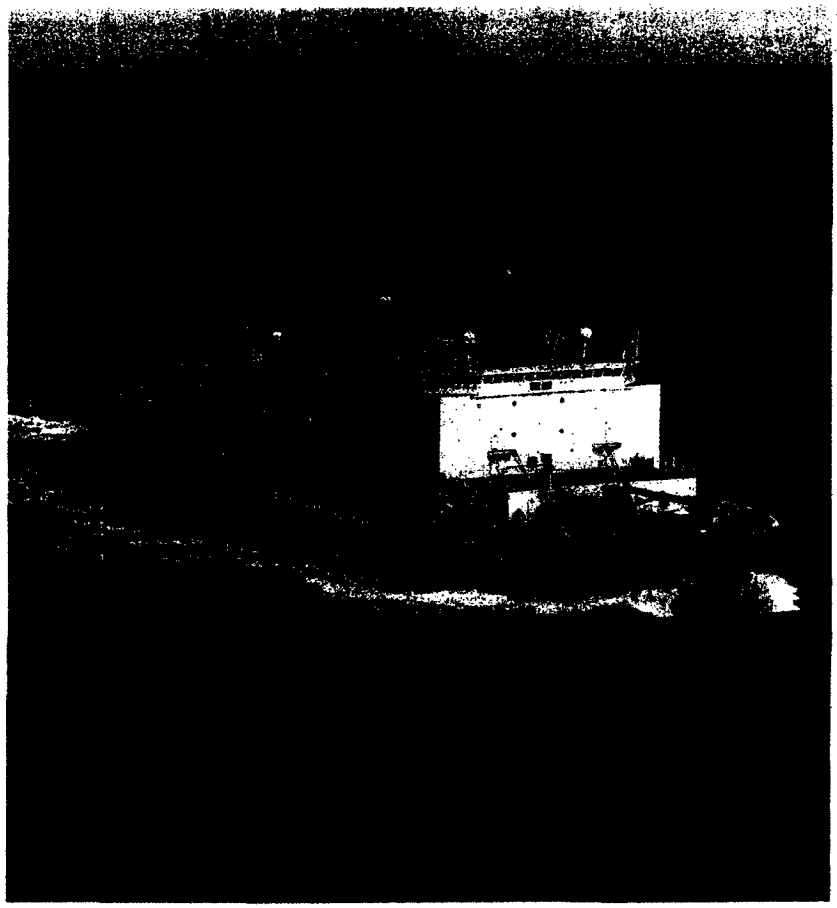
USCGC POLAR STAR (WAGB-20)

U.S. Coast Guard
Polar Class Icebreaker/Research Vessel

INTRODUCTION



USCGC HEALY (WAGB 20) was constructed by Avondale Industries in New Orleans, Lousiana. Her keel was laid on September 16, 1996. A spectacular launch followed on November 15, 1997. Delivered to the Coast Guard and placed "In Commission, Special" on November 10, 1999, HEALY joins the icebreakers POLAR STAR (WAGB 10) and POLAR SEA (WAGB 11) in their homeport of Seattle, Washington.

HEALY is designed to conduct a wide range of research activities, providing more than 4,200 square feet of lab space, numerous electronic sensor systems, oceanographic winches, and accommodations for up to 50 scientists. HEALY is designed to break 4 1/2 feet of ice continuously at three knots and can operate in temperatures as low as -50 degrees F. The science community provided invaluable input on lab lay-outs and science capabilities during design and construction of the ship. At a time when scientific interest in the Arctic Ocean basin is intensifying, HEALY enhances U.S. Arctic research capabilities substantially.

As a Coast Guard cutter, HEALY is also a capable platform for supporting other potential missions in the polar regions, including logistics, search and rescue, ship escort, environmental protection, and enforcement of laws and treaties.

BIOGRAPHY

CAPTAIN MICHAEL A. HEALY was born near Macon, Georgia in 1839. He was the fifth of ten children born to Michael Morris Healy, an Irish plantation owner, and his wife Mary Elisa Smith, a former slave. This family produced a number of distinguished individuals. Three brothers entered the priesthood; James became the first black bishop in North America, Patrick was president of Georgetown University, and Sherwood became an expert in canon law. Three sisters became nuns, one reaching the level of mother superior. When his siblings became bishops, priests and nuns, it may have been to compensate for the man who became known as "Hell Roaring Mike".

Michael Healy was uninterested in academic pursuits and so began a seagoing career as a cabin boy aboard the American East Indian clipper JUMNA in 1854. He quickly became an expert seaman and rose to the rank of officer on merchant vessels. In 1864 he applied for a commission in the U. S. Revenue Marine and was accepted as a Third Lieutenant. After serving successfully on several cutters in the East, Healy began his lengthy service in Alaskan waters in 1875 as the second officer on the cutter RUSH. He was given command of the revenue cutter CHANDLER in 1877. Promoted to Captain in March 1883, he was given command of the cutter THOMAS CORWIN in 1884. Finally in 1886, he became Commanding Officer of the cutter BEAR, taking her into Alaskan waters for the first time. Here he remained until 1895.

Although already held in high regard as a seaman and navigator in the waters of Alaska, it was as Commanding Officer of BEAR that Healy truly made his mark in history. During the last two decades of the 19th Century, Captain Healy was the United States Government in most of Alaska. In his twenty years of service between San Francisco and Point Barrow, he acted as: judge, doctor, and policeman to Alaskan natives, merchant seamen and whaling crews. He operated in an eerie echo of what would become the mission of his Coast Guard successors a century later; protecting the natural resources of the region, suppressing illegal trade, resupply of remote outposts, enforcement of the law, and search and rescue. Even in the early days of Arctic operations, science was an important part of the mission. Renowned naturalist John Muir made a number of voyages with Healy during the 1880's as part of an ambitious scientific program. With the reduction in the seal and whale populations, he introduced reindeer from Siberia to Alaska to provide food, clothing and other necessities for the native peoples. The primary instrument in Healy's capable hands, to accomplish all of this, was the cutter BEAR, probably the most famous ship in the history of the Coast Guard. Under "Hell Roaring Mike", BEAR became legendary as "Healy's Fire Canoe". Healy and BEAR proved to be a perfect match, a marriage of vessel capability and unrivaled ice seamanship that became legend.

The USCGC HEALY (WAGB 20) will carry on the legacy of her namesake, providing a highly dedicated scientific platform with the search and rescue, and resupply services which have become the hallmark of the United States' icebreaking fleet for over 100 years.

CAPTAIN MICHAEL HEALY, USRCS

MISSION DESCRIPTION AND PROFILE

MISSION DESCRIPTION

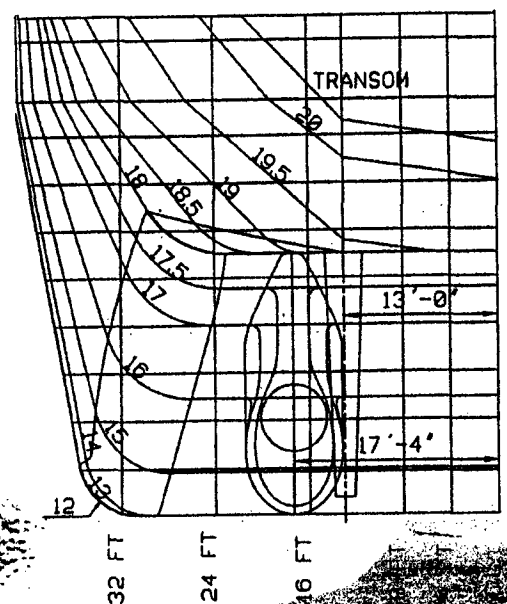
USCGC HEALY's primary mission will be to function as a world class high latitude research platform.

The HEALY will be employed in icebreaking operations during all seasons in the Arctic and Antarctic. All ship systems are designed to function for extended winter operations in these areas including intentional wintering over.

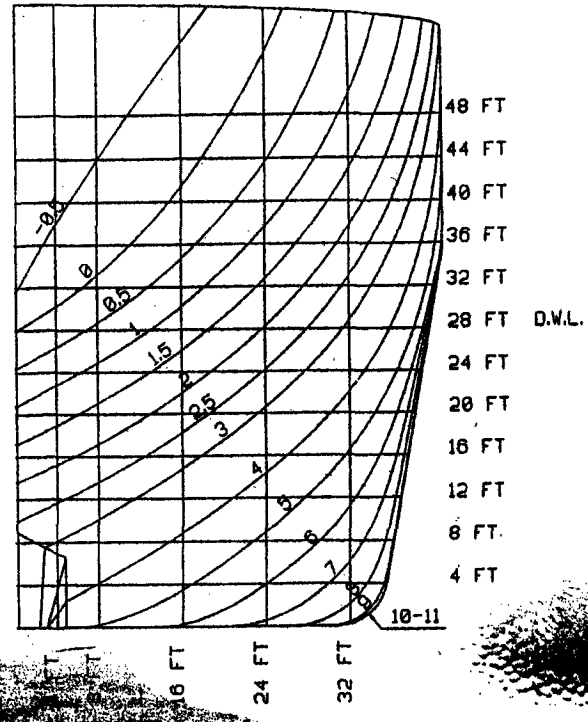
Arctic missions include service as a scientific platform and ice escort to supply vessels supporting Arctic installations and bases. Antarctic missions include support of the U. S. Antarctic Program in scientific research projects, ice escort of supply vessels, transport of cargo and passengers, and support of Antarctic Treaty inspection teams.

MISSION PROFILE

Ice Free Transit	15 Days
Full Power Icebreaking	12 Days
Half Power Icebreaking	18 Days
Hove To/At Anchor	20 Days

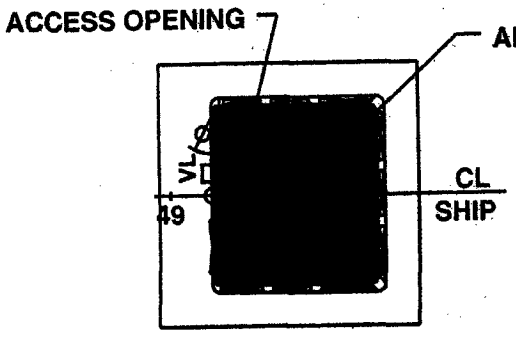


PRINCIPAL CHARACTERISTICS

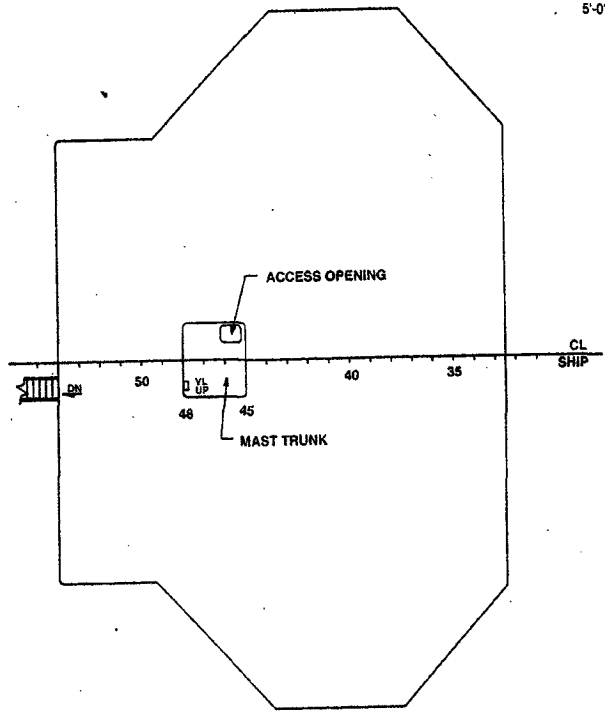


Length, Overall	420'0" (128 meters)
Beam, Maximum	82'0" (25 meters)
Draft, Full Load	29'3" @ Delivery (8.9 meters)
Displacement, Full Load	16,000LT @ Delivery
Propulsion	Diesel Electric, AC/AC Cycloconverter
Generating Plant	4 Sultzer 12Z AU40S
Drive Motors	2 AC Synchronous, 11.2Mw
Shaft Horsepower	30,000 Max HP
Propellers	2 Fixed Pitch, 4 Bladed
Auxiliary Generator	EMD 16-645F7B 2400Kw
Fuel Capacity	1,220,915 gal (4,621,000 liters)
Speed	17 knots @ 147 RPM
Endurance	16,000 NM @ 12.5 KNOTS
Icebreaking Capability	4.5ft (1.37m) @ 3 knots Continuous
	8ft (2.44m) Backing and Ramming
Science Labs	Main, Wet, Bio-Chem, Electronics,
	Meteorological, Photography
Accommodations	12 Officers, 10 CPO, 53
	5 Scientists, 15 Surg

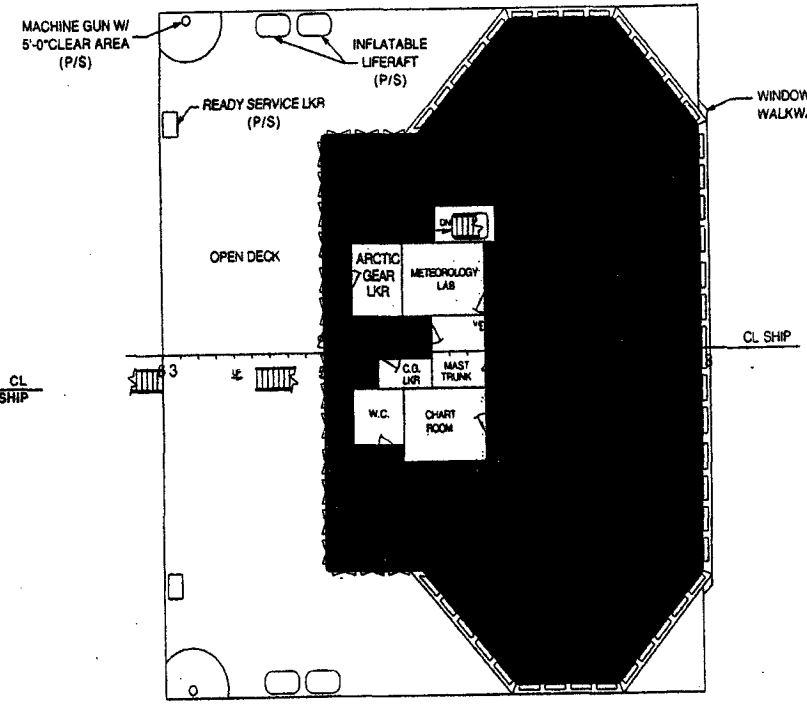
GENERAL ARRANGEMENTS



08 Level Aloft Conning Station



06 Level Pilothouse Top & Mast



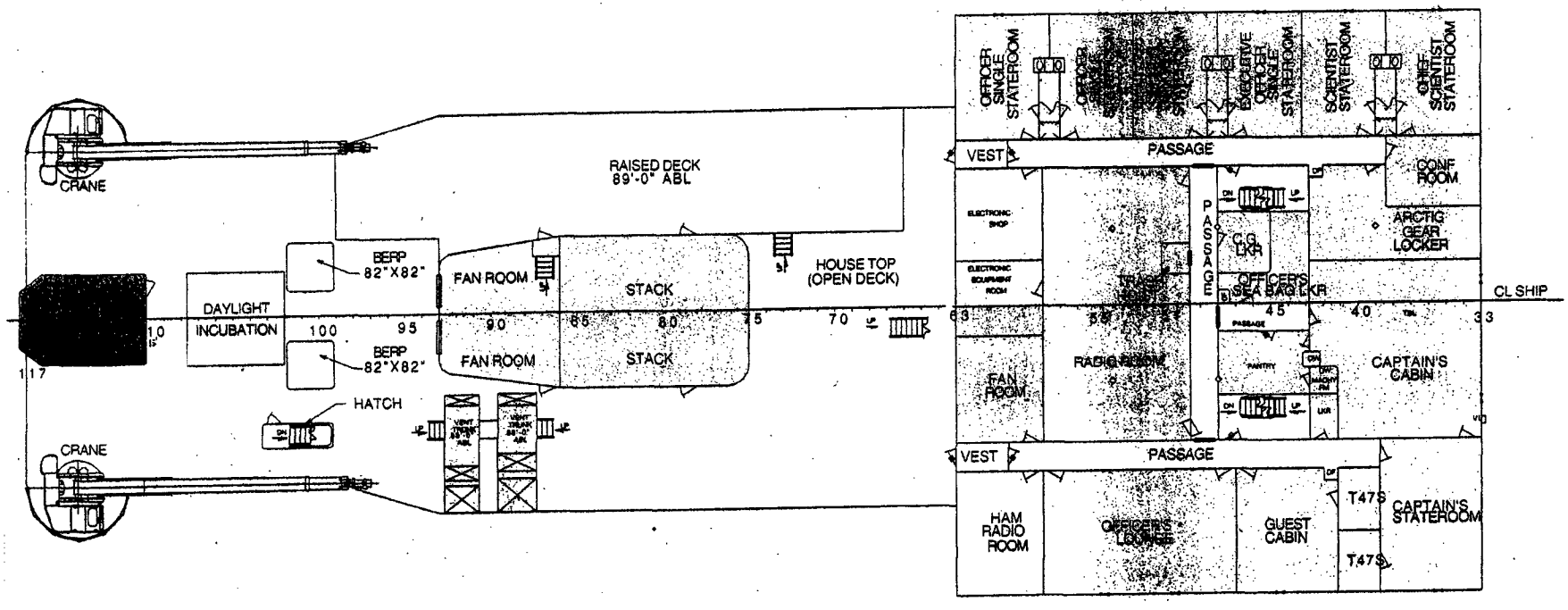
The 05 Level consists of the Pilothouse, Chart Room, and Meteorological Lab.

LEGEND FOR COLORS

- Living Spaces
- Mission Spaces
- Machinery Spaces
- Control Spaces

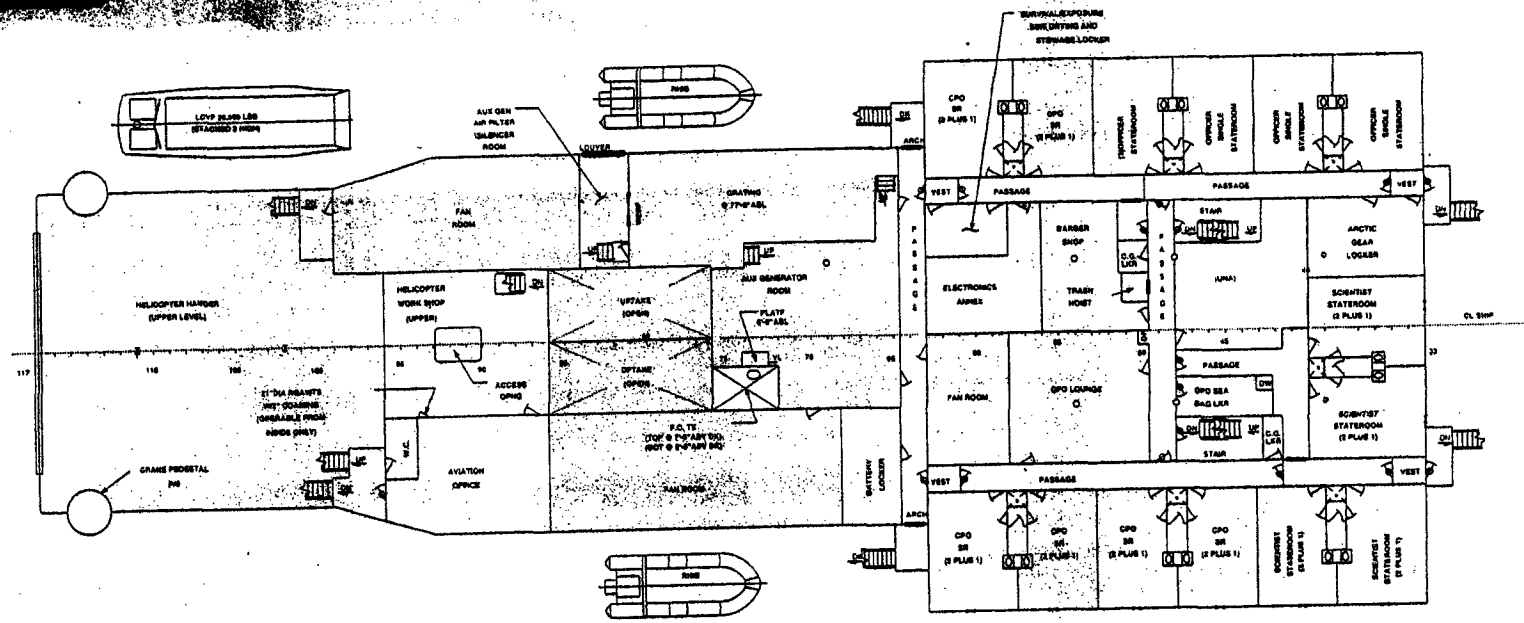
Frame Spacing - 30"

GENERAL ARRANGEMENTS

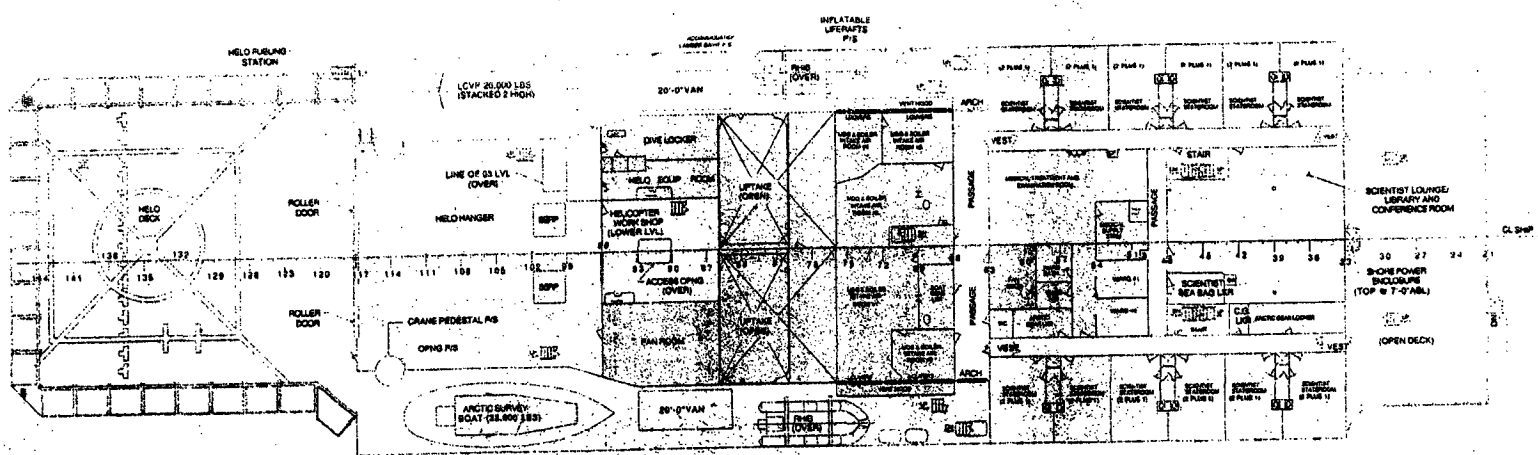


The 04 Level contains berthing for the Commanding Officer, Chief Scientist and Ship's Officers, the Radio Room, and the Helo Control Station.

GENERAL ARRANGEMENTS

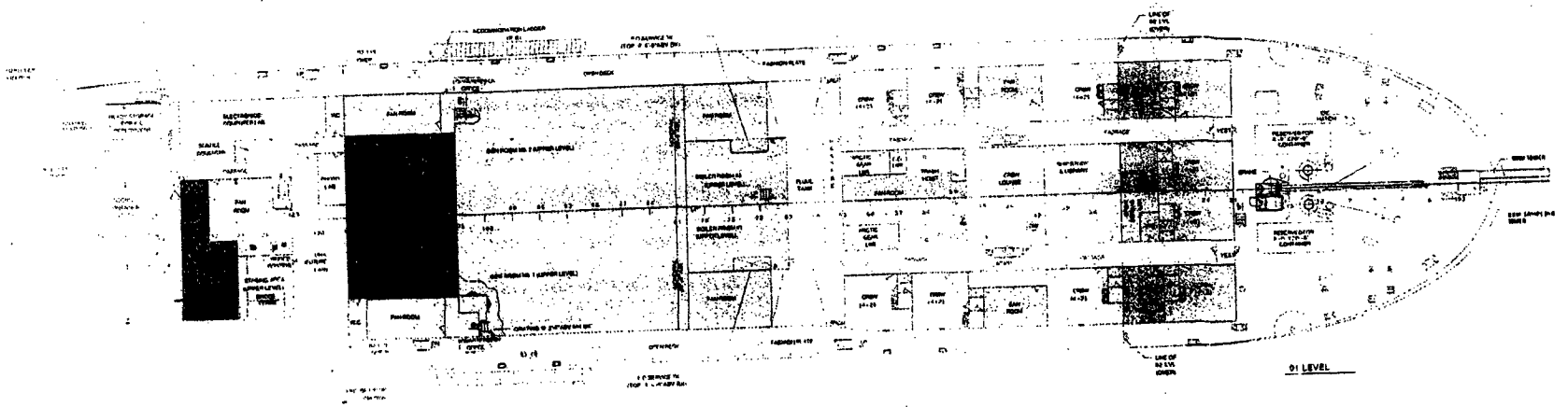


The 03 Level consists of CPO Berthing and Lounge Areas, Visitor Berthing, and the Auxiliary Generator Room.

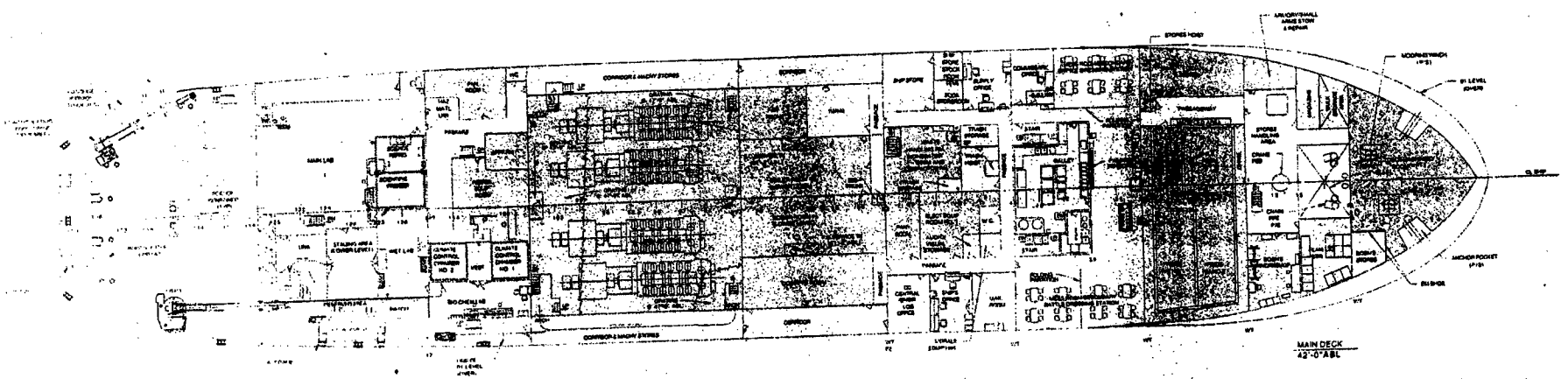


The 02 Level contains Scientist Berthing and Lounge Areas, Medical Spaces, Flight Deck, Hangar, Dive Locker and Small Boats.

GENERAL ARRANGEMENTS

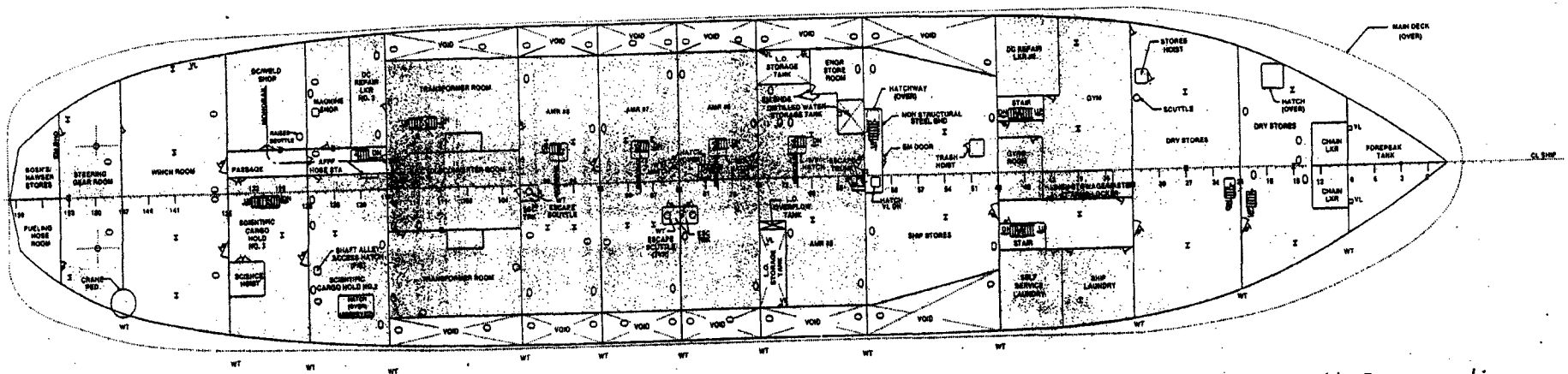


The 01 Level consists of Crew Berthing and Lounge Areas, Anti-roll Tank, Engineering Control Center, Science Working Spaces, and open weather working deck forward.

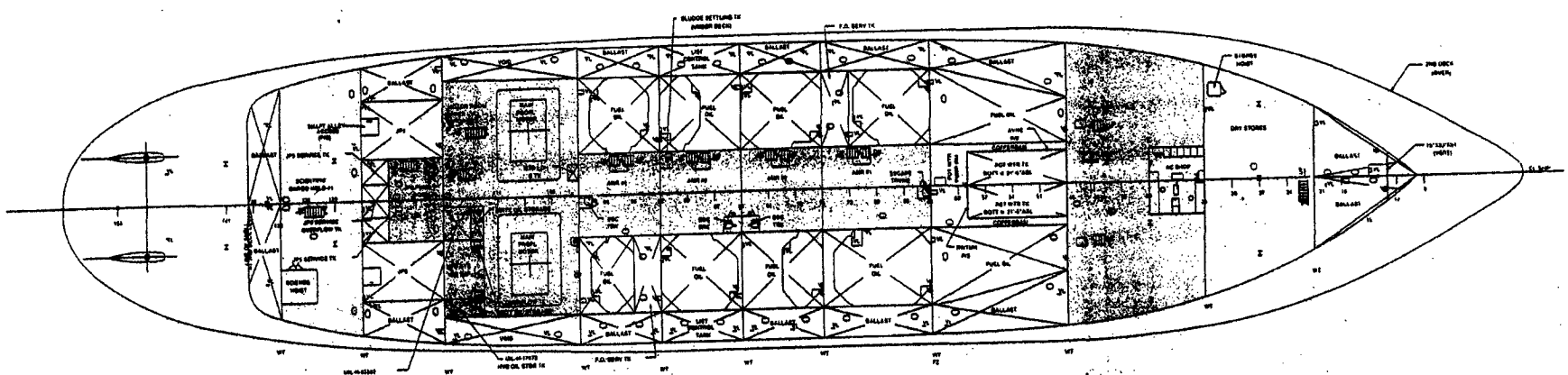


The Main Deck contains the Commissary and Messing Spaces, Deck Machinery Equipment Rooms, Main Generator Rooms, Auxiliary Boiler Rooms, Science Labs and Working Spaces, and open weather working deck aft.

GENERAL ARRANGEMENTS

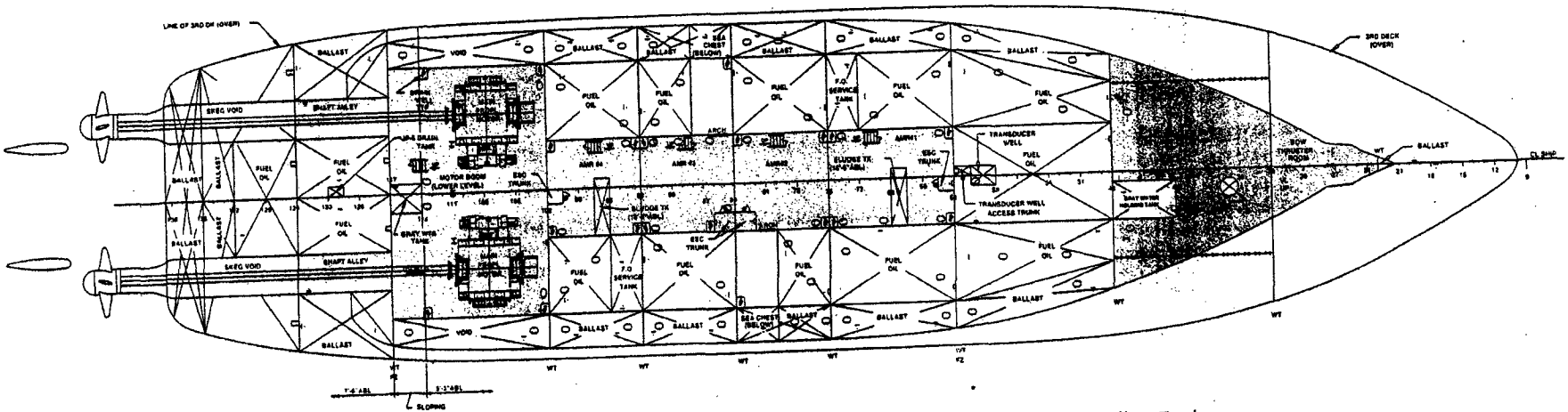


The Second Deck contains Storerooms, Auxiliary Machinery Rooms, Gym, Damage Control Spaces, Cycloconverter Equipment Rooms, Science Cargo Holds, Oceanographic Winch Room, and Steering Gear Room.

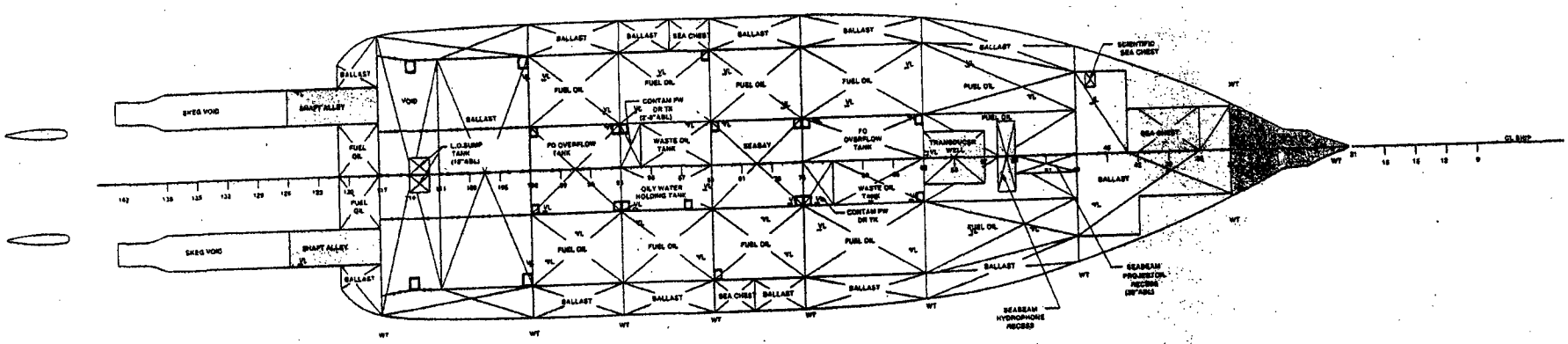


The Third Deck contains Storerooms, Refrigeration Machinery Room, Potable Water Tanks, JP5 Tanks and Pump Room, and Science Cargo Holds.

GENERAL ARRANGEMENTS



The Tank Top contains the Sewage Treatment Room, Auxiliary Machinery Rooms, Propulsion Motor Rooms, and Fuel and Ballast Tanks.



The Inner Bottom consists of the Bow Thruster Room, Seabeam Projector Recess, Transducer Well, Shaft Alleys, Fuel and Ballast Tanks, and Sea Chests.

SHIP FEATURES

MACHINERY

Central Power Generating Plant and AC/AC Cycloconverter Propulsion Drive
Machinery Plant Control & Monitoring System (MPCMS) - providing automated control of machinery plant
Fixed Pitch Propellers
Twin Rudders
2400Kw Auxiliary Generator
2200HP Bow Thruster and Bow Wash System
Cranes - five hydraulically operated, 100% coverage of working decks
Pollution Control
- OWS
- Incinerator
- CHT System
- Trash Compactor

Anti-roll Stabilization Tank

MISSION CAPABILITIES

Icebreaking - 4.5' continuous at 3 knots, up to 8' ramming
Three Conning Stations - Pilothouse, Aloft Conn, & Science Conn providing automated control & navigation
Boats - two LCVPs, two RHIBs
Science Spaces - six labs, two climate control chambers, freezer/refrigerator, three holds, library/conference room
Vans - space for eight with services

OTHER

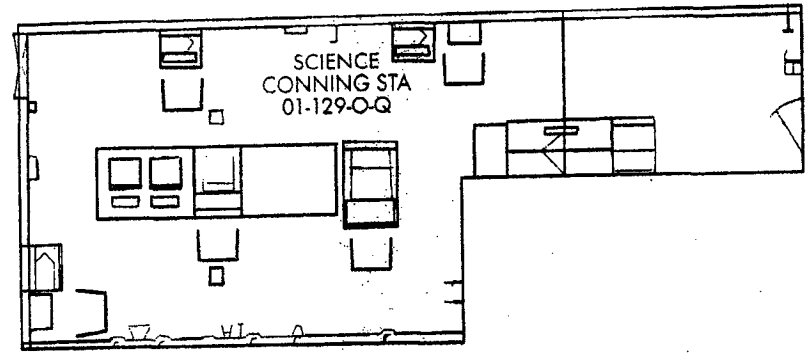
Aviation - two HH-65 helicopters, flight deck, hangar, helo workshop and storeroom, aviation office
Underway Replenishment
Underway Refueling
Quiet Ship Operations
Dive Locker & Portable Recompression Chamber
Open Working Decks; forward 500 sq. ft., aft 3,000 sq. ft.

COMMAND AND CONTROL

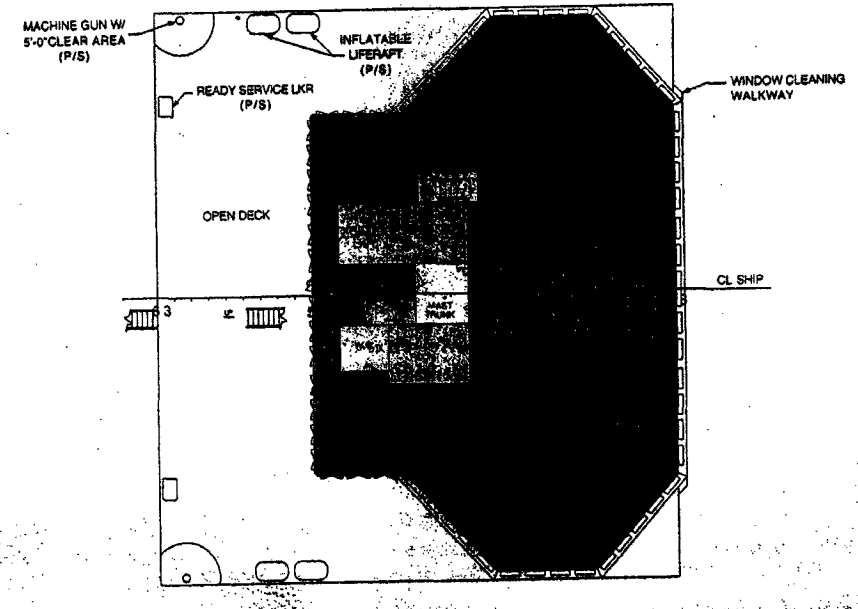
USCGC HEALY is provided with fully automated systems for control of the ship and the machinery plant.

Ship control is provided at three conning stations with five conning positions. The conning stations are the Pilothouse, which contains the Master Ship Control Console (MSCC) and Port and Starboard consoles, the Aloft Conn and the Science Conn. The Main Ship Control Console consists of the Integrated Bridge System based on Sperry Marine VISION 2100IBS. The Integrated Bridge System consists of Integrated Navigation System (INS), Steering Control System, Electronic Chart Display Information System (ECDIS), and communications incorporating inputs from radar, speed log, gyrocompass, wind speed and direction, motion sensor, RDF, and TDP GPS. The hardware is a PC based Pentium processor using Windows NT. An Integrated Navigation System (INS) display and a Steering Control System are located at each of the other conning stations. The steering control system incorporates the following steering modes; Dynamic Positioning System, Autopilot, manual (INS computer assisted, MSCC analog, aft computer assisted, or aft analog), or non-follow up. Steering system status is displayed on the INS display.

Machinery Plant control is provided in the Engineering Control Center (ECC) through the Machinery Plant Control and Monitoring System (MPCMS). MPCMS provides control, monitoring, alarm, and reporting functions for all propulsion and auxiliary equipment. The MPCMS also provides remote control of the propulsion plant from all conning stations and remote monitoring of the machinery plant at the Main Ship Control Console (MSCC) and in the Damage Control Center (DCC)/Log Office. Alarms are sounded and accepted in ECC but can be displayed at the MSCC and DCC.



PLAN VIEW SCIENCE CONN



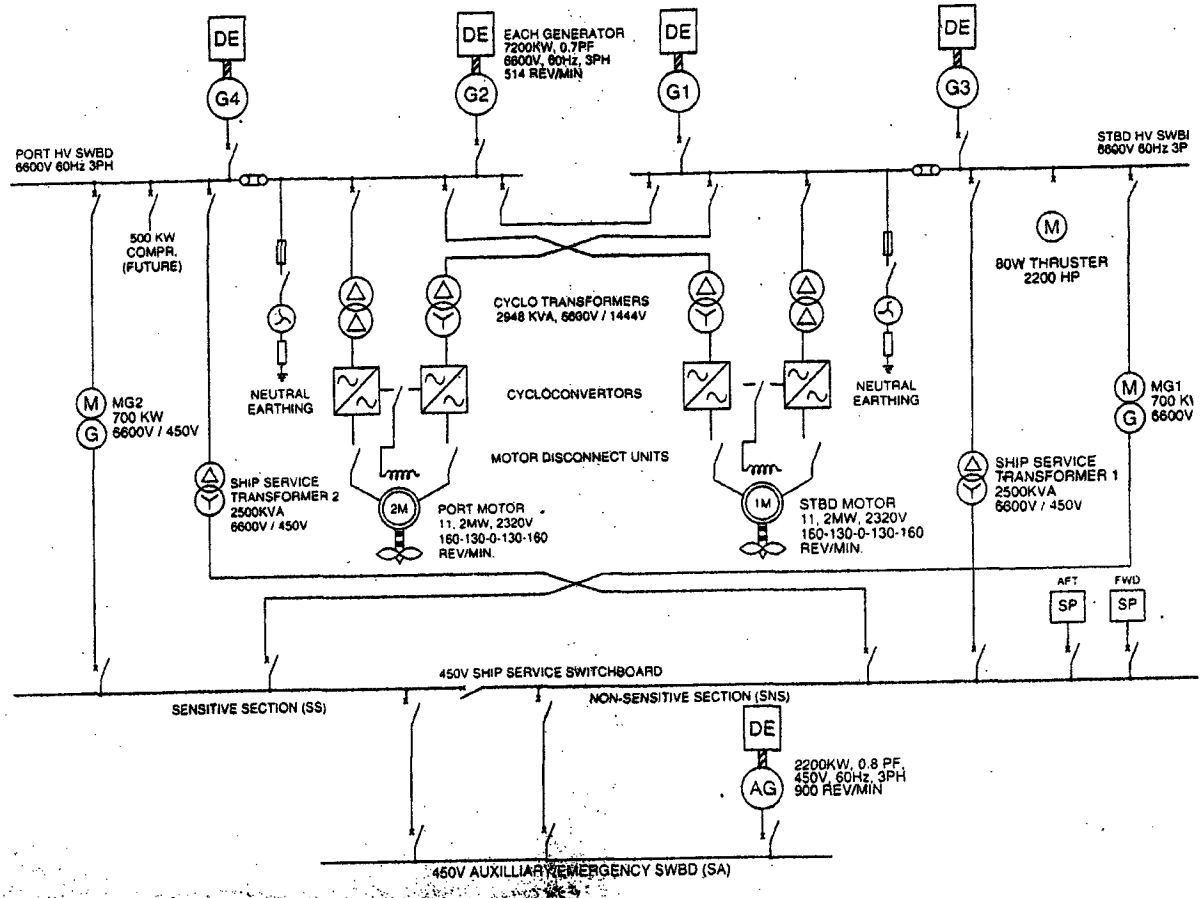
PLAN VIEW PILOTHOUSE

PROPULSION/ELECTRICAL SYSTEM

Electric power for propulsion and ship's services is provided from a "Central Power Plant" through a 6600VAC, 60Hz, 3phase common bus distribution system. Power is generated by four diesel generator sets located on the main deck. This system provides several distinct advantages; eliminating the need for separate ship service generators, providing redundancy in the power generating plant, and offering the flexibility to operate only enough generators to supply the required load while permitting maintenance to be performed on the other units.

Propulsion power is provided by two fully reversing, variable speed, AC synchronous motors fed from the common bus through an AC/AC Cycloconverter system. The cycloconverter controls the speed of the propulsion motors by varying the frequency of the power provided to the motors. A number of distinct advantages are gained using AC synchronous motors including smaller size and weight, excellent torque characteristics for icebreaking, and reduced maintenance.

The Ship's Service electrical system provides 450VAC, 60Hz, 3phase power from the common bus through a switchboard which is separated into sensitive and non-sensitive power. The sensitive power is provided via motor generator sets and non-sensitive power via transformers.



SCIENCE SYSTEMS

Labs -

Science Wet Lab	390 sq ft
Main Science Lab	1233 sq ft
Science Staging Area (Bay)	325 sq ft
Science Dry Assembly Area	153 sq ft
Biological/Chemical Analysis Lab	310 sq ft
Science Freezer	266 sq ft
Science Refrigerator	169 sq ft
Climate Control Chambers	206 sq ft
Electronics/Computer Lab	528 sq ft
Photography Lab	105 sq ft
Future Science Lab	546 sq ft
Meteorological Lab	64 sq ft

Labs and Climate Control Chambers provided with deck sockets, Unistrut system, and clean electrical power.

Winches - Two oceanographic winches, capable of handling 10,000 meters of 3/8" wire, 12,000 meters of 0.322" electro-mechanical cable, or 14,000 meters of 1/4" wire;

Two double drum trawl/core winches, capable of handling 10,000 meters of 3/4" wire, 12,000 meters of 0.680" electro-mechanical cable, or 14,000 meters of 9/16" wire

Open Working Decks - Forward, 500 sq. ft.; aft 2,000 sq. ft.; starboard aft, 600 sq. ft.

Dedicated Science Communications Center - INMARSAT system containing voice and high speed data transmission, GMDSS & interface with Science Data Network

Staging Areas for Science Operations - Starboard staging area provided with a bridge crane & hoist, roller door access to weather deck, direct access to wet lab, science conning station and holds. Aft staging area for fantail work and snowmobile ondeck stowage

Electronics - Science Data Network - dual fiber optic network with 120 ethernet ports throughout the science spaces for real time data transfer, provided with processors, plotters, printers, GPS master clock, installed workstations

Bathymetric Survey System including
- Echo Sound Processor and Depth Digitizer
- Seabeam Bottom Mapping Sonar
- XBT Data Acquisition Unit
- Acoustic Doppler Current Profiler

Cranes - Five hydraulically operated cranes [illegible] nearly 100% coverage of working decks

A-frame - Two A-frames located on working decks aft and starboard

Vans - Eight standard ISO vans with service hookups (including electrical, HVAC, air, science data network, and uncontaminated seawater), two 40' vans for storage (when ASB & LCVP not embarked)

Core Handling Brackets - Coring will be handled from both the starboard side (up to 90 feet) and directly off the stern (length of cores unknown at this time)

Transducer Well & Dedicated Science Seachest

Science Freezer and Refrigerator - With access to the two Climate Control Chambers

Cargo Holds - Three cargo holds of 20,000 cu. ft. provided with storage system and serviced by a dedicated science hoist

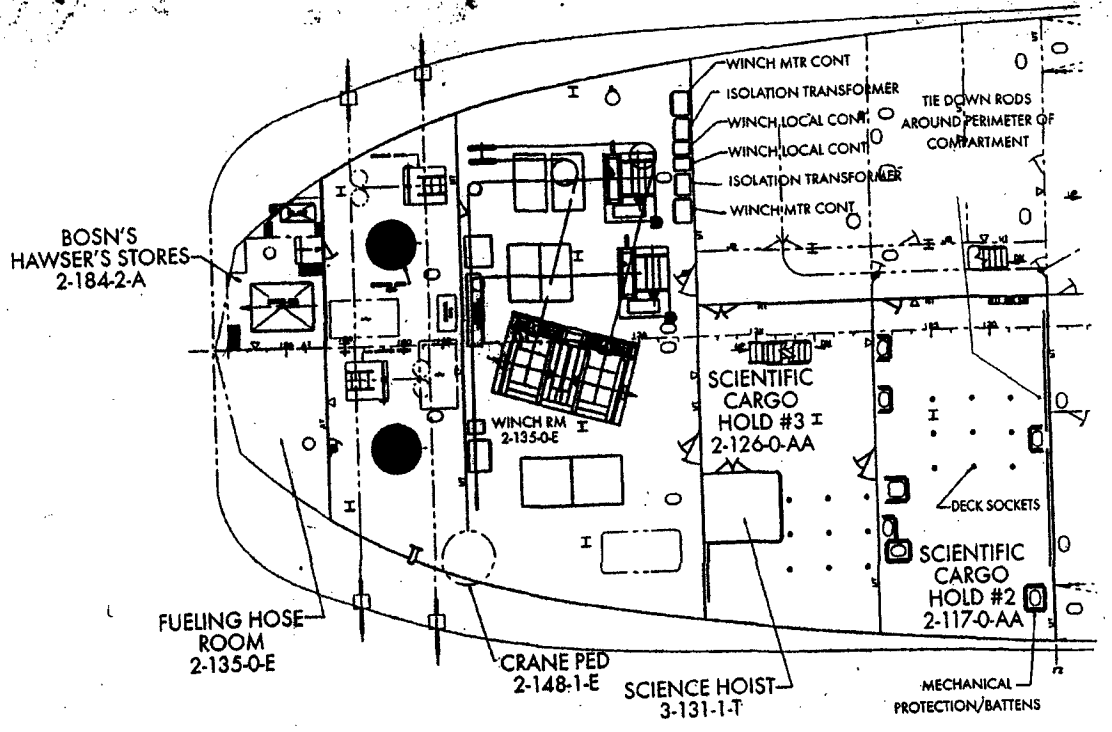
Bow Boom & Tower Sampling Systems - The bow boom is approximately 15 feet forward of the ships bow and the bow tower is approximately 60 feet above water line

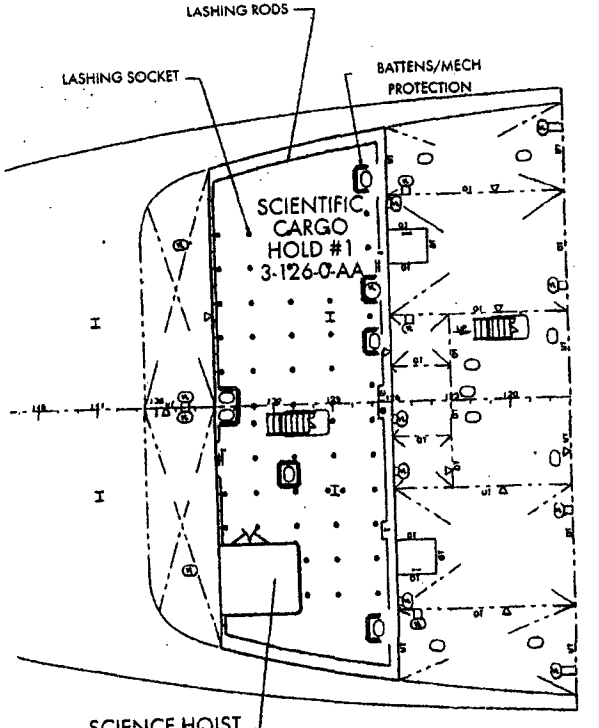
Dive Locker - Containing high pressure air compressor and storage for dive equipment

Quiet Ship Operations - Co[illegible] noise for underwater acc[illegible] operation of underwa[illegible]

SCIENCE ARRANGEMENTS

2nd DECK

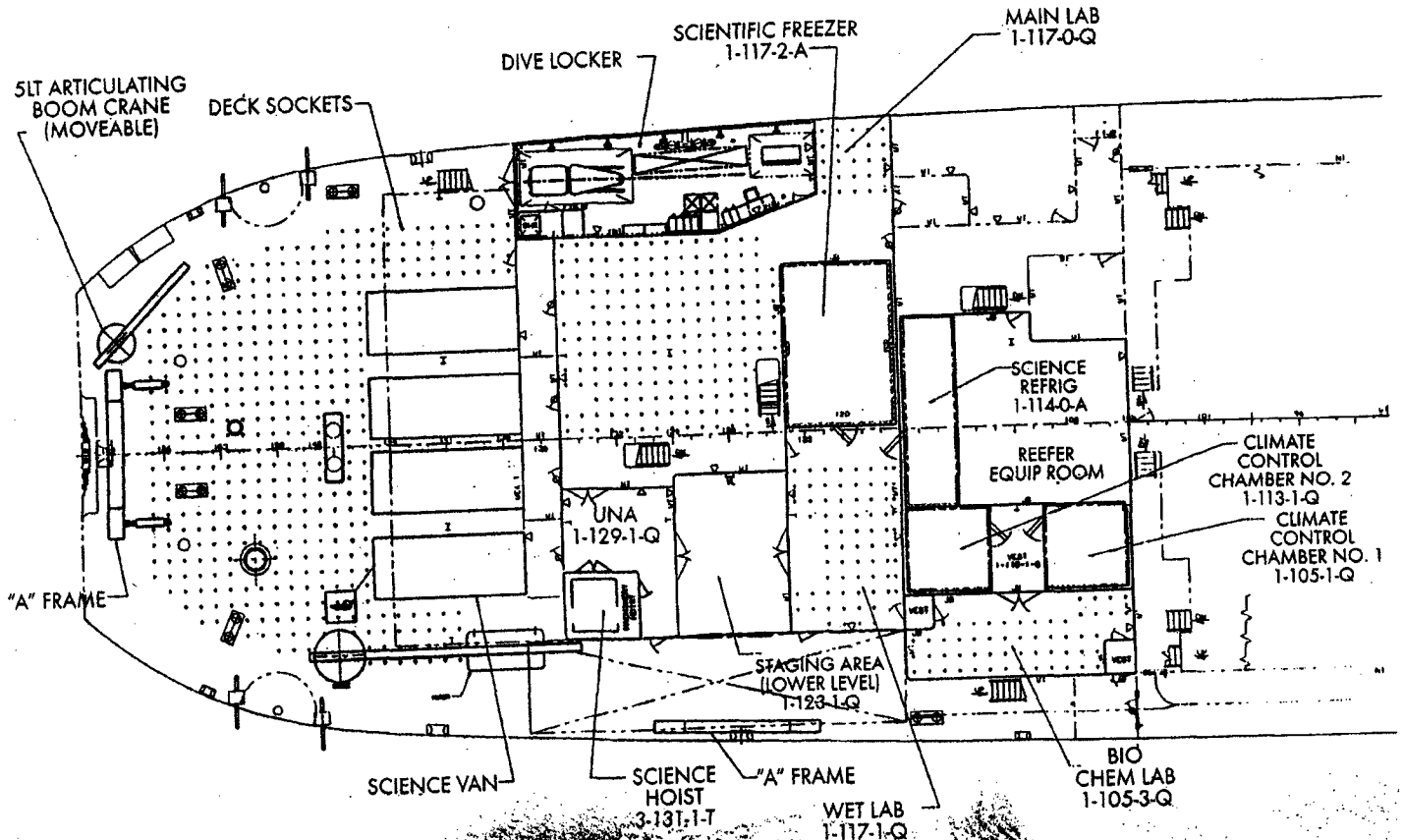




3rd DECI

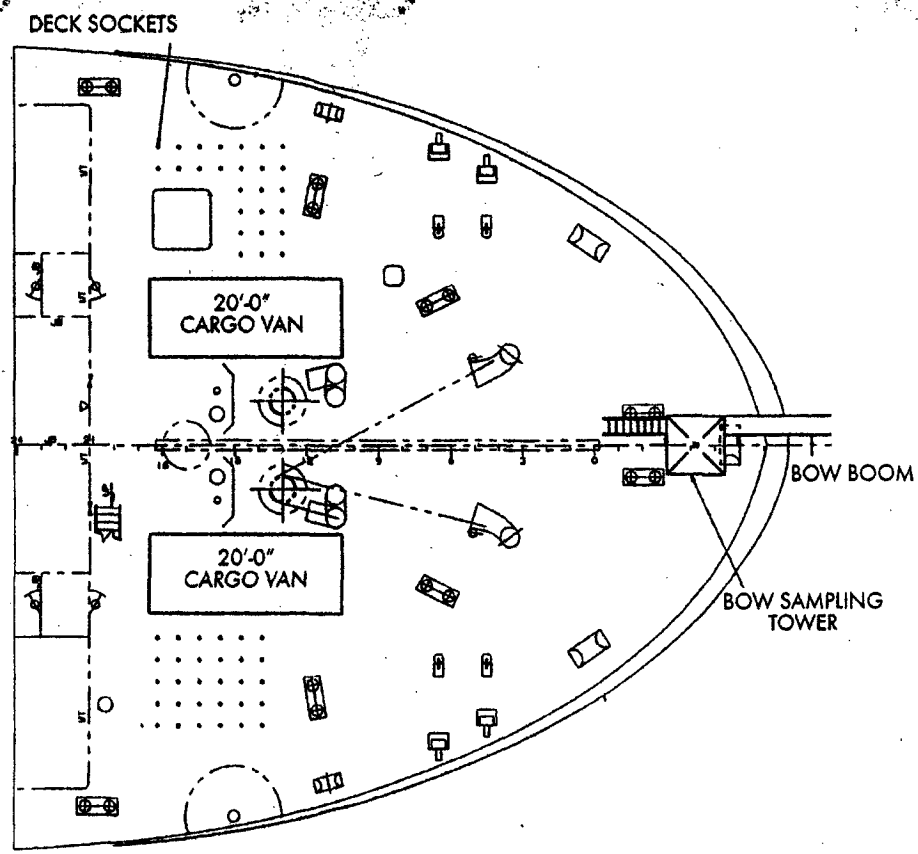
SCIENCE ARRANGEMENTS

MAIN DECK



SCIENCE ARRANGEMENTS

01 LEVEL



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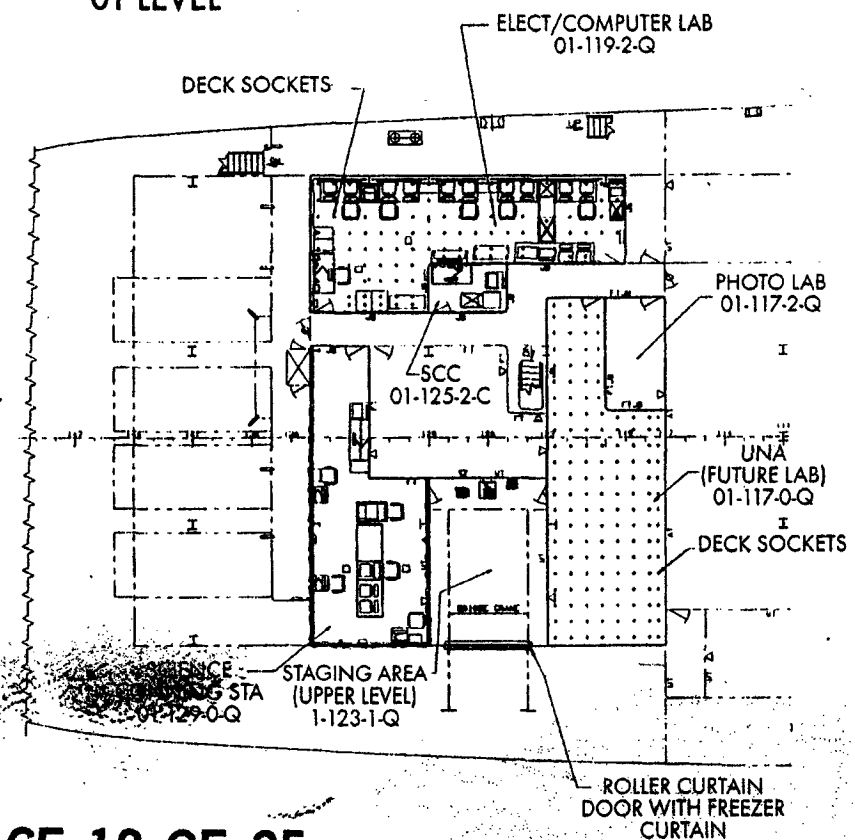

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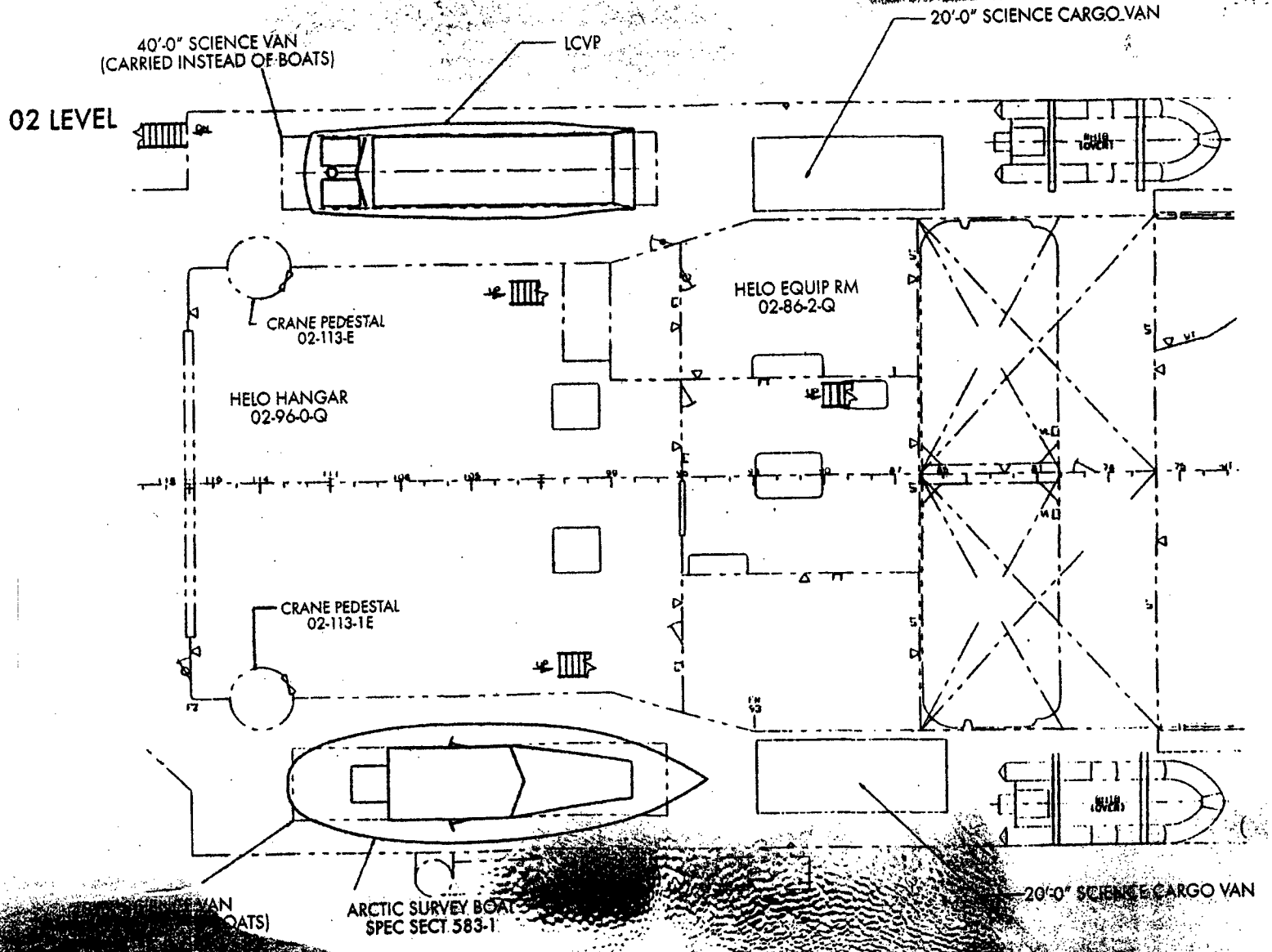
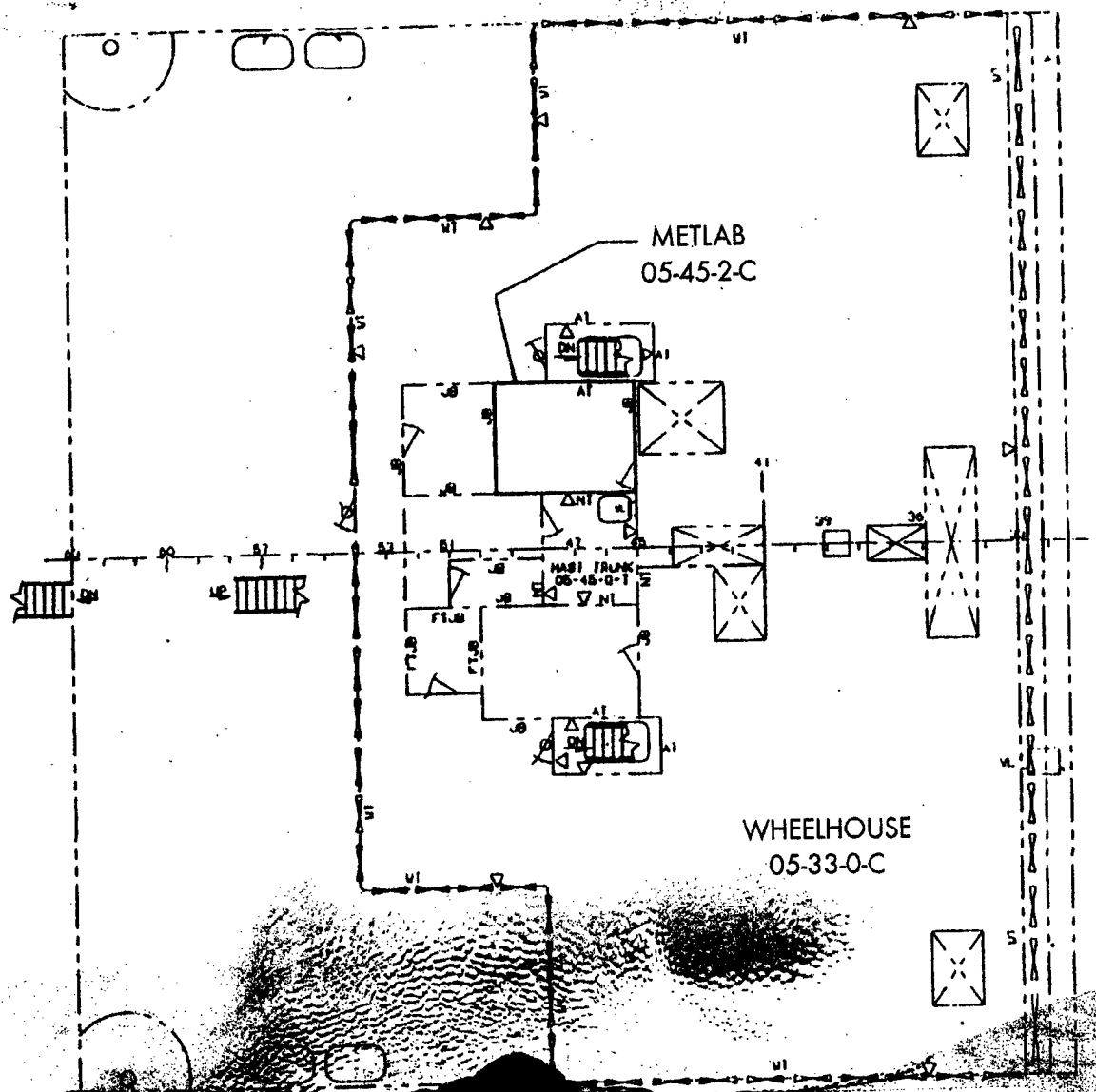
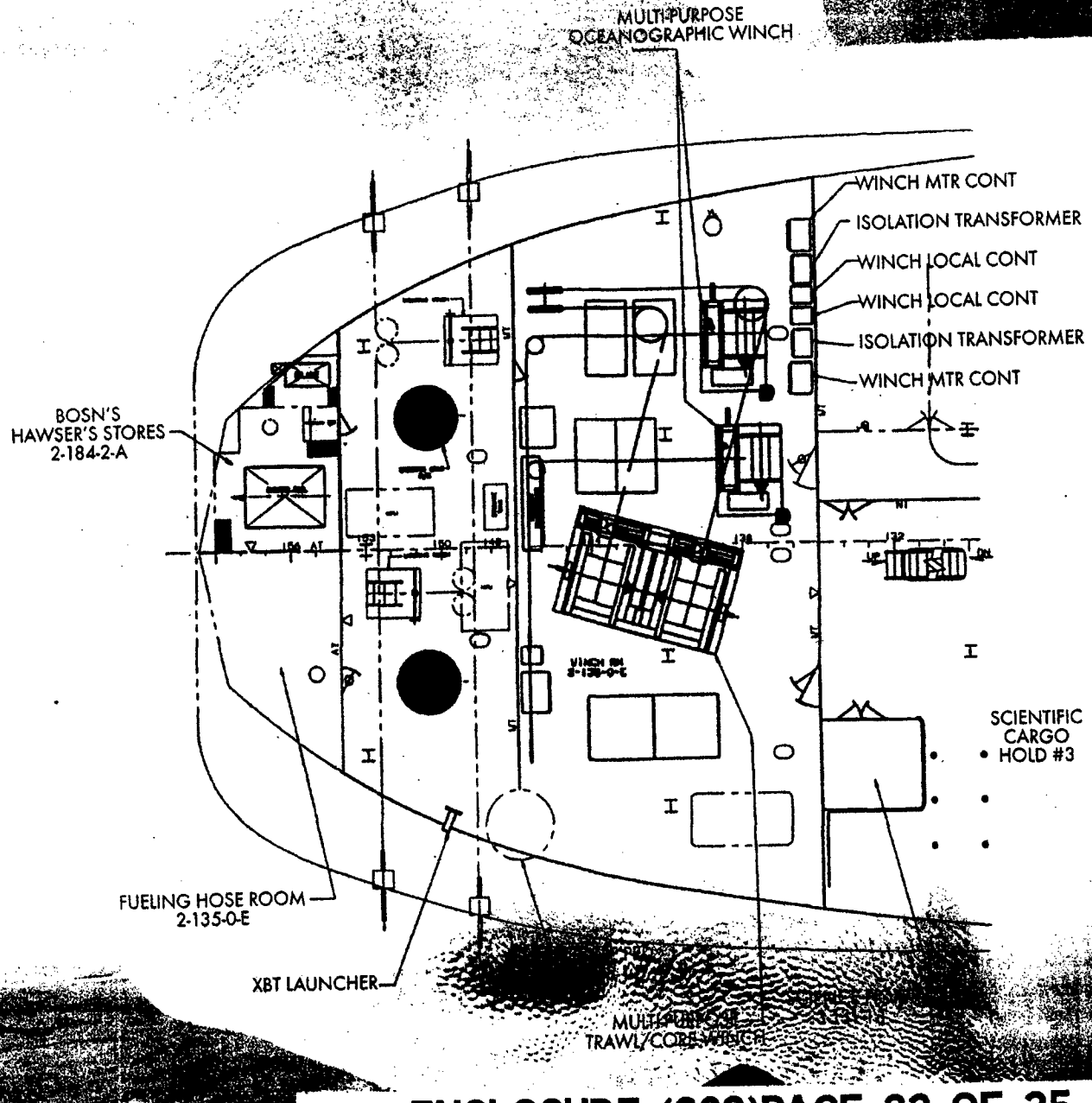


ENCE ARRANGEMENTS

04 LEVEL



SCIENCE/WEIGHT HANDLING SYSTEMS

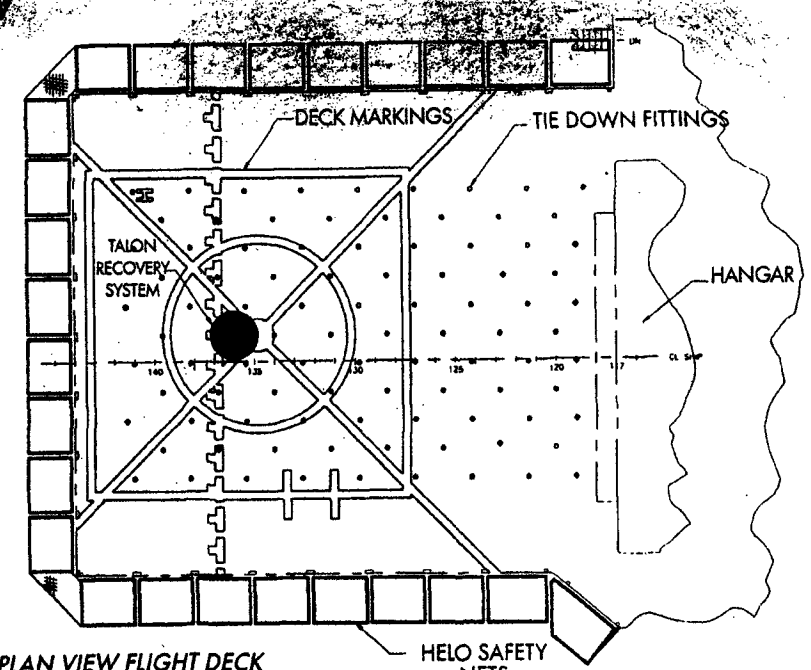


AVIATION FACILITIES

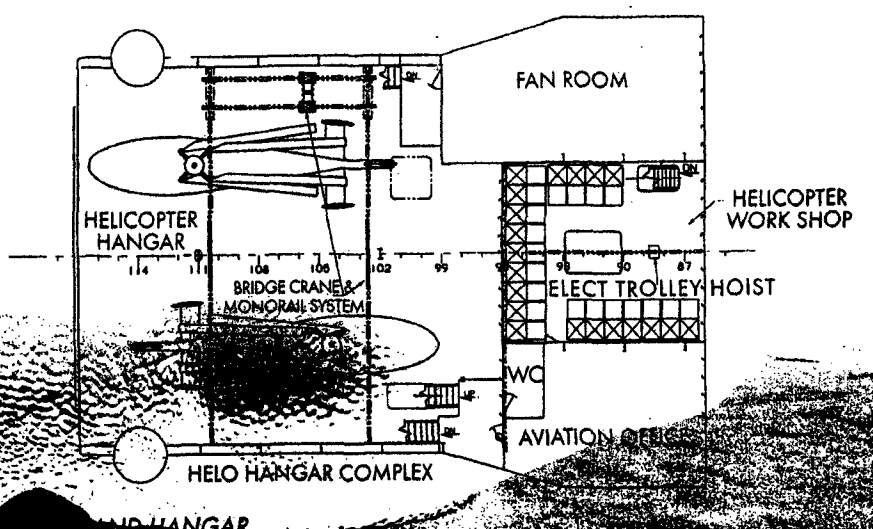
The aviation facilities aboard USCGC HEALY include a flight deck, hangar complex and helo control station capable of supporting two (2) HH-65-A helicopters.

The flight deck is certified for both day and night operations and is capable of handling vertical replenishment operations. A TALON helo securing grid is incorporated into the flight deck and consists of a landing grid, watertight deck recess and grid cover. The fight deck is equipped with hinged safety netting around the periphery and recessed tie-down fittings for securing the helos.

The hangar complex consists of the hangar, a two-level helo workshop, a helo equipment room, and an aviation office. The hangar contains recessed tie-downs to secure the helicopters, a weathertight roll-up door to the flight deck, a work bench, stowage for spare blades, refueling hose stowage reel, and provision for future installation of a helo in-haul winch system. A bridge crane system is installed in the overhead of the hangar.



PLAN VIEW FLIGHT DECK



PLAN VIEW ... HANGAR

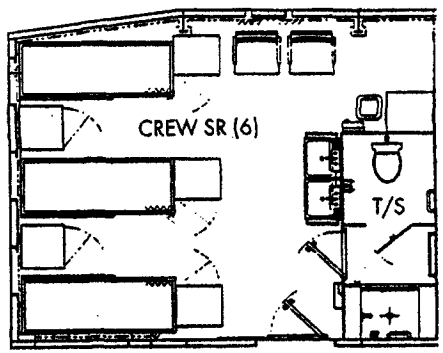
ACCOMMODATIONS / HABITABILITY

ACCOMMODATIONS:

The HEALY has permanent accommodations for 125 persons. All berthing spaces are located above the main deck.

Accommodations are provided for:

Officer	12
Scientist	35
CPO	10
Enlisted	53
Surge	15
Total	125



PLAN VIEW CREW

HABITABILITY:

Living spaces dedicated to the Science Community include:

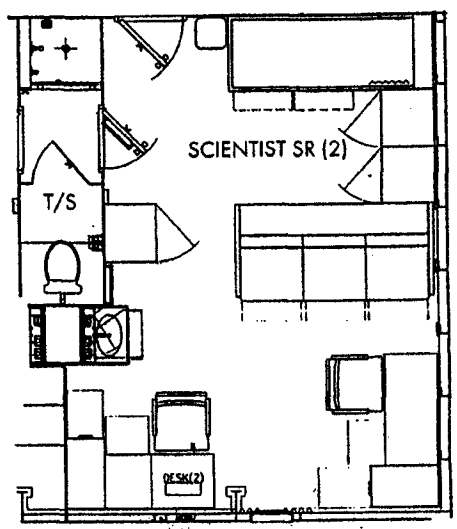
- Chief Scientist Stateroom and Conference Room
- Scientist Staterooms (2 person)
- Science Leisure Area consisting of Lounge, Library, and Conference Room

Living spaces dedicated to the Ship's Crew include:

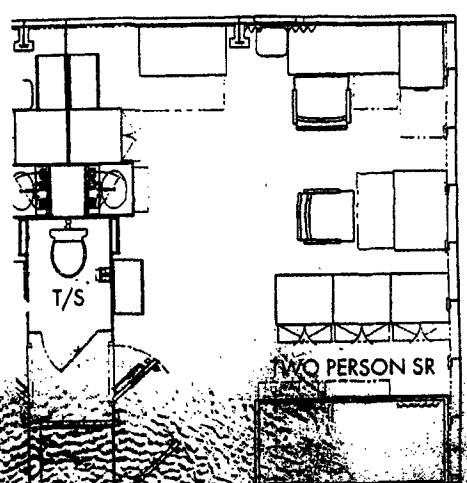
- C.O. Cabin and Stateroom
- Officer Staterooms (2 person)
- CPO Staterooms (2 person)
- Enlisted Berthing (4 & 6 person)
- Leisure Areas consisting of Officer Lounge, CPO lounge, and Crew Lounge

Common living spaces include:

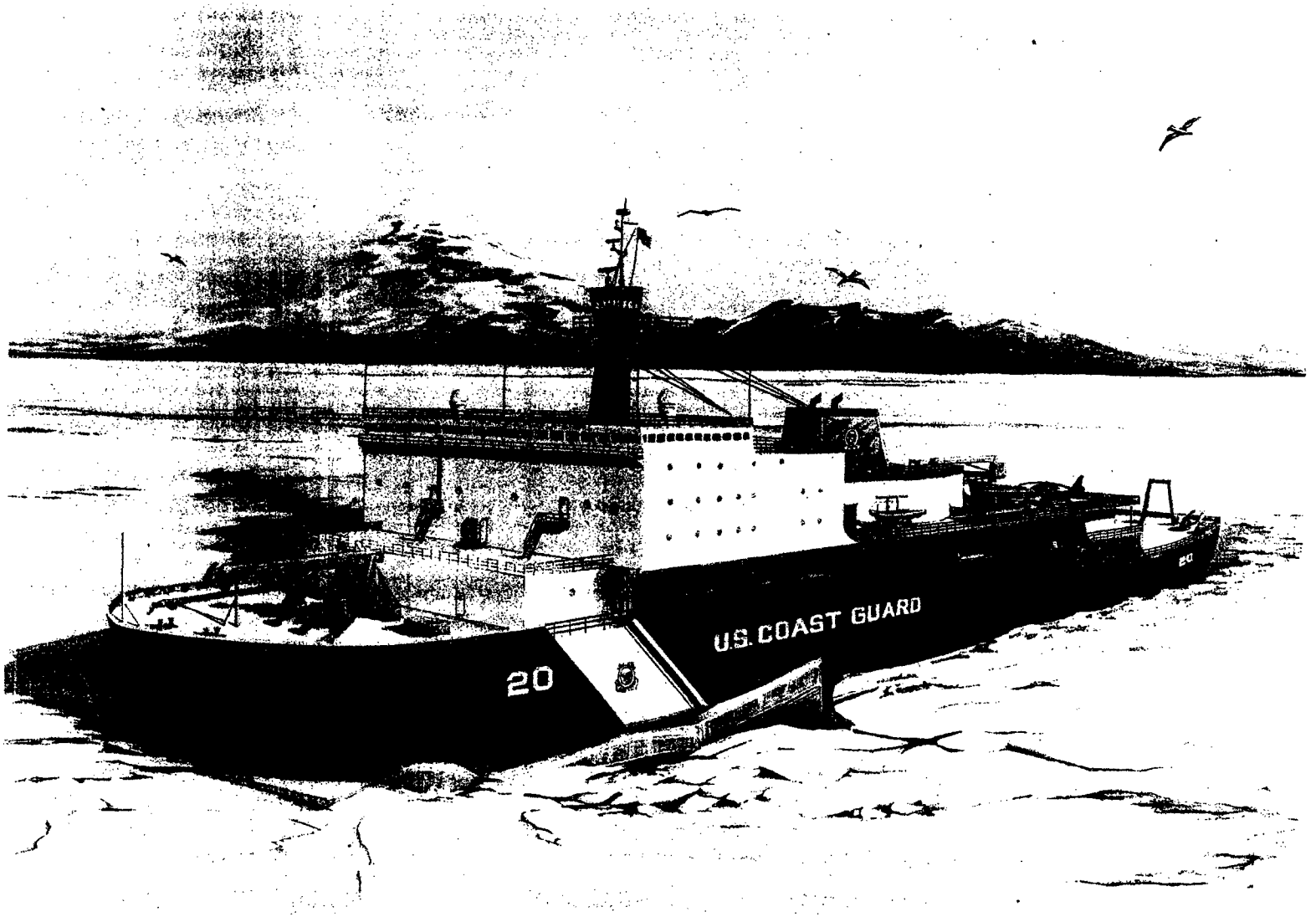
- Messing Facility
- Laundry
- Gym
- Ship's Store
- Medical Treatment



PLAN VIEW SCIENTIST



PLAN VIEW OFFICER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