IEEE Council on

OCEANIC ENGINEERING

NEWSLETTER

EDITOR: HAROLD A. SABBAGH DECEMBER 1980 (USPS 420-910)

Seasons Greetings

To the readers of this newsletter, the Council on Oceanic Engineering extends sincerest wishes for a joyous holiday season, and to all nations of this Earth,

PEACE—GOOD WILL.

Harold A. Sabbagh

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President's Message

OCEANS '80 in Seattle was a very successful conference. The attendees found it to be technically challenging. The beautiful weather in Seattle permitted many of the attendees to take in some of the additional opportunities available, such as watching the salmon swim up the fish ladder, etc. Congratulations to Ed Early and the team that made OCEANS '80 a success.

The new Council officers, effective January 1, 1981 are: Professor Donald Bolle, Chairman of the Electrical Engineering Department, Lehigh University; East Coast Vice President, J. Barry Oakes; and the West Coast Vice President, Walter Bacon. I know that under Don's leadership, the Council will make significant strides. As you will recall, Don was the founder and the first Editor of our journal. We are indeed fortunate in having a man of his stature as the President of the Council who will lead us through the challanges and opportunities that the next few years will bring.

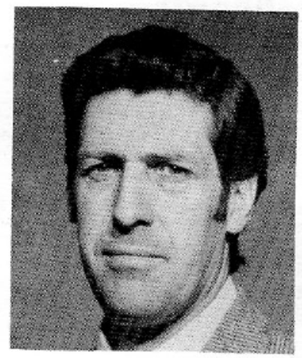
It is with joy and a certain regret that I relinquish my role as President. The job was time consuming but very rewarding. The Council Members are an excellent group of professionals. We have established a strong base for cooperative ventures with the Marine Technology Society, commencing with joint sponsorship of OCEANS '81 in Boston. We also are joint sponsors of an educational brochure for secondary schools to help acquaint the students with the opportunities and challenges of engineering in the ocean environment. The Council is financially healthy and all but one of the Groups and Societies that are represented on the Council have been active. The success of the Council, to a great extent, is associated with the support provided by individuals who are interested in oceanic engineering. There are many opportunities which come to a President which cannot be filled because there are not sufficient people to perform the various tasks. I urge any of you who are interested in working on a committee or performing various functions with the Council to write Don Bolle and give him a brief resume of your background and experience and tell him how you would like to participate with the Council. One such contact from Bill Woodward resulted in the Council establishing the committee on Current Measurement Technology. Don's address is: Professor Donald M. Bolle, Chairman, Department of Electrical Engineering, Lehigh University, Bethlehem, PA 18015, tel. (215) 861-4061.

I expect to be working with Don, at least during the next year, and I am looking forward to seeing many of you in Houston.

Lloyd Z. Maudlin
President IEEE/COE

Don Bolle was not only elected to serve as COE President, starting in January 1981, but he was awarded the 1980 Distinguished Service Award at OCEANS '80. The following are Don's comments.

Don Bolle's Comments



I was delighted and feel honored to have been awarded the 1980 Distinguished Service Award by the IEEE Council on Oceanic Engineering. I would like to recognize and thank in print the many people who have been so very helpful in, and in many cases crucial to, the activities in which I participated.

It is, of course, always a particular pleasure to receive accolades from one's peers but at the same time I am somewhat embarassed by being singled out because whatever success I have had in my COE activities has depended to a substantial degree on the strong support and direct help of a number of people. The backing and en-

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In This Issue

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Address by Thomas R. Pickering

Chairman's Luncheon, Oceans '80

Seattle, Washington
Monday, September 8, 1980

It is a pleasure to be with the IEEE and the Council on Oceanic Engineering for this forum on Engineering in the ocean environment in the next decade. Your focus on the oceans in the '80's is timely and places you in good company. Last year 53 members of the Congress broached the concept of the 1980's as a decade of ocean resource use and management in a letter to the President. The idea is now under study by the administration and by the Presidentially-appointed National Advisory Committee on Oceans and Atmosphere.

By whatever name we give to these endeavors—whether it be the decade of ocean resource use and management, or a name yet to be coined—I believe we are all striving to attain a common goal, in which the role of engineering is basic. That goal is the development of marine resources, through the encouragement of private enterprise, in a manner that protects the marine environment and that accommodates competing demands on ocean space.

Certainly, that is a major goal of the bureau which I head in the Department of State—the Bureau of Oceans and International Environmental and Scientific Affairs. We are charged with handling a wide variety of international oceans issues, many of them pertinent to your theme here today. These include fisheries, ocean energy, marine scientific research, marine mammals, marine pollution, and polar affairs. Recently, we assumed responsibility for the Department's role in implementing legislation on deep seabed mining. We also have responsibilities with regard to the Third United Nations Conference on the Law of the Sea, which just finished its ninth session. At the conclusion of the conference, my bureau will be responsible for the foreigh policy follow-up and implementation.

During the past year, we engaged in an analysis of trends and national objectives in ocean affairs during the 1980's. I would like to share with you some of our thoughts on these matters, particularly as they relate to the development and management of ocean resources and the role of the Department of State. I look forward to your comments on our analysis in the discussion period after these remarks.

One development we see is that principles are evolving that will be applicable to the development and management of ocean resources. Chief among these is coastal state control—control over exploring, exploiting, conserving, and managing both the living and nonliving resources of the waters and seabed out to 200 miles from the coast. These ideas are of course included in the law of the Sea Treaty, the conclusion of which was pretty well assured last month. Most of the presently exploitable resources of the oceans are found in this 200-mile zone, so ocean resource activities will increasingly be carried out uinder the regulation and control of national governments. We in the State Department will necessarily be involved because of the potential for international dispute and conflict.

Fisheries

Since the 1940's the Department of State has been concerned with the development of the ocean fisheries as an important world source of protein. Now, looking ahead to the decade of the 80's, we foresee a declining per capita world fisheries harvest. Despite a marked increase in investment in fishing fleets since 1970, with investment in high technology instrumentation from your industry, the annual world catch has increased little beyond 70 million tons. At the same time the world's population continues to grow apace.

This is a critical issue. In preparing the Global 2000 Report which the President requested from the Department of State and the Council on Environmental Quality, we found that between now and the year 2000, food consumption per capita in South Asia, the Middle East, and the LDCs of Africa will scarcely improve or will actually decline below present inadequate levels. At the same time real prices for food are expected to double. Maximum substainable fishery yields will have been reached or surpassed during the 1980's in many regions, unless more effective management schemes are instituted. With better management the annual world catch might increase to 80 million tons by the year 2000, from the present 70 million tons.

Another trend we see for the 1980's is away from long-distance fishing fleets, as coastal states extend their control and restrict access to their waters. But coastal fishing fleets and domestic shore-based or offshore processing operations will grow.

Our own fisheries policy, we anticipate, will continue to be set by the fishery conservation and management act of 1976, which established our 200-nautical mile Fishery Conservation Zone. The act has encouraged significant new investment in U.S. harvesting and processing capacity, so that during the 1980's we expect to see a continuing decline in the level of foreign fishing off our coasts. However, we will continue to negotiate international fishery agreements in cases where there are opportunities for either reciprocal access by U.S. vessels or for increased economic benefit in the U.S. fisheries sector, such as joint ventures and increased exports. We also have an interest in insuring that U.S. fishery resources are fully utilized, and in this regard we will continue to do what we can to see that fish which is surplus to the needs of U.S. fishermen is allocated to foreign nations in an effective and timely manner. During the 1980's, we will also be giving priority to negotiating arrangements with other countries to help maintain U.S. access to important fisheries such as tuna, shrimp, and groundfish.

Mineral Resources

Turning from fish to mineral resources, we are struck by the dramatic growth in exploration for offshore oil and natural gas during the past decade. This trend will continue. Fortunately, oil reserves don't swim. So, unless the seaward extension of a boundary between two countries happens to cross an oil pool, international arrangements for the production of petroleum should not be necessary. Where the problem of a common pool occurs, bilateral or multilateral agreement will have to be reached if it is to be exploited efficiently and equitably. In general, this has involved a principle of equitable sharing of a resource straddling a disputed zone. In certain areas, cooperative arrangements for the landing or transit of oil and gas may be desirable.

Perhaps you can reassure me with a contrary view, but we fear that increased exploitation of offshore petroleum in the 1980's will bring greater possibilities of blowouts and other pollution incidents. Of particular interest to my department are the transboundary environmental impacts which these may have. Last winter's massive blowout and oil spill in the Bay of Campeche is an example of the effect on our nation of activities on the continental shelf of another. The mutual vulnerability of coastal nations bordering the same body of water points to a clear need to harmonize safety and anti-pollution measures, including provisions for blowout prevention, control, and liability.

Already, we have negotiated joint marine pollution contingency plans with Canada and Mexico, the latter signed in August. Further, working in close cooperation with other agencies such as the Coast Guard, the Department of Energy, and the Department of the Interior, we expect during the 1980's to negotiate with our neighbors new and additional contingency planning and other environmental agreements concerning offshore hydrocarbon development. Such agreements may well serve also as a precedent for safety and environmental standards in a broader international context. Our long term goal will be the development of an internationally agreed policy for offshore resource activities having possible transboundary impacts.

Polar Areas

Interest in ocean resources have directed man's attention out to the most distant frontiers of our planet. The question of possible resource development in Antarctica, for instance, has become an important item of discussion among the parties to the Antarctic Treaty. They have committed themselves to the development of regimes for the conservation and management of living resources in waters around Antarctica and of the minerals which may exist on the Antarctic continent or continental shelf. The U.S. has taken the lead in seeking solutions to these resource issues. We are very pleased that an international treaty—the convention on the conservation of Antarctic marine living resources—has just been negotiated in Canberra. Our ambassador will sign the convention this Thursday, and the administration will push for early ratification. The convention, when in force, will establish the institutional machinery and legal obligations to provide for the conservation and protection of Antarctic marine resources and the ecological systems of which they are a part.

The early start-up and implementation of this new convention will be one of our major objectives with regard to Antarctica in the decade ahead. Of equal importance will be meeting our commitment to develop an international regime for mineral resource activities in Antarctica. The challenge of the '80's is to construct effective systems to respond to these resource issues. This will require solutions to the differences in view among the Antarctic treaty parties over sovereignty in Antarctica, and it will require innovative approaches to resource management. The Living Marine Resource Convention succeeded in solving similar questions. If we succeed for mineral resources, as I am confident we will, we will ensure the maintenance of the Antarctic treaty system which has set aside the sovereignty issue and successfully reserved Antarctica for peaceful purposes and as an arena for scientific research for the last two decades.

Energy

Toward the end of the decade of the 80's, renewable ocean energy sources such as OTEC (Ocean Thermal Energy Conversion) may become commercially attractive. By 1986, under the recently enacted OTEC Research, Development, and Demonstration Act, we will have OTEC pilot plants with a combined capacity of al least 100 megawatts. By 1989, capacity should total at least 500 megawatts. Successful demonstrations, combined with ever increasing oil prices, could make OTEC a very interesting energy option during the 1990's for countries in a suitable geographic environment, especially if they must import oil for base-load electricity generation. There are many developing nations in this category with a strong potential interest in this technology. We will need to consider, however, OTEC's possible environmental impact, and the international legal regime under which OTEC is to operate.

Waste Disposal

Disposal of wastes at sea, we believe, constitutes another threat to the environmental health of the oceans in the 80's. The Love Canal case and related environmental and political objections to land-based disposal of highly toxic chemical wastes are making at-sea incineration of such wastes more attractive. Last year, the Ocean Dumping Convention was amended to take account of this emerging technology (one could call it a burning issue) and interim technical guidelines have been endorsed by the parties to that convention.

Disposal of nuclear wastes at sea is also likely to become a more visible issue in the 1980's. Quantities of low-level radioactive wastes being disposed of at the agreed North Atlantic site have been increasing yearly, and the U.S., while not using ocean disposal, has advocated proper monitoring and assessment of the site. Japan is considering similar disposal in the North Pacific. An engineering challenge—the emplacement of high-level nuclear wastes in the deep seabed—is also receiving increased attention. The United States is studying this concept as a back-up option to our primary plans for land-based geological disposal of such wastes. But for some countries with serious demographic or physical constraints, deep seabed burial may be the only possibility short of shipping wastes to other nations. As further experimentation and development of the concept takes place during the 1980's, international legal and policy issues are certain to arise.

The Department of State will also continue to be involved in the more traditional ocean pollution issues. Tanker accidents will continue, and require us to be concerned with the development and enforcement of protective standards. However, because of our strategic and commercial interests in the freedom of navigation, the United States opposes the concept of absolute coastal state control for pollution purposes in 200-mile zones. The inconsistencies and contradictions in various nations' marine pollution standards which could result from such absolute control would not only inhibit the freedom of navigation, both military and commercial, but would also weaken the overall effort to regulate pollution from vessels. We therefore believe that our interests, as well as international interests, are better served by the development and implementation of anti-pollution standards that are international. Specifically, we support the efforts of the Intergovernmental Maritime Consultative Organization (IM CO), which is the competent international body for the development of pollution standards and for a variety of other construction, safety, and navigation measures to prevent intentional or accidental discharges into the ocean. Unfortunately, pollution from ocean-based activities is only part of the issue. The bulk of ocean pollution occurs through river run-offs and atmospheric transfers. With the continued growth of coastal populations and agricultural and industrial activity, pressure on the oceans' absorptive capacities from land-based activities will increase well beyond this decade, presenting another significant problem for engineers and governments.

As I mentioned earlier, the Third United Nations Conference on the Law of the Sea has just concluded its ninth session. The conference completed work on virtually all substantive issues, including solution of what Ambassador Elliot Richardson calls the "single most difficult issue of all"—the decision-making procedures of the 36-member Council of the International Seabed Authority. The Authority will be the governing body for all seabed mining activities. Under the newly agreed procedures, the majority required for a decision in the Council of the International Seabed Authority will depend on the nature of the issue. The most sensitive issues will be decided by consensus, which means that the U.S. or any one else on the council has a blocking vote. A ¾ majority is required for less sensitive issues, and a ⅔ majority for the least sensitive. For any issues not specifically enumerated, consensus will be required.

With negotiations completed on the substantive issues, next year's LOS session will have as its main task the formalization of the LOS Treaty text. The other issues before the session will be essentially procedural, such as the duties of a preparatory commission to set up rules and regulations for the treaty's entry into force, preliminary investment protection and the possible participation by entities other than states.

The significance of the treaty is enormous. Not only seabed mining, but virtually everything connected with the seas will be dealt with by the treaty—jurisdiction over offshore oil and gas reserves, for example, and freedom of passage for naval vessels and aircraft, the protection of the marine environment against pollution, and rules for carrying out marine scientific research.

My bureau, along with Ambassador Richardson and his inter-agency team, worked long and arduously throughout this session to negotiate improvements in the draft agreement. We drew on advice from all the varied interests in the United States who will be affected by a comprehensive law of the Sea Treaty, including, most certainly, some of your own industries. While we did not achieve all our nogotiating objectives, I believe that we have obtained a draft treaty that well serves a broad range of our nation's multiple interests in the oceans.

Seabed Mining

Deep seabed mining will be one of the greatest challenges to technology and engineering in the next decade of the ocean. The Deep Seabed Hard Mineral Resources Act which President Carter signed on June 28 outlines a regime that permits U.S. industry to take up this supreme challenge. At the same time, the act takes into account the fears of the developing countries that the United States would preempt seabed resources considered to be the common heritage of mankind.

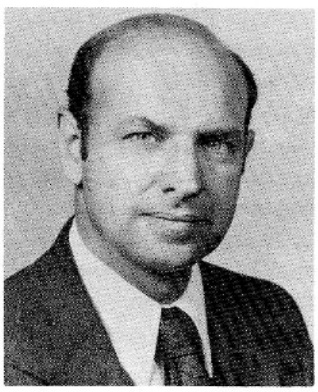
The act is drafted to be compatible with the work of The Law of the Sea Treaty Conference. It recognizes that the resources of the seabed are a common heritage of mankind and thus are the objects of international interest in a broad sense. It requires that part of the revenues from commercial production be set aside for developing countries. But the act provides for the government to license U.S. firms to commence exploration activities beginning next July. Permits for commercial recovery can be effective as early as January 1, 1988. Under this timetable, The Law of the Sea Conference will have ample time to complete its work and to prepare for implementation of the treaty before commercial recovery under American law can take place. At the same time, potential ocean miners are assured that they may continue their work without fear that delays in the international process will cause unanticipated and costly interruptions in their development programs.

The act authorizes reciprocal agreements with any foreign nation that regulates the conduct of its citizens in a manner compatible with the act. My bureau in the State

Department expects to play a major role in working out agreements with signatory states and assuring compatibility with the emerging deep sea mining regime under the Law of the Sea Treaty. With the Deep Seabed Hard Mineral Resources Act and the new treaty, we can look forward to an era in which ocean resources benefit all mankind, and the institutions overseeing these resources set a new standard for international cooperation.

It has been a pleasure top appear before you. I will be happy to answer questions you may have. I would also be pleased to hear any comments you, as members of the industrial sector, may have concerning our assessment of trends affecting engineering in the ocean environment of the 1980's which I have highlighted here today.

Thank you.



Thomas Reeve Pickering, son of Hamilton R. and Sarah C. (Chasteney), was born in Orange, New Jersey on November 5, 1931. He received an A.B. degree from Bowdoin College in 1953, an M.A. degree from the Fletcher School of Law and Diplomacy in 1954, and also an M.A. degree from the University of Melbourne in 1956.

Mr. Pickering then became a commissioned officer in the Naval Reserve in 1956. After completing three years of active duty with the U.S. Navy, he joined the Foreign Service in 1959 as a Foreign Affairs Officer and was assigned to the U.S. Arms Control and Disarmament Agency. In 1961, he became a Political Adviser of the U.S. delegation to the Eighteen-Nation Disarmament Conference in Geneva, Switzerland. He served in that capacity until 1964. From 1965–1967 he served as Consul in Zanzibar. He was assigned to Dar es Salaam, Tanzania as Deputy Chief of Mission from 1967–1969. From 1969–1973, he served in the Department of State as Deputy Director of the Bureau of Politico-Military Affairs. He became Special Assistant to the Secretary of State and Executive Secretary of the State Department in 1973. From 1974 to 1978 he was the U.S. Ambassador to Hashemite Kingdom of Jordan and was then appointed Assistant Secretary of State for the Bureau of Oceans and International Environmental and Scientific Affairs, which position he currently holds.

Mr. Pickering is a member of the Council on Foreign Relations, Phi Beta Kappa, International Institute for Strategic Studies and a member of the Board of the Foreign Service.

Mr. Pickering speaks French and Swahili. He is married to the former Alice J. Stover. They have two children.

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couragement of past and of present Presidents of our Council: first, Art Westneat who got me involved in OCEANS '72 in Newport, induced me to reactivate the Oceanic Coordinating Committee Newsletter (now so ably continued by Hal Sabbagh), and who was never satisfied with the status quo but urged us all on to further efforts; Ed Early, our Junior Past President, about to become Senior Past President, who steadfastedly supported the efforts to initiate our *Journal of Oceanic Engineering*—his friendly encouragement, good advice, and constant concern were so helpful particularly during the initial period when the difficulties were many; our current President, Lloyd Maudlin, who made sure that the challenge was met and growth continued. His broad knowledge of the field and many contacts were invaluable. These three people I particularly thank for giving me an experience which has given me much satisfaction and made good friends out of respected colleagues.

In a field as diverse as the application of electrical and electronics technologies it was inevitably necessary that the editorial efforts be a cooperative one. I have been very fortunate to have had the help of a group of extremely able and widely known professionals who very generously gave of their valuable time. Associate Editors Art Baggeroer, Tom Dauphinee, Stan Ehrlich, and Dave Weissman—I owe them a large debt, as do we all, for their fine efforts on behalf of our Journal.

In addition, the help of Dick Emberson and Gail Ferenc at headquarters made my task so much simpler than it might have been. The secretarial help of Linda Carnaveli made light work of the myriad of details and was essential in keeping the multichannel flow of papers moving and in order.

It is clear that the success of our Journal is due to the combined efforts of many people. It is a joy to see that under the leadership of Dave Weissman the Journal continues to grow in quality and stature.

It is also a pleasure to return to the fold, after a timeout which allowed for a sabbatical leave and a change of venue, and to have a chance to work on the Council with a group of people I respect highly and whose company I enjoy greatly.

Thank you again for the honor you do me and which I accept in name of all my colleagues on the Journal of Oceanic Engineering.

Donald M. Bolle

President Elect COE

The Role of Science and Technology in Ocean Management*

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Abstract

In the near future, the U.S. will acquire in the legal sense of property, 1.4 billion acres of ocean space within an exclusive economic zone out to 200 miles offshore. In effect, the new area under national control will be an extension of the public lands which are retained under the stewardship of the federal government. This will create a need for the development of an ocean and coastal resource management system which must incorporate the concepts of multiple use and sustained yield. The working tools of resource management are knowledge and information. Marine Science and Technology must play a key role in providing a foundation for the management system. By focusing ocean policy on the development of a resource management system, we will for the first time have a framework for fitting marine science and technology into an integrated scheme which relates to a major national goal. As a consequence, ocean R&D can assume in the future a prominence which it has not enjoyed since the "golden age of technology" in the 1960's.

The Offshore Technology Conference (OTC), which is held in Houston, Texas, each May, has become an international barometer of technological progress in ocean science and engineering. One cannot help being impressed with the advancements that have been made during the past 25 years in offshore technology. This progress has largely taken place as a result of the impetus for oil and gas exploration and development in the Outer Continental Shelf. To the more than casual observer, however, the OTC sounds a sobering note for American technology and the U.S. offshore industry.

The offshore oil and gas industry was born and flourished in the United States long before it was exported to the North Sea, Indonesia, and elsewhere in the World. Yet during the past decade we have seen other nations, such as Norway, Sweden, France, Japan, West Germany, Canada, the United Kingdom, and the Netherlands adapt U.S. technology and apply their own innovative talents to developing new technologies and services for the offshore industry. Foreign presence at the OTC grows each year.

The implications of the rapid catch-up game which the other industrialized nations have successfully played since World War II in the fields of marine science and technology are stern warnings that the postwar prominence of the United States in technical fields, which was subsequently fed by the momentum of the space era, is not immune from serious economic challenges from our international competitors. While there is no reason to despair, in fact the trend was expected, there is ample reason to be concerned about this technological challenge.

According to a number of indicators, the relative vitality of overall U.S. innovation and the national rate of growth in productivity significantly waned during the decade of the 1970's. This phenomenon has been ascribed to a number of reasons, the most popular being the fallback in government funding of research and development and the imposition of government regulations on the private sector. While it is true that the current ratio of federal R&D expenditures to GNP is less than half the ratio of 1967 in constant dollars, it is equally true that the industrial R&D investment has doubled since 1967 until it is presently equal to or slightly greater than the government's contribution. The overall fiscal picture is hardly one that supports the lamentations of some, that United States industry is going down the tubes. Yet there are obviously serious short circuits in the R&D process and problems in how American industry conducts business in the international market place. These problems may not be wholly related to the money spent in the R&D effort.

Whether ocean R&D tracts with the overall pattern of domestic R&D is uncertain. Unfortunately, there are no time series analyses which disaggregate government ocean R&D investment data or analyze private sector contributions to marine science and technology. However, if the OTC is any measure, it appears as though the U.S. offshore industry is beginning to show signs of vulnerability not unlike other domestic industries which have been severely challenged by aggressive foreigh competitors.

To date, ocean development has lagged behind the expectations of the Stratton Commission as set out in its 1969 report *Our Nation and the Sea.* It is often the fault with visionaries that their predictions come before their time. But come they will, because there are undeniable signs that the nations of the world are looking enviably at the energy, minerals, and living resources of the ocean as land-based resources and usable space diminish. There is little doubt that the current debates at the United Nations Conference of the Law of the Sea (UNCLOS) center on international economic issues and how the world's oceans will be divided, rather than on the strategic military uses of the ocean as in the past.

The importance of the ocean to the United States is presently manifest in the emphasis being placed on development of offshore oil and gas resources, the mining industry's interest in the deep seabed, and the efforts of the American fisheries industry to expand its capacity to fully utilize the fish stocks within the 200-mile Fishery Conservation Zone. A new awareness of the importance of domestic natural resources has set the stage for focusing increased public attention on the potential of offshore resources and open space as land-based resources become more scarce. Thus, the 1980s hold promise for being the most progressive era in the evolution of U.S. ocean policy.

The reasons for the slow pace in developing the ocean's resources are varied and complex. Lack of economic incentives, investment uncertainties, limited risk capital, magnitude of capitalization required, technological limita-

*Presented at OCEANS '80.

tions, and uncertainties in international law have joined to mitigate against more rapid ocean development. As much as anything, however, the lack of clear cut objectives for focusing U.S. ocean policy have exacerbated the factors mentioned above to limit the expansion of ocean use.

In the past, we have tried to peg ocean policy on science and technology, environmental protection, and international law. All of these have failed to provide an integrating theme upon which to build a lasting framework for ocean policy. The country's flirtation with science and technology as the centroid for ocean policy in the late 1950s and the 1960s was an outgrowth of the "golden age of technology," which was stimulated by the atoms-for-peace and space exploration programs. During that period, "ocean policy" was tantamount to "ocean science policy."Since then, we have come to realize that the premise upon which the Stratton Commission based its recommendations for developing undersea technology was fatally flawed. The dream of a "wet NASA" disappeared in the 1970s when the public's faith in technology faltered, the federal R&D budget began drying up, and the U.S. became preoccupied with environmental protection. While the Stratton Commission based its recommendations on an assumption that once the technological capability to extract the wealth of the ocean was developed, commercial exploitation would automatically follow, we have since learned that the reverse is true, that enonomics drives technological development rather than technology driving economic development. As an example, commercial diving technology has advanced significantly as the need for performing work in underwater increased in response to offshore oil and gas development in ever-increasing depths of water. Similarly, deep seabed mining technology was developed in response to the prospect of economic recovery of critical minerals from the ocean floor.

In the near future we will extend our national control over 1.4 billion acres of ocean space and marine resources within a 200-mile exclusive economic zone. This zone will for the first time become legal property of the United States, free of any foreign claims save the right of peaceful ingress and egress. This will happen in one of three ways: (1) through successful negotiation of a ratifiable treaty in UNCLOS, which has already reached agreement on the economic zone; (2) by extension of national jurisdiction through legislative action; or (3) by presidential proclamation, as was done in 1945 by President Truman. With the advent of an U.S. economic zone, a foundation will be layed for managing the waters, seabed and the resources of the economic zone as integral units in the same manner that we treat the public lands under the stewardship of the federal government. Instead of exercising control over the coastal waters in a piecemeal fashion as has been the policy of the past, the United States will have an opportunity to develop a management system based on the precepts of multiple use and sustained yield.

For the first time there will be a focus for U.S. ocean policy aimed at comprehensive resource management. The development of an ocean and coastal management system, which will ensure the balanced use and protection of the resources within the U.S. economic zone, requires the integration of five policy components: (1) development policies, (2) conservation principles, (3) protection strategies, (4) management data and information, and (5) ocean services. Each of these components involves the disciplines of science and engineering to one degree or another.

Science and technology are the working tools of resource management. Development policy is directly linked to the technological capability to exploit resources in a manner which will satisfy the conservation principles applied to the management system and the protection strategies needed to protect the environment.

On the other hand, application of conservation principles requires a knowledge of the extent and nature of the resources and the physiographic setting in which they exist. And protection strategies must be based on a knowledge of the environmental systems and the manner in which they will respond to perturbation.

While the future will provide a focus for a domestic ocean effort, it will also present challenges which must be met. We have not yet come to grips with formulating a development policy for ocean resources. Until we establish an agenda for development, ocean policy will consist of nothing more than government regulations counterpoised against private sector initatives. The sooner the Nation is able to articulate what it seeks to gain from the ocean, the more responsive industry can be in meeting those needs and the more effective regulatory programs will be in protecting and conserving the natural resources.

We must also overcome the devisive adversarial atmosphere between the government and industry that prevails today. This can be accomplished by identifying the mutual goals of the government and the private sector and by emphasizing these common objectives instead of concentrating on their differences. Government must continue to protect the nonmarket common property values, ensure recovery of the fair market value for public resources, and protect the aesthetic qualities of the ocean. The nation's stake in the responsible development and utilization of the ocean resources off our shores are parallel national goals as well and must be pursued with equal vigor.

Differences between the perspectives of government and the perspectives of the private sector will always exist. The responsibilities of each are significantly different under the American system. However, once national goals are identified, it is the responsibility of the government to reduce the uncertainties of doing business in offshore waters to the maximum extent possible. This means the clear articulation of the rules by which the game will be played and an assurance that the rules will not be changed after the hand is dealt.

It is to the mutual advantage of both the government and industry that these contrasting roles do not become confused. Government must play a supportive role in the development and application of technology, but its direct role in innovation and the deployment of technology is limited. The private sector is justifiably concerned about the potential for government's incursion into what is perceived as nongovernmental responsibilities, while at the same time, those within the government are chary of becoming too cozy with industry for fear that the government's regulatory responsibilities will be coopted. However, rather than being plagued by too much government intervention in the innovation process, the ocean industries, and ocean technology in general, has been met more with government indifference.

Ocean engineering within the federal government has diminished at a constant rate since its prime in the 1960s. The Navy, once the bulwark of ocean technology, has been forced to choose between guns and butter. Guns have consistently won out in the past several fiscal years. Neither have the civil agencies with ocean responsibility moved to bolster the cutbacks in Navy programs. Notwithstanding recommendations made by the National Research Council's Marine Board in 1972 and 1980, and the recommendation of the National Advisory Committee on Oceans and Atmosphere made in 1974, there continues to be a high level of confusion and uncertainty about the appropriate role and scope of effort for ocean technology within the federal civil ocean agencies.

There are a number of functions which are legitimate concerns of the federal government. These include: (1) the collection and disemination of engineering information and environmental data for use by the private and public sector, (2) the development of performance specifications for use in regulatory processes, (3) technical development which is linked to a specific mission of the agencies, (4) direct support of high-risk, high-cost ventures with a long-term public interest payoff, and (5) support of R&D aimed at fragmented-industries that do not have the technological capability and where innovation tends to benefit the industry as a whold rather than an individual firm. The challenge of the immediate future is to fit these necessary and legitimate government responsibilities for ocean R&D into the framework for management of the ocean under the 200-mile economic zone. Through this process we may ultimately be able to bring balance and perspective to the role of federal agencies in ocean engineering and technology.

There is no need to fool ourselves however. Economic conditions in both the public and private sectors are not condusive to forging bold new directions. But in some ways the realities we face—energy shortfalls, a diminishing land base, less than self sufficiency in certain critical materials, economic constraints caused by alternating cycles of inflation and stagnation—reinforce the need for managing ocean space and marine resources in a productive, efficient, and systematic manner.

It is apparent that we must abandon some of our timeworn habits and adopt new ways of doing business. First, the federal agencies must find ways to share facilities, develop cooperative projects, and formulate complementary plans for undertaking ocean R&D. Second, we must find ways for the government and the private sector to form joint ventures to undertake programs which are aimed at mutual objectives. Third, we must focus our limited resources on maximizing the effectiveness of R&D programs within the 200-mile economic zone under the framework of an ocean and coastal management system. Fourth, the attitudes of government against industry, and industry against government, must moderate to one of accommodation based upon mutual national objectives.

While perrimists may dwell on the problems before us, those set upon achievement will seek out the opportunities behind each challenge. Clearly, the ocean R&D community has many challenges before it.

James W. Curlin is presently Deputy Assistant Secretary for Land and Water Resources in the Department of the Interior. Dr. Curlin formerly held positions as Deputy Assistant Secretary for Policy at the Department of Commerce and served as Senior Specialist in Ocean Affairs in the Library of Congress. Prior to coming to Washington, Curlin was Associate Director for the Environmental Program at Oak Ridge National Laboratory. He has also held positions with private industry and the Tennessee Valley Authority.

Dr. Curlin holds a Doctorate in environmental science from Louisiana State University and a J.D. in environmental and natural resources law from the University of Tennessee. He is a member of the District of Columbia and Tennessee bars. Curlin was responsible for conceiving and leading the Department of Commerce Ocean Policy Study, "U.S. Ocean Policy in the 1970's: Status and Issues," which was released last year. Curlin has authored over 60 publications in the fields of law, science policy, natural resources, oceans and the environment.

A Note on the American Society of Naval Engineers and the Naval Engineers Journal*

Since 1889 many engineers and scientists involved in maritime transportation, ocean engineering, and naval systems have been reporting their achievements in the *Naval Engineers Journal* (NEJ). Fundamentals of hydromechanics, structural mechanics, and propeller theory are among the important scientific information which has been reported in the journals, along with a wealth of creativity covering combat systems, electronic systems, ship operations, and other valuable ocean and maritime technology. Early issues repeat the names of Taylor, Dyson, Isherwood, and other pioneers in naval architecture and marine engineering.

The American Society of Naval Engineers (ASNE) was founded in 1888 in response to a recognized need among naval engineers of the time for a means of promoting the profession of naval engineering.

The founders of the Society were officers of the Engineering Corps of the U.S. Navy. However, over the 91-year growth, the Society has come to include members from the U.S. Coast Guard and maritime industry. As technological growth prompted more specialized knowledge the number of civilian members increased. Now with more than 5000 members, there is a broad scope and a good mix.

At the time the Society was founded, Navy ships were largely wooden hulls propelled by reciprocating steam engines with coal-fired boilers and armed with muzzle-loading guns. The technological development of the period consisted of the introduction of steel for hull construction, the application of breech-loading guns, the development of triple and quadruple expansion steam engines, and the application of shipboard electrical power. In the same year that the Society was founded, the *USS Baltimore,* one of the first three steel-hulled cruisers, was launched from the Philadelphia Naval Shipyard.

The magnitude of the advances in Naval Engineering technology since that time can be measured by today's widespread use of guided missiles, nuclear power, gas turbine engines, radar, satellite navigation, and similar innovations, together with the development of high-speed hydrofoils and surface effect ships. The NEJ chronicles the advances.

Since 1889 there have been 397 issues of the *Journal.* Each year the journals have been indexed so it is possible to find much of this information, provided a searcher is willing to explore 91 individual indexes. However, the great effort required to make such a search causes the information in the journals to be essentially inaccessible.

Now the ASNE is completing a project which will place the entire indexing of the full 397 issues, covering the 91 years, in a single 700-page volume. The new index is expected to be an invaluable key to the buried information important to many branches of ocean activities. It should be useful to naval architects, combat system engineers, marine engineers, ship owners and operators, naval engineers, electronics engineers, offshore rig owners and operators, ocean engineers, and the officers of the Navy, Coast Guard, NOAA, and the Maritime Service. Scientific information, such as the temperature-expansion and pressure-compressibility coefficients of seawater, has enduring value, and ninety-year-old information is as useful today as it was in 1890. The journals also contain much transferable technology, e.g., coaling at sea might be applicable to the transportation of manganese nodules from the mining site, and the technology of burning coal may once again become important.

From the beginning, the NEJ has included many reprints from other periodicals. This practice continued up into 1969. The reprinted articles were selected for their technical quality and for their applicability to the design and construction of naval and merchant ships. The practice of including reprints constitutes a valuable asset for the holders of the ASNE *Journals.* It means that considerable amount of technical information from other periodicals is now accessible on their own bookshelves through the use of the new cumulative index. This should save trips to the library.

***Ed. note:** Occasionally we will print information about sister professional societies when we think that it will be of interest to our readers.

Of Oceanic Interest

(Taken from recent issues of SEA TECHNOLOGY, a publication of Compass Publications, Inc.)

Verdict on USS Monitor—She Can't Be Raised

After last summer's exhaustive analysis of the U.S. Civil War ironclad *Monitor* at its resting place in 210 feet of water off Cape Hatteras three technical sessions were held to determine the hulk's salvageability.

Unanimous verdict—no.

In a press conference held in conjunction with introduction of NOAA's documentary film "Down to the Monitor", Larry Tise of North Carolina and Kenneth Morris of New York, said that even trying to retrieve the turret would destroy the side.

Although most of the artifacts retrieved from the wreck are still undergoing preservation, some of the more recognizable items are now on display at the Navy Memorial Museum, U.S. Navy Yard, Washington, D. C.

Photograph the Titanic!

Of several declared projects to search for and photograph the sunken SS *Titanic* which went down in 1912 in 3,700 m to 4,300 m of water 300 miles southeast of

Newfoundland after hitting an iceberg, one appears to be moving faster than the others. Titanic 80, Inc., a Texas firm backed by oilman Jack Grimm, kicked off its program with a press conference last month. Here is the lineup for the $1 million project. The search will be conducted by the Tracor Marine research vessel *H. J. W. Fay*. It leaves Miami early this month. The most common coordinate for the wreck's location is 41°46' No. Lat.; 50°14' W. Long. Chief scientist for the search, Dr. William Ryan, Lamont-Doherty Geological Observatory, said that two kinds of vehicles would be deployed. One is a sidescan sonar-magnetometer towfish called Sea MARC-1 (Mapping and Remote Characterization). The other is a type of photographic vehicle. Two of them will be carried. Sea MARC will provide data over a swath up to five km wide....If the wreck is found, funds may pour in for a larger expedition the following summer. There is a possibility of reactivating the Reynolds submersible *Aluminaut* which has been laid up since 1972. It would be converted for operations to depths of 4,600 m.

Tale of the South Pacific

A catamaran sailing vessel, replica of ships used by ancient Polynesians, in May and June traveled alone 2,500 miles from Tahiti in the Society Islands to the big island of Hawaii in the state of Hawaii without sextant or compass. Using only the ancient sailing arts, a crew of 14 made the journey from May 13 to June 7.

Hawaiian Charles Nainoa Thompson established this modern first voyage in a 20-m double-hulled sailing canoe. To help trackers, but not the crew, an oceanographic satellite system was used. This satellite "watch" provided safety without intrusion in the cultural exercise. The satellite system is used to track drafting buoys and was recently used in the Observer single-handed sailing race from Plymouth, England to Newport, R. I.

Combining the voyage with proving the tracking system helped the causes of anthropology and oceanography. Two scientists at the Scripps Institution of Oceanography, Dr. William S. Patzert and Gerard J. McNally, have been testing the buoy tracking system. The voyage provided another successful test.

During the expedition the Hawaiian navigator made a voice recording, logging each decision and giving his judgment regarding the ship's location. This was compared with the satellite positions.

The satellite transmitter used aboard the *Hokule'a* (Hawaiian for "star of joy") is now back at Scripps. It was in use the same time as those of 60 buoys which had been deployed in the central Pacific. Based on buoy experiments the scientists were able to predict where the *Hokule'a* would be at a given time. Then an airplane flew over the craft after it had been underway three weeks.

The Polynesian Voyaging Society of Honolulu financed the expedition. To get in position the *Hokule'a* sailed from Hawaii to Tahiti from March 16 to April 17 with a ship escort.

To anthropologists the expedition proved that settlement on the islands and continuing communication between them was not accidental but planned.

A Tree Grows in Adak

For the U.S. GIs and Navymen who served anywhere in the Aleutian Islands, noted for their miserable, cold and stormy weather, this tidbit from *The Navy Civil Engineer* will ring a bell. There were no trees on Adak, Alaska, in 1959.

Although only God can make a tree, the Seabees determined that they would improve the barren landscape. So when the next ship was unloaded there were half a dozen small trees which were planted by the Seabees and are still growing.

There's a sign today which reads "Adak National Park." The sign is larger than the trees.

Correspondence

To The Editor:

This correspondence is in reference to your Editor's Comments in the June 1980 issue of Oceanic Engineering Newsletter.

You state that official dissatisfaction of world conditions is the province of the United Nations. Since that organization is completely incapable of effecting the actions of agressor nations such as the Soviet Union's invation of Afghanistan and Vietnam's invasion of Cambodia, it is the province of all organizations (scientific, political, economic, religious) to take actions against these agressors before military action is the only alternative.

The action by the IEEE is manifestly appropriate. I believe your objection to the IEEE's leadership position is naive and requires re-examination.

A.C. Doskocil, Jr.

Solutions to September 1980 issue

These solutions have been taken from *Extrapolations,* a newsletter for Purdue engineering alumni, Vol. 7, No. 2.

"Gold Cubes"

A man bought twelve gold cubes from a merchant who told him that eleven of the cubes weighed exactly the same, but that one was slightly different in weight. The merchant did not know which was the odd cube and whether it was lighter or heavier than the others. However, he assured the buyer, the odd cube could be determined in three weighings on a balance beam scale and a determination made as to whether it was lighter or heavier than the others. How was this done?

Solution

FIG. 1

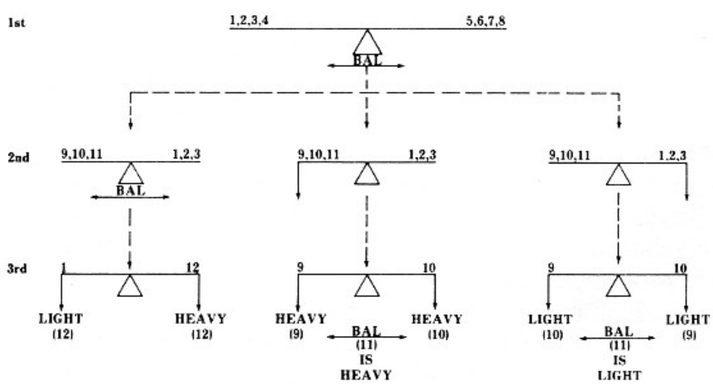
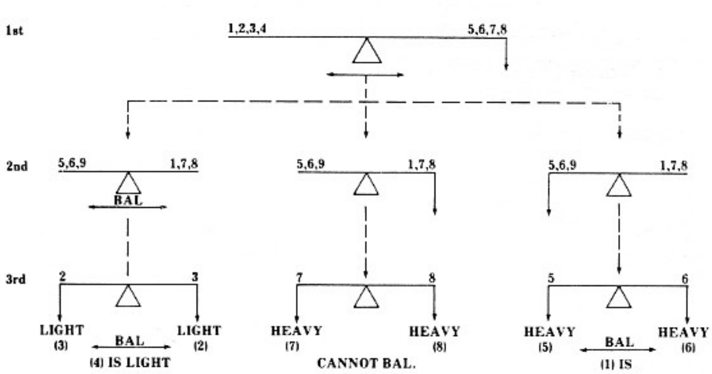


FIG. 2



As shown graphically: Number the cubes from 1 through 12. For the first weighing place 1, 2, 3, and 4 on one pan and 5, 6, 7,and 8 on the other. If the beam balances the odd cube is 9, 10, 11, or 12. The steps in the next two weighings are shown in Fig. 1.

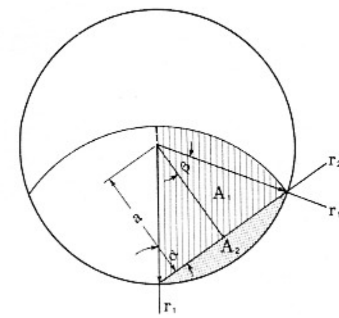
If the beam tips down on the right in the first weighing, the odd cube is one of the eight. The steps in the next two weighings are shown in Fig. 2.

If the beam tips down on the left in the first weighing, the solution can be obtained as a transposition of that in Fig. 2.

"Friendly Cow"

A farmer owns a circular field. His neighbor wants to rent one-half of it as a pasture for his cow. The farmer, not wanting to go to the expense of stringing a fence across the middle of the field, comes up with an idea. He will place a stake at a point on the periphery of the field and tether the cow with a rope. How long should the rope be with respect to the radius of the field?

Solution



Refer to the figure:

$$\beta = \sin^{-1}(r_2/2r_1)$$

$$\alpha = \pi/2 - \beta$$

$$A_1 = 1/2\, r_2^2\, \alpha = 1/2\, r_2^2\, (\pi/2 - \beta)$$

$$A_2 = 1/2\,(2\beta)\, r_1^2 - a r_2/2 = \beta r_1^2 - a r_2/2$$

$$a = \sqrt{r_1^2 - (r_2/2)^2}$$

Therefore $A_2 = \beta r_1^2 - 1/2\, r_2 \sqrt{r_1^2 - (r_2/2)^2}$

The area of the field is πr_1^2. The area A_1 plus the area A_2 is one-half the total grazing area. Since it is specified that the total grazing area is one-half that of the field $A_1 + A_2 = \pi r_1^2/4$

Hence:

$$1/2\, r_2^2\, (\pi/2 - \beta) + \beta r_1^2 - 1/2\, r_2 \sqrt{r_1^2 - (r_2/2)^2} = \pi r_1^2/4$$

Setting $r_2 = 1$ and simplifying yields

$$\pi/2 - \beta + 2\beta r_1^2 - \sqrt{r_1^2 - 1/4} = \pi r_1^2/2$$

Rearrranging and substituting for β

$$r_1^2\,[\pi/2 - 2\sin^{-1}(1/2r_1)] + \sin^{-1}(1/2r_1) + \sqrt{r_1^2 - 1/4} - \pi/2 = 0$$

By trial it is found that this equation is satisfied by $r_1 = 0.863$. Therefore

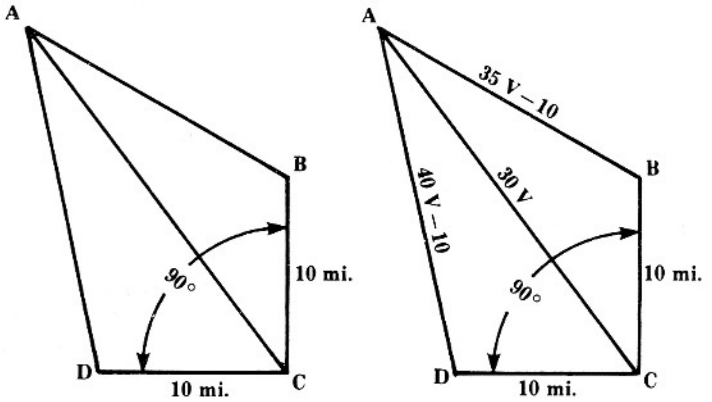
$$r_1/r_2 = 0.863 \text{ and } r_2/r_1 = 1.1587.$$

(Solutions to September issue, continued)

"Car Trip"

A car travels at constant speed V miles per minute over three routes starting at A to reach C. The first route A to C direct takes 30 minutes; the second, A to B to C takes 35 minutes; and the third, A to D to C, takes 40 minutes; Determine V.

Solution



By the cosine law

$$\cos \angle ACB = \frac{(30V)^2 + 10^2 - (35V - 10)^2}{2 \bullet 10 \bullet 30V}$$

$$= \frac{7 - 3.25V}{6}$$

$$\cos \angle ACD = \frac{(30V)^2 + 10^2 - (40V - 10)^2}{2 \bullet 10 \bullet 30V}$$

$$= \frac{8 - 7V}{6}$$

Since the angles are complementary

$$\frac{(7 - 3.25V)^2}{6} + \frac{(8 - 7V)^2}{6} = 1$$

From which

$$59.5625V^2 - 157.5V + 77 = 0$$

Solving this by the quadratic equation and using the negative sign in front of the radical yields

$V = 0.6474$ mi. per min. or 38.84 mi. per hr.

Mathematical Purdue Graduate

There are many Purdue graduates who were x years old in the year $4x^2$. How old are they today?

Solution

If we assume that $4x^2 = 2{,}000 \pm$, then $x = \sqrt{500} \pm$. If we take x = 21, then $4x^2 = 1764$ (a bit premature for a Purdue grad). An x = 23 puts $4x^2$ into the 22nd century, not a possible solution. But x = 22 yields $4x^2 = 1936$. Subtracting 22 from 1936 yields a birth year of 1914 and an age of 66 today.

Speedy Reflections

The reflection factor y of a certain electrical transmission line with a characteristic impedance x and a certain connected load is given by the equation

$$y = \frac{\sqrt{(x + 100)^2 + 50^2} + \sqrt{(x - 100)^2 + 50^2}}{\sqrt{(x + 100)^2 + 50^2} - \sqrt{(x - 100)^2 + 50^2}}$$

Determine the value of x for which y is a minimum and the minimum value of y.

Solution

The equation can be rewritten as

$$y = \frac{1 + \sqrt{\dfrac{(x - 100)^2 + 50^2}{(x + 100)^2 + 50^2}}}{1 - \sqrt{\dfrac{(x - 100)^2 + 50^2}{(x + 100)^2 + 50^2}}}$$

Let $w = \dfrac{(x - 100)^2 + 50^2}{(x + 100)^2 + 50^2}$ Then $y = \dfrac{1 + \sqrt{w}}{1 - \sqrt{w}}$

y will be a minimum when w is a minimum. Taking the derivative of w with respect to x and setting the derivative equal to zero yields $x^2 = 12{,}500$. From this $x = 111.8$. Substitution of this value of x in the original equation yields $y = 1.618$.

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A car travels at constant speed V miles per minute over three routes starting at A to reach C. The first route A to C direct takes 30 minutes; the second, A to B to C takes 35 minutes; and the third, A to D to C, takes 40 minutes; Determine V.

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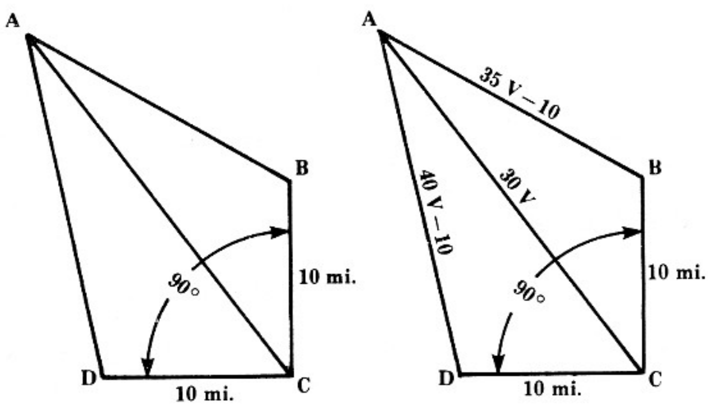

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Let $w = \dfrac{(x - 100)^2 + 50^2}{(x + 100)^2 + 50^2}$ Then $y = \dfrac{1 + \sqrt{w}}{1 - \sqrt{w}}$

y will be a minimum when w is a minimum. Taking the derivative of w with respect to x and setting the derivative equal to zero yields $x^2 = 12{,}500$. From this $x = 111.8$. Substitution of this value of x in the original equation yields $y = 1.618$.

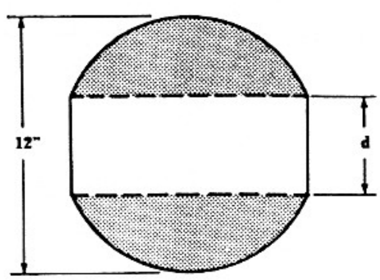
A couple of colleagues of mine, Larry Brown and Pat Arvin, and I, when I was at the Naval Weapons Support Center, Crane, IN, solved the "Bell Ringer" puzzle. In making the transition to nongovernment life, however, I seem to have misplaced the solution (honestly). Thus, I'll have to wait for someone to submit a solution for publication. Be patient.

New Challenges

(Taken from *Extrapolations,* a newsletter for Purdue engineering alumni.)

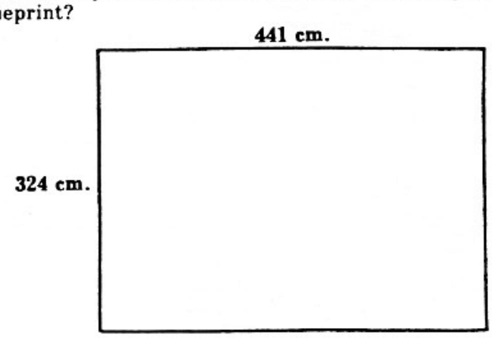
Hole in a Sphere

A hole is drilled through the exact center of a sphere 12 inches in diameter, such that the remaining volume is 36 pi cubic inches. Determine the diameter of the hole (d).



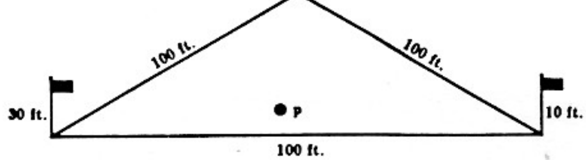
Rectangle to Square Conversion

An engineer with a jigsaw and a keyhole saw wished to cut a board 441 centimeters by 324 centimeters into two identical pieces which can be reassembled as a square 378 centimeters on a side. Can you provide him with a blueprint?



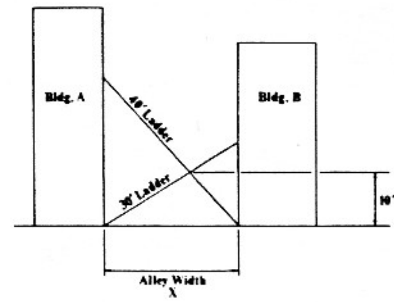
Rally 'Round the Flagpoles

A parade ground is in the shape of an equilateral triangle 100 feet on a side. A vertical flagpole is located at each vertex; They are respectively 10 feet, 20 feet, and 30 feet high. Find a point (p) in the ground that is equidistant from the tops of the three poles.



Leaning Ladders

Building A is across an alley of width x feet from Building B. The building bases and the alley surface are all at the same level. The walls are parallel. A 30-foot ladder leans across the alley from the base of A to the wall of B. A 40-foot ladder, beside the first, leans across the alley from the base of B to the wall of A. The ladders cross 10 feet above the alley surface. How wide is the alley?



OCEANS 81

It's never too early, but often too late....The IEEE and MTS will join forces to cosponsor OCEANS'81, September 16–18, 1981, in Boston, MA. OCEANS 81 promises to be the ocean technology conference of the year and exhibitors are urged to reserve space as soon as possible.

For information on exhibitor space and arrangements contact:

Jack McCarthy
Box 436
Cohasset, MA 02025

1981 Summer Meeting
Power Engineering Society
July 26–31, 1981
Portland, Oregon

The 1981 Summer Meeting of the IEEE Power Engineering Society will be held July 26-31, 1981, in Portland, Oregon. The Summer Meeting is a general meeting and covers the entire field of Power and its many areas of technical interest. Authors who have important information to contribute are invited to submit papers for presentation and discussion at the meeting.

Prospective authors should request an Author's Kit from the Power Engineering Society Special Activities Office at IEEE Headquarters. The Kit includes a Declaration of Intent form, the Publication Guide for Power Engineers which outlines requirements, Copyright Transfer, Confirmation of Presentation Arrangements, and a supply of Model Paper on which the manuscript is to be typed. The completed Declaration of Intent form should be returned immediately so that preliminary plans may be made to include the paper in the Technical Program.

February 1, 1981 is the deadline date for the receipt of the original manuscript at IEEE Headquarters, if it is to be considered for the 1981 Summer Meeting. Papers submitted should be within the scope of interest of the Power Engineering Society, technically sound, contribute to existing knowledge, or reveal new knowledge.

Papers will be reviewed by the appropriate Technical Committee and if accepted, included in the meeting program. Preprints will be made of all papers accepted. Following presentation, papers will be published in full along with their discussions and closure in the *Transactions on Power Apparatus and Systems.* A one-page summary of all accepted, presented papers will be published in the *Power Engineering Society Review.* To be published, a paper must be of high quality and make a definite technical contribution. All accepted papers along with discussions and closures will be indexed and available on request in the future.

Dean E. Perry
Technical Program Chairman
1981 IEEE/PES Summer Meeting

OCEANS '81 Sept. 16-18,1981 Boston, Mass.

The Ocean . . . an International Workplace

CALL FOR PAPERS

The conference committee is inviting papers to be presented at OCEANS '81, September 16-18, 1981, at the Sheraton Boston, Boston, Mass. Original papers are sought on research, development, practice and policy pertaining to the following subjects:

- Oceanographic Instrumentation
- Communications & Telemetry
- Remote Sensing
- Navigation
- Computer Graphics
- Seismic Exploration
- Acoustics in the Ocean
- Microprocessor Applications
- Buoy Technology
- Cables & Connectors
- Coastal Zone Management
- Diving
- Education
- Geology & Geophysics
- Marine Biology
- Marine Power Systems
- Marine Fisheries
- Marine Geodesy
- Technology Exchange
- Marine Law & Policy
- Marine Materials
- Marine Mineral Resources
- Ocean Economic Potential
- Ocean Energy
- Oceanographic Ships
- Offshore Structures
- Financing & Capital Formation
- Salvage & Towing
- Seafloor Engineering
- Undersea Physics
- Undersea Vehicles
- Underwater Photography & Sensing
- Water Quality
- Intl. Marine Food & Drug Resources

OCEANS '81 Sept. 16-18,1981 Boston, Mass.

SUBMISSION INFORMATION

The conference will provide both for lecture and for poster presentations. If you wish to present a paper in either mode, please prepare the following materials:

- An abstract that does not exceed 400 words. Structure the abstract in three sections:
  (1) problems addressed, including background
  (2) procedure applied
  (3) results and conclusions
- Indicate your preference for mode of presentation (lecture or poster)
- A brief biographical sketch of the author(s)

Submit the abstract and biographical sketch(s) as soon as possible to: (the deadline is February 1, 1981)

OCEANS '81
Technical Program Committee
P.O. Box 132
Portsmouth, R.I. 02871

Authors of papers selected for presentation, and the mode selected, will be notified by mail by March 15, 1981. For both modes of presentation, final camera-ready papers must be submitted before May 15, 1981, and must be accompanied by the author's signed release for publication in the Conference Technical Record. Authors should fully recognize their responsibilities with respect to this schedule. The costs of preparing the manuscript and attending the conference are the author's obligations.

SPONSORS:

- IEEE Council of Oceanic Engineers (COE)
- Boston Section IEEE
- Marine Technology Society (MTS)
- New England Section MTS
- Southern New England Section MTS

PARTICIPATING ORGANIZATIONS:

Sea Grant Association

1981 IEEE/MTT-S

International Microwave Symposium

Bonaventure Hotel
Los Angeles
California

JUNE 15, 16, 17, 1981

FIRST CALL FOR PAPERS

The 1981 IEEE MTT-S International Microwave Symposium theme is "Around the world with Microwaves". The theme emphasizes the importance of microwaves throughout the world. The Microwave Symposium will be held jointly with the IEEE Antennas and Propagation Symposium which will meet June 17, 18, 19. Papers are solicited describing original work that has not been published or presented previously. Papers concerned with microwave techniques, devices, systems, and applications in the following subject areas will be considered:

- Computer-Aided Design and Measurement Techniques
- Microwave and Millimeter-Wave Solid-State Devices
- Microwave and Millimeter-Wave Integrated Circuits
- Low Noise Techniques
- Microwave Passive Components and Networks
- Microwave Ferrite Devices
- High Power Amplifiers, Circuits, and Systems
- GaAs Monolithic Circuits
- Phased Array and Active Array Techniques
- Radiometry and Remote Sensing Systems and Applications
- Satellite Communication/Microwave Systems
- Wide band Millimeter-Wave and Microwave Systems
- Submillimeter-Wave Techniques and Devices
- Integrated Optics, Fiber Optics, and Optical Techniques
- Microwave Acoustics
- Microwave Field and Network Theory
- Microwave Bioeffects

Authors are requested to submit both a 35 word abstract and a 500 - 1000 word summary (up to 6 illustrations), clearly explaining their contribution, its originality, and relative importance. Abstracts and summaries (5 copies) must be received on or before January 9, 1981 by:

Dr. Don Parker
TPC 1981 MTT-S Symposium
Hughes Aircraft Company
Bldg. 268/Mail Station A54
Canoga Park, California 91304

Notice of Acceptance or rejection will be mailed to authors by February 13, 1981. Author of accepted papers will receive material for preparing photo ready copies of papers to be printed in Symposium Digest.

IECI '81 International Conference and Exhibit on

Industrial, Control and Instrumentation

THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.

Applications of Mini and Microcomputers

San Francisco, CA
November 9–12, 1981

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Call For Papers

This IECI Conference is International in scope and underscores the exponentially increasing number of applications of microprocessors in Industrial Control and Instrumentation. The importance of conventional analog methods is being undermined, with analog devices relegated to serving only input/output roles in many new systems. The microprocessor revolution is here, and the purpose of this conference is to provide a medium for exchanging information in this new and developing field.

Areas of Interest

IECI '81 will strive to continue the record of contribution for a seventh consecutive year. The scope of this conference encompasses the technical aspects of designing, implementing and testing small computer systems for manufacturing, process control, consumer products, biomedical instruments, energy systems, data acquisition, signal processing, vehicles, and other applications in process control and instrumentation. The topics of interest include:

- Microcomputer software design techniques
- Microcomputer requirements documents
- Microcomputer software testing & validation
- Automotive diagnosis and operation
- Vehicle control/diagnosis
- Automated inspection & testing
- "Intelligent" instrumentation
- Transducers & sensors
- Data acquisition & signal processing
- Process control & motor control
- Consumer systems
- Reliability and fault tolerance
- Microcomputer software management
- Microcomputer software cost estimating
- Microcomputer programming software support
- Computer control & distributed systems
- Automated manufacturing
- Energy systems/power systems
- Numerical control & robotics
- Biomedical control & monitoring
- New digital electronics products
- Mini/Microcomputer interfacing
- New control techniques
- New software techniques/products

Paper Requirements

Ten copies of the paper in extended summary form, 500-600 words long; and an abstract of no more than 40 words, describing work not generally published or previously presented, should be mailed by March 1, 1981 to V.K.L. Huang (East), or R.A. Begun (West).

The extended summary will be used for paper selection and session assignment and thus should clearly define the salient concepts and NOVEL features of the work described.

Notification of acceptance and format required for publication in the IECI '81 proceedings will be sent to you by April 15, 1981. Final manuscripts of papers for publication in the IECI '81 proceedings must be received by August 1, 1981.

Special Sessions

Suggestions and proposals for tutorial and special panel sessions on topics of current interest should be sent by April 1, 1981 to the General Chairmen.

To order the IECI '80 Proceedings, send $25 to the IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854 (201-981-0060 Ext. 135). Catalog #80CH1551-1.

Sponsor: Industrial Electronics & Control Instrumentation Society and the Computer Society

Patents*

UNITED STATES PATENT NO. 4,172,255

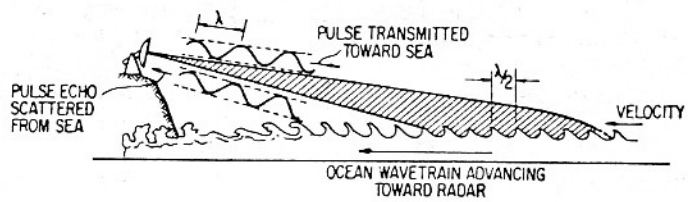
HF COASTAL CURRENT MAPPING RADAR SYSTEM

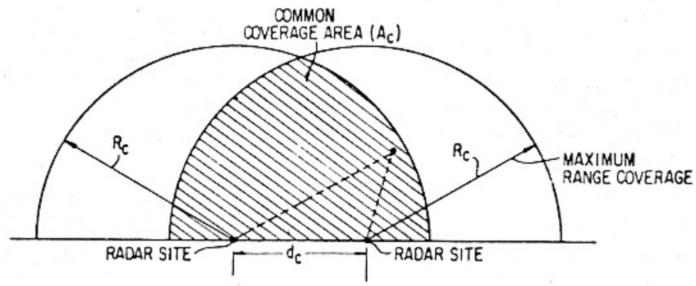
Inventors: Donald E. Barrick, Boulder, CO; Michael W. Evans, Longmont, CO

Assignee: The United States of America as represented by the Secretary of the Interior, Washington, DC

ABSTRACT

A system for radar remote sensing of near surface ocean currents in coastal regions. The system employs a pair of low power, transportable high frequency radar units to scatter signals from the shore off to the ocean waves. Underlying surface currents impart a slight change in velocity to the ocean waves which is detected by the radar units. Each radar unit can determine the angular direction of arrival of the radar echo signals by comparing the phase of the signals received at three short antennas on the shore. Signals scattered from the same point on the ocean by each of the two geographically separated radar units are used to construct a complete current vector for that point. The radar pair takes simultaneous measurements over an ocean area with a predetermined grid pattern. Vectors are constructed for each square section of the grid, and a map of the near surface current field is output in real-time by an on-site mini-computer.





*From AESS Newsletter, May 1980.

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