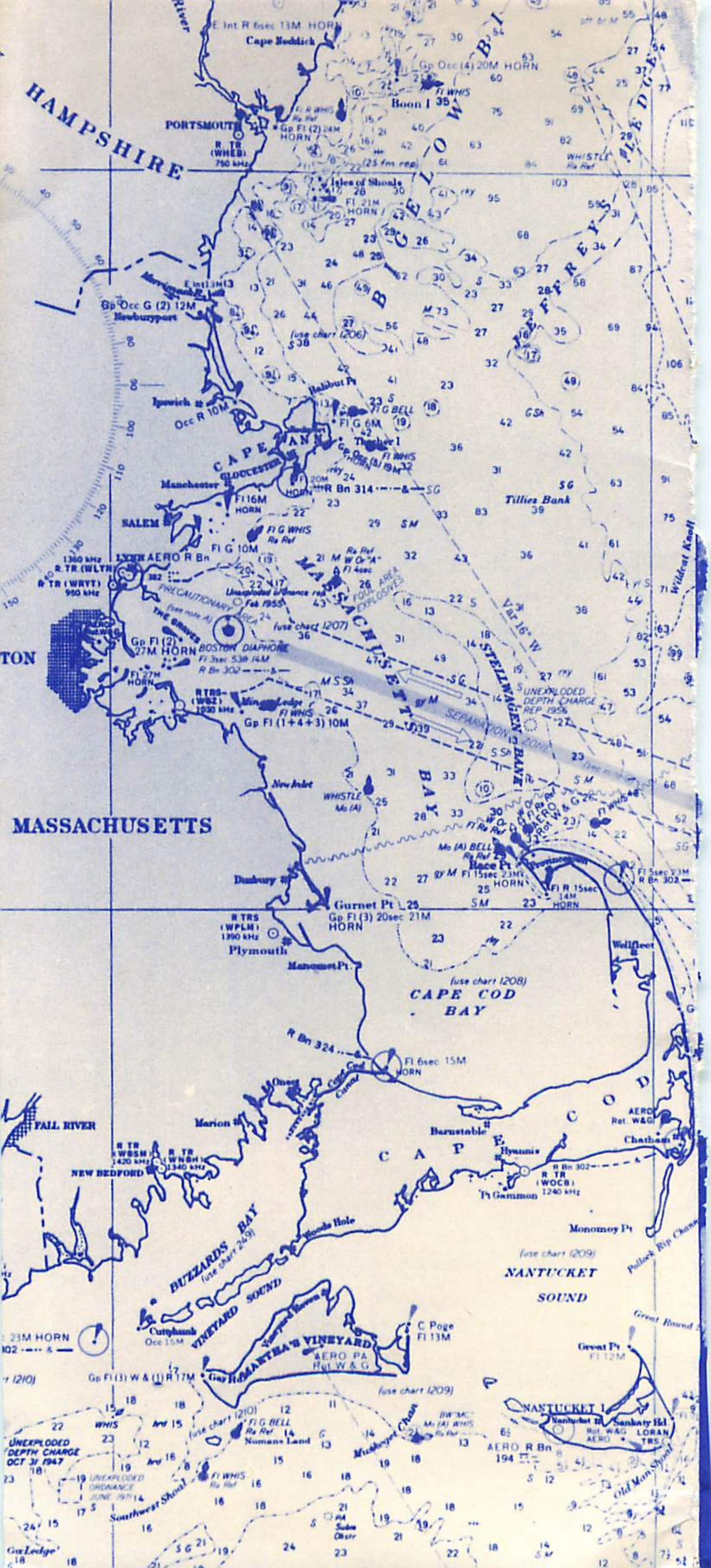
USING THE SEAS TO SERVE MAN

SEA GRANT PROGRAM
MASSACHUSETTS
INSTITUTE OF TECHNOLOGY


HAMPSHIRE
Cape Neddick
PORTSMOUTH
Boon I
Isles of Shoals
BIGELOW BIGHT
JEFFREYS LEDGE
Newburyport
Halibut Pt
Ipswich
CAPE ANN
Thacher I
GLOUCESTER
Manchester
SALEM
LYNN
(use chart 1206)
(use chart 1207)
(use chart 1208)
(use chart 1209)
(use chart 1210)
Tillies Bank
MASSACHUSETTS BAY
STELLWAGEN BANK
SEPARATION ZONE
PRECAUTIONARY AREA
THE GRAVES
BOSTON DIAPHONE
FOUL AREA EXPLOSIVES
UNEXPLODED DEPTH CHARGE REP 1956
Minots Ledge
Var 16° W
TON
MASSACHUSETTS
New Inlet
Duxbury
Gurnet Pt
Race Pt
Provincetown
Wellfleet
Plymouth
Manomet Pt
CAPE COD BAY
Cape Cod Canal
Onset
Marion
FALL RIVER
NEW BEDFORD
Barnstable
Hyannis
CAPE COD
Chatham
Pt Gammon
Monomoy Pt
Woods Hole
BUZZARDS BAY
VINEYARD SOUND
NANTUCKET SOUND
Pollock Rip Channel
Great Round Shoal
Great Pt
Cuttyhunk
C Poge
MARTHA'S VINEYARD
Gay Head
Nomans Land
Muskeget Chan
NANTUCKET I
Nantucket
Sankaty Hd
Southwest Shoal
Old Man Shoal
Wildcat Knoll
UNEXPLODED DEPTH CHARGE OCT 31 1947
UNEXPLODED ORDNANCE JUNE 1971
Cox Ledge

TECHNOLOGY FOR THE SEAS

The M.I.T. Sea Grant Program participates in the national search for solutions to current critical problems in ocean utilization and coastal zone development. Following the lead of the National Sea Grant Program, created by Congress in 1966, the Institute's engineers and scientists work to improve marine technology and to understand the social, economic, and environmental constraints on man's use of the seas.

The Institute's Program participation began in 1970 with a Coherent Area Project. Initial funds to support this coordinated research came from the Office of Sea Grant, a division of the National Oceanic and Atmospheric Administration in the U.S. Department of Commerce, from the Henry L. and Grace Doherty Charitable Foundation, Inc., and from the Institute. This broadly based program now receives additional support from over fifteen industries, foundations, organizations, and non-federal government agencies.

In July, 1972, M.I.T. was designated an Institutional Sea Grant Program in recognition of its continuing distinguished contributions to national goals. Through the Program's research, education, and advisory services, Sea Grant promotes the wise development of ocean and coastal resources, in New England and nationwide.

RESEARCH FOR OCEAN UTILIZATION

Under Sea Grant sponsorship, M.I.T. faculty, research staff, and students attempt to answer crucial questions about the future role of the oceans in man's activities.

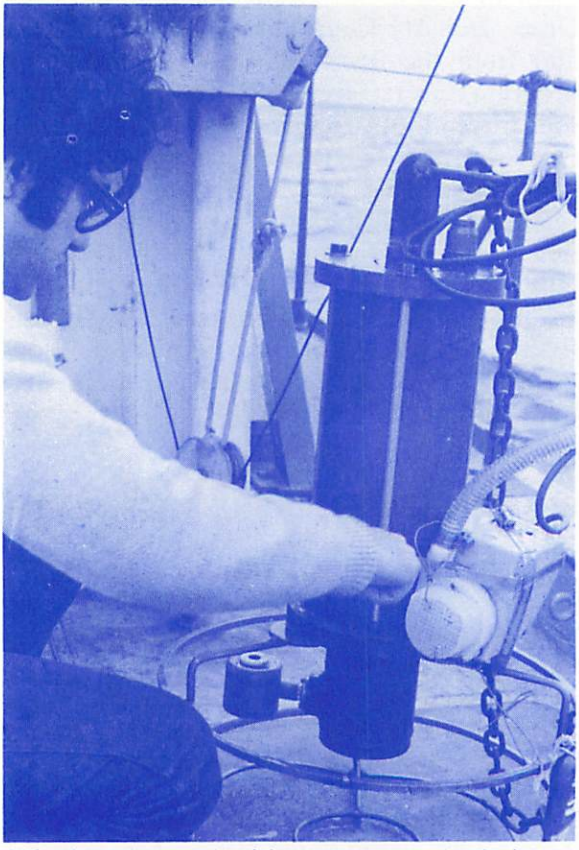
How can we convert wastes into useful resources or minimize the harmful effects on the seas of natural and man-made pollution?

A complex computer program will describe how the Massachusetts Bay, and other offshore waters, react to the influx of fresh water runoff, sewage plant effluents, and industrial

wastes. Waste water and sludge treatment with high energy electrons could protect the ocean environment and transform such wastes into nutrients for marine life. Understanding the movement of oil spills on the ocean's surface could lead to better siting of offshore oil production rigs and deepwater terminals and more effective spill containment systems.

How can engineers modify technology to extend man's capacity for living and working in a marine environment?

Improved techniques and equipment for underwater welding and metal cutting will make possible economical repairs on structures beneath the sea. Offshore platforms could cater to a variety of marine activities, in addition to oil drilling and power production, once criteria necessary for policy, manage-



Adjusting the conductivity-temperature-depth instrument on board the M.I.T. research vessel R.R. *Schrock.*

One type of offshore platform.

ment, and design decisions have been outlined.

How can ocean engineers contribute to marine safety?

Knowing the fracture toughness of the fiberglass reinforced plastics now used for boat hulls of many sizes could help to prevent boating accidents. The design of a safer hook-up block, used for the net cables on side trawling fishing boats, can reduce the injuries suffered by New England fishermen.

Two Gloucester fishermen trying out M.I.T.'s hook-up block design.

In what ways can innovative technology maximize the harvest of food and useful materials from the sea?

The underutilized squid can be processed and marketed as nutritious food products or perhaps as a protein concentrate food supplement. Chitosan, a cellulose-like material derived from the shells of lobster, crabs, and shrimp, could replace plastics for packaging, improve paper's wet strength, and function as a biological membrane for burn treatment and kidney dialysis. The warmed coolant water from power plants could be successful as an environment for cultivating marketable oysters, as demonstrated by a joint M.I.T./ University of Massachusetts Sea Grant project. Other research at M.I.T. will measure the amount and composition of lipids such as cholesterol in raw and processed fish and shellfish.

Whatever their objectives, all the M.I.T. Sea Grant research projects represent strong

combinations of disciplines and departments, joined to apply the experience and progress of engineering and other technologies to marine problems.

EDUCATION FOR ENGINEERING IN THE OCEAN

Sea Grant-sponsored education at M.I.T. emphasizes research and field experience in ocean systems, ocean engineering, and coastal zone planning.

Each year, an interdisciplinary systems design subject and a student summer laboratory provide M.I.T. students with the chance to apply to "real-world" situations the knowledge they have acquired in classrooms. Students have worked on practical problems, such as a resource study of a Massachusetts coastal town. They have redesigned or invented many types of instruments for oceanography, navigation, or ocean engineering.

Short courses offered in the summer teach practicing professionals new technological and scientific methods for solving marine problems.

Through a joint program with Harvard Law School, faculty in law and ocean engineering will be working together to identify the interacting institutions, techniques, and perspectives needed for the proper use of the sea's resources.

Also sponsored by Sea Grant, professors

Students working on an underwater robot programmed to do oceanographic research.

from M.I.T.'s Department of Ocean Engineering are creating three new subjects, in marine data systems, deep ocean engineering, and utilization of marine resources, to continue the Institute's leadership in curriculum development for this field.

ADVISORY SERVICES: OPENING MARINE HORIZONS

The M.I.T. Sea Grant Advisory Services supply comprehensive information and technical assistance, to anyone who needs such knowledge, on many facets of resource development in the oceans and coastal zones, and on the theories and techniques created at M.I.T. for furthering man's marine activities. Sea Grant serves Massachusetts, New England, and the nation by channeling new and useful marine technology into the public domain for implementation.

Reports from Sea Grant projects reach government agencies, industries, businesses, universities, and all those who can benefit from the research results.

Lectures, symposia, and conferences, which are open to the M.I.T. community and to the public, provide introductions and overviews on a variety of ocean topics.

Sea Grant's Marine Resources Information Center (MARIC) supplies to the public reference assistance and bibliographic research on ocean engineering and resource development, on coastal zone management, and on technology for marine industries. MARIC also distributes Sea Grant research reports and information.

Sea Grant's Advisory Services reflect the competence and concerns of M.I.T. The Program is gearing its advisory activities to the technical information needs of marine-oriented industries throughout the nation.

And local problems are not being forgotten. While maintaining the Institute's emphasis on engineering solutions to practical ocean-related problems, the Advisory Services staff

continues to increase its contacts in Massachusetts and New England, working with local government on economic and environmental criteria for land use planning in the coastal zones, discovering new opportunities for marine industries in New England, and cooperating with business interests on technical and political means of sustaining the marine resources of the New England states.

Sea Grant's collaborative relationships with the University of Massachusetts, both the executive and legislative branches of Massachusetts government, the Massachusetts and Maine Maritime Academies, and the New England Aquarium are growing as channels for Advisory Services outreach to the New England marine community.

Low cost plastic dam for herring runs, a joint M.I.T.-U.Mass. Sea Grant project.

AN INVITATION...

Please call or write the M.I.T. Sea Grant Program for information or assistance on ocean resource utilization or coastal zone matters. To be placed on the Program's mailing list, fill out and return the enclosed card.

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