operating superconducting homopolar model machinery and full-scale current collectors
- Encompasses 25,000 square feet with the following characteristics:
  - 2.6 megawatts of installed substation power. 1.1 megawatts of continuous DC power at 110,000 Amperes, 10 Volts
  - 8200 sq ft of high bay (16 feet) area
  - Large bore (12 to 24 inches) superconducting magnet systems capable of producing peak magnetic fields of 50,000 to 60,000 Gauss for superconducting wire and coil development and testing
  - Full scale electric drive current collector test facility containing a 70 inch diameter warm bore superconducting magnet. Provides the ability to test advanced current collectors at peak DC currents of 180,000 Amperes, rotational speeds of 180 rpm and magnetic fields of 25,000 Gauss
  - Liquid helium refrigeration systems capable of producing liquid helium at the rate of 50 liters per hour

Electrical Power Technology Facility

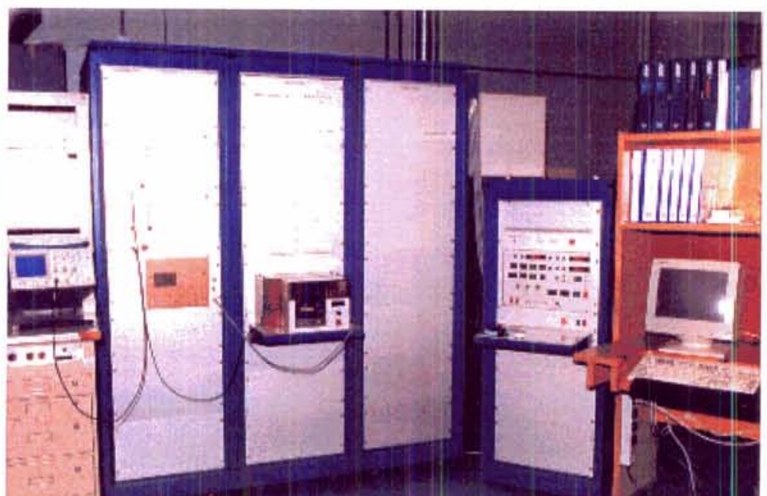
Power Distribution Laboratory



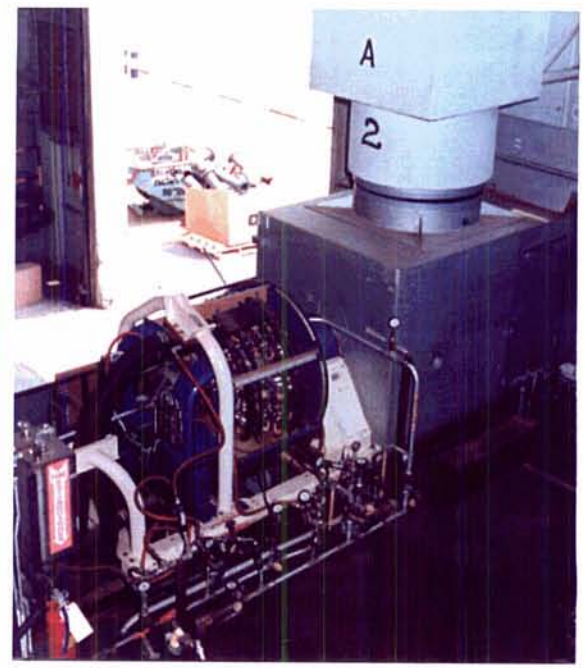
Electric Transport Simulation



15 Generators



Semiconductor Characterization



Reduced Scale Electric Drive

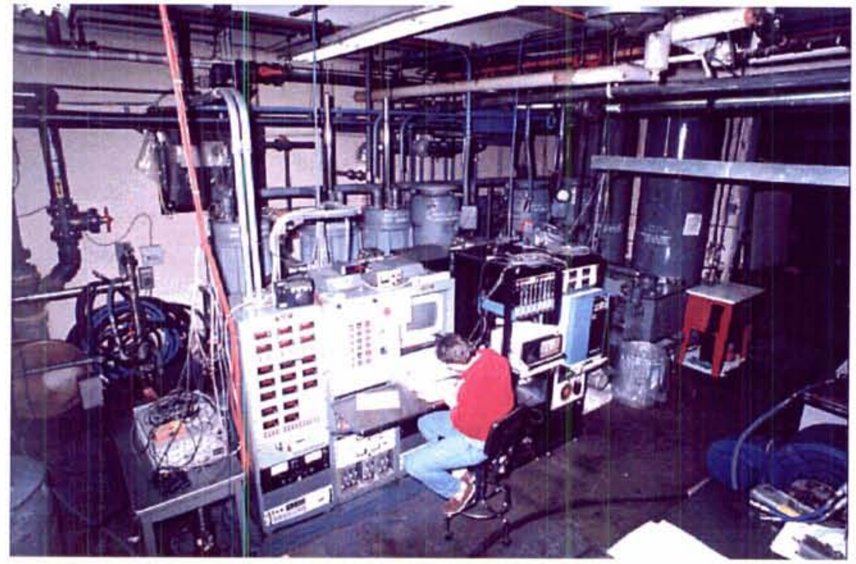
Electrical Power Technology Facility

CAPABILITIES

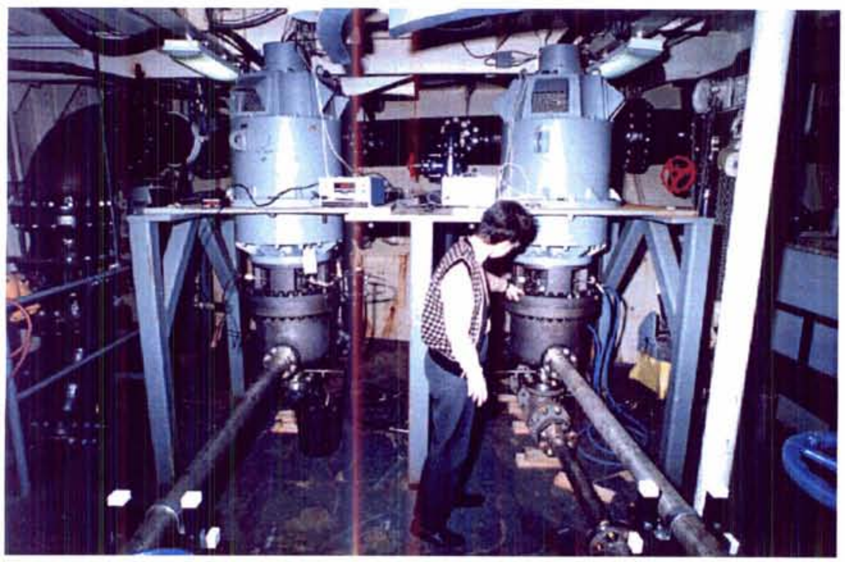
- The facility encompasses specialized laboratories dedicated to reduce costs of future Navy ship electric power generation, distribution and conversion systems.
- Site flexibility provides seven test beds in a 7000 ft^2 area for multiple surface and submarine ship class configurations which provide opportunities for affordable component development and system design.
- Computer simulation of systems and components with concurrent laboratory reduced-scale hardware validation prior to full-scale system component development
  - seven multi-tasking simulation user work stations with local and network mass storage
  - over 25 electric power sources with loading and system interfacing capability
- Semiconductor characterization laboratory measures power electronic device capabilities to provide a basis for future technology development and to guide proper application of these devices for reliable use aboard Navy ships.

Advanced Shipboard Auxiliary Machinery Facility

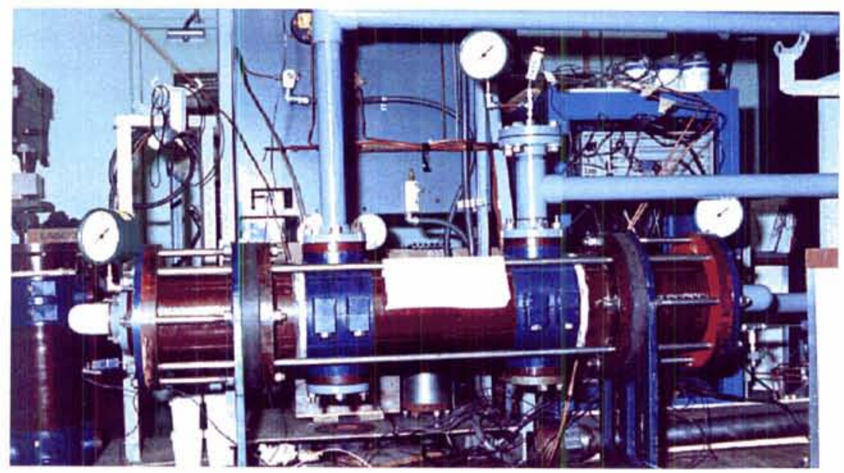
Inline Shaftless Pump Evaluation



Shipboard Hydraulics Laboratory



Seawater Pump Laboratory



Prototype Composite Heat Exchanger Evaluation

Advanced Shipboard Auxiliary Machinery Facility

CAPABILITIES

- The Facility consists of specialized labs dedicated to:
  - Ballast blow (compressed air), and heat exchangers
  - Submarine and surface ship hydraulic steering and diving
  - Ventilation, fluid systems, piping, and valves
  - Composite machinery and fresh water production

- Supports programs focused on research, development and experimental evaluation of auxiliary machinery components and new system architectures.

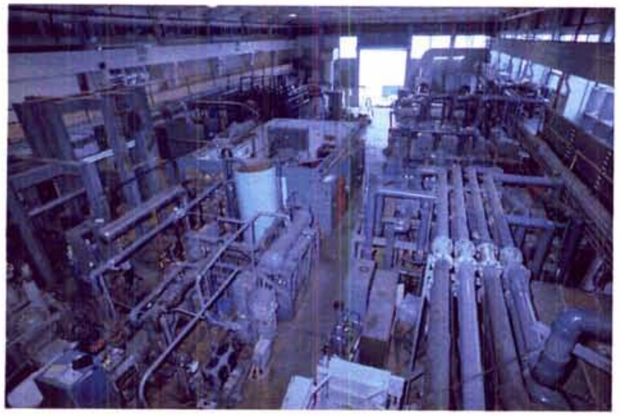
- Unique facility providing environment for controlled operation of machinery components over full range of operating conditions while controlling parameter variables: pressure, temperature, stress, and heat transfer.

- Encompasses 22,000 square feet with the following characteristics:
  - 7,000 sq ft with floor loading of 300 lb/sq ft
  - 2.3 megawatts of installed electric power
  - 3,200 sq ft of high bay (16 ft) area
  - 1,600 gal/min of cooling capacity
  - 100 tons of chilled water capacity

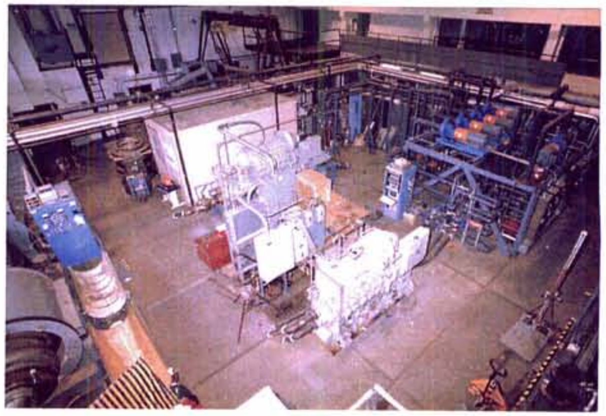
CFC Elimination R&D Facility

Facility Overview

DDG-51 & CVN68 A/C Plants



FFG-7 A/C Plant



CG-47 and LSD-44 A/C Plants

CFC Elimination R&D Facility

CAPABILITIES

- The Facility encompasses 30,000 sq ft of floor space with very high floor loading (550 lb/sq ft) in a high bay area with 15 ton crane service. Facility includes 6000 gpm of cooling water capacity and 7500 hp of 460V-60Hz-3ϕ electrical power to produce 3500 tons of cooling.

- Tailored to unique naval applications of water heat rejection over a wide range of water temperatures.

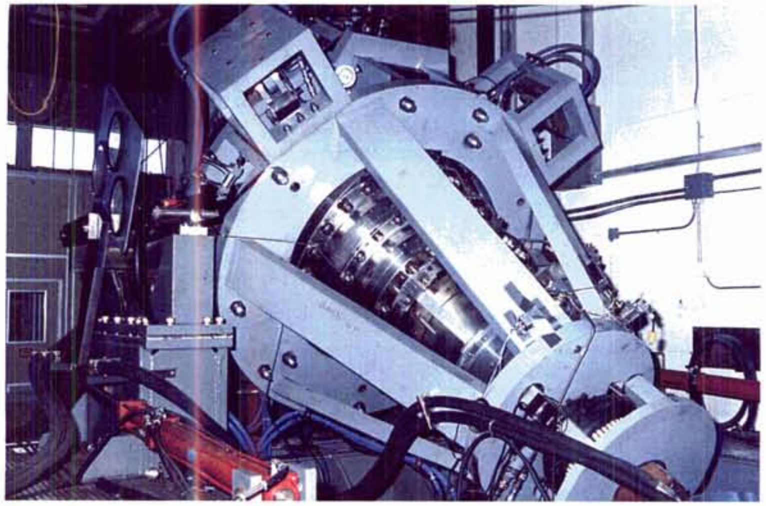
- Consists of a large complex composed of many test facilities integrated and interconnected by shared water systems, electrical power distribution systems, and data acquisition and analysis systems.

- Program goals are directed to meet requirements of CNO's environmentally sound future combatant ship and address the cooling systems for: weapon controls, sensors, communication systems, computers, navigation systems, and personnel.

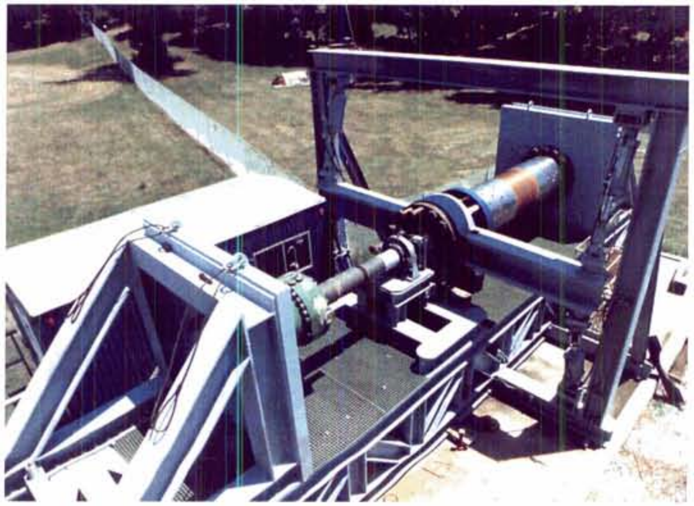
- Facility is continually expanding to add additional fleet AC Plants as CFC Elimination Program accelerates.

- Products are transferable to commercial non-CFC applications.

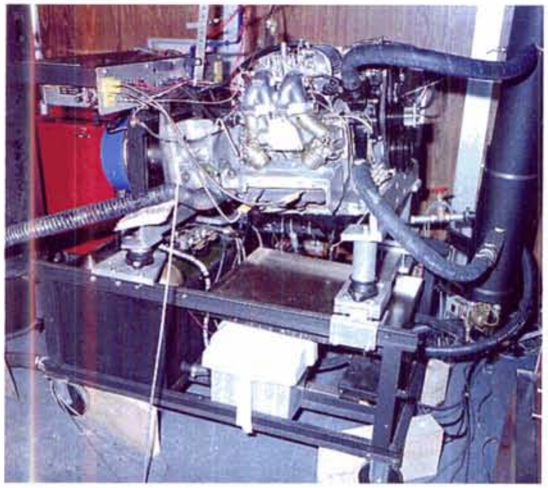
Advanced Propulsion Machinery Facility



SSN21 Main Shaft Seal Test Machine



Full Scale Composite Shaft Test Machine



Engine Development Laboratory

Advanced Propulsion Machinery Facility

CAPABILITIES

- The facility encompasses seven laboratories totalling 20,000 sq. ft. with 1,300,000 gal/day of cooling water and 110,000 kw of electrical power at a total capital investment of $20,000,000.

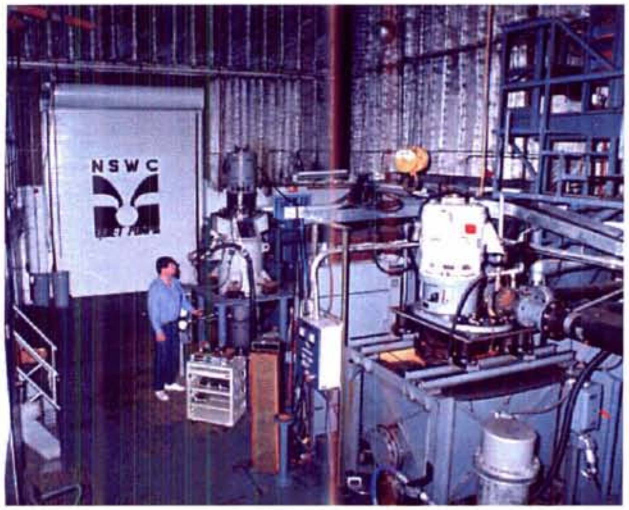
- Supports programs to conduct research and development and evaluate experimental propulsion systems and components.

- Capabilities address advanced development engine and component testing for performance validation, emissions control concepts, durability, and peripheral problems while also stimulating and augmenting commercial development.

- Technologies which reduce operational and acquisition costs realize $100,000,000 savings annually to the Navy.

- Unique laboratories include: land-based shaft test, shaft seal, composite shaft torsion/bending/loading, and engine development laboratory.

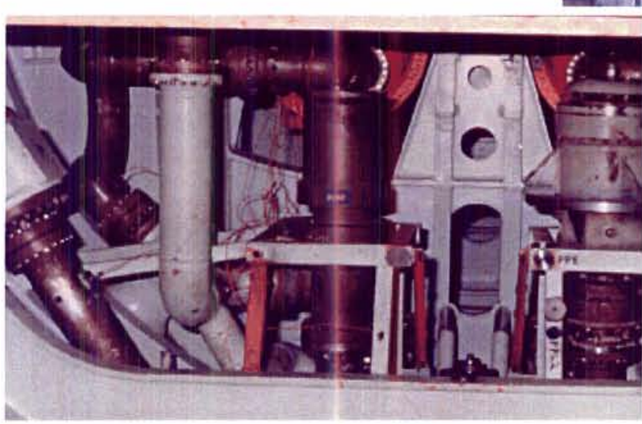
Machinery Acoustic Silencing Laboratory



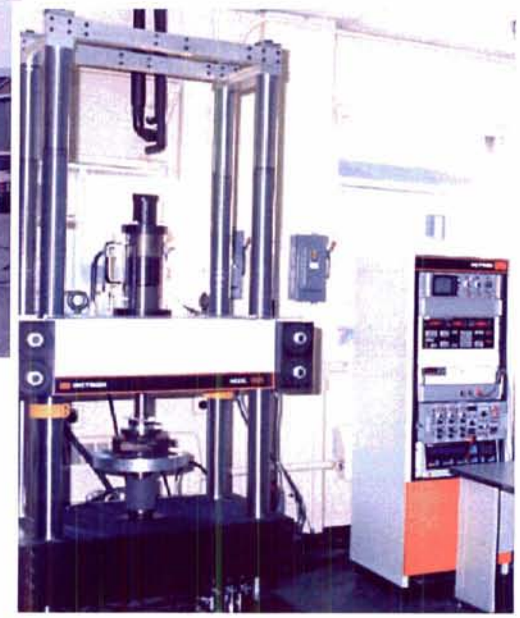
Quiet Pump R&D Facility

Quiet Fan R&D Facility

Machinery Acoustic Silencing Building



Noise Transmission Research Model



Advanced Mount R&D Facility

Machinery Acoustic Silencing Laboratory

CAPABILITIES

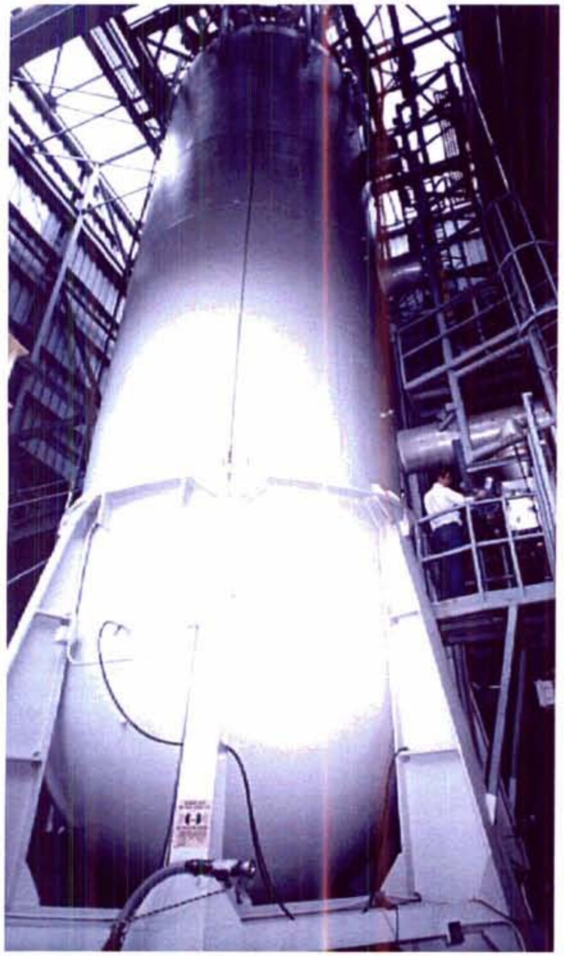
- The facility encompasses 12,200 sq ft housing three test cells dedicated to: fan noise, quiet pumps, resilient mounts, and structural acoustics.

- Only DOD research and development facility dedicated to quiet naval machinery and isolation devices, it provides performance evaluation and measurement of low level fluidborne, airborne, and structureborne noise of full-scale shipboard machinery.

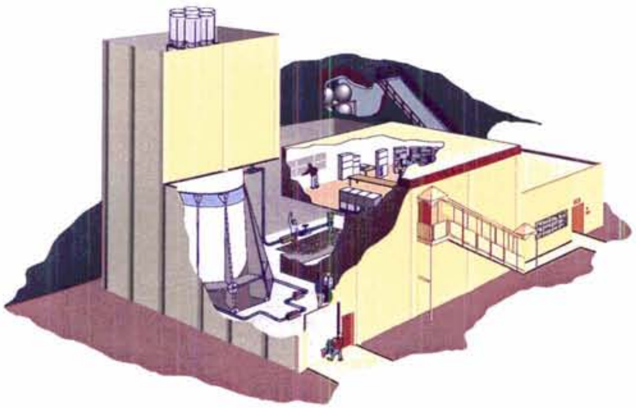
- Supports programs to develop quiet machinery technology and prototype hardware for all classes of submarines (including improved 688 class, Seawolf, Trident and the New Attack Submarine) and surface ships (including DDG-51 and CG-47).

- Facility features:
  - Semi-anechoic environment (as low as 25 Hz)
  - Thick concrete walls
  - A massive, vibration isolated seismic floor
  - Specialized mechanical and electrical support

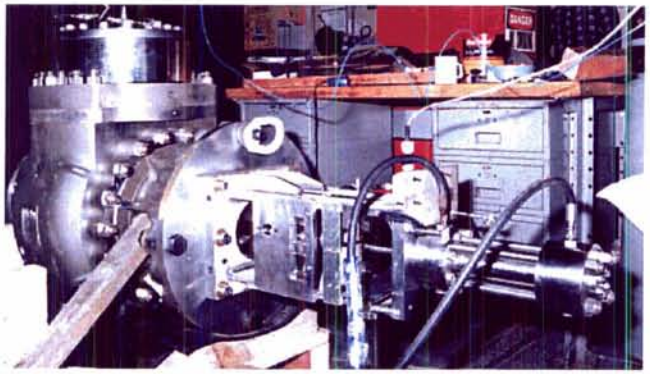
Submarine Fluid Dynamics Facility



High Pressure Water
Quiet Flow Laboratory

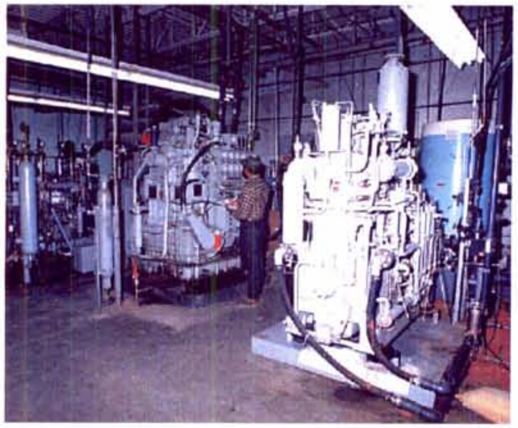


Submarine Fluid Dynamics Facility



Sea Wolf Depth Control Valve

High Pressure Air Storage
and Quiet Flow Laboratory



High Pressure Air
Compressors and Dryers

Submarine Fluid Dynamics Facility

CAPABILITIES

- The facility is a world class facility uniquely designed to simulate high pressure air and water fluid dynamic conditions for acoustic and operational evaluation of components.

- Facility provides air flow rates to 35,000 SCFM at pressures to 4500 psig and water flow rates to 3500 gpm at pressures to 1000 psig.

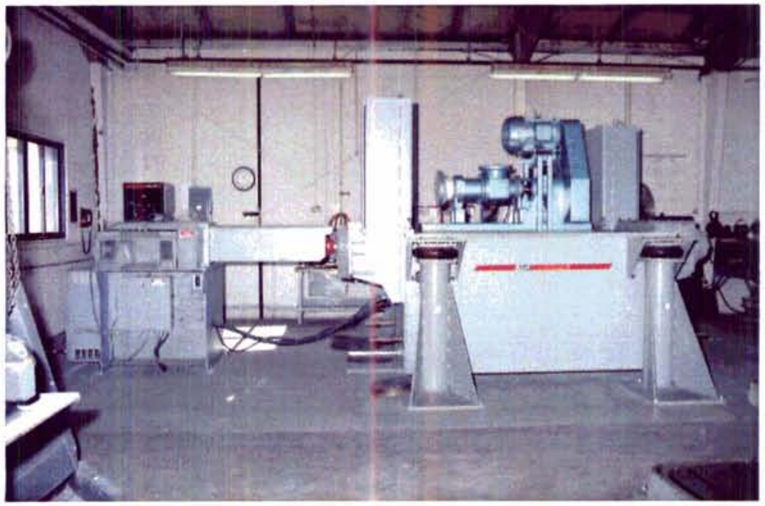
- Only government or private industry facility capable of full-scale testing and evaluation of submarine deballasting and ship-board fluid system components (valves, piping, and flow regulating devices) during high pressure operation.

- Primary thrust is to design and qualify fluid system components which operate quietly and reliably.

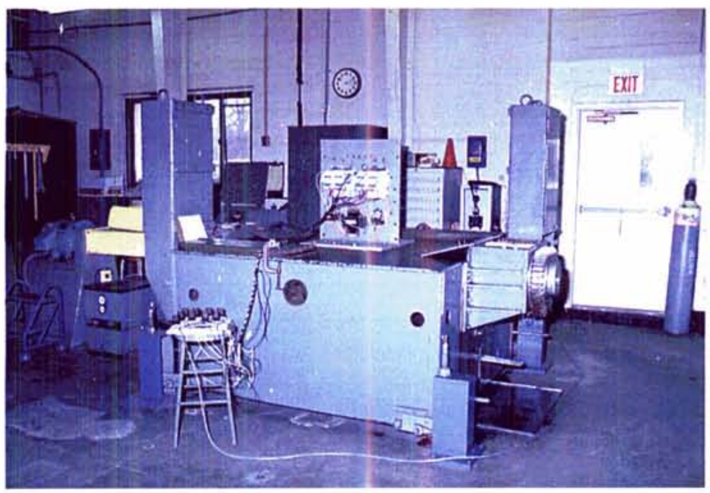
- Facility offers data acquisition and analysis of fluidborne, structureborne, and airborne noise.

- Acoustically treated air and water piping; low structureborne noise environment.

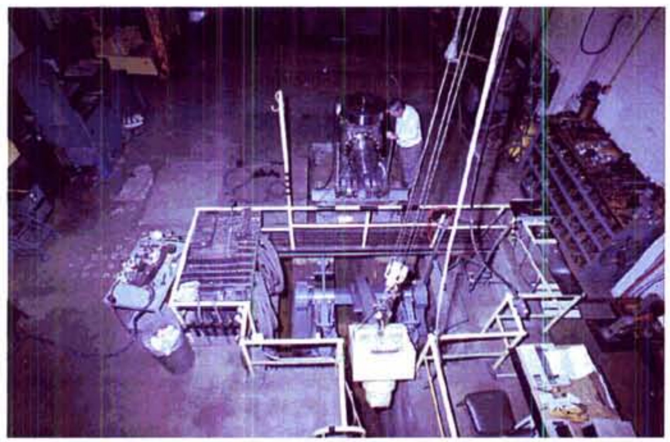
Shock and Vibration Facility



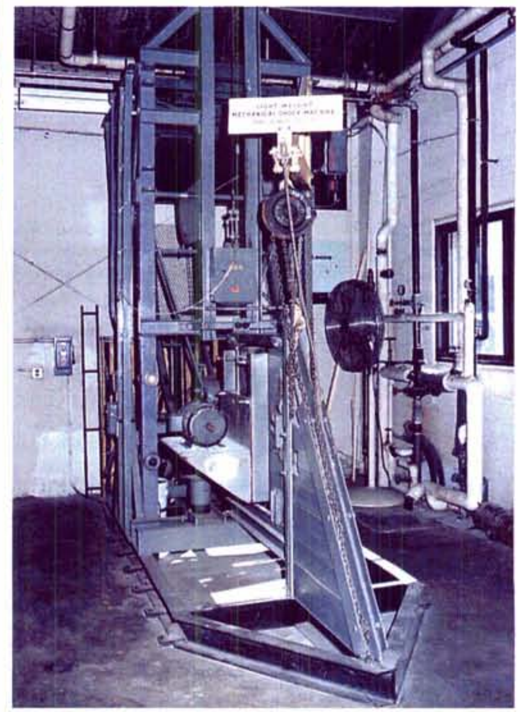
Stripping Pump on
10,000 lb. Vibration Table



Solid Waste Pulper Control Panel on Medium
Weight Vibration Table



Seawater Control Valve on Medium Weight
Shock Machine



Light Weight Shock Machine

Shock and Vibration Facility

CAPABILITIES

- Shock and vibration qualification of surface ship and submarine equipment.

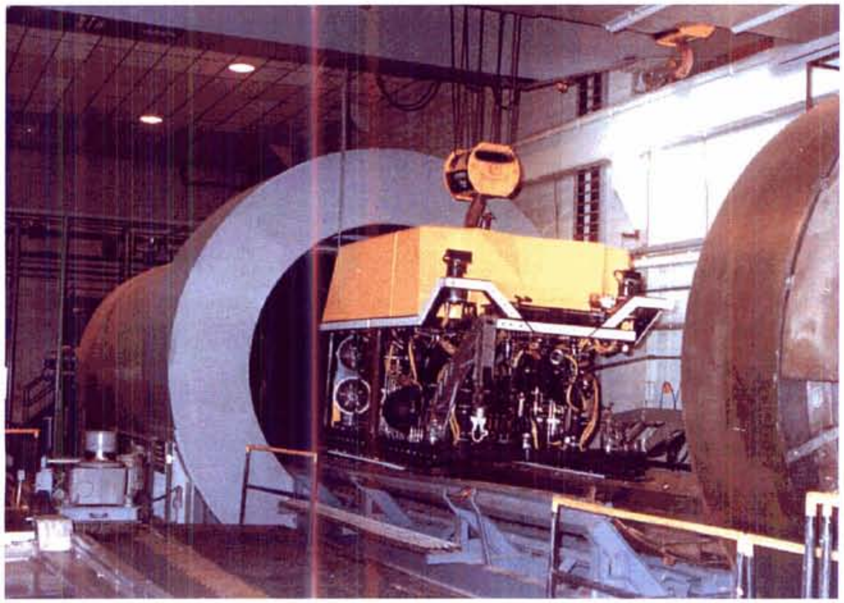
- Verify shock design calculations, define shock inputs, analyze shock response of equipment, diagnose causes of equipment damage, and add to the existing shock technology base.

- Facility capabilities:
  - Light and medium weight shock testing (250 lb & 7,500 lb capacities)
  - Medium and heavy weight vibration testing
  - Computerized analysis system provides real-time output in acceleration, velocity, and displacement
  - High-speed video system documents testing and provides failure analysis
  - Situated in building 171 with 3,400 sq ft of reinforced floor space and 6,000 sq ft open air storage.

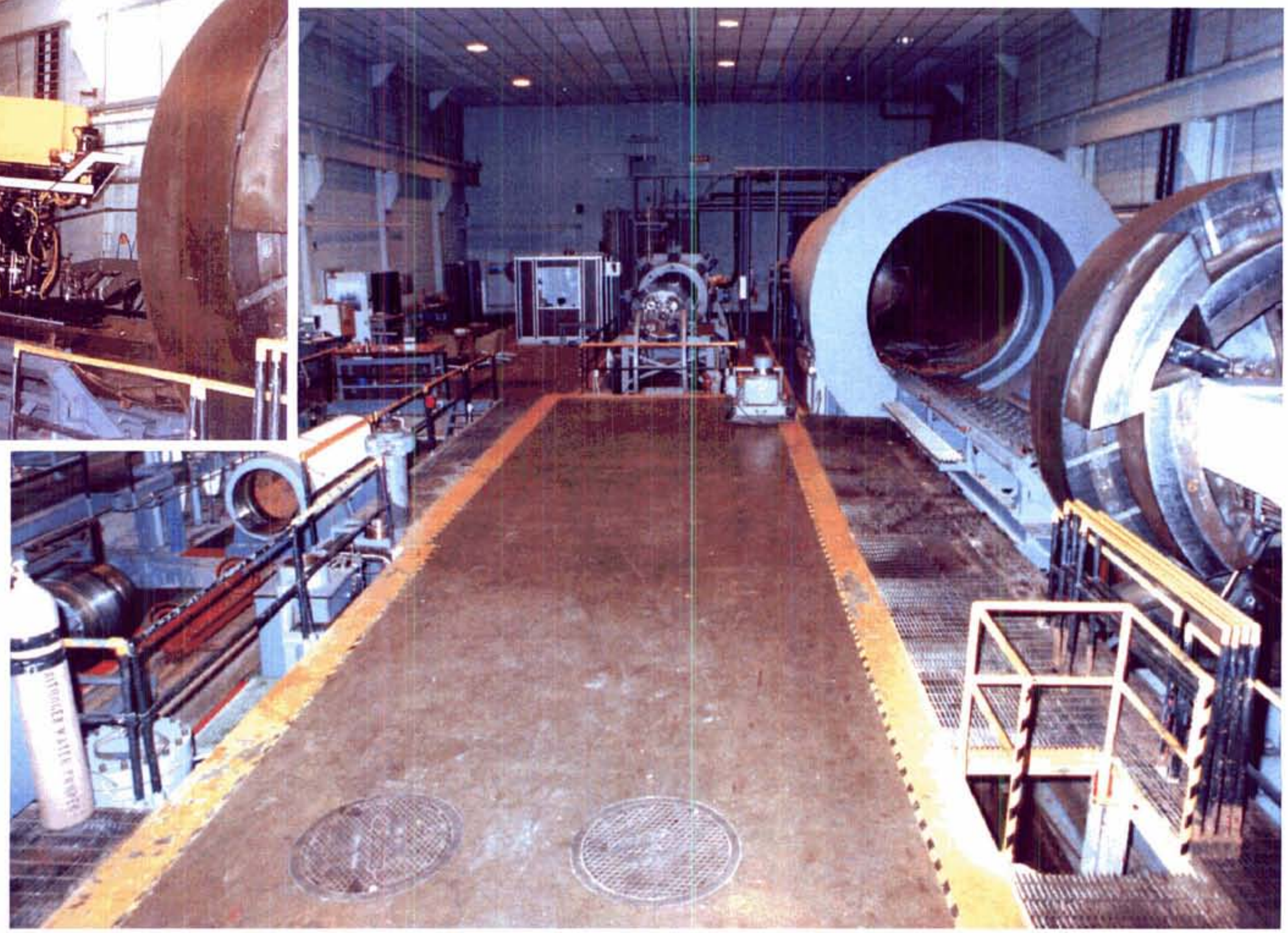
- Facility utilized by DOD, government non-DOD and industry.

- Facility houses 3,000 and 10,000 pound capacity vibration machines (4-50 Hz with 10g max acceleration) for equipment testing and qualification.

Deep Ocean Vehicle and Machinery Pressure Simulation Facility



CURV III
Remotely
Operated
Vehicle



Pressure
Tank
Complex

Deep Ocean Vehicle and Machinery Pressure Simulation Facility

CAPABILITIES

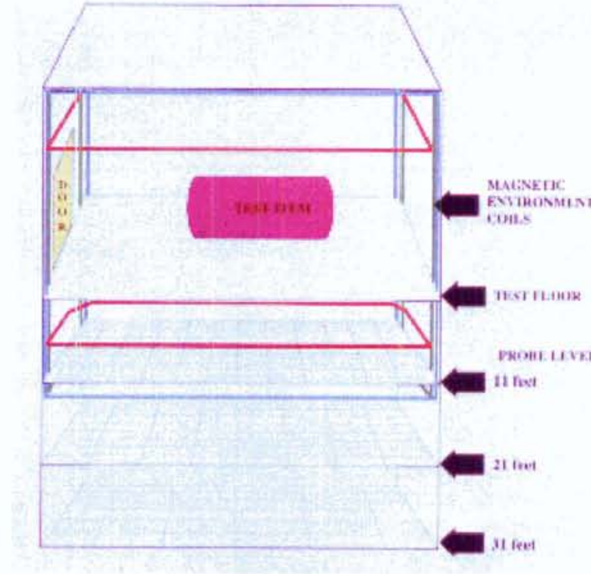
- The facility is unique in the world in size and capabilities for pressure testing; a true national asset
  - Simulates ocean pressure, temperature, and salinity to depths of 27,000 feet
  - Accomodates submersibles and equipment up to 10 feet in diameter and 27 feet long
  - Simulates diving and surfacing from 4,000 psi at a rate of once a minute

- Facility provides hydrostatic pressure testing using fresh or salt water for: materials, machinery systems, full-size ***manned submersibles,*** and unmanned underwater vehicles (UUV's) for the Navy, other government agencies, universities, and industry.

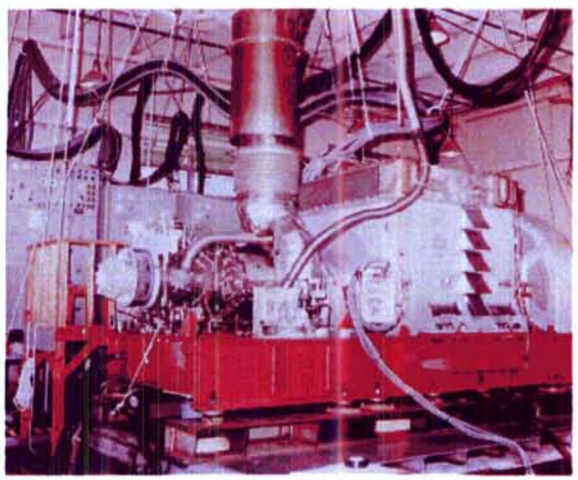
- Houses numerous pressure simulation tanks, the largest weighing 850 tons.

Magnetic Fields Laboratory

Magnetic Fields Measurement Building

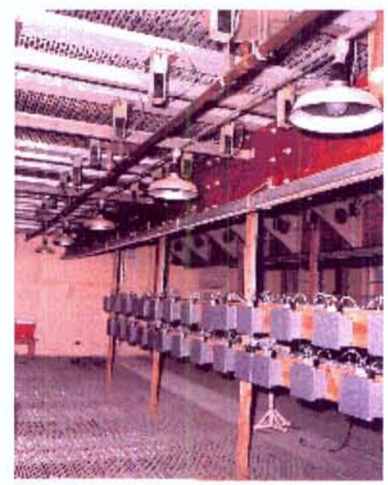


Internal Representation of Measurement Building



Minesweep Generator Stray Magnetic Field Measurements

Data Acquisition and Analysis Room, Control Building



Sensors and Magnetometers Measurement Building Lower Levels

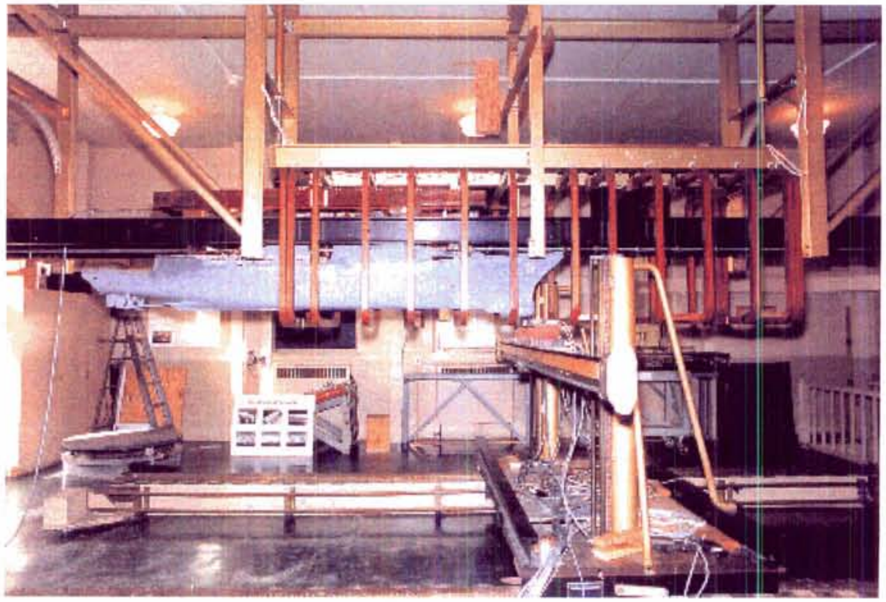
Magnetic Fields Laboratory

CAPABILITIES

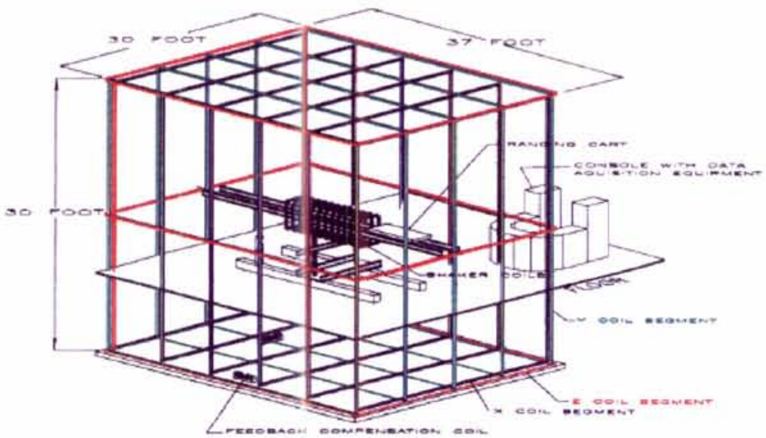
- Supports submarine and surface ship programs focused on the reduction of vulnerability to mines and hostile detection systems.
- Constructed entirely of nonmagnetic materials and physically located in a low noise environment.
- Only facility in the United States that provides accurate measurement of magnetic field signatures beneath full-size operating electrical machinery.
- Powering and loading capabilities include rectified power sources from 200A to 2500A, a 1200A motor starter/controller, a 5000A load bank, three 900A water rheostats, and two water brake dynamometers.
- Capable of simulating actual shipboard machinery environments over the 50 ft. long, 42 ft. wide, and 20 ft. high testing area, weighing up to 44 tons.
- Upgrade of facility in progress to include capability of measuring scaled physical models of submarines and surface ships up to 12 ft. long and weighing up to 1,000 pounds.

Magnetic Ship Models Laboratory

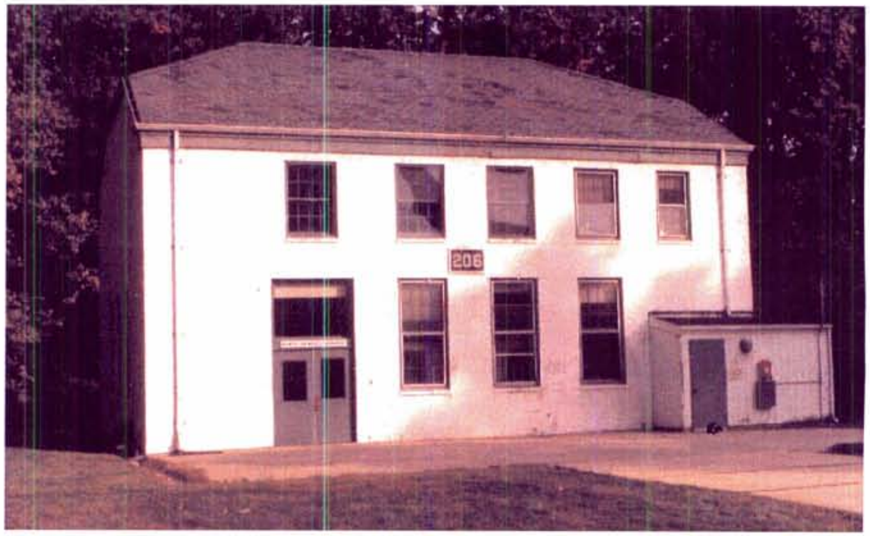
WHITE OAK SITE



Ship Model Under Test



Internal Representation of Ship Models Building



Magnetic Ship Models Building

Magnetic Ship Models Laboratory

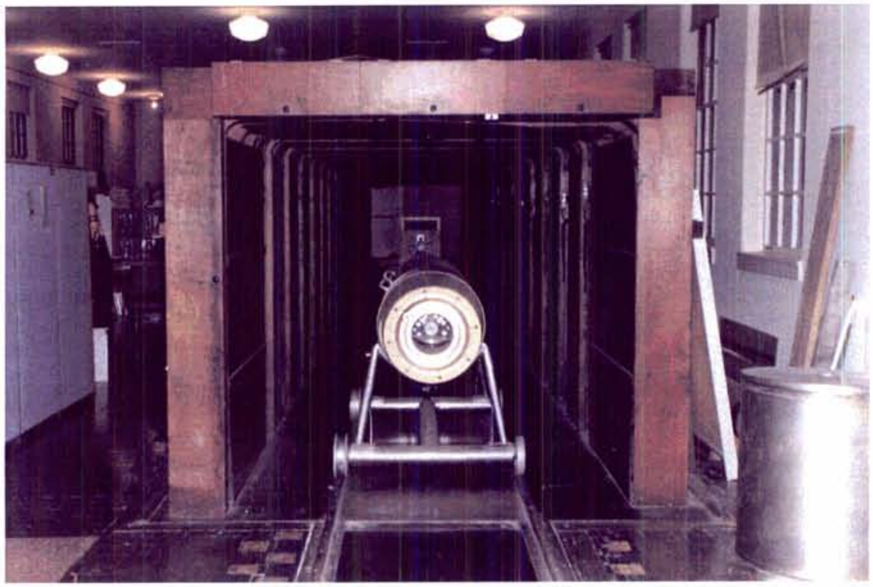
WHITE OAK SITE

CAPABILITIES

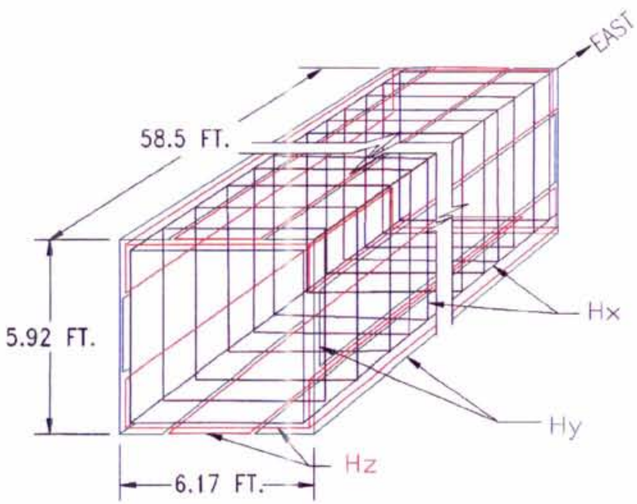
- Fully Automated Data Acquisition and Control.
- Test Physical Magnetic Models up to 12 Ft. long, max width of 21 inches, and weigh 500 lbs.
- Capable of producing very uniform magnetic fields.
- Generate magnetic field to replicate the magnetic environment for anywhere on Earth and space using magnetic field feedback stabilization system.

Long Coil Test Facility

WHITE OAK SITE



Magnetically Compensated
Ship Signature
Performance Evaluation



Internal Representation of Long Coil Building

Long Coil Test Building

Long Coil Test Facility

WHITE OAK SITE

CAPABILITIES

Long Coil Facility

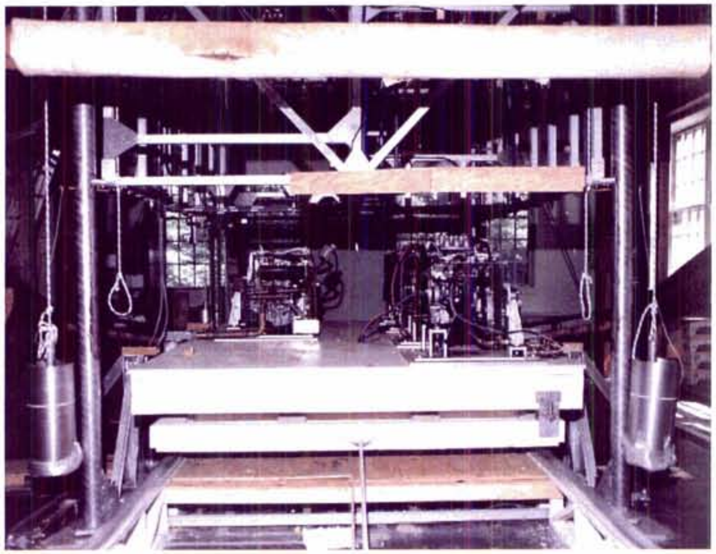
- Capable of handling items 32 ft. long cylinder and 2 ft. diameter.
- Capable of producing very uniform field magnetic centered in coil system.
- Capable of frequency response to 200 Hz.
- Has a magnetic signature ship simulator.
- Has a shaking coil (50 G).
- Generate magnetic field X = ±50,000 nT.

Coil "P"

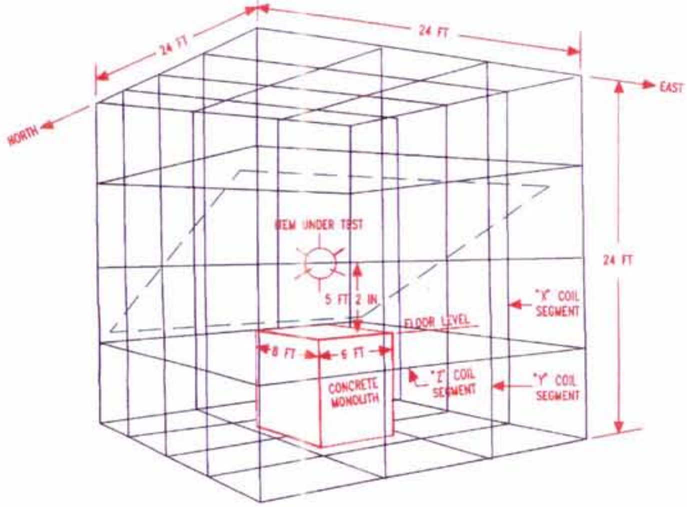
- Capable of handling items 20 ft. long cylinder and 2 ft. diameter.
- Capable of producing very uniform field magnetic centered in coil system.
- Capable of frequency response to 800 Hz.
- Generate magnetic field X = ±50,000 nT.
- Size: 23.5 ft. long, X 3.25 ft. wide X 3.5 ft. high.

Magnetic Structures Test Facility

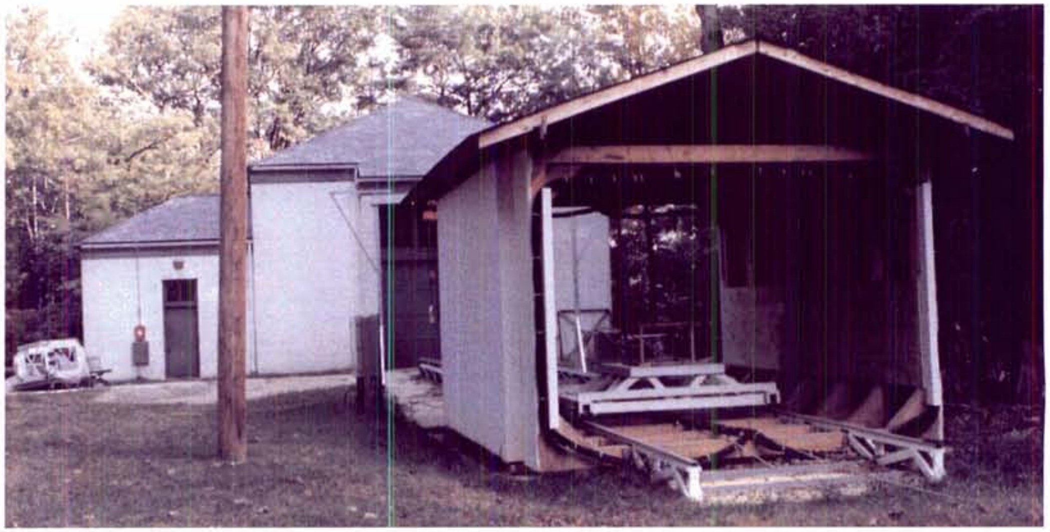
WHITE OAK SITE



MCM Engine Room Mockup Under Test



Internal Representation of Magnetic Structures Building



Magnetic Structures Test Building

Magnetic Structures Test Facility

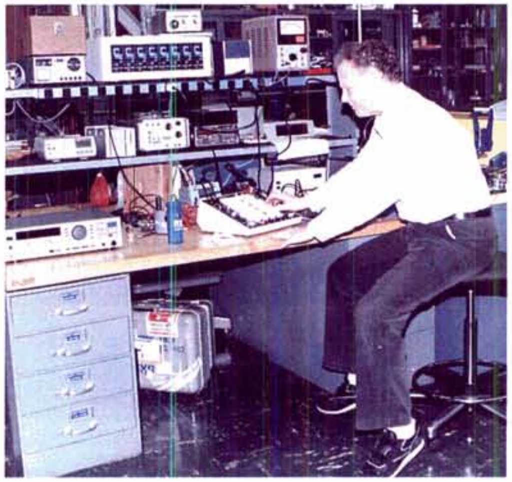
WHITE OAK SITE

CAPABILITIES

- Automated data acquisition and control system.
- Capable of handling items 9.5 ft. wide, 13 ft. long, and 10 ft. high; weighing up to 35 tons, with floor loading no more than 600 lb/sq ft.
- Capable of producing very uniform magnetic fields.
- Generate magnetic field to replicate the magnetic environment for anywhere on Earth and space.
- Has a multiple sensor array installed to map field signatures of items under test.
- Capable of performing eddy current measurements.

Fiber Optics Technology Laboratory

F/O Sensor Fabrication Bench



Opto-Electronics Fabrication

Smoke Test Chamber

F/O Liquid Level Test Stand

Environmental Test Chamber

Fiber Optics Technology Laboratory

CAPABILITIES

- The Laboratory encompasses 6,300 square feet and houses three labs dedicated to development of fiber optic sensors for machinery control, damage control, and condition based maintenance (health monitoring of machinery).

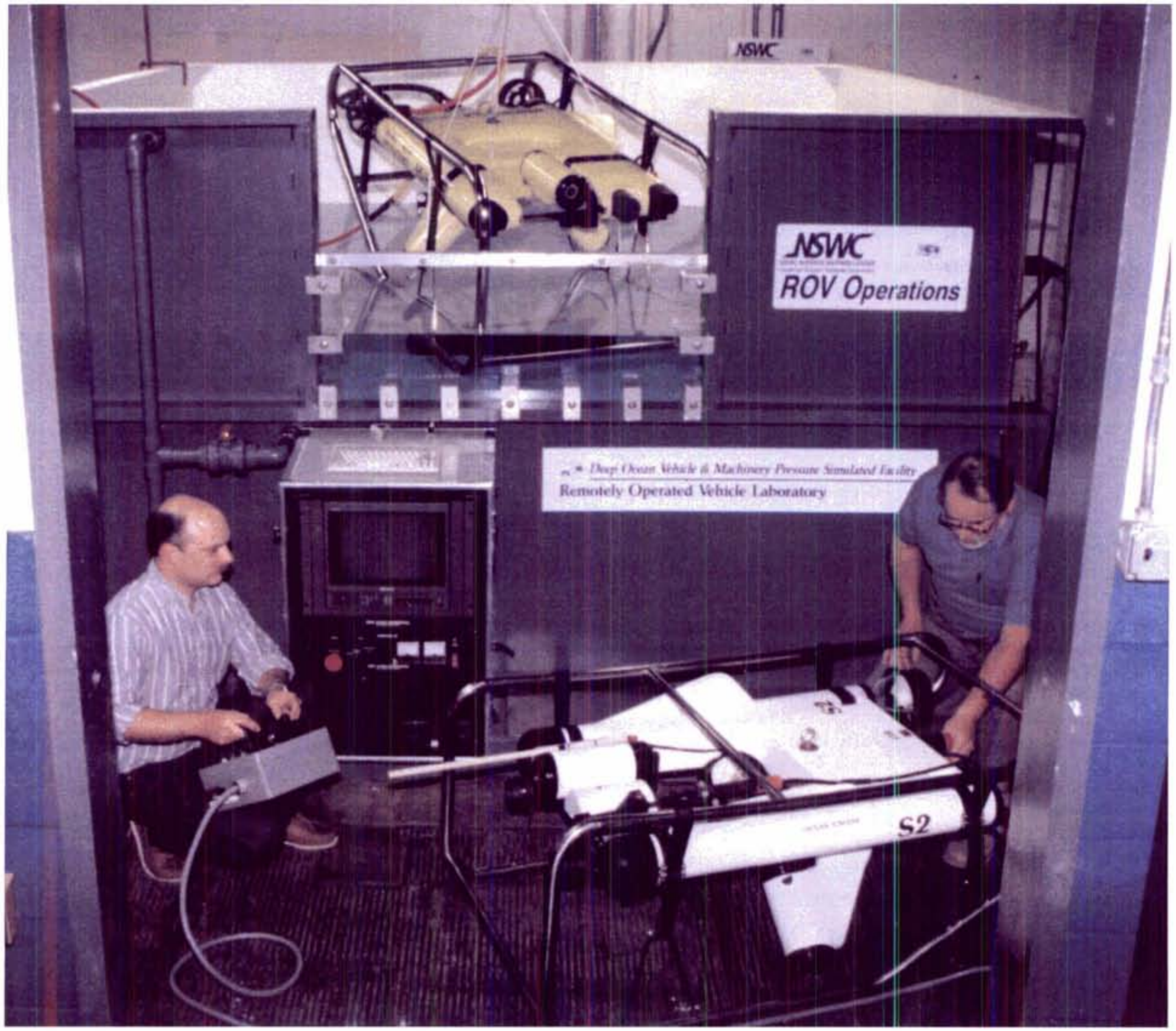
- Supports standard monitoring and control programs which ensure the safe operation and availability of propulsion and auxiliary systems.

- Supports accurate diagnosis of the condition and required maintenance of equipment.

- Laboratory houses a vibration-free electro-optics lab, electronics light lab, and computer lab.

- Fiber optic sensor development is highly interactive with commercial applications, academia, and the National Institute of Science and Technology.

Remotely Operated Vehicle Laboratory



Remotely Operated Vehicles and Test Pool

Remotely Operated Vehicle Laboratory

CAPABILITIES

- The ROV Lab has an above ground test pool 10 feet by 10 feet by 6 feet deep. The pool is constructed of 1/4 inch steel plate with two fixed viewing windows and a removable door for loading vehicles/sensors. An overhead crane with 2 ton capacity is centered over the pool.
- The ROV Lab also maintains several Remotely Operated Vehicles which are used to perform field deployments such as underwater hull inspection, acoustic diagnostics, and hull potential field characterization. These ROVs are equipped with a precision navigation and positioning system and run under closed loop computer control which allows automated pre-planned ROV trajectories.
- Personnel experienced in the deployment and operation of these vehicles
- ROV & Instrumentation Assets:
  - Deep Ocean Engineering, Inc. Phantom S2 - with closed loop control/precision navigation system, color video.
  - Deep Ocean Engineering, Phantom HVS4 - with closed loop control/precision navigation system, color video.
  - Underwater color/black & white video and still cameras. Various hull system sensors: plate & thickness, hull potential measurement system.

Advanced Navy Information Infrastructure Laboratory

CARDEROCK SITE

Broadband Network Development Complex

Advanced Navy Information Infrastructure Laboratory

CARDEROCK SITE

CAPABILITIES

- Supports modernization, integration, development, and test and evaluation of Navy technology infrastructure for communication, information, resource management and engineering, and technical services.

- Capabilities lead the development of shipwide information integration, generic optical fiber system and networks, and ship automations.

- Facility characteristics:
  - 5,000 sq ft with raised floor
  - 4,000 VA of installed electric power with 1,000 VA UPS for computers and environment control (one hour power backup)
  - 250 tons of air conditioning capacity for climate control

Pulsed Power Systems Test Facility
(under construction)

Pulse Power Module

Pulse Power Test Building

Pulsed Power Systems Test Facility
(under construction)

CAPABILITIES

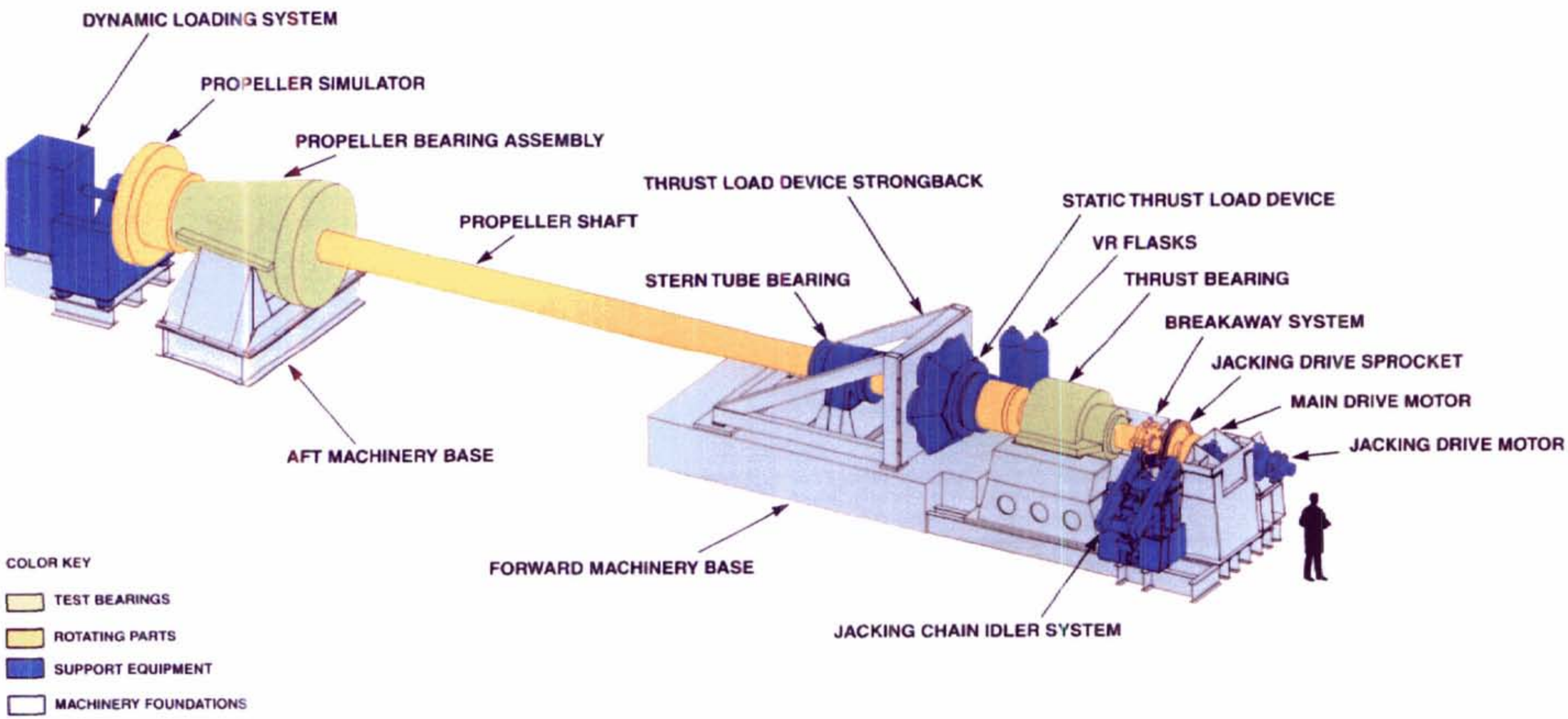
- The Facility supports integration, testing and evaluation of new concepts such as prime power, power conditioning, pulse forming transmission, and control systems for various Navy electric gun and pulsed power component development programs.

- Teaming arrangements with NSWC Dahlgren, NSWC Indian Head, Defense Nuclear Agency, and the U.S. Army.

- Capabilities address improved combat system performance and affordability.

- Facility characteristics:
  - 4,000 square foot building with high bay doors
  - Staging and assembly area with 10 ton crane
  - Prime power trailer and adjacent fuel tank
  - Specialized high voltage grounding grid
  - Climate control, 1 MW electrical service
  - EMI shielded data acquisition/thermal management

Propulsion Shaftline Development Facility
(under construction)



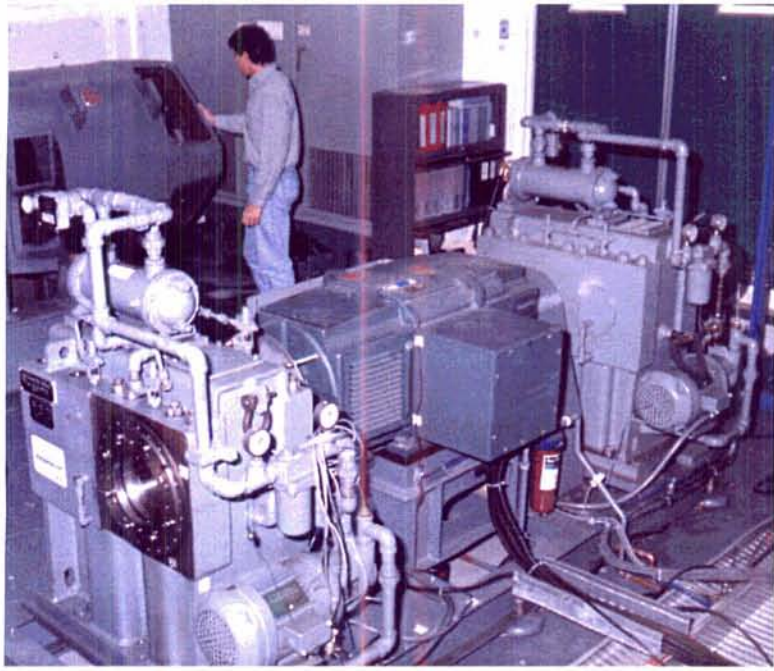
Full Scale Submarine Shaftline Laboratory

Shaftline Development Facility
(under construction)

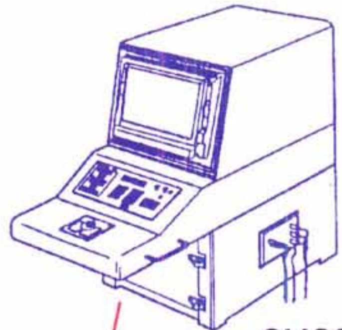
CAPABILITIES

- Advanced Vibration Reducer development: this full scale submarine quieting system will be evaluated and refined prior to the start of costly at-sea testing.
- Thrust bearing qualification: the reliability and safety of each **first article** submarine main propulsion thrust bearing must be verified in land based tests prior to the lead ship going to sea.
- Propeller shaft fatigue testing: this facility compliments other Annapolis Detachment facilities for development testing of a full scale composite shaft.
- Water lubricated bearing development: full scale testing of water lubricated shaft bearings with length-to-diameter ratios of 1:1 to 4:1 can be accomplished in this facility.

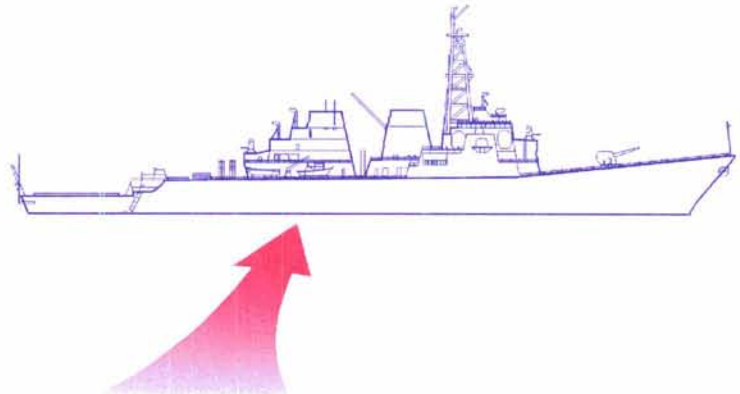
Integrated Power Systems Facility
(under construction)

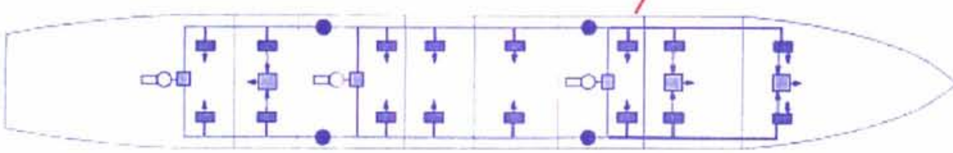


Ship Service Generators

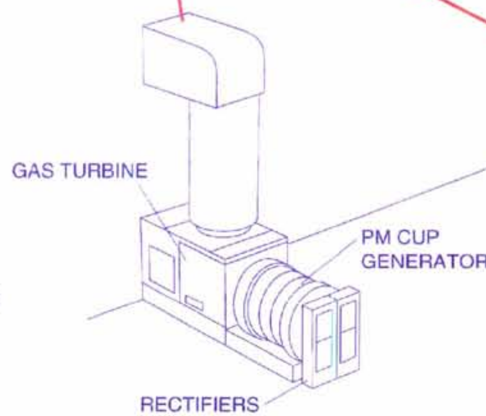


SMCS

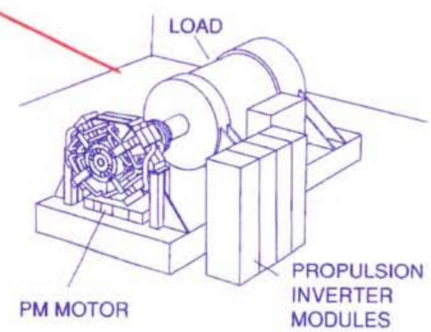




DC Zonal



Propulsion Generator



Propulsion Motor

Integrated Power Systems Facility

(under construction)

CAPABILITIES

- Zonal electrical distribution system (Bldg 100) supports DDG-51 Flight 2A, LPD-17 class, and 21st century Surface Combatant (SC21) with new construction and technology growth into the 21st century.

- Integrated power system (Bldgs 3 and 100) unites the propulsion plant, ship service electrical plant, and ship's monitoring and control functions for the "more electric" ships of the future.

- Fuel cell test installation (MINCON adjacent to Bldg 100) will allow emerging power source technology to be efficiently integrated into future ships.

- Power electronic building block technology integration site to combine system and component requirements for re-inventing Navy industrial base with common building blocks on ***MORE ELECTRIC*** ships.

NAVAL SURFACE WARFARE CENTER, CARDEROCK DIVISION
SHIP SYSTEMS ENGINEERING STATION
PHILADELPHIA, PA.

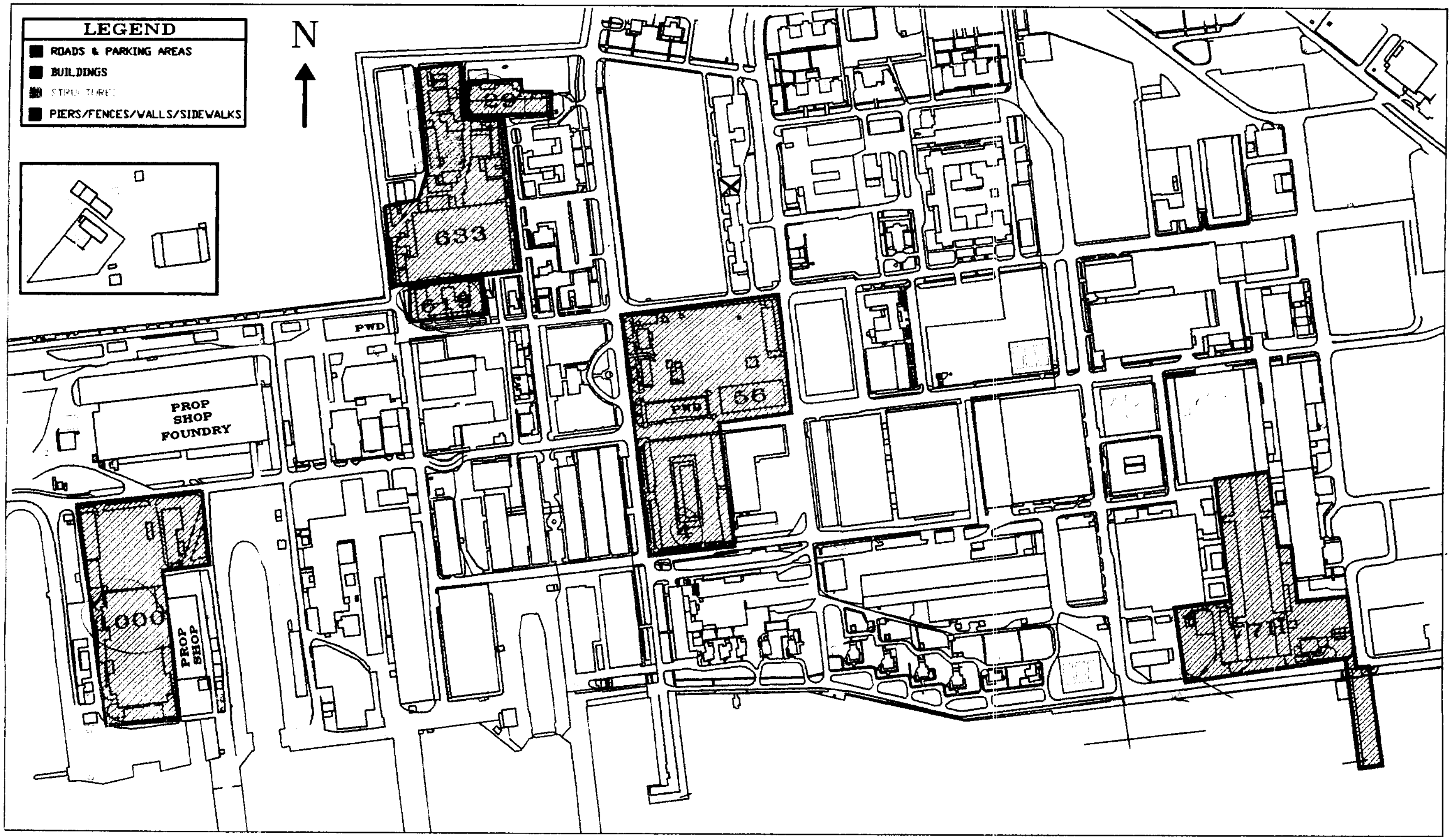
NSWC
Naval Surface Warfare Center
CARDEROCK DIVISION
PHILADELPHIA

BRAC 95 Visit By
Mr. David Epstein

6 April 1995

NSWC-CARDEROCK RECOMMENDATIONS CONCERNING THE PROPOSED RELOCATION OF EIGHT FACILITIES FROM ANNAPOLIS, MD TO PHILADELPHIA, PA

DRAFT



LEGEND
ROADS & PARKING AREAS
BUILDINGS
PIERS/FENCES/WALLS/SIDEWALKS
N
633
619
PWD
56
PWD
PROP
SHOP
FOUNDRY
1000
PROP
SHOP

NSWC-CARDEROCK RECOMMENDATIONS CONCERNING THE PROPOSED RELOCATION OF EIGHT FACILITIES FROM ANNAPOLIS, MD TO PHILADELPHIA, PA AS A RESULT OF BRAC 95

SUMMARY

The Secretary of Defense recommendations to the 1995 Base Realignment and Closure (BRAC) Commission include the relocation of eight facilities from Annapolis to Philadelphia. These facilities are:

(1) **ADVANCED SHIPBOARD AUXILIARY MACHINERY**
(2) **ELECTRIC POWER TECHNOLOGY**
(3) **ADVANCED ELECTRIC PROPULSION DEVELOPMENT**
(4) **PULSE POWER**
(5) **ADVANCED PROPULSION MACHINERY**
(6) **MACHINERY ACOUSTIC SILENCING**
(7) **SEA SURVIVAL LIFE SAVING SYSTEMS**
(8) **NON-CFC LABORATORY**

On 17 March 1995, a team from Philadelphia met with their counterparts in Annapolis to tour the targeted facilities to gain better understanding of these facilities and their support requirements. On the following Monday, 20 March, the Philadelphia Team hosted the Annapolis Team to show them our facilities and to present a rough plan for the location of the Annapolis facilities in Philadelphia.

After reviewing our proposal and the information regarding our facilities, Annapolis and Philadelphia concurred that the Annapolis R&D facilities must be integrated into the Philadelphia site to simultaneously achieve:

- synergy with related ISE facilities and capabilities
- retention of physical and operational connectivity essential to an increasingly system focused R&D and ISE programs.

This integration encourages collocation of equipments where practical. It also permits machinery R&D and ISE facilities to be clustered to allow desired interconnection.

SUMMARY (Continued)

Several of our facilities are planned to move into Building 1000 to meet the requirements of BRAC 91. Our goal is to minimize the duplication of facilities and to promote synergism between research and development scientists and engineers and in-service engineers. Our proposal, which uses all of the main "retained" NAVSSES buildings (Buildings 633, 77H and 1000), provides an efficient and effective integration for technical development.

Attached are preliminary comparisons and layouts of integrated R&D and ISE facilities in three major building complexes at the Philadelphia Site. Additional buildings and alternative facility arrangements are being examined to more completely meet all integration goals and requirements.

(1) ADVANCED SHIPBOARD AUXILIARY MACHINERY FACILITY

Auxiliary machinery is defined as pumps, air compressor hydraulics, piping and valves, distillation plants, he exchangers, refrigeration, and oxygen generator systems th support all aspects of operation such as propulsion, combata systems, life support, weapons, acoustics, depth, and maintenan for surface ships, submarines, and craft.

The Annapolis facility is composed of smaller sites consisting of the Ventilation and Filtration Systems, Compressed Air, Steering and Diving and Hydraulics, Trim and Drain Pump, Piping, Advanced Centrifugal Pump Loop, and Fuel Cell facilities that allow controlled operation of machinery components over the full range of operating conditions while controlling variables such as pressure, temperature, stress, flow rates and heat transfer in order to conduct experiments.

As an aggregate this facility is approximately 20,000 ft^2, with 5000 ft^2 requiring floor loading of 300 lbs/ft^2, and 3500 ft^2 of high-bay (16 ft) area. It has a total of 2.3 Megawatts of installed electric power, uses 1600 gallons/minute of cooling capacity along with 100 tons of chilled water capacity, and requires other services such as low pressure air, varying degrees of crane capacity, and low pressure steam.

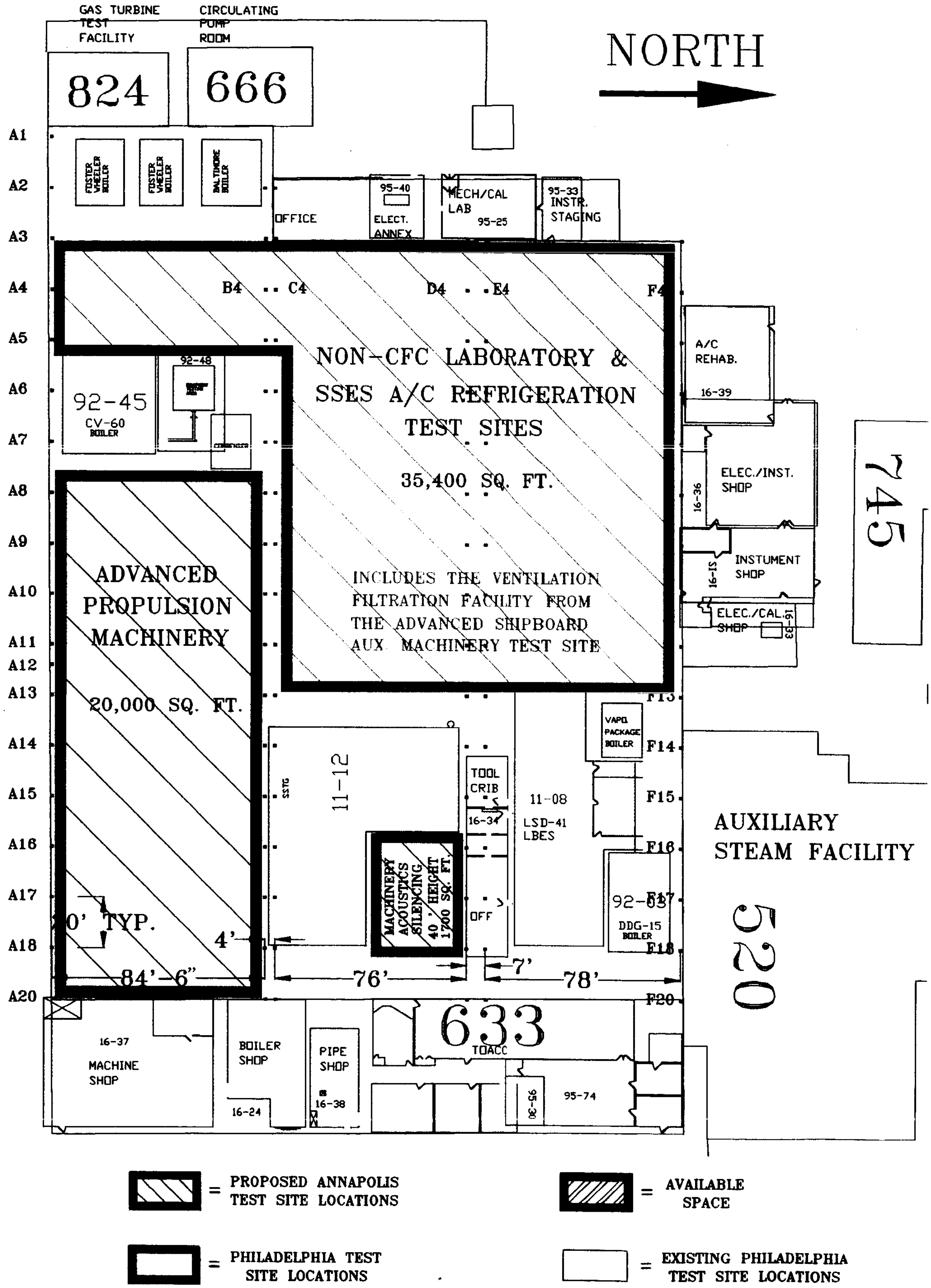
Some of the smaller sites are already represented by similar facilities in Philadelphia and would be integrated into the existing Philadelphia facilities where the infrastructure is already in place to support these sites. Specifically, the Compressed Air, Trim and Drain Pump, Pump Seal and Variable Capacity Pump, and Advanced Centrifugal Pump Loop should be incorporated into the similar facilities in building 77H.
The Ventilation & Filtration Systems would be located in Building 633. The remaining components of the Advanced Shipboard Auxiliary Machinery Facility would be located on the third floor of building 1000 where sufficient space and electric power are available.

(1) ADVANCED SHIPBOARD AUXILIARY MACHINERY DEVELOPMENT FACILILTY					
ANNAPOLIS			PHILADELPHIA		
COMPONENT	FT^2	REQUIREMENTS	SITE CAPABILITIES	FT^2	LOCATION
Ventilation & Filtration Systems	2400	480v, 440v, 208v, 110v 12 ft clearance fresh water shop air	480v, 440v, 208v, 110v 40 ft high bay fresh water shop air	2400	633
Compressed Air	2000	500 gpm cooling water 450 kw 480v 300 lbs/ft^2 floor load	900 gpm cooling water 1100 kVA 480 VAC 300 lbs/ft^2 floor load 100 gpm chilled water	2000	77H Integrate w/existing
Steering and Diving and Hydraulics & fluids with quiet hydraulic power source	3500	Data acq/reduction ctr 15 ft high bay 440v, 110 v Low background noise 300 gpm cooling water	TOACC 18 ft high bay 440v, 110v low background noise 300 gpm *	3500	1000, 3rd Floor
Composite Machinery with Flex Connector & Hose Fac.	8200	440v, 220v, 110v shop air 35 gpm fresh water	440v, 220v, 110v shop air 35 gpm *	8200	1000, 3rd Floor
Trim & Drain Pump Pump Seal, Variable Capacity Pump with AC to DC inverter	1000	440v 1600 gpm salt water 5000 lb hoist	440v 1600 gpm 5 ton crane	1000	77H Integrate w/existing
Pipe & Machinery Structural Test Facility with hydraulic power supply	1500	300 lb/ft^2 floor loading 150 kw of 440v 5 ton crane 30 gpm cooling water 17 ft clearance	300 lb/ft^2 flr load ** 150 kw 440v 80 ton crane 30 gpm * 18 ft clearance	1500	1000, 3rd Floor
Fuel Cells	2000	440v, 110v 60 gpm cooling water 1 ton crane	440v, 110v 60 gpm cooling water * 1 ton crane	2000	Outside 1000

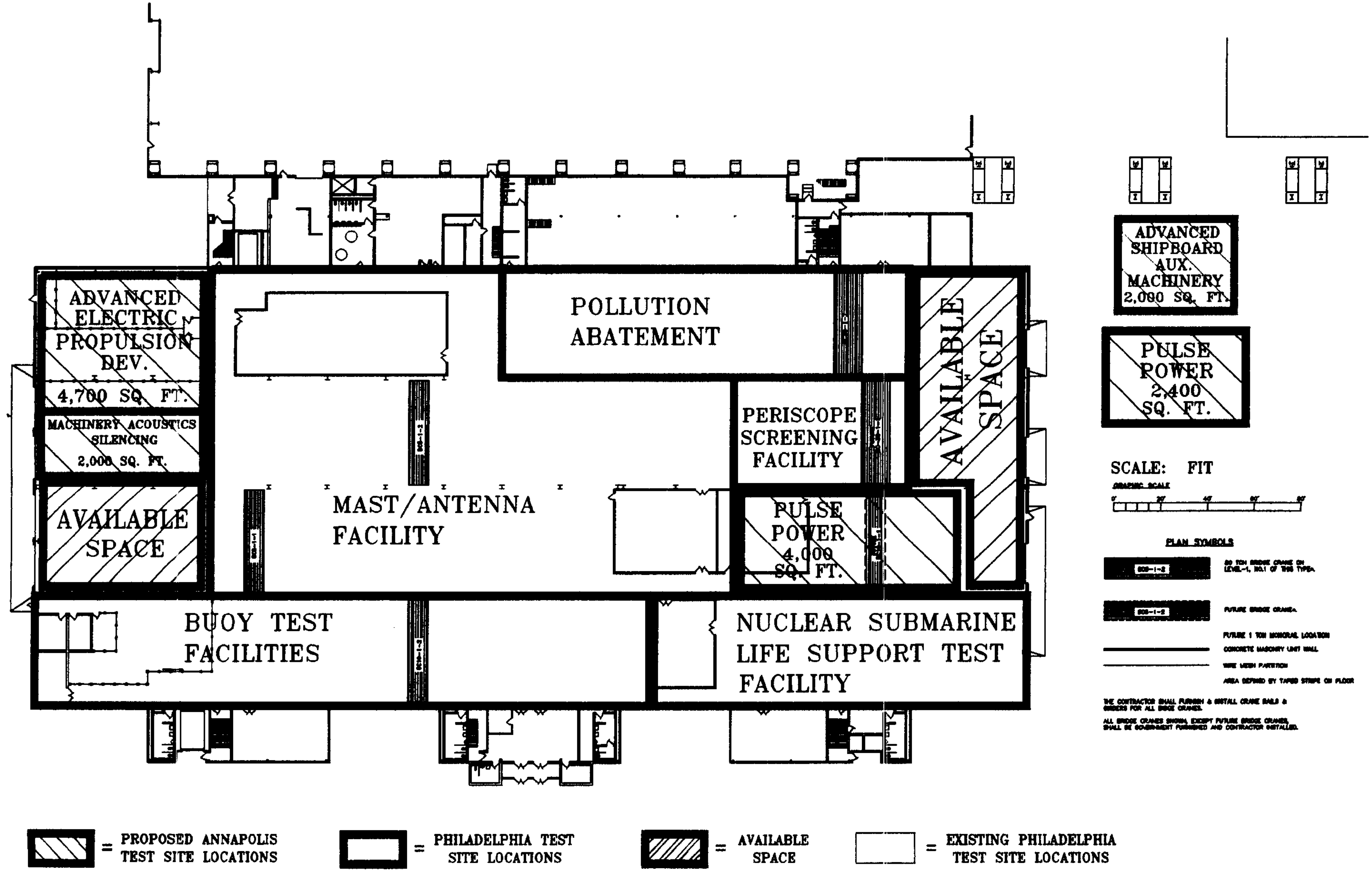
(1) ADVANCED SHIPBOARD AUXILIARY MACHINERY DEVELOPMENT FACILILTY					
ANNAPOLIS			PHILADELPHIA		
COMPONENT	FT^2	REQUIREMENTS	SITE CAPABILITIES	FT^2	LOCATION
Advanced Centrifugal Pump Loop with Air Flow Modeling Facility	1500	150 amp 440v shop air	150 amp 440v shop air	1500	77H Integrate w/existing facility

* A cooling tower/system will have to be designed and constructed for BLDG 1000.

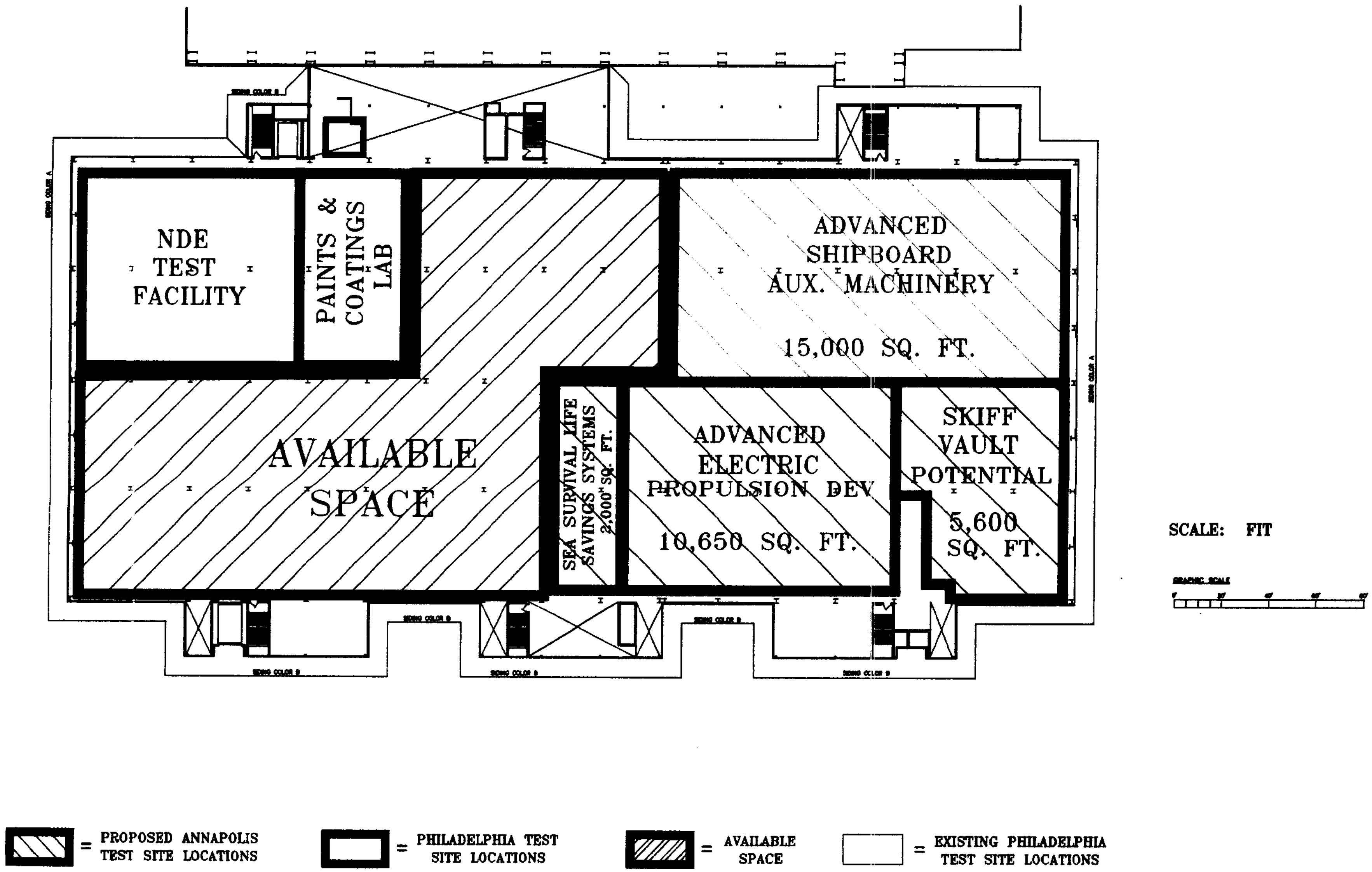
** Some areas of the floor may have to be reinforced. Some areas on this floor will accept this load and more.



BUILDING 633



BUILDING 1000 – FIRST FLOOR



BUILDING 1000 — THIRD FLOOR

(2) ELECTRIC POWER TECHNOLOGY FACILITY

The Electric Power Technology Facility consists of laboratory areas as follows: Power Distribution Laboratory, Power Electronics Laboratory, Machinery Controls Laboratory, and a Fiber Opti Laboratory. It encompasses 3600 ft^2.

It is recommended that the Electric Power Technology Facili be located in the east bay of Building 77H. The labs would occu the first floor and additional labs and offices would be created the mezzanine above. This space would amount to a total of 28,0 ft^2. In addition, we would utilize the space (identified storage) behind the east bay. This space comprises 8000 ft^2.

This site has many advantages, both for Annapolis a Philadelphia. The space is already prepared for use by t Philadelphia site Electric Power System Branch (Code 934). This branch closely parallels the Annapolis Power Distribution Systems Branch (814). The equipment utilized by these branches is similar. We expect a high synergism by integrating the test sites.

Building 77H is equipped with high loading floors, machinery bedplates, erected electrical test cells, more than adequate cooling water, and more than adequate space for load banks. It also has steam and fuel available if needed. Building 77H is generally reserved for full scale testing. Some of these programs developed by Annapolis were scheduled to transition pre-BRAC 95 anyway. They were scheluded to be moved to Building 77H. These programs were: Standardized Machinery Controls, Zonal Electrical Distribution, Integrated Power System, and other component level tests for the AEGIS program.

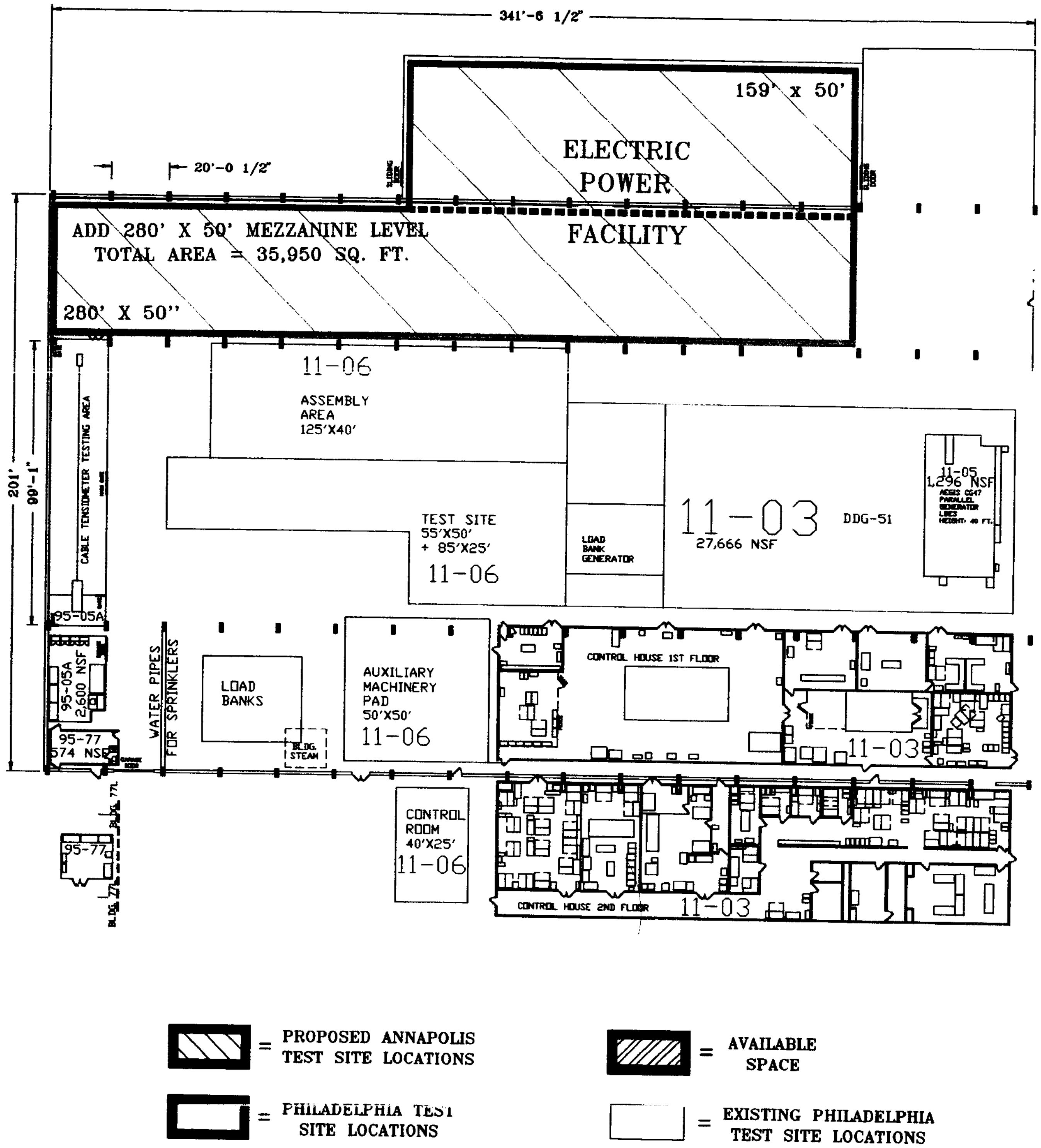
Additionally, the Annapolis Fiber Optics laboratory could be consolidated with the SSES Code 953 Fiber Optics Laboratory located at the south end of Building 77H in the west bay. This would reduce the Electric Power Technology lab space requirements at the north end of Building 77H.

We expect that any shortcomings in utilities or enclosed test cells at this space would be very minor and easily remedied. If there is still a shortfall in space at this location, we recommend that the shortfall be located with the Advanced Electric Propulsion Development Facility on the third floor of Building 1000. This area has more than adequate space for any other labs or offices and was previously suggested by Annapolis as being acceptable.

(2) ELECTRIC POWER TECHNOLOGY FACILITY

CHARACTERISTIC	ANNAPOLIS	PHILADELPHIA (77H NORTH END)
Space (square feet)	Total 35,993	14,000 Level 1 14,000 Mezzanine 8,000 Storage Area Total 36,000
Overhead Clearance (feet)	10 to 14	14
Floor Loading (PSF)	100 to 400	Level 1 and Mezzanine 250 to 500
Electric Power (Volts, KVA)	450V, 440V, 220V 2.4KV, 13.8KV, 4540KVA	450V, 440V, 220V * up to 8000KVA
Cooling Water (GPM)	230	Up to 25,000 w/connecting line

* Voltage requirements are easily met with installation of a transformer.



BUILDING 77H NORTH

(3) ADVANCED ELECTRIC PROPULSION DEVELOPMENT FACILITY

This facility's major capabilities include: multi-megawatt electric drive evaluation facilities, including 200,000 amp power supply and full scale current collector test facility, cryogenics delivery systems, superconducting magnetic design and fabrication capability.

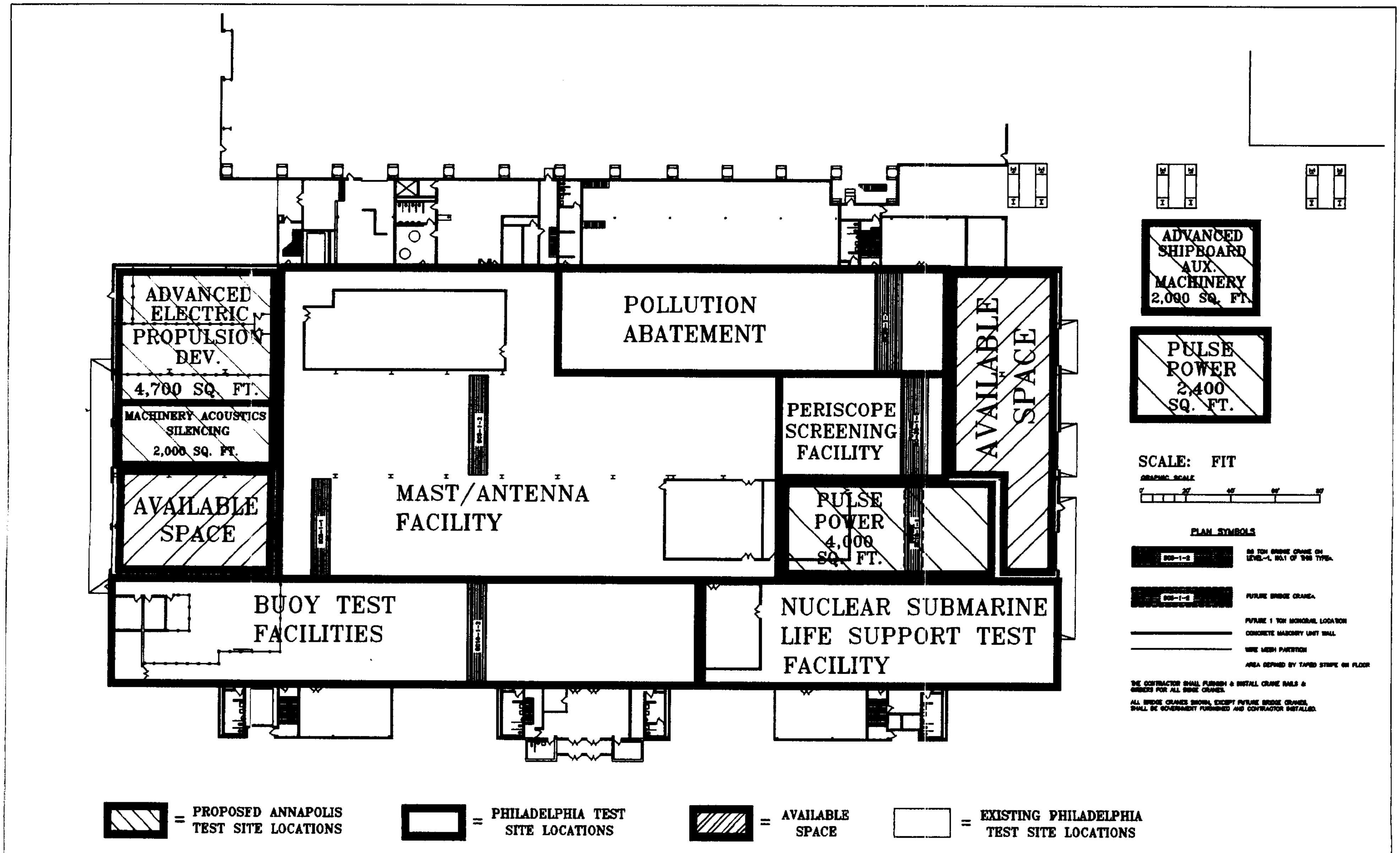
It is recommended that this facility be divided into two locations in Building 1000. The heavier equipment would be located on the first floor where high floor loading exists. The balance the Advanced Electric Propulsion Development Facility would located on the third floor. This will provide more than adequa space for any other labs and offices. If needed, specialized wal or space could be erected to prevent any stray electromagnet interferences from high energy emitting equipment.

(3) ADVANCED ELECTRIC PROPULSION DEVELOPMENT FACILITY

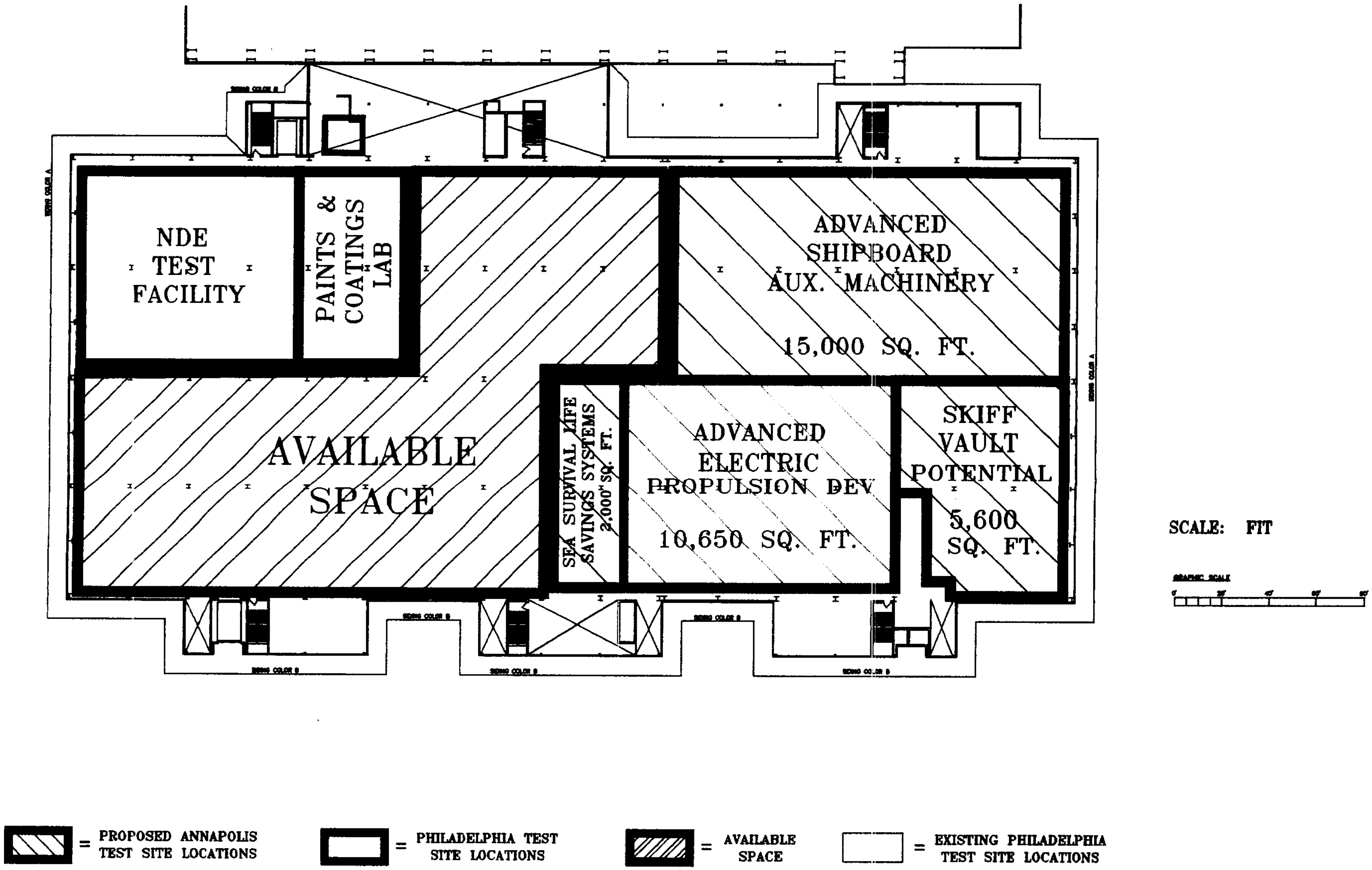
CHARACTERISTIC	ANNAPOLIS	PHILADELPHIA (BLDG. 1000)
Space (square feet)	Total 15,350	Level 1 - 4,000 Level 3 - 11,350 ------ Total 15,350 plus more on level 3 & 4 if needed
Overhead Clearance (feet)	14 to 20	20 to 30
Floor Loading (PSF)	400 - (11,350 sq ft) 200 - (4,000 sq ft)	Level 1 - 400 (4,700 sq ft) Level 3 - 400 (6,650 sq ft) flooring strengthended Level 3 - 200 (4,000 sq ft)
Electric Power (Volts, KVA)	13.8KV, 440V, 208V 7550KVA	13.8KV, 440V, 220V * up to 8000KVA
Crane (tons)	5 to 18	5 to 30
Cooling Water (GPM)	1350	Phila. will be providing a new cooling system to cover all of bldg. 1000 needs
JP-5 Fuel Storage and Containment	Gas Turbine not currently installed but Annapolis requests capability of 267 gal/hr	Phila. will either relocate a storage tank or procure a new tank and will combine w/Pulse Power Lab needs

* Voltage requirements are easily met with installation of a transformer.

(3) ADVANCED ELECTRIC PROPULSION DEVELOPMENT FACILITY (CONT'D)		
CHARACTERISTIC	**ANNAPOLIS**	**PHILADELPHIA (BLDG. 1000)**
Permits	Gas Turbine Operation	Permits already exists
Load Banks	Locate outside	This site is near outside wall
Shop Air	Pressure not specified	80-100 PSIG
Clear Area for High Magnetic Field test	35' x 35'	Phila. has abundent space on level 3
Liquid Metal Handling Room	250 sq. ft.	Phila. has various metal handling rooms that can accommodate this need
Clean Room	400 sq. ft.	Phila. has various that can accommodate this need. We will need to install a filtration system



BUILDING 1000 – FIRST FLOOR



BUILDING 1000 — THIRD FLOOR

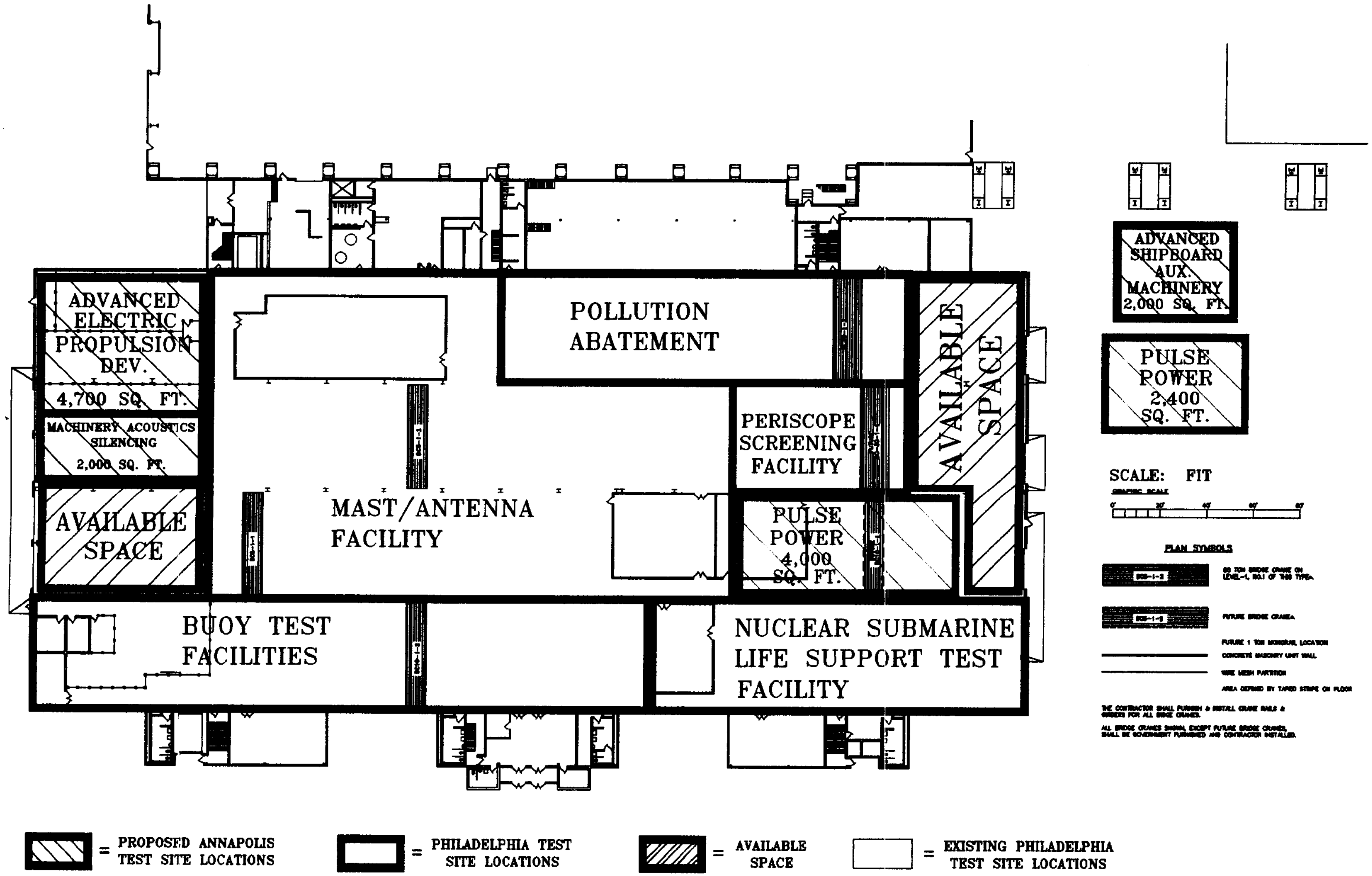
(4) PULSE POWER FACILITY

This facility currently occupies two trailers in Annapolis. These trailers are periodically moved to Dahlgren, VA for testing and returned. Currently, the trailers are housed in Annapolis in a shed type enclosure. This arrangement provides for additional weather protection and for open space around the trailers to minimize personnel and equipment exposure to the electro-magnetic interference (EMI) generated by this equipment when being tested.

It is recommended that this facility be located on the first floor of Building 1000 where adequate space is available and there is access via large doors for moving the trailers into and out of the building as necessary for testing. If needed for personnel safety, shielding could be installed around this location.

(4) PULSE POWER FACILITY		
CHARACTERISTIC	**ANNAPOLIS REQUIREMENT**	**PHILADELPHIA CAPABILITY**
SPACE-inside (square feet)	4,000	4000 in bldg. 1000 D
Space-outside (square feet)	2,400 on open 40′ x 60′ concrete pad	Unlimited square feet outside bldg. 1000
Overhead Clearance (feet)	14	30
Crane (tons)	10	30
Floor Loading (pounds per square foot)	Not specified; trailer weighs 40 tons & needs access to highways	400 pounds/square foot with access to highways
High Voltage Grounding Grid	Yes	Will need to be installed
Physical Separation & Isolation of test equipment for personnel safety	8′ Distance from equipment plus walls for isolation	8′ distance is available and walls will be erected
EMI Shielding from other sites	Shielded walls	Walls will be provided
Climate Control	Minimize humidity on high voltage systems	Space will be properly climate controlled typical of other spaces on level 1
Permits	Gas Turbine Operation	Some permits already exists; if necessary these permits can be modified or a new one issued

(4) PULSE POWER FACILITY (CONT'D)		
CHARACTERISTIC	**ANNAPOLIS REQUIREMENT**	**PHILADELPHIA CAPABILITY**
Noise Abatement	No decibel level was provided	Phila. has in the past and will continue to meet noise limitations
Electrical Power	Dedicated 2MVA, 13.8V, 3phase, 60HZ power feed w/switchgear	Bldg. 1000 has 8MVA, however Annapolis is bringing their transformer, so Phila. will provide connection from nearby feed and will provide switchgear
Cooling Water (GPM)	500	Phila. will be providing a new cooling system to cover all of bldg. 1000 needs
JP-5 Fuel Storage (Gals)	2000 minimum; currently Annapolis draws from a very large (1M +) tank	Phila. will either relocate a storage tank or procure a new tank 2000 minimum capacity
JP-5 Fuel Containment	System to contain spill from tank	Phila. will install whatever fuel containment system that is needed for safe operation
Cabling and Cable Trays	100-150 feet of cabling and cable trays	Phila. will provide whatever cabling and trays Annapolis can not bring



BUILDING 1000 — FIRST FLOOR

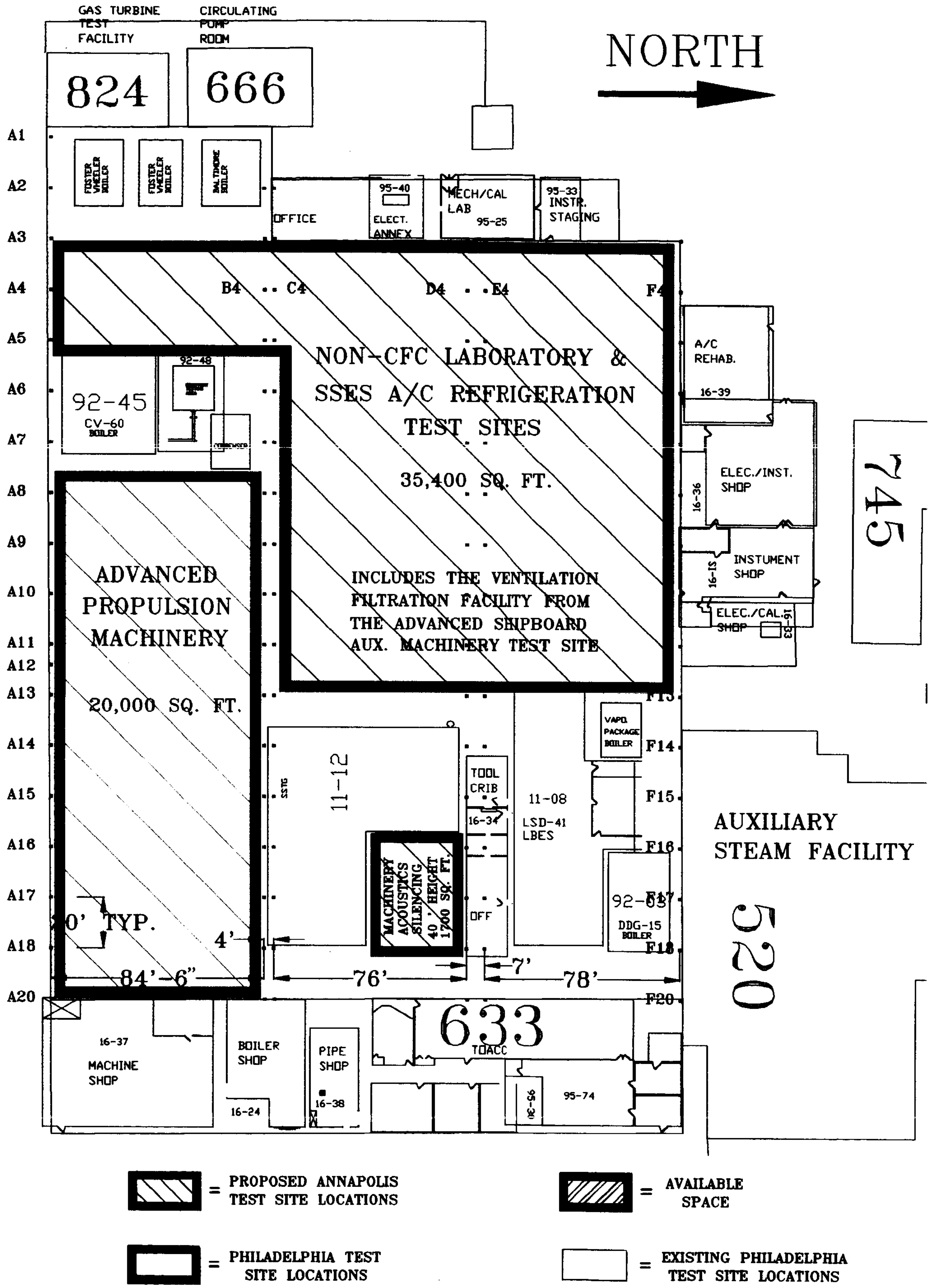
(5) ADVANCED PROPULSION MACHINERY FACILITY

This facility consists of a full scale submarine shaft line and thrust bearing, shaft seal facility, seal test stand support, a line shaft bearing test facility, a full scale composite shaft test facility, a small scale composite shaft test area, and a small engine test facility. The aggregate facility occupies approximately 20,000 ft^2 of floor space, requires some areas of high floor loading, fuel storage, cooling water, 440v electrical service, and a high-bay area with crane service.

It is proposed to locate this facility in the south bay of Building 633 where adequate floor space, overhead clearance, crane service, fuel service, electrical power and cooling water meet the Annapolis requirements. Some normal floor modification may be required for the Submarine Shaft line, otherwise all floor loading requirements are met. In addition, there is close proximity to machine shops, electrical shops, and instrumentation shops for quick modifications to equipment as experiments expose the need to make changes.

(5) ADVANCED PROPULSION MACHINERY FACILILTY

ANNAPOLIS			PHILADELPHIA		
COMPONENT	FT^2	REQUIREMENTS	SITE CAPABILITIES	FT^2	LOCATION
Full Scale Shaft Line	4200	400 Amps 440 350 gpm cooling water 1000 lbs/ft^2 low noise	Meets all electrical, cooling water, fuel storage, acoustic, and floor loading requirements	20,000	633
Composite Shaft Landbased Test Facility	4800	150 amps 440 v 20 gpm cooling water			
Composite Shaft Small Scale Test Equipment	650	300 Amps 440v 40 gpm cooling water			
Fleet Shaft Seal Facility	4600	930 Amps 440v 100 gpm fresh water 90 gpm cooling water			
SSN-21 Shaft Seal Facility	1600	460 Amps 440v 1 gpm fresh water 20 gpm cooling water			
Shaft Bearing Facility	2500	225 Amps 440v 15 gpm cooling water			
Engine Development Laboratory	1850	250 Amps 440v 250 gpm cooling water inlet/exhaust ducts Fuel storage Noise enclosure			



BUILDING 633

(6) MACHINERY ACOUSTIC SILENCING FACILITY

The Machinery Acoustic Silencing Facility is an integrated complex composed of three (3) major test cells, each constructed as semi-anechoic facilities, with over 8,000 ft^2 of test area and bays ranging in heights of 12 ft to 50 ft, namely:

1. Quiet Ventilation Fan R&D Facility, within which is an anechoic platform, with a floor area of 3500 ft^2 and a 50 ft high bay.

2. Quiet Pump R&D Facility with a floor area of 2500 ft^2 and a high bay in excess of 12 ft.

3. Resilient Mount/Structural Acoustics Facility consisting of three (3) areas:

    a) Mount Facility with a floor area of 900-1000 ft^2 and a bay height equal to or in excess of 12 ft.

    b) Damping Technology Facility with a floor area of 2000 ft^2 and a 12 ft high bay.

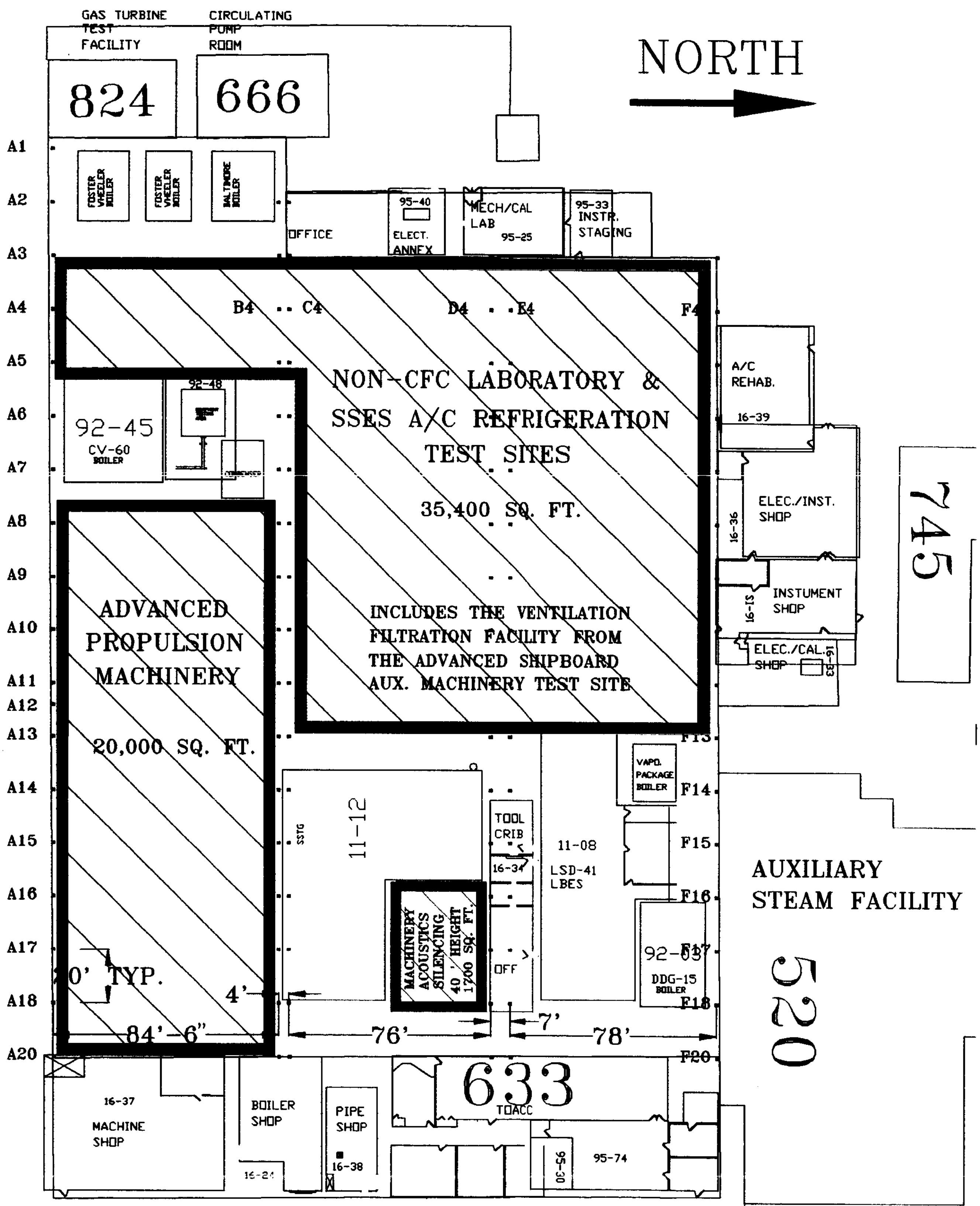
    c) 1/3 Scale Model Facility with a floor area of approximately 1856 ft^2 and a lifting height of approximately 32 ft above an isolated metal/concrete floor of 700 ft^2.

The Machinery Acoustics Silencing Facility requires clean low noise electrical power of 440v, 3 phase, 400 Hz, and DC, 15 kVA (110 and 208 v), 460 VAC, and 30 kVA (120 and 220 v); proper earth grounding provisions; 3 to 15 ton overhead crane capacity; shop air; cooling water (20 gpm fresh and 235 gpm river); floor loading capacity of 350 lbs/ft^2.

It is proposed that the Machinery Acoustics Silencing Facility be integrated with the existing NSWCCD-SSES Facilities of Buildings 633, 77H, and 1000 wherein the above requirements of electrical power, grounding provisions, crane capacity, air and water and floor load capacity in excess of 350 lbs/ft^2 already exist and/or can be readily provided.

Sites proposed for buildings 633, 77H, and 1000 will exhibit and provide acoustic design characteristics equal to or greater that those acoustic characteristics designed for the SSN-21 Main Propulsion Machinery testing conducted in building 633 and the Diesel-Generator test site presently under construction in building 77H. It is important to note that in order to meet the acoustic requirements for sound and vibration testing of the SSN-21 an isolated test site with an acoustic enclosure of semi-anechoic design was constructed to enclose the main propulsion machinery. This design (and subsequent procurement) enabled NAVSSES to realize a 55 decibel transmission loss across the barrier. When coupled with an average "in the building" noise level of 92 decibels the 55 decibel noise loss enabled NAVSSES to measure noise levels within the enclosure of about 40 decibels. Additionally, within the chamber itself the Noise Reduction Coefficient is estimated to be about 1.05. This means that sound measurements from the machinery being tested would only be comprised of the machinery (not reflections or noise external to the barrier). These noise levels are extremely low, certainly low enough for any conceivable developmental measurements for decades. This technology will be employed at the proposed sites and will meet the requirements of all equipment to be removed from Annapolis.

(6) MACHINERY ACOUSTIC SILENCING FACILITY					
ANNAPOLIS			PHILADELPHIA		
COMPONENT	FT^2	REQUIREMENTS	SITE CAPABILITIES	FT^2	LOCATION
Quiet Ventilation Fan R&D Facility	3500	Low Noise Elec Pwr - 440v, 3 phase, 400 HZ, & DC 15 kVA (110 & 208 v) 460 VAC	Low Noise Elec Pwr - 440v, 3 phase, 400 HZ, & DC 15 kVA (110 & 208 v) 460 VAC	3500	77H
Quiet Pump R&D Facility	2500	30 kVA (120 & 220 v) Earth Grounding 3 to 15 Ton Overhead Crane Shop Air	30 kVA (120 & 220 v) Earth Grounding 3 to 15 Ton Overhead Crane Shop Air	2500	633
Resilient Mount/Structural Acoustics Facility	4556	20 gpm fresh water 235 gpm river water 350 lbs/ft^2 floor loading	20 gpm fresh water 235 gpm river water 350 lbs/ft^2 floor loading	4556	77H & 1000



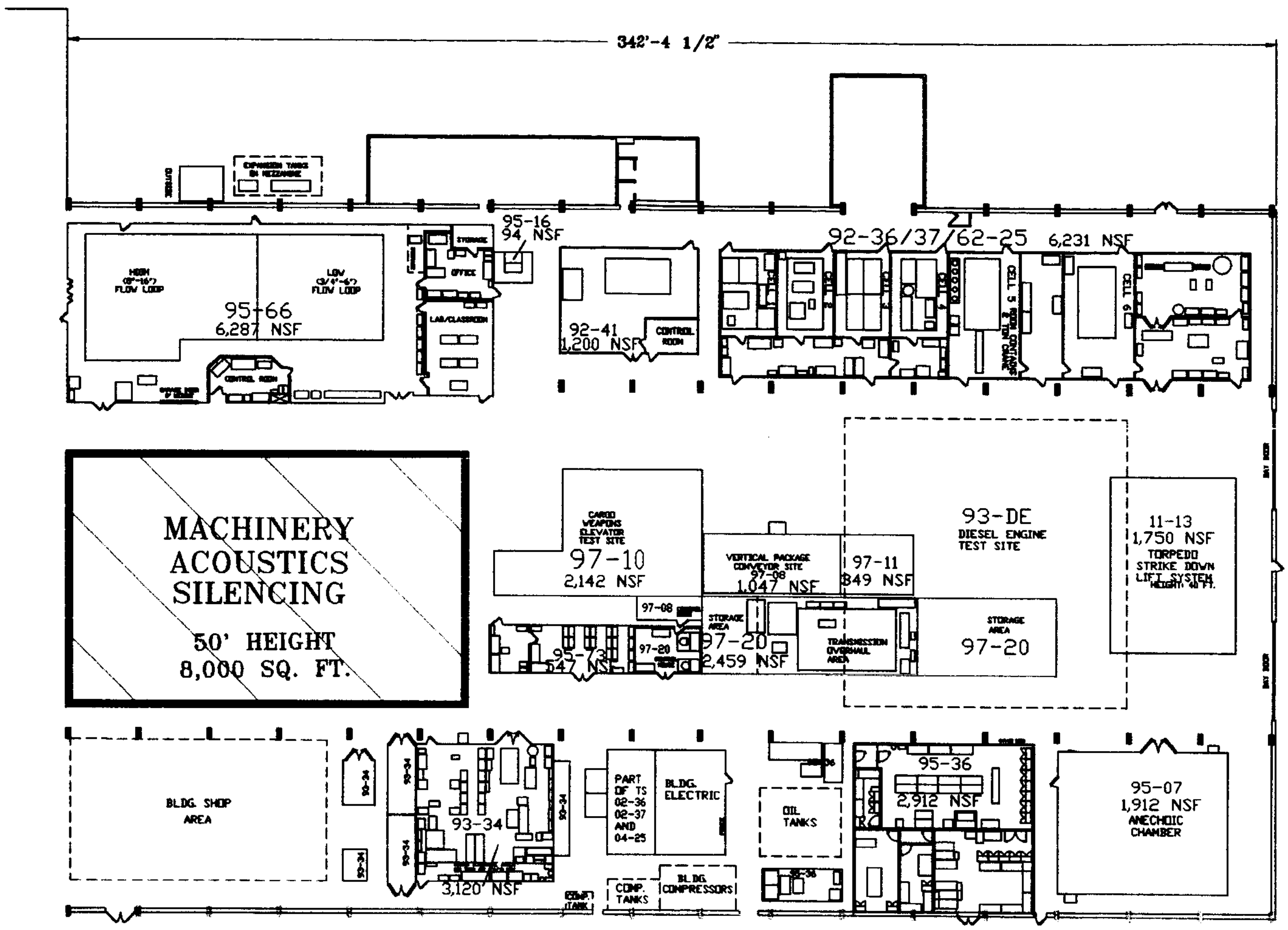
= PROPOSED ANNAPOLIS TEST SITE LOCATIONS

= AVAILABLE SPACE

= PHILADELPHIA TEST SITE LOCATIONS

= EXISTING PHILADELPHIA TEST SITE LOCATIONS

BUILDING 633



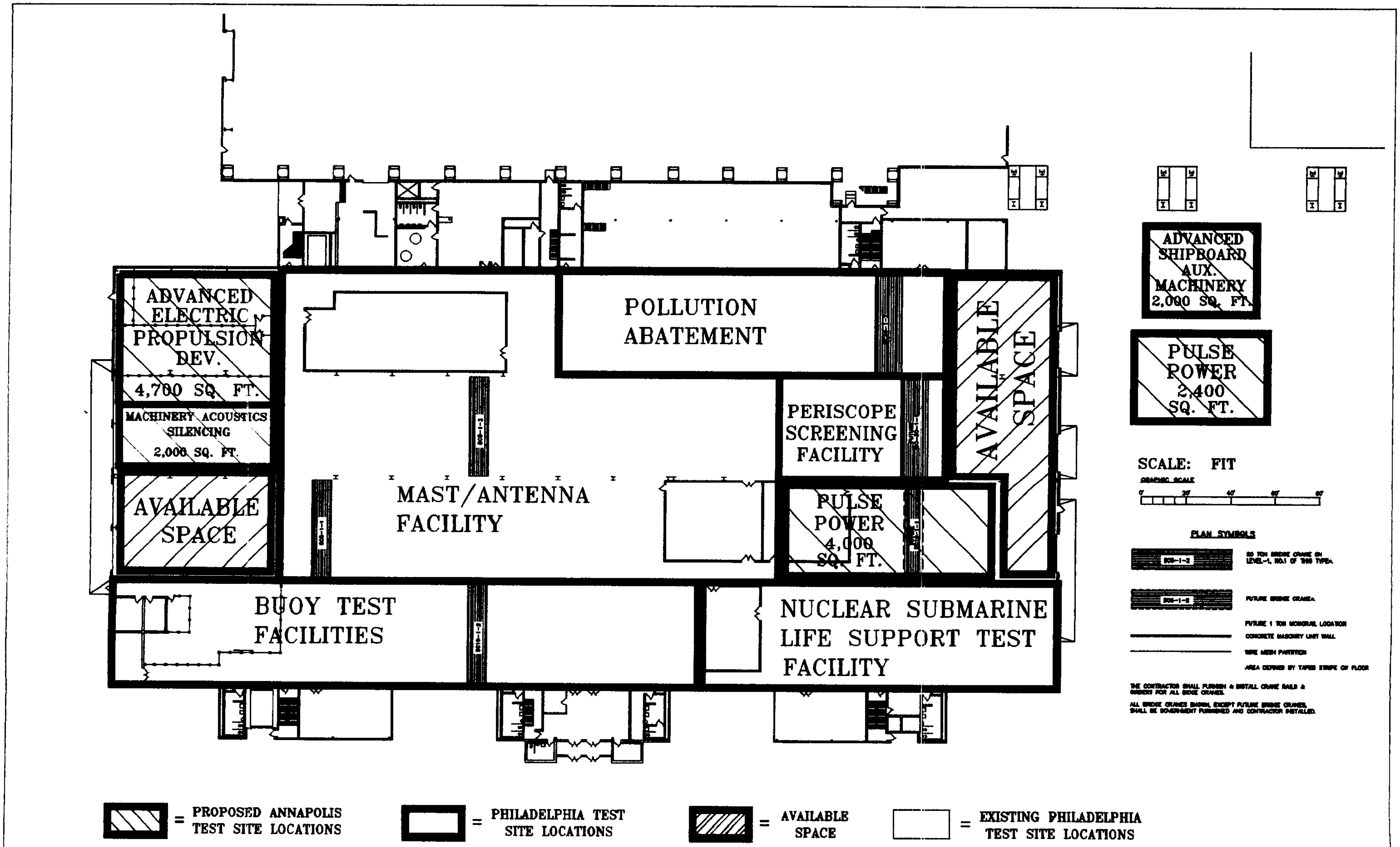
= PROPOSED ANNAPOLIS TEST SITE LOCATIONS

= AVAILABLE SPACE

= PHILADELPHIA TEST SITE LOCATIONS

= EXISTING PHILADELPHIA TEST SITE LOCATIONS

BUILDING 77H SOUTH



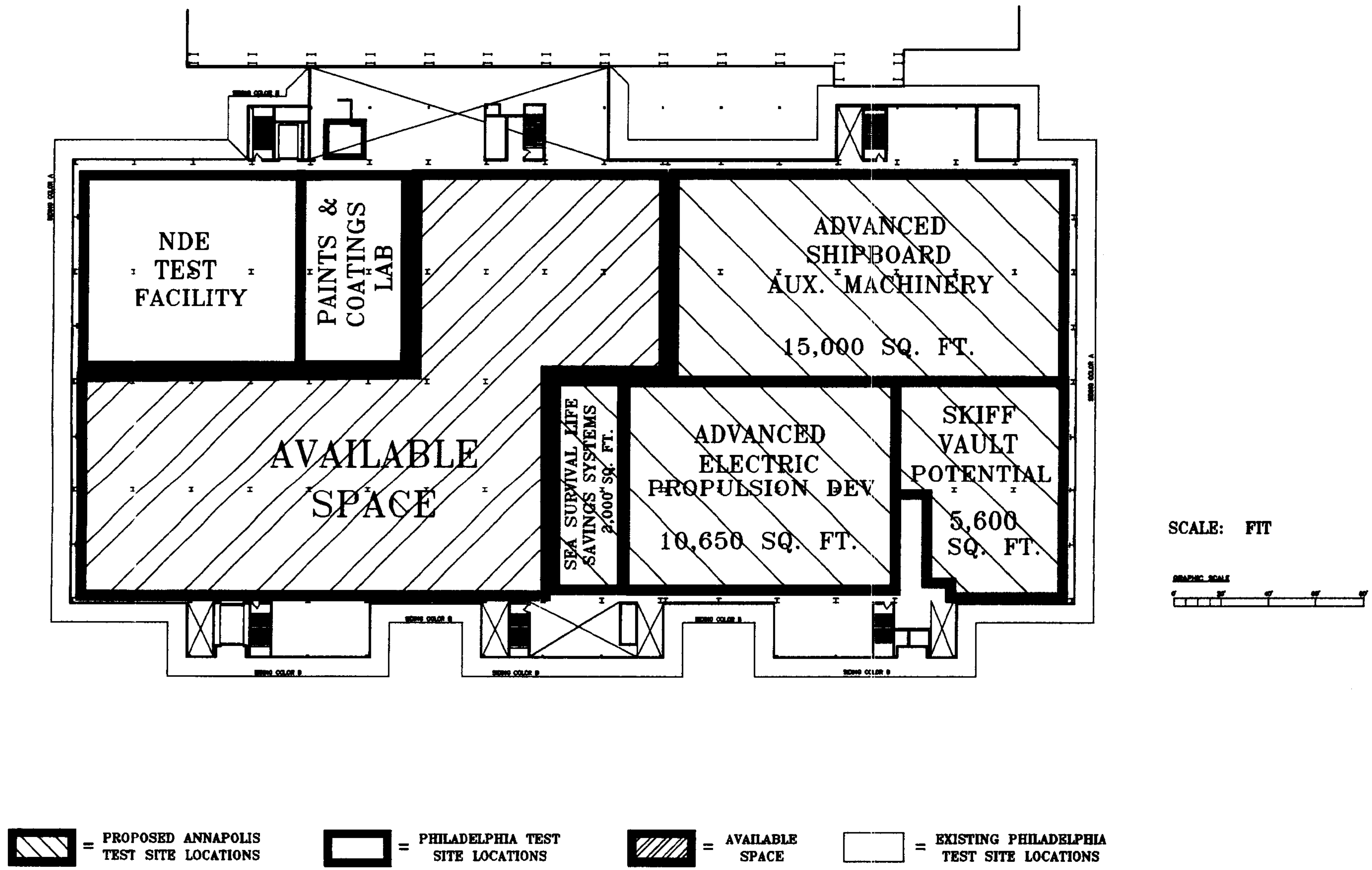
BUILDING 1000 – FIRST FLOOR

(7) SEA SURVIVAL LIFE SAVING SYSTEMS FACILITY

This facility exists to investigate, identify and correct the causes of product failures and poor operational performance in the area of sea safety equipment and consists primarily of benchtop and wall mounted equipment for small scale testing, sample conditioning, sample ageing, life-cycle simulation, and sample preparation.

It is recommended that this facility be integrated with the Philadelphia damage control and Chemical, Biological, and Radiation protection functions. This facility would be located on the third floor of Building 1000 where adequate space and support services are available.

(7) SEA SURVIVAL LIFE SAVING SYSTEMS					
ANNAPOLIS			PHILADELPHIA		
COMPONENT	FT^2	REQUIREMENTS	SITE CAPABILITIES	FT^2	LOCATION
Sea Survival Life Saving Systems	2000	240v, 110v A/C & Humidity Control potable water	240v, 110v A/C & Humidity Control potable water	2000	1000, 3rd Floor



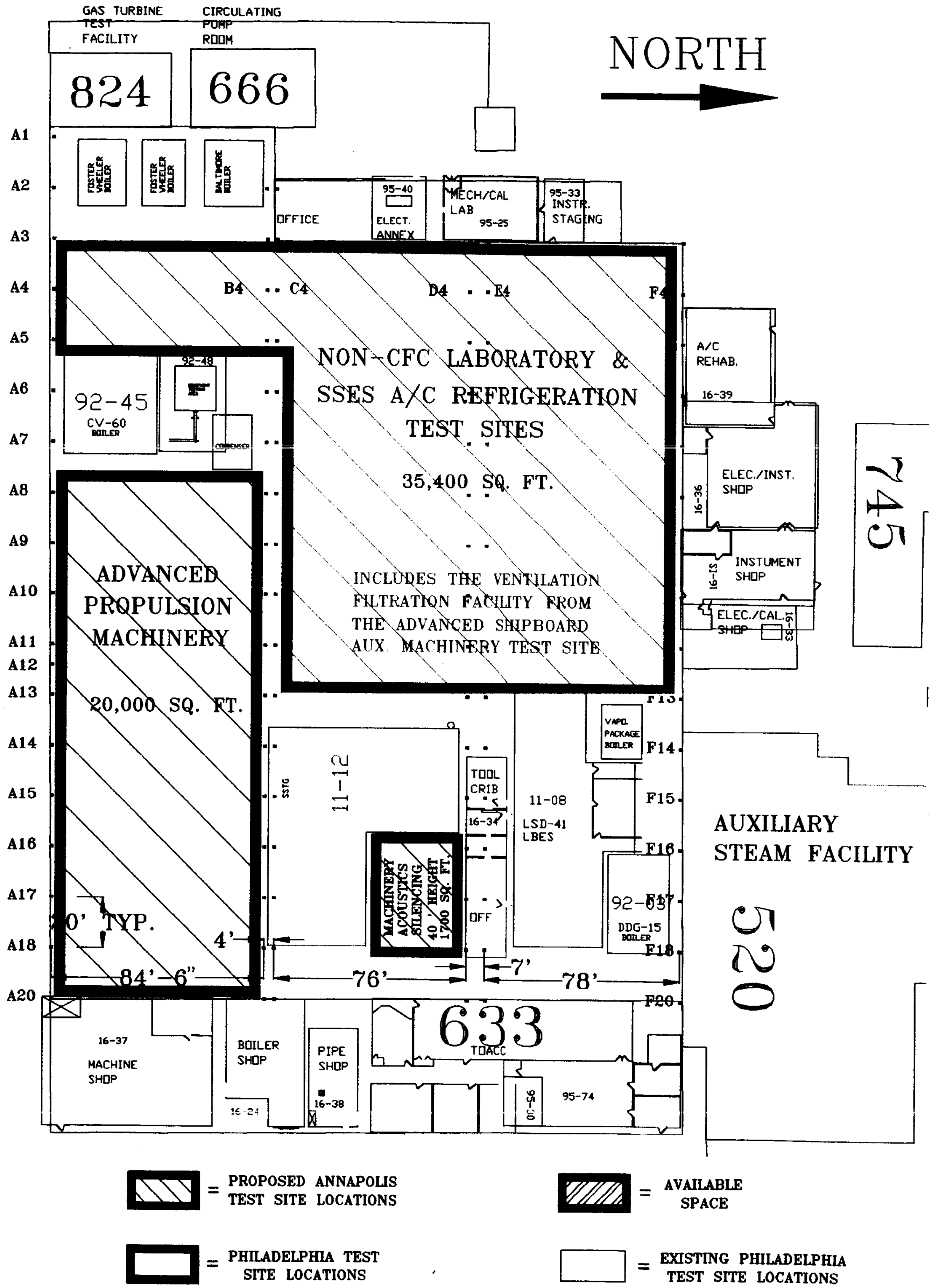
BUILDING 1000 – THIRD FLOOR

(8) NON-CFC LABORATORY

The Non-CFC Laboratory is a large complex composed of many test facilities integrated and interconnected by a variety of shared water systems, electrical power distribution systems and data acquisition and analysis systems. Overall it encompasses 30,000 ft^2 of floor space with very high floor loading (550 lbs/ft^2) in a high-bay area (16 ft) with 15 ton crane service. The facility requires 6,000 gallons/minute of cooling water and 560 kilowatts of 480v, 60 hertz, three phase electrical power.

It is proposed that this facility be integrated with the existing Philadelphia Air Conditioning and Refrigeration Site and be located in building 633. This arrangement will permit the continuation of both the Annapolis and Philadelphia Non-CFC program with minimal schedule impact. In the targeted location there is 33,000 ft^2 of floor space capable of handling the high floor loading specified with a minimum overhead clearance of 40 ft. Additionally, 50,000 gallon/minute of cooling water capacity already exists in this area with heat rejection to the Reserve Basin and can support air conditioning plants over the full range of conditions encountered in service. This is an unlimited source of cooling water with NO environmental restrictions. There is also sufficient electrical power from a substation that was installed to support the now idle Improved Performance Machinery Program Test Site. This area also has 50 ton crane service and is tied into our Test Operations and Analysis Control Center (TOACC). TOACC is an automatic, computerized data collection, storage, and retrieval system which provides for high speed remote data acquisition as well as local data acquisition at the test site.

(8) NON-CFC LABORATORY					
ANNAPOLIS			PHILADELPHIA		
COMPONENT	FT^2	REQUIREMENTS	SITE CAPABILITIES	FT^2	LOCATION
Non-CFC Laboratory	30000	6 MW elec power 16 ft high bay 6000 gpm cooling water 15 ton crane 550 lbs/ft^2 floor load Data Acquisition	> 6 MW elec power 40 ft high bay 50,000 gpm cooling water 50 ton crane > 550 lbs/ft^2 floor load Data Acquisition (TOACC)	33,000	633



BUILDING 633

CONSOLIDATED

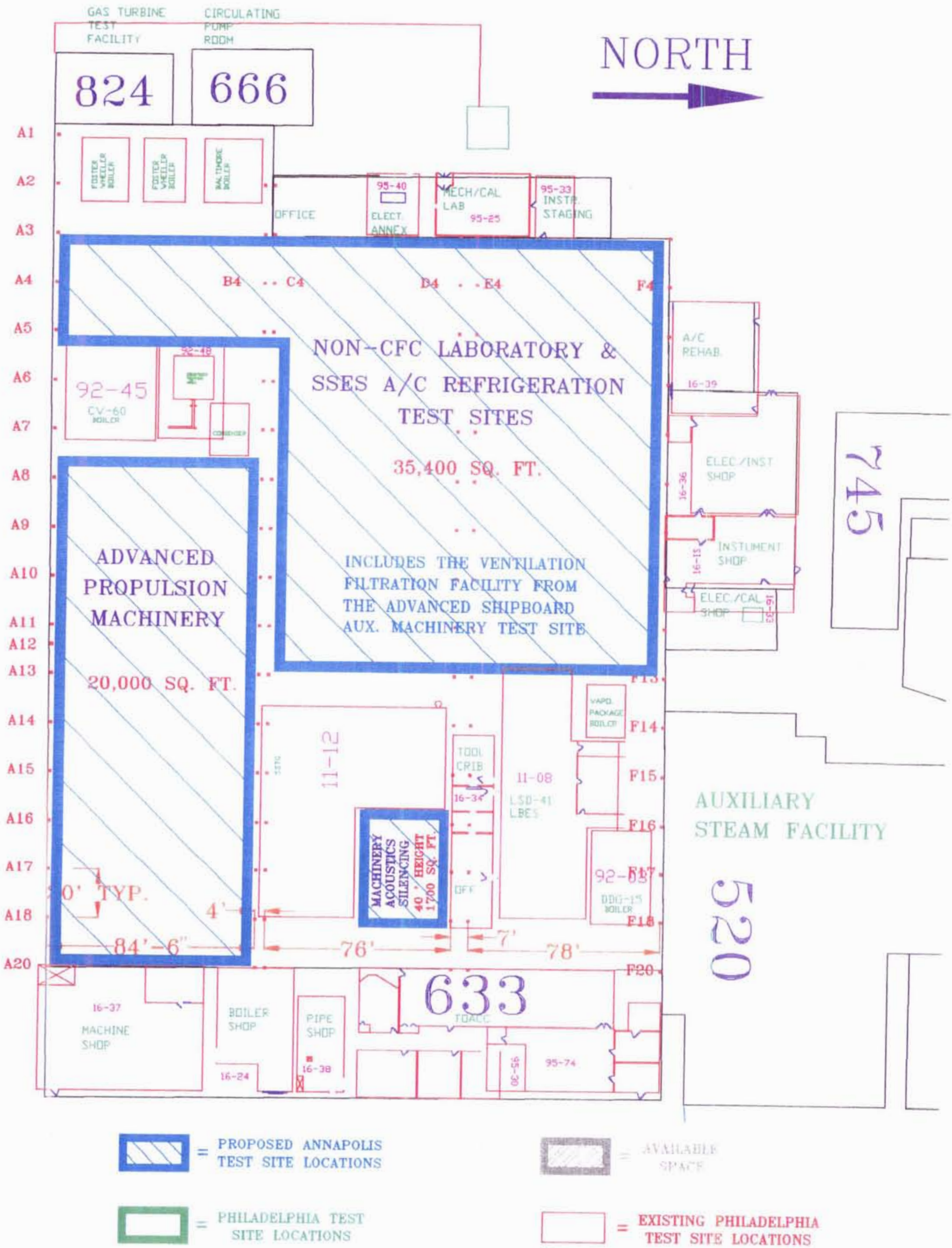
PHILADELPHIA

SITE PLAN

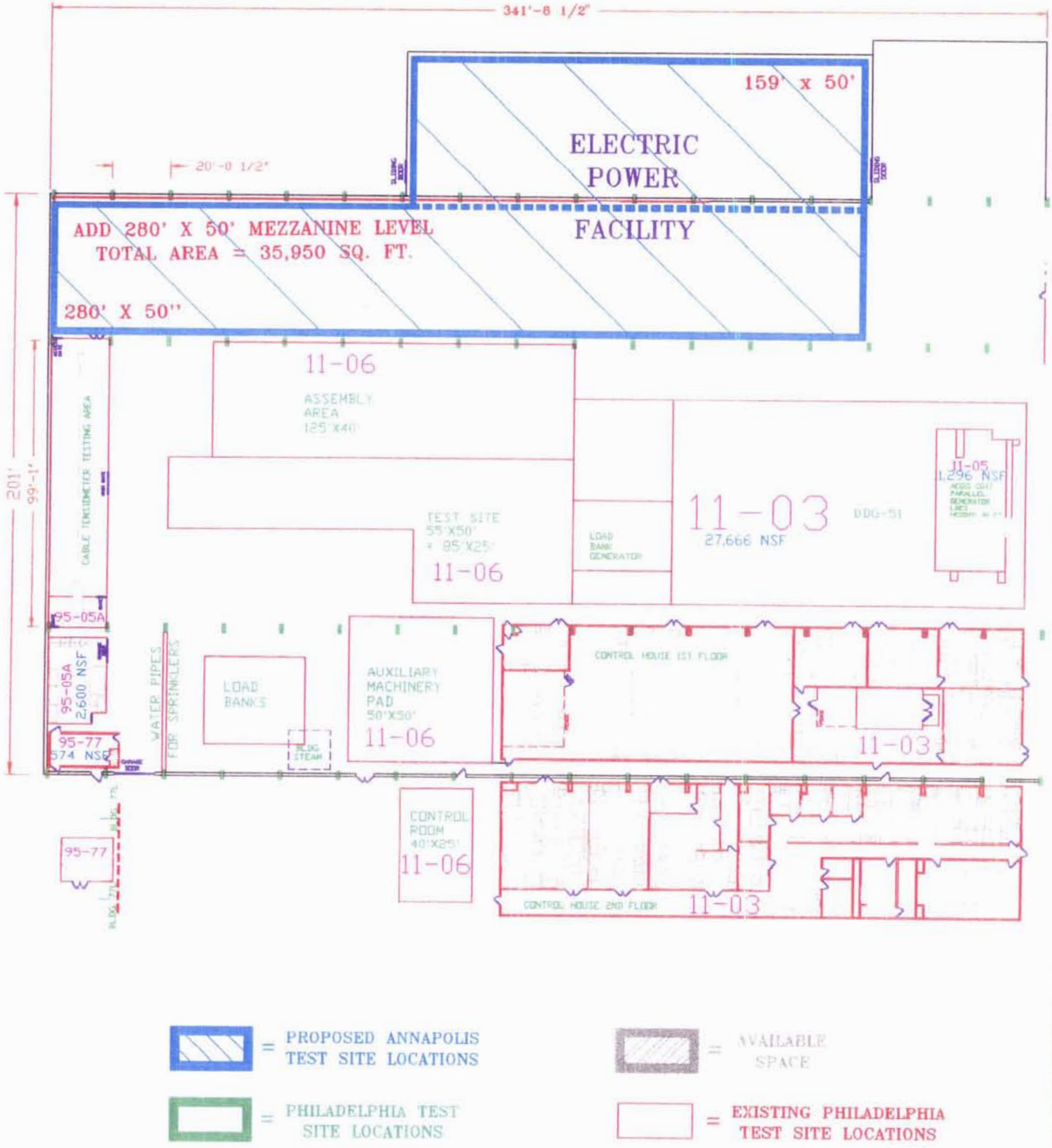
BLDG 633

BLDG 77H

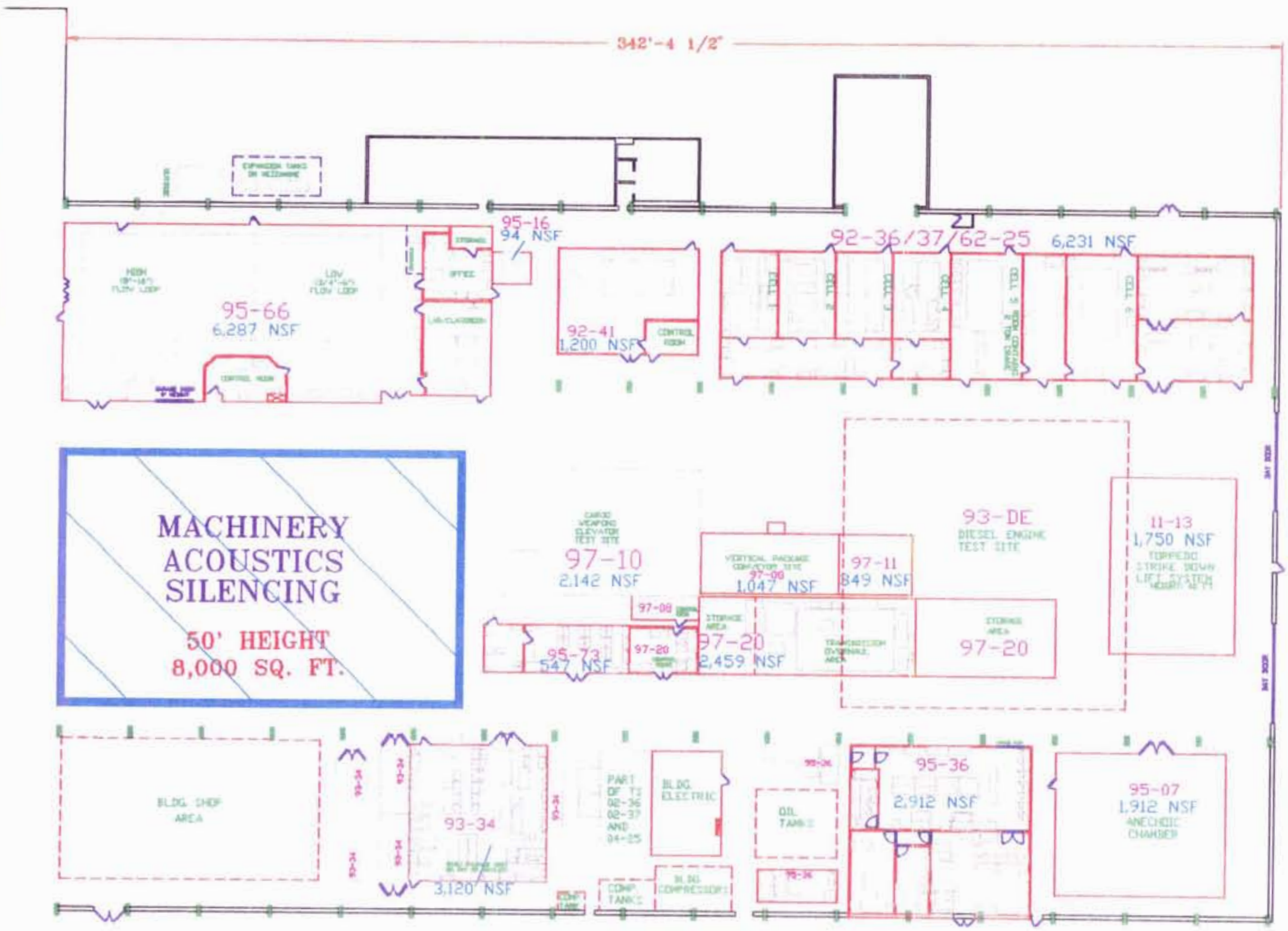
BLDG 1000



BUILDING 633



BUILDING 77H NORTH



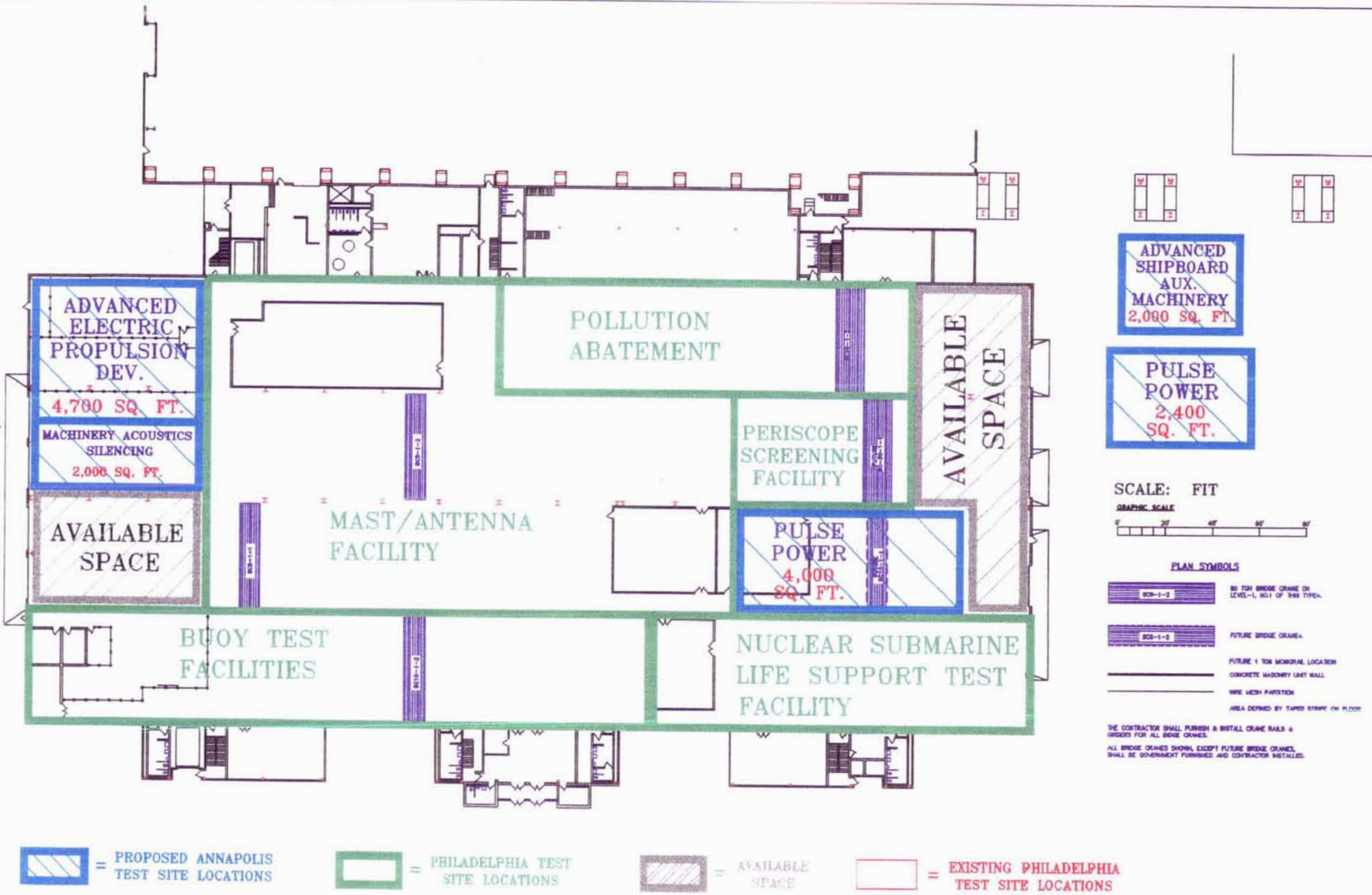
= PROPOSED ANNAPOLIS TEST SITE LOCATIONS

= AVAILABLE SPACE

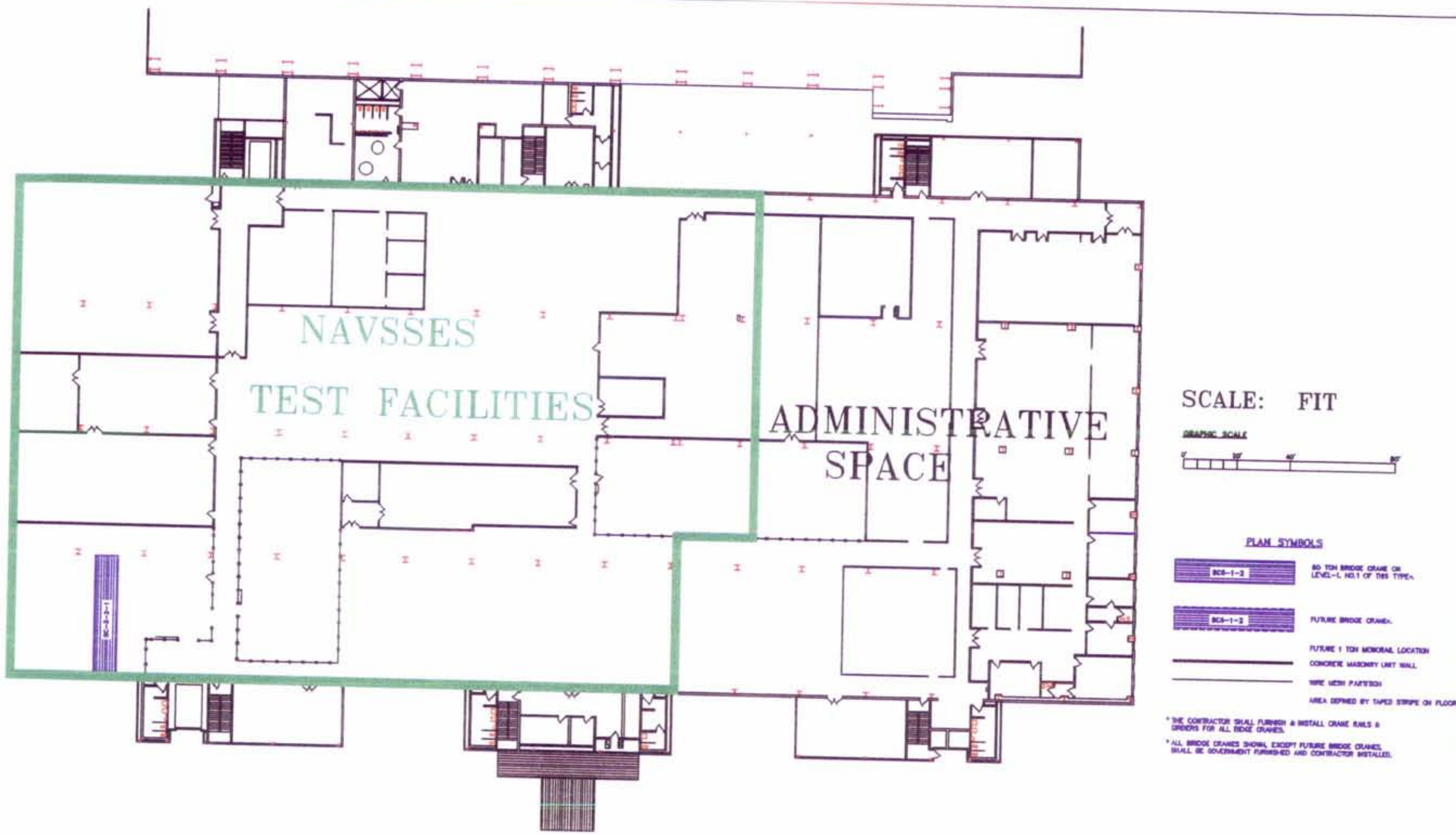
= PHILADELPHIA TEST SITE LOCATIONS

= EXISTING PHILADELPHIA TEST SITE LOCATIONS

BUILDING 77H SOUTH



BUILDING 1000 – FIRST FLOOR



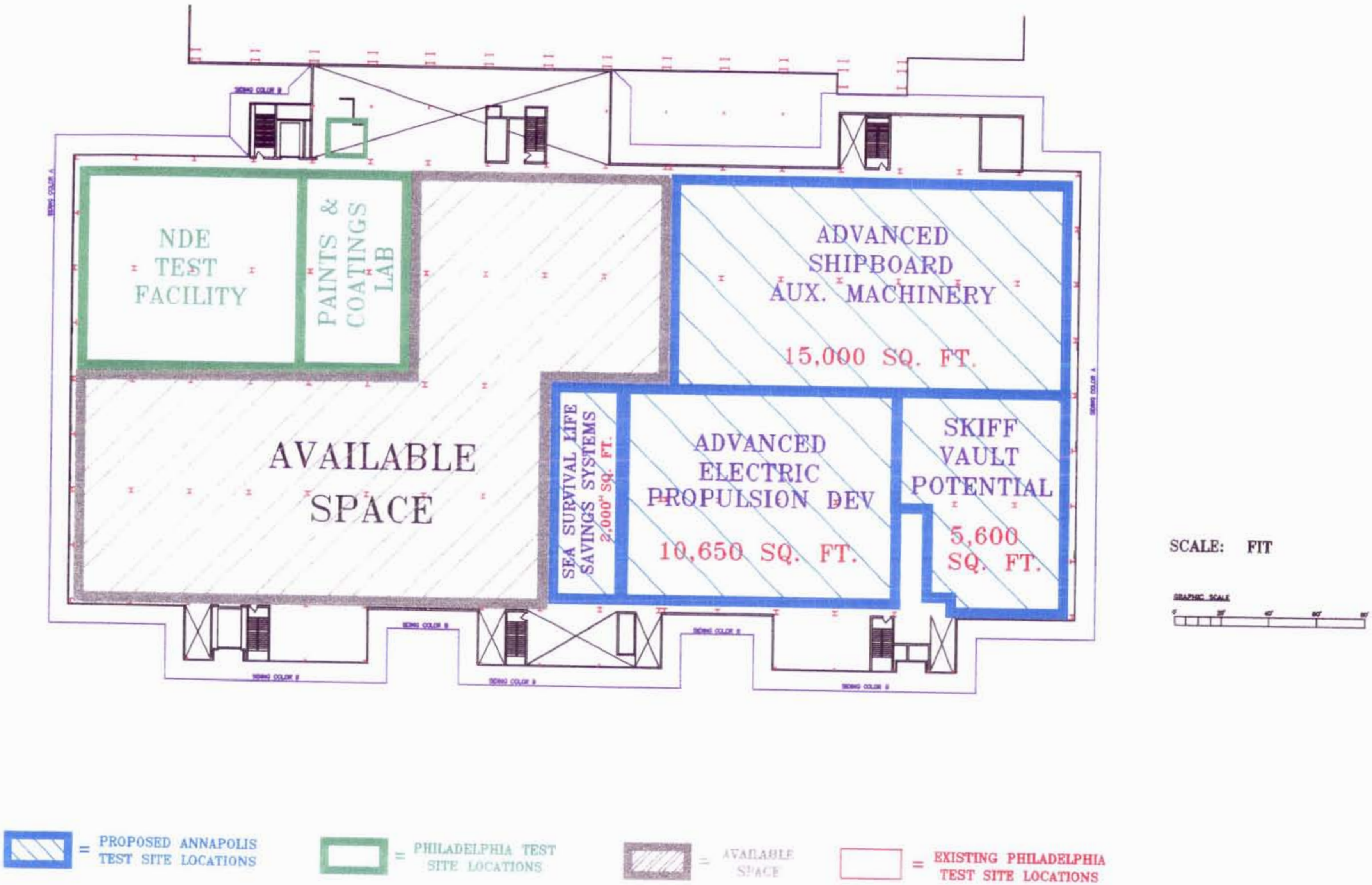
= PROPOSED ANNAPOLIS TEST SITE LOCATIONS

= PHILADELPHIA TEST SITE LOCATIONS

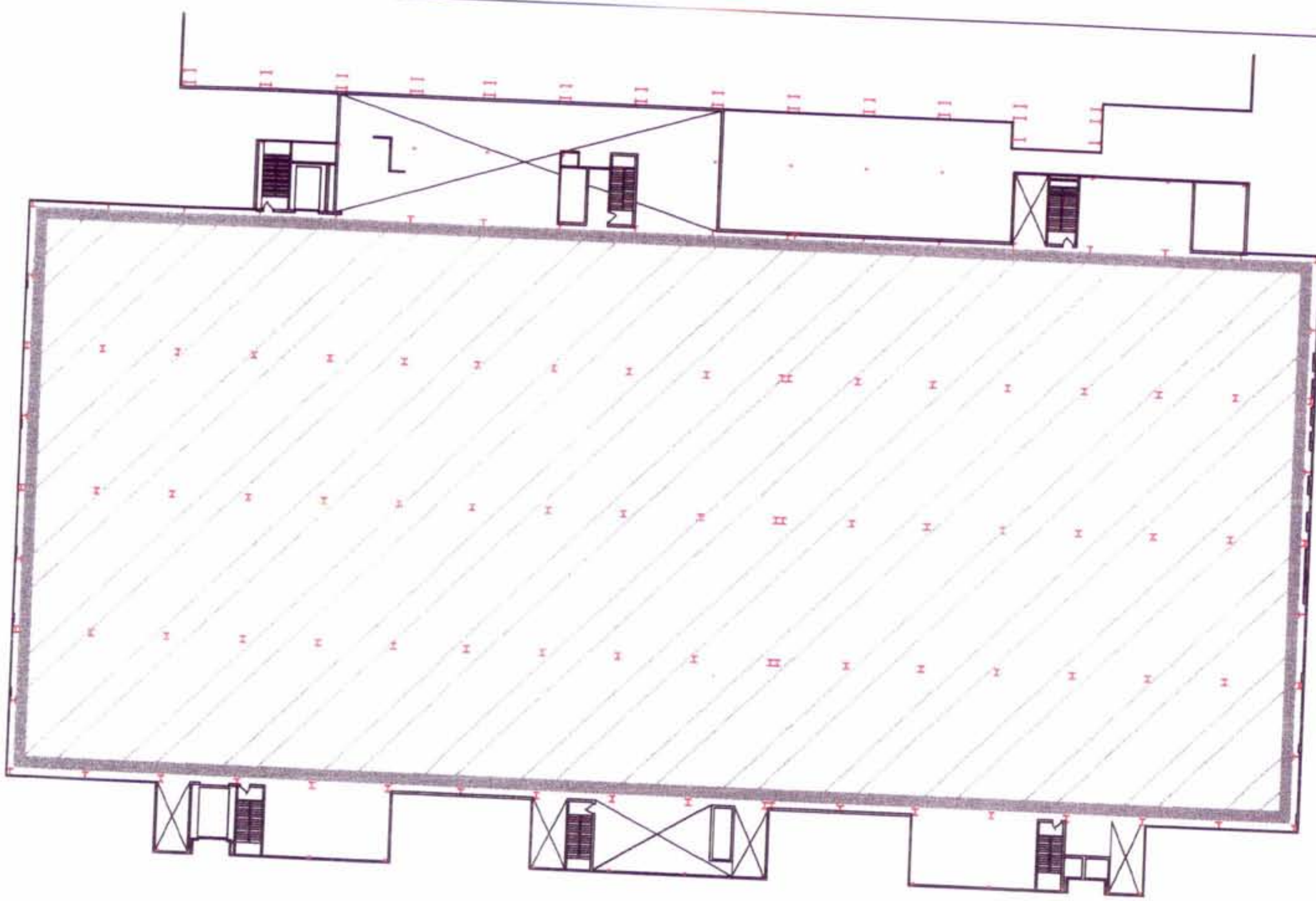
= AVAILABLE SPACE

= EXISTING PHILADELPHIA TEST SITE LOCATIONS

BUILDING 1000 – SECOND FLOOR



BUILDING 1000 – THIRD FLOOR



SCALE: FIT

GRAPHIC SCALE

0' 20' 40' 60' 80'

PLAN SYMBOLS

BCS-1-1 — 80 TON BRIDGE CRANE ON LEVEL-1, NO.1 OF THIS TYPE.

BCS-1-2 — FUTURE BRIDGE CRANE.

FUTURE 1 TON MONORAIL LOCATION

CONCRETE MASONRY UNIT WALL

WIRE MESH PARTITION

AREA DEFINED BY TAPED STRIPE ON FLOOR

* THE CONTRACTOR SHALL FURNISH & INSTALL CRANE RAILS & GIRDERS FOR ALL BRIDGE CRANES.

* ALL BRIDGE CRANES SHOWN, EXCEPT FUTURE BRIDGE CRANES, SHALL BE GOVERNMENT FURNISHED AND CONTRACTOR INSTALLED.

= PROPOSED ANNAPOLIS TEST SITE LOCATIONS

= PHILADELPHIA TEST SITE LOCATIONS

= AVAILABLE SPACE

= EXISTING PHILADELPHIA TEST SITE LOCATIONS

BUILDING 1000 - FOURTH FLOOR

PERSONNEL

LOADING

BY BUILDING

PROJECTED FY-97 PERSONNEL LOADING BY BUILDING

	TOTAL	PROJECTED LOADING BLDG. 4	PROJECTED LOADING BLDG. 619	PROJECTED LOADING BLDG. 29	PROJECTED LOADING BLDG.1000	PROJECTED LOADING BLDG. 77H	PROJECTED LOADING FIREHOUSE BLDG. 56
AVAILABLE SF		147,400	39,548	27622	100,550		
MAXIMUM LOADING @ 150sf/person	2,167	982	264	184	670	21	46
PROJECTED LOADING	1,790	977	260	170	316	21	46
BALANCE AVAILABLE	377	5	4	14	354	0	0

619 x 4 similar interiors

CIVILIAN	1602
MILITARY	13
CONTRACTORS	24
PSD OFFICE	17
ANNAPOLIS	281
SUBTOTAL	1937
SHOP & TRANS	-120
WHS & HAZMAT	-27
TOTAL ADMIN	1790

EXISTING

NAVAL SURFACE WARFARE CENTER, CARDEROCK DIVISION
SHIP SYSTEMS ENGINEERING STATION
PHILADELPHIA, PA.

NAVAL SURFACE WARFARE CENTER, CARDEROCK DIVISION
SHIP SYSTEMS ENGINEERING STATION
PHILADELPHIA, PA.

NSWC
Naval Surface Warfare Center
CARDEROCK DIVISION
PHILADELPHIA

NAVAL SURFACE WARFARE CENTER
CARDEROCK DIVISION PHILADELPHIA

BACKGROUND

The Naval Surface Warfare Center, Carderock Division, Ship Systems Engineering Station (NSWCCD-SSES) is located on the Philadelphia Naval Base. Founded in 1910, the engineering station has a long history of technical innovation.

The Station evolved from a fuel oil testing plant in 1910 to a full-scale naval engineering center, providing life cycle engineering services for the U.S. Navy, U.S. Coast Guard, Army Corps of Engineers, foreign navies, and the commercial maritime community. NSWCCD-SSES currently employs about 1,600 people. Engineers, scientists, and technicians comprise approximately 80% of this employee base.

The Station has the life cycle responsibility and the capability to test and engineer the full range of shipboard systems and equipment from main propulsion systems to digital controls and electric power. Its test facilities are also uniquely environmentally permitted to conduct testing within current requirements.

Additionally, the Station possesses a corporate knowledge of more than 20,000 years of machinery systems technical experience and is the dominant source of hull, mechanical and electrical (HM&E) engineering support, including logistics, for the Navy.

MISSION

- Provide engineering and technical management of HM&E ship systems
- Provide test and evaluation of HM&E ship systems
- Provide in-service engineering of HM&E ship systems & equipment
- Perform such other responsibilities as assigned by Commander, Naval Surface Warfare Center, Carderock Division

TECHNICAL CAPABILITIES

- Areas of technical leadership/responsibilities in ship systems
  - Marine Gas Turbines
  - Ship Survivability
  - Shock & Vibration
  - Submarine Life Support
  - High & Low Pressure Air
  - Submarine Antenna
  - Fiber Optics
  - Materials & Fluid Systems
  - Paints & Coatings
  - Corrosion Prevention
  - Diesel Propulsion
  - Aerosol Separators
  - Failure Analysis
  - Non-Destructive Testing
  - Metallurgy
  - Chemical Analysis
  - Machinery Control Systems
  - Vertical Package Conveyors
  - Steam Propulsion Systems
  - Cargo/Weapon Elevators
  - Condition Based Maintenance
  - A/C, Refrigeration and Ventilation
  - Electronic Cooling Systems
  - Undersea Vehicle Sail and Deployed Systems
  - Radar Cross Section Measurement
  - Electrical Power Generation
  - Environmental Pollution Abatement
  - Volumetric Flow Calibration
  - Petroleum, Oil and Lubrication
  - Data Collection and Calibration

NAVAL SURFACE WARFARE CENTER
CARDEROCK DIVISION PHILADELPHIA

FACILITIY CAPABILITIES

- The station's facilities infrastructure includes:
  - More than 515,000 square feet of test space.
  - 96,700 square feet of special reinforced floors.
  - Can produce one million pounds of steam per hour.
  - Environmentally compliant cooling water system with a capacity of more than 150,000 gallons per minute.
  - Can store 1.3 million gallons of fuel oil.
  - 14,000 Kwh of electric power available.
  - Centralized data acquisition and analysis system fiber optically linked to all major test sites.

MAJOR TEST SITE FACILITIES

- Boiler Components Test Facility
- Steam Propulsion Test Facility
- Data Collection and Calibration Facility
- Gas Turbine Development Facility
- Small Gas Turbine Test Facility
- Diesel Engine Development Facility
- Mission Support Facility
- Environmental Systems Facility
- Power Generation Test and Evaluation Facility
- Materials and Processes Facility
- Fiber Optics Facility
- Undersea Deployed Systems Facility
- Compressed Air Systems Facility
- AC&R Test Facility
- Survivability Engineering Facility
- Steam Propulsion Support Facility
- Cargo and Weapon Systems Facility

ENGINEERING SERVICES

- Key part of Station Mission is In-Service Engineering. This includes the following responsibilities:
  - Design
  - Systems & Engineering
  - Test & Evaluation
  - Software Maintenance
  - Safety
  - Configuration Management
  - Installation
  - Training & Manning
  - Integrated Logistics Support
  - Maintenance Engineering
  - Production Support
  - Test Equipment

STEAM PROPULSION TEST FACILITY
SUBMARINE PROPULSION & AUXILIARY POWER TEST SITE
ONLY NAVY SUBMARINE PROPULSION & ELECTRICAL GENERATION TEST SITE

MAIN PROPULSION UNIT TEST SITE HISTORY

Design and construction of the Main Propulsion Test Site occurred between 1984-1987 to provide an independent facility to evaluate various manufacturer's stream turbine propulsion units. Unique facility systems include a Centralized Boiler Operation Station and the incorporation of a Stream Conditioning Station providing a realistic shipboard system for testing.

MAIN PROPULSION UNIT TEST SITE ACCOMPLISHMENTS

The test and evaluation of two major Submarine Class Improved Performance Machinery Programs for the Los Angeles Class (SSN-688) and the Seawolf Class (SSN-21) were accomplished at this site. Specific accomplishments include:

- Full power testing of Improved SSN-688 Class Main Propulsion Unit
- Full power testing of SSN-21 Class prototype Main Propulsion Unit
- Uncovered 980 Discrepancies during testing of which 90% were corrected and retested at NSWCCD-SSES

Today's submarines use safety, full power, and economy procedures developed during testing at this facility.

ELECTRICAL POWER GENERATION TEST SITE

This site was designed and constructed between 1988-1992. This facility is capable of performance testing of one Ship Service Turbine Generator (SSTG) set from a Trident Class submarine. Alternate bearing technology will be tested and evaluated on one of these SSTG sets beginning in December 1994.

FACILITY ADVANTAGES

The Main Propulsion Site and Electrical Power Site provide numerous advantages to the Navy and DOD in general. These sites maintain the Navy's capability to provide tested solutions to Fleet equipment problems without tying up operational ships. Today's test engineer is the Fleet's In-Service Engineer who is well trained and experienced. These facilities are the only full power capable sites within the U.S. which provide the Navy with impartial, third party testing of various manufacturer's equipment.

FUTURE/POTENTIAL USERS

Future uses of these facilities include test and evaluation of the new attack submarine main propulsion unit and turbine generator; and use as beds for overhauled and repaired main propulsion units and SSTGs. New technologies such as: alternate bearings, quiet steam flow valves, sound damping mounting improvements and active force cancellation will also be evaluated.

STEAM PROPULSION TEST FACILITY
MULTI-PURPOSE STEAM EQUIPMENT TEST COMPLEX
LARGEST CONSOLIDATED HIGH PRESSURE STEAM TEST FACILITY IN THE U.S.

FLEET OPERATIONAL UNITS

Currently, the Navy utilizes Steam Generators (Boilers) on over 190 of the ships in the active Fleet. These include: Main Propulsion Boilers on Boiler-Power Ships (75), Reboilers for nuclear powered ships (16), Auxiliary Boilers for Diesel and Nuclear Powered Ships (42) and Waste Heat Boilers for Gas Turbine Ships (60).

STEAM EQUIPMENT TEST COMPLEX CAPABILITIES

In response to stream power Fleet assets, NSWCCD-SSES Philadelphia's Steam Complex is capable of providing the following services:

- Testing of all the main propulsion systems for all future nuclear and conventional steam ships
- Producing over one million pounds per hour of superheated or saturated steam
- Steam pressure up to 1,500 psi
- High quality feedwater
- Fuel and water storage
- State of the art instrumentation
- EPA permits for water/gas discharge

SAMPLING OF TESTS COMPLETED

- Seawolf (SSN-21) propulsion steam turbine/plant tested
- Flow tests of LHD boiler superheater
- Flow testing of SSN-21, SSN-688 and CVN-68 main feed and steam valves
- Flow testing of main feed pumps or other water pumps for conventional or nuclear ship systems
- Heat exchanger performance testing

DUAL USAGE FOR DEFENSE CONVERSION

NSWCCD-SSES Philadelphia Steam Complex can support various other federal and private stream equipment development and testing.

- Military Sealift Command (MSC)
- Foreign Military Sale/Lease (FMS)
- Government Stationary Steam Plant Facilities
- Private Industry

DATA COLLECTION AND CALIBRATION FACILITY
TEST OPERATIONS ANALYSIS AND CONTROL CENTER
CENTRALIZED COMPUTER BASED DATA MONITORING AND ANALYSIS FACILITY

SITE UNIQUENESS/PURPOSE

The Test Operations Analysis and Control Center (TOACC) at the NSWCCD Ship Systems Engineering Station is the largest Fleet machinery vibration and performance databases in the Navy; no OEM has a comparable capability. The 100 percent government developed and operated center, with the higher throughput (hundreds of machines per week) supports data monitoring, analysis and archiving; operator console monitoring; and safety and alarm displays/warnings. It is fully instrumented to replicate AEGIS ships.

FUNCTIONS

TOACC provides the capability for independent assessment and smart buyer capabilities for systems/equipment being tested at NSWCCD-SSES. It can also be used for validation of expert diagnostic rules and virtual reality prototyping. Additionally, the Center can be utilized as a multi-media data communication hub to other engineering activities. The technologies contained within the Center include:

- High speed computerized data acquisition
- Complex vibration signal processing and automated analysis
- Electronic circuit design, analysis and fabrication
- Artificial intelligence hardware and software development and application

CAPABILITIES

A sampling of the Test Operations Analysis and Control

CAPABILITIES

A sampling of the Test Operations Analysis and Control Center's capabilities are listed below:

- Fiber optic linked to remote sites
- Real time data capture, display and storage
- On-line calculations and analysis
- Electronic data links to/from Fleet engineering teams
- Satellite connection to deployed ships (SALTS)

BENEFITS

Among the benefits of utilizing the facilities located within TOACC are:

- Centralized concept eliminated duplication of hardware and labor.
- Modular building blocks plus needs of test engineers/sponsors equal cost-effective, customized solutions.
- The on-line processing/analysis capability results in optimum real-time engineering testing decisions.

IMPACTS

TOACC supports shipboard systems throughout the full life-cycle (R&D) prototype/acceptance, training, and deployed operation) and its automated vibration screening and analysis provides 48-hour turn-around on reports to the Fleet. The site/Fleet data contained within the Center is the source for diagnostic expert system rule generation. Additionally, the existing resources facilitate efficient component/small-scale testing at NSWCCD-SSES.

DATA COLLECTION AND CALIBRATION FACILITY
VOLUMETRIC FLOW CALIBRATION LABORATORY (VFCL)
DOD's ONLY CERTIFIED 10,000 GPM FLOW CALIBRATION AND T&E FACILITY

FLEET IMPACT

The Volumetric Flow Calibration Laboratory (VFCL) provides the Fleet with efficient, affordable machinery health monitoring; cost effective predictive maintenance; maximum system readiness and operation; logistics support and troubleshooting problem resolution by telephone; and qualified enlisted personnel, through on-site training.

VFCL BENEFITS

Use of the VFCL provides measurement traceability to national standards; and gives NSWCCD-SSES a "smart buyer" capability for flowmeter technology that is not attainable elsewhere. The Fleet data archived here yields class-wide problem identification and resolution.

VFCL CAPABILITIES

Independent and simultaneous flow calibrations utilizing both high flow and low flow systems can be accomplished at the VFCL. It allows SSES to calibrate both intrusive and non-intrusive flowmeters. It also is utilized for research, development, specification, testing, and evaluation of various types of flowmeters and piping system dynamics. Flowmeter training is conducted at the VFCL for both civilian and military personnel.

VFCL UNIQUENESS

The VFCL is the only facility of its kind in the world and is certified by the National Institute of Standards and Technology (NIST). The lab replicates all surface ship and submarine piping systems.

VFCL SPECIFICATIONS

- 0-10,000 GPM of fresh water
- Copper, copper/nickel, brass, stainless steel, and carbon steel piping in 3/4" thru 16" diameter sizes
- 0.5% of flow rate system accuracy

AWARDS & RECOGNITION

- LOA from NAVSEA for outstanding Fleet support (Sept 1992)
- Outstanding Customer Service Award (Dec 1992)
- Excellence in Government Award, Silver Medalist (May 1993)
- Total Quality Leadership Cost Reduction Award (Septr 1993)

FUTURE PLANS

- Installation of additional test pipe sections to increase capabilities for new ship classes
- Upgrading the control system to improve efficiency and productivity
- Installation of overhead rail system for more efficient handling of large intrusive flowmeters

REPLACEMENT COST = $4,000,000

GAS TURBINE DEVELOPMENT FACILITY
INTERCOOLED RECUPERATED GAS TURBINE DEVELOPMENT FACILITY
ONLY GAS TURBINE DEVELOPMENT TEST FACILITY IN THE NAVY

ICR LBTS ACCOMPLISHMENTS

The Intercooled Recuperated Westinghouse/Rolls Royce RB211 gas turbine engine is the Navy's propulsion gas turbine for the 21st century. Currently the site has accomplished the following:

- Test site design completed ahead of schedule and cost
- Construction 70% complete
- Planning developmental and production test programs with Navy and industry

ICR LBTS BENEFITS

Early design changes developed at a land based test site save Fleet wide retrofits. There is a 50% cost reduction benefit for testing at ICR test site vice shipboard. In-house expertise reduces Fleet introduction costs and drives down the cost of follow-on engineering changes - documented. Shipboard crews learn from the experienced test site engineers.

UNIQUE SITE CAPABILITIES

The ICR LBTS is designed to make extremely accurate fuel, air and torque measurements necessary to determine the performance capabilities of various types of gas turbines and diesels. Items such as rapid engine change out/in, electrical propulsion testing and large diesel testing make the test site extremely flexible.

ICR LBTS PROGRAMS

- ICR development testing
- ICR production testing (dual/joint use)
- Electric propulsion testing
- Crew training
- Capability to accommodate large gas turbine and diesel engines
- Fast turnaround capability

ICR LBTS ECONOMICS

- Expenditures thru FY94: $ 6M
- Potential savings:

- Ship Integration	$ 1M
- Hot Plant Training	$ 10M
- IPS Testing	$ 5M
- ICR Production Testing	$ 10M
	$ 26M

- Fuel Savings per Ship per Year $ 1.3M

SMALL/MEDIUM GAS TURBINE AND AEROSOL TEST COMPLEX
SMALL/MEDIUM GAS TURBINE TEST FACILITY
THE ONLY LANDING CRAFT AIR CUSHION GAS TURBINE TEST FACILITY

SMALL/MEDIUM GAS TURBINE FACILITY

The Small/Medium Gas Turbine Test Facility was designed and constructed to test gas turbine engines up to 10,000 horsepower. The facility consists of two explosion proof test cells that are fully supported by an automatic fire suppression system, river and city water, low pressure shop air, steam and 120/140 volts AC and 24 volt DC electrical power. Both the TF40B and T-62T-40-7 gas turbine engines are located in test cell number Two, to minimize operating and maintenance costs.

ACCOMPLISHMENTS

NSWCCD-SSES has successfully tested and validated components for TF40B, such as:

- Exhaust Diffuser
- Exhaust Gas Temperature Limiter
- Foreign Object Damage Screen

The latest materials and technologies have been installed and evaluated on the T-62-T-40-7 gas turbine at NSWCCD-SSES. Some examples of these are as follows:

- Carbon and Ceramic Seal
- Electronic Sequencing Unit
- Flexible Fuel Manifold

Fleet support testing accomplishment includes LCAC on-line detergent wash fluid evaluation, cold weather emissions testing and alternate fuels testing.

REPLACEMENT

The following valves are estimated for the replacement of the Small/Medium Gas Turbine Facility.

Building $900,000

Engine Hardware $600,000

Auxiliary Systems $1,200,000

SMALL/MEDIUM GAS TURBINE AND AEROSOL TEST COMPLEX
AEROSOL SEPARATOR TEST FACILITY
THE ONLY NAVY GAS TURBINE INTAKE FILTER TEST FACILITY

AEROSOL SEPARATOR HISTORY

The cleanliness of air entering a gas turbine engine is critical to its performance, as well as, to the safety of equipment and personnel. The Navy has selected NSWCCD-SSES Philadelphia to be the qualification facility for all gas turbine inlet filters. NSWCCD-SSES Philadelphia's experience in gas turbine testing and Fleet support aids in the overall analysis in the effectiveness of new Aerosol Separators (i.e. filters). NSWCCD-SSES utilizes laser technology in the evaluation of the separators' effectiveness in removing various sized particles and concentrations.

CAPABILITIES

Aerosol Separator Test Facility is capable of the injection of salt water spray and sand/dust to simulated actual conditions experience anywhere within the Navy's operating limits. Environmental conditions such as relative humidity, temperature and velocity can be controlled in this facility.

PREVIOUS TESTING

The NSWCCD-SSES Philadelphia facility has been used to support qualification testing for the DDG-51, LCAC and A1M1 Tank.

FUTURE TESTING

- Advanced Amphibious Assault Vehicle Inlet Filtration System
- DDG-51 Inlet Filtration System Water Wash Blow-Back Cleaning System for in-place cleaning

DIESEL ENGINE DEVELOPMENT FACILITY
FFG-7 SHIP SERVICE DIESEL ENGINE DEVELOPMENT FACILITY
THE ONLY BASELINE CONFIGURATION FFG-7 CLASS DIESEL ENGINE SITE

FFG-7 TEST SITE HISTORY

The FFG-7 Ship Service Diesel Engine Facility has been utilized to complete component and system testing. Highlights of testing include: mechanical and safety shutdown devices, starting air compressor for gas turbine engines, brushless excitation system, lube oil strainer, and fuel filter.

ACCOMPLISHMENTS

- Transient Load Tests
- Performance Enhancement Program
- 2,000 Hour Reliability Test
- High Speed Rotor Test
- Air/Oil Separator Test (Environmental Impact)
- Numerous Component Improvement Tests
- Engine changes and improved components installed throughout the Fleet

FFG-7 CLASS SHIPS

The FFG-7 Class has the largest population of ships (50) within the active Fleet today. FFGs are used in the following roles: carrier escort, convoy escort, anti-submarine warfare and anti-drug enforcement operations.

BENEFITS

- Improved engine reliability
- Increased engine mean time before overhauls
- Enhanced engine performance
- Reduced maintenance load

REPLACEMENT/RELOCATION COSTS

Replacement cost $5 million

Movement cost $5.75 million

DIESEL ENGINE DEVELOPMENT FACILITY
DIESEL ENGINE TEST SITE
ONLY SSN-688 CLASS EMERGENCY DIESEL AND SNORKEL VALVE TEST SITE

PRESENT AND FUTURE USE

The Diesel Engine Test Site provides wide ranging support from testing environmental factors to performance testing. The site can support more than one ship class, such as, SSN-688, MHC and MCM ship classes. Current and future uses include:

- Exhaust Emission Reduction Program
- Marine Corp Rotary Engine Validation
- Mine Hunter Coastal Class Engine Durability Test
- MCM-3 Class MPDE Improved Parts Validation
- Submarine Engine Block Repair Validation
- Prototype Data Collection and Analysis System

PAST UTILIZATION

In the past the Diesel Engine Test Site has been utilized to support: Navy distillate fuel programs, shale oil fuel program, coal derived fuel program, fuel qualification procedure, submarine EDG blower overhaul procedure, MCM-3 Class MPDE qualification, FFG-7 Class SSDG qualification, and Dyna-Star engine qualification.

MULTIPLE USE FACILITY

The Diesel Engine Test Site is a multi-facet facility capable of engine tests, component test, fuel test, lube oil test, prototype tests and can be used as a repair facility.

BENEFITS

The site provides a number of direct benefits to the Fleet such as new fuel technologies which provide for lower costs; improving engine performance; acquisition of in-house expertise gained during testing, which expedites resolution of Fleet problems.

REPLACEMENT/RELOCATION COSTS

Replacement cost $6.7 million

Moving cost $7.0 million

DIESEL ENGINE DEVELOPMENT FACILITY
LSD-41 PROPULSION SYSTEM LAND BASED ENGINEERING SITE
THE ONLY LARGE MEDIUM - SPEED DIESEL ENGINE HOT PLANT

WHIDBEY ISLAND (LSD-41) CLASS

Whidbey Island (LSD-41) Class ships are Amphibious dock landing ships that transport Marines. These ships play a major role in the Littoral Warfare strategy "from the Sea" concept. Military actions such as Desert Storm, Bahrain, Somalia, Haiti and Cuba have utilized these ships. Currently, there are eight operational LSD-41 ships with four additional ships under construction.

LSD-41 LBES ACCOMPLISHMENTS

- Development and Acceptance Testing
  - 350 engineering changes applied to lead ship
  - Operational lessons learned incorporated
- Engine Power Component Investigation Following Initial Ship Delivery
  - Only test facility available
- Crew Familiarization with Propulsion System
  - 400 + crew members trained on "Hot Plant"

LSD-41 SITE HISTORY

Design and construction of the LSD-41 Land Based Engineering Site was in response to significant developments in large diesel engines and machinery control systems. The site replicates the Starboard Propulsion Plant of the LSD-41 Class. Prior to Fleet implementation, construction techniques, diesel system modifications, and operational procedures were evaluated at the site.

FUTURE APPLICATIONS

Future applications for the LSD-41 include testing the main propulsion system for the LPD-17 (LX) Class, Standard Machinery Control System (SMCS), crew familiarization U.S. and foreign military, exhaust emissions control techniques.

BENEFITS

A unique facility for testing an integrated diesel propulsion system. Direct benefits to the Navy include the development of a Center for the Navy's Diesel system knowledge, resolution of Fleet problems and crew familiarization training.

REPLACEMENT/RELOCATION COSTS

Replacement cost $40 million

Movement cost $55 million

T&E AND ISE MISSION SUPPORT FACILITY
MAIN PLANT AUXILIARY STEAM
SUPPORT SYSTEMS FOR T&E OF ALL TYPES MAIN PROPULSION MACHINERY

MAIN PLANT AUXILIARY SYSTEMS

This machinery functions as part of the main plant auxiliary steam system and supports the steam facility which is used for testing machinery for all steam propelled ships in the Navy. The Main Propulsion Plant Systems consist of feedwater treatment facility, fuel oil facility, and main steam facility. These systems can also be utilized to test Fleet pumps, valves, dearating tanks and boiler feedwater equipment.

The following additional industrial support facilities are contained within this complex. These facilities, as well as, all of the industrial test sites and facilities at NSWCCD-SSES, are maintained and operated by a core of highly trained blue collar workers to provide industrial support for our T&E and ISE mission.

- Machine Shop
- Boiler Shop
- Pipe Shop
- Electrical Shop
- Instrument Shop
- Carpenter Shop
- Insulation Shop
- Gear Disassembly Shop
- Tool Crib
- Shop Stores

Replacement cost = $7.9

MAIN PLANT CAPABILITIES

Support facility features/capabilities required for test and evaluation are 1,000,000 gallons of fuel storage; distilling plant capable of 25,000 gallons of feedwater; 1,000,000 gallons per minute of cooling water for test sites within building 633. Additional ancillary systems include a 200,000 gallon per minute cooling water system in building 77H, waste recovery and disposal; electrical load distribution systems; and a steam conditioning system.

PAST AND PRESENT PROGRAMS

Some of the tests supported by this facility in the past:

- SSN-688 Class (IPMP-1) and SSN-21 Class MPU (IPMP-2)
- FFG-7 Class and DDG-963 Main Propulsion
- Landing Craft Air Cushion (LCAC)

Some of the tests currently supported:

- LSD-41 Class Main Propulsion and Control Systems
- Ships Service Steam Turbine Generator
- DDG-51 Class Main Propulsion, Control System, and Electrical Generator
- CG-47 Class Ship Service Gas Turbine Generator and Controls
- FFG-7 Class Ship Service Diesel Generator

ENVIRONMENTAL SYSTEMS FACILITY
ENVIRONMENTAL POLLUTION ABATEMENT TEST SITE
ONLY NAVY IN-SERVICE ENVIRONMENTAL SYSTEMS EQUIPMENT LABORATORY

SITE INFORMATION

This site has provided the Fleet with effective pollution abatement system testing as an integrated system rather than at component levels for fifteen years. The site ensures Fleet compliance with present and future environmental regulations without impacting ship's operation. This site includes a state-of-the-art Analytical Laboratory, full operation oil/water separator systems, air/gas emissions test equipment, sanitary waste sub-systems, a hazardous materials, waste spill response test lab and an automated data acquisition system for effective system/component testing. This site is designed to simulate various shipboard installations and supports processing both controlled and extreme characteristics of waste water influent. The replacement value of this site currently exceeds $2.5M.

Direct Fleet cost savings:

- Saved the Navy $9M while providing the Fleet with a more reliable oil content monitor.
- Use of state-of-the-art equipment produces a yearly operational savings of $100K.
- Machinery alterations developed on the site produce yearly savings of near $200K.
- Saved maintenance time and lowered cost by providing the Fleet with a reliable oily waste transfer pump.

ACCOMPLISHMENTS

The Environmental Pollution Abatement Test Site aided the Navy during deployments such as Desert Storm and conducting various analysis of ship's influent and hazardous material support. Some examples of our accomplishments include:

- Conducted bilge water characterization study for the U.S. Coast Guard polar ice breakers.
- Evaluated oil pollution problems related to compensated fuel systems.
- Developed a hazardous material spill response kit for Fleet distribution.

ONGOING PROJECTS

Currently, Environmental Pollution Abatement facilities are being utilized to support the Fleet, as well as, joining with local universities and the EPA to improve maritime abatement procedures.

- Evaluate oil/water separator effluent characteristics under controlled conditions.
- Evaluate bilge cleaners compatible with Navy oil/water separators.
- Joint venture with universities and private industry to study transport phenomena of oily waste mixtures flowing thru piping and oil water separators.

POWER GENERATION T&E FACILITY
CG 47/DDG 51 POWER GENERATION SYSTEMS/ELECTRICAL EQUIPMENT SITES
NAVY'S ONLY COMPREHENSIVE GAS TURBINE/ELECTRICAL PLANT TEST FACILITY

FACILITY MISSION

Gas turbine powered electric generation and distribution is critical to the ship's mission by supplying all shipboard electric power requirements through efficient, reliable, and survivable systems.

ACCOMPLISHMENTS

The power generation and electrical equipment sites have been utilized extensively to support the Navy's conversion of power generation from steam turbine to gas turbine technology. Some of NSWCCD-SSES accomplishments include the following:

- CG 47 Waste Heat Boiler Systems Development & Testing
- DDG 993 Class GTG Upgrade Development
- DDG 51 High Pressure Start Air System Development Testing
- DDG 51 Advanced Gas Turbine Control System Testing
- Gas Turbine Generator Performance Testing
- Generator Protection Circuitry Improvements
- Voltage Regulator Improvements
- Power Line Carrier

VALUE TO THE FLEET

The Fleet has benefited from test and evaluation at NSWCCD-SSES Philadelphia by equipment changes, maintenance and operational procedure changes which reduce the number of manyears of maintenance and support required on these systems. Additionally, these facilities have been utilized to train Navy personnel. Listed below are examples of support to the Fleet.

- 34 CG 47/DDG 51 crews received supplemental training to date
- 34 engineering improvements (ECPs) developed
- 2,500 engineering improvement kits issued to the Fleet
- $17M saved to date from engineering improvements and testing

MATERIALS & PROCESSING FACILITY
SIMULATED - SERVICE CORROSION TEST SITE
SOLE COMMERCIAL/GOVERNMENT SITE FOR SYSTEM CORROSION PREVENTION

BEARING TEST FACILITY

Bearings are used in over 90% of the equipment used by the Fleet. Hence, the testing and improvements in bearing technology greatly effects the operational Fleet.

- Testing of lubricating and refrigerant oil to ensure inferior product is not supplied to the Fleet.
- Used to qualify oil for compliance to miliary specifications/stringent machinery requirements.
- Oil used in main reduction gears, air compressors, air conditioners, refrigeration systems, gas turbine generators, and steam turbines minimizes machinery failure due to oil-related problems.
- Substantial cost savings of $10 million for main reduction gear, $2 million for gas turbine generator, per unit.
- Decreases chances for catastrophic failure of machinery.

MODEL BOILER/DIESEL COOLANT TEST LOOP FACILITY

The Model Boiler/Diesel Coolant Test Loop Facility provides the in-service engineer with resources to resolve Fleet problems using smaller scaled equipment which reduces testing costs. Listed below are examples of benefits and accomplishments of this test facility.

- Allows preliminary testing of boiler water and coolant treatments at a reasonable cost.
- Reduces the cost of performing expensive full-scale tests. Saves >$200,000 per test.
- Use of polymeric dispersants was evaluated prior to shipboard trials.
- Polymers used successfully to flush feedwater system on Wisconsin for recommissioning.

MATERIALS & PROCESSING FACILITY
PAINTS & COATINGS TEST SITE
COATINGS, COVERINGS & STEALTH MATERIALS FOR TOMORROW'S NAVY

CAMOUFLAGE PAINT REPLACEMENT PROGRAM

Increased the serviceability of submarine coating system (from 6 weeks to 2 years) for major cost savings of approximately $2K/ship/year.

RUBBER-BOOTED SONAR DOME INVESTIGATION

Identification of adhesive problems relating to the adherence of rubber boots to submarine sonar domes. Loss of rubber boot during service (2 in last 3 years) >$1 million.

DEVELOPMENT OF SIGNATURE COATING MATERIALS

Materials R&D to reduce detectability of surface ships and submarines.

ENVIRONMENTALLY SAFE ANTIFOULANT PAINTS

Development of new coating systems designed to prevent bio-fouling, and at the same time, meet or exceed EPA regulations regarding the ban on toxic based antifoulant.

MATERIALS & PROCESSING FACILITY
METALLURGICAL & FLUID SYSTEMS TEST SITE
SOLE FLUIDS & MATERIALS TEST SITE FOR PENTAGON-DELEGATED AGENT

WATER & ANALYTICAL CHEMISTRY TEST SITE

Elemental analysis vital to development of chelant boiler feedwater treatment. Chelant treatment reduced need for inspections and cleanings of boiler watersides: resulting in $30 million savings per year. Kudos from vice-president Al Gore.

Developed EDTA cleaning method for removal of soft waterside deposits, reducing the need for high pressure waterjet cleaning. Savings of $20,000 per cleaning.

Eliminated routine acid cleanings due to NSWCCD-SSES-established criteria based on composition and depot thickness. Cost savings of $40,000 per boiler for cleaning and hazardous waste disposal.

Developed vapor compressor distiller treatment and diesel engine coolant treatment which decreases operational down-time and cleaning costs.

PETROLEUM ANALYSIS TEST SITE

Laboratory sets criteria and policy for oil analysis program for the Navy. Part of the Tri-Service Program established by the Joint Chiefs of Staff.

NSWCCD-SSES-developed equipment enables ship's force to diagnose potential failures to oil-wetted machinery. Reduces engine failures due to accurate oil monitoring. Reduces frequency of oil changes, resulting in a reduction of hazardous
waste disposal of used oil. This saves approximately $35,000 per ship in disposal costs of oil.

Supported Desert Storm by providing on-site oil analysis for Army and Navy equipment.

METALLURGICAL TEST SITE

The Metallurgical Test Site supports the testing of advanced material composites and metals which increase equipment life and equipment performance which saves dollars. Some examples of material uses and tests are ceramic blade replacement for gas turbines, ISOTTA Fraschini engine component tests, and underwater/surface welding procedures.

TERMINAL ANALYSIS TEST SITE

Terminal Analysis Test Site is used to determine physical properties. The qualification of adhesives for use in special hull treatment coatings for submarines, recoatings cost $1.2 million per submarine were tested at this site. Characterizing aircraft carrier flight non-skid deck covering. Cost of re-coating is $2 million per carrier. Characterize polymeric materials i.e. gaskets, o-rings, paints, hull coatings, and variety of shipboard materials.

FIBER OPTIC TEST AND EVALUATION FACILITY
FIBER OPTIC LABORATORY
DOD's ONLY CERTIFIED FIBER OPTIC QPL AND T&E LABORATORY

FIBER OPTICS LABORATORY PURPOSE

To test and qualify fiber optic components for shipboard and land-based use. Develop designs and installations for Local Area Networks (LANS) using Fiber Optic technology. NSWCCD-SSES Philadelphia provides testing and repair of Fiber Optic Cable systems. NSWCCD-SSES Philadelphia personnel provide Fiber Optic LAN operation and repair training.

FIBER OPTIC ADVANTAGES

- Low weight
- High data transfer rate
- Immunity to electromagnetic interference
- "Mature" technology (telecommunications)

FIBER OPTIC LABORATORY TEST SERVICES

- Optical Tests
- Dimensional Tests
- Mechanical Tests
- Environmental Tests

FIBER OPTIC LAN CAPABILITIES

- Testing LAN Topology Design
  - USS MT. WHITNEY (LCC-20) Testbed
  - LAN configuration tested: FDDI, Ethernet
  - Software Compatibility Test
  - Hardware Compatibility Test
  - Test, evaluate, and monitor performance
- Testing Fiber Optic Cable Plant
  - Cable Attenuation Test
  - Cable Assembly Link Loss Test
  - Cable Continuity Test
  - Cable Plant End-to-End Attenuation Test
  - Test and Certification of Cable Plant
- Installation and Repair
  - Fault isolation and repair
  - Mechanical splicing
  - Connector termination

UNDERSEA VEHICLE SAIL AND DEPLOYED SYSTEMS FACILITY
RADAR CROSS SECTION MEASUREMENT FACILITY
VERSATILE RF/ELECTROMAGNETIC ELECTRONICS LABORATORY

RADAR CROSS SECTION FACILITY ACCOMPLISHMENTS

The Radar Cross Section Measurement Facility provides cost savings improvements through the introduction of improved materials (composites). These improvements not only cut costs but also increase the effectiveness of the system.

- Saved government approximately $300K ($100/year) by introduction of AN/BRD-7 absorber screening.
- Introduced periscope/antenna composite absorber to reduce maintenance costs and extend service life (AN/BRD-7, Type 15L).
- Introduced "Tripleband" absorber to improve mission effectiveness.

TESTS COMPLETED/PLANNED

- Anechoic Chamber Characterization Testing
- Radar Camouflage Unit Developmental Testing
- Electromagnetic Interference Testing of Shipboard Blackbox Prototype
- Radome Transmission Measurement and Material Testing

BENEFITS

Provides the In-Service Engineering Agent with an on-site and cost-effective means to:

- Assess new surveillance and avoidance capabilities for submarine sail mounted sensors.
- Simulate and investigate operational failures/ deficiencies.
- Test and validate system improvements.
- Validate depot repairs.
- Cultivate/maintain government technical expertise and corporate knowledge.

UNDERSEA VEHICLE SAIL AND DEPLOYED SYSTEMS FACILITY
TOWED BUOY TEST SITE
UNIQUE FACILITY FOR TOWED HANDLING SYSTEM

TOWED BUOY TEST SITE

Fleet Ballistic Missile Submarine Towed Buoy Facility consisting of the following sites for deployed communication handling systems:

- AN/BRR-6 Buoy Test Site (Trident Unique). Full AN/BRR-6 Towed Buoy Antenna System mounted on a partial Trident submarine hull, which accurately duplicates Trident submarine installation for developmental production and operational testing (mechanical and electrical).

- OE-305/BRR Buoy Test Site (SSBN 640 and Trident Capable). Actual shipboard installation of AN/BRA-8 and OE-305 Towed Buoy Handling Systems.

TOWED BUOY TEST SITE ACCOMPLISHMENTS

- Saved Government approximately $15M by influencing cancellation of AN/BRR-6A on Trident Class.

- Validated redesign of depth and destruct canister.

- Validated redesign of tone.

TESTS COMPLETED/PLANNED

- SSBN 739 Failed Servo Valve Test.

- AN/BRR-6A Tension Sheave Test.

- AN/BRR-6 Depth and Destruct Canister Redesign Validation.

- AN/BRR-6B Modification Testing.

BENEFITS

Provides the In-Service Engineering Agent with an on-site and cost-effective means to:

- Perform independent assessment of new capabilities for deployed antenna handling systems.

- Simulate and investigate operational failures/ deficiencies.

- Test and validate system improvements.

- Validate technical documentation.

- Conduct training of Navy and civilian personnel.

UNDERSEA VEHICLE SAIL AND DEPLOYED SYSTEMS FACILITY
SUBMARINE ANTENNA CYCLE TEST STAND
UNIQUE FACILITY FOR SAIL MOUNTED SYSTEMS

SUBMARINE ANTENNA FACILITY

SSN/SSBN Submarine Facility consisting of the following sites for communication, navigation and surveillance HM&E systems:

- Antenna Cycle Test Stand. Enclosed 4 bay tower to mechanically test new and current antenna sail mounted systems and components.
- Mast Bend Test Apparatus. Fixture to structurally certify new and repaired mast farings.
- Antenna High Power RF Test Site. Open field facility to electrically and electronically test new and current antenna systems and system components.

SUBMARINE ANTENNA FACILITY ACCOMPLISHMENTS

- Developed AN/BRA-34 and OE-207/BR Mast Assembly Designs for SSN and SSBN Classes.
- Resolved Trident OE-207 Antenna Baseplate Failures resulting in cost savings of approximately $340K per year.
- Developed/validated Mast Repair Procedure to reduce maintenance costs by approximately 30%.

TESTS COMPLETED & PLANNED

- AN/BRA-34 and OE-207/BR Mast Assembly Developmental Testing
- OE-207/BR Antenna Baseplate Testing
- Improved Mast Fairing Design Developmental Testing for all Submarine Classes
- Mast Fairing Production Acceptance Testing for all Antenna Systems
- NPM EHF Mechanical Support Group Developmental Testing (SSN 688 and SSN 21)
- Antenna Electrical/Electronic Modification Testing
- High Data Rate Antenna Developmental Testing (SSN 688, SSN 21, NSSN)

BENEFITS

Provides the In-Service Engineering Agent with an on-site and cost-effective means to:

- Perform independent assessment of new sail system capabilities.
- Simulate and investigate operational failures/deficiencies.
- Test and validate system improvements/ documentation.
- Conduct training of Navy and civilian personnel.
- Cultivate/maintain government technical expertise and corporate knowledge.

UNDERSEA VEHICLE SAIL AND DEPLOYED SYSTEMS FACILITY
ELECTRONIC TEST AND ENGINEERING SITE
ADVANCED ANTENNA DIAGNOSTIC FACILITY

ELECTRONIC TEST & ENGINEERING SITE

SSN/SSBN Submarine Facility consisting of the following sites for communication, navigation and surveillance HM&E systems.

- Antenna Electronic Test and Engineering Site. Lab area used for the repair, test and manufacture of submarine antenna electrical/electronic components and prototypes.

- Hydrostatic Pressure Site. Fully automatic hydrostatic test tank (5' dia x 40') used to pressure test and certify submarine antenna systems, sub-assemblies, whips, cables and fittings.

- Fiberglass/Plastic Fabrication Site. Support facility used to repair/fabricate submarine antenna and periscope mast fairing assemblies.

ACCOMPLISHMENTS

- Assessed/implemented global positioning system for SSN and SSBN Class submarines.

- Provided upgraded, high data rate communications capabilities (DAMA, JTIDS) to allow joint task force operations.

- Developed Navy test standards for antenna group equipment.

TESTS COMPLETED & PLANNED

- AN/BRA-34 and OE-207/BR Production/Overhaul Acceptance Testing (SSN 688 and Trident)

- AN/BRA-34 and OE-207/BR Modification Testing (SSN 688 and Trident)

- GPS Development/Operational Testing (SSN 688 and Trident)

- DAMA Development/Operational Testing (SSN 688 and Trident)

- JTIDS Developmental Testing (SSN 688)

BENEFITS

Provides the In-Service Engineering Agent with an on-site and cost-effective means to:

- Perform independent assessments of new capabilities for sail and deployed systems.

- Simulate and investigate operational failures/ deficiencies.

- Test and validate system improvements.

- Conduct training of Navy and civilian personnel.

COMPRESSED AIR SYSTEM FACILITY
COMBAT SYSTEMS ELECTRONIC COOLING SYSTEM TEST SITE
SOLE PROVIDER OF ELECTRONIC COOLING SYSTEM TESTING FOR THE FLEET

ELECTRONICS COOLING WATER SITE

Tests and evaluates the electronic cooling water skids used to cool high powered weapons electronics preventing overheating and system shutdown.

- AEGIS Spy Radar (DDG51, CG47)
- Sonar Electronics (DDG51, CG47, DD963, FFG7
- Electronic Warfare/Jamming (all Surface Ships)
- Missile Control Systems (CGs, DDGs, FFGs, CVN)
- Close In Weapons Fire Control (all Surface Ships)
- Aircraft Control Radars (CVN, LHD)

CAPABILITIES

Full scale testing of: Heat exchangers, pumps, valves, strainers, temperature regulators, deionizers, flow switches, alarms.

- Flows to 300 gallons per minute
- Pressures to 250 psig
- Capacity up to 2 million BTUs/hour
- Cooling air system test facility

CONSTRUCTION MILESTONES

- Construction Approval 2/92
- AEGIS Skid Installation 4/93
- Complete Mechanical 2/95
- Complete Electrical 4/95
- Environmental Enclosure 7/95
- Mission Readiness Review 10/95
- Full Scale Lightoff 11/95

BENEFITS

- Independent test and evaluation
- Crew training
- Proof-in software/logistics
- Demonstrate new maintenance concepts
- Alternate source qualification
- First article testing

COMPRESSED AIR SYSTEM FACILITY
HIGH AND LOW PRESSURE AIR SYSTEM TEST SITE
THE NAVY'S ONLY FULL SCALE ENVIRONMENTAL CONTROLLED AIR TEST SITE

COMPRESSED AIR SYSTEMS

Compressed air systems are utilized by a large number of equipment and systems such as: starting air for engines/generators; emergency breathing air; submarine emergency surfacing; aircraft launch and recovery; and combat systems support. Compressed air systems air vital to a ship's operation.

CAPABILITIES

The High and Low Pressure Air System Test Site is capable of testing all configurations of surface ships and submarines. Some of the test facilities capabilities and characteristics are listed below:

- Air system testing up 5,000 psig
- Variable operating environment
- Sea water cooling
- Capacity exceeds two CVNs

MAJOR TESTS CONDUCTED

- Alternate Parts Qualification
- AEGIS Ship Air System Qualification
- DDG-51/SSN-21 Compressor Qualification
- Desiccant Standardization Test
- Dehydrator First Article Test
- Hygrometer Endurance Test

FLEET COST SAVINGS

- Alternate Parts Qualification. Saved to date - $8 million
- RIX HP Air Compressor Qualification. Estimated savings - $1 million
- AEGIS LP Air System Qualification. Estimated savings - $1/2 million
- Air System Dryer Test. Estimated savings - $2 million

A/C, REFRIGERATION AND VENTILATION TEST FACILITY
AIR CONDITIONING, REFRIGERATION AND VENTILATION TEST SITE
ONLY SITE FOR TESTING HVAC SYSTEMS IN THE NAVY

NAVY HVAC SYSTEMS

HVAC Systems are vital to the operation and performance of personnel and equipment under various environmental conditions. Equipment and systems which can be tested and evaluated at NSWCCD-SSES Philadelphia include the following:

- Air condition plants
- Refrigeration plants
- Ventilation systems
- CBR protective systems
- Damper/precipitators

TEST & EVALUATION CONDUCTED

- Alternate refrigerant testing. CFC free refrigerants will reduce ozone depletion
- Shipboard backfit modifications
- Toxic/fire damper evaluations/critical to ship's survivability
- Ventilation system testing
- Chemical, biological, radiological protection system testing

TECHNICAL COMMUNITY TEAMING

- Naval Sea Systems Command
- Environmental Protection Agency
- Military Sealift Command
- Coast Guard
- Commercial Companies (Dupont, Castrol, York, etc.)

COST SAVINGS

- Reduced refrigerant leaks = $5 million
- A/C plant condenser failure elimination = $50 million
- Ventilation system improvements = $2 million
- CBR filter changes = $3 million

A/C, REFRIGERATION AND VENTILATION TEST FACILITY
SUBMARINE LIFE SUPPORT TEST SITE
THE FREE WORLD'S ONE AND ONLY SUBMARINE LIFE SUPPORT TEST SITE

TESTING PROGRAMS

Current test and evaluation support:

- Chlorofluorcarbon compatibility
- Oxygen generating plant land based techeval
- Gas management system endurance
- Central atmosphere monitoring system carbon monoxide analyzer replacement
- Electrolytic oxygen generator power supply silencing
- New attack submarine oxygen system

ACCOMPLISHMENTS

The Life Support Test Site has been used extensively to support testing of new configuration of HVAC equipment for Trident and Seawolf submarine classes. New system and design criteria will save $17M per submarine. New chlorofluorcarbon replacements have been demonstrated and tested at NSWCCD-SSES Philadelphia. Additionally, these facilities have designed and demonstrated a modification to the Seawolf oxygen systems which saves the Navy $4M per submarine.

SHIPS EQUIPMENT

- Gas management system
- Electrolytic oxygen generator
- Central atmosphere monitoring system
- Carbon dioxide scrubber
- Carbon monoxide and hydrogen burner
- Oxygen generating plant

BENEFITS TO NAVY

- Unique - free world's only
- Smart buyer - fly before buy
- Honest broker - no $ conflicts
- ISEA and RDT&E Agent - serve the Fleet
- Experience - since 1967
- Modification saved Navy $4M per submarine

SURVIVABILITY ENGINEERING FACILITY
SHOCK AND VIBRATION LABORATORY
THE NAVY'S MOST COMPREHENSIVE ENVIRONMENTAL T&E FACILITY

SURVIVABILITY ENGINEERING FACILITY

The Survivability Engineering Facility includes various laboratories necessary to test and evaluate ship survivability.

- Shock and Vibration Laboratory
- Heavy Mechanical Test Site
- Component Environmental Test Laboratory
- Electromagnetic Conformance Laboratory
- Temperature Test Laboratory
- ARC Fault Detector System Test Laboratory
- Infrared Thermographic Test and Evaluation Laboratory
- Moisture Monitoring Laboratory
- Electric Power Systems Instrument Site
- Chemical Instrumentation Test Site

SHOCK & VIBRATION ENGINEERING FACILITY

Evaluate shipboard components, assemblies and systems to determine and improve their ability to not only survive but function reliably during and subsequent to the imposition of combat-induced vibration and shock effects.

ARC FAULT LABORATORY

- Helium-Cadmium Laser System
- AFD Training Unit
- AFD Photo Sensor Calibration
- Configuration Control/Management Drawing Changes/Revisions

ELECTROMAGNETIC CONFORMANCE LABORATORY

Electromagnetic conformance is critical to safe operation of equipment onboard ship. NSWCCD-SSES Philadelphia is capable of testing and designing corrections to equipment to meet Military Standard-461 compliance. Testing and evaluation can be accomplished in an automated fashion.

ENVIRONMENTAL TEST LABORATORY

NSWCCD-SSES Philadelphia environmental facilities are capable of testing the effects of equipment operation and performance with following conditions: salt spray, temperature ranges from -100°F to 392°F, and 0 to 100% relative humidity.

INFRARED THERMOGRAPHIC LABORATORY

- Infrared/Visible Spectrum Overlay Analysis Evaluations
- Low (-20 DEG F) and High (1500 DEG F) Temperature Analysis Capabilities
- Microscopic Thermographic Capabilities

CARGO & WEAPONS HANDLING SYSTEM FACILITY
CARGO/WEAPONS ELEVATOR ENGINEERING SITE
THE ONLY ONE OF ITS KIND

WHY WAS THIS SITE BUILT?

Because: There are over 600 elevators in the Fleet with over 240 design variations.

Solution: Develop three standard designs which standardizes components, drawings, specifications at a cost savings in construction and maintenance.

WHERE IS STANDARD ELEVATOR INSTALLED?

- AOE-6 Class, AOJ-177 Class
- LSD-49 Class, LHD-1 Class
- Plus Standard Components on 400 plus Elevators

WHY DO TESTING HERE VICE FLEET?

- Fleet has shunned high risk shipboard tests in past due to impact on mission operation
- 100 + testing specialists at NSWCCD-SSES
- 60 elevator personnel at NSWCCD-SSES
- Saves money

FLEET CUSTOMER FEEDBACK

INSURV Elevator Inspection Data For Calendar Year 1993

"The AOE-6 Class (standard) elevators were exceptional, with safety deficiencies in only one of seven elevators (14%)."

Compared with the total "Of 213 elevators inspected, 48% had safety related deficiencies."

RADM P. R. Olson, President INSURV Board

WHAT ELSE IS THE SITE USED FOR?

Supports the training of elevator inspectors (INSURV BOARD) as well as a trainer for Fleet personnel.

COMPLETED TESTING

The Cargo/Weapons Elevator Engineering Site has been utilized to test the following: prove the standard elevator design; simulate shipboard voltages; dynamic braking; effectiveness of watertight doors; and hydraulic equipment performance.

FUTURE TESTING

- Programmable logic controller for CVN-76
- Flush deck watertight hatch
- Personnel safety barrier

CARGO & WEAPONS HANDLING SYSTEM FACILITY
VERTICAL PACKAGE CONVEYOR TEST SITE
THIS SITE IS SAVING LIVES

VERTICAL PACKAGE CONVEYOR ACCOMPLISHMENTS

- Reduced personnel injuries and deaths
- Successful prototype lab and Fleet testing
- Standardized Fleet safety features
- Established Fleet 2-man rule for operation
- Standardized all technical documentation
- Standardized electrical control system
- Reduced in service/life cycle costs

UNIQUE CAPABILITY

- Only conveyor test site for appraising engineering designs and modifications.
- Has full scale versions of shipboard conveyors.
- Only units with same and opposite side handling at the top level to support continuous testing, especially full load.

VALUE TO THE NAVY

Test site to continue keeping conveyors safe

- Testing does not interfere with Fleet operations
- Can be used for problem replication and troubleshooting to support Fleet.

VALUE TO IN-SERVICE ENGINEERS

- Failures in the Fleet can be readily recreated, evaluated, resolved, and converted, when needed, into alterations.
- Solutions are proofed before Fleet implementation.
- Technical documentation is proofed for alterations.
- New ideas are tested.

VALUE TO COMMERCIALIZATION

- Commercial Off The Shelf (COTS) components, can be tested
- Readily adapts for new designs
- Provides feedback to commercial sector

GAS TURBINE DEVELOPMENT FACILITY
GAS TURBINE SHIP LAND BASED ENGINEERING SITE
DUPLICATES THE FREE WORLD'S FRONT-LINE COMBATANT

GAS TURBINE SHIP LAND BASED ENGINEERING SITE

The Gas Turbine Ship Land Based Engineering Site was constructed at NSWCCD-SSES between 1986-1989 in response to significant independent development efforts including a software based machinery control system, a newly designed LM2500 gas turbine engine with uprated power, and integrated electronic controller, and an uprated ship's electrical generation system.

ACCOMPLISHMENTS

- First time integration of all propulsion equipment ahead of shipyard construction schedule.
- Tested over 30 versions of computer control system software for DDGs and AOEs.
- Conducted over 128 machinery tests.
- Identified over 600 deficiencies.
- Saved/eliminated two ship trials ($4M cost savings).
- Trained over 200 Naval and Fleet personnel.

SHIP EQUIPMENT ON-SITE

- Propulsion Gas Turbine engine (2)
- Reduction Gear
- Electric Generators and Gas Turbine engines (2)
- All support systems water, fuel, oil, high pressure air
- Computerized control system
- Computerized data collection system

Replacement cost $147M

ONGOING AND PLANNED TESTING

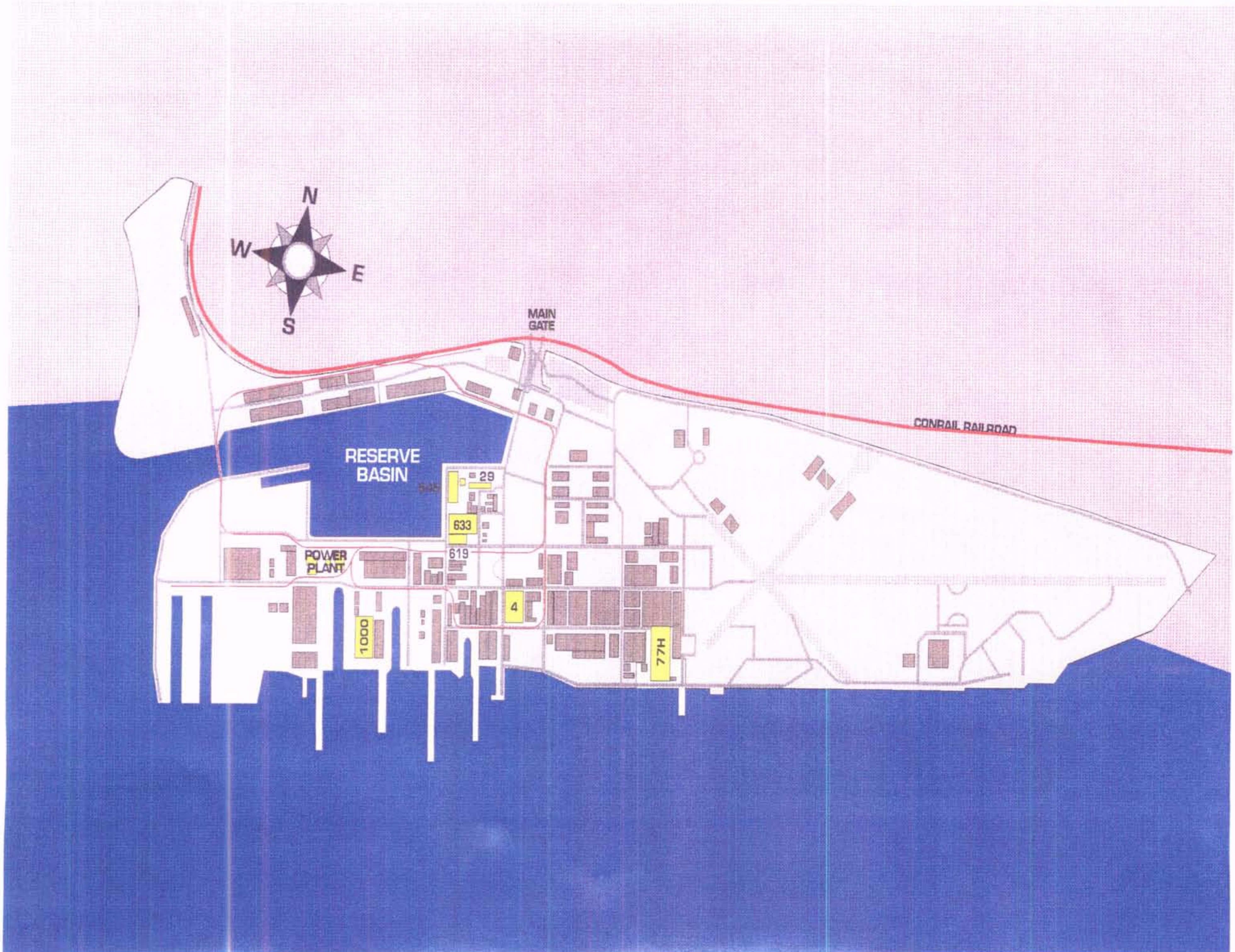
Some examples of current and future testing are listed below:

- Embedded training consoles
- New engine controller
- New machinery control system
- New fiber optic communications
- Electric generator upgrade
- New air starter unit
- New ICR engine integration

BENEFITS

- Early design changes save Fleet wide retrofits.
- 50% cost reduction for testing at LBES vice ship.
- In-house expertise drives down the cost of engineering changes - documented.
- Crews learned from the experienced test site engineers.

Reduces schedule, cost and technical risk.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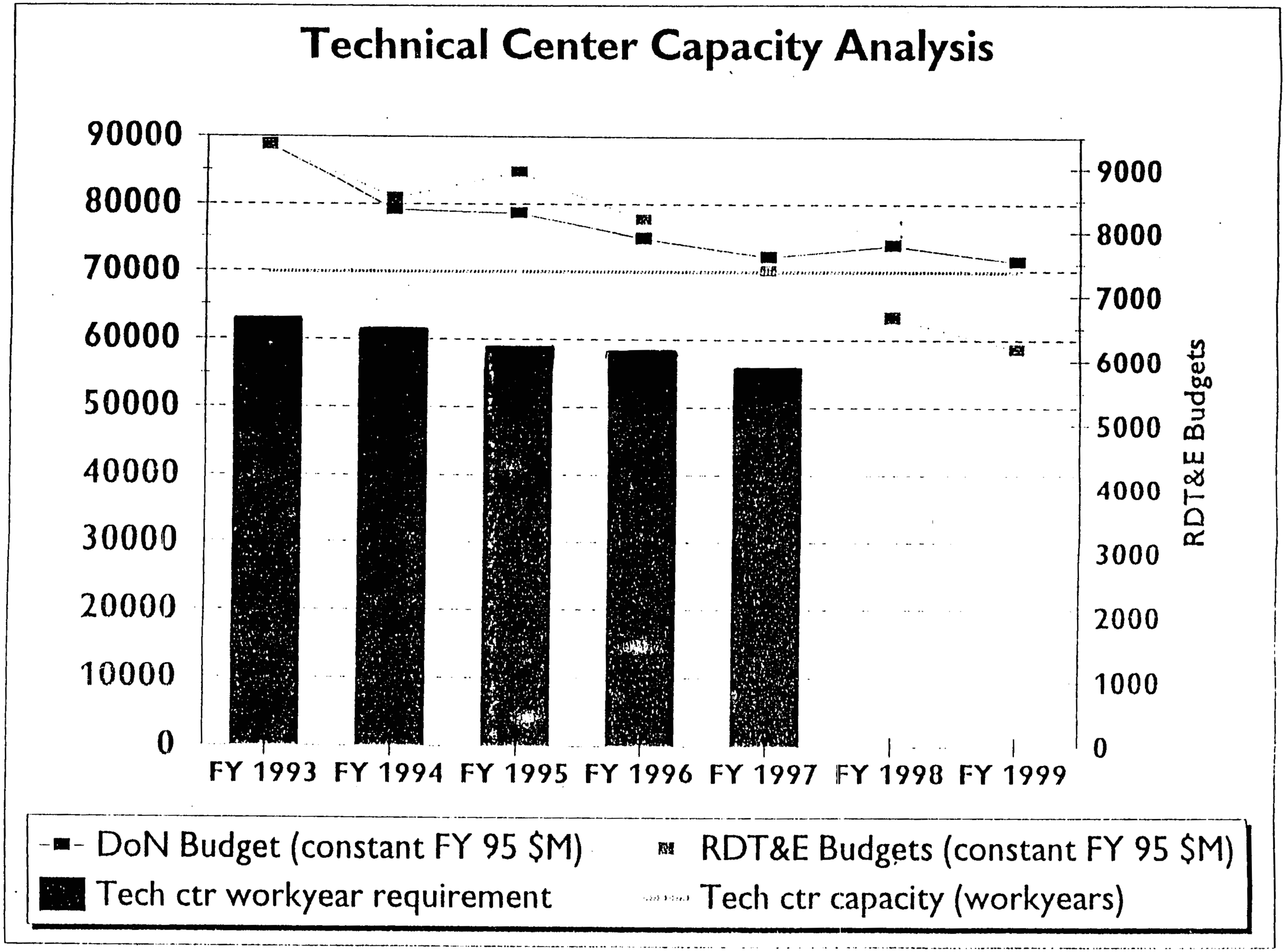

Technical Center Capacity Analysis
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
RDT&E Budgets
FY 1993
FY 1994
FY 1995
FY 1996
FY 1997
FY 1998
FY 1999
DoN Budget (constant FY 95 $M)
RDT&E Budgets (constant FY 95 $M)
Tech ctr workyear requirement
Tech ctr capacity (workyears)

CAPACITY ANALYSIS
(Technical Centers & Laboratories)

Maximum Work Years (1986 - 1994)		71,986.80
1997 Projected Work Years	-	56,749.29
		15,237.51

	BUDGETED WORKYEARS													Total	Civilian
	86	87	88	89	90	91	92	93	94	95	96	97	Max BWY	Civilians on Board	Technical on Board
NAWC HQ	ND	ND	ND	ND	ND	ND	ND	34	35	33	33	ND	35	0	0
NAWC CHINA LAKE	5910	5668	5720	5784	5876	5867	5658	5344	5130	4901	4687	4526	5910	4495	3266
NAWC POINT MUGU	5279	5661	5707	5584	5761	5710	5969	5138	4718	4402	4242	4098	5969	3549	2533
NAWC INDIANAPOLIS	2801	3025	3054	3241	3328	3314	3383	3159	3031	2766	2766	2736	3383	2844	2414
NAWC PAX RIVER	3892	3863	3994	4039	4207	4242	4308	3861	4804	4618	6183	5939	6183	4546	3149
NAWC DET WARMINSTER	NA	NA	8	12	8	14	11	12	ND	ND	ND	ND	14	25	24
NAWC DWTF ORELAND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	0	0
NAWC LAKEHURST	ND	2619	2532	2492	2567	2428	2320	2190	1967	1779	1885	1825	2619	1879	1243
NATSD ORLANDO	1318	1323	1312	1311	1298	1228	1185	1093	1069	1050	1050	1050	1323	931	616
NATSF PHILADELPHIA	307	323	322	303	286	322	317	309	300	289	284	284	323	237	201
NAESU LAKEHURST	1614	1542	1423	1313	1069	1042	1042	994	939	916	903	891	1614	78	20
NSWC HQ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	11	0
NSWC CRANE	3210	3505	3490	3708	3671	4002	3867	3648	3796	3609	3163	2973	4002	3666	2577
NSWC DET LOUISVILLE	2493	2527	2532	2472	2251	2264	2705	2561	2229	2120	1857	1746	2705	2165	1732
NSWC HTA SULLIVAN	2	2	2	2	2	2	2	2	3	3	3	3	3	0	0
NSWC DAHLGREN	3142.9	3220.5	3099.9	3207.8	3196.3	3271.8	3429.2	3242.4	3301.2	2795.3	2767.9	2860	3429.2	3637	2774
NSWC PANAMA CITY	1210	1207	1300	1333	1246	1242	1300	1211	1245	1352	1250	1156	1352	1431	1073
NSWC PORT HUENEME	2753	2621	2673	2664	3113	3346	3121	2979	2715	2462	2292	2168	3346	2508	2185
NSWC CARDEROCK	1915	1963	1849	1863	1834	1829	1696	1519	1405	1362	1322	1425	1963	1712	1223
NSWC DET PHILADELPHIA	1250	1462	1593	1683	1751	1753	1758	1746	1585	1560	1715	1614	1758	1899	1443
NSWC DET ANNAPOLIS	775	807	764	781	761	778	719	659	715	743	680	431	807	372	386
NSWC ARD BAYVIEW	14	25	23	29	26	34	32	35	68	60	57	51	68	48	37
NSWC INDIAN HEAD	2250.8	2237.5	2263	2126.6	2290.1	2637.7	2560.3	2341.2	2185	2082.3	1980.9	1895.2	2637.7	2414	1714
NSWC DET YORKTOWN	58.69	56.74	61.33	50	51.1	53.5	59.1	45.8	48.44	55.2	49.86	43.89	61.33	46	46
NAVSEALOGCEN MACHANICSBURG	134	323	314	328	374	328	322	314	298	326	308	308	374	357	214
NAVSEASUPCEN SAN DIEGO	ND	ND	ND	467	494	482	494	471	463	492	462	329	494	442	399
NAVSEASUPCEN PEARL HARBOR	ND	ND	ND	48	51	52	54	54	54	55	55	55	55	54	51
NUWC HQ	0	0	0	0	0	0	0	17	19	19	19	19	19	17	3
NUWC NEWPORT	2378	2337	2343	2300	2310	2347	2222	2308	2470	2739	2881	2820	2881	1146	1013
NUWC DET NEW LONDON	1584	1542	1551	1566	1539	1536	1380	1354	1312	1073	734	510	1584	528	459
NUWC KEYPORT	3277	3173	3147	3018	3160	3452	3432	3159	2681.1	2498.9	2228.9	2206.9	3452	2695	2251
SEASPARROW PSO	30	34	34	34	40	47	47	51	52	59	65	65	65	32	18
NAVWARASSESDIV CORONA	1060	1270.4	1247.9	1305.5	1322.1	1157.2	1100.4	1215.4	1054.8	1069.9	1067.6	1062.8	1322.1	890	813
NAVEODTECHDIV INDIAN HEAD	210	250	240	262	247	251	267	265	233	233	233	233	267	235	186
NOC INDIAN HEAD	NA	NA	NA	NA	NA	NA	NA	NA	104	95	95	95	104	85	0
AEGIS COMBAT CENTER WALLOPS	ND	ND	ND	ND	316	354	371	382	388	338	347	345	388	40	16
AEGIS TECH REP MOORESTOWN	93.4	93.4	99	99	99	103	103	103.5	97.5	97	97.5	97.5	103.5	29	14
NCCOSC HQ	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	23	0
NCCOSC RDT&E SAN DIEGO	3465	3319	3358	3399	3389	3301	3525	3427	2825	2542	2490	2416	3525	2665	2156
NCCOSC RDT&E DET WARMINSTER	303	265	278	281	274	281	284	289	291	296	288	292	303	293	291
NCCOSC ISE EAST CHARLESTON	325	330	347	375	379	372	377	362	347	319	628	620	628	604	500
NCCOSC ISE EAST DET NORFOLK	433	432	445	444	437	421	412	407	391	360	325	285	445	53	50
NCCOSC ISE WEST SAN DIEGO	558	600	621	662	606	616	616	605	622	775	662	631	775	801	592
NCCOSC ISE WEST PEARL HARBOR	159	196	223	218	218	213	195	132	132	132	132	132	223	135	108
NAVMASO CHESAPEAKE	647	677	607	578	575	602	560	531	512	503	501	500	677	270	216
NAVTECHREPO LAUREL	33	26	38	31	40	26	18	15	14	12	11	11	40	14	3
NRL	3169	3313	3502	3439	3466	3450	3142	2988	3115	3049	3005	2989	3502	2924	2077

	BUDGETED WORKYEARS												Max BWY	Total Civilians on Board	Civilian Technical on Board
	86	87	88	89	90	91	92	93	94	95	96	97			
NRL DET UNDERWATER SOUND RE	108	112	116	114	120	127	113	124	118	100	100	100	127	111	85
ONR	NA	555	517	498	496	506	477	466	496	485	466	449	555	443	281
NAVFACENGSERCEN PT HUENEME	432	503	602	565	553	561	531	548	520	473	525	525	602	434	324
AFWTF	42	46	46	45	47	43	41	41	40	39	39	39	47	36	15
FTSC ATLANTIC	ND	ND	ND	514	606	567	575	585	607	699	653	653	699	557	484
FTSC ATLANTIC NORFOLK	ND	ND	ND	122	122	122	122	122	151	151	151	151	151	30	26
FTSC ATLANTIC MAYPORT	ND	ND	ND	116	120	120	123	123	130	136	138	138	138	49	43
PMRF BARKING SANDS	ND	80	92	96	103	107	108	129	141	153	153	153	153	140	65
NPRDC SAN DIEGO	371	365	302	311	307	285	266	264	231	168	167	167	371	220	152
COMOPTEVFOR NORFOLK	ND	ND	42	43	43.7	55.25	63	71	71	71	71	71	71	59	5
NCTRF NATICK	50	52	48	50	50	47	49	49	47	47	47	47	52	41	34
NAVMEDRESINST BETHESDA	ND	ND	ND	ND	ND	166	162	162	162	162	162	162	166	139	112
NAVHTHRESCEN SAN DIEGO	110	110	110	115	125	140	150	155	150	160	163	165	165	58	43
NAVAERMEDRESLAB PENSACOLA	UKNWN	UKNWN	UKNWN	60	57	45	43	45	42	32	34	35	60	26	14
NAVBIOLAB NEW ORLEANS	ND	ND	70	72	86	83	75	66	66	66	46	46	86	34	16
NAVSUBMEDRESLAB GROTON	ND	ND	ND	72	72	72	72	72	64	64	64	64	72	34	25
NAVDENRESINST GREAT LAKES	35	35	35	35	37	39	47	47	47	47	47	47	47	10	6
								63642.3	61847	59093.6	58831.7	56749.29	71986.8	55246	41816

TECHNICAL CENTERS Military Value Matrix

Ques Impo	Ques Seq	QUESTIONS	Criteria				Criteria				Criteria weights				Score	Weight
			R	F	M	C	R	F	M	C	R	F	M	C		
			40	20	10	30	40	20	10	30	40	20	10	30		
		MISSION STATEMENT														14.252
1	1	Includes full-spectrum life cycle responsibility.	1	1	1	1	1	1	1	1	0.741	0.504	0.508	0.741	10	2.493
1	2	Includes total systems responsibility.	1	1	1	1	1	1	1	1	0.741	0.504	0.508	0.741	10	2.493
3	3	Includes sub-system/component responsibility.	1				1	0	0	0	0.296	0.000	0.000	0.000	4	0.296
1	4	Includes systems integration responsibility.	1	1		1	1	1	0	1	0.741	0.504	0.000	0.741	10	1.985
3	5	Includes component integration responsibility.		1			0	1	0	0	0.000	0.202	0.000	0.000	4	0.202
2	6	Includes research.	1				1	0	0	0	0.519	0.000	0.000	0.000	7	0.519
2	7	Includes development.	1				1	0	0	0	0.519	0.000	0.000	0.000	7	0.519
2	8	Includes test and evaluation.	1				1	0	0	0	0.519	0.000	0.000	0.000	7	0.519
2	9	Includes procurement/acquisition.	1				1	0	0	0	0.370	0.000	0.000	0.000	5	0.370
2	10	Includes in-service engineering.	1		1		1	0	1	0	0.444	0.000	0.305	0.000	6	0.749
2	11	Includes support to direct formal training of naval forces.	1		1		1	0	1	0	0.296	0.000	0.203	0.000	4	0.499
1	12	A naval surface warfare activity.	1				1	0	0	0	0.593	0.000	0.000	0.000	8	0.593
1	13	A naval air warfare activity.	1				1	0	0	0	0.593	0.000	0.000	0.000	8	0.593
1	14	A naval undersea warfare activity.	1				1	0	0	0	0.519	0.000	0.000	0.000	7	0.519
1	15	A naval command, control, and ocean surveillance activity.	1				1	0	0	0	0.667	0.000	0.000	0.000	9	0.667
1	16	A naval research laboratory activity.	1				1	0	0	0	0.741	0.000	0.000	0.000	10	0.741
3	17	Includes joint/lead service assignments..		1		1	0	1	0	1	0.000	0.202	0.000	0.296	4	0.498
		TECHNICAL FUNCTIONS					0	0	0	0					0	14.096
3	18	Include a minimum of 100 in-house technical WYs in PLATFORMS.	1				1	0	0	0	0.296	0.000	0.000	0.000	4	0.296
1	19	Include a minimum of 100 in-house technical WYs in WEAPONS SYSTEMS	1				1	0	0	0	0.667	0.000	0.000	0.000	9	0.667
1	20	Include a minimum of 100 in-house technical WYs in COMBAT SYSTEM IN	1				1	0	0	0	0.667	0.000	0.000	0.000	9	0.667
3	21	Include a minimum of 100 in-house technical WYs in SPECIAL OPERATIO	1				1	0	0	0	0.148	0.000	0.000	0.000	2	0.148
2	22	Include a minimum of 100 in-house technical WYs in SENSORS & SURVEIL	1				1	0	0	0	0.444	0.000	0.000	0.000	6	0.444
3	23	Inlcude a minimum of 100 in-house technical WYs in NAVIGATION.	1				1	0	0	0	0.148	0.000	0.000	0.000	2	0.148
1	24	Include a minimum of 100 in-house technical WYs in C3I.	1				1	0	0	0	0.667	0.000	0.000	0.000	9	0.667
3	25	Inlcude a minimum of 100 in-house technical WYs in DEFENSE SYSTEMS.	1				1	0	0	0	0.296	0.000	0.000	0.000	4	0.296
3	26	Include a minimum of 100 in-house technical WYs in STRATEGIC PROGR	1				1	0	0	0	0.222	0.000	0.000	0.000	3	0.222
3	27	Include a minimum of 100 in-house technical WYs in GENERAL MISSION	1				1	0	0	0	0.148	0.000	0.000	0.000	2	0.148
2	28	Include a minimum of 100 in-house technical WYs in GENERIC TECHNOL	1				1	0	0	0	0.519	0.000	0.000	0.000	7	0.519
2	29	Inlcude a minimum of 100 in-house technical WYs in BASIC RESEARCH (	1				1	0	0	0	0.519	0.000	0.000	0.000	7	0.519
2	30	Include a minimum of 100 in-house technical WYs in TECHNICAL BASE (R	1				1	0	0	0	0.444	0.000	0.000	0.000	6	0.444
1	31	Include a minimum of 100 in-house technical WYs in DEVELOPMENT & D	1				1	0	0	0	0.593	0.000	0.000	0.000	8	0.593
2	32	Include a minimum of 100 in-house technical WYs in ACQUISITION.	1				1	0	0	0	0.296	0.000	0.000	0.000	4	0.296
2	33	Include a minimum of 100 in-house technical WYs in LIFETIME SUPPORT.	1		1		1	0	1	0	0.370	0.000	0.254	0.000	5	0.624
2	34	Include a minimum of 100 in-house technical WYs in TRAINING/SIMULATI	1		1		1	0	1	0	0.222	0.000	0.152	0.000	3	0.375
3	35	PLATFORMS share of DON in-house technical WYs is => 5%.	1				1	0	0	0	0.222	0.000	0.000	0.000	3	0.222
1	36	WEAPONS SYSTEMS share of DON in-house technical WYs is => 5%.	1				1	0	0	0	0.593	0.000	0.000	0.000	8	0.593
1	37	COMBAT SYSTEMS INTEGRATION share of DON in-house technical WYs is	1				1	0	0	0	0.593	0.000	0.000	0.000	8	0.593
3	38	SPECIAL OPERATIONS SUPPORT share of DON in-house technical WYs is =	1				1	0	0	0	0.074	0.000	0.000	0.000	1	0.074
2	39	SENSORS & SURVEILLANCE SYSTEMS share of DON in-house technical W	1				1	0	0	0	0.370	0.000	0.000	0.000	5	0.370
3	40	NAVIGATION share of DON in-house technical WYs is => 5%.	1				1	0	0	0	0.074	0.000	0.000	0.000	1	0.074
1	41	C3I share of DON in-house technical WYs is => 5%.	1				1	0	0	0	0.593	0.000	0.000	0.000	8	0.593
3	42	DEFENSE SYSTEMS share of DON in-house technical WYs is => 5%.	1				1	0	0	0	0.222	0.000	0.000	0.000	3	0.222
3	43	STRATEGIC PROGRAMS share of DON in-house technical WYs is => 5%.	1				1	0	0	0	0.148	0.000	0.000	0.000	2	0.148
3	44	GENERAL MISSION SUPPORT share of DON in-house technical WYs is => 5	1				1	0	0	0	0.074	0.000	0.000	0.000	1	0.074
2	45	GENERAL TECHNOLOGY BASE share of DON in-house technical WYs is =	1				1	0	0	0	0.444	0.000	0.000	0.000	6	0.444
2	46	BASIC RESEARCH (RDT&E) share of DON in-house technical WYs is => 5%	1				1	0	0	0	0.444	0.000	0.000	0.000	6	0.444
2	47	TECHNICAL BASE (RDT&E) share of DON in-house technical WYs is => 5 %	1				1	0	0	0	0.370	0.000	0.000	0.000	5	0.370
1	48	DEVELOPMENT & DEVELOPMENT SUPPORT (RDT&E) share of DON in-hous	1				1	0	0	0	0.519	0.000	0.000	0.000	7	0.519
2	49	ACQUISITION share of DON in-house technical WYs is => 5%.	1				1	0	0	0	0.222	0.000	0.000	0.000	3	0.222
2	50	LIFETIME SUPPORT share of DON in-house technical WYs is => 5%.	1		1		1	0	1	0	0.296	0.000	0.203	0.000	4	0.499

2	51	TRAINING/SIMULATION share of DON in-house technical WYs is => 5%.	1		1		1	0	1	0	0.222	0.000	0.152	0.000	3	0.375
3	52	Technical functions are performed for aircraft.	1				1	0	0	0	0.296	0.000	0.000	0.000	4	0.296
3	53	Technical functions are performed for submarines.	1				1	0	0	0	0.296	0.000	0.000	0.000	4	0.296
3	54	Technical functions are performed for surface ships.	1				1	0	0	0	0.296	0.000	0.000	0.000	4	0.296
3	55	Technical functions are performed for command, control and ocean s	1				1	0	0	0	0.296	0.000	0.000	0.000	4	0.296
		FACILITIES					0	0	0	0					0	15.431
1	56	Facility is a host activity.	1	1			1	1	0	0	0.741	0.504	0.000	0.000	10	1.245
2	57	80% to 89% of administrative & laboratory space is ADEQUATE.		1			0	1	0	0	0.000	0.252	0.000	0.000	5	0.252
1	58	90% to 100% of administrative & laboratory space is ADEQUATE.		1			0	1	0	0	0.000	0.403	0.000	0.000	8	0.403
2	59	3% to 5% of administrative & laboratory space is INADEQUATE.		1			0	1	0	0	0.000	0.252	0.000	0.000	5	0.252
1	60	Less than 3% of administrative & laboratory space is INADEQUATE.		1			0	1	0	0	0.000	0.403	0.000	0.000	8	0.403
1	61	No funds are required to correct inadequacies.		1		1	0	1	0	1	0.000	0.403	0.000	0.593	8	0.996
2	62	Funds are required to correct inadequacies, but less then $500,000.		1		1	0	1	0	1	0.000	0.252	0.000	0.370	5	0.622
3	63	Funds are required to correct inadequacies, totaling between $500,000		1		1	0	1	0	1	0.000	0.151	0.000	0.222	3	0.373
3	64	Less than 5% of utilized floor space is leased.				1	0	0	0	1	0.000	0.000	0.000	0.148	2	0.148
3	65	Less than 25% of plant account space is assigned to tenants.				1	0	0	0	1	0.000	0.000	0.000	0.148	2	0.148
3	66	10,000 to 49,999 sqft of existing Government owned space is available f		1	1	1	0	1	1	1	0.000	0.151	0.152	0.222	3	0.526
2	67	50,000 to 100,000 sqft of existing Government owned space is available		1	1	1	0	1	1	1	0.000	0.252	0.254	0.370	5	0.876
1	68	More than 100,000 sqft of existing Government owned space is availabl		1	1	1	0	1	1	1	0.000	0.353	0.355	0.519	7	1.226
3	69	10,000 to 49,999 sqft of Government owned space can be constructed		1	1		0	1	1	0	0.000	0.101	0.102	0.000	2	0.202
2	70	50,000 to 100,000 sqft of Government owned space can be constructed		1	1		0	1	1	0	0.000	0.202	0.203	0.000	4	0.405
1	71	More than 100,000 sqft of Government owned space can be construct		1	1		0	1	1	0	0.000	0.302	0.305	0.000	6	0.607
3	72	Expansion opportunities can support 50 to 99 additional persons.		1	1		0	1	1	0	0.000	0.151	0.152	0.000	3	0.303
2	73	Expansion opportunities can support 100 to 499 additional persons.		1	1		0	1	1	0	0.000	0.252	0.254	0.000	5	0.506
1	74	Expansion opportunities can support more than 500 additional persons.		1	1		0	1	1	0	0.000	0.353	0.355	0.000	7	0.708
3	75	250 to 499 unimproved & unencumbered acres available for expansion			1		0	0	1	0	0.000	0.000	0.102	0.000	2	0.102
2	76	500 to 1000 unimproved & unencumbered acres available for expansio			1		0	0	1	0	0.000	0.000	0.203	0.000	4	0.203
1	77	More than 1,000 unimproved & unencumbered acres available for exp			1		0	0	1	0	0.000	0.000	0.305	0.000	6	0.305
3	78	Expansion is not constrained by parking limitations.			1		0	0	1	0	0.000	0.000	0.051	0.000	1	0.051
3	79	Expansion is not constrained by radio frequency limitations.			1		0	0	1	0	0.000	0.000	0.102	0.000	2	0.102
3	80	10 to 49 acres with roads and utilities available for expansion.		1	1	1	0	1	1	1	0.000	0.101	0.102	0.148	2	0.350
2	81	50 to 499 acres with roads and utilities available for expansion.		1	1	1	0	1	1	1	0.000	0.202	0.203	0.296	4	0.701
1	82	More than 500 acres with roads and utilities available for expansion.		1	1	1	0	1	1	1	0.000	0.302	0.305	0.444	6	1.051
3	83	Site utilizes less than 70% of its utility capacity.			1	1	0	0	1	1	0.000	0.000	0.152	0.222	3	0.375
3	84	Less than 20% of replacement value of the Site's SF&E is PORTABLE.		1		1	0	1	0	1	0.000	0.101	0.000	0.148	2	0.249
3	85	Replacement value of FIXED SF&E is between $25,000,000 and $100,000,		1		1	0	1	0	1	0.000	0.202	0.000	0.296	4	0.498
1	86	Replacement value of FIXED SF&E exceeds $100,000,000.		1		1	0	1	0	1	0.000	0.302	0.000	0.444	6	0.747
3	87	Site has revenue producing resources.		1		1	0	1	0	1	0.000	0.202	0.000	0.296	4	0.498
		RANGES, FEATURES AND OTHER CAPABILITIES					0	0	0	0					0	13.816
1	88	Site operates piers that can support naval combatants.		1		1	0	1	0	1	0.000	0.353	0.000	0.519	7	0.871
1	89	Site operates an operational air field that supports high performance ai		1		1	0	1	0	1	0.000	0.353	0.000	0.519	7	0.871
3	90	Site has ordnance storage capacity between 500,000 and 999,999 net e		1	1		0	1	1	0	0.000	0.101	0.102	0.000	2	0.202
2	91	Site has ordnance storage capacity between 1,000,000 and 9,999,999 n		1	1		0	1	1	0	0.000	0.202	0.203	0.000	4	0.405
1	92	Site has ordnance storage capacity is at least 10,000,000 net explosive v		1	1		0	1	1	0	0.000	0.302	0.305	0.000	6	0.607
3	93	Facility has a super computer or parallel computer on site.		1			0	1	0	0	0.000	0.202	0.000	0.000	4	0.202
3	94	Data transfer across the site is supported by a high speed network.	1	1	1		1	1	1	0	0.222	0.151	0.152	0.000	3	0.526
2	95	Real time data interconnectivity is achieved with other sites.	1	1	1		1	1	1	0	0.444	0.302	0.305	0.000	6	1.051
2	96	Production is accomplished at this site.	1	1	1	1	1	1	1	1	0.444	0.302	0.305	0.444	6	1.496
3	97	Site has a real time Video Teleconferencing Center.		1		1	0	1	0	1	0.000	0.101	0.000	0.148	2	0.249
3	98	Officially assigned mobilization responsibility.		1	1		0	1	1	0	0.000	0.101	0.102	0.000	2	0.202
3	99	Adequate facilities available to support mobilization responsibilities.		1	1		0	1	1	0	0.000	0.101	0.102	0.000	2	0.202
3	100	Site maintains production facilities to be activated for contingencies.		1	1		0	1	1	0	0.000	0.101	0.102	0.000	2	0.202
3	101	Site supports Reserve Unit mobilization responsibilities.			1		0	0	1	0	0.000	0.000	0.102	0.000	2	0.102
1	102	Site controls range airspace of greater than 5,000 sq mi..		1		1	0	1	0	1	0.000	0.353	0.000	0.519	7	0.871
2	103	Airspace range(s) has no limiting (current or future) encroachment or e		1			0	1	0	0	0.000	0.302	0.000	0.000	6	0.302
1	104	Site controls range sea/undersea space of greater than 100 sq mi.		1		1	0	1	0	1	0.000	0.353	0.000	0.519	7	0.871
2	105	Seaspace/undersea range(s) has no limiting (current or future) encroac		1			0	1	0	0	0.000	0.302	0.000	0.000	6	0.302

1	106	Site controls range landspace of greater than 100 sq mi.		1		1	0	.	0	1	0.000	0.353	0.000	0.519	7	0.871	
2	107	Landspace range(s) has no limiting (future or current) encroachment o		1			0	1	0	0	0.000	0.302	0.000	0.000	6	0.302	
3	108	Site has range facilities that are used for fleet tactical training.	1		1		1	0	1	0	0.296	0.000	0.203	0.000	4	0.499	
1	109	Facility is part of the DoD Major Range and Test Facility Base.	1	1		1	1	1	0	1	0.741	0.504	0.000	0.741	10	1.985	
2	110	At least 100,000 man hours of depot/industrial maintenance performed	1		1		1	0	1	0	0.370	0.000	0.254	0.000	5	0.624	
		MANPOWER					0	0	0	0					0	19.250	
2	111	Total civilians on board is between 1000 and 1999.	1		1	1	1	0	1	1	0.444	0.000	0.305	0.444	6	1.193	
1	112	Total civilians on board is between 2000 and 3,999.	1		1	1	1	0	1	1	0.519	0.000	0.355	0.519	7	1.392	
1	113	Total civilians on board is greater than 4000.	1		1	1	1	0	1	1	0.593	0.000	0.406	0.593	8	1.591	
3	114	Average civilian technical staff years of experience is less than 7.	1			1	1	0	0	1	0.148	0.000	0.000	0.148	2	0.296	
3	115	Average civilian technical staff years of experience is greater than 7 ar	1			1	1	0	0	1	0.296	0.000	0.000	0.296	4	0.593	
2	116	Average civilian technical staff years of experience is greater than 9 ar	1			1	1	C	0	1	0.519	0.000	0.000	0.519	7	1.037	
1	117	Average civilian technical staff years of experience is greater than 11 a	1			1	1	0	0	1	0.667	0.000	0.000	0.667	9	1.333	
2	118	Average civilian technical staff years of experience is greater than 13 a	1			1	1	0	0	1	0.444	0.000	0.000	0.444	6	0.889	
2	119	Average civilian technical staff years of experience is greater than 15.	1			1	1	0	0	1	0.222	0.000	0.000	0.222	3	0.444	
3	120	Average civilian technical staff education level is less than 13.	1			1	1	0	0	1	0.148	0.000	0.000	0.148	2	0.296	
2	121	Average civilian technical staff education level is greater than 13 and l	1			1	1	0	0	1	0.296	0.000	0.000	0.296	4	0.593	
2	122	Average civilian technical staff education level is greater than 14 and l	1			1	1	0	0	1	0.444	0.000	0.000	0.444	6	0.889	
1	123	Average civilian technical staff education level is greater than 15 and l	1			1	1	0	0	1	0.593	0.000	0.000	0.593	8	1.185	
1	124	Average civilian technical staff education level is greater than 16.	1			1	1	0	0	1	0.741	0.000	0.000	0.741	10	1.481	
3	125	Average # of articles published over last 4 years per 100 technical staff i	1				1	0	0	0	0.296	0.000	0.000	0.000	4	0.296	
3	126	Average # of articles published over last 4 years per 100 technical staff i	1				1	0	0	0	0.074	0.000	0.000	0.000	1	0.074	
3	127	Books/chapters written over last 4 years per 100 technical staff is in the t	1				1	0	0	0	0.296	0.000	0.000	0.000	4	0.296	
3	128	Books/chapters written over last 4 years per 100 technical staff is in the n	1				1	0	0	0	0.074	0.000	0.000	0.000	1	0.074	
3	129	Activity has Nobel laureate(s) employed.	1				1	0	0	0	0.148	0.000	0.000	0.000	2	0.148	
3	130	Average # of awards over last 4 years per 100 technical staff is in the top	1				1	0	0	0	0.148	0.000	0.000	0.000	2	0.148	
3	131	Average # of awards over the last 4 years per 100 technical staff is in the	1				1	0	0	0	0.074	0.000	0.000	0.000	1	0.074	
2	132	Patents granted over last 4 years per 100 technical staff is in the top 25%	1				1	0	0	0	0.444	0.000	0.000	0.000	6	0.444	
3	133	Patents granted over last 4 years per 100 technical staff is in the next 25	1				1	0	0	0	0.296	0.000	0.000	0.000	4	0.296	
2	134	Patents applied for over last 4 years per 100 technical staff is in the top 2	1				1	0	0	0	0.444	0.000	0.000	0.000	6	0.444	
3	135	Patents applied for over last 4 years per 100 technical staff is in the next	1				1	0	0	0	0.296	0.000	0.000	0.000	4	0.296	
3	136	National Academy of Engineering/Science members.	1				1	0	0	0	0.148	0.000	0.000	0.000	2	0.148	
2	137	# of CRDAs signed by the Activity is over 10.	1			1	1	0	0	1	0.370	0.000	0.000	0.370	5	0.741	
2	138	Annual royalty income per 100 technical staff is in the top 25%.	1			1	1	0	0	1	0.370	0.000	0.000	0.370	5	0.741	
3	139	Annual royalty income per 100 technical staff is in the next 25%.	1			1	1	0	0	1	0.222	0.000	0.000	0.222	3	0.444	
2	140	Number of major end item prototypes currently in use is in the top 25%.	1	1			1	1	0	0	0.519	0.353	0.000	0.000	7	0.871	
2	141	Number of major end item prototypes currently in use is in the next 25%	1	1			1	1	0	0	0.296	0.202	0.000	0.000	4	0.498	
		LOCATION/ENVIRONMENT					0	0	0	0					0	8.455	
1	142	Location is necessary to perform assigned technical functions.	1			1	1	0	0	1	0.444	0.000	0.000	0.444	6	0.889	
1	143	Location has natural features that are essential to the mission of the fac	1	1			1	1	0	0	0.444	0.302	0.000	0.000	6	0.747	
2	144	Location enhances synergy with other activities and bases.	1			1	1	0	0	1	0.296	0.000	0.000	0.296	4	0.593	
3	145	Location enhances joint use capability.	1				1	0	0	0	0.222	0.000	0.000	0.000	3	0.222	
2	146	Location provides favorable weather conditions.		1			0	1	0	0	0.000	0.202	0.000	0.000	4	0.202	
1	147	Location is important to customers.	1			1	1	0	0	1	0.444	0.000	0.000	0.444	6	0.889	
2	148	Site has no endangered/threatened species and biological habitats tha		1			0	1	0	0	0.000	0.302	0.000	0.000	6	0.302	
2	149	Site has no jurisdictional wetlands that currently restrict base operations		1			0	1	0	0	0.000	0.302	0.000	0.000	6	0.302	
2	150	Site has no National Register cultural resources that constrain base ops		1			0	1	0	0	0.000	0.302	0.000	0.000	6	0.302	
2	151	Base ops or development plans are not constrained by laws applying to		1			0	1	0	0	0.000	0.302	0.000	0.000	6	0.302	
2	152	Site is in an "attainment" or "maintenance" air quality control area for C		1			0	1	0	0	0.000	0.202	0.000	0.000	4	0.202	
2	153	Site operations or development plans have not been restricted due to c		1			0	1	0	0	0.000	0.202	0.000	0.000	4	0.202	
2	154	Site has no Installation Restoration issues that restrict operations or devel		1			0	1	0	0	0.000	0.202	0.000	0.000	4	0.202	
3	155	Site has no significant maintenance dredging restrictions.		1			0	1	0	0	0.000	0.101	0.000	0.000	2	0.101	
		QUALITY OF LIFE					0	0	0	0					0	8.839	
1	156	Is there sufficient off base housing?		1		1	0	1	0	1	0.000	0.302	0.000	0.444	6	0.747	
1	157	Do 90% or more of the housing units have all the required amenities?		1		1	0	1	0	1	0.000	0.302	0.000	0.444	6	0.747	
2	160	Is the average wait for housing three months or less?		1		1	0	1	0	1	0.000	0.302	0.000	0.444	6	0.747	
1	163	Are 90% of BEQ rooms adequate?		1		1	0	1	0	1	0.000	0.403	0.000	0.593	8	0.996	

1	165	Are 90% of BOQ rooms adequate?		1		1	0	.	0	1	0.000	0.302	0.000	0.444	6	0.747	
2	166	Does the site have >90% of the listed MWR facilities?		1		1	0	1	0	1	0.000	0.353	0.000	0.519	7	0.871	
3	169	Are >90% of the child care facilities adequate?		1		1	0	1	0	1	0.000	0.202	0.000	0.296	4	0.498	
2	172	Is the average wait for 0-12 month child care <180 days?		1		1	0	1	0	1	0.000	0.302	0.000	0.444	6	0.747	
3	177	Do >50% of site military and civilian personnel live within a 30 minute co	1			1	1	0	0	1	0.296	0.000	0.000	0.296	4	0.593	
3	178	Are local area educational institution programs adequate for military fa				1	0	0	0	1	0.000	0.000	0.000	0.296	4	0.296	
3	179	Are there educational opportunities at all college levels within a 30-mile	1			1	1	0	0	1	0.296	0.000	0.000	0.296	4	0.593	
3	180	Are college education courses available on the base?	1			1	1	0	0	1	0.296	0.000	0.000	0.296	4	0.593	
1	184	Do military family members have reasonable access to medical/denta				1	0	0	0	1	0.000	0.000	0.000	0.444	6	0.444	
3	185	Is the violent crime rate <758/100,000?				1	0	0	0	1	0.000	0.000	0.000	0.074	1	0.074	
3	186	Is the property crime rate <4902/100,00?				1	0	0	0	1	0.000	0.000	0.000	0.074	1	0.074	
3	187	Is the drug crime rate <402/100,000?				1	0	0	0	1	0.000	0.000	0.000	0.074	1	0.074	
		COST					0	0	0	0					0	4.963	
1	188	Percent of all employees employed in technical operations is more tha				1	0	0	0	1	0.000	0.000	0.000	0.593	8	0.593	
2	189	Percent of all employees employed in technical opertions is between 7				1	0	0	0	1	0.000	0.000	0.000	0.444	6	0.444	
2	190	Percent of all employees employed in technical opertions is between 5				1	0	0	0	1	0.000	0.000	0.000	0.296	4	0.296	
3	191	Percent of all employees employed in technical opertions is between 3				1	0	0	0	1	0.000	0.000	0.000	0.148	2	0.148	
3	192	Percent of all employees employed in technical opertions is less than 3(				1	0	0	0	1	0.000	0.000	0.000	0.074	1	0.074	
3	193	Percent of overhead performed by government civilians is greater thar				1	0	0	0	1	0.000	0.000	0.000	0.222	3	0.222	
2	194	Percent of overhead performed by government civilians is between 70				1	0	0	0	1	0.000	0.000	0.000	0.370	5	0.370	
1	195	Percent of overhead performed by government civilians is between 50				1	0	0	0	1	0.000	0.000	0.000	0.519	7	0.519	
2	196	Percent of overhead performed by government civilians is between 30				1	0	0	0	1	0.000	0.000	0.000	0.370	5	0.370	
3	197	Percent of overhead performed by government civilians is less than 30.				1	0	0	0	1	0.000	0.000	0.000	0.222	3	0.222	
2	198	Percent of technical operations performed by government civilians is g				1	0	0	0	1	0.000	0.000	0.000	0.222	3	0.222	
2	199	Percent of tech. operations performed by government civilians is betw				1	0	0	0	1	0.000	0.000	0.000	0.370	5	0.370	
1	200	Percent of tech. operations performed by government civilians is betw				1	0	0	0	1	0.000	0.000	0.000	0.519	7	0.519	
2	201	Percent of tech. operations performed by government civilians is betw				1	0	0	0	1	0.000	0.000	0.000	0.370	5	0.370	
3	202	Percent of tech. operations performed by government civilians is less th				1	0	0	0	1	0.000	0.000	0.000	0.222	3	0.222	
		LOSS IMPACT					0	0	0	0					0	3.899	
3	203	Directly impact naval force training. (20 TO 39 WYs in Training/Simulatior	1	1			1	1	0	0	0.148	0.101	0.000	0.000	2	0.249	
3	204	Directly impact naval force training. (40 or higher WYs in Training/Simula	1	1			1	1	0	0	0.148	0.101	0.000	0.000	2	0.249	
2	205	Directly impact existing naval force readiness. (100 to 499 WYs in Lifetim	1	1			1	1	0	0	0.296	0.202	0.000	0.000	4	0.498	
2	206	Directly impact existing naval force readiness. (500 or higher WYs in Life	1	1			1	1	0	0	0.296	0.202	0.000	0.000	4	0.498	
1	207	Directly impact future naval force development. (100 to 499 WYs in RDT		1	1		0	1	1	0	0.000	0.353	0.355	0.000	7	0.708	
1	208	Directly impact future naval force development (500 or higher WYs in R		1	1		0	1	1	0	0.000	0.403	0.406	0.000	8	0.809	
1	209	Loss of activity adversely affects top 25% of technical mission areas.	1				1	0	0	0	0.444	0.000	0.000	0.000	6	0.444	
2	210	Loss of activity adversely affects 2nd 25% of technical mission areas.	1				1	0	0	0	0.296	0.000	0.000	0.000	4	0.296	
3	211	Loss of activity adversely affects 3rd 25% of technical mission areas.	1				1	0	0	0	0.148	0.000	0.000	0.000	2	0.148	
			106	75	43	79	106	75	43	79	40	20	10	30		100.000	

TECHNICAL CENTERS Military Value Matrix

Que Seq	QUESTIONS	NAVAL SURFACE WARFARE CENTERS													NUWC				LOGCEN	EOD
		HQ	Crane	Lville	Sullivan	Dahlgrn	Pan City	Pt Huen	Cardrck	Annap	Phily	Bayview	Indn Hd	Yorktwn	HQ	Newpt	N Lond	Keyport	Mechan	Tech Ct
	MISSION STATEMENT	0.593	2.136	4.629	1.111	9.047	5.435	4.649	8.677	6.184	2.661	1.407	6.184	2.675	0.519	10.292	3.119	4.575	0.749	2.062
1	Includes full-spectrum life cycle responsibility.	0	0	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	0	0
2	Includes total systems responsibility.	0	0	1	0	1	1	1	1	0	0	0	0	0	0	1	0	1	0	0
3	Includes sub-system/component responsibility.	0	1	1	0	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1
4	Includes systems integration responsibility.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
5	Includes component integration responsibility.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
6	Includes research.	0	0	0	0	1	1	0	1	1	0	0	1	0	0	1	1	0	0	0
7	Includes development.	0	0	0	0	1	1	0	1	1	0	0	1	1	0	1	1	0	0	1
8	Includes test and evaluation.	0	0	0	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	0
9	Includes procurement/acquisition.	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	Includes in-service engineering.	0	1	1	0	1	0	1	1	1	1	0	1	1	0	1	1	1	1	1
11	Includes support to direct formal training of naval forces.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	A naval surface warfare activity.	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
13	A naval air warfare activity.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	A naval undersea warfare activity.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0
15	A naval command, control, and ocean surveillance activity.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	A naval research laboratory activity.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	Includes joint/lead service assignments..	0	1	1	0	1	1	0	1	1	1	0	1	0	0	0	0	0	0	1
	TECHNICAL FUNCTIONS	0.000	7.864	3.568	0.296	7.613	2.846	6.086	2.815	1.856	3.198	0.296	3.736	0.000	0.000	6.661	3.735	3.864	1.809	0.667
18	Include a minimum of 100 in-house technical WYs in PLATFORMS.	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0
19	Include a minimum of 100 in-house technical WYs in WEAPONS SYSTEMS	0	1	1	0	1	0	1	0	0	0	0	1	0	0	1	0	1	0	1
20	Include a minimum of 100 in-house technical WYs in COMBAT SYSTEM IN	0	1	0	0	1	0	1	0	0	1	0	0	0	0	1	0	0	0	0
21	Include a minimum of 100 in-house technical WYs in SPECIAL OPERATIO	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
22	Include a minimum of 100 in-house technical WYs in SENSORS & SURVEIL	0	1	0	0	1	0	1	0	0	0	0	0	0	0	1	1	1	0	0
23	Inlcude a minimum of 100 in-house technical WYs in NAVIGATION.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	Include a minimum of 100 in-house technical WYs in C3I.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	Inlcude a minimum of 100 in-house technical WYs in DEFENSE SYSTEMS.	0	1	0	0	1	1	1	0	0	0	0	1	0	0	0	0	0	0	0
26	Include a minimum of 100 in-house technical WYs in STRATEGIC PROGR	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	Include a minimum of 100 in-house technical WYs in GENERAL MISSION	0	1	0	0	1	1	0	0	0	0	0	1	0	0	1	0	1	1	0
28	Include a minimum of 100 in-house technical WYs in GENERIC TECHNOL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	Inlcude a minimum of 100 in-house technical WYs in BASIC RESEARCH (	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	Include a minimum of 100 in-house technical WYs in TECHNICAL BASE (I	0	1	0	0	1	1	0	1	1	0	0	0	0	0	1	1	0	0	0
31	Include a minimum of 100 in-house technical WYs in DEVELOPMENT & D	0	1	0	0	1	0	1	1	0	0	0	0	0	0	1	1	0	0	0
32	Include a minimum of 100 in-house technical WYs in ACQUISITION.	0	1	1	0	1	1	1	1	0	1	0	1	0	0	1	1	1	1	0
33	Include a minimum of 100 in-house technical WYs in LIFETIME SUPPORT.	0	1	1	0	1	1	1	0	0	1	0	1	0	0	1	1	1	1	0
34	Include a minimum of 100 in-house technical WYs in TRAINING/SIMULATI	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35	PLATFORMS share of DON in-house technical WYs is => 5%.	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0
36	WEAPONS SYSTEMS share of DON in-house technical WYs is => 5%.	0	1	1	0	1	0	1	0	0	0	0	1	0	0	1	0	1	0	0
37	COMBAT SYSTEMS INTEGRATION share of DON in-house technical WYs is	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0
38	SPECIAL OPERATIONS SUPPORT share of DON in-house technical WYs is =	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
39	SENSORS & SURVEILLANCE SYSTEMS share of DON in-house technical WY	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
40	NAVIGATION share of DON in-house technical WYs is => 5%.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41	C3I share of DON in-house technical WYs is => 5%.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42	DEFENSE SYSTEMS share of DON in-house technical WYs is => 5%.	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
43	STRATEGIC PROGRAMS share of DON in-house technical WYs is => 5%.	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	GENERAL MISSION SUPPORT share of DON in-house technical WYs is => 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	GENERAL TECHNOLOGY BASE share of DON in-house technical WYs is =	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
46	BASIC RESEARCH (RDT&E) share of DON in-house technical WYs is => 5%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
47	TECHNICAL BASE (RDT&E) share of DON in-house technical WYs is => 5 %	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	0	0
48	DEVELOPMENT & DEVELOPMENT SUPPORT (RDT&E) share of DON in-hous	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
49	ACQUISITION share of DON in-house technical WYs is => 5%.	0	1	0	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0
50	LIFETIME SUPPORT share of DON in-house technical WYs is => 5%.	0	1	1	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0

TECHNICAL CENTERS Military Value Matrix

Que Seq	QUESTIONS	NAVAL SURFACE WARFARE CENTERS													NUWC				LOGCEN	EOD
		HQ	Crane	Lville	Sullivan	Dahlgrn	Pan City	Pt Huen	Cardrck	Annap	Phily	Bayview	Indn Hd	Yorktwn	HQ	Newpt	N Lond	Keyport	Mechan	Tech Ct
51	TRAINING/SIMULATION share of DON in-house technical WYs is => 5%.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
52	Technical functions are performed for aircraft.	0	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
53	Technical functions are performed for submarines.	0	1	1	1	0	0	0	1	1	1	1	1	0	0	1	1	1	0	0
54	Technical functions are performed for surface ships.	0	1	1	0	1	1	1	1	1	1	0	1	0	0	0	0	0	1	0
55	Technical functions are performed for command, control and ocean s	0	1	0	0	1	0	1	0	0	0	0	1	0	0	1	1	1	0	0
	FACILITIES	0.000	9.010	8.006	1.477	7.666	7.955	2.825	6.259	3.315	2.927	3.878	6.801	0.397	0.148	5.495	5.943	5.201	0.148	0.397
56	Facility is a host activity.	0	1	1	0	1	1	0	1	1	0	0	1	0	0	1	1	1	0	0
57	80% to 89% of administrative & laboratory space is ADEQUATE.	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1	0	0
58	90% to 100% of administrative & laboratory space is ADEQUATE.	0	1	1	0	1	1	0	1	0	1	0	0	0	0	1	1	0	0	0
59	3% to 5% of administrative & laboratory space is INADEQUATE.	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
60	Less than 3% of administrative & laboratory space is INADEQUATE.	0	1	1	0	1	1	1	0	0	1	1	1	0	0	0	1	1	0	0
61	No funds are required to correct inadequacies.	0	1	1	0	1	1	0	0	0	0	1	0	0	0	0	1	0	0	0
62	Funds are required to correct inadequacies, but less then $500,000.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
63	Funds are required to correct inadequacies, totaling between $500,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
64	Less than 5% of utilized floor space is leased.	0	1	1	1	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1
65	Less than 25% of plant account space is assigned to tenants.	0	0	1	0	1	1	1	1	1	1	1	1	0	0	1	1	1	0	0
66	10,000 to 49,999 sqft of existing Government owned space is available f	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
67	50,000 to 100,000 sqft of existing Government owned space is available	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
68	More than 100,000 sqft of existing Government owned space is availabl	0	1	1	0	1	1	0	1	0	1	0	1	0	0	1	1	0	0	0
69	10,000 to 49,999 sqft of Government owned space can be constructed	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
70	50,000 to 100,000 sqft of Government owned space can be constructed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
71	More than 100,000 sqft of Government owned space can be construct	0	1	1	0	1	1	0	1	0	0	0	0	0	0	0	0	1	0	0
72	Expansion opportunities can support 50 to 99 additional persons.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
73	Expansion opportunities can support 100 to 499 additional persons.	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
74	Expansion opportunities can support more than 500 additional persons.	0	1	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0
75	250 to 499 unimproved & unencumbered acres available for expansion	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
76	500 to 1000 unimproved & unencumbered acres available for expansio	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
77	More than 1,000 unimproved & unencumbered acres available for exp	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
78	Expansion is not constrained by parking limitations.	0	1	1	1	1	0	1	1	1	0	0	0	0	0	1	1	1	0	0
79	Expansion is not constrained by radio frequency limitations.	0	0	0	1	0	0	1	1	1	0	1	1	0	0	1	1	1	0	0
80	10 to 49 acres with roads and utilities available for expansion.	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	0	0
81	50 to 499 acres with roads and utilities available for expansion.	0	0	1	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0
82	More than 500 acres with roads and utilities available for expansion.	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
83	Site utilizes less than 70% of its utility capacity.	0	1	1	1	1	1	0	1	1	0	1	1	0	0	1	1	1	0	0
84	Less than 20% of replacement value of the Site's SF&E is PORTABLE.	0	1	1	0	1	1	0	1	1	1	1	1	1	0	1	1	1	0	1
85	Replacement value of FIXED SF&E 's between $25,000,000 and $100,000,	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
86	Replacement value of FIXED SF&E exceeds $100,000,000.	0	1	1	0	1	1	1	1	1	0	1	1	0	0	1	1	1	0	0
87	Site has revenue producing resources.	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0
	RANGES, FEATURES AND OTHER CAPABILITIES	0.000	6.365	4.654	0.000	4.387	4.005	3.203	2.448	1.577	2.951	1.879	5.261	2.305	1.577	8.559	3.406	7.603	0.000	2.083
88	Site operates piers that can support naval combatants.	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1	1	1	0	0
89	Site operates an operational air field that supports high performance ai	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
90	Site has ordnance storage capacity between 500,000 and 999,999 net e	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
91	Site has ordnance storage capacity between 1,000,000 and 9,999,999 n	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
92	Site has ordnance storage capacity is at least 10,000,000 net explosive v	0	1	0	0	1	0	0	0	0	0	0	1	0	0	0	0	1	0	0
93	Facility has a super computer or parallel computer on site.	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
94	Data transfer across the site is supported by a high speed network.	0	1	1	0	1	1	1	1	1	1	1	1	0	1	1	1	1	0	1
95	Real time data interconnectivity is achieved with other sites.	0	1	1	0	1	1	1	1	1	1	1	1	0	1	1	1	1	0	1
96	Production is accomplished at this site.	0	1	1	0	1	0	0	0	0	0	0	1	1	0	1	0	1	0	0
97	Site has a real time Video Teleconferencing Center.	0	1	1	0	0	1	1	0	0	0	0	1	0	0	1	1	1	0	0
98	Officially assigned mobilization responsibility.	0	1	1	0	1	1	1	0	0	1	0	1	1	0	1	1	1	0	1
99	Adequate facilities available to support mobilization responsibilities.	0	1	1	0	1	1	1	0	0	1	0	1	1	0	1	1	1	0	1
100	Site maintains production facilities to be activated for contingencies.	0	1	1	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0

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101	Site supports Reserve Unit mobilization responsibilities.	0	1	1	0	1	1	1	0	0	1	0	1	0	0	1	1	1	0	1
102	Site controls range airspace of greater than 5,000 sq mi..	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
103	Airspace range(s) has no limiting (current or future) encroachment or e	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
104	Site controls range sea/undersea space of greater than 100 sq mi.	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0	1	0	0
105	Seaspace/undersea range(s) has no limiting (current or future) encroac	0	0	0	0	0	1	0	0	0	0	1	0	0	0	1	0	1	0	0
106	Site controls range landspace of greater than 100 sq mi.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
107	Landspace range(s) has no limiting (future or current) encroachment o	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
108	Site has range facilities that are used for fleet tactical training.	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	1	0	0
109	Facility is part of the DoD Major Range and Test Facility Base.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
110	At least 100,000 man hours of depot/industrial maintenance performed	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0
	MANPOWER	0.000	3.694	3.694	0.000	6.038	5.250	3.890	6.806	5.760	4.132	2.693	4.990	3.239	2.370	6.856	7.694	5.56[illegible]	1.726	3.313
111	Total civilians on board is between 1000 and 1999.	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	1	0	0	0
112	Total civilians on board is between 2000 and 3,999.	0	1	1	0	1	0	1	0	0	0	0	1	0	0	1	0	1	0	0
113	Total civilians on board is greater than 4000.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
114	Average civilian technical staff years of experience is less than 7.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
115	Average civilian technical staff years of experience is greater than 7 ar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
116	Average civilian technical staff years of experience is greater than 9 ar	0	1	0	0	0	1	1	1	0	1	1	1	1	0	0	0	0	1	0
117	Average civilian technical staff years of experience is greater than 11 a	0	0	1	0	1	0	0	0	1	0	0	0	0	0	1	1	0	0	0
118	Average civilian technical staff years of experience is greater than 13 a	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1
119	Average civilian technical staff years of experience is greater than 15.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
120	Average civilian technical staff education level is less than 13.	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
121	Average civilian technical staff education level is greater than 13 and le	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1
122	Average civilian technical staff education level is greater than 14 and le	0	0	0	0	0	0	1	0	0	1	1	0	1	0	0	0	0	1	0
123	Average civilian technical staff education level is greater than 15 and le	0	0	0	0	1	1	0	1	1	0	0	0	0	0	1	0	0	0	0
124	Average civilian technical staff education level is greater than 16.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
125	Average # of articles published over last 4 years per 100 technical staff i	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
126	Average # of articles published over last 4 years per 100 technical staff i	0	1	1	0	1	1	1	0	0	1	1	1	1	0	1	1	1	0	0
127	Books/chapters written over last 4 years per 100 technical staff is in the t	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	1	0	0	0
128	Books/chapters written over last 4 years per 100 technical staff is in the n	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
129	Activity has Nobel laureate(s) employed.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
130	Average # of awards over last 4 years per 100 technical staff is in the top	0	0	0	0	0	1	0	1	1	0	1	0	1	0	0	0	0	0	0
131	Average # of awards over the last 4 years per 100 technical staff is in the	0	0	0	0	1	0	0	0	0	1	0	1	0	0	1	1	1	0	0
132	Patents granted over last 4 years per 100 technical staff is in the top 25%	0	0	0	0	0	1	0	1	1	0	1	1	0	0	1	1	0	0	0
133	Patents granted over last 4 years per 100 technical staff is in the next 25	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1
134	Patents applied for over last 4 years per 100 technical staff is in the top 2	0	0	0	0	1	0	0	1	1	0	0	1	0	0	1	1	0	0	0
135	Patents applied for over last 4 years per 100 technical staff is in the next	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1
136	National Academy of Engineering/Science members.	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
137	# of CRDAs signed by the Activity is over 10.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
138	Annual royalty income per 100 technical staff is in the top 25%.	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	0	0	1
139	Annual royalty income per 100 technical staff is in the next 25%.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
140	Number of major end item prototypes currently in use is in the top 25%.	0	0	0	0	0	1	0	1	1	1	0	1	0	0	1	1	0	0	0
141	Number of major end item prototypes currently in use is in the next 25%.	0	1	1	0	1	0	1	0	0	0	0	0	1	0	0	0	1	0	1
	LOCATION/ENVIRONMENT	3.194	2.137	1.910	2.661	2.951	3.455	3.052	2.602	2.460	1.713	3.761	2.104	1.209	3.194	3.941	3.941	4.143	1.713	2.104
142	Location is necessary to perform assigned technical functions.	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
143	Location has natural features that are essential to the mission of the fac	0	0	0	1	1	1	1	0	1	0	1	0	0	0	1	1	1	0	0
144	Location enhances synergy with other activities and bases.	1	0	0	0	1	1	1	0	0	0	0	1	0	1	1	1	1	0	1
145	Location enhances joint use capability.	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
146	Location provides favorable weather conditions.	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0
147	Location is important to customers.	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0
148	Site has no endangered/threatened species and biological habitats tha	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
149	Site has no jurisdictional wetlands that currently restrict base operations	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
150	Site has no National Register cultural resources that constrain base ops c	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1

TEC...ICAL CENTERS Military Value Matrix

Que Seq	QUESTIONS	NAVAL SURFACE WARFARE CENTERS													NUWC				LOGCEN	EOD
		HQ	Crane	Lville	Sullivan	Dahlgrn	Pan City	Pt Huene	Cardrck	Annap	Phily	Bayview	Indn Hd	Yorktwn	HQ	Newpt	N Lond	Keyport	Mechan	Tech Ct
151	Base ops or development plans are not constrained by laws applying to	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
152	Site is in an "attainment" or "maintenance" air quality control area for C	0	1	0	1	1	1	0	0	0	0	1	0	0	0	0	0	1	0	0
153	Site operations or development plans have not been restricted due to	1	1	0	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	0
154	Site has no Installation Restoration Issues that restrict operations or devel	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
155	Site has no significant maintenance dredging restrictions.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	QUALITY OF LIFE	3.991	4.637	3.567	0.222	4.388	5.754	4.668	4.086	5.008	6.625	3.667	6.605	4.293	6.874	6.874	4.234	6.599	4.732	6.606
156	Is there sufficient off base housing?	0	1	1	0	0	1	1	0	1	0	1	1	1	1	1	1	1	1	1
157	Do 90% or more of the housing units have all the required amenities?	1	0	1	0	0	1	0	1	1	1	1	1	1	0	0	0	1	0	1
160	Is the average wait for housing three months or less?	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	1
163	Are 90% of BEQ rooms adequate?	0	1	0	0	1	1	0	0	1	1	0	1	0	0	0	0	1	0	1
165	Are 90% of BOQ rooms adequate?	1	1	0	0	1	1	0	1	0	0	0	0	1	1	1	1	0	0	0
166	Does the site have >90% of the listed MWR facilities?	0	0	0	0	0	0	0	0	0	1	0	1	0	1	1	0	1	0	1
169	Are >90% of the child care facilities adequate?	1	0	0	0	1	0	1	0	0	1	0	1	1	1	1	0	1	1	1
172	Is the average wait for 0-12 month child care <180 days?	0	0	0	0	0	0	1	0	0	1	0	0	0	1	1	0	0	1	0
177	Do >50% of site military and civilian personnel live within a 30 minute co	0	0	1	0	0	1	1	1	1	1	0	0	1	1	1	1	1	1	0
178	Are local area educational institution programs adequate for military fa	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
179	Are there educational opportunities at all college levels within a 30-mile	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
180	Are college education courses available on the base?	1	1	0	0	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1
184	Do military family members have reasonable access to medical/denta	1	1	1	0	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1
185	Is the violent crime rate <758/100,000?	0	1	1	1	1	0	1	0	0	1	1	0	1	0	0	1	1	1	0
186	Is the property crime rate <4902/100,00?	1	1	1	1	1	0	1	1	0	1	1	1	0	0	0	1	1	1	1
187	Is the drug crime rate <402/100,000?	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	0
	COST	0.519	1.185	0.889	0.000	1.185	1.185	1.185	0.889	0.889	1.037	1.037	1.037	1.037	0.667	1.185	1.037	1.037	1.185	0.889
188	Percent of all employees employed in technical operations is more tha	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
189	Percent of all employees employed in technical opertions is between 7	0	1	1	0	1	1	1	1	1	1	1	0	0	0	1	1	1	0	1
190	Percent of all employees employed in technical opertions is between 5	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
191	Percent of all employees employed in technical opertions is between 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
192	Percent of all employees employed in technical opertions is less than 30	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
193	Percent of overhead performed by government civilians is greater thar	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
194	Percent of overhead performed by government civilians is between 70	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
195	Percent of overhead performed by government civilians is between 50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
196	Percent of overhead performed by government civilians is between 30	0	1	0	0	1	1	0	0	0	0	0	1	0	0	0	0	0	1	0
197	Percent of overhead performed by government civilians is less than 30	0	0	1	0	0	0	1	1	1	1	0	1	0	1	1	1	0	1	1
198	Percent of technical operations performed by government civilians is g	0	0	1	0	0	0	0	1	1	0	0	0	1	1	0	0	0	0	1
199	Percent of tech. operations performed by government civilians is betw	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1	0	0
200	Percent of tech. operations performed by government civilians is betw	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0
201	Percent of tech. operations performed by government civilians is betw	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0	1	0	0	0
202	Percent of tech. operations performed by government civilians is less th	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	LOSS IMPACT	0.000	1.650	0.942	0.000	2.000	1.751	1.899	1.264	1.004	1.043	0.296	1.650	0.148	0.000	1.751	1.751	1.191	0.498	0.148
203	Directly impact naval force training. (20 TO 39 WYs in Training/Simulatior	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0
204	Directly impact naval force training. (40 or higher WYs in Training/Simula	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
205	Directly impact existing naval force readiness. (100 to 499 WYs in Lifetim	0	0	0	0	1	1	0	0	0	0	0	1	0	0	0	1	0	1	0
206	Directly impact existing naval force readiness. (500 or higher WYs in Life	0	1	1	0	0	0	1	0	0	1	0	0	0	0	1	0	1	0	0
207	Directly impact future naval force development. (100 to 499 WYs in RDT	0	1	0	0	0	1	1	0	1	0	0	1	0	0	0	0	0	0	0
208	Directly impact future naval force development (500 or higher WYs in R	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	1	0	0	0
209	Loss of activity adversely affects top 25% of technical mission areas.	0	1	1	0	1	0	1	1	0	0	0	1	0	0	1	1	1	0	0
210	Loss of activity adversely affects 2nd 25% of technical mission areas.	0	0	0	0	0	1	0	0	1	1	1	0	0	0	0	0	0	0	0
211	Loss of activity adversely affects 3rd 25% of technical mission areas.	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
		8.30	38.58	31.16	5.77	45.47	37.64	31.45	35.83	27.75	26.19	18.70	38.31	15.30	15.35	50.62	34.86	37.73	12.76	18.27

TECHNICAL CENTERS Military Value Matrix

Que Seq	QUESTIONS		Proj. Off.	AEGIS	NWAD	OPSUP	CINCLANTFLT			NSEACEN				Naval Air Warfare Center						
		NOC	SeaSp.	Wallops	Corona	Moorest	Norfolk	NorDet	Maypt	S Diego	Pearl H	PMRF	AFWTF	HQ	China L	Pt Mugu	Indy	Pax Riv	Warmin	Oreland
	MISSION STATEMENT	1.543	1.638	5.496	0.498	6.385	1.545	1.545	1.545	1.045	1.045	1.018	1.536	1.090	11.234	11.234	4.062	11.234	3.193	1.407
1	Includes full-spectrum life cycle responsibility.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0
2	Includes total systems responsibility.	0	0	1	0	1	0	0	0	0	0	0	0	0	1	1	0	1	0	0
3	Includes sub-system/component responsibility.	1	0	0	0	0	1	1	1	1	1	0	0	0	1	1	1	1	1	1
4	Includes systems integration responsibility.	0	0	1	0	1	0	0	0	0	0	0	0	0	1	1	0	1	0	0
5	Includes component integration responsibility.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0
6	Includes research.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
7	Includes development.	0	1	0	0	1	0	0	0	0	0	0	1	0	1	1	1	1	1	0
8	Includes test and evaluation.	0	0	1	0	1	0	0	0	0	0	1	1	0	1	1	1	1	1	1
9	Includes procurement/acquisition.	0	1	0	0	1	0	0	0	0	0	0	0	0	1	1	1	1	0	0
10	Includes in-service engineering.	1	1	0	0	0	1	1	1	1	1	0	0	0	1	1	1	1	1	0
11	Includes support to direct formal training of naval forces.	0	0	1	0	1	1	1	1	0	0	1	1	0	0	0	0	0	0	0
12	A naval surface warfare activity.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	A naval air warfare activity.	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
14	A naval undersea warfare activity.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	A naval command, control, and ocean surveillance activity.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	A naval research laboratory activity.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	Includes joint/lead service assignments..	1	0	0	1	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0
	TECHNICAL FUNCTIONS	0.000	0.000	0.296	0.971	0.296	3.143	1.809	1.513	0.772	0.000	0.897	0.000	0.000	7.659	8.021	7.217	7.809	0.296	0.000
18	Include a minimum of 100 in-house technical WYs in PLATFORMS.	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	1	0	0
19	Include a minimum of 100 in-house technical WYs in WEAPONS SYSTEMS	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	1	0	0	0
20	Include a minimum of 100 in-house technical WYs in COMBAT SYSTEM IN	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0
21	Include a minimum of 100 in-house technical WYs in SPECIAL OPERATIO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
22	Include a minimum of 100 in-house technical WYs in SENSORS & SURVEIL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
23	Inlcude a minimum of 100 in-house technical WYs in NAVIGATION.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	Include a minimum of 100 in-house technical WYs in C3I.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
25	Inlcude a minimum of 100 in-house technical WYs in DEFENSE SYSTEMS.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0
26	Include a minimum of 100 in-house technical WYs in STRATEGIC PROGR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	Include a minimum of 100 in-house technical WYs in GENERAL MISSION	0	0	0	1	0	1	0	0	1	0	1	0	0	1	1	1	1	0	0
28	Include a minimum of 100 in-house technical WYs in GENERIC TECHNOL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	Inlcude a minimum of 100 in-house technical WYs in BASIC RESEARCH (	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	Include a minimum of 100 in-house technical WYs in TECHNICAL BASE (	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0
31	Include a minimum of 100 in-house technical WYs in DEVELOPMENT & D	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0
32	Include a minimum of 100 in-house technical WYs in ACQUISITION.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0
33	Include a minimum of 100 in-house technical WYs in LIFETIME SUPPORT.	0	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	0	0
34	Include a minimum of 100 in-house technical WYs in TRAINING/SIMULATI	0	0	0	1	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0
35	PLATFORMS share of DON in-house technical WYs is => 5%.	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
36	WEAPONS SYSTEMS share of DON in-house technical WYs is => 5%.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
37	COMBAT SYSTEMS INTEGRATION share of DON in-house technical WYs is	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0
38	SPECIAL OPERATIONS SUPPORT share of DON in-house technical WYs is =	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
39	SENSORS & SURVEILLANCE SYSTEMS share of DON in-house technical WY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
40	NAVIGATION share of DON in-house technical WYs is => 5%.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0
41	C3I share of DON in-house technical WYs is => 5%.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
42	DEFENSE SYSTEMS share of DON in-house technical WYs is => 5%.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0
43	STRATEGIC PROGRAMS share of DON in-house technical WYs is => 5%.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
44	GENERAL MISSION SUPPORT share of DON in-house technical WYs is => 5	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0
45	GENERAL TECHNOLOGY BASE share of DON in-house technical WYs is =	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
46	BASIC RESEARCH (RDT&E) share of DON in-house technical WYs is => 5%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
47	TECHNICAL BASE (RDT&E) share of DON in-house technical WYs is => 5 %	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0
48	DEVELOPMENT & DEVELOPMENT SUPPORT (RDT&E) share of DON in-hous	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0
49	ACQUISITION share of DON in-house technical WYs is => 5%.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
50	LIFETIME SUPPORT share of DON in-house technical WYs is => 5%.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0

TECHNICAL CENTERS Military Value Matrix

Que Seq	QUESTIONS	NOC	Proj. Off. Seasp.	AEGIS Wallops	NWAD Corona	OPSUP Moorestn	CINCLANTFLT Norfolk	CINCLANTFLT NorDet	CINCLANTFLT Maypt	NSEACEN S Diego	NSEACEN Pearl H	PMRF	AFWTF	Naval Air Warfare Center HQ	Naval Air Warfare Center China L	Naval Air Warfare Center Pt Mugu	Naval Air Warfare Center Indy	Naval Air Warfare Center Pax Riv	Naval Air Warfare Center Warmin	Naval Air Warfare Center Oreland
51	TRAINING/SIMULATION share of DON in-house technical WYs is => 5%.	0	0	0	1	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0
52	Technical functions are performed for aircraft.	0	0	0	0	0	1	0	1	0	0	0	0	0	1	1	1	1	1	0
53	Technical functions are performed for submarines.	0	0	0	0	0	1	1	1	0	0	0	0	0	0	1	1	0	0	0
54	Technical functions are performed for surface ships.	0	0	1	0	1	1	1	1	0	0	0	0	0	0	1	1	1	0	0
55	Technical functions are performed for command, control and ocean s	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1	1	1	0	0
	FACILITIES	0.148	0.000	4.338	7.150	4.814	0.498	0.148	0.148	0.148	0.148	5.447	1.545	0.000	7.456	6.761	7.009	3.840	3.468	3.227
56	Facility is a host activity.	0	0	1	1	1	0	0	0	0	0	1	0	0	1	1	1	1	1	0
57	80% to 89% of administrative & laboratory space is ADEQUATE.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
58	90% to 100% of administrative & laboratory space is ADEQUATE.	0	0	1	1	1	0	0	0	0	0	1	0	0	0	1	1	0	1	1
59	3% to 5% of administrative & laboratory space is INADEQUATE.	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
60	Less than 3% of administrative & laboratory space is INADEQUATE.	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1
61	No funds are required to correct inadequacies.	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1
62	Funds are required to correct inadequacies, but less then $500,000.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
63	Funds are required to correct inadequacies, totalling between $500,000	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
64	Less than 5% of utilized floor space is leased.	1	0	1	1	1	0	1	1	1	1	1	1	0	1	0	0	1	1	1
65	Less than 25% of plant account space is assigned to tenants.	0	0	1	1	1	0	0	0	0	0	1	0	0	1	1	1	1	1	1
66	10,000 to 49,999 sqft of existing Government owned space is available f	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
67	50,000 to 100,000 sqft of existing Government owned space is available	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
68	More than 100,000 sqft of existing Government owned space is availabl	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
69	10,000 to 49,999 sqft of Government owned space can be constructed	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
70	50,000 to 100,000 sqft of Government owned space can be constructed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
71	More than 100,000 sqft of Government owned space can be construct	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0
72	Expansion opportunities can support 50 to 99 additional persons.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
73	Expansion opportunities can support 100 to 499 additional persons.	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
74	Expansion opportunities can support more than 500 additional persons.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0
75	250 to 499 unimproved & unencumbered acres available for expansion	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
76	500 to 1000 unimproved & unencumbered acres available for expansio	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
77	More than 1,000 unimproved & unencumbered acres available for exp	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0
78	Expansion is not constrained by parking limitations.	0	0	0	1	0	0	0	0	0	0	1	1	0	1	0	1	1	0	1
79	Expansion is not constrained by radio frequency limitations.	0	0	0	1	1	0	0	0	0	0	1	1	0	1	1	0	1	0	1
80	10 to 49 acres with roads and utilities available for expansion.	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81	50 to 499 acres with roads and utilities available for expansion.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
82	More than 500 acres with roads and utilities available for expansion.	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0
83	Site utilizes less than 70% of its utility capacity.	0	0	0	1	1	0	0	0	0	0	1	0	0	1	1	1	1	1	0
84	Less than 20% of replacement value of the Site's SF&E is PORTABLE.	0	0	1	1	1	0	0	0	0	0	1	0	0	1	1	0	1	1	1
85	Replacement value of FIXED SF&E is between $25,000,000 and $100,000,	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1	0
86	Replacement value of FIXED SF&E exceeds $100,000,000.	0	0	1	1	1	0	0	0	0	0	1	1	0	1	1	0	1	0	0
87	Site has revenue producing resources.	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0
	RANGES, FEATURES AND OTHER CAPABILITIES	1.032	0.000	1.826	2.230	1.677	2.083	2.083	2.083	0.000	0.000	1.626	6.675	1.826	9.734	10.137	4.030	7.468	0.000	0.000
88	Site operates piers that can support naval combatants.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
89	Site operates an operational air field that supports high performance ai	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0
90	Site has ordnance storage capacity between 500,000 and 999,999 net e	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
91	Site has ordnance storage capacity between 1,000,000 and 9,999,999 n	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0
92	Site has ordnance storage capacity is at least 10,000,000 net explosive v	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
93	Facility has a super computer or parallel computer on site.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
94	Data transfer across the site is supported by a high speed network.	1	0	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0
95	Real time data interconnectivity is achieved with other sites.	0	0	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0
96	Production is accomplished at this site.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0
97	Site has a real time Video Teleconferencing Center.	0	0	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0
98	Officially assigned mobilization responsibility.	1	0	0	1	0	1	1	1	0	0	0	0	0	1	1	1	1	0	0
99	Adequate facilities available to support mobilization responsibilities.	1	0	0	1	0	1	1	1	0	0	0	0	0	1	1	1	1	0	0
100	Site maintains production facilities to be activated for contingencies.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0

TECHNICAL CENTERS Military Value Matrix

Que Seq	QUESTIONS		Proj. Off.	AEGIS	NWAD	OPSUP	CINCLANTFLT			NSEACEN				Naval Air Warfare Center						
		NOC	Seasp.	Wallops	Corona	Moorest	Norfolk	NorDet	Maypt	S Diego	Pearl H	PMRF	AFWTF	HQ	China L	Pt Mugu	Indy	[illegible]	Warmin	Oreland
101	Site supports Reserve Unit mobilization responsibilities.	1	0	0	0	0	1	1	1	0	0	0	0	0	1	1	1	1	0	0
102	Site controls range airspace of greater than 5,000 sq mi..	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0	1	0	0
103	Airspace range(s) has no limiting (current or future) encroachment or e	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0
104	Site controls range sea/undersea space of greater than 100 sq mi.	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0
105	Seaspace/undersea range(s) has no limiting (current or future) encroac	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
106	Site controls range landspace of greater than 100 sq mi.	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0
107	Landspace range(s) has no limiting (future or current) encroachment o	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
108	Site has range facilities that are used for fleet tactical training.	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0	1	0	0
109	Facility is part of the DoD Major Range and Test Facility Base.	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	0	0
110	At least 100,000 man hours of depot/industrial maintenance performed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MANPOWER	0.000	2.370	2.815	2.868	1.926	1.556	0.815	1.111	0.741	0.741	3.090	2.370	0.000	7.203	5.967	4.560	6.833	2.815	0.000
111	Total civilians on board is between 1000 and 1999.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
112	Total civilians on board is between 2000 and 3,999.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
113	Total civilians on board is greater than 4000.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0
114	Average civilian technical staff years of experience is less than 7.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
115	Average civilian technical staff years of experience is greater than 7 an	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
116	Average civilian technical staff years of experience is greater than 9 an	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
117	Average civilian technical staff years of experience is greater than 11 a	0	0	1	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0
118	Average civilian technical staff years of experience is greater than 13 a	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0
119	Average civilian technical staff years of experience is greater than 15.	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0
120	Average civilian technical staff education level is less than 13.	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0
121	Average civilian technical staff education level is greater than 13 and l	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
122	Average civilian technical staff education level is greater than 14 and l	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	1	0	0	0
123	Average civilian technical staff education level is greater than 15 and l	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
124	Average civilian technical staff education level is greater than 16.	0	1	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1	0
125	Average # of articles published over last 4 years per 100 technical staff i	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
126	Average # of articles published over last 4 years per 100 technical staff i	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0
127	Books/chapters written over last 4 years per 100 technical staff is in the t	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
128	Books/chapters written over last 4 years per 100 technical staff is in the n	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
129	Activity has Nobel laureate(s) employed.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
130	Average # of awards over last 4 years per 100 technical staff is in the top	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
131	Average # of awards over the last 4 years per 100 technical staff is in the	0	0	0	1	0	1	1	1	0	0	1	0	0	1	1	0	0	0	0
132	Patents granted over last 4 years per 100 technical staff is in the top 25%	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0
133	Patents granted over last 4 years per 100 technical staff is in the next 25	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
134	Patents applied for over last 4 years per 100 technical staff is in the top 2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0
135	Patents applied for over last 4 years per 100 technical staff is in the next	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
136	National Academy of Engineering/Science members.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
137	# of CRDAs signed by the Activity is over 10.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
138	Annual royalty income per 100 technical staff is in the top 25%.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0
139	Annual royalty income per 100 technical staff is in the next 25%.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
140	Number of major end item prototypes currently in use is in the top 25%.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0
141	Number of major end item prototypes currently in use is in the next 25%	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	LOCATION/ENVIRONMENT	1.511	2.306	3.550	1.713	2.306	2.993	3.094	3.194	1.796	2.501	3.761	3.550	2.306	4.365	4.163	1.935	3.677	2.460	2.460
142	Location is necessary to perform assigned technical functions.	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0	0	0	0
143	Location has natural features that are essential to the mission of the fac	0	0	1	0	0	0	0	0	0	0	1	1	0	1	1	0	1	1	1
144	Location enhances synergy with other activities and bases.	0	1	0	0	1	1	1	1	0	0	0	0	1	1	1	0	1	0	0
145	Location enhances joint use capability.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0
146	Location provides favorable weather conditions.	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0
147	Location is important to customers.	0	0	1	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0
148	Site has no endangered/threatened species and biological habitats tha	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1
149	Site has no jurisdictional wetlands that currently restrict base operations	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1
150	Site has no National Register cultural resources that constrain base ops	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1

TECHNICAL CENTERS Military Value Matrix

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151	Base ops or development plans are not constrained by laws applying to	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1
152	Site is in an 'attainment' or 'maintenance' air quality control area for C	0	0	1	0	0	0	1	0	0	1	1	1	0	0	0	0	1	0	0
153	Site operations or development plans have not been restricted due to c	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1
154	Site has no Installation Restoration issues that restrict operations or devel	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1
155	Site has no significant maintenance dredging restrictions.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	QUALITY OF LIFE	6.605	3.991	6.632	3.043	2.821	3.245	3.245	6.999	5.132	5.519	5.882	3.419	3.991	6.765	5.156	4.907	7.271	6.400	0.148
156	Is there sufficient off base housing?	1	0	1	1	1	1	1	1	0	1	1	1	0	1	1	1	1	1	0
157	Do 90% or more of the housing units have all the required amenities?	1	1	1	0	0	0	0	1	0	1	1	1	1	1	0	1	1	1	0
160	Is the average wait for housing three months or less?	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0
163	Are 90% of BEQ rooms adequate?	1	0	1	0	0	0	0	1	1	0	1	0	0	1	1	0	1	1	0
165	Are 90% of BOQ rooms adequate?	0	1	1	0	0	0	0	1	1	0	0	0	1	1	0	0	1	1	0
166	Does the site have >90% of the listed MWR facilities?	1	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0	1	0	0
169	Are >90% of the child care facilities adequate?	1	1	0	0	0	1	1	1	0	1	1	0	1	1	0	0	1	1	0
172	Is the average wait for 0-12 month child care <180 days?	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0
177	Do >50% of site military and civilian personnel live within a 30 minute co	0	0	1	1	1	0	0	1	1	1	1	1	0	1	1	1	1	1	0
178	Are local area educational institution programs adequate for military fa	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
179	Are there educational opportunities at all college levels within a 30-mile	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0
180	Are college education courses available on the base?	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	0
184	Do military family members have reasonable access to medical/denta	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
185	Is the violent crime rate <758/100,000?	0	0	1	0	1	1	1	0	0	1	1	0	0	1	1	1	1	1	1
186	Is the property crime rate <4902/100,00?	1	1	1	0	1	0	0	0	0	0	1	0	1	1	1	0	1	1	1
187	Is the drug crime rate <402/100,000?	0	0	1	1	0	0	0	0	0	1	1	0	0	0	0	1	0	0	0
	COST	0.519	1.037	0.889	1.333	1.037	0.889	1.037	1.037	0.889	1.037	0.889	0.889	0.519	1.185	1.185	1.037	1.037	1.185	0.000
188	Percent of all employees employed in technical operations is more tha	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
189	Percent of all employees employed in technical opertions is between 7	0	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	0	0	0
190	Percent of all employees employed in technical opertions is between 5	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
191	Percent of all employees employed in technical opertions is between 3	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
192	Percent of all employees employed in technical opertions is less than 3	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
193	Percent of overhead performed by government civilians is greater thar	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
194	Percent of overhead performed by government civilians is between 70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
195	Percent of overhead performed by government civilians is between 50	0	0	1	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0
196	Percent of overhead performed by government civilians is between 30	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
197	Percent of overhead performed by government civilians is less than 30.	0	0	0	1	0	1	1	[illegible]	1	1	0	0	0	1	1	1	0	1	0
198	Percent of technical operations performed by government civilians is g	0	0	0	0	0	1	0	0	1	1	0	1	0	0	0	0	0	0	0
199	Percent of tech. operations performed by government civilians is betw	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1	1	0
200	Percent of tech. operations performed by government civilians is betw	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
201	Percent of tech. operations performed by government civilians is betw	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
202	Percent of tech. operations performed by government civilians is less th	1	0	1	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	0
	LOSS IMPACT	0.000	0.000	0.645	0.249	0.296	0.794	0.498	0.498	0.498	0.000	0.645	0.545	0.000	2.000	2.000	1.899	2.000	0.148	0.296
203	Directly impact naval force training. (20 TO 39 WYs in Training/Simulation	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
204	Directly impact naval force training. (40 or higher WYs in Training/Simula	0	0	0	1	0	0	0	0	0	0	1	1	0	1	1	0	1	0	0
205	Directly impact existing naval force readiness. (100 to 499 WYs in Lifetim	0	0	0	0	0	0	1	1	0	0	0	0	0	1	0	1	1	0	0
206	Directly impact existing naval force readiness. (500 or higher WYs in Life	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0
207	Directly impact future naval force development. (100 to 499 WYs in RDT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
208	Directly impact future naval force development (500 or higher WYs in R	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0
209	Loss of activity adversely affects top 25% of technical mission areas.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0
210	Loss of activity adversely affects 2nd 25% of technical mission areas.	0	0	1	0	1	1	0	0	0	0	1	1	0	0	0	0	0	0	1
211	Loss of activity adversely affects 3rd 25% of technical mission areas.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
		11.36	11.34	25.29	20.06	21.46	16.74	14.27	18.13	11.02	11.00	26.15	20.53	9.73	59.61	54.62	36.66	51.17	19.97	7.54

TE...ICAL CENTERS Military Value Matrix

Que Seq	QUESTIONS					SPAWAR										NRL				
		Lakehst	NAESU	NATSF	NATSD	HQ	RDT&E	Warmin	Chston	Norfolk	S Diego	Pearl H	NTRO	NMSO	NRL	Orlando	ONR	NAVFAC	NPRDC	OPTEV
	MISSION STATEMENT	5.740	0.749	1.119	8.656	0.667	10.440	6.258	1.913	2.411	1.9 3	2.931	0.870	2.284	4.567	2.593	0.519	2.284	2.034	1.016
1	Includes full-spectrum life cycle responsibility.	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
2	Includes total systems responsibility.	1	0	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0
3	Includes sub-system/component responsibility.	1	0	0	1	0	0	1	1	1	1	1	0	1	1	1	0	0	0	0
4	Includes systems integration responsibility.	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Includes component integration responsibility.	1	0	0	1	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0
6	Includes research.	0	0	0	1	0	1	1	0	0	0	0	0	0	1	1	1	1	1	0
7	Includes development.	1	0	0	1	0	1	1	0	0	0	0	0	1	1	1	0	1	1	0
8	Includes test and evaluation.	1	0	0	1	0	1	1	0	0	0	1	0	1	0	1	0	0	0	1
9	Includes procurement/acquisition.	1	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
10	Includes in-service engineering.	1	1	1	1	0	1	1	1	1	1	1	0	1	0	0	0	1	0	0
11	Includes support to direct formal training of naval forces.	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0
12	A naval surface warfare activity.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	A naval air warfare activity.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	A naval undersea warfare activity.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	A naval command, control, and ocean surveillance activity.	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
16	A naval research laboratory activity.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
17	Includes joint/lead service assignments..	0	0	0	1	0	1	1	0	1	0	0	0	0	0	0	0	1	1	1
	TECHNICAL FUNCTIONS	1.736	0.000	0.444	2.264	0.000	7.736	1.852	2.772	3.069	3.419	2.476	0.000	1.852	7.564	0.296	3.259	1.513	1.185	0.000
18	Include a minimum of 100 in-house technical WYs in PLATFORMS.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	Include a minimum of 100 in-house technical WYs in WEAPONS SYSTEMS	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
20	Include a minimum of 100 in-house technical WYs in COMBAT SYSTEM IN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	Include a minimum of 100 in-house technical WYs in SPECIAL OPERATIO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	Include a minimum of 100 in-house technical WYs in SENSORS & SURVEIL	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0
23	Inlcude a minimum of 100 in-house technical WYs in NAVIGATION.	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
24	Include a minimum of 100 in-house technical WYs in C3I.	0	0	0	0	0	1	0	1	1	1	1	0	1	1	0	0	0	0	0
25	Inlcude a minimum of 100 in-house technical WYs in DEFENSE SYSTEMS.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
26	Include a minimum of 100 in-house technical WYs in STRATEGIC PROGR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	Include a minimum of 100 in-house technical WYs in GENERAL MISSION	0	0	1	1	0	0	0	0	0	1	0	0	0	1	0	1	1	1	0
28	Include a minimum of 100 in-house technical WYs in GENERIC TECHNOL	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0
29	Inlcude a minimum of 100 in-house technical WYs in BASIC RESEARCH (	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
30	Include a minimum of 100 in-house technical WYs in TECHNICAL BASE (	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1	1	1	0
31	Include a minimum of 100 in-house technical WYs in DEVELOPMENT & D	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0
32	Include a minimum of 100 in-house technical WYs in ACQUISITION.	1	0	1	1	0	1	1	0	1	0	0	0	1	0	0	0	0	0	0
33	Include a minimum of 100 in-house technical WYs in LIFETIME SUPPORT.	1	0	0	1	0	1	0	1	1	1	1	0	0	0	0	0	1	0	0
34	Include a minimum of 100 in-house technical WYs in TRAINING/SIMULATI	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
35	PLATFORMS share of DON in-house technical WYs is => 5%.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	WEAPONS SYSTEMS share of DON in-house technical WYs is => 5%.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37	COMBAT SYSTEMS INTEGRATION share of DON in-house technical WYs is	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38	SPECIAL OPERATIONS SUPPORT share of DON in-house technical WYs is	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39	SENSORS & SURVEILLANCE SYSTEMS share of DON in-house technical W	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0
40	NAVIGATION share of DON in-house technical WYs is => 5%.	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0
41	C3I share of DON in-house technical WYs is => 5%.	0	0	0	0	0	1	0	1	1	1	1	0	1	0	0	0	0	0	0
42	DEFENSE SYSTEMS share of DON in-house technical WYs is => 5%.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
43	STRATEGIC PROGRAMS share of DON in-house technical WYs is => 5%.	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0
44	GENERAL MISSION SUPPORT share of DON in-house technical WYs is => 5	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	GENERAL TECHNOLOGY BASE share of DON in-house technical WYs is =	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0
46	BASIC RESEARCH (RDT&E) share of DON in-house technical WYs is => 5%	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
47	TECHNICAL BASE (RDT&E) share of DON in-house technical WYs is => 5 %	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0
48	DEVELOPMENT & DEVELOPMENT SUPPORT (RDT&E) share of DON in-hous	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
49	ACQUISITION share of DON in-house technical WYs is => 5%.	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50	LIFETIME SUPPORT share of DON in-house technical WYs is => 5%.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TECHNICAL CENTERS Military Value Matrix

Que Seq	QUESTIONS					SPAWAR										NRL				
		Lakehst	NAESU	NATSF	NATSD	HQ	RDT&E	Warmin	Chston	Norfolk	S Diego	Pearl H	NTRO	NMSO	NRL	Orlando	ONR	NAVFAC	NPRDC	OPTEV
51	TRAINING/SIMULATION share of DON in-house technical WYs is => 5%.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
52	Technical functions are performed for aircraft.	1	0	0	1	0	1	1	0	0	0	0	0	0	1	0	1	0	0	0
53	Technical functions are performed for submarines.	0	0	0	1	0	1	1	1	1	1	0	0	0	1	1	1	0	1	0
54	Technical functions are performed for surface ships.	0	0	0	1	0	1	1	1	1	1	1	0	0	1	0	1	0	1	0
55	Technical functions are performed for command, control and ocean s	0	0	0	0	0	1	1	1	1	1	1	0	1	1	0	1	1	0	0
	FACILITIES	7.431	0.148	0.148	5.456	2.620	6.426	0.895	0.401	0.500	1.026	0.148	0.000	0.249	6.297	4.464	0.000	2.170	0.397	1.541
56	Facility is a host activity.	1	0	0	1	1	1	0	0	0	0	0	0	0	1	1	0	0	0	1
57	80% to 89% of administrative & laboratory space is ADEQUATE.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
58	90% to 100% of administrative & laboratory space is ADEQUATE.	1	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
59	3% to 5% of administrative & laboratory space is INADEQUATE.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	Less than 3% of administrative & laboratory space is INADEQUATE.	1	0	0	1	0	0	0	0	0	1	0	0	0	1	1	0	1	0	0
61	No funds are required to correct inadequacies.	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0
62	Funds are required to correct inadequacies, but less then $500,000.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
63	Funds are required to correct inadequacies, totaling between $500,000	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
64	Less than 5% of utilized floor space is leased.	1	1	1	0	1	1	1	0	1	0	1	0	0	1	1	0	0	1	1
65	Less than 25% of plant account space is assigned to tenants.	1	0	0	0	0	1	0	0	0	0	0	0	0	1	1	0	1	0	1
66	10,000 to 49,999 sqft of existing Government owned space is available f	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
67	50,000 to 100,000 sqft of existing Government owned space is available	0	0	0	1	0	0	0	0	0	0	0	0	0	0	[illegible]	0	0	0	0
68	More than 100,000 sqft of existing Government owned space is availabl	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
69	10,000 to 49,999 sqft of Government owned space can be constructed	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
70	50,000 to 100,000 sqft of Government owned space can be constructed	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
71	More than 100,000 sqft of Government owned space can be construct	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
72	Expansion opportunities can support 50 to 99 additional persons.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
73	Expansion opportunities can support 100 to 499 additional persons.	1	0	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0
74	Expansion opportunities can support more than 500 additional persons.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75	250 to 499 unimproved & unencumbered acres available for expansion	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
76	500 to 1000 unimproved & unencumbered acres available for expansio	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
77	More than 1,000 unimproved & unencumbered acres available for exp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
78	Expansion is not constrained by parking limitations.	1	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0
79	Expansion is not constrained by radio frequency limitations.	1	0	0	0	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0
80	10 to 49 acres with roads and utilities available for expansion.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
81	50 to 499 acres with roads and utilities available for expansion.	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
82	More than 500 acres with roads and utilities available for expansion.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
83	Site utilizes less than 70% of its utility capacity.	1	0	0	1	1	1	0	0	0	1	0	0	0	1	1	0	1	0	0
84	Less than 20% of replacement value of the Site's SF&E is PORTABLE.	1	0	0	1	0	1	1	1	0	1	0	0	1	1	1	0	1	1	0
85	Replacement value of FIXED SF&E is between $25,000,000 and $100,000,	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0
86	Replacement value of FIXED SF&E exceeds $100,000,000.	1	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0
87	Site has revenue producing resources.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RANG[illegible]ATURES AND OTHER CAPABILITIES	4.452	0.000	1.678	1.678	1.577	5.405	1.577	2.332	2.450	2.955	1.677	0.000	1.577	2.533	0.000	1.577	1.051	1.981	1.577
88	Site operates piers that can support naval combatants.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
89	Site operates an operational air field that supports high performance ai	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
90	Site has ordnance storage capacity between 500,000 and 999,999 net e	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
91	Site has ordnance storage capacity between 1,000,000 and 9,999,999 n	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
92	Site has ordnance storage capacity is at least 10,000,000 net explosive v	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
93	Facility has a super computer or parallel computer on site.	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0
94	Data transfer across the site is supported by a high speed network.	1	0	1	1	1	1	1	1	1	1	1	0	1	1	0	1	0	1	1
95	Real time data interconnectivity is achieved with other sites.	1	0	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1
96	Production is accomplished at this site.	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
97	Site has a real time Video Teleconferencing Center.	1	0	0	0	0	1	0	1	1	1	0	0	0	1	0	0	0	0	0
98	Officially assigned mobilization responsibility.	1	0	0	0	0	1	0	1	0	1	0	0	0	1	0	0	0	1	0
99	Adequate facilities available to support mobilization responsibilities.	1	0	0	0	0	1	0	1	0	1	0	0	0	1	0	0	0	1	0
100	Site maintains production facilities to be activated for contingencies.	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0

TECHNICAL CENTERS Military Value Matrix

Que Seq	QUESTIONS	Lakehst	NAESU	NATSF	NATSD	SPAWAR HQ	RDT&E	Warmin	Chston	Norfolk	S Diego	Pearl H	NTRO	NMSO	NRL	NRL Orlando	ONR	NAVFAC	NPRDC	OPTEV
101	Site supports Reserve Unit mobilization responsibilities.	1	0	1	1	0	1	0	1	0	1	0	0	0	1	0	0	0	0	0
102	Site controls range airspace of greater than 5,000 sq mi..	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
103	Airspace range(s) has no limiting (current or future) encroachment or e	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
104	Site controls range sea/undersea space of greater than 100 sq mi.	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
105	Seaspace/undersea range(s) has no limiting (current or future) encroac	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
106	Site controls range landspace of greater than 100 sq mi.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
107	Landspace range(s) has no limiting (future or current) encroachment o	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
108	Site has range facilities that are used for fleet tactical training.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
109	Facility is part of the DoD Major Range and Test Facility Base.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
110	At least 100,000 man hours of depot/industrial maintenance performed	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
	MANPOWER	4.065	1.037	1.185	4.350	0.000	6.708	4.127	2.222	1.481	1.778	2.074	2.074	0.741	8.189	3.631	4.444	5.558	5.019	2.519
111	Total civilians on board is between 1000 and 1999.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
112	Total civilians on board is between 2000 and 3,999.	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0
113	Total civilians on board is greater than 4000.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
114	Average civilian technical staff years of experience is less than 7.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
115	Average civilian technical staff years of experience is greater than 7 ar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
116	Average civilian technical staff years of experience is greater than 9 ar	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1
117	Average civilian technical staff years of experience is greater than 11 a	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1	0	1	0
118	Average civilian technical staff years of experience is greater than 13 a	0	0	1	1	0	1	0	0	1	1	1	1	0	0	0	0	0	0	0
119	Average civilian technical staff years of experience is greater than 15.	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
120	Average civilian technical staff education level is less than 13.	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
121	Average civilian technical staff education level is greater than 13 and l	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
122	Average civilian technical staff education level is greater than 14 and l	1	0	0	0	0	0	0	1	0	1	0	0	0	0	1	0	0	0	0
123	Average civilian technical staff education level is greater than 15 and l	0	0	0	1	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0
124	Average civilian technical staff education level is greater than 16.	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	1	1	1	1
125	Average # of articles published over last 4 years per 100 technical staff I	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	1	0	1	0
126	Average # of articles published over last 4 years per 100 technical staff I	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0
127	Books/chapters written over last 4 years per 100 technical staff is in the t	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0	1	1	1	0
128	Books/chapters written over last 4 years per 100 technical staff is in the r	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
129	Activity has Nobel laureate(s) employed.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
130	Average # of awards over last 4 years per 100 technical staff is in the top	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1	1	1	0
131	Average # of awards over the last 4 years per 100 technical staff is in the	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
132	Patents granted over last 4 years per 100 technical staff is in the top 25%	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1	1	0	0
133	Patents granted over last 4 years per 100 technical staff is in the next 25	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0
134	Patents applied for over last 4 years per 100 technical staff is in the top 2	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1	1	1	0	0
135	Patents applied for over last 4 years per 100 technical staff is in the next	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
136	National Academy of Engineering/Science members.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
137	# of CRDAs signed by the Activity is over 10.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
138	Annual royalty income per 100 technical staff is in the top 25%.	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0
139	Annual royalty income per 100 technical staff is in the next 25%.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
140	Number of major end item prototypes currently in use is in the top 25%.	1	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	1	1	0
141	Number of major end item prototypes currently in use is in the next 25%	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0
	LOCATION/ENVIRONMENT	1.935	1.713	1.713	2.729	3.194	2.157	2.460	1.914	3.194	3.194	3.396	3.194	2.305	3.194	2.863	3.194	2.662	2.003	1.914
142	Location is necessary to perform assigned technical functions.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
143	Location has natural features that are essential to the mission of the fac	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	1	0	0
144	Location enhances synergy with other activities and bases.	0	0	0	1	1	0	0	0	1	1	1	1	1	1	0	1	0	1	0
145	Location enhances joint use capability.	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
146	Location provides favorable weather conditions.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
147	Location is important to customers.	0	0	0	0	1	0	0	0	1	1	1	1	0	1	0	1	0	0	0
148	Site has no endangered/threatened species and biological habitats thc	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	1
149	Site has no jurisdictional wetlands that currently restrict base operations	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
150	Site has no National Register cultural resources that constrain base ops (	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

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151	Base ops or development plans are not constrained by laws applying to	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
152	Site is in an "attainment" or "maintenance" air quality control area for C	0	0	0	1	0	0	0	1	0	0	1	0	0	0	1	0	0	0	1
153	Site operations or development plans have not been restricted due to c	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
154	Site has no Installation Restoration issues that restrict operations or devel	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
155	Site has no significant maintenance dredging restrictions.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	QUALITY OF LIFE	7.197	3.911	3.911	3.265	4.759	4.759	6.400	6.676	3.837	5.132	5.629	2.901	4.199	3.991	2.821	3.991	4.658	4.759	3.246
156	Is there sufficient off base housing?	1	0	0	1	0	0	1	1	0	0	1	1	1	0	1	0	1	0	1
157	Do 90% or more of the housing units have all the required amenities?	0	1	1	0	0	0	1	1	0	0	1	1	1	1	0	1	0	0	0
160	Is the average wait for housing three months or less?	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
163	Are 90% of BEQ rooms adequate?	1	0	0	0	1	1	1	1	0	1	0	0	1	0	0	0	0	1	0
165	Are 90% of BOQ rooms adequate?	1	0	0	0	1	1	1	0	1	1	0	0	1	1	0	1	0	1	0
166	Does the site have >90% of the listed MWR facilities?	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
169	Are >90% of the child care facilities adequate?	1	1	1	0	1	1	1	0	1	0	1	0	0	1	0	1	1	1	1
172	Is the average wait for 0-12 month child care <180 days?	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0
177	Do >50% of site military and civilian personnel live within a 30 minute co	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	1	1	0
178	Are local area educational institution programs adequate for military fa	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
179	Are there educational opportunities at all college levels within a 30-mile	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1
180	Are college education courses available on the base?	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1
184	Do military family members have reasonable access to medical/denta	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	1
185	Is the violent crime rate <758/100,000?	1	1	1	0	0	0	1	0	1	0	1	0	1	0	0	0	1	0	1
186	Is the property crime rate <4902/100,00?	0	1	1	0	0	0	1	0	0	0	0	1	0	1	0	1	1	0	0
187	Is the drug crime rate <402/100,000?	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
	COST	0.889	0.667	0.889	0.889	0.296	1.037	1.333	0.889	0.889	1.037	0.889	0.667	0.889	0.667	0.667	[illegible].889	0.889	1.185	0.667
188	Percent of all employees employed in technical operations is more tha	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
189	Percent of all employees employed in technical opertions is between 7	0	0	1	0	0	1	0	1	1	1	1	0	1	1	1	0	0	0	0
190	Percent of all employees employed in technical opertions is between 5	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0
191	Percent of all employees employed in technical opertions is between 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
192	Percent of all employees employed in technical opertions is less than 3(	0	1	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	1
193	Percent of overhead performed by government civilians is greater thar	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
194	Percent of overhead performed by government civilians is between 70	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
195	Percent of overhead performed by government civilians is between 50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
196	Percent of overhead performed by government civilians is between 30	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0
197	Percent of overhead performed by government civilians is less than 30.	0	0	1	0	0	1	1	1	1	1	1	0	1	1	1	0	0	0	0
198	Percent of technical operations performed by government civilians is g	1	1	1	1	0	0	0	0	0	0	1	1	1	0	0	1	1	0	0
199	Percent of tech. operations performed by government civilians is betw	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
200	Percent of tech. operations performed by government civilians is betw	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0
201	Percent of tech. operations performed by government civilians is betw	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
202	Percent of tech. operations performed by government civilians is less th	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
	LOSS IMPACT	1.502	0.000	0.000	0.794	0.000	2.000	0.296	0.794	0.498	0.498	0.498	0.000	0.148	1.502	0.296	0.708	1.899	1.004	0.000
203	Directly impact naval force training. (20 TO 39 WYs in Training/Simulatior	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
204	Directly impact naval force training. (40 or higher WYs in Training/Simula	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0
205	Directly impact existing naval force readiness. (100 to 499 WYs in Lifetim	1	0	0	1	0	1	0	1	1	0	1	0	0	0	0	0	1	0	0
206	Directly impact existing naval force readiness. (500 or higher WYs in Life	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
207	Directly impact future naval force development. (100 to 499 WYs in RDT	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0
208	Directly impact future naval force development (500 or higher WYs in R	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0
209	Loss of activity adversely affects top 25% of technical mission areas.	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0
210	Loss of activity adversely affects 2nd 25% of technical mission areas.	1	0	0	1	0	0	1	1	0	0	0	0	0	0	1	0	0	1	0
211	Loss of activity adversely affects 3rd 25% of technical mission areas.	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
		34.95	8.22	11.09	30.07	13.11	46.67	25.20	19.81	18.13	20.97	19.52	9.21	14.24	38.50	17.83	18.58	22.68	19.57	12.48

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	MISSION STATEMENT	5.592	1.556	1.556	1.556	1.037	1.037	2.053	3.404
1	Includes full-spectrum life cycle responsibility.	1	0	0	0	0	0	0	12
2	Includes total systems responsibility.	0	0	0	0	0	0	0	16
3	Includes sub-system/component responsibility.	1	0	0	0	0	0	0	38
4	Includes systems integration responsibility.	0	0	0	0	0	0	0	7
5	Includes component integration responsibility.	0	0	0	0	0	0	0	11
6	Includes research.	1	1	1	1	1	1	1	27
7	Includes development.	1	1	1	1	1	1	1	33
8	Includes test and evaluation.	1	1	1	1	0	0	1	36
9	Includes procurement/acquisition.	0	0	0	0	0	0	0	11
10	Includes in-service engineering.	1	0	0	0	0	0	0	39
11	Includes support to direct formal training of naval forces.	0	0	0	0	0	0	0	9
12	A naval surface warfare activity.	0	0	0	0	0	0	0	13
13	A naval air warfare activity.	0	0	0	0	0	0	0	8
14	A naval undersea warfare activity.	0	0	0	0	0	0	0	4
15	A naval command, control, and ocean surveillance activity.	0	0	0	0	0	0	0	7
16	A naval research laboratory activity.	0	0	0	0	0	0	0	2
17	Includes joint/lead service assignments..	1	0	0	0	0	0	1	25
	TECHNICAL FUNCTIONS	0.000	1.037	0.000	0.000	0.000	0.593	0.000	2.181
18	Include a minimum of 100 in-house technical WYs in PLATFORMS.	0	0	0	0	0	0	0	8
19	Include a minimum of 100 in-house technical WYs in WEAPONS SYSTEMS	0	0	0	0	0	0	0	13
20	Include a minimum of 100 in-house technical WYs in COMBAT SYSTEM IN	0	0	0	0	0	0	0	9
21	Include a minimum of 100 in-house technical WYs in SPECIAL OPERATIO	0	0	0	0	0	0	0	3
22	Include a minimum of 100 in-house technical WYs in SENSORS & SURVEIL	0	0	0	0	0	0	0	11
23	Inlcude a minimum of 100 in-house technical WYs in NAVIGATION.	0	0	0	0	0	0	0	1
24	Include a minimum of 100 in-house technical WYs in C3I.	0	0	0	0	0	0	0	8
25	Inlcude a minimum of 100 in-house technical WYs in DEFENSE SYSTEMS.	0	0	0	0	0	0	0	10
26	Include a minimum of 100 in-house technical WYs in STRATEGIC PROGR	0	0	0	0	0	0	0	2
27	Include a minimum of 100 in-house technical WYs in GENERAL MISSION	0	1	0	0	0	0	0	23
28	Include a minimum of 100 in-house technical WYs in GENERIC TECHNOL	0	0	0	0	0	0	0	2
29	Inlcude a minimum of 100 in-house technical WYs in BASIC RESEARCH (	0	0	0	0	0	0	0	1
30	Include a minimum of 100 in-house technical WYs in TECHNICAL BASE (R	0	1	0	0	0	0	0	15
31	Include a minimum of 100 in-house technical WYs in DEVELOPMENT & D	0	0	0	0	0	0	0	13
32	Include a minimum of 100 in-house technical WYs in ACQUISITION.	0	0	0	0	0	0	0	23
33	Include a minimum of 100 in-house technical WYs in LIFETIME SUPPORT.	0	0	0	0	0	0	0	27
34	Include a minimum of 100 in-house technical WYs in TRAINING/SIMULATI	0	0	0	0	0	0	0	6
35	PLATFORMS share of DON in-house technical WYs is => 5%.	0	0	0	0	0	0	0	6
36	WEAPONS SYSTEMS share of DON in-house technical WYs is => 5%.	0	0	0	0	0	0	0	9
37	COMBAT SYSTEMS INTEGRATION share of DON in-house technical WYs is	0	0	0	0	0	0	0	6
38	SPECIAL OPERATIONS SUPPORT share of DON in-house technical WYs is	0	0	0	0	0	0	0	3
39	SENSORS & SURVEILLANCE SYSTEMS share of DON in-house technical WY	0	0	0	0	0	0	0	6
40	NAVIGATION share of DON in-house technical WYs is => 5%.	0	0	0	0	0	0	0	5
41	C3I share of DON in-house technical WYs is => 5%.	0	0	0	0	0	0	0	7
42	DEFENSE SYSTEMS share of DON in-house technical WYs is => 5%.	0	0	0	0	0	0	0	7
43	STRATEGIC PROGRAMS share of DON in-house technical WYs is => 5%.	0	0	0	0	0	0	0	6
44	GENERAL MISSION SUPPORT share of DON in-house technical WYs is =>	0	0	0	0	0	0	0	5
45	GENERAL TECHNOLOGY BASE share of DON in-house technical WYs is =	0	0	0	0	0	0	0	5
46	BASIC RESEARCH (RDT&E) share of DON in-house technical WYs is => 5%	0	1	0	0	0	0	0	3
47	TECHNICAL BASE (RDT&E) share of DON in-house technical WYs is => 5 %	0	0	0	0	0	0	0	7
48	DEVELOPMENT & DEVELOPMENT SUPPORT (RDT&E) share of DON in-hous	0	0	0	0	0	0	0	4
49	ACQUISITION share of DON in-house technical WYs is => 5%.	0	0	0	0	0	0	0	7
50	LIFETIME SUPPORT share of DON in-house technical WYs is => 5%.	0	0	0	0	0	0	0	6

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51	TRAINING/SIMULATION share of DON in-house technical WYs is => 5%.	0	0	0	0	0	0	0	5
52	Technical functions are performed for aircraft.	0	0	0	0	0	0	0	17
53	Technical functions are performed for submarines.	0	0	0	0	0	1	0	27
54	Technical functions are performed for surface ships.	0	0	0	0	0	0	0	28
55	Technical functions are performed for command, control and ocean s	0	0	0	0	0	1	0	24
	FACILITIES	0.148	1.268	0.148	0.895	2.061	0.397	0.148	2.602
56	Facility is a host activity.	0	0	0	0	0	0	0	26
57	80% to 89% of administrative & laboratory space is ADEQUATE.	0	0	0	0	0	0	0	3
58	90% to 100% of administrative & laboratory space is ADEQUATE.	0	0	0	0	1	0	0	21
59	3% to 5% of administrative & laboratory space is INADEQUATE.	0	0	0	0	0	0	0	3
60	Less than 3% of administrative & laboratory space is INADEQUATE.	0	0	0	0	1	0	0	24
61	No funds are required to correct inadequacies.	0	0	0	0	1	0	0	16
62	Funds are required to correct inadequacies, but less then $500,000.	0	0	0	0	0	0	0	0
63	Funds are required to correct inadequacies, totaling between $500,000	0	1	0	0	0	0	0	5
64	Less than 5% of utilized floor space is leased.	1	0	1	1	0	1	1	47
65	Less than 25% of plant account space is assigned to tenants.	0	1	0	0	0	0	0	29
66	10,000 to 49,999 sqft of existing Government owned space is available f	0	0	0	0	0	0	0	3
67	50,000 to 100,000 sqft of existing Government owned space is available	0	0	0	0	0	0	0	3
68	More than 100,000 sqft of existing Government owned space is availabl	0	0	0	0	0	0	0	14
69	10,000 to 49,999 sqft of Government owned space can be constructed	0	0	0	0	0	0	0	6
70	50,000 to 100,000 sqft of Government owned space can be constructed	0	0	0	0	0	0	0	1
71	More than 100,000 sqft of Government owned space can be construct	0	0	0	0	0	0	0	10
72	Expansion opportunities can support 50 to 99 additional persons.	0	0	0	0	0	0	0	0
73	Expansion opportunities can support 100 to 499 additional persons.	0	0	0	0	0	0	0	7
74	Expansion opportunities can support more than 500 additional persons.	0	0	0	0	0	0	0	8
75	250 to 499 unimproved & unencumbered acres available for expansion	0	0	0	0	0	0	0	2
76	500 to 1000 unimproved & unencumbered acres available for expansio	0	0	0	0	0	0	0	1
77	More than 1,000 unimproved & unencumbered acres available for exp	0	0	0	0	0	0	0	3
78	Expansion is not constrained by parking limitations.	0	0	0	0	0	0	0	21
79	Expansion is not constrained by radio frequency limitations.	0	0	0	0	0	0	0	22
80	10 to 49 acres with roads and utilities available for expansion.	0	0	0	0	0	0	0	5
81	50 to 499 acres with roads and utilities available for expansion.	0	0	0	0	0	0	0	9
82	More than 500 acres with roads and utilities available for expansion.	0	0	0	0	0	0	0	4
83	Site utilizes less than 70% of its utility capacity.	0	0	0	0	0	0	0	28
84	Less than 20% of replacement value of the Site's SF&E is PORTABLE.	0	1	0	1	1	1	0	38
85	Replacement value of FIXED SF&E is between $25,000,000 and $100,000,	0	1	0	1	0	0	0	7
86	Replacement value of FIXED SF&E exceeds $100,000,000.	0	0	0	0	0	0	0	23
87	Site has revenue producing resources.	0	0	0	0	0	0	0	5
	RANGES, FEATURES AND OTHER CAPABILITIES	1.678	0.102	1.577	1.577	1.981	1.577	1.577	2.589
88	Site operates piers that can support naval combatants.	0	0	0	0	0	0	0	5
89	Site operates an operational air field that supports high performance ai	0	0	0	0	0	0	0	3
90	Site has ordnance storage capacity between 500,000 and 999,999 net e	0	0	0	0	0	0	0	1
91	Site has ordnance storage capacity between 1,000,000 and 9,999,999 n	0	0	0	0	0	0	0	4
92	Site has ordnance storage capacity is at least 10,000,000 net explosive v	0	0	0	0	0	0	0	4
93	Facility has a super computer or parallel computer on site.	0	0	0	0	0	0	0	4
94	Data transfer across the site is supported by a high speed network.	1	0	1	1	1	1	1	50
95	Real time data interconnectivity is achieved with other sites.	1	0	1	1	1	1	1	50
96	Production is accomplished at this site.	0	0	0	0	0	0	0	12
97	Site has a real time Video Teleconferencing Center.	0	0	0	0	0	0	0	21
98	Officially assigned mobilization responsibility.	0	0	0	0	1	0	0	28
99	Adequate facilities available to support mobilization responsibilities.	0	0	0	0	1	0	0	28
100	Site maintains production facilities to be activated for contingencies.	0	0	0	0	0	0	0	10

TECHNICAL CENTERS Military Value Matrix

Que Seq	QUESTIONS	NCTRF	BUMED Bethsda	S Diego	Pcola	N Orlns	Groton	GLakes	AVG./ no.
101	Site supports Reserve Unit mobilization responsibilities.	1	1	0	0	0	0	0	28
102	Site controls range airspace of greater than 5,000 sq mi..	0	0	0	0	0	0	0	5
103	Airspace range(s) has no limiting (current or future) encroachment or e	0	0	0	0	0	0	0	4
104	Site controls range sea/undersea space of greater than 100 sq mi.	0	0	0	0	0	0	0	8
105	Seaspace/undersea range(s) has no limiting (current or future) encroac	0	0	0	0	0	0	0	7
106	Site controls range landspace of greater than 100 sq mi.	0	0	0	0	0	0	0	2
107	Landspace range(s) has no limiting (future or current) encroachment o	0	0	0	0	0	0	0	1
108	Site has range facilities that are used for fleet tactical training.	0	0	0	0	0	0	0	9
109	Facility is part of the DoD Major Range and Test Facility Base.	0	0	0	0	0	0	0	5
110	At least 100,000 man hours of depot/industrial maintenance performed	0	0	0	0	0	0	0	7
	MANPOWER	3.905	4.819	4.498	5.090	2.818	2.868	4.202	3.321
111	Total civilians on board is between 1000 and 1999.	0	0	0	0	0	0	0	5
112	Total civilians on board is between 2000 and 3,999.	0	0	0	0	0	0	0	11
113	Total civilians on board is greater than 4000.	0	0	0	0	0	0	0	2
114	Average civilian technical staff years of experience is less than 7.	0	0	0	0	0	0	0	0
115	Average civilian technical staff years of experience is greater than 7 ar	0	0	0	0	0	1	0	2
116	Average civilian technical staff years of experience is greater than 9 an	1	0	0	1	1	0	1	20
117	Average civilian technical staff years of experience is greater than 11 a	0	1	1	0	0	0	0	16
118	Average civilian technical staff years of experience is greater than 13 a	0	0	0	0	0	0	0	13
119	Average civilian technical staff years of experience is greater than 15.	0	0	0	0	0	0	0	7
120	Average civilian technical staff education level is less than 13.	0	0	0	0	0	0	0	6
121	Average civilian technical staff education level is greater than 13 and l	0	0	0	0	0	0	0	8
122	Average civilian technical staff education level is greater than 14 and l	0	0	0	0	0	0	0	13
123	Average civilian technical staff education level is greater than 15 and l	1	1	0	0	1	0	0	14
124	Average civilian technical staff education level is greater than 16.	0	0	1	1	0	1	1	17
125	Average # of articles published over last 4 years per 100 technical staff i	1	1	1	1	1	1	1	15
126	Average # of articles published over last 4 years per 100 technical staff i	0	0	0	0	0	0	0	21
127	Books/chapters written over last 4 years per 100 technical staff is in the t	1	0	1	0	1	0	0	15
128	Books/chapters written over last 4 years per 100 technical staff is in the n	0	0	0	0	0	0	0	0
129	Activity has Nobel laureate(s) employed.	0	0	0	0	0	0	0	1
130	Average # of awards over last 4 years per 100 technical staff is in the top	1	0	1	1	0	0	0	15
131	Average # of awards over the last 4 years per 100 technical staff is in the	0	1	0	0	0	0	0	16
132	Patents granted over last 4 years per 100 technical staff is in the top 25%	0	1	0	1	0	0	1	16
133	Patents granted over last 4 years per 100 technical staff is in the next 25	0	0	0	0	0	0	0	9
134	Patents applied for over last 4 years per 100 technical staff is in the top 2	1	1	1	1	0	0	1	19
135	Patents applied for over last 4 years per 100 technical staff is in the next	0	0	0	0	0	0	0	7
136	National Academy of Engineering/Science members.	0	0	0	0	0	0	0	2
137	# of CRDAs signed by the Activity is over 10.	0	1	0	0	0	0	0	5
138	Annual royalty income per 100 technical staff is in the top 25%.	0	0	0	1	0	0	0	13
139	Annual royalty income per 100 technical staff is in the next 25%.	0	0	0	0	0	0	0	0
140	Number of major end item prototypes currently in use is in the top 25%.	0	0	0	0	0	0	0	16
141	Number of major end item prototypes currently in use is in the next 25%	1	0	1	1	0	1	1	17
	LOCATION/ENVIRONMENT	1.935	1.411	2.305	2.104	1.914	1.701	2.305	2.623
142	Location is necessary to perform assigned technical functions.	0	0	0	0	0	0	0	6
143	Location has natural features that are essential to the mission of the fac	0	0	0	0	0	0	0	21
144	Location enhances synergy with other activities and bases.	0	0	1	1	0	1	1	33
145	Location enhances joint use capability.	1	0	0	0	0	0	0	9
146	Location provides favorable weather conditions.	0	0	0	0	0	0	0	6
147	Location is important to customers.	0	0	0	0	0	0	0	18
148	Site has no endangered/threatened species and biological habitats tha	1	1	1	1	1	1	1	61
149	Site has no jurisdictional wetlands that currently restrict base operations	1	1	1	0	1	0	1	61
150	Site has no National Register cultural resources that constrain base ops	1	0	1	1	1	0	1	60

TEC...ICAL CENTERS Military Value Matrix

Que Seq	QUESTIONS	NCTRF	BUMED Bethsda	S Diego	Pcola	N O-lns	Groton	GLakes	AVG./ no.
151	Base ops or development plans are not constrained by laws applying tc	1	1	1	1	1	1	1	62
152	Site is in an "attainment" or "maintenance" air quality control area for C(	0	0	0	1	1	0	0	19
153	Site operations or development plans have not been restricted due to c	1	1	1	1	1	1	1	58
154	Site has no Installation Restoration Issues that restrict operations or devel	1	1	1	1	1	1	1	62
155	Site has no significant maintenance dredging restrictions.	1	1	1	0	1	1	1	63
	QUALITY OF LIFE	5.135	3.991	4.759	5.505	3.265	4.412	6.525	4.761
156	Is there sufficient off base housing?	1	1	0	1	1	0	1	44
157	Do 90% or more of the housing units have all the required amenities?	0	1	0	0	0	0	1	34
160	Is the average wait for housing three months or less?	0	0	0	0	0	0	0	10
163	Are 90% of BEQ rooms adequate?	1	0	1	1	0	0	1	29
165	Are 90% of BOQ rooms adequate?	0	0	1	1	0	1	0	30
166	Does the site have >90% of the listed MWR facilities?	0	0	0	0	0	1	1	16
169	Are >90% of the child care facilities adequate?	1	1	1	1	0	1	1	41
172	Is the average wait for 0-12 month child care <180 days?	1	0	0	0	0	0	0	11
177	Do >50% of site military and civilian personnel live within a 30 minute co	1	0	1	1	1	1	1	46
178	Are local area educational institution programs adequate for military fa	1	1	1	1	1	1	1	61
179	Are there educational opportunities at all college levels within a 30-mile	1	1	1	1	1	1	1	60
180	Are college education courses available on the base?	0	1	1	1	1	1	1	55
184	Do military family members have reasonable access to medical/denta	1	1	1	1	1	0	1	57
185	Is the violent crime rate <758/100,000?	1	0	0	0	0	1	1	35
186	Is the property crime rate <4902/100,00?	1	1	0	0	0	1	1	36
187	Is the drug crime rate <402/100,000?	1	0	0	0	0	1	0	15
	COST	0.889	1.037	1.185	0.889	0.889	1.037	1.185	0.922
188	Percent of all employees employed in technical operations is more tha	0	0	0	0	0	0	0	5
189	Percent of all employees employed in technical opertions is between 7	1	1	1	0	0	1	0	33
190	Percent of all employees employed in technical opertions is between 5	0	0	0	1	1	0	1	13
191	Percent of all employees employed in technical opertions is between 3	0	0	0	0	0	0	0	3
192	Percent of all employees employed in technical opertions is less than 3(	0	0	0	0	0	0	0	8
193	Percent of overhead performed by government civilians is greater thar	0	0	0	0	0	0	0	5
194	Percent of overhead performed by government civilians is between 70	0	0	0	0	0	0	0	3
195	Percent of overhead performed by government civilians is between 50	0	0	0	0	0	0	0	4
196	Percent of overhead performed by government civilians is between 30	0	0	0	1	1	0	1	15
197	Percent of overhead performed by government civilians is less than 30.	1	1	1	0	0	1	0	35
198	Percent of technical operations performed by government civilians is g	1	0	0	1	1	0	0	22
199	Percent of tech. operations performed by government civilians is betw	0	0	0	0	0	1	0	11
200	Percent of tech. operations performed by government civilians is betw	0	0	1	0	0	0	1	10
201	Percent of tech. operations performed by government civilians is betw	0	1	0	0	0	0	0	8
202	Percent of tech. operations performed by government civilians is less th	0	0	0	0	0	0	0	8
	LOSS IMPACT	0.148	1.004	0.000	0.000	0.296	0.296	0.000	0.718
203	Directly impact naval force training. (20 TO 39 WYs in Training/Simulatior	0	0	0	0	0	0	0	6
204	Directly impact naval force training. (40 or higher WYs in Training/Simula	0	0	0	0	0	0	0	10
205	Directly impact existing naval force readiness. (100 to 499 WYs in Lifetim	0	0	0	0	0	0	0	17
206	Directly impact existing naval force readiness. (500 or higher WYs in Life	0	0	0	0	0	0	0	10
207	Directly impact future naval force development. (100 to 499 WYs in RDT	0	1	0	0	0	0	0	11
208	Directly impact future naval force development (500 or higher WYs in R	0	0	0	0	0	0	0	9
209	Loss of activity adversely affects top 25% of technical mission areas.	0	0	0	0	0	0	0	16
210	Loss of activity adversely affects 2nd 25% of technical mission areas.	0	1	0	0	1	1	0	19
211	Loss of activity adversely affects 3rd 25% of technical mission areas.	1	0	0	0	0	0	0	5
		19.43	15.92	16.03	17.62	14.25	13.92	18.00	23.32

Technical Center Configuration Modeling

Preliminary Specifications

Approach

- Parameters included:
  - Technical Center total technical workyear capacity
  - Technical Center functional capacity in workyears
  - Technical Center functional requirement in workyears

- Objective function components:
  - Minimize technical excess capacity

Technical Function Definitions

- Activities partitioned their workload into 1,386 functional categories:
  - 18 life-cycle phases
  - 77 functional support areas
- For the configuration model, these were aggregated into 116 functional categories:
  - 4 life-cycle phases
  - 29 functional support areas

Functional Support Areas

Configuration Model Functional Support Categories		Data Call Functional Support Categories
Platform	Ship	Undersea and surface ship
	Air	Aircraft
	Space	Space satellites
	Ground	Ground vehicles
Weapon systems	Missiles and free-fall weapons	Guided missiles, free fall weapons and rockets
	Torpedoes	Torpedoes
	Mines	Mines
	Guns	Gun systems
	Other	Directed energy systems, explosives, launchers, fire control, weapon data links, weapons fuzing, weapons propulsion, other ordnance, and EOD
Combat systems integration	Subsurface	Subsurface
	Air	Air
	Surface	Surface
	Multi-platform	Multi-platform
Special operations		Special operations, landing force equipment and systems, coastal/ special warfare support
Sensors and surveillance systems		Sonar systems, radar systems, special sensors, space sensors/surveillance systems, and ocean surveillance
Navigation		Submarine navigation systems, aircraft navigation systems, surface ship navigation, weapons navigation systems, satellite navigation systems.
C4I		Submarine, airborne, shipboard, land-based, space communications systems, non-tactical data systems, air traffic control systems, intelligence information systems
Defense Systems	Ballistic missile defense	Ballistic missile defense
	Other	Countermeasures and electronic warfare (EW) systems
Strategic systems		Navy strategic systems and nuclear weapons effects

Configuration Model Functional Support Categories		Data Call Functional Support Categories
General mission support	Training	Personnel and training: submarine-, aircraft-, surface-, weapons-related training systems; human resources research and development
	Logistics	Logistics planning and implementation
	Facilities	Facilities engineering
	Diving	Diving, salvage, and ocean engineering
	Environment	Environmental description, prediction, and effects
	Crew support	Crew equipment and life support: submarine, aircraft, surface ship, medical research and combat casualty care, and clothing and textiles
	Ranges	Major range development and operation
	Other	Other subsidary systems or components; center mission and functional support
Generic technology base		Computers; software; communications networking; electronic devices; materials and processes; energy storage, propulsion and energy conversion; design automation; human-systems interfaces; and other technology base programs

Life-Cycle Phases

Configuration Model Life-Cycle Phases	Data Call Life-Cycle Phases
RDT&E	Basic research, exploratory development, advanced development, engineering and manufacturing development, RDT&E managment support, and operational systems development
Acquisition	Production, acceptance testing, modernization, and program support
Life time support	Maintenance, repair, testing, in-service engineering, program support, and retirement
General	Training and operations support; simulation modeling and analysis

Total Technical Workyear Capacity

Symbol	Description
bwy94	1994 budgeted workyears
maxbwy	Maximum budgeted workyears
onbd94	1994 civilian and military onboard
exppers	Expansion personnel capacity
expspace	Expansion space capacity
sqfpers	Square feet required per person (125)
twy93	1993 total technical workyears
bwy93	1993 budgeted workyears
bwy97	1997 budgeted workyears
twyfut	Estimated future technical workyears

maximum onboard = $(onbd94/bwy94) \times maxbwy$

Alternate calculation: maximum onboard =

$$\max\left[(onbd94/bwy94) \times maxbwy,\ onbd94 + exppers,\ onbd94 + (expspace/sqfpers)\right]$$

maximum technical workyears = maximum onboard x $(twy93/onbd94)$

twyfut = $twy93 \times (bwy97/bwy93)$

Technical Center Workload Capacity Data

Technical Center	1994 civ/mil onboard	1994 budgeted workyear	1997 budgeted workyear	Onboard/ workyear factor	Maximum budget. wy	Max bwy onboard	Personnel expansion potential	Maximum onbd with exp. pers.	Expansion space (SF)	Expansion space/ 125 SF	Maximum onbd with exp. sp.	Alternate maximum onboard	1993 technical workload	Future technical workload	Tech wy/ onbd	Maximum BWY tech workload	Alternate max tech workload
NAWC HQ	38	35.00		1.09	35.00	38	0	38	0	0	38	38	0.0	0.0	0.00	0	0
NAWC CHINA LAKE	4963	5130.00	4526.00	0.97	5910.00	5718	2594	7557	302,000	2416	7379	7557	3567.8	3147.7	0.72	4111	5433
NAWC POINT MUGU	4315	4718.00	4098.00	0.91	5969.00	5459	1120	5435	0	0	4315	5459	3423.1	2973.3	0.79	4331	4331
NAWC INDIANAPOLIS	2861	3031.00	2736.00	0.94	3383.00	3193	1415	4276	0	0	2861	4276	2639.8	2382.9	0.92	2946	3945
NAWC PAX RIVER	6100	4804.00	5939.00	1.27	6183.00	7851	0	6100	0	0	6100	7851	5335.3	6595.8	0.87	6867	6867
NAWC DET WARMINSTER	30			0.00	14.00	0	0	30	0	0	30	30	12.0	0.0	0.40	0	12
NAWC DWTF ORELAND	0			0.00	0.00	0	0	0	0	0	0	0	0.0	0.0	0.00	0	0
NAWC LAKEHURST	2120	1967.00	1825.00	1.08	2619.00	2823	43	2163	43,000	344	2464	2823	1164.0	1079.9	0.55	1550	1550
NATSD ORLANDO	967	1069.00	1050.00	0.90	1323.00	1197	150	1117	0	0	967	1197	1080.0	1060.8	1.12	1337	1337
NATSF PHILADELPHIA	247	300.00	284.00	0.82	323.00	266	0	247	0	0	247	266	206.0	195.0	0.83	222	222
NAESU LAKEHURST	86	939.00	891.00	0.09	1614.00	148	0	86	0	0	86	148	0.0	0.0	0.00	0	0
NSWC HQ	14			0.00	0.00	0	0	14	0	0	14	14	0.0	0.0	0.00	0	0
NSWC CRANE	3698	3796.00	2973.00	0.97	4002.00	3899	1225	4923	193,000	1544	5242	5242	2637.1	2065.4	0.71	2780	3738
NSWC DET LOUISVILLE	2178	2229.00	1746.00	0.98	2705.00	2643	0	2178	119,000	952	3130	3130	1463.3	1146.2	0.67	1776	2103
NSWC HTA SULLIVAN	0	3.00	3.00	0.00	3.00	0	0	0	0	0	0	0	3.0	3.0	0.00	0	3
NSWC DAHLGREN	2986	3301.20	2860.00	0.90	3429.20	3102	0	2986	0	0	2986	3102	2241.1	1941.6	0.75	2328	2328
NSWC PANAMA CITY	1299	1245.00	1156.00	1.04	1352.00	1411	168	1467	25,493	203.944	1503	1503	887.8	824.3	0.68	964	1027
NSWC PORT HUENEME	2718	2715.00	2168.00	1.00	3346.00	3350	541	3259	67,800	542.4	3260	3350	2389.0	1907.7	0.88	2944	2944
NSWC CARDEROCK	1443	1405.00	1425.00	1.03	1963.00	2016	448	1891	10,900	87.2	1530	2016	938.0	951.4	0.65	1310	1310
NSWC DET PHILADELPHIA	1673	1585.00	*1614.00	1.06	1758.00	1856	0	1673	6,812	54.4928	1727	1856	1308.0	1331.9	0.78	1451	1451
NSWC DET ANNAPOLIS	785	715.00	431.00	1.10	807.00	886	0	785	0	0	785	886	454.3	273.9	0.58	513	513
NSWC ARD BAYVIEW	49	68.00	51.00	0.72	68.00	49	15	64	0	0	49	64	39.8	29.9	0.81	40	52
NSWC INDIAN HEAD	2293	2185.00	1895.20	1.05	2637.70	2768	32	2325	50,820	406.56	2700	2768	1333.8	1156.9	0.58	1610	1610
NSWC DET YORKTOWN	46	48.44	43.89	0.95	61.33	58	0	46	0	0	46	58	39.0	35.3	0.85	49	49
NAVSEALOGCEN MECHANICSBUR	312	298.00	308.00	1.05	374.00	392	0	312	0	0	312	392	367.0	379.3	1.18	461	461
NAVSEASUPCEN SAN DIEGO	508	463.00	329.00	1.10	494.00	542	0	508	0	0	508	542	504.0	358.1	0.99	538	538
NAVSEASUPCEN PEARL HARBOR	54	54.00	55.00	1.00	55.00	55	0	54	0	0	54	55	54.0	55.0	1.00	55	55
NUWC HQ	19	19.00	19.00	1.00	19.00	19	0	19	0	0	19	19	0.0	0.0	0.00	0	0
NUWC NEWPORT	2184	2470.00	2820.00	0.88	2881.00	2547	402	2586	88,164	705.312	2889	2889	1803.4	2058.9	0.83	2103	2386
NUWC DET NEW LONDON	1290	1312.00	510.00	0.98	1584.00	1557	800	2090	0	0	1290	2090	1091.5	424.3	0.85	1317	1768
NUWC KEYPORT	2969	2681.10	2206.90	1.11	3452.00	3823	0	2969	24,000	192	3161	3823	2253.3	1854.8	0.76	2901	2901
SEASPARROW PSO	49	52.00	65.00	0.94	65.00	61	0	49	0	0	49	61	51.0	63.8	1.04	63	61
NAVWARASSESDIV CORONA	896	1054.80	1062.80	0.85	1322.10	1123	948	1844	74,050	592.4	1488	1844	874.8	881.4	0.98	1096	1800
NAVEODTECHDIV INDIAN HEAD	327	233.00	233.00	1.40	267.00	375	0	327	0	0	327	375	152.0	152.0	0.46	174	174
NOC INDIAN HEAD	104	104.00	95.00	1.00	104.00	104	0	104	0	0	104	104	0.0	0.0	0.00	0	0
AEGIS COMBAT CENTER WALLOPS	133	388.00	345.00	0.34	388.00	133	0	133	0	0	133	133	86.0	76.5	0.65	86	86
AEGIS TECH REP MOORESTOWN	49	97.50	97.50	0.50	103.50	52	0	49	0	0	49	52	93.5	93.5	1.91	99	99
NCCOSC HQ	29			0.00	0.00	0	0	29	0	0	29	29	0.0	0.0	0.00	0	0
NCCOSC RDT&E SAN DIEGO	2789	2825.00	2416.00	0.99	3525.00	3480	1114	3903	391,895	3135.16	5924	5924	1690.8	1446.0	0.61	2110	3591
NCCOSC RDT&E DET WARMINSTER	265	291.00	292.00	0.91	303.00	276	0	265	0	0	265	276	220.3	221.1	0.83	229	229
NCCOSC ISE EAST CHARLESTON	329	347.00	620.00	0.95	628.00	595	0	329	0	0	329	595	324.0	578.9	0.98	586	586
NCCOSC ISE EAST DET NORFOLK	432	391.00	285.00	1.10	445.00	492	0	432	0	0	432	492	393.0	286.5	0.91	448	448
NCCOSC ISE WEST SAN DIEGO	816	622.00	631.00	1.31	775.00	1017	0	816	0	0	816	1017	609.6	618.4	0.75	760	760
NCCOSC ISE WEST PEARL HARBOR	136	132.00	132.00	1.03	223.00	230	0	136	0	0	136	230	170.1	170.1	1.25	288	288
NAVMASO CHESAPEAKE	387	512.00	500.00	0.76	677.00	512	0	387	0	0	387	512	531.0	518.6	1.37	703	703
NAVTECHREPO LAUREL	16	14.00	11.00	1.14	40.00	46	tenant	16	0	0	16	46	0.0	0.0	0.00	0	0
NRL	2958	3115.00	2989.00	0.95	3502.00	3325	292	3250	37,000	296	3254	3325	1887.0	1810.7	0.64	2121	2121
NRL DET UNDERWATER SOUND RE	111	118.00	100.00	0.94	127.00	119		111		0	111	119	62.8	53.2	0.57	67	67

Technical Center Workload Capacity Data

Technical Center	1994 civ/mil onboard	1994 budgeted workyear	1997 budgeted workyear	Onboard/ workyear factor	Maximum budget. wy	Max bwy onboard	Personnel expansion potential	Maximum onbd with exp. pers.	Expansion space (SF)	Expansion space/ 125 SF	Maximum onbd with exp. sp.	Alternate maximum onboard	1993 technical workload	Future technical workload	Tech wy/ onbd	Maximum BWY tech workload	Alternate max tech workload
ONR	478	496.00	449.00	0.96	555.00	535	0	478	0	0	478	535	452.5	409.6	0.95	506	506
NAVFACENGSERCEN PT HUENEME	514	520.00	525.00	0.99	602.00	595	0	514	0	0	514	595	428.4	432.5	0.83	496	496
AFWTF	127	40.00	39.00	3.18	47.00	149	0	127	0	0	127	149	44.0	42.9	0.35	52	52
FTSC ATLANTIC	617	607.00	653.00	1.02	699.00	711	0	617	0	0	617	711	753.0	810.1	1.22	868	868
FTSC ATLANTIC NORFOLK	127	151.00	151.00	0.84	151.00	127	0	127	0	0	127	127	299.0	299.0	2.35	299	299
FTSC ATLANTIC MAYPORT	123	130.00	138.00	0.95	138.00	131	0	123	0	0	123	131	118.0	125.3	0.96	126	126
PMRF BARKING SANDS	254	141.00	153.00	1.80	153.00	276	0	254	0	0	254	276	244.0	264.8	0.96	265	265
NPRDC SAN DIEGO	236	231.00	167.00	1.02	371.00	379	0	236	0	0	236	379	245.3	177.3	1.04	394	394
COMOPTEVFOR NORFOLK	301	71.00	71.00	4.24	71.00	301	0	301	0	0	301	301	61.0	61.0	0.20	61	61
NCTRF NATICK	47	47.00	47.00	1.00	52.00	52	0	47	0	0	47	52	54.9	54.9	1.17	61	61
NAVMEDRESINST BETHESDA	372	162.00	162.00	2.30	166.00	381	0	372	0	0	372	381	289.0	289.0	0.78	296	296
NAVHTHRESCEN SAN DIEGO	83	150.00	165.00	0.55	165.00	91	0	83	0	0	83	91	48.0	52.8	0.58	53	53
NAVAERMEDRESLAB PENSACOLA	38	42.00	35.00	0.90	60.00	54	0	38	0	0	38	54	42.0	35.0	1.11	60	60
NAVBIOLAB NEW ORLEANS	63	66.00	46.00	0.95	86.00	82	0	63	0	0	63	82	21.0	14.6	0.33	27	27
NAVSUBMEDRESLAB GROTON	61	64.00	64.00	0.95	72.00	69	0	61	0	0	61	69	42.8	42.8	0.70	48	48
NAVDENRESINST GREAT LAKES	31	47.00	47.00	0.66	47.00	31	0	31	0	0	31	31	37.0	37.0	1.19	37	37
													47561.08			56983	63596

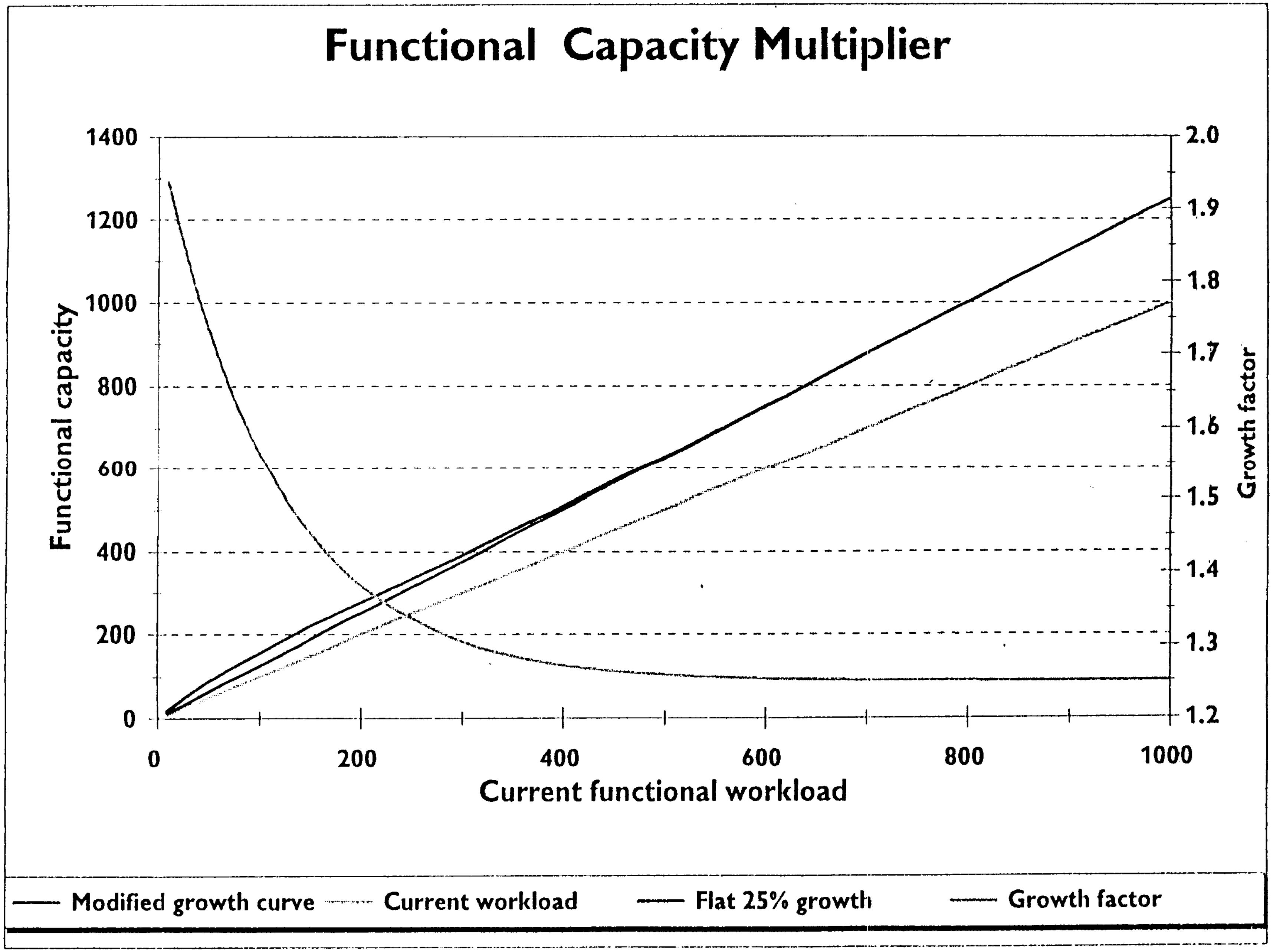
Technical Function Capacities and Requirements

Symbol	Description
twy93	1993 total technical workyears
twyfut	1997 total technical workyears
cur(l,f)	Current technical workyears in (l,f) life cycle/functional support area combination
mingro	Minimum growth in any (l,f) combination (1.25)
maxgro	Maximum growth in any (l,f) combination (2.00)
α	solves mingro x (1-((maxgro/mingro) - 1) x exp(-500α))= mingro + 0.01

Functional capacity (l,f) =

$$cur\,(l,f) \text{ X } mingro \text{ X } \left(1+((maxgro/mingro) - 1) \text{ X } \exp(-\alpha\, cur(l,f))\right)$$

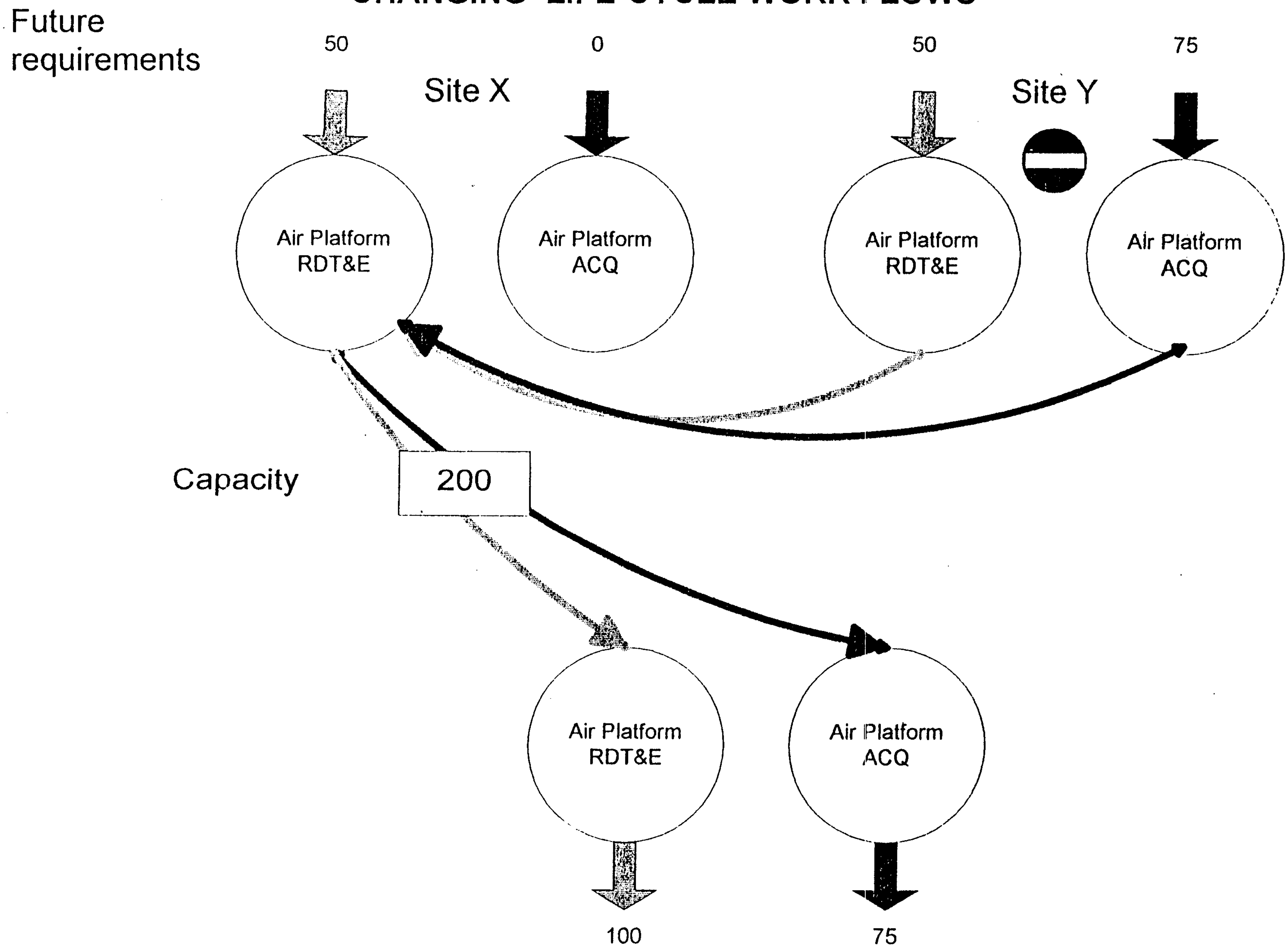
Functional requirement (l,f) = $(twyfut\ /\ twy93) \text{ X } cur(l,f)$


Functional Capacity Multiplier
1400
1200
1000
800
600
400
200
0
Functional capacity
2.0
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
Growth factor
0
200
400
600
800
1000
Current functional workload
Modified growth curve
Current workload
Flat 25% growth
Growth factor

Initial Configuration Model Rules

- Average military value is maintained
- Preserve minimum required capability at specific geographically restricted activities:
  - Keep open: FTSC LANT, Det Norfolk, Det Mayport; FTCS PAC, Det Pearl
  - Maintain at least one:
    - Lake: NRL Det Orlando, Bayview ID
    - AEGIS facility: Moorestown NJ, Wallops Island
- Future requirements scaled down by 20%
- No workload transferred between open activities
- No workload transferred between different functional support areas
- Workload can be transferred between life-cycle areas where capability exists

CHANGING LIFE-CYCLE WORK FLOWS



Model Output Measures

- Technical centers open or closed
- Additional measures:
  - Percent reduction in technical capacity
  - Average military value
  - Percent excess capacity
  - Functional workload assignment

Generation of Alternatives

Model allows the generation of three solution sets:

- Best solution-for a given set of constraints and data
- Next best-obtained by excluding the first solution
- Third best-obtained by excluding the first two solutions

Output measures will be reported for all solutions

Sensitivity Analysis

Sensitivity analyses will be conducted by:

- Varying the reduced requirements scaling
  - +10%, -10%, -20%
- Varying the rules for calculating capacities
  - Use alternative calculation for maximum onboard

Technical Center	Baseline Best	Baseline 2nd best	Baseline 3rd best	+10% Best	-10% Best	-20% Best	Alt. cap. baseline
CL	1	1	1	1	1	1	1
MUGU	1	1	1	1	1	1	1
INDY	0	0	0	0	0	0	0
PAX	1	1	1	1	1	1	1
LAKE	0	0	0	0	0	0	0
WARM	1	1	1	0	0	0	1
NATSD	1	1	1	1	1	1	1
NATSF	1	1	1	1	1	1	1
CRANE	0	0	0	0	0	0	0
LOUIS	1	1	1	1	1	1	1
DAHL	1	1	1	1	1	1	1
PANAM	1	1	1	1	1	1	1
HUEN	1	1	1	1	1	1	1
CARD	1	1	1	1	1	1	1
PHIL	1	1	1	1	0	0	1
ANN	0	0	0	0	0	0	1
BAYV	1	1	1	0	1	1	0
IHEAD	0	0	0	0	0	0	1
SULL	0	1	0	0	0	0	0
YORK	1	1	1	1	1	1	1
MECH	1	1	1	1	0	0	1
SUPSD	1	1	1	1	1	1	1
SUPPH	1	1	1	1	1	1	1
NPT	1	1	1	1	1	1	1
NLON	0	0	0	0	0	0	0
KEY	1	1	1	1	1	1	1
SEASP	1	1	1	1	1	1	1
COR	0	0	0	0	0	0	0
EOD	0	0	0	0	0	0	0
WALL	1	1	0	0	1	1	1
MOOR	0	0	1	1	0	0	0
OSSD	1	1	1	1	1	1	1
OSWAR	0	0	0	1	0	0	0
ISECH	1	1	1	1	1	1	1
ISENOR	0	0	0	0	0	0	0
ISESD	0	0	0	0	0	0	0
ISEPH	0	0	0	0	0	0	0
MASO	0	0	0	0	0	0	0
NRL	1	1	1	1	1	1	1
NRLUW	0	0	0	1	0	0	0
ONR	1	1	1	1	1	1	1
FAC	1	1	1	1	1	1	1
AFWTF	1	1	1	1	1	1	1
FLNT	1	1	1	1	1	1	1
FNOR	1	1	1	1	1	1	1
FMAY	1	1	1	1	1	1	1
BARK	1	1	1	1	1	1	1
NPRDC	0	0	0	0	0	0	0
OPTEV	0	0	0	0	0	0	0
NCTRF	1	1	1	0	0	0	1
BETH	0	0	0	1	0	0	0
HLTH	1	1	1	0	1	0	1
MEDPEN	0	0	0	1	0	0	0
BIOLAB	0	0	0	1	1	1	0
SUBMED	1	1	1	0	0	0	1
DENGL	1	1	1	0	1	1	1
No. open	35	36	35	34	31	30	35
No. closed	21	20	21	22	25	26	21
Capacity	41578	41581	41591	42019	39572	39519	45066
Pct. reduct.	27.1	27.1	27.0	26.3	30.6	30.7	29.1
Avg. MV	26.8	26.2	26.7	27.0	27.7	28.1	26.8

BASELINE

OPEN	CLOSE
CHINA LAKE	NAWC INDY
PT. MUGU	NAWC LAKEHURST
PAX	NSWC CRANE
PAX DET WARMINISTER	NSWC ANNAPOLIS
NATSD	NSWC INDIANHEAD
NATSF	CRANE DET SULLIVAN (LAKE)
LOUISVILLE	NUWC NEW LONDON
DAHLGREN	NWAD CORONA
PANAMA CITY	EOD TECH CNTR
PORT HUENEME	AEGIS MOORESTOWN
CARDEROCK	NCCOSC DET WARMINISTER
NSWC PHILLY	NISE E NORFOLK
BAYVIEW	NISE W SAN DIEGO
YORKTOWN	NISE W PEARL HARBOR
NAVSEALOGCEN	NAVMASSO
FSTC SAN DIEGO	NRL UW ORLANDO
FSTC PEARL	NPRDC
NEWPORT	OPTEVFOR
KEYPORT	NAMRI BETHESDA
SEASPARROW	AEROMED PENSCAOLA
WALLOPS	BIODYNAMICS LAB N O
NRAD	
NISE E CHARLESTON	
NRL	
ONR	
NFESC	
AFWTF	
BARKING SANDS	
FTSC LANT NORFOLK	
FSTC DET NORFOLK	
FTSC DET MAYPORT	
NCTRF	
HEALTH RESEARCH S. DIEGO	
SUBMED	
DENTAL RES INST.	

2ND BEST CHANGES

CRANE DET SULLIVAN (LAKE)

3RD BEST CHANGES

AEGIS MOORESTOWN	AEGIS WALLOPS

+ 10 %

OPEN	CLOSE
MOORESTOWN	NAWC PAX DET WARM
NCCOSC DET WARM	BAYVIEW
NRL UWRL ORLANDO	AEGIS WALLOPS
NAMRI BETHESDA	NCTRF
AEROMED PENSACOLA	HEALTH RESEARCH CEN
BIODYNAMICS LAB NEW ORL.	SUBMED GROTON
	DENTAL INSTITUTE GL

- 10 %

BIODYNAMICS LAB NO	NAWC PAX DET WARM
	NSWC PHILLY
	NAVSEALOGCEN MECH.
	NCTRF
	SUBMED GROTON

- 20 %

BIODYNAMICS LAB NO	NAWC PAX DET WARM.
	NSWC PHILLY
	NAVSEALOGCEN MECH.
	NCTRF
	HEALTH RESEARCH LAB SD
	SUBMED GROTON

BASELINE TECH WKYR	EXCURSIONS
NO CHANGE FROM BASELINE	NO CHANGE FROM BASELINE

SITES WITH NO TECHNICAL WORKYEARS

NAWC HQ
ORELAND (LAKE)
NAESU PHILLY
NSWC HQ
NUWC HQ
NOC INDIAN HEAD
NCCOSC HQ
NAVTECHREP LAUREL

Technical Function Capacities and Requirements

Symbol	Description
twy93	1993 total technical workyears
twyfut	1997 total technical workyears
cur(l,f)	Current technical workyears in (l,f) life cycle/functional support area combination
mingro	Minimum growth in any (l,f) combination (1.25)
maxgro	Maximum growth in any (l,f) combination (2.00)
α	solves mingro x (1-((maxgro/mingro) - 1) x exp(-500α))= mingro + 0.01

Functional capacity (l,f) =

$$cur\,(l,f) \text{ X } mingro \text{ X } \left(1+((maxgro/mingro) - 1) \text{ X } \exp(-\alpha\; cur(l,f))\right)$$

Functional requirement (l,f) = $(twyfut \,/\, twy93) \text{ X } cur(l,f)$

Document Separator

TO: DAVID EPSTEIN

FROM: P. HATCHARD

INCLUDED

1) Comments on BSEC response to 15 May Q's – one page

2) Agreement with Naval Academy on water – five pages

3) BSEC answers to Gilchrest Questions of 8 June – one page

4) Response to (3) – one page

5) JSC Contractor Lease Costs – one page

BSEC Response to BRAC Questions of 15 May 1995

Comments

Q1/A1 (a)

No acknowledgement of other unique characteristics such as accommodates operating equipment, heat removal size, horizontal orientation.

Q1/A1 (b)

No acknowledgement of costs of at sea or dry dock tests. The ratio is at least 10:1. Dry docking reduces risk but costs even more.

Q3/A3

Agree that Naval Academy funding should not be counted as savings. However, the 5 people were counted as savings in the BSEC analysis but should not be. Also the reimbursement received from Naval Academy is $160K per year. If Annapolis disappears, they can spend that money on services from elsewhere, but the cost of 5 people transferred to Academy is still $340K per year, even at unburdened rates.

ADDITIONAL INFO

Annapolis data did not include packing and shipping costs. Also the cost for periodic maintenance, calibration, recertification, etc., may be "built into DBOF," but the sponsors are the folks who pay for it in reality.

7100
Ser 3120/1134
15 JUN 92

From: Commander, Carderock Division, Naval Surface Warfare Center
To: Superintendent, United States Naval Academy

Subj: INTRASERVICE SUPPORT AGREEMENT N00167-92182-011

Encl: (1) DD Form 1144, Agreement N00167-92182-011

1. Enclosure (1) is the support agreement between the U.S. Naval Academy, Annapolis, MD, and the Carderock Division, Naval Surface Warfare Center (CDNSWC), Bethesda, MD, for utilities serving the Retelle Room, US Naval Station, and Family Housing.

2. The agreement is provided for your review. It is requested that when approved, items 12, 14, 14a and 14b of the DD 1144 be completed.

3. Please return this support agreement to the Carderock Division, NSWC (Code 3120) for further processing.

4. The point of contact for support agreements is Mr. M. Lashley, Autovon 287-1116 or commercial (301) 227-1116.

D.K. KRUSE

Blind copy to: (w/encl)
312
41
4120
4201
w/o encl:
00
01
31
312 CF

Prepared by: M. Lashley, 312, x71116, bad, 22 April 1992

SUPPORT AGREEMENT

1. DOCUMENT IDENTIFIER ("X" one): [X] NEW [ ] REVIEW NO. [ ] REVISION NO. ___ [ ] TERMINATION

2. SUPPLIER (Name, Office Symbol & complete address)
Carderock Division
Naval Surface Warfare Center
Bethesda, MD 20084-5000
GEOGRAPHICAL AREA OR COUNTRY CODE: 24

2a. MAJOR COMMAND CODE: N00024
2b. SUBORDINATE COMMAND CODE: N00167
3. PRESENT AGREEMENT NUMBER: N00167-92182-011
3a. SUPERSEDED AGREEMENT NUMBER: N00167-83274-010
4. TERMINATION DATE (Month and Year): 06/95

5. RECEIVER (Name, Office Symbol & complete address)
U.S. Naval Academy
Annapolis, MD 21402-5000
GEOGRAPHICAL AREA OR COUNTRY CODE: 24

5a. DODAAC/FEDSTRIP NUMBER: N/A
5b. MAJOR COMMAND CODE: N00011
5c. SUBORDINATE COMMAND CODE: N/A

6. SUPPORT AGREEMENT RESOURCE SUMMARY

a. CATEGORY CODES	b. MAN YEARS (SUPPLIER)		c. GROSS ADDITIONAL COSTS (SUPPLIER)		
	MILITARY	CIVILIAN	TOTAL	NON-REIMBURSABLE	REIMBURSABLE
AP	0	0	$162,215	0	$162,215
TOTAL	0	0	$162,215	0	$162,215

6d. RECEIVER DATA (When applicable, provide similar data required in blocks 6a, b and c)

7. SAVINGS ACCRUED/COSTS INCURRED/MAN YEARS SAVED/EXPENDED TO FEDERAL GOVERNMENT

7a. SAVINGS	7b. COSTS	7c. MAN YEARS SAVED	7d. MAN YEARS EXPENDED
0 FY:	0 FY:	0 FY:	0 FY:

8. FUNDING AND REIMBURSEMENT ARRANGEMENT (Include all details concerning billing/reimbursement procedures, funding limitations, and the appropriate "billing/submit due" addresses. Also list those references which specifically apply to the type of organization being supported.)

Accrued actual costs will be provided by Code 4201 to Code 313 for periodic billing on SF1080 to Comptroller, U.S. Naval Academy.

Annual Work Requests (NAVCOMPT Form 2275) will be submitted at the beginning of each fiscal year, citing the funds allocated.

Document Separator

TO: DAVID EPSTEIN

FROM: P. HATCHARD

INCLUDED

1) Comments on BSEC response to 15 May Q's – one page

2) Agreement with Naval Academy on water – five pages

3) BSEC answers to Gilchrist Questions of 8 June – one page

4) Response to (3) – one page

5) JSC Contractor Lease Costs – one page

Cat Code	Support Function	Host will	Tenant Will
		Fuel Storage & Distribution: Provide facilities and personnel for receipt, storage, issue and stock control of fuel oil located at CARDEROCKDIV NSWC.	Advise Host sufficiently in advance of distribution requirements to insure receipt of fuel as required.

DEPARTMENT OF THE NAVY
OFFICE OF THE SECRETARY
1000 NAVY PENTAGON
WASHINGTON, D.C. 20350-1000

LT-0825-F16
BSAT/DD
8 June 1995

The Honorable Wayne T. Gilchrest
House of Representatives
Washington, D.C. 20515

Dear Mr. Gilchrest:

Thank you for your letter received on June 8, 1995, regarding the Environmental Non-CFC Facility at NSWC Annapolis.

The original Scenario Development Data Call response regarding NSWC Annapolis did not retain the Environmental Non-CFC Facility because of the view that the R&D program would be finished by the end of the six-year closure implementation period. During its deliberations, the Base Structure Evaluation Committee (BSEC) decided that the facility should be retained and relocated to NSWC Philadelphia so that it could support the second phase of the non-CFC program. This phase involves in-service engineering (ISE) support for implementation of non-CFC hardware into the fleet. This work is considered a good fit with NSWC Philadelphia's mission of providing ISE support to the fleet. The BSEC directed that while costs for relocating the facility should be included in the COBRA analysis, R&D personnel should not be included because ISE personnel at NSWC Philadelphia would pick up the implementation work for the fleet.

No severe adverse schedule impact will occur to the R&D program because the relocation would take place on a gradual basis throughout the closure implementation period. During this period, the completion of the R&D program would be synchronized with the movement of the non-CFC facilities. Based on information provided on incremental financing requirements, R&D efforts are to be largely completed in FY 2001. The non-CFC facilities (minus the shipboard cooling systems) need to be custom designed to the unique physical characteristics of the Philadelphia site, therefore the new facilities would be built to accommodate the shipboard cooling systems prior to completion of the R&D program. Costs for the new facilities at NSWC Philadelphia are included in our COBRA analysis. At the completion of the R&D efforts, the shipboard cooling systems would be relocated to NSWC Philadelphia for the commencement of the ISE phase.

As always, if I can be of any further assistance, please let me know.

Sincerely,

Charles P. Nemfakos
Vice Chairman,
Base Structure Evaluation Committee

Re: BSEC Answers to Congressman Gilchrest Questions of 8 June 1995.

The questions to BSEC asked how can you continue a scheduled and mission critical CFC program without the experienced R&D staff.

BSEC said R&D will be completed at Annapolis with the R&D staff, and they will not be necessary at Philadelphia. This is wrong! In the original scenario responses (November 1994 through January 1995) Annapolis was to be abandoned with all possible speed (2-3 years) and R&D would commence at Philadelphia. This rapid closure requirement came from the SECNAV recommendations for execution of BRAC 95 actions. In more recent Navy plans to minimize program disruption of CFC R&D, Annapolis CFC efforts would wind down with last Annapolis tasks completed in 3-4 years - but this plan also requires CFC R&D also to commence at Philadelphia in FY96. With this transition schedule, Philadelphia would have more R&D underway in FY 97 than Annapolis.

All Navy plans, as described above require significant, early conduction of R&D at Philadelphia - therefore, the elimination of the Annapolis CFC R&D staff must require program continuation with less capable personnel without R&D experience.

JSC CONTRACTOR LEASED FACILITY 06-Jun-95

		FY95
COST OF CONTRACTOR LEASED FACILITY		
LEASE COSTS:		
Lease Cost of Contractor Facility		1.505
Taxes		0.116
	SUBTOTAL	1.621
OTHER COSTS ASSOCIATED WITH LEASED FACILITY		
Electricity		0.236
Water & Sewage		0.010
Trash Collection		0.008
Fire Insurance		0.005
Security Guard Force		0.116
Building maintenance, repairs, etc.		0.060
	SUBTOTAL	0.435
	TOTAL	2.056

TRAVEL BETWEEN LEASED FACILITY & NSWC FACILITY

COURIER BETWEEN BUILDINGS: (5 trips daily)		
Drivers		0.042
Vehicle lease		0.004
gas & maintenance		0.001
	SUBTOTAL	0.047

OTHER TRAVEL MADE BY EMPLOYEES BETWEEN BUILDINGS:
Total trips between buildings 5,445 per year
No. of miles RT between buildings 14 miles roundtrip
Approximately 76,230 miles/year
Takes Approximately 45 minutes for roundtrip

Estimated cost of travel between buildings:		
Mileage reimbursement @ .30/mile		0.023
Production time lost due to travel		0.143
	SUBTOTAL	0.166
TOTAL COST OF TRAVEL BETWEEN BLDGS		0.213

INFORMATION CONCERNING LEASE:
Current lease between IITRI and Furhman expires 30 Jun 95. IITRI has just been awarded the follow-on contract for JSC. Basic JSC contract period ends 30 Sep 98 and then there is an option for a 24 month extension. IITRI currently negotiating with landlord for new lease. Could be less than the above lease costs--should not be greater. Normally, there is a six month penalty for breaking the lease. IITRI trying to negotiate a lease that if they give 6 months notice prior to 30 Sep 98, there would be no penalty for breaking lease. IITRI tries to negotiate lease terms to coincide with contract with JSC.

IN THE CFC compressor lab Commissioner Cornella asked Dick Helmick if he would go to Phila.

He said "not likely"

He could have said:

the BSEC specifically directed that only CFC facilities would move — the positions of the Annapolis CFC personnel would be eliminated and their elimination was counted as "savings" in their COBRA analysis

PROPOSED QUESTIONS TO BE DISCUSSED ON MONDAY:

1. HOW MANY CFC EMPLOYEES WILL MIGRATE TO PHILA?
2. WHEN ARE YOU PREPARED TO CLOSE NSWC ANNAPOLIS -- IS IT 1998, AS DOCUMENTED IN THE COBRA OR IS IT 2001 AFTER MOST OF THE NSSN, SEAWOLF, AND CFC WORK IS COMPLETED?
3. DEEP DEPTH SIMULATION FACILITY
   - HOW MANY TESTS DID YOU CONDUCT ON THE DEEP DEPTH SIMULATION FACILITY DURING 1992, 1993, 1994, AND 1995? WERE THESE TESTS ALL ON NEW SYSTEMS? (PLEASE RESTRICT YOUR ANSWER FOR THIS AND ALL QUESTIONS TO TESTING DONE BY OR FOR THE NAVY)
   - AFTER INTRODUCTION OF A PLATFORM, DOES IT EVER COME BACK TO THIS FACILITY FOR ADDITIONAL TESTING?
   - HOW MANY TESTS DO YOU ENVISION WILL BE CONDUCTED DURING EACH OF THE NEXT 5 YEARS? 10 YEARS? 20 YEARS?
   - ON AVERAGE, HOW MUCH DOES IT COST TO CONDUCT A TEST USING THIS FACILITY?
   - ON AVERAGE, HOW MUCH DOES IT COST TO CONDUCT A TEST USING OTHER METHODS?
   - DO THESE FIGURES INCLUDE COSTS SUCH AS MILITARY PERSONNEL, COSTS OF USING A DRYDOCK (USING STANDARD SHIPYARD CHARGES), A REASONABLE DAILY RATE FOR THE USE OF A SUBMARINE, ETC. PLEASE EXPLAIN YOUR ANSWER.
4. FLUID DYNAMICS FACILITY
   - HOW MANY TESTS DID YOU CONDUCT ON THE DEEP DEPTH SIMULATION FACILITY DURING 1992, 1993, 1994, AND 1995? WERE THESE TESTS ALL ON NEW SYSTEMS? (PLEASE RESTRICT YOUR ANSWER FOR THIS AND ALL QUESTIONS TO TESTING DONE BY OR FOR THE NAVY)
   - AFTER INTRODUCTION OF A PLATFORM, DOES IT EVER COME BACK TO THIS FACILITY FOR ADDITIONAL TESTING?
   - HOW MANY TESTS DO YOU ENVISION WILL BE CONDUCTED DURING EACH OF THE NEXT 5 YEARS? 10 YEARS? 20 YEARS?
   - ON AVERAGE, HOW MUCH DOES IT COST TO CONDUCT A TEST USING THIS FACILITY?
   - ON AVERAGE, HOW MUCH DOES IT COST TO CONDUCT A TEST USING OTHER METHODS?
   - DO THESE FIGURES INCLUDE COSTS SUCH AS MILITARY PERSONNEL, COSTS OF USING A DRYDOCK (USING STANDARD SHIPYARD CHARGES), A REASONABLE DAILY RATE FOR THE USE OF A SUBMARINE, ETC. PLEASE EXPLAIN YOUR ANSWER.

5.
6.

1. CONFIRM THAT THE ~~CFC~~ EQUIPMENT WILL MOVE BUT NO STAFF FROM ANNAPOLIS WILL MOVE.

2. MOVING

3. HOW WILL TESTS CURRENTLY DONE IN THE ___ AND ___ BE PERFORMED IN THE FUTURE. IS THERE AN ADDED COST TO THE NAVY [illegible]
D COSTS, WHAT IS THE ANNUAL COST TO [illegible]

Team Concepts

* one copy placed in the File

Alex
David E. -

June 6, 1995

Mr. David S. Lyles
Staff Director
Defense Base Closure and Realignment Commission
1700 North Moore Street
Suite 1425
Arlington, VA 22209

Dear Mr. Lyles:

I appreciated your June 5, 1995, letter responding to my concerns about a member of your staff. Your direct involvement and review of this situation has gone a long way in relieving my concerns.

However, please do not get the wrong impression from my letter and concerns in this case. I consider you overall staff to be second-to-none and anyone would be hard pressed to duplicate such a fine team. People like: Alex Yellin, Bob Cook, Frank Cirillo, Ben Borden, and Ed Brown are well known and respected in the BRAC world. The credibility and intergity people like these bring to the BRAC process is priceless.

In closing, I totally endorse the level-playing field approach you discussed in your letter. This type of approach serves as the pillar of an independent Commission.

Sincerely,

Jim Casey

Jim Casey
President & CEO

13539 Smallwood Lane
Chantilly, VA 22021
(703) 378-5350 FAX (703) 378-5325

FAX 703-696-0550

TO: DAVID EPSTEIN

SUBJECT: JSC FLOOR SPACE

JSC SPACE REQUIREMENTS

Special Use Rooms	Total SQ FT
Lobby	419
Reception Area	78
Mail room/class doc control	1,005
Mechanical Room	2,002
Supply Room	355
Computer Room	4,221
AUTODIN	450
Restrooms	1,208
SCIF	1,169
UNIVAC Services	315
Conf Room	1,660
Telephone Room	524
Training Room	150
Canteen	312
Utility room	180
Copier Room	450
Storage Room	1,169
Maintenance Shop	313
Vault	500
Special Use Rooms Sub Total	**15,667**
Hallways	8,400
Construction Space & Stairways	6,000
Office Space*	29,850
TOTAL GROSS SQ FOOTAGE	**59,917**

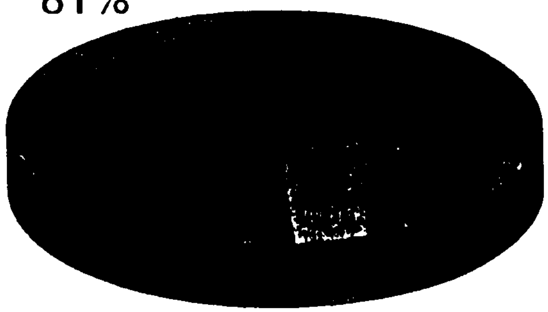
*149 Gov + 50 Contractor = 199 people

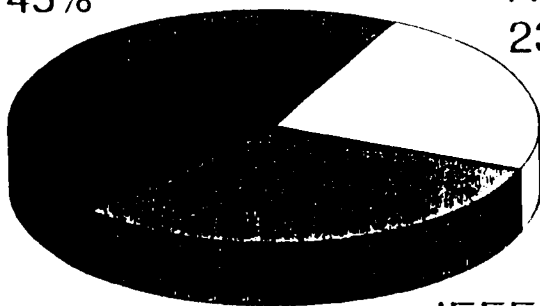
Document Separator

Machinery R&D Directorate

PROFESSIONAL ACTIVITIES

CY 1993





NSWC
Naval Surface Warfare Center
A tradition of excellence!

CONCLUSIONS

- Machinery R & D is Healthy and Must Remain So:
  - Responsive to Need
  - Growing Business Base
  - Top Marks in Strategic Assessments

- Directorate Capabilities are Excellent
  - Experienced, Competent, Dedicated Professional Staff
  - World Class, Growing Lab Facilities

Loss of Experience Base for Annapolis in Machinery R&D

	Approximate People/Manyears
• Experience Base 1 January 1994	365/6800
• 1994 Attrition due to Separation Pay Incentives (31personnel)	31/786
• 1995 Attrition due to SIP applications already approved (26 personnel)	26/786
• Balance estimated as of 10/1/95	308/5084

Thus a loss of approximately 15% of the personnel represents a loss of over 25% of the experience knowledge base.

• Estimated attrition of Annapolis Machinery R&D work force due to move to Philadelphia & Carderock is 50% or 154 people with a concentration as above in the most experienced. A conservative estimate is a loss of 65% of the experience base in man years thus the moving loss is:	154/3305
• Balance of experience that may be available after move	154/1779

Thus the combine effect of retirement incentives and attrition due to relocation is a loss of 60% of the personnel and 74% of the experience base. This does not include attrition for "normal" reasons which will likely increase under the threat of closure.

• Alternatively using the same ratio of people to years of experience noted in the 1994/95 losses, the 50% personnel loss translates to an 83% experience loss. In this case the moving loss is:	154/4218
and the remaining experience after moving is:	154/866

Thus a worst case results of SIPS and relocation is a loss of 88% of the experience base.

Explanation of Cost Delta

The internally generated NSWC\Carderock Headquarters cost* for the closure of NSWC\Annapolis differs from the cost generated by the community group using the COBRA model. The NSWC\Carderock HQ cost is $78.1M, whereas the community COBRA cost is $83.5M. These differences are explained below:

NSWC	78.1M
Add missing MILCON at Carderock	+7M
Deduct more generous personnel moving expense	-8M
Add program management and support expense	+2M
Add missing one-time costs at NSWC\Philadelphia	+3.5M
Total corrected NSWC	**82.6M**

This agrees well with the $8[illegible] [illegible]lation. The remaining <$1M is due to the vari[illegible] [illegible]used by NSWC which are not applicable [illegible]

Transition Center Middleton SIPS BRAC

also correct MILCON

595-6370

Marriott C

*attached

Is the current plan in the process do you envision that
will you transfer non-CFC people
non CFC
how many
when

SCENARIO 35A VS COBRA
ANNAPOLIS-DRAFT VERSION

	FY96		FY97		FY98		FY99		Totals	
	35A	BSEC	35A	BSEC	35A	BSEC	35A	BSEC	35A	BSEC
"One-Time Unique Moving Costs"										
Magnetics Fields Laboratory	$0	$0	$5,000	$0	$0	$0	$0	$0	$5,000	$0
Advanced Propulsion Machinery Facility	$2,500	$0	$2,500	$0	$5,000	$0	$0	$0	$10,000	$0
Machinery Acoustic Silencing Laboratory	$0	$0	$4,900	$0	$0	$0	$0	$0	$4,900	$0
Advanced Shipboard Auxiliary Machinery Facilities	$1,500	$0	$700	$0	$0	$0	$0	$0	$2,200	$0
Advanced Electric Propulsion Development Facility	$0	$0	$2,300	$0	$0	$0	$0	$0	$2,300	$0
Electric Power Technology Facility	$0	$0	$3,000	$0	$0	$0	$0	$0	$3,000	$0
Pulsed Power Facility	$2,000	$0	$0	$0	$0	$0	$0	$0	$2,000	$0
Joint Spectrum Center	$0	$0	$1,100	$0	$0	$0	$0	$0	$1,100	$0
Thermal Spray System Facility	$0	$0	$25	$0	$0	$0	$0	$0	$25	$0
Polyurethane Processor Facility	$0	$0	$25	$0	$0	$0	$0	$0	$25	$0
Reactive Metals Spray Forming Facilities	$0	$0	$100	$0	$0	$0	$0	$0	$100	$0
Non-CFC R&D Systems Facilities	$0	$0	$0	$0	$11,200	$0	$0	$0	$11,200	$0
Subtotal	$6,000	$0	$19,650	$0	$16,200	$0	$0	$0	$41,850	$0
Equipment/Support Tonnage	40	0	109	0	5	0	0	0	154	0
"Other One-Time Unique Costs"										
Contract Termination Costs	$2,500	$0	$4,300	$0	$1,000	$0	$0	$0	$7,800	$0
Depreciation of Capital Equipment	$0	$0	$0	$0	$0	$0	$8,919	$0	$8,919	$0
Close Annapolis Library	$15	$0	$0	$0	$0	$0	$0	$0	$15	$0
Subtotal	$2,515	$0	$4,300	$0	$1,000	$0	$8,919	$0	$16,734	$0
"Other Unique One-Time Costs"										
Carderock										
Environmental Impact Assessment	$125	$125	$0	$0	$0	$0	$0	$0	$125	$0
Environmental Mitigation	$125	$0	$0	$0	$0	$0	$0	$0	$125	$0
Subtotal	$250	$125	$0	$0	$0	$0	$0	$0	$250	$0
NRL Chesapeake Beach Detachment										
Environmental Permits/Installation Costs	$0	N/A	$100	N/A	$0	N/A	$0	N/A	$100	N/A
Philadelphia										
Office/Equipment Realignments	$21	N/A	$28	N/A	$3	N/A	$0	N/A	$52	N/A
Advanced Propulsion Machinery Facility	$25	N/A	$0	N/A	$0	N/A	$0	N/A	$25	N/A
Machinery Acoustics Silencing Laboratory	$0	N/A	$100	N/A	$0	N/A	$0	N/A	$100	N/A
Advanced Shipboard Auxiliary Machinery Facilities	$50	N/A	$0	N/A	$0	N/A	$0	N/A	$50	N/A
Advanced Electric Propulsion Development Facility	$0	N/A	$40	N/A	$0	N/A	$0	N/A	$40	N/A
Electric Power Technology Facility	$0	N/A	$50	N/A	$0	N/A	$0	N/A	$50	N/A
Pulsed Power Facility	$50	N/A	$0	N/A	$0	N/A	$0	N/A	$50	N/A
Sea Survival	$0	N/A	$5	N/A	$0	N/A	$0	N/A	$5	N/A
Subtotal	$146	$3,662	$223	$2,723	$3	$3	$0	$0	$372	$6,388
"Miscellaneous Recurring Costs"										
M&R-Philadelphia (Fire Protection, Utilities, etc)	$0	$0	$380	$0	$0	$0	$0	$0	$380	$0
Leasing Costs-Joint Spectrum Center	$0	$0	$1,000	$0	$0	$0	$0	$0	$1,000	$0
Subtotal	$0	$0	$1,380	$0	$0	$0	$0	$0	$1,380	$0
MILCON										
Carderock										
RDT&E Facilities (10,000 sq ft)									$0	$0
Thermal Spray System Facility	$350	$350	$0	$0	$0	$0	$0	$0	$350	$350
Polyurethane Processor Facility	$400	$400	$0	$0	$0	$0	$0	$0	$400	$400
Reactive Metals Spray Forming Facilities	$250	$250	$0	$0	$0	$0	$0	$0	$250	$250
Subtotal	$1,000	$8,000	$0	$0	$0	$0	$0	$0	$1,000	$8,000
"Other"	N/A	$1,148	N/A	$1,149	N/A	$607	N/A	$0	N/A	$2,904
Personnel Related Costs										
PCS ($50K per person)										
To Carderock	$500	$0	$450	$450	$0	$0	$0	$0	$950	$450
To Philadelphia	$5,350	$0	$7,000	$7,000	$1,700	$1,700	$0	$0	$14,050	$8,700
Subtotal	$5,850	$0	$7,450	$7,450	$1,700	$1,700	$0	$0	$15,000	$9,150
Terminations										
SIPS	$1,250	$0	$0	$0	$0	$0	$0	$0	$1,250	$0
Separations	$45	$0	$150	$0	$113	$0	$0	$0	$308	$0
Subtotal	$1,295	$0	$150	$0	$113	$0	$0	$0	$1,558	$0
RIF	N/A	$128	N/A	$299	N/A	$64	N/A	$0	N/A	$491
Retire	N/A	$59	N/A	$118	N/A	$20	N/A	$0	N/A	$197
Moving	N/A	$2,092	N/A	$3,608	N/A	$613	N/A	$0	N/A	$6,313
Freight	N/A	$105	N/A	$334	N/A	$99	N/A	$0	N/A	$538
Unemployment	N/A	$19	N/A	$44	N/A	$9	N/A	$0	N/A	$72
Other	N/A	$0	N/A	$0	N/A	$4	N/A	$0	N/A	$4
Personnel Related Totals	$7,145	$2,403	$7,600	$4,403	$1,813	$809	$0	$0	$16,558	[illegible]
SUMMARY OF COSTS										
"One-Time Unique Moving Costs"	$6,000	$0	$19,650	$0	$16,200	$0	$0	$0	$41,850	$0
"Other One-Time Unique Costs"	$2,515	$0	$4,300	$0	$1,000	$0	$8,919	$0	$16,734	$0
"Other Unique One-Time Costs"	$396	$3,787	$223	$2,723	$3	$3	$0	$0	$[illegible]22	$6,388
"Miscellaneous Recurring Costs"	$0	$0	$1,380	$0	$0	$0	$0	$0	$1,380	$0
MILCON	$1,000	$8,000	$0	$0	$0	$0	$0	$0	$1,000	$8,000
"Other"	N/A	$1,148	N/A	$1,149	N/A	$607	N/A	$0	N/A	$2,904
Personnel Related Costs	$7,145	$2,403	$7,600	$4,403	$1,813	$809	$0	$0	$16,558	$7,615
Totals	$17,056	$15,338	$33,153	$8,275	$19,015	$1,419	$8,919	$0	$78,144	$24,907

p 3-3R

p 3-3R also 3-4R

p 3-4R

COBRA

COBRA

check COBRA addition

NAVSEA Golden Nugget Facilities
Annapolis Standings

In the spring of 1994, Naval Sea Systems Command (NAVSEA) undertook the task of examining engineering capabilities and prioritizing them for the purpose of "right sizing", in response to reduced budgets. In preparation for that the Carderock Division was asked to identify no more than four facilities for Annapolis which would be considered essential to the Navy's future mission. The Carderock Division submitted the:

(1) Deep Ocean Vehicle and Machinery Pressure Facility,
(2) Machinery Acoustic Silencing Laboratory,
(3) Submarine Fluid Dynamics Facility, and the
(4) Magnetic Fields Facility.

At the NAVSEA level, these were reduced to two (see attached). These were the Magnetic Fields Laboratory and the Deep Ocean Pressure Facility.

According to the DOD recommendations for BRAC 95, the Deep Ocean Pressure Facility and the Submarine Fluid Dynamics Facility will be abandoned.

COMNAVSEA VADM STERNER - ULTIMATE RECIPIENT
4 to 2 PROBABLY AT NSWC;
ACCEPTED ? AT NAVSEA

NAVSEA RIGHTSIZING - APPROACH - THE FUTURE

ENGINEERING CAPABILITIES EXAMINATION

POLICY IMPERATIVES*

1. EXPLOSIVE SAFETY QUANTITY DISTANCE SAFETY ARCS
2. ACCESS TO MAJOR, DEEP WATER PORTS
3. CONCEPTUALIZE AND TECHNICALLY PACKAGE MAJOR WEAPON SYSTEMS WITH TRANSLATION OF MILITARY REQUIREMENTS INTO TECHNICAL SPECIFICATIONS
4. NO-RISK, ORGANIC LARGE DECK DRYDOCKS
5. BEFORE A REQUIRED CAPABILITY IS ELIMINATED, DON MUST ENSURE CAPABILITY EXIST IN PRIVATE SECTOR
6. RESPOND TO CHANGES IN THE TREAT, TECHNOLOGY APPLICABLE TO MEETING A THREAT, AND TIMES OF URGENT NATIONAL NEED
7. ORGANIC CAPABILITY TO SUPPORT FLEET MAINTENANCE THROUGH THE INTERMEDIATE LEVEL
8. REDUNDANT SUPPLIERS/PRODUCTION PLANTS FOR EXPLOSIVES/HAZMAT
9. CONTROL AND EVALUATE T/E PROGRAMS
10. GUARANTEED ACCESS TO TEST RANGES
11. CONTROL AND VALIDATE ALL ASPECTS OF ACQUISITION-SMART BUYER, IN-HOUSE TECHNICAL AUTHORITY
12. CALIBRATION AND METROLOGY TRACEABILITY
13. RETAIN CRITICAL AND UNIQUE FACILITIES INCLUDING THOSE FOR HIGHLY CLASSIFIED WORK
14. MANAGE ORDNANCE LOGISTICS
15. PROVIDE JOINT SERVICE FUNCTIONS
16. CERTIFY SHIPS, SUBS, WEAPONS PRIOR TO FLEET USE

* COMNAVSEA MEMO, DATED 14 FEBRUARY 1994

GOLDEN NUGGET CRITERIA

1. TRULY UNIQUE AND ESSENTIAL
   - A. NO INDUSTRY CAPABILITY
   - B. NO DOD CAPABILITY
   - C. CANNOT BE MOTHBALLED FOR POSSIBLE RECONSTITUTION
   - D. HIGHLY CLASSIFIED WORK
2. HIGH RISK - INDUSTRY SHIES AWAY FROM
3. NEEDED CAPACITY - INDUSTRY HAS INSUFFICIENT CAPACITY
4. MISSION ESSENTIAL - RISK TO NAVY MISSION IF NOT AVAILABLE TOO GREAT
   - A. IS FUNDAMENTAL TO SHIP, ORDNANCE, AND COMBAT SYSTEM ACQUISITION
5. ALLOWS NAVSEA TO BE A SMART BUYER
   - A. NECESSARY FOR GOVERNMENT CONCEPT DEVELOPMENT, TEST, VALIDATION, AND ACCEPTANCE
6. SUBSTANTIVE COMPETITION
7. IMPOSSIBLE TO RECONSTITUTE

NAVSEA CRITICAL ENGINEERING FACILITIES

NAVSEA CORPORATION SITE EVALUATION - NSWC

		GOLDEN NUGGETS		IMPERATIVES	
NSWC SITE	BACKGROUND	DESCRIPTION	CRITERIA	DESCRIPTION	VALUE
CARDEROCK MD	Mission: Provide research, development, test and evaluation, fleet support, and in-service engineering for surface and undersea vehicl hull, mechanical and electrical systems, and propulsors; provide logistics R&D; and provide support to the Maritime Administration and the maritime industry.	**Carderock, Md.** Corporate technical knowledge including S&T, development, acquisition, production support and Fleet support for surface ship and submarine hull, mechanical, and equipment. -Surface Warfare Analysis -Ship Vulnerability & Surviva bility (incl. submarines) -Ship active & passive sign. (incl. submarines) -Surface & Undersea Vehicle hull, machinery, propulsors and equipment	1A No Industry 1B No DOD 1D Hi Class 3 Needed Cap 4 Navy Mis Est 5 Smart Buyer 6 Sub Compet	3 Translate Req 5 DON Ensure Priv Sector 6 Changes To Threat 9 T&E Programs 11Acq Smart Buyer 15 Joint Service 16 Certify Ship/System 13 Critical and Unique	H H H H M H M H
	This set of facilities is required to support the Navy's corporate technical knowldge for hydro-dynamics including performance, maneuvering and seakeeping	**Hydrodynamic RDT&E Fac** - ship vulnerability & survi-vability (incl. submarines) - surface & undersea vehicle hull, machinery, propulsors and equipment	1A No Industry 1B No DOD 1D Hi Class 3 Needed Cap 4 Navy Mis Est 5 Smart Buyer 6 Sub Compet	3 Translate Req 5 DON Ensure Priv Sector 6 Changes To Threat 9 T&E Programs 11Acq Smart Buyer 15 Joint Service 13 Critical and Unique	H H H H M H H
ANNAPOLIS, MD	Support the mission of the Carderock Division of NSWC	**Annapolis, Md.** Corporate technical knowledge including S&T, development, acquisition, production support and Fleet support for surface ship and submarine hull, mechanical and equipment. -Ship Vulnerability & Surviva bility (incl. submarines)	1B No DoD Cap 1D Hi Class 4 Navy Mis Est 5 Smart Buyer 6 Sub Compet	3 Translate Req 5 DON Ensure Priv Sector 6 Changes To Threat 7 Fleet Maintenance 9 T&E Programs 11Acq Smart Buyer 15 Joint Service 16 Certify Ship/System	H H H H H M H H

NAVSEA CRITICAL ENGINEERING FACILITIES

NAVSEA CORPORATION SITE EVALUATION - NSWC					
		GOLDEN NUGGETS		IMPERATIVES	
NSWC SITE	BACKGROUND	DESCRIPTION	CRITERIA	DESCRIPTION	VALUE
ANNAPOLIS cont.		-Ship Active & Passive Sign (incl. submarines) -Surface & Undersea Vehicle hull, machinery, propulsors and equipment			
	This facility if required to support the Navy's corporate technical knowledge for ship and submarine magnetic silencing	**Magnetic Fields Laborato** - ship active & passive sign - surface & undersea vehicle hull, machinery, propulsors and equipment	1A No Industry 1B No DOD Cap 3 Needed Cap 4 Navy Mis Est	3 Translate Req 5 DON Ensure Priv Sector 6 Changes To Threat 10 Guarantee Access 11 Acq Smart Buyer 13 Critical and Unique 16 Certify Ship/System	H H H H H H M
	The Deep Ocean Pressure Fac is the only facility in the free world to test large objects (10ft in diameter) to pressures equal to the deepest part of the ocean. It is also capable of testing systems while they operate, including manned submersibles	**Deep Ocean Pressure Fac** - surface & undersea vehicle hull, machinery, propulsors and equipment	1A No Industry 1B No DOD Cap 1D Hi Class 2 Hi Risk 3 Needed Cap 4 Navy Mis Est 5 Smart Buyer 6 Sub Compact	5 DON Ensure Priv Sector 6 Changes To Threat 9 T&E Programs 11 ACQ Smart Buyer 13 Critical and Unique 15 Joint Service 16 Certify Ship/System	H H H H H H H

Two "Golden Bullets" are missing! ??
* Machinery Acoustic Silencing Lab
* Fluid Dyn Facility

NSWC Core Technical Capabilities
Annapolis Standings

The Naval Surface Warfare Center formed a Leadership Working Group to identify and preserve Core Technical Capabilities among its five Divisions. Each Division developed a description of its Core Technical Capabilities and submitted them to a review by the NSWC Board of Directors. The Carderock Division submitted 23. A total of 78 technical capabilities were assembled at NSWC headquarters. The Board of Directors, along with the Technical Directors of each Division, then evaluated each Capability according to relevance to mission, business base and customers, jointness, location and facilities.

The list of 78 Technical Capabilities, along with a spreadsheet of evaluation results, is attached. The spreadsheet shows the individual scores of each Division Technical Director plus members of NSWC Board of Directors (12 each), and is arranged in order of highest average score. Three Annapolis Core Capabilities, as judged by their peers, are ranked in the Top Ten. These are:

Propulsion Machinery Systems and Components (#3),

Auxiliary Machinery Systems and Components (#7), and

Electrical Machinery Systems (#10).

Division heads of NSWC sites all Divisions, CO + TD of each division (RADM SARGENT of NAVSURFWARCEN)

LWG TASKING

- LEADERSHIP WORKING GROUP FORMED TO DEVELOP A FRAMEWORK THAT DESCRIBES CURRENT AND FUTURE NSWC WORK DISTRIBUTION THAT WILL IDENTIFY AND PRESERVE CORE TECHNICAL CAPABILITIES

- THE LWG EFFORTS WILL SUPPORT STRATEGIC THRUST #6: PRESERVE CORE TECHNICAL CAPABILITY AND ELIMINATE EXCESS TECHNICAL CAPACITY

*

NSWC

CORE TECHNICAL CAPABILITY DEFINITION

- COMPRISED OF A CADRE OF TECHNICAL PEOPLE WITH KNOWLEDGE, SKILL, EXPERIENCE, AND REQUISITE FACILITIES AND EQUIPMENT. BLENDING THESE INTELLECTUAL AND PHYSICAL ASSETS YIELDS THE ABILITY TO DELIVER TECHNICAL PRODUCTS. THIS TECHNICAL CAPABILITY IS CORE WHEN THE FUNCTION IS INHERENTLY GOVERNMENTAL OR ENABLES THE ACCOMPLISHMENT OF NSWC KEY MISSION ELEMENTS, PARTICULARLY VALUE JUDGEMENTS AFFECTING TECHNOLOGICAL SUPERIORITY; i.e., THE QUALITY AND EFFECTIVENESS OF OUR WEAPONS, COMBAT SYSTEMS AND SHIP SYSTEMS. THESE FUNCTIONS MUST BE PERFORMED ORGANICALLY.

8 NOV 91

NSWC

GUIDING PRINCIPLES

- THE DECISION MAKING PROCESS LEADING TO MATERIAL ACQUISITION IS INHERENTLY A GOVERNMENTAL FUNCTION.

- EQUALLY AS FUNDAMENTAL TO GOVERNMENTAL R&D IS THE POLICY THAT THE GOVERNMENT SHALL RELY TO A LARGE DEGREE ON THE PRIVATE SECTOR TO SUPPLY ITS NEEDS. *

- FUNCTION OF SELECTING AMONG TECHNICAL ALTERNATIVES REQUIRES INTERNAL TECHNICAL CAPABILITY OF SUFFICIENT BREADTH, DEPTH AND CONTINUITY TO ASSURE THE PUBLIC INTEREST.

- SUCH CAPABILITY CAN ONLY BE SUSTAINED THROUGH CONTINUED, DIRECT PARTICIPATION IN ALL PHASES OF R&D (TECH BASE TO USER SERVICES AND SUPPORT TO OPERATING FORCES) BY GOVERNMENT TECHNICAL ORGANIZATIONS

• SUMMARIZED FROM "REQUIRED IN-HOUSE CAPABILITIES FOR DOD's RDT&E"
William J. Perry, USD, Research and Engineering, 1 Oct 1980

CARDEROCK DIVISION

CAD 1. Cost Benefit/Analysis Simulation and Modelling

CAD 2. Vulnerability and Survivability Systems

CAD 3. Active and Passive Acoustic Signatures and Silencing Systems

CAD 4. Non-Acoustic Signatures and Silencing Systems

CAD 5. Propulsion Machinery Systems and Components

CAD 6. Auxiliary Machinery Systems and Components

CAD 7. Electrical Machinery Systems and Components

CAD 8. Hull and Deck, and UNREP Machinery Systems and Components

CAD 9. Habitability and Hull Outfitting Systems and Components

CAD 10. Undersea Vehicle Sail and Deployed Systems

CAD 11. Hull Forms and Propulsors

CAD 12. Materials and Processing Technology

CAD 13. Structures

CAD 14. Small Surface and Undersea Manned and Unmanned Vehicles including Combatant Craft

CAD 15. Marine Corps Vehicle Systems and Components

CAD 16. Designs and Integrated Systems

CAD 17. Shipbuilding and Manufacturing Technology

CAD 18. Aircraft/Ship Interfaces

CAD 19. Experimental Aerodynamics

CAD 20. Environmental Quality Science and Systems

CAD 21. Logistics

CAD 22. Model Experiments and Full-Scale Vehicle Trials/Measurements

CAD 23. Multidisciplinary/Multi-System Analytical and Numerical Modelling

CRANE DIVISION

CRD 1. Electronic Warfare Systems

CRD 2. Naval Gun Warfare Systems

CRD 3. Microelectronic Technology

CRD 4. Electronic Module Test and Repair

CRD 5. Microwave Components

CRD 6. Electrochemical Power Systems

CRD 7. Acoustic Sensors

CRD 8. Surface Missile Systems Launchers

CRD 9. Small Arms

CRD 10. Conventional Ammunition

CRD 11. Pyrotechnics

CRD 12. Mechanical Manufacturing/Repair/Overhaul

CRD 13. Management & Distribution of Naval Drawings

CRD 14. Shipboard Physical Security

CRD 15. Night Vision/Electro-Optics

CRD 16. Mine Countermeasures

CRD 17. Radar

DAHLGREN DIVISION

DD 1. Surface and Strategic Warfare and Cost Analysis

DD 2. Combat Systems Engineering

DD 3. Joint Mission Planning Systems

DD 4. RF and EO Sensors

DD 5. Combat & Weapon Control Systems

DD 6. Weapon Systems

DD 7. Theater Air Defense Systems

DD 8. Surface Ship Defense Systems

DD 9. Cooperative Engagement Capability Systems

DD 10. Tactical Ballistic Missile Systems

DD 11. Gun Weapon Systems

DD 12. Marine Corps Weaponry

DD 13. Strategic and Space Systems

DD 14. Electronic Warfare Systems

DD 15. Mine Warfare Systems

DD 16. Amphibious Warfare Systems

DD 17. Special Warfare Systems

DD 18. Diving and Life Support Systems

DD 19. Electromagnetic Environmental Effects (E3)

DD 20. Weapon Systems Safety

DD 21. Chemical/Biological Warfare Defense Systems

DD 22. Warheads

DD 23. Weapons Materials

DD 24. Defense against Nuclear Weapons Radiation Effects

DD 25. Electrochemical Power Sources (Batteries)

DD 26. Magnetic Silencing

INDIAN HEAD

IHD 1 - Rocket/Missile/Gun Propulsion

IHD 2 - Energetics Manufacturing/Manufacturing Technology

IHD 3 - Cartridge Actuated Devices, Propellant Actuated Devices, and Aircrew Escape Propulsion Systems Tri-Service

IHD 4 - Explosives

IHD 5 - Missile Simulator/Trainers/Test and Diagnostic Equipment

IHD 6 - Ordnance Environmental Support

IHD 7 - Explosive Safety Engineering

PORT HUENEME

PHD 1. Surface ship combat and combat direction (control) systems

PHD 2. Surface ship weapon systems

PHD 3. Missile and missile support systems

PHD 4. Underway Replenishment Systems and Equipment

PHD 5. Surface ship combat and weapon system test/assessment/evaluation

PHD 6. NAVSEA and SPAWARS Surface and Undersea Technical Manuals.

PHD 7. Combat Direction (Control) Systems Computer Programs

PHD 8. Logistics

TCs BY AVERAGE POINTS

				RATERS 1	2	3	4	5	6	7	8	9	10	11	12	12 AVG	10 AVG	DIV. MAX	HI-LO Rem.	DIR. WKYR	CUM WKYR
1.	TC 4	CAD 4	Non-Acoustic Signatures and Silencing Systems	214	211	107	107	195	196	134	141	226	200	200	173	184.2	180.1	214	186.0	112.9	113
2.	TC 11	CAD 11	Hull Forms and Propulsors	219	226	140	140	191	191	167	162	226	165	177	148	179.7	166.7	226	179.1	162.2	275
3	TC 5	CAD 5	Propulsion Machinery Systems and Components	209	219	184	184	176	170	122	122	217	184	201	163	170.0	172.3	219	180.5	199.2	474
4	TC 25	CRD 5	Microwave Components	173	179	196	190	181	181	126	129	202	187	198	149	173.6	170.3	198	175.3	181	655
5	TC 65	IHD 2	Energetics Manufacturing/Manufacturing	173	149	151	151	172	172	181	179	184	168	170	189	170.9	160.8	181	171.3	320.4	976
6	TC 52	DD 16.	Mine Warfare Systems	174	220	152	152	214	214	76	153	187	179	180	153	170.4	162.5	214	174.9	440.5	1416
7	TC 0	CAD 0	Auxiliary Machinery Systems and Components	214	210	168	168	164	164	144	137	207	168	182	151	170.1	160.9	216	168.8	449	1865
8	TC 12	CAD 12	Materials and Processing Technology	219	212	145	145	176	176	120	146	212	126	172	143	170.0	168.7	219	170.1	104.9	1970
9	TC 64	IHD 1	Rocket/Missile/Gun Propulsion	185	182	125	125	163	163	177	180	202	181	190	187	167.7	164.3	188	168.6	253.1	2223
10.	TC 7	CAD 7	Electrical Machinery Systems and	202	209	150	150	161	161	127	114	193	188	182	185	164.9	150.1	209	165.6	187.4	2411
	TC 60	IHD 3	Cartridge Actuated Devices,	203	168	160	169	124	124	184	173	210	160	168	143	164.6	163.4	173	164.2	325.5	2736
	TC 67	IHD 4	Explosives	192	144	162	162	156	158	126	180	205	168	174	178	164.5	170.1	150	164.2	87.7	2824
	TC 28	CRD 6	Electrochemical Power Systems	142	160	186	188	148	148	131	181	208	154	191	124	162.8	157.3	188	162.2	110.0	2934
	TC 2	CAD 2	Vulnerability and Survivability Systems	164	220	118	118	183	183	124	164	194	176	177	149	162.7	157.5	220	160.9	129.9	3064
	TC 72	PHD 2.	Surface ship weapon systems	194	169	126	126	172	172	158	131	192	201	193	133	162.7	159.8	201	163.1	1074	4138
	TC 22	CRD 2	Naval Gun Warfare Systems	178	170	190	190	160	160	105	128	194	140	170	130	162.0	154.2	190	164.5	1129.4	5268
	TC 31	CRD 11	Pyrotechnics	143	163	181	181	189	169	114	156	188	177	164	141	160.6	150.2	181	162.8	150.6	5418
	TC 42	DD 5.	Combat & Weapon Control	103	203	145	145	173	173	137	139	185	163	168	124	160.3	167.0	173	159.6	113.3	5532
	TC 56	DD 19.	Electromagnetic Environmental Effects (E3)	200	208	117	117	183	183	108	132	218	165	172	125	160.1	155.0	183	159.7	55.0	5587
	TC 30	DD 2.	Combat Systems Engineering	160	198	122	122	181	181	174	118	183	141	174	141	158.4	152.1	181	158.8	525.3	6113
	TC 40	DD 11.	Gun Weapon Systems	149	192	108	108	191	191	140	135	207	168	191	131	158.1	162.5	191	158.4	74.4	6187
	TC 14	CAD 14	Small Surface and Undersea	226	209	108	108	157	157	113	169	187	124	160	141	156.8	141.4	226	154.8	93.7	6281
	TC 13	CAD 13	Structures	201	216	127	127	162	162	84	142	202	139	160	130	156.3	144.1	216	157.5	52.3	6333
	TC 43	DD 6.	Weapon Systems	141	182	138	138	190	190	110	108	204	105	170	138	156.9	162.0	190	156.0	120.3	6462

TCs BY AVERAGE POINTS

			← RATERS →												12	10	DIV.	HI-LO	DIR.	CUM
			1	2	3	4	5	6	7	8	9	10	11	12	AVG	AVG	MAX	Elim.	WKYR	WKYR
TC 19	CAD 20	Environmental Quality Science and	100	206	105	105	142	142	137	170	211	114	174	121	155.0	142.7	206	154.4	65.3	6548
TC 30	CRD 10	Conventional Ammunition	156	176	183	183	132	132	129	141	191	180	143	138	154.9	151.8	183	153.9	405.5	6953
TC 73	PHD 3.	Missile and missile support systems	188	181	124	124	158	158	149	138	194	188	197	93	154.9	151.0	194	156.9	145	7098
TC 54	DD 17.	Special Warfare Systems	168	188	120	120	178	178	141	137	178	152	157	126	153.4	148.3	178	153.4	132.2	7230
TC 75	PHD 5.	Surface ship combat and weapon	199	189	130	130	126	126	181	128	207	185	193	88	152.5	147.0	207	153.4	148	7378
TC 20	CAD 21	Logistics	211	209	99	99	181	181	43	127	218	134	172	126	151.5	138.0	211	155.6	158.5	7537
TC 40	DD 3.	Joint Mission Planning Systems	177	197	93	93	178	178	124	125	200	150	161	140	151.5	146.0	178	152.4	190.9	7728
TC 53	DD 16.	Amphibious Warfare Systems	161	177	136	136	173	173	121	109	173	146	178	120	151.5	146.5	173	153.0	65	7793
TC 41	DD 4.	RF and EO Sensors	170	158	158	158	171	171	111	147	151	156	160	112	151.2	147.7	171	153.2	80.7	7874
TC 59	DD 22.	Warheads	141	172	117	117	193	193	109	120	173	132	180	136	150.1	139.7	193	149.9	133.0	8007
TC 71	PHD 1.	Surface ship combat and combat	179	187	113	113	141	141	113	121	192	182	191	130	147.4	142.9	192	146.3	607	8614
TC 77	PHD 7.	Combat Direction (Control)	216	153	121	121	151	151	90	120	204	194	196	95	147.1	141.4	204	146.9	40	8654
TC 21	CRD 1	Electronic Warfare Systems	165	142	177	177	130	130	93	123	165	195	194	122	146.2	144.9	177	147.6	354.9	9009
TC 24	CRD 4	Electronic Module Test and Repair	187	158	140	140	141	141	118	137	151	127	176	125	146.2	143.9	140	148.0	173	9182
TC 8	CAD 6	Hull and Deck, and UNREP	167	190	110	110	159	159	103	132	181	171	178	110	145.4	141.3	190	145.1	92	9274
TC 3	CAD 3	Active and Passive Acoustic	165	211	99	99	141	141	90	162	184	126	166	143	143.7	133.1	211	142.4	427.1	9701
TC 23	CRD 3	Microelectronic Technology	178	134	139	139	149	149	79	123	145	125	188	149	142.9	141.9	139	144.8	625.1	10326
TC 29	CRD 9	Small Arms	114	173	176	176	137	137	86	117	114	144	170	137	139.7	132.9	176	141.5	113.8	10440
TC 51	DD 14.	Electronic Warfare Systems	137	177	95	95	137	137	155	139	170	113	177	117	139.6	137.5	137	140.4	77.8	10518
TC 55	DD 18.	Diving and Life Support Systems	166	185	93	93	126	126	72	173	181	150	177	132	138.5	142.2	126	140.6	80.5	10598
TC 32	CRD 12	Mechanical	150	131	168	168	124	124	67	137	150	86	164	131	138.5	127.3	168	142.6	55.7	10654
TC 68	IHD 5	Missile Simulator/Trainers/Test and Diagnostic Equipment	151	147	120	120	143	143	121	123	171	149	176	81	136.0	140.1	123	137.5	155.4	10809
TC 35	CRD 15	Night Vision/Electro-Optics	112	165	141	141	129	129	88	142	171	141	150	100	133.4	132.6	141	134.1	93.6	10903
TC 45	DD 8.	Surface Ship Defense Systems	138	172	101	101	143	143	105	121	169	130	174	107	133.1	131.4	143	132.2	128.5	11032
TC 47	DD 10.	Tactical Ballistic Missile Systems	160	190	48	48	183	183	64	120	185	77	186	102	132.6	117.0	183	136.4	39.5	11071
TC 58	DD 21.	Chemical/Biological Warfare	108	162	74	74	162	162	153	103	203	112	140	72	130.8	122.5	162	129.3	45	11116
TC 46	DD 9.	Cooperative Engagement	172	188	85	85	188	188	61	95	138	71	186	81	130.5	117.0	188	130.8	38.8	11155
TC 38	DD 1.	Surface and Strategic Warfare and	130	175	77	77	184	184	124	118	164	89	151	93	129.7	118.8	184	130.6	45.9	11201
TC 60	DD 13.	Strategic and Space Systems	124	158	85	85	168	168	72	109	155	135	150	137	128.8	121.6	168	130.8	208.7	11497
TC 74	PHD 4.	Underway Replenishment Systems	164	126	102	102	140	140	98	137	178	160	144	91	128.4	123.4	178	127.1	41	11538
TC 70	IHD 7	Explosive Safety Engineering	116	155	101	101	112	112	120	135	184	95	165	79	125.5	121.0	135	124.2	14.7	11553
TC 57	DD 20.	Weapon Systems Safety	115	159	70	70	184	184	94	113	178	127	151	100	125.3	117.7	184	125.6	37.5	11591
TC 61	DD 24.	Defense against Nuclear Weapons	139	187	51	51	174	174	102	110	138	128	149	116	125.0	115.5	174	127.5	2.7	11593

TCs BY AVERAGE POINTS

			RATERS												12	10	DIV.	HI-LO	DIR.	CUM
			1	2	3	4	5	6	7	8	9	10	11	12	AVG	AVG	MAX	Rem.	WKYR	WKYR
TC 27	CRD 7	Acoustic Sensors	100	153	137	137	107	107	116	98	163	109	168	88	124.6	120.5	197	124.1	100.3	11754
TC 63	DD 28.	Magnetic Silencing	119	160	81	81	173	173	66	113	151	127	169	128	123.8	114.3	173	125.2	41.2	11795
TC 60	DD 23.	Weapons Materials	112	143	108	108	167	167	96	124	77	128	149	110	123.4	115.1	167	123.6	63.8	11859
TC 15	CAD 15	Marine Corps Vehicle Systems and Components	200	189	53	53	129	129	54	141	177	68	130	90	122.9	102.2	200	121.4	20.8	11879
TC 9	CAD 9	Habitability and Hull Outfitting Systems and Components	182	183	59	59	101	101	90	121	172	117	165	109	122.0	109.4	183	122.2	3	11882
TC 18	CAD 18	Designs and Integrated Systems	158	158	62	62	121	121	71	93	103	94	143	127	110.0	108.7	158	117.3	139.1	12022
TC 1	CAD 1	Cost Benefit/Analysis Simulation	108	159	59	59	134	134	106	114	191	87	131	98	117.2	111.1	159	115.6	13.1	12035
TC 82	DD 25.	Electrochemical Power Sources (Batteries)	128	138	81	81	147	147	38	108	122	122	180	121	118.0	110.4	147	118.5	5.2	12040
TC 37	CRD 17	Radar	90	158	110	110	130	130	82	100	130	49	134	74	113.5	107.7	110	112.9	55.7	12098
TC 10	CAD 10	Undersea Vehicle Sail and	171	133	41	41	128	128	80	114	161	102	142	102	113.4	104.5	171	114.0	86	12181
TC 89	IHD 6	Ordnance Environmental Support	103	118	60	60	97	97	127	142	161	71	140	113	110.7	102.0	142	110.8	18.8	12199
TC 49	DD 12.	Marine Corps Weaponry	111	182	41	41	158	158	71	118	69	69	163	98	108.9	94.1	158	108.4	3	12202
TC 38	CRD 16	Mine Countermeasures	74	134	86	86	120	120	70	57	181	112	141	109	105.3	109.0	80	104.5	137.4	12340
TC 17	CAD 17	Shipbuilding and Manufacturing Technology	135	169	42	42	98	98	41	101	187	84	113	108	102.7	89.0	180	100.5	22.7	12363
TC 78	PHD 6.	NAVSEA and SPAWARS Surface	118	114	79	79	90	90	82	94	155	181	135	91	102.5	97.2	155	99.5	150	12513
TC 28	CRD 8	Surface Missile Systems Launchers	109	150	58	58	92	92	90	108	121	63	122	83	98.1	103.0	58	97.1	182.7	12695
TC 34	CRD 14	Shipboard Physical Security	130	140	80	80	81	81	58	64	144	112	117	85	96.7	101.6	80	95.9	71.5	12707
TC 70	PHD 8.	Logistics	88	112	28	28	87	87	69	98	160	92	172	105	94.8	87.4	169	93.8	170	12946
TC 33	CRD 13	Management & Distribution of Naval Drawings	57	118	52	52	54	54	69	120	178	141	120	100	89.1	101.7	52	83.9	20.0	12967
TC 18	CAD 18	Experimental Aerodynamics	70	121	48	48	82	82	54	128	72	90	121	47	80.0	77.0	121	78.7	8.2	12973
TC 44	DD 7.	Theater Air Defense Systems	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0	0.0	80	13061

Document Separator

MACHINERY R&D DIRECTORATE
ANNAPOLIS CAPABILITY

MACH R&D
FACILITY
"PROXIMITY"
NEEDS

KEY ELEMENTS

* Required Interconnected Modules Are Linked Mechanically and Electrically

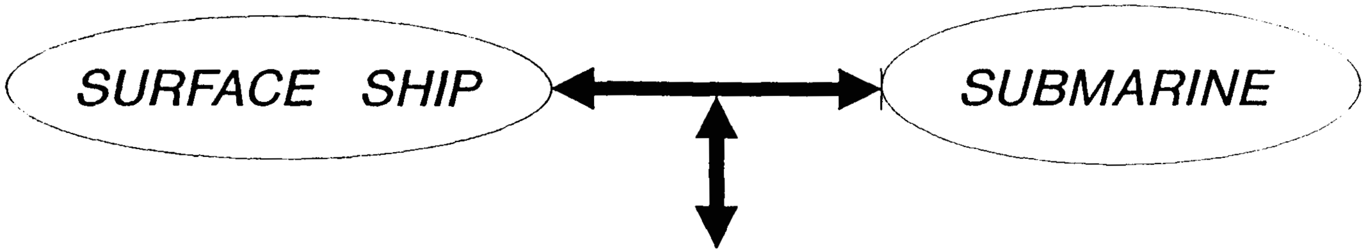
* Integrated Machinery Development with Reduced Scale Systems within "Ship-Like" Distances and Space

* Engineers/Technicians Work on Multiple Projects Between Several Adjacent Facilities

* Requirement For Close Integration of Systems and Personnel is Customer Driven

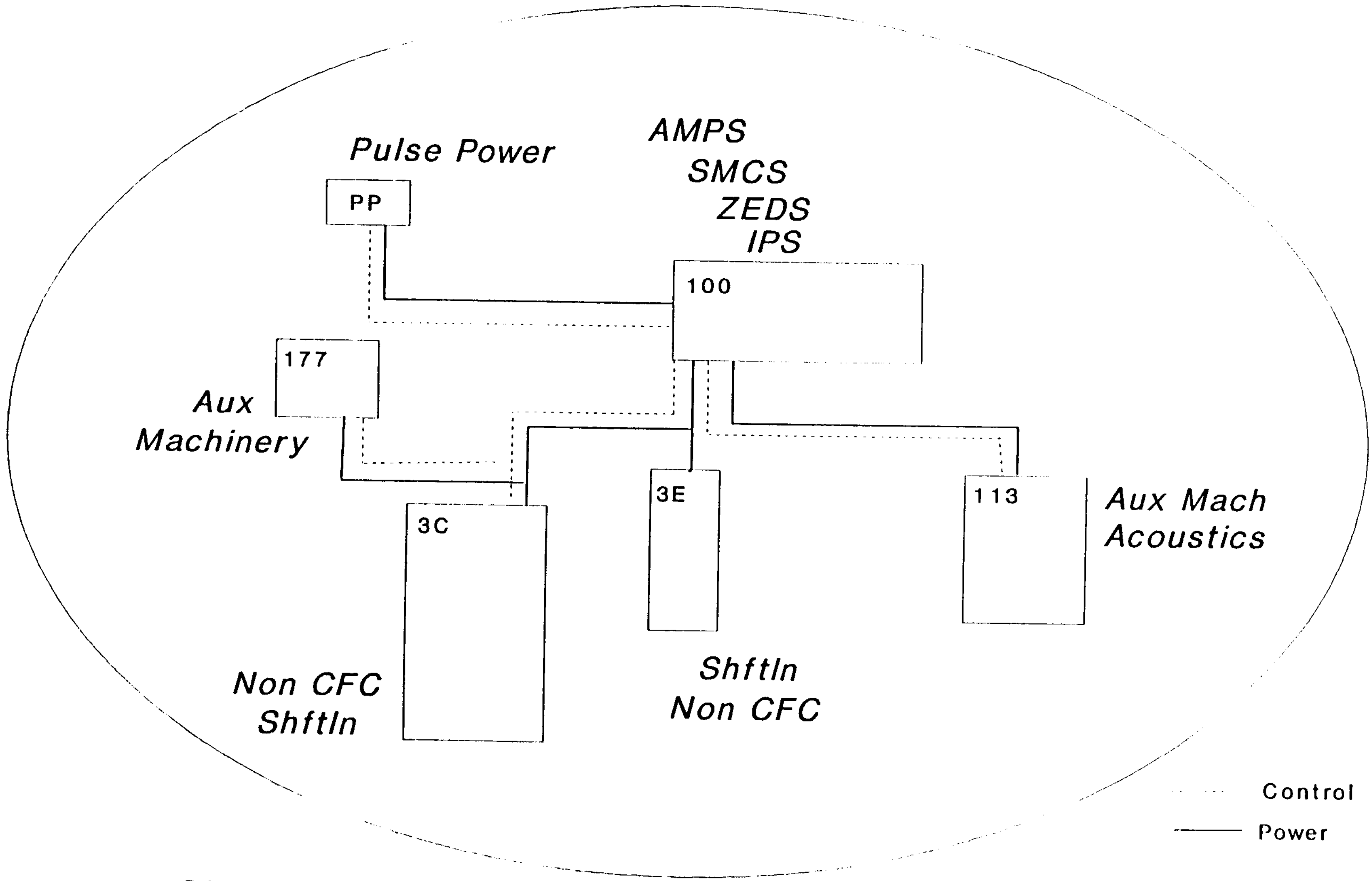
MACHINERY R&D DIRECTORATE
ADVANCED MACHINERY SYSTEMS

PROGRAM COMMONALITY



Advanced Modular Power System (AMPS)
Ship Service Inverter Module (SSIM)
Non-CFC Refrigeration Systems
Affordability Through Commonality (ATC)
Power Electronic Building Blocks (PEBB)
Zonal Electrical Distribution System (ZEDS)
Variable Speed Drives
Auxiliary Machinery
Propulsion Shaftline
Fuel Cells

MACHINERY R&D DIRECTORATE
ANNAPOLIS SITE



CLOSE CONNECTED RESEARCH OPERATION

MACHINERY R&D DIRECTORATE
NEW ATTACK SUBMARINE

CONNECTIVITY

PROGRAMS

FACILITIES	AMPS	SHFTLN / AVR	AUX MACH	NON-CFC
ELECTRICAL	X	X	X	X
MECHANICAL		X	X	X
ACOUSTIC	X	X	X	X

Example

CRITICAL PARAMETERS

Power Quality / Continuity
Electromagnetic Interference
Electro-Acoustics
Stability

PHYSICAL REQUIREMENT

900 V dc
"Shipboard" Distances
3 MW Power

MACHINERY R&D DIRECTORATE
NEW SURFACE COMBATANT

CONNECTIVITY

FACILITIES	ZEDS	SMCS	IPS	NON-CFC
ELECTRICAL	X	X	X	X
MECHANICAL		X	X	X
ACOUSTIC	X	X	X	X

PROGRAMS

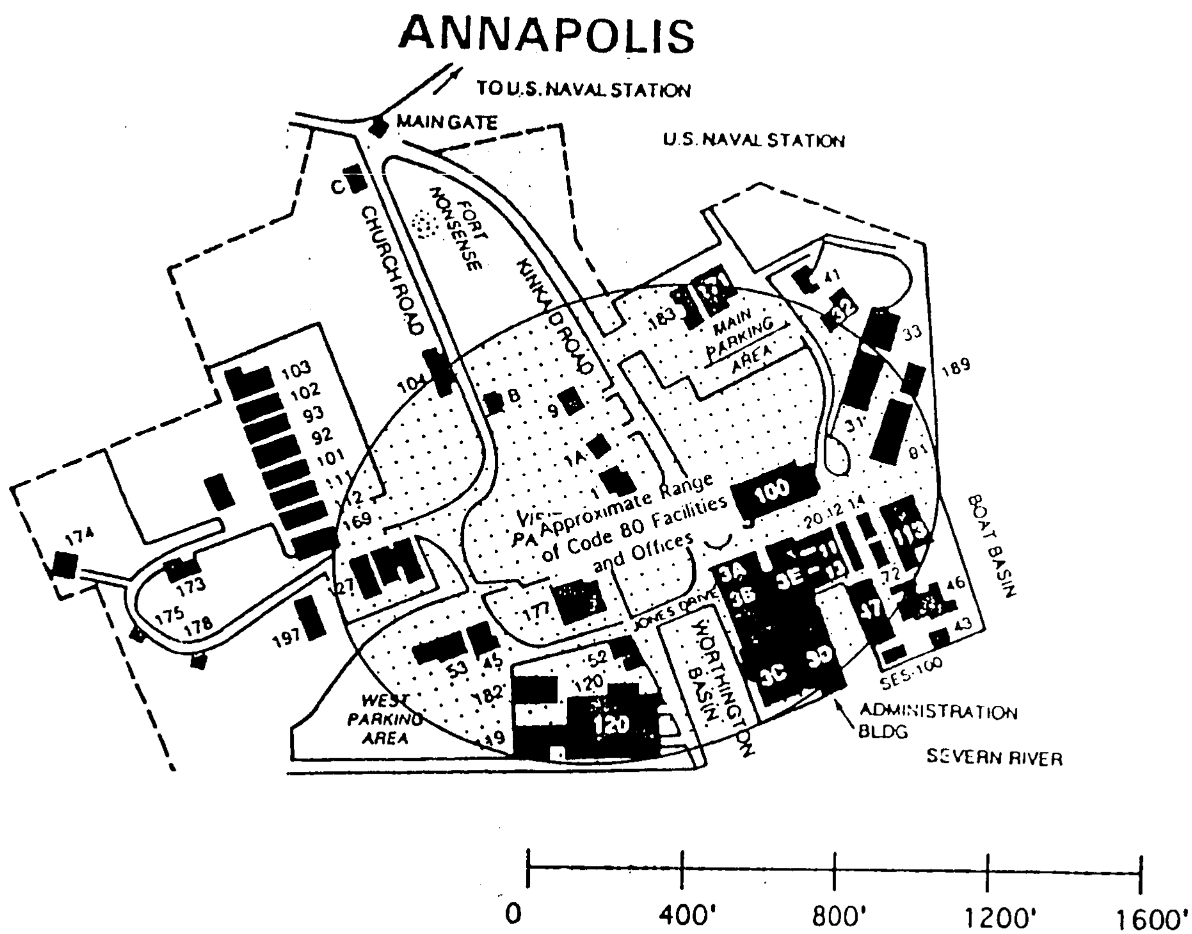
EXAMPLE

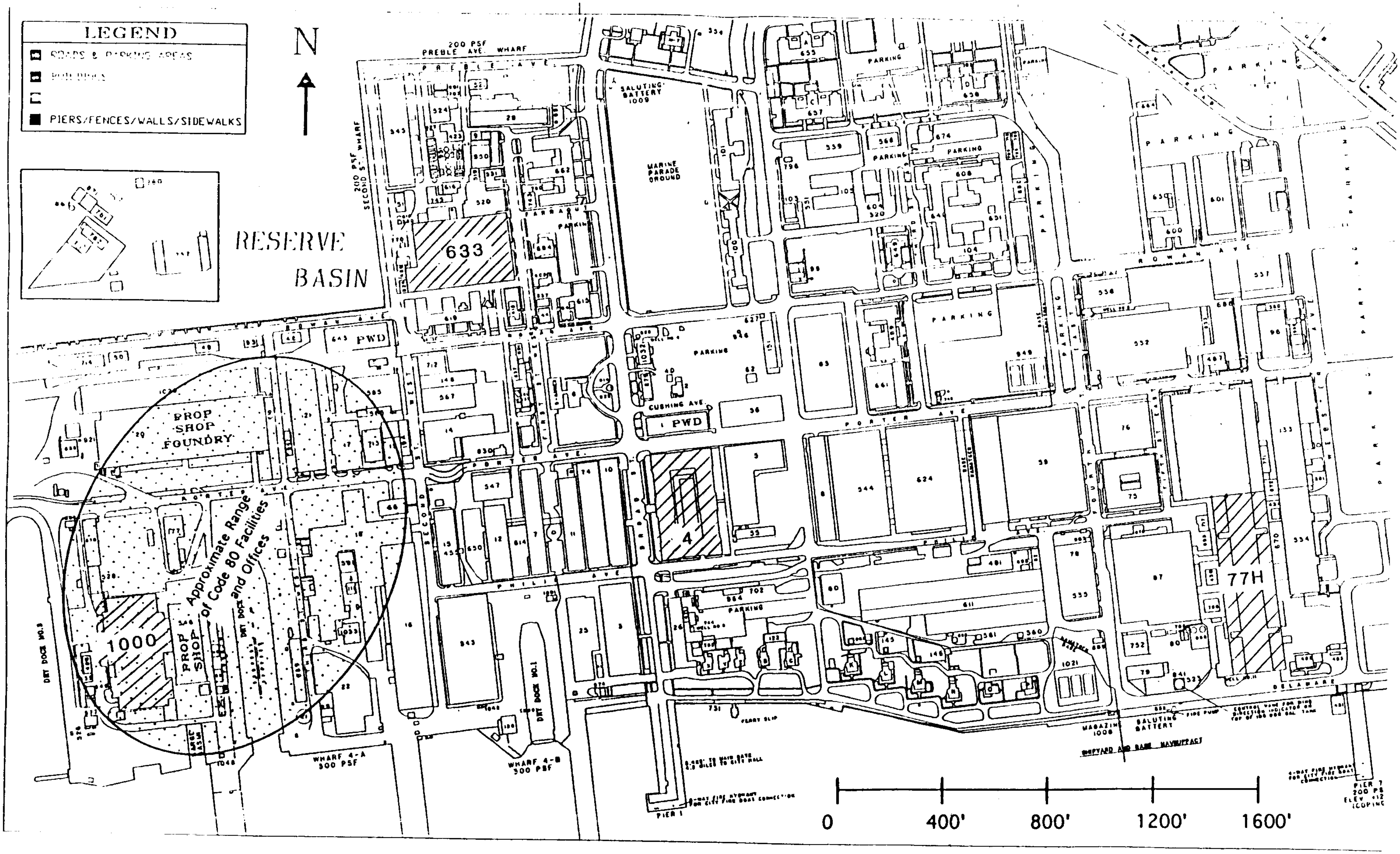
CRITICAL PARAMETERS

Power Quality / Continuity
Electromagnetic Interference
Electro-Acoustics
Line Losses
Stability

PHYSICAL REQUIREMENT

900 V dc
"Shipboard" Distances
"Smart" Switchgear


ANNAPOLIS
TO U.S. NAVAL STATION
MAIN GATE
U.S. NAVAL STATION
FORT NONSENSE
CHURCH ROAD
KINKAID ROAD
MAIN PARKING AREA
WEST PARKING AREA
JONES DRIVE
WORTHINGTON BASIN
BOAT BASIN
ADMINISTRATION BLDG
SEVERN RIVER
Approximate Range of Code 80 Facilities and Offices
SES-100
C
B
9
1A
1
100
103
102
93
92
101
174
173
175
178
197
169
104
183
41
33
189
31
81
113
72
46
43
47
3A
3B
3E
3C
3D
177
53
45
52
120
182
19
0
400'
800'
1200'
1600'


LEGEND
ROADS & PARKING AREAS
BUILDINGS
PIERS/FENCES/WALLS/SIDEWALKS
N
RESERVE BASIN
PROP SHOP FOUNDRY
PROP SHOP
1000
633
4
77H
PWD
Approximate Range of Code 80 Facilities and Offices
DRY DOCK NO.1
DRY DOCK NO.3
WHARF 4-A 300 PSF
WHARF 4-B 300 PSF
200 PSF PREBLE AVE. WHARF
200 PSF SECOND ST. WHARF
SALUTING BATTERY 1009
MARINE PARADE GROUND
CUSHING AVE.
PORTER AVE
PARKING
FERRY SLIP
PIER 1
MAGAZINE 1008
SALUTING BATTERY
0
400'
800'
1200'
1600'

Document Separator