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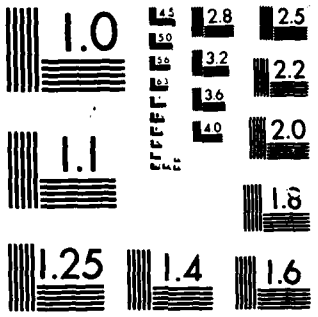

Professional Paper 440 / August 1985

The Center for Naval Analyses Past, Present, and Future

by

Thomas D. Bell, Jr.
Chairman of the Board and President, CNA

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A Division of CNA Hudson Institute
CENTER·FOR·NAVAL·ANALYSES
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TABLE OF CONTENTS

THE CENTER FOR NAVAL ANALYSES
PAST, PRESENT, AND FUTURE

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BEGINNINGS

A few centuries ago, Sir Isaac Newton observed that:

> If, instead of sending the observations of able seamen to able mathematicians on land, the land would send able mathematicians to sea, it would signify much more to... the safety of men's lives and estates on that element.

There are two ways to accomplish Newton's suggestion. The first is followed by such institutions as the Naval Postgraduate School, which runs the oldest graduate program in operations research in the country. The PG School takes able seamen and makes scientists out of them. At CNA, on the other hand, an important part of our effort, the field program, takes mathematicians and other scientists and sends them to sea. (If they become seamen in the process, so much the better.)

CNA's origins go back to World War II when, as the Antisubmarine Warfare Operations Research Group, it helped defeat the U-boats. CNA is the oldest civilian organization that does operations research and systems analysis for the U.S. military. We are proud of that distinction. It has helped us develop a special relationship with the Navy and Marine Corps.

CNA'S RELATIONSHIP WITH THE NAVY AND MARINE CORPS

CNA is a Federally Funded Research and Development Center. It is one of a handful of FFRDCs sponsored by the Department of Defense and the only one sponsored by the Navy; others include Rand and Mitre Corporations, who do work for the Air Force, and the Institute for Defense Analyses, sponsored by OSD. FFRDCs are managed and funded in such a way that they are able to

NOTE: Adapted from a speech to the Naval Postgraduate School, 4 June 1985.

provide unique services to their sponsors. Let me explain, using CNA as an example.

CNA is a hybrid, dwelling somewhere between the Department of the Navy and the private contractors who do defense studies and analyses. As an FFRDC, CNA has been granted privileges that enable it to provide a unique kind and level of service.

First, we are a continuing line item in the Navy's and the Marine Corps' budgets. This allows us to devote all our efforts to our study program. We don't have to expend a lot of energy bidding on contracts.

Second, our contract with the Department of the Navy ensures that we are not its intellectual captive. Specific provision is made for CNA to devote up to 15 percent of its resources on projects that *we* decide are important to study. This independent status ensures our Navy and Marine Corps clients of candid evaluations of operations, systems, and programs. And our position as the Navy's FFRDC guarantees us access to plans and highly classified information not available to outside contractors. But within this framework of intellectual freedom, CNA maintains a lawyer-client relationship with the Navy and Marine Corps. CNA exists to help the Navy, not to tell it how to do its job or to broadcast its problems to the world at large.

The Navy's expectations for CNA were perhaps best expressed in 1972 by then Assistant Secretary of the Navy Dr. Robert Frosch:

> What we want is some combination of organization that is close enough to the Navy so that it understands what is going on and has access to the information, but is ornery enough that it will answer back, and independent enough that it will give an answer which has nothing to do with what it thinks the Navy might want the answer to be.

Since October 1983, CNA has been managed by the Hudson Institute. Hudson was founded in 1961 by the late Herman Kahn. It is a nonprofit, nonpartisan organization dedicated to the study of important issues of public policy. As specified in Hudson Institute's contract with the Navy, "studies will be selected for CNA based on importance to the Navy and on the requirements for an innovative and independent point of view."

The Navy and Marine Corps, then, look to CNA for innovative work, carried out in an atmosphere of objectivity, on important subjects. CNA has been selected to perform this kind of work because over the years it has developed some singular assets that have earned the Navy's trust and confidence.

FIELD PROGRAM

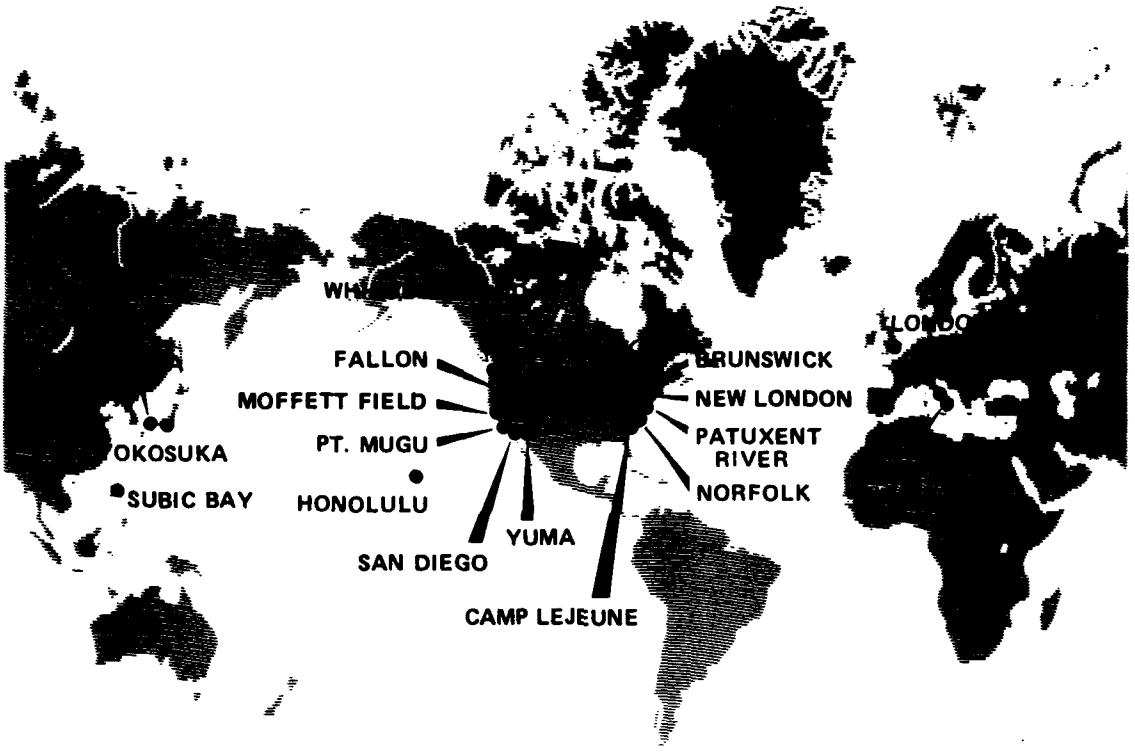
The first of these assets is our field program. Figure 1 shows the locations where 40 of CNA's 180 analysts work. These field representatives are assigned to Navy and Marine Corps commands around the United States and the world. They are the mathematicians, physicists, chemists, and other scientists that we send to sea. CNA field reps work with a variety of commands, from the numbered fleets to air, surface, submarine, and Marine forces, to operational test and evaluation activities.

The field program began in the heat of World War II when the first civilian analysts were sent to antisubmarine bases to obtain firsthand operational data at the source. Analysts even went along on missions, deploying with submarines, surface ships, and ASW aircraft. The effectiveness of analysts in the field was further proved during the Korean and Vietnam wars, as analysts once again observed combat operations firsthand and suggested improvements on the spot. In the Korean War, this practice led to CNA's only combat casualty, when the plane in which a field analyst was collecting data was shot down during an interdiction mission.

Today, as in wartime, CNA analysts gain firsthand, practical knowledge of the forces and systems they are analyzing. The analyst typically spends between 2 and 3 years at a command. When these field representatives return to CNA-Washington, they bring with them invaluable real-world experience – experience that is then applied to projects for Navy and Marine Corps offices in Washington.

The continuing flow of new analysts to the field accomplishes several things:

- An analyst never spends so much time at any command that he loses his detached point of view.



Brunswick, Maine
Patrol Wings, Atlantic

China Lake, California
Air Test and Evaluation Squadron Five

Fallon, Nevada
Naval Strike Warfare Center

Gaeta, Italy
Sixth Fleet

Honolulu, Hawaii
Commander-in-Chief, Pacific Fleet
Fleet Marine Force, Pacific
Third Fleet

Jacksonville, North Carolina (Camp Lejeune)
Fleet Marine Force, Atlantic

Kamiseya, Japan
Patrol and Reconnaissance Force, Seventh Fleet

London, England
Commander-in-Chief, U.S. Naval Forces, Europe

Moffett Field, California
Patrol Wings, Pacific

Naples, Italy
Battle Force, Sixth Fleet
Submarine Force, Sixth Fleet
Maritime Surveillance and Reconnaissance Force, Sixth Fleet

New London, Connecticut
Submarine Development Squadron Twelve

Norfolk, Virginia
Commander-in-Chief, Atlantic Fleet
Second Fleet
Operational Test and Evaluation Force
Tactical Training Group, Atlantic
CNA Tactical Analysis Team

Patuxent River, Maryland
Air Test and Evaluation Squadron One

Point Mugu, California
Air Test and Evaluation Squadron Four

San Diego, California
Fighter Airborne Early Warning Wing, Pacific
Tactical Training Group, Pacific
CNA Tactical Analysis Team

Subic Bay, Philippines
Carrier Striking Force, Seventh Fleet

Whidbey Island, Washington
Medium Attack Tactical Electronic Warfare Wing, Pacific

Yokosuka, Japan
Seventh Fleet

Yuma, Arizona
Marine Aviation Weapons and Tactics Squadron

FIG. 1: CNA IN THE FIELD

- CNA-Washington receives regular transfusions of real-world experience as analysts return to home base.

- By returning to his desk, the analyst catches up on changes in methods of analysis and learns what's been going on analytically elsewhere within CNA.

- Afloat and shore commands receive the benefit of fresh perspectives and approaches.

The work of the field reps falls into three main categories: evaluation of systems' performance, tactical development and evaluation, and analysis of exercises. The performance of new systems is evaluated both before and after the systems reach the fleet. These evaluations help the Navy and Marine Corps decide whether to accept new systems and how to modify them to make them more effective. Aegis, Tomahawk, Harpoon, the F/A-18, and the AV-8B are among the systems assessed by CNA field reps in the last couple of years.

The second type of work done in the field is tactical development and evaluation. About half of the field reps contribute directly to evaluating tactics for Navy and Marine Corps forces. Recently completed work of this type includes devising a firing doctrine for the Harpoon missile, analyzing standoff bombing tactics for attack aircraft, and evaluating maneuvers in engagements between submarines.

Finally, field reps also analyze fleet exercises, to help commanders assess fleet effectiveness and evaluate new tactics. Results of these efforts are analyses of individual exercises to point the way to specific improvements in training and procedures and summaries of many exercises to gain realistic estimates of force effectiveness. Washington-based analysts are often called to the field to help plan, observe, reconstruct, and analyze large-scale exercises and tests. For example, 27 CNA analysts worked on the Second Fleet exercise READEX 2-84.

But what about the other analysts toiling away in Washington? Those analysts bring to bear a wide range of disciplines in carrying out studies for Navy and Marine Corps staffs. The organization of CNA's research staff is designed to build expertise in specialized areas and at the same time facilitate studies of issues requiring multidisciplinary analysis.

ORGANIZATION OF CNA

When Hudson Institute was chosen by the Navy to manage CNA, it carried out a detailed review of CNA's management and organization. The review team recommended that CNA be reorganized into a matrix of divisions and research departments. Figure 2 shows the results of that reorganization.

The divisions form the columns of the matrix. There are four of them, one of which—the Field Operations Division—I have already described. The others are: Naval Warfare Operations; Naval Planning, Manpower, and Logistics; and Marine Corps Programs.

Within the divisions are programs, and within programs are projects. Analysts work on projects, and projects are the entities that produce studies and analyses.

The research departments form the rows of the matrix. Although an analyst may work on projects in more than one division, he will belong to only one research department. The research departments enhance the quality of CNA's work by building and maintaining expertise. They do this in three main ways:

- Conducting research aimed at developing models and data bases
- Organizing courses and seminars for analysts
- Supporting analysts' participation in outside professional activities.

CNA'S STAFF

The research departments are designed to make the most of the second of CNA's unique assets—its research staff. CNA analysts have an average of more than 10 years of experience in naval analysis. Over 40 percent have spent one or more tours in the field, and more than 90 percent have advanced degrees (65 percent PhDs). New analysts go through a 2-year orientation and training program at CNA. The program features lectures, group discussions, and one-on-one sessions with senior analysts. Here they learn about the Navy and the Marine Corps—forces, systems, and organization. They study the defense budget and decision-making process. They learn which analytical

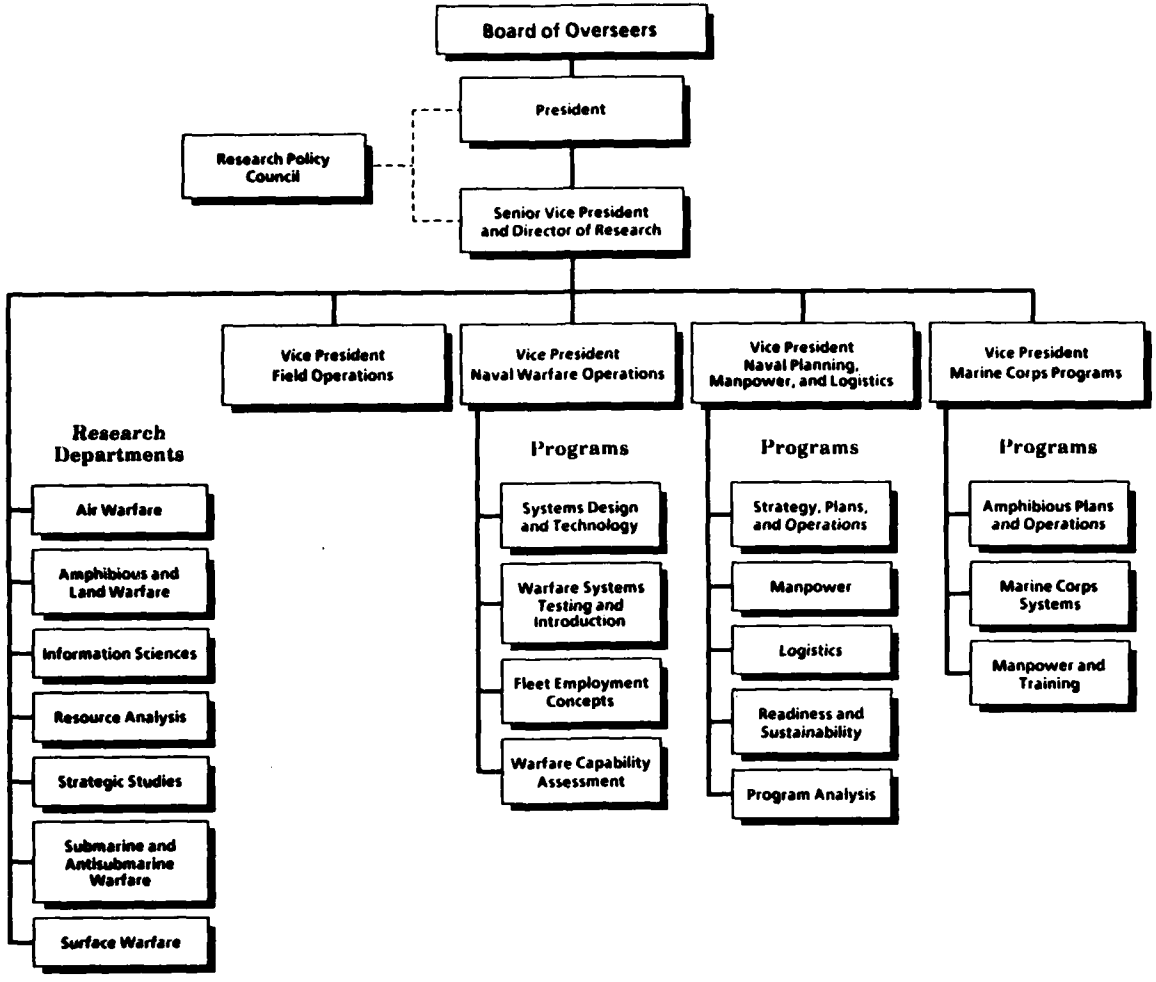


FIG. 2: ORGANIZATION OF CNA

techniques are best suited to particular types of problems. Specialized training, in the specific problems and techniques of the analyst's area of specialization, is given as well. The importance of the field program to CNA's work is stressed; all new analysts must expect to spend time in the field.

At the same time that they are being trained, the new analysts start working on CNA projects. They begin to integrate their education and work experience with the particular demands of naval analysis. Typically, the new analyst works as part of a study team headed by a senior analyst.

All analysts also have the benefit of CNA's third unique asset—the information resources at their fingertips. Within the analytical community, CNA's technical library is known to be unparalleled for completeness and for the accessibility of its contents provided by detailed cataloging. The technical library contains more than 200,000 technical and analytical reports and documents dating back to World War II. The catalog, until now contained on over one million catalog cards, has recently been converted to a machine-readable data base. The Information Services staff has developed sophisticated information retrieval software, and within a few months, analysts will be able to search the online catalog of CNA's holdings from the computer terminals in their offices.

Another important component of CNA is the Operations Study Group (OSG). This group comprises the naval officers and enlisted personnel assigned to CNA as working members of the analytical and support staff. Other than dressing in uniform, OSG people do much the same things as CNA staff. But they are also responsible for a great deal of the credibility of our studies—by providing the rest of CNA with the benefit of their practical experience, technical knowledge, and user's point of view. Currently there are 20 officers and 2 enlisted men in OSG. Fifteen of the officers have graduate degrees, 11 of which are in operations research.

But enough on CNA's background and key assets. I want to move now to some initiatives CNA has undertaken to use its assets to greater advantage since Hudson Institute began to manage it.

BOARD OF OVERSEERS

First, we have fielded a distinguished and active Board of Overseers to make sure that CNA continues on track. This board has strong qualifications

and much experience in defense management and defense analysis. Members include:

- Gen. Robert Barrow, former Commandant of the Marine Corps
- Frank Carlucci, former Deputy Secretary of Defense
- Gen. Alexander Haig, former Secretary of State and SACEUR
- Adm. Robert Long, former VCNO and CINCPAC
- Robert Murray and James Woolsey, both former Under Secretaries of the Navy
- Steuart Pittman and Bing West, both former Assistant Secretaries of Defense, and
- James Schlesinger, former Secretary of Defense and Director of the CIA.

We also have several Board members who are leaders in industry and the academic world.

This new Board has taken an active role in revitalizing CNA. They have formed into teams known as Technical Advisory Committees, which meet regularly to review CNA's work and to suggest new areas of research and subjects for analysis.

PLANNING THE STUDY PROGRAM

A second initiative carried out under Hudson Institute's management has changed the way CNA arrives at its study program. Under the new planning process, the program is reviewed and revised more frequently so that the work being done remains relevant to changing naval priorities and circumstances. Every quarter, CNA draws up a study plan that covers the next 12 months. The plan is based on continuing interchange with OPNAV, Headquarters Marine Corps, and the fleets, with guidance from the Navy's CNA Policy Council and CNA's Board of Overseers. The plan is submitted to the VCNO and the Assistant Commandant of the Marine Corps, who recommend changes and negotiate a mutually acceptable program with

CNA's President. As each quarter passes, the plan can be changed to accommodate new issues and to rearrange priorities and staffing levels.

This planning process illustrates the two principles upon which CNA is built—closeness and independence. We work closely with the Navy and Marine Corps to devise our study program, but we can turn down a particular project if we feel we don't have the expertise to take it on. Conversely, CNA can initiate a project that the Navy may not have seen a need for. Our institutional experience at times allows us to anticipate important issues looming in the Navy's future and to begin studying them before the need becomes critical.

INITIATIVES IN THE FIELD

A third initiative has revamped the field program. The most significant change is the establishment of two five-person tactical analysis teams, based in Norfolk and San Diego. The teams will provide support to battle groups during their work-ups and will better support fleet exercises and testing. At times they will deploy analysts with battle groups to meet such objectives as testing specially configured airwings and evaluating new systems at fleet introduction.

One such assignment is now underway. An analyst on the San Diego Tactical Analysis Team has been with the Constellation battle group on its deployment to the Western Pacific, which began early this year. This deployment promises to be of more than ordinary interest as it will see the introduction of three systems: the LAMPS Mk III ASW system, the F/A-18 aircraft, and the Tactical Flag Command Center Data Display System. The CNA analyst on board the Constellation has been collecting data and observing the performance of these new systems. The data he is gathering on the F/A-18, for example, will provide the raw material with which CNA-Washington analysts will begin to assess the effectiveness of a standard airwing equipped with F/A-18s.

We envision the teams' making it possible to do analyses on a broader scale. Together with temporarily assigned CNA-Washington personnel, the teams will document tactical innovations and operations at the battle-group and battle-force levels. With help from Washington, they will also be able to tackle a wider range of issues, including, for example, logistics.

Also new in the field program is a billet at the Naval Strike Warfare Center. The new initiatives in the field program, being made in response to input from Navy and Marine Corps clients, attest to the value of the field program in the eyes of our Navy and Marine Corps clients. We remain open to suggestions for its further development.

EXAMPLES OF CNA'S WORK

Over the past year, CNA's research staff as a whole has grown by 15 percent, and as a result, we were able to give more attention to such important issues as:

- The effectiveness of the Aegis AAW system
- The role of electronic warfare in fleet air defense
- The mix of active and reserve forces
- Applications of advanced technology to future missions
- Analysis of major fleet exercises.

Let's look at a few of these more closely—first, the assessment of the Aegis air defense system. With the initial deployment of the USS Ticonderoga, the first ship outfitted with Aegis, Commander Sixth Fleet asked CNA to analyze the tactical employment of Aegis and the integration of Ticonderoga into Sixth Fleet operations in the Mediterranean. Because of the volatile events in Lebanon, activities that had been planned for the Ticonderoga were shelved, and the ship spent almost all of her deployment as part of a large battle force off the coast of Lebanon, supporting the U.S. Marines ashore.

This situation presented an excellent opportunity for looking at two important things that could not have been adequately evaluated in exercises: the quality of the air picture produced by the SPY-1 radar, and the adequacy of the picture's transmission over the main data link to the other ships.

In response to Sixth Fleet's request, four CNA analysts took turns embarking in Ticonderoga throughout the deployment. From the data they collected, the analysts concluded that Aegis generates an excellent air picture.

Aegis will provide commanders with a clear view of how events are evolving. But the analysts also identified some shortcomings, which will need to be remedied before all the ships in a battle force can benefit fully from Aegis's capabilities. The Navy will use the results of this work to develop tactical guidelines for employing Aegis cruisers in future operations.

On a related front, CNA's work in electronic warfare has led to the development of the concept of countertargeting. Under countertargeting, the fleet's EW assets are employed in a coordinated manner to deny information to the enemy's targeting sensors. Begun in 1980, the CNA EW project provides a good example of the application of operations analysis, laboratory simulation, and at-sea testing to tactical development and evaluation. Over the 5-year period, a total of 15 countertargeting events have been conducted during major fleet exercises. The results of this work have led to the publication of a countertargeting tactics guide by the fleet and many improvements to EW systems by the systems commands.

A study that represents another side of CNA is our analysis of the active-reserve force mix. CNA drew on its expertise in several areas – manpower, readiness, and cost analysis – to help the Navy assess the effects of assigning more of its missions to reserve forces. Manpower analysts developed techniques to estimate how many skilled reservists the Navy could attract and retain in specific geographic areas, and how changes in Navy policy could increase this number. Readiness experts developed measures to compare the readiness of active and reserve forces in peacetime, crisis, and war. And finally, analysts devised a model to compare the costs of active and reserve units, reaching the controversial conclusion that only small savings result from putting ships in reserve.

Under plans approved by the Navy, CNA will continue to grow through the 1980s. As we grow, we intend to increase our efforts in the area of force-mix issues, do more to assess the payoffs from advanced technology, and expand the field program.

We will also undertake new lines of research. One important topic that we are just beginning to examine is the ability of the Navy's logistics system and ordnance programs to support its war plans. This work will be typical of the "new" CNA, in that it will bring together analysts from a variety of disciplines and draw more heavily on fleet experience to address an issue with important implications for long-term planning.

CNA PROFESSIONAL PAPER INDEX[1]

PP 407[2]
Laird, Robbin F. *The French Strategic Dilemma*, 22 pp., Nov 1984

PP 415
Mizrahi, Maurice M. *Can Authoritative Studies Be Trusted?* 2 pp., Jun 1984

PP 416
Jondrow, James M., and Levy, Robert A. *The Displacement of Local Spending for Pollution Control by Federal Construction Grants*, 6 pp., Jun 1984 (Reprinted from *American Economic Review*, May 1984)

PP 418
Reslock, Patricia A. *The Care and Feeding of Magnetic Tapes*, 7 pp., Jul 1984

PP 420
Weiss, Kenneth G. *The War for the Falklands: A Chronology*, 32 pp., Aug 1982

PP 422
Quester, Aline, and Marcus, Alan. *An Evaluation of The Effectiveness of Classroom and On the Job Training*, 35 pp., Dec 1984. (Presented at the Symposium on Training Effectiveness, NATO Defense Research Group, Brussels, 7-9 January 1985)

PP 423
Dismukes, N. Bradford, and Weiss, Kenneth G. *MARE MOSSO: The Mediterranean Theater*, 26 pp., Nov 1984. (Presented at the Seapower Conference, Washington, D.C., 26-27 November 1984)

PP 424
Berg, Dr. Robert M., *The CNA Ordnance Programming Model and Methodology*, 27 pp., Oct 1984. (Presented at the ORSA-MAS/MDRS Symposium, Washington, Aug 1984)

PP 425
Horowitz, Stanely A., and Angier, Bruce N. *Costs and Benefits of Training and Experience*, 18 pp., Jan 1985. (Presented at the Symposium on Training Effectiveness, NATO Defense Research Group, Brussels, 7-9 January 1985)

PP 427
Cavalluzzo, Linda C. *OpTempo and Training Effectiveness*, 19 pp., Dec 1984. (Presented at the Symposium on Training Effectiveness, NATO Defense Research Group, Brussels, 7-9 January 1985)

PP 428
Matthes, Greg, Cdr., USN and Evanovich, Peter *Force Levels, Readiness, and Capability*, 24 pp., Nov 1984. (Presented at the ORSA-TIMS 26-28 November Meeting, Washington, D.C.)

PP 429
Perla, Peter P. and Barrett, Raymond T. LCdr., USN, *Wargaming and Its Uses*, 13 pp., Nov 1984. (Published in the Naval War College Review, XXXVIII, No. 5 / Sequence 311, September-October 1985)

PP 430
Goldberg, Matthew S. *The Relationship Between Material Failures And Flight Hours: Statistical Considerations*, 18 pp., Jan 1985

PP 431
McConnell, James M. *A Possible Change in Soviet Views on the Prospects for Anti-Submarine Warfare*, 19 pp., Jan 1985

PP 432
Marcus, Alan J. and Curran, Lawrence E., Cdr., USN. *The Use of Flight Simulators in Measuring and Improving Training Effectiveness*, 29 pp., Jan 1985 (Presented at the Symposium on Training Effectiveness, NATO Defense Research Group, Brussels, 7-9 January 1985)

PP 433
Quester, Aline O. and Lockman, Robert F. *The All Volunteer Force: Outlook for the Eighties and Nineties*, 20 pp., Mar 1984. (To be published in *Armed Forces and Society*, 1985)

PP 435
Levine, Daniel B. and Jondrow, James M. *Readiness or Resources: Which Comes First?* 12 pp., Mar 1985

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1 CNA Professional Papers with an AD number may be obtained from the National Technical Information Service, U.S. Department of Commerce, Springfield, Virginia 22151. Other papers are available from the Management Information Office, Center for Naval Analyses, 4401 Ford Avenue, Alexandria, Virginia 22302-0268. An index of selected publications is also available on request. The index includes a listing of professional papers, with abstracts, issued from 1969 to December 1983).

2. Listings for Professional Papers issued prior to PP 407 can be found in *Index of Selected Publications (through December 1983)*, March 1984.

CNA PROFESSIONAL PAPER INDEX (Continued)

PP 440
Bell, Jr., Thomas D. *The Center for Naval Analyses Past, Present, and Future*, 12 pp., Aug 1985

PP 442
Berg, Robert, Dennis, Richard, and Jondrow, James. *Price Analysis and the Effects of Competition*, 23 pp., Sep 1985. (Presented at the Association for Public Policy Analysis and Management – The Annual Research Conference, Shoreham Hotel, Washington, D.C., 25 October 1985)

PP 444
Ernst, Maurice E. (Hudson Institute). *Implications of Global Economic Forces for Political Instability in Selected Third World Countries*, 37 pp., Jul 1985

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