effort was to identify elements of the armed forces in terms of "building blocks." In Hitch's words, program elements are "integrated combinations of men, equipment and installations whose effectiveness could be related to our national security objectives."

Examples are (i) the B-52 bomber force with all the manpower, weapons, and supplies on which it depends for its effectiveness, (ii) recruit training, and (iii) the manned orbiting laboratory which last week got a Presidential go-ahead worth $1.5 billion.

A necessary part of the job is to determine the full cost of training and equipping men and of operating an element over several years. Only then, says Hitch, is it possible to compare the effectiveness of one system with others designed to do similar jobs.

The second major part of the programming task was to relate the program elements, which number perhaps a thousand, to the major missions of DOD. There are now nine major mission groupings: (i) strategic retaliatory forces; (ii) continental-defense forces; (iii) general-purpose forces; (iv) airlift and sealift; (v) reserve and guard; (vi) research and development; (vii) general support; (viii) retired pay; (ix) military assistance.

The program elements with their costs, grouped under missions, represent, in the new Pentagon vocabulary, the Five Year Force Structure and Financial Program. And, according to Hitch, the annual budget "now represents a detailed analysis of the financial requirements of the first annual increment of the appoved five-year program."

In theory, programming brings budgets into line with plans, and in fact it appears that considerable progress has been made. Difficulties still remain, however, and Hitch discusses some of these in the Gaither lectures. The ultimate test of McNamara's policies, of course, lies in Vietnam and on putative battlefields of the future.

Programming has been generally well received inside and outside the Pentagon, says Hitch, but the second major innovation—systems analysis, or cost-effectiveness studies, as they are more familiarly known has roused considerable controversy.

The systems analysts see a clear necessity for economic choice when resources are limited. Cost-effectiveness studies are viewed as a logical way to make quantitative analyses of comparative benefits to provide decision-makers with a rational basis for choice.

Cost-effectiveness studies, however, have been interpreted by critics as a justification for penny pinching. The tradition that only the best in weapons and equipment is good enough for the American fighting man (a tradition not infrequently honored in the breach) is difficult to square with the analysts' objective of getting the most from available resources.

Cost-effectiveness studies have become most important at the planning level, traditionally a preserve of professional military men. It is perhaps not surprising that it is here that the greatest heat has been generated and that the charge is heard (often from Congress) that computers manned by bright but callow civilians have usurped the rightful place of experienced military men.

Hitch and his colleagues have sought to counter these attacks. In the Gaither lectures, for instance, he avers, "I am the last to believe that an 'optimal strategy' can be calculated on slide rules or even high speed computers. Nothing could be farther from the truth. Systems analysis is simply a method to get before the decision-maker the relevant data, organized in a way most useful to him. It is no substitute for sound and experienced military judgment and it is but one of the many kinds of information needed by the decision-maker." Despite these efforts to explain, suspicions have not been quelled. (The state of systems analysis in the Defense Department will be discussed in more detail in a later article in this space.)

It seems generally agreed, however, that neither McNamara's planning-programming-budgeting process nor the systems analysis work that supports it will go out of style at the Pentagon. Hitch is leaving now that his pioneering period is over, but he has been replaced by Harvard Business School professor Robert N. Anthony, who takes a similar economist's view of the job. And the systems analysis work, which has been done in the comptroller's office, has been institutionalized by the creation of a new subcabinet post—Assistant Secretary of Defense for Systems Analysis. The new assistant secretary is Alain C. Enthoven, an economist and Ph.D. and perhaps the best known among the group of academically trained young civilians who came to be called in the Pentagon, with a mixture of respect and spite, the "Whiz Kids." As a deputy to Hitch, Enthoven ran the systems analysis section in the comptroller's office but often dealt directly with McNamara.

The triumph of McNamara's management innovations is attested by efforts within the military services, made in self-defense, to develop their own competence to prove their points with pickproof cost-effectiveness studies. Systems analysis techniques are now being taught at the service academies.

Abroad, Britain, Canada, and West Germany are adapting American ideas for the unified management of the military services to their own needs. And, as he leaves the Pentagon, Hitch can take ironic pleasure in the knowledge that a printing of 10,000 copies of *The Economics of Defense* reportedly was ordered (sans royalties) in the Soviet Union—JOHN WALSH

Aerospace: Congressional Study of AF Contractor Raises Questions About Proper Role of Nonprofits

A congressional study of the Aerospace Corporation published late last month has prepared the way for renewed discussion of one of the more ambiguous forms of American enterprise, the nonprofit corporation. The report* of the special investigations subcommittee of the House Armed Services committee is formally a limited analysis of Aerospace's fiscal and management policy. Committee researches on this subject uncovered a variety of abuses, some sensational, some comical, that were featured headlines when the report was issued. These make amusing reading. But, more important, the particular issues reflect an underlying uncertainty about what the proper role of the nonprofits ought to be, and about how they should conduct themselves.

The term "nonprofit" is currently applied to about 450 institutions so varied that they defy orderly classification. They range from small groups of eight to ten scholars affiliated with universities and conducting foundation-sponsored research on farm policy, for example, to giant quasi-industrial operations like Aerospace, which employs over 4000 people and operates on an

* The report, entitled *The Aerospace Corporation, A Study of Fiscal and Management Policy and Control*, is available from the Government Printing Office, Washington, D.C. 20402, for 25 cents.

annual budget exceeding $70 million. For such a variety of institutions, only a few generalizations apply. Nonprofits as a rule do not engage in any manufacturing activity and they are not responsible, financially or technically, to stockholders. This does not mean that they may not, in fact, make a "profit," just that profits are not distributed to stockholders but are disposed of in some other way. Beyond those two points, the only rule is that there are no rules. But, while real sorting out is impossible, nonprofits can be ranked for convenience according to their closeness to the government. At the bottom of the list would be a small institution in Washington, the Institute for Policy Studies, which forbids its associates to take any government money at all. More toward the middle are institutions such as the Institute for Defense Analyses, which, though closely tied to the military, works for several government agencies, accepts foundation grants, and carries on many self-generated activities in a near-academic environment. At the top of the list are a group of institutions spawned by the government, which work almost exclusively for a single government agency and are so close to the sponsoring agency that they are regarded almost as extensions of particular branches. This category might be further divided into institutions that concentrate on operations research and do not actually manage projects, such as the Center for Naval Analyses, and those that do some of both, such as MITRE (an offshoot of M.I.T.'s Lincoln Laboratory) and Aerospace.

The creation of Aerospace in 1960 represented the Air Force solution to the critical problem of managing new space and ballistic-missile programs for which the military lacked in-house capability. In the early 1950's it was decided that, rather than contract with a major university or hastily build up a capacity of its own, the Air Force would place full responsibility for systems engineering and technical direction of the ICBM program in the hands of an outside contractor who in turn would direct many associate contractors working on missile components. The first holder of the job was a private, profit-making firm, the Ramo-Wooldridge Corporation (now Thompson-Ramo-Wooldridge, Inc.). In time, however, Ramo-Wooldridge objected to the ban on producing hardware that accompanied the contract and created a special subsidiary, Space Technology Laboratories (STL), to handle the Air Force work. But, while STL was similarly enjoined from producing hardware, it still had a close relationship with Ramo-Wooldridge. Tensions developed between STL and its associate contractors, many of whom, fearing unfair competitive advantages, were reluctant to furnish STL with the technical information it needed to direct the programs.

Company Evolution

By 1959 considerable anxiety had developed over the future of the ICBM and other military space programs, which were then accorded highest urgency in national security affairs. A military operations subcommittee of the House Government Operations Committee, headed by Representative Chet Holifield (D–Calif.), in an influential report, suggested that Air Force needs for technical and managerial resources could best be met by a nonprofit organization which could be completely objective and disinterested. A committee appointed by the Air Force and headed by Clark Millikan, director of the Guggenheim Aeronautical Laboratory of Caltech, came to a similar conclusion, and an extremely prestigious group was set-up to work out the details. The architects of Aerospace included Jerome Wiesner (subsequently Kennedy's science adviser and now dean of science at M.I.T.); William Foster, now head of the Arms Control and Disarmament Agency; and William O. Baker, vice president for research of Bell Telephone Laboratories. These worked closely with other high denizens of government military and science circles, including Roswell Gilpatric, Harold Brown, Najeeb Halaby, Trevor Gardner, and several others. Many of these individuals served on the board of trustees before their appointment to federal offices. The present board still includes notables such as Herbert York, chancellor of the University of California at San Diego; Athelstan Spilhaus, dean of the Institute of Technology at the University of Minnesota; Charles Lauritsen, professor of physics at Caltech; and several eminent representatives of the military and business worlds as well. The first trustees, acting in concert with the Air Force, selected the president of the new corporation, Ivan A. Getting, a former Raytheon official, and performed many other functions, including supervising the transfer from STL to Aerospace of large numbers of employees and certain key facilities.

Aerospace was a more or less direct extension of the Air Force Systems Command, and organized its functions to correspond with AFSC Space Systems and Ballistic Systems Divisions. Its main job has been what is known as general systems engineering—the overall integration of a system being produced by a number of different industrial contractors—but it also engages in long-range planning and analysis of potential projects in the space and missile fields, and, to some extent, in relevant fundamental research. It has been heavily involved in many key programs, including Titan III, Minuteman II, and the Manned Orbiting Laboratory, to which President Johnson gave his assent last week.

The difficulties now enveloping Aerospace arise from conflicting notions about what the corporation should be. The issues are both practical and philosophic. On the practical side, Getting and other corporation officials felt that in order to get the job done they needed first-rate people, and they needed them fast. The way to get them, they reasoned, was to make Aerospace as attractive as possible, and this they did by establishing generous salary levels, providing comfortable surroundings, and developing a rather impressive array of employee fringe benefits. On the philosophic side, they frankly felt, and still feel, that, although it is "nonprofit," Aerospace is not necessarily noncommercial—that is, that it is properly regarded as a legitimate business, and that its rightful place is in the business world. Accordingly, Aerospace behaved as business behaves, and adopted a lot of the paraphernelia of modern corporate enterprise—consulting psychologists, public relations advisers, company-paid country club memberships, expense-account leniency, and so forth. The company's attitude led directly to a large number of expenditures that, from the viewpoint of congressional guardians of the taxpayers' money (and every cent of Aerospace income comes from the government), inevitably seem excessive. From the viewpoint of Aerospace employees, these expenditures undoubtedly make the company a very pleasant place to work.

The excesses cited by the Armed Services subcommittee fall into roughly two categories. The first can be described as undue benevolence toward

employees. This involved, according to the report, "unusually high starting salaries, unusually sharp increases in pay after short periods of employment, very high salary scales for management level personnel, an incentive compensation plan for those making $20,000 a year (but no incentive program of any kind for lower and middle grade employees), unlimited sick leave, exorbitant recreation allowances, liberal education grants with no requirement for continued employment at Aerospace following the schooling, and a pattern of needless and frivolous expenditures from fee for such things as subsidized meals for executives, country club memberships, and elaborate and frequent entertainment." One of the specific instances was the payment of over $3000 for trucking Getting's yacht from Massachusetts to California (despite the fact that Getting's annual earnings total $90,000). Another was the fact that, during the relocation of a portion of the company's personnel from El Segundo to San Bernardino, about 70 miles away, Aerospace paid one executive $2361 for moving from Anaheim to Santa Ana, a distance of about 10 miles. The expenditure was not too wide of the $2000 mark allotted by the Air Force for moving each employee. The catch was that in Anaheim the employee's home was 48 miles from San Bernardino, after relocation in Santa Ana he was 51 miles away. Another engineer was paid $3900 for moving from Pacific Palisades, 80 miles from San Bernardino, to Palm Springs, 59 miles from the new facilities. Security is another area where Aerospace is said to have behaved with "an extraordinary measure of forbearance for the employees." These cases are treated with circumspection in the report, but for one of them enough detail is offered to provide a scenario for a Hollywood comedy. Two executives were thought to be carrying on with their secretaries—a practice of concern to defense contractors on security, not moral, grounds. Aerospace's response, for whatever reason, was not to turn the matter over to the Air Force but to hire a private detective who, before sending a bill for over $3000, managed to disgrace himself twice—first by being forced from his supposedly unobtrusive post by the discovery of "people staring," second by being charged by the police on a "Peeping Tom" complaint brought by a citizen. Subsequently, Aerospace requested one of the suspected executives to check-up on the first, with obvious results. The individuals concerned denied the allegations, and the corporation took no further action.

Corporate Frills

The second broad category of complaints brought by the Armed Services committee has less to do with munificence to individuals than with the generally munificent style adopted by the corporation as a whole. A building program on which Aerospace spent about $22 million for new facilities despite the fact that the government already owned property in those places that could have been modified for Aerospace was criticized heatedly. In response to an initiative by Representative Porter Hardy (D–Va.), chairman of the subcommittee that studied Aerospace, Congress has recently taken action to prevent similar moves by other nonprofits in the future. The committee similarly saw no reason why a nonprofit corporation with a single guaranteed customer should require an elaborate public relations apparatus consisting of a New York public relations firm (at $2000 a month), a Washington military affairs reporter who was asked to "keep his eyes and ears open" (for $150 a month), and an extensive internal PR operation in California. Aerospace also maintained a nine-man Washington office, whose staff included a chauffeur. The annual income of the head of the office, the report observed, "paid by public funds of the government, was the same as the salary of the Secretary of Defense," or $35,000. The committee was also disturbed by the payment of $240 a day to a consulting psychologist whose services consisted, among other things, of providing "group therapy for the library staff to better communications between the head of the library and his supervisory personnel," and of producing a report entitled "Human factors affecting the reliability of the space program," some of whose insights were described by one Aerospace official as no more sophisticated than those of "any text book on industrial management."

The question arising from the committee's disclosures is not simply whether Aerospace made some frivolous choices. Officials admit that it did, and they have quietly taken steps to correct them—dropping the public relations firm, the psychologist, and the Washington consultant, and putting the lid on certain executive emoluments. (Aerospace officials would, if they were feeling more combative, choose to defend some of the other practices attacked by the committee. As it is they seem to have adopted a policy of being as unquarrelsome as possible until the storm has passed.) The fundamental issue raised by the committee, however, is not whether Aerospace did particular things that were improper but whether the corporation as a government-sponsored nonprofit has the right to shape its own character at all. At the heart of the issue is a long unresolved and rather esoteric argument about the payment of fees for sponsored research.

Until recently there has been general agreement that nonprofits should be paid fees in addition to the cost of the work they perform. Both Air Force policy statements and the guidelines set out by the Bureau of the Budget's Bell Committee in 1962 point out that there are legitimate reasons why nonprofits should be given some independent funds. Chief among these reasons, in the words of the Bell report, are the need "to provide some degree of operational stability and flexibility to organizations which otherwise would be very tightly bound to the precise limitations of cost financing of specific tasks" and the importance of enabling the nonprofits to conduct the "independent, self-initiated research [necessary] if they are to obtain and hold highly competent scientists and engineers."

Dispute over Fees

But the way these funds should be handled has been a matter of dispute. The government regards the nonprofits almost as government installations, second in dependence only to actual government laboratories, and has tried to exercise a fair amount of control. The nonprofits, on the other hand, regard themselves as businesses, as legitimate members of the world of private enterprise. The fee, in the words of one official of another major nonprofit, should not be considered a "magnanimous allowance" but a legitimate payment earned for legitimate work, which the company has a right to use as it sees fit. Most of the particular disagreements between the government and the nonprofits grow out of the basic philosophical one. Aerospace's indiscretions were financed almost wholly from its fees. The committee, for example, was particularly incensed that out of $16 million earned in fees over the last 5 years Aerospace had spent only $411,000 on independent research. Aero-

space officials privately agreed that this was much too little but said they had been putting off major research efforts until their building program was satisfactorily financed, and they want to retain the right to make such choices. The relationship between the government and its nonprofits seems to be like that of parent and child not only in the sense of ancestry but in the sense that, like many children, the nonprofits are struggling for independence.

One outcome of the investigation of Aerospace seems to be a feeling in Washington that it is time to have a look at the nonprofits as a whole. What the look might reveal is hard to say, for it is unclear how far Aerospace may have departed in some of its actions from the standard practices of nonprofits, or even if a standard exists. Officials of nonprofits seem to be trying to avoid investigation by lying low, playing down the kind of disagreements with their government sponsors that sometimes led to tensions at contract-negotiation time, and perhaps trimming their sails somewhat to avoid the comparisons with civil service standards that politicians tend to find inequitable and invidious. Nonetheless, some kind of examination now seems likely. The Hardy subcommittee suggested that "the Air Force management concept which led to the formation of Aerospace Corp. should be reappraised"—a hint that it was time to consider in-house capacities once more—and recommended that "steps should be taken to eliminate the use of a fee for Aerospace." There have been similar rumblings of dissatisfaction from other congressional sources lately, and it is probable that one or another of them will undertake a review.

Final decisions on the future shape of the nonprofits will obviously require concentrated study and debate. Public policy in this area is so entangled with defense and security matters that the room for maneuver is small. The manpower situation in the missile and space fields is still competitive, and it is conceivable that even a move to eliminate fees (thereby reducing management flexibility) might produce an upheaval in a company like Aerospace. It is certain that a move to transform the company into a government laboratory would do so. If any changes in the status of nonprofits adversely affected defense programs, defense officials would have to answer for it—and congressmen would be the first to ask the questions.—ELINOR LANGER

Announcements

Purdue University and four midwestern public utility companies have formed a **research and education center**. The center will work on a study of the long-range use of computers in electric utility management, and on the preparation of computer programs adapted to the needs of each participating company. Purdue's participating agency is the recently formed Purdue Energy Research and Education Center (PEREC), directed by Philip N. Powers. The industrial representatives are Consumers Power of Jackson, Michigan; Indianapolis Power and Light; Public Service Indiana; and Detroit Edison.

The National Science Foundation has announced plans for the operation of the research vessel *Anton Bruun* for a year, as a national facility for **biological oceanographic research** in the southeastern Pacific Ocean. A series of nine cruises has been scheduled from October until next September; they will be for the study of various biological phenomena associated with the Humboldt Current and adjacent waters. Limited financial support will be available for cruise participants. Additional information on the program, and applications for participation are available from Edward Chin, Woods Hole Oceanographic Institution, Woods Hole, Massachusetts.

Meeting Notes

Papers are invited for presentation at the second international congress of **food science** and technology, to be held in Warsaw next August. The languages of the meeting are English, French, German, and Russian, with simultaneous translation only for English and Russian. Deadline for receipt of titles and abstracts: *1 November*. In addition to the technical sessions, discussion will be held on plans to establish an international union of national scientific and technical organizations which deal with food science and technology. (A. Borys, Instytut Przemyslu Miesnego, Rakowiecka 36, Warsaw 12, Poland)

Papers are being solicited for the 13th annual **solid state circuits** conference, sponsored by the University of Pennsylvania and the Institute of Electrical and Electronics Engineers. The meeting will be held in Philadelphia 9–11 February. Unpublished papers on solid state circuits or related fields will be considered. Abstracts of 35 words, and 300- to 500-word summaries are required. Deadline: *15 October*. (K. H. Fischer, U.S. Army Electronics Command, Attn: AMSEL-KL-I, Fort Monmouth, New Jersey 07703)

A symposium on interdisciplinary aspects of **radiative energy transfer** will be held in Philadelphia 24–26 February. Papers are being solicited on: space and atmospheric physics, stellar aerodynamics, plasmas, oceanography, atmospheric entry and reentry, and solid transparent media. Persons planning to participate in the meeting are requested to notify the arrangements committee by *15 October*. (J. J. Welsh, Space Sciences Laboratory, General Electric Company, Box 8555, Valley Forge, Pa.)

Papers are invited for the second international congress on **hormonal steroids**, scheduled for 23–28 May in Milan, Italy. Abstracts of the papers are required. The languages of the meeting are French, Italian, and English; English will be preferred because there will be no simultaneous translation. Deadline for abstracts: *1 December*. (L. Martini, Istitutio de Farmacologia, Via Andrea del Sarto 21, Milan, Italy)

The New York Academy of Sciences will sponsor the seventh international **transplantation** conference, scheduled for 10–11 February in New York. Symposiums will be held on transplantation antigens and tissue typing, effector mechanisms, and immunobiology. Abstracts of research in transplantation biology are invited for presentation during the meeting; a maximum of 30 will be accepted. Twenty copies of the abstracts are required by *15 October*. (F. T. Rapaport, New York University Medical Center, 550 First Avenue, New York 16)

Courses

Training Services, Inc., will present the second annual **measurement and instrumentation** institute, 29–30 October in New York. The theme will be "conversion of phenomenon to be measured into a usable signal." The program will be directed toward users of instruments, and manufacturers and sellers of instruments and associated equipment. (L. J Smith, Training Services, Inc., 33 Lincoln Avenue, Rutherford, N.J. 07070)