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The attached information is part of the material presented at the Seminar in University Project Management for Technical Officers held at Langley. We consider this information most appropriate for your use as technical monitor for a university grant.

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Date 8-28-76
3 - POLICY STATEMENTS

NASA's policy toward universities is enunciated in NPD 8320.1, entitled "Basic Policy for NASA University Relationships." Policy is summarized as follows:

"Universities are considered as partners with government and industry in the nation's aerospace program. NASA's objective is to have them bring their scientific, engineering, and social research competence to bear on aerospace problems and on the broader social, economic, and international implications of NASA's technical and scientific programs. It is expected that, in so doing, universities will strengthen both their research and their educational capabilities to contribute more effectively to the national well-being. NASA is expected to encourage and provide stable financial support for this university role. All of NASA's affairs with universities should be conducted in a way that strengthens the universities' educational capabilities and assures maximum benefit to NASA and the universities."

More specific policy statements in NPD 8320.1 provide:

1. To the maximum extent practicable, universities throughout the country, both large and small, should be encouraged to participate in the space and aeronautics program.

2. University activities supported by NASA should be relevant to NASA's mission, should be compatible with the interests, activities and capabilities of the university, and should be defined and conducted cooperatively. They should provide, to the maximum extent practicable, for participation by younger faculty members and graduate students as well as senior investigators in ways that strengthen and enhance the universities' traditional teaching and research mission.

3. NASA should encourage and respect a university's ability to plan and manage its research and other activities toward the objectives, and within the constraints, mutually agreed upon by NASA and the university.
4. NASA shall avoid, to the extent practicable, contracting with universities to perform sub-professional or job-shop types of work which do not directly and significantly contribute to both education and research.

5. NASA will encourage universities to become acquainted with and to utilize NASA laboratory facilities and staff, to the maximum extent practicable, under appropriate cooperative agreements.

6. Informal discussion with university scientists, engineers, and administrators is encouraged as an effective means of exchanging information on activities, interests and policy or operational constraints.

7. University research activities of a continuing nature shall be supported by suitable long-term funding arrangements (e.g. step funding) whenever funds and circumstances permit.

To carry out the basic policy implicit in NPD 8320.1, NASA has developed a variety of subordinate policies. Five of the most important of these, all of which are discussed in later seminar units, relate to:

- Emphasis on University Initiative
- Use of Appropriate Instruments
- Concepts of Negotiation
- Concepts of Administration
- Use of Step Funding

**Emphasis on University Initiative.** One of the early decisions in the university program was to place substantial reliance on university initiative, as reflected in unsolicited proposals. It was believed that reliance on such proposals would encourage universities to do their research planning in the light of their instructional planning and to avoid undertaking research which did not integrate with their educational curriculum.

**Use of Appropriate Instruments.** As illustrated by Slide 23, the region of maximum NASA activity vis-a-vis universities lies essentially in the area of research contracts and specific purpose grants.

A grant is generally used when the primary intent is to seek new knowledge or understanding of a scientific
To this point, the seminar has been concerned with the history and scope of NASA's University program, its underlying philosophy, and the policies and procedures which have been developed as a basis for carrying out the program.

The remaining seminar units will be devoted essentially to consideration of how the established policies and procedures should be applied to each step in the life cycle of a university research project, making allowance for different methods of application as between contracts and grants.

Any listing of steps in the life cycle of a research project is necessarily arbitrary; for the purpose of the seminar the following have been assumed:

1. Publicizing NASA's Needs
2. Pre-Proposal Guidance
3. Proposal Preparation and Submission
4. Proposal Handling
5. Proposal Evaluation
6. Proposal Acceptance or Rejection
7. Preparation for Procurement
   a. Funding
   b. Step-Funding
   c. Types of Agreements
   d. Other Requirements
8. Negotiation
9. Technical Administration
10. Business Administration
11. Project Continuation or Termination
12. Project Evaluation

Publicizing NASA's Needs. Procedures for apprising the university community of the nature of NASA's general and specific interests fall into two categories: formal and informal.

The formal category includes three publications:

"Guide to Policies and Procedures for Sponsored Research" (Draft)

"Research Topics Bulletins" (NMI 7140.1)

"Opportunities for Participation in Space Flight Investigations" (NHB 8030.1A)

The Guide will be the basic tool for advising prospective investigators of areas of general NASA interest. Although the description of interests in the Guide is necessarily broad, ten major research areas are outlined; within these areas nearly a hundred subjects of research interest are listed. Substantial additional information is included with regard to proposal preparation and evaluation, with the objective of providing a single source of background information on the preparation of unsolicited proposals.

Bulletins. The "Research Topics Bulletins" are envisaged as companion pieces of the Guide, with the objective of providing more current information on specific NASA interests. Each Bulletin contains the following:

1. A brief description of a single topic or problem area of more-than-ordinary current or prospective concern.

2. An explanatory paragraph making clear that the Bulletin is not a request for proposals, but is intended to supplement other sources of public information about aerospace research needs.

3. A contact within NASA (usually the initiator of the Bulletin) for readers who wish further discussion of the problem.

4. The approximate time planned for selection of proposals, if timing is especially important.

5. Identification of the Proposal Control Officer in the Office of University Affairs as the addressee for unsolicited proposals resulting from the Bulletin.

From the point of view of the Technical Officer, an important aspect of the NMI is that Program Managers or other Technical Officers who recognize the need for and expect to support research projects suitable for university
participation are responsible for drafting concise problem
descriptions suitable for Bulletins.

Opportunities. The third formal publication, "Opportu-
nities for Participation in Space Flight Investigations," was published in April, 1967, and has been updated several
times. In addition to instructions on submitting unsolic-
ited proposals, it contains:

1. A description of specific opportunities
which exist for potential investigators
to participate in NASA flight programs
and the individual in NASA who can be
contacted regarding these opportunities.

2. A brief technical description of all
current spacecraft and launch vehicle
programs, even though a particular
program may not have an immediate oppor-
tunity for participation.

3. A brief description of advanced missions
currently under study by NASA.

Somewhat over fifty individuals in NASA have been
specifically designated as technical contacts on various
projects and, where necessary, have responsibility for
developing Memorandum Changes to the basic publication.

Informal procedures for publicizing NASA's research
interests include: public announcements of research needs
of more than usual interest; related work published in
the open literature; various Government publications, in-
cluding authorization and appropriation requests to Congress;
and discussions between potential investigators and Tech-
nical Officers at scientific meetings, during visits to
universities, at NASA, and so on.

NPD 8320.1, "Basic Policy for NASA University Relation-
ships," is quite explicit in encouraging such meetings:

"Informal discussion with university
scientists, engineers and administrators
is encouraged as an effective means of
exchanging information on activities,
interests and policy or operational
constraints."
If used judiciously, the totality of these means of communication should have favorable results, including

1. New contacts and improved communication between NASA technical personnel and their counterparts in universities.

2. Favorable NASA visibility to the university scientific community, with improved understanding of NASA interests in fundamental research; and, most important of all

3. Improved program relevance of unsolicited research proposals, with better selection opportunities for NASA.

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The responsibilities of the Technical Officer in this stage include:

1. Awareness of the various ways in which NASA's research needs are communicated to the university community; and

2. Personal participation, either in the preparation of appropriate written materials or in personal discussions with university investigators, as a means of publicizing NASA's interests.
9 - PRE-PROPOSAL PERIOD

For purposes of discussion the pre-proposal period is considered to be the period which follows the dissemination to the University community—by whatever means—of information on the nature of NASA's current research interests and the formal receipt of an unsolicited proposal from a university.

Pre-Proposal Guidance. The publications discussed in Unit 8 recommend that potential investigators seek some pre-proposal guidance from NASA Technical Officers before submitting a formal proposal. By and large this guidance could be expected to fall in four areas:

1. The probable relevance of proposed research to NASA's needs
2. The proper form for proposal submission
3. Evaluation procedures
4. Management procedures

Relevance. In addition to responding to specific questions as to the relevance of a proposed project to NASA's requirements, it is recommended that Technical Officers point out that encouragement and support are particularly given to those university proposals which

1. are compatible with the interests, activities and capabilities of the university department(s) involved;
2. strengthen the university in its primary teaching function;
3. contribute to the professional development of the principal investigator, his department and his graduate students (the use of graduate students on research projects should be encouraged);
4. are likely to produce results suitable for theses and dissertations;
5. are of sufficient duration and stability to enable sound planning and execution by the university (the use of step-funding could be explained).
and that, except in unusual circumstances, NASA is not interested in supporting university activities which:

1. contribute only to the personal interests of the principal investigator or have little relationship to the interest of the department or of the university as a whole;

2. are short-term "crash" projects that disrupt the planned academic functioning of the university;

3. involve extended and unpredictable absences from the university, or in other ways tend to reduce contacts between faculty and students;

4. are for technical or engineering services which are provided primarily by non-teaching staff and bear little relationship to the instructional activities of the university.

Even with the best of intentions, pre-proposal meetings are not without pitfalls. Some of the areas in which problems have arisen include:

1. Overly explicit technical guidance;

2. Assurance that a project will be funded.

3. Encouragement of research which does not fall in an area where NASA's, the University's, and the Principal Investigator's own interests coincide (see Slide 71).


The former notes that except for certain flight proposals there is no prescribed format, but that all proposals should be specific and include, where applicable, the following items:
RESEARCH INTERESTS

University  NASA

P. I.
1. Institutional Data  
2. Abstract  
3. Schedule  
4. Description of Proposed Research  
5. Facilities  
6. Personnel  
7. Budget and Allowable Costs  
8. Cost Sharing  
9. Security  
10. Disclosure of Technical Data

"Opportunities for Space Flight Investigations" is considerably more explicit and notes that a specific check should be made with the appropriate "Technical Contact" since in some instances submission of particular materials on a prepared form is necessary.

NASA considers requests for continuation of sponsored research in much the same manner as proposals for new endeavors. Accordingly, such requests should contain similar technical and budgetary information as an original proposal. They should also include a summary of work accomplished to date and the costs incurred. These requirements are often satisfied by including recent status and updated technical and financial reports.

Evaluation Procedures. The procedures by which proposals are evaluated are discussed in Unit 10.

Management Procedures. The procedures by which projects are managed and administered are discussed in Units 17-20. The basic philosophy derives from paragraph 5c of NPD 8320.1, "Basic Policy for NASA University Relationships":

"c. NASA shall encourage and respect a university's ability to plan and manage its research and other activities toward the objectives, and within the constraints, mutually agreed upon by NASA and the university."

Two other areas of interest frequently relate to proposals from foreign sources and the solicitation of unsolicited proposals.

Although NASA supports a small amount of research in foreign countries, based on unsolicited proposals, as a
general rule the Agency undertakes projects abroad on a cooperative basis (wherein there is no exchange of funds). NASA sponsors research projects at foreign institutions only if the project contributes directly toward meeting an urgent NASA program requirement, which, as a practical matter, cannot be met within the United States. NPD 1362.1B, a copy of which appears in the textbook, discusses this subject.

From time to time there is research which the Technical Officer may feel is highly desirable, but which is just not suggested in the unsolicited proposals which cross his desk. What can he do, short of issuing a Request for Proposal?

If the matter is not urgent, the use of the "Research Topics Bulletins" offers one device for making his needs known.

A second procedure involves the use of the spoken word in meetings and in personal conversation with potential investigators.

* * * *

The responsibilities of the Technical Officer in regard to the above steps include:

1. With respect to pre-proposal guidance, appropriate response to questions posed by potential Principal Investigators and avoidance of such pitfalls as overly explicit technical guidance, assurance of funding, or encouragement of research not conducive to university interests; and

2. With respect to proposal preparation and submission, personal knowledge of accepted procedures and of the publications in which relevant information can be found.
TYPICAL MAJOR PROBLEM AREAS

To this point the seminar has dealt in some detail with the background and philosophy of NASA's university program and the various steps which lead up to a decision either to accept or reject an unsolicited university proposal.

A number of problem areas have been mentioned; this unit is designed to review what a Technical Officer might do to avoid or ameliorate some of these problems.

One problem area is that of dwindling budgetary support for the Sustaining University Program.

It was pointed out that although there is increasing emphasis on relevance to the NASA mission the basic objectives of the program remain unchanged:

1. To strengthen universities which contribute to the NASA program; and

2. To complement project-type research.

There is probably not too much the Technical Officer can do with respect to the second objective. On the other hand, there are things he can do with respect to the first objective to help supplement the shrinking availability of SUP funding. Always recognizing the importance of satisfactory completion of the research project itself, these include:

1. Assuring that universities throughout the country, both large and small, have appropriate project opportunities.

2. Ensuring that the projects which are funded are compatible with the interest of the university in question and will support it in its primary teaching functions.

3. Encouraging use of graduate students.

4. Providing opportunities for theses and dissertations.

5. Providing some assurance of financial stability through step funding.
Another type of problem arises in situations in which a Technical Officer, in his enthusiasm, indicates in pre-proposal meetings that a particular project will undoubtedly be funded after a proposal is submitted. Necessary funds may not always be forthcoming. Broken promises can undermine NASA's general stature with the university community; the results of specific situations can range from disappointment on the part of the investigator to an actual wastage of university funds if projects are started prematurely.

In connection with pre-proposal and pre-negotiation conferences, the point was made that their purpose was the provision of a variety of information in various areas such as the relevance of the proposed research to NASA interests, the proper form for proposal submission, evaluation procedures, management procedures, etc. Where inadequate information is provided inadequate proposals will result, which, as a minimum, slows down the whole process and exasperates the participants.

Another and different type of problem arises when the Technical Officer endeavors to reach "agreements" with university representatives in the course of pre-negotiation meetings. Experience has shown that misunderstandings and roadblocks to smooth negotiation frequently result from the prior participation of persons representing NASA who are not trained in the negotiation process.

Another problem area relates to situations in which the Technical Officer gives overly explicit technical guidance, thus negating the potential investigator's freedom of inquiry.

There are obvious opportunities for improvement in the internal processes by which proposals are handled. The fact that less than half of the unsolicited university proposals are either accepted or rejected in the three months target period may be considered an indictment of the responsible Technical Officers. So too are the facts that incomplete procurement packages are forwarded to the negotiator, that the packages have unexplained differences in time, scope, or funds from the original proposal, and that they sometimes include items not eligible for financing.

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In summary, ways by which Technical Officers can assist NASA in resolving some of the above-mentioned problems are by endeavoring to:

Assure, wherever possible, that projects do assist in strengthening the educational capabilities of universities in stipulated ways;

Assure the provision of adequate information to prospective investigators;

Avoid undermining the negotiator;

Avoid promises which may be broken;

Avoid overly explicit guidance;

Endeavor to make accept/reject decision within thirty days;

Assure the procurement package is complete and responsive.
13 - FUNDING

As noted in Unit 9, one of the ten or so items required to be included in an unsolicited proposal is entitled "Budget and Allowable Costs." The draft "Guide to Policies and Procedures for Sponsored Research" describes this requirement as follows:

"Proposals should contain cost and technical parts in one volume. Include separate cost estimates for salaries and wages, equipment, expendable supplies, travel, subcontracts, publication, other miscellaneous direct costs that can be identified, and overhead. Categorize salaries and wages by principal investigator, other scientific and engineering professionals, graduate research assistants, and technicians and other nonprofessional personnel. Estimate all manpower data in terms of man-months or fractions of full time. Explanatory notes should accompany the budget to provide identification and estimated cost of major capital equipment items to be acquired, justification of extraordinary travel costs, basis of overhead computation, and clarification of other items in the budget that are not self-evident. List estimated expenses as yearly requirements by major work phases. The cost principles set forth in Exhibit B of the NASA Grant Handbook and Part 15 of the NASA Procurement Regulations govern, respectively, the allowable costs of research on NASA grants and contracts. These principles are based on the requirements of Bureau of the Budget Circular A-21."

Based on the above materials, NMI 5101.12A, "Policy and Procedures Concerning Procurement Requests," includes the following among the materials to be included in support of a procurement request.

1. A proposed statement of the work to be performed, specifications and drawings, as appropriate, required delivery schedule or period of performance, an estimate of the dollar cost of the procurement, and the proper program codes. Alternatively, a grant title with dollar costs and appropriate program codes.

2. Background information useful for complete understanding of the requirements, such as a record of previous contacts between technical personnel and potential contractors.
relating to the work. Copies of correspondence affecting the technical or budgetary aspects of unsolicited proposals should be included.

3. Explanation of discrepancies if the work to be supported differs substantially from the work proposed in technical content or coverage, period of performance, or funding.

4. Statement of reasonableness of direct costs, particularly where extensive travel or purchase of major items of capital equipment is involved.

A basic responsibility of the Technical Officer is to ensure that projected efforts are commensurate with cost. This requires that the cost estimates in the procurement package be realistic; no one is in better position than the Technical Officer to make judgements on such matters as overall manpower requirements, equipment needs, travel, etc. Similarly, the Technical Officer should understand the nature of items not susceptible of reimbursement, i.e. purchase of land, automobiles, etc.

An area of frequent concern arises from situations in which the work the Technical Officer proposes for support differs substantially from the work recommended in the original proposal. There can be valid reasons for this, but the Technical Officer has an obligation to assure that the modification is adequately explained in his documentation.

Another item of importance, which is discussed further in Unit 16, is cost sharing.

In recent years cost sharing has been applied to research grants to universities, although not to research contracts. Section 408 of the new NASA Appropriation Act changes this, providing as follows:

Sec. 408. None of the funds provided in this Act may be used for payment, through grants or contracts, to recipients that do not share in the cost of conducting research resulting from proposals for projects not specifically solicited by the Government; Provided, that
the extent of cost sharing by the recipient shall reflect the mutuality of interest of the grantee or contractor and the Government in the research.

This new policy obviously has major implications for the entire university program and eventually could necessitate changes in the way many agencies deal with universities.

In NASA, for example, where the university program has been so heavily based on the concept of the unsolicited proposal, the obvious question is "In the light of the requirement for cost sharing in unsolicited proposals, are we now penalizing universities if we continue to emphasize unsolicited proposals?"

The Senate Appropriation Committee, in its related report on the bill (No. 91-521, November 6, 1969) suggested that:

"Cost Sharing should generally be related to the amount of faculty salaries associated with the research project."

This may provide some index of the magnitude of cost sharing to be anticipated. It is expected that the Bureau of the Budget will eventually have to issue new regulations to establish uniform policies among government agencies.

Another aspect of the problem relates to just what is an unsolicited proposal under the provisions of Section 408. For the moment at least it has been decided that proposals received in response to "Opportunities for Participation in Space Flight Investigations" need not be considered as unsolicited, since the Handbook specifically solicits proposals for identified NASA missions.

* * *

In summary, it is stressed that the matter of the appropriate amount of funding for a university research project is an inalienable part of the responsibility of the Technical Officer, although it is stressed that the amount of cost sharing is in no way a valid criterion for accepting or rejecting a proposal. The key is mutuality of interest.

The Technical Officer may not have responsibility for obtaining the funds for a project. He does have responsibility, as we shall emphasize later, for seeing that they are used properly. And certainly he has responsibility for seeing that the proper amount is used.
As discussed in Unit 11, one of the items which NMI 5101.12A requires be included in the procurement package is "A statement describing the suitability or lack thereof of providing step-funding. (Educational institutions only.)" OUA can provide a list of such institutions.

Step funding is a method of ensuring stability of support for academic research; as provided in NPD 8320.1:

"University research activities of a continuing nature shall be supported by suitable long-term funding arrangements (e.g. step funding) whenever funds and circumstances permit."

Assuring university research grantees of continuity of support for periods substantially longer than one year is advantageous to both NASA and the universities. It benefits NASA by enabling retention of highly qualified investigators on NASA work, encouraging participation by the most able graduate students, and making possible advanced planning for the most effective use of research funds. Work productivity is maintained, without the distraction of uncertainty or the interruption and reestablishment of research teams that accompany annual financial crises. Fundamental problem areas can be investigated in depth to strengthen the base of knowledge undergirding the development and application of aeronautics and space science and technology. The universities benefit, as their educational function requires planning and commitment of university staff and graduate assistants over periods longer than a year, to provide a degree of stability in assignment of personnel.

In its simplest form, a step-funded research project is one for which funds are obligated over a three-year period in the pattern illustrated in NMI 8310.1. In addition to full support for the first year's effort, funds are also obligated for a second year's operation approximately two-thirds of the first year level, and for a third year's effort at one-third of the first year level. Thus, the grantee is assured that his project will receive at least partial support over a three-year period. If the research effort is satisfactory, and NASA decides to continue its support, additional funds are obligated for the grant in the second
and subsequent years to maintain the initial annual level and the forward funded steps.

As explained in NMI 8310.1, "Step Funding of Research Grants," a copy of which is included in the text, the following general criteria are applied in determining whether a grant is suitable for step funding:

1. The effort is of direct relevance and importance to the NASA mission;

2. The effort is of a long-term, continuing nature (i.e. at least three years of full support is anticipated);

3. The grant is for fundamental research at an institution of higher education and has significant graduate student involvement.

Projects that meet the above criteria are inherently suitable for coverage by a grant instrument. Therefore, step-funding is used only with grants.

Specific factors indicating the desirability of step-funding include:

1. The investigator is of demonstrated capability, and his continued effort is particularly desirable;

2. The research is essential to the success of a planned NASA program;

3. A new project is assessed as being of high potential for extended support.

The following procedures are followed for all NASA-sponsored research projects, contemplated as new or renewal actions to educational institutions, except for on-board flight experiments:

1. The Office or Center initiating the procurement request makes a determination regarding the suitability for step-funding. The reasons either for or against step-funding will be specifically set forth in the documentation supporting the procurement request, and, if step-funding is in-
tended, the full amount of the required funds will be cited in the procurement request.

2. The procurement request and supporting documentation will be routed through the normal channels for approval and fund certification.

3. If the grant is the selected instrument, the Office of University Affairs will review the determination for policy adherence prior to award of the support instrument. The review will be based on documentation received pursuant to Procurement Regulation Directive 68-1.

4. The Office of University Affairs may be consulted for assistance in selection of projects for step-funding, the development of suitable funding schedules, or the resolution of any related problems.

Funds required to establish and maintain steps are normally provided by the office initiating the procurement request. However, like any other grant or contract, step-funded grants may be jointly supported by several fund sources. Each source should be identified with the amount of its contribution, and approved by the official responsible for the source. In some instances, funds have been provided through the Office of University Affairs to add the second-and-third-year steps to selected Program Office and Center grants. In these cases, as with all step-funded grants, subsequent yearly increments will be provided by the responsible Office or Center.

Each recipient of a step-funded grant is requested to submit a renewal proposal several months in advance of the grant anniversary when support is scheduled to drop to the 2/3 level. Each renewal proposal should outline the progress made during the preceding year, and describe the research planned for the next three years (update plans previously proposed for the next two years, and extend plans for an additional year). Renewal proposals should be acted upon promptly by the respective supporting Offices or Centers to enable grant supplements (or notices of non-support) to be issued prior to the grant anniversary date.
There are three situations in which some resistance to step funding has tended to develop.

The first is the situation in which a program office or field center is reluctant to support step-funding because of an unwillingness to obligate the requested amount, which generally would be twice what would be expended in the first year. If a Technical Officer finds himself in this situation, one possibility is to seek some of the support from other funding sources. OUA may be able to assist in this regard.

A second potential problem area arises in situations in which the Technical Officer himself is reluctant to apply step-funding to a new project because he wants a year's experience with the Principal Investigator to assure himself of the quality of the work, the capabilities of the participants, etc. What is required here is that the Technical Officer not be completely arbitrary, but that he recognize there are arguments on both sides of the matter.

The last point relates to the fact that step-funded grants must be refinanced annually and if the refinancing is not completed by the anniversary date the Principal Investigator is left with the very lack of assurance which NASA is trying to avoid.

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This is another step in the life cycle of a project in which the recommendation of the Technical Officer is all-important.

The policy of supporting appropriate university research activities by suitable long-term funding arrangements has been enunciated; the procedures for carrying out the policy have been laid out in detail; but the Technical Officer is the one who must make them work.
Management Instruction

SUBJECT: STEP FUNDING OF UNIVERSITY RESEARCH GRANTS

1. PURPOSE

This Instruction sets forth:
   a. The nature and purpose of step funding of university research grants,
   b. Criteria for the use of step funding, and
   c. Procedures for initiation and maintenance of step funding.

2. APPLICABILITY

This Instruction is applicable to NASA Headquarters and Field Installations.

3. BACKGROUND

a. Step funding is a method for ensuring stability of support for academic research. Assuring university research grantees of continuity of support for periods substantially longer than one year is advantageous to both NASA and the universities. It benefits NASA by enabling retention of highly qualified investigators on NASA work, encouraging participation by the most able graduate students, and making possible advanced planning for the most effective use of research funds. Work productivity is maintained, without the distraction of uncertainty or the interruption and reestablishment of research teams that accompany annual financial crises. Fundamental problem areas can be investigated in depth to strengthen the base of knowledge undergirding the development and application of aeronautics and space science and technology. The universities benefit, as their educational function requires planning and commitment of university staff and graduate assistants over periods longer than a year, to provide a degree of stability in assignment of personnel.

b. Step funding was developed by NASA to provide the agency and its grantees with these benefits while retaining the programmatic convenience of regular planned annual commitments.
4. **POLICY**

   It is NASA policy to establish and maintain maximum feasible step funding for university grants that support research of a continuing or long-term nature.

5. **DESCRIPTION OF STEP FUNDING**

   **a.** In its simplest form, a step-funded research project is one for which funds are obligated over a three-year period in the pattern illustrated in Attachment A. In addition to full support for the first year's effort, funds are also obligated for a second year's operation approximately two-thirds of the first year level, and for a third year's effort at one-third of the first year level. Thus, the grantee is assured that his project will receive at least partial support over a three-year period. If the research effort is satisfactory, and NASA decides to continue its support, additional funds are obligated for the grant in the second and subsequent years to maintain the initial annual level and the forward funded steps.

   **b.** The foregoing description is for a grant supported at a fixed level. However, fixed-level support is not required, and the method can be applied to a varying support level. This flexibility permits gradual buildup to a projected level of effort, or adjustment of the support level as NASA needs and resources and university interests and capabilities change.

   **c.** In the general case, for either new or existing grants, the total level of support is projected for each of the next three years. Funds are then obligated in whatever amount is required to bring the immediately forthcoming year up to its projected level, the following year to two-thirds of plan for that year, and the next year to one-third of plan.

6. **CRITERIA**

   **a.** The following general criteria shall be applied in determining whether a grant is suitable for step funding:

   (1) The effort is of direct relevance and importance to the NASA mission;

   (2) The effort is of a long-term, continuing nature (i.e. at least three years of full support is anticipated);

   (3) The grant is for fundamental research at an institution of higher education and has significant graduate student involvement.

   Projects that meet the above criteria are inherently suitable for coverage by a grant instrument. Therefore, step funding is used only with grants.
b. Specific factors indicating the desirability of step funding include:

(1) The investigator is of demonstrated capability, and his continued effort is particularly desirable;

(2) The research is essential to the success of a planned NASA program;

(3) A new project is assessed as being of high potential for extended support.

7. PROCEDURES

a. The following procedures will be followed for all NASA-sponsored research projects, contemplated as new or renewal actions to educational institutions, except for on-board flight experiments:

(1) The Office or Center initiating the procurement request will make a determination regarding the suitability for step funding. The reasons either for or against step funding will be specifically set forth in the documentation supporting the procurement request, and if step funding is intended, the full amount of the required funds will be cited in the procurement request.

(2) The procurement request and supporting documentation will be routed through the normal channels for approval and fund certification.

(3) If the grant is the selected instrument, the Office of University Affairs will review the determination for policy adherence prior to award of the support instrument. The review will be based on documentation received pursuant to Procurement Regulation Directive 68-1, Part II, a and b.

(4) The Office of University Affairs may be consulted for assistance in selection of projects for step funding, the development of suitable funding schedules, or the resolution of any related problems.

8. SOURCE AND AMOUNT OF STEP FUNDS

a. Funds required to establish and maintain steps will normally be provided by the office initiating the procurement request. However, like any other grant or contract, step-funded grants may be jointly supported by several fund sources. Each source should be identified with the amount of its contribution, and approved by the official responsible for the source. In some instances, funds have been provided by the Office of University Affairs to add the second- and third-year steps to selected Program Offices and Center grants. In these cases, as with all step-funded grants, subsequent yearly increments will be provided by the responsible Office or Center.
b. Upward or downward adjustments in the annual levels may be made as outlined in paragraph 9c. Annual levels should be rounded to the nearest $1000 where feasible, and the levels of the steps rounded to approximate 2/3 and 1/3 of the projected annual levels for the years covered by the respective steps.

c. Obligations available to, but unused by, the grantee in a particular grant year may be allowed to carry over and remain available in the following year. However, in accepting renewal proposals, it is the responsibility of the initiating office to ensure that only a reasonable amount (ordinarily, less than 15% of annual level) of unused prior obligations are allowed to accumulate. Where an unwarranted surplus exists, consideration should be given to adjusting the level of effort, rescheduling prior-year funds with a concomitant reduction in the amount of new funds supplied, or both of these.

9. CONTINUATION

Each recipient of a step-funded grant will be required to submit a renewal proposal several months in advance of the grant anniversary when support is scheduled to drop to the 2/3 level. Each renewal proposal will outline the progress made during the preceding year, and describe the research planned for the next three years (update plans previously proposed for the next two years, and extend plans for an additional year). Renewal proposals will be acted upon promptly by the respective supporting Offices or Centers to enable grant supplements (or notices of non-support) to be issued prior to the grant anniversary date.

10. TERMINATION OF SUPPORT

Although step funding a grant shows clearly that continued support is anticipated, continuation is not mandatory; i.e. it is not required that a renewal proposal be accepted. However, in order to phase out a step-funded grant with less than five years of support (including the final two years of reduced support by step funds) it must be shown that the particular support termination is in the best interest of the Government, and the action must be reviewed by the Assistant Administrator for University Affairs. A decision to cease support of a step-funded grant does not affect the obligations made previously, and ordinarily the grant will receive two years of reduced support following rejection of a renewal proposal. Step-funded grants may, of course, be terminated at any time for cause or by mutual consent, and the obligations rescinded in accord with the terms of the grant instrument.
11. RESPONSIBILITY

The Assistant Administrator for University Affairs is responsible for administering agency-wide application of step funding, and for issuing special instructions, as part of his responsibility for functional management of NASA's University Program.

[Signature]

Administrator

Attachment:

A. Typical Step-Funding Pattern

Distribution:

SDL 1
TYPICAL STEP FUNDING PATTERN

In this example, funds in the amount of $180,000 are obligated initially to provide a three-year grant. The full annual level of effort is $90,000. A second year at two-thirds full level ($60,000) and a third year at one-third ($30,000) are included in the obligation. Subsequent extensions at the $90,000 level require annual obligations of $90,000. The step configuration is maintained with each extension, as indicated by the dashed lines.
TYPICAL STEP FUNDING PATTERN

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Step Funded Research Grants

Twenty-three years ago Vannevar Bush set forth a basic principle for government support of science in universities: "... There must be stability of funds over a period of years so that long range programs may be undertaken. ..." 1 Despite the early elucidation of this principle, real progress has been small in freeing research sponsored in universities from ill-timed stops and starts arising from the vagaries of the governmental fiscal cycle. This problem is magnified by the extensive government-university relationships of recent years. Of the various ameliorating approaches which have been tried, "step funding" or "forward funding" may well be an optimum technique in consideration of the needs of both the government and the universities. Step funding provides extended support for research projects and allows at least 2 years' advance notice of termination.

Need for Longevity

Research productivity is greatly enhanced if the investigators can plan ahead for a period commensurate with that anticipated as necessary for completion of a particular research project. Without assurance of continuing funds to see a project through, the length of the advance planning period is artificially constrained, resulting in nonproductive anxiety and inefficient scheduling of work. The benefits of stability and longevity, however, exceed a mere calming of the nerves. This point is worth dwelling upon, as the step funding concept has meaning only when viewed in the context of some of the more specific advantages accruing through long-term support.

First of all, it is unrealistic to start certain types of projects on a 1- or 2-year basis, particularly those in which the natural phenomenon under study has a normal cycle on the order of a year or more. Perhaps even greater difficulty is experienced in interesting a promising graduate student in a project when abrupt termination of the work may leave him stranded with a half-finished dissertation. Indeed, neither graduate students nor outstanding faculty members are disposed to commit themselves to projects having yearly built-in summer salary crises. In many types of research the first year is essentially a "tool-up" period, with the potential for results only being realized in the second or third year. When studies of this type are on a year-to-year basis, uncertainty or premature termination of support can preclude capitalization on painstaking development of experimental techniques and instrumentation. Again, with reasonable certainty of future support, speculative staffing commitments can be avoided, long lead-time items ordered well in advance, and economies realized through volume purchases and long-term arrangements with leasors and subcontractors. And last, but not least, investigators are spared the drain on their time attendant to constant proposal writing and related fund-raising activities.

To achieve these benefits, the best situation for the investigator, of course, would be for the sponsoring agency to provide sufficient funds initially for the entire project. Aside from the obvious problem of realistically determining the length and cost of a project in advance, it would be extremely difficult for a government agency to commit funds for, say, 5 years at one time. Added to this is the hard fact that there are never sufficient government funds for the support of all worthwhile projects; thus, the option of "more projects of shorter duration" is usually exercised. The problem, then, is one of supporting the maximum amount of research with the total dollars available and getting optimum return on each dollar invested under conditions conducive to good research.

It is, of course, possible to establish a project with a 5- or 10-year life expectancy, with a conditional promise of adding funding increments every few years. This technique only gives the illusion of stability; there is no substitute for funds firmly obligated. A more feasible approach would be 3-year funding. Here, however, it is only possible to make long-term plans during the first year, and at the end of the second year extended planning is not possible; finally, traumatic termination, with support going from the normal operating level to zero, is an all too real possibility. The 3-year technique also bears with it two major disadvantages for the sponsoring agency.

1) The planning of agency programs based on annual appropriations is complicated by severe year-to-year discontinuities, i.e., no obligations for a particular project are required for 2 successive years, followed by a massive 3-year obligation. Schedule slippages or short-term fiscal austerity occurring during the year major funding is due can be catastrophic for individual projects.

2) During the final year the problems are the same as encountered on a one-year grant. Therefore, while the sponsor has tied up funds for 3 years, the efficiency of the final year of funding is rather low, unless, of course, the project is one which can be completed in 3 years. However, this discussion contemplates projects which by their very nature require longer durations for successful completion.

Step Funding Concept

Step funding is derived from a combination of the best parts of the previously described concepts and techniques of short-term, long-term, and conditional long-term support. With step funding, the sponsoring agency initially provides funds for 3 years, but the money is spread in tapering amounts over the period; viz., the first year is fully supported, while ½ and ⅓ of the eventually required amounts are provided for the second and third years, respectively. Each year the project is reviewed and, if it is to be continued, additional funds are added to raise the level of effort and to extend the work for an additional year. The original tapering funding structure in the last 2 years is maintained. Thus, each year plans and

Predictable, stable support pattern enhances output from government-sponsored research in universities.


2 Step funding was innovated in the early 1960's by Dr. T. L. K. Smull, then Director of the Office of Research Grants and Contracts, National Aeronautics and Space Administration; the operational details were developed by Mr. Carl B. Palmer of the same office. The first published exposition of step funding appeared in "Smull, T. L. K., NASA-University Relationships—Proceedings of the NASA-University Conference on Science and Technology of Space Exploration, Volume I," Washington, D.C., 1962 (NASA-SP-11), pages 81-89. Official agency policy is set forth in NASA Management Instruction No. 911.5, "Step Funding of University Research Grants," dated September 16, 1965. Other longevity methods include occasional provisions of initial support for a full three year period, primarily by DOD; NSF awards Continuing Research Grants which carry initial funding for two years (see memorandum from Leland J. Haworth, Director, National Science Foundation to Presidents of universities and colleges, et al., "Continuing Research Grants" January 1, 1966); and DOE has adopted step funding for THEMIS (see "Project THEMIS: A Program to Strengthen the Nation's Academic Institutions," Office of the Director of Defense Research and Engineering, Washington, D.C., December 1968.)
commitments can be made for 3 years in advance. Alternatively, if support must be discontinued, the investigator can be given notice 2 years in advance. He can use the 2 years of tapering funding either to phase out the work in an orderly manner or obtain other support. In either event abrupt termination on short notice is avoided.

The key to providing continuing support over long periods through step funding lies in the care in which the grants are initially selected. It is crucial that the project studies be of such importance to the requirements of the sponsoring group that annual extensions of the basic 3-year pattern are highly probable. It is reasonable to expect that a grant would be step funded only if at least two extensions are planned at the onset. Therefore, barring unusual circumstances, the minimum life of a step funded grant should be on the order of 5 years. However, annual review of the project, including evaluation of the renewal proposal, is a crucial element in determining the ultimate duration of the grant. The depth and nature of this process will not be the same in all instances, as sponsoring agencies have differing requirements and missions. In general, renewal proposals submitted during the first few years of the grant will concentrate more on revised or new plans than on concrete findings. Regardless of the results to be reported, the annual review allows the grantee and the sponsor to critically examine their requirements and directions at intervals consistent with the need to ensure the most effective utilization of public funds.

More knowledge of concept does not guarantee full realization of the potential benefits of step funded grants. University investigators and business officers, as well as the grant monitors and procurement officers in the sponsoring agencies, should be constantly alert to the special nature of step funded grants.

The university must fully understand the nature of a step funded grant; with this understanding it will make some staffing, space, or other commitments and plans each successive year for the next 36 months. Likewise, the annual levels of effort must be subjected to the same careful advance planning, so the research may be effectively carried out within the resources available; unexpected or unauthorized "over-runs" can destroy step concept—perhaps when it is needed most. Renewal proposals should be submitted well in advance of the anniversary date when additional funding is required. For its part, the sponsoring agency must be prepared to act quickly upon the proposals, so that notice of renewal or phase-out is available prior to the scheduled renewal date.

Finally, the ultimate objective of step funding must be recognized during negotiation and subsequent administration to prevent government or university regulations designed for other purposes to so complicate the business arrangements that step funding becomes a burden.

### Step Funding Mechanics

Basic step funding mechanics are relatively simple. At the onset a grant is funded for a 3-year period. The first year is funded for the full amount agreed upon between the sponsor and the grantee. This, by definition, is the full annual level. The second year is funded at two-thirds of the full annual level and the third year at one-third. Prior to the end of the first year additional funding may be provided to raise the second year to the full annual level, to raise the third year to two-thirds of full annual level, and to provide for a fourth year of effort at one-third of the full annual level. Promissory (incremental) funding is not used, i.e., all of the funds required to establish and continue a 1:3:6:16 pattern are actually obligated initially and at each yearly renewal. The use of this technique is most easily described by a graphic representation of the funding pattern.

Figure 1 shows the distribution of the money which results from initiating a grant at a full annual level of $90,000. An arbitrary starting date of 1 March 1968 is used as a convenient time reference. Although the first year's level is $90,000, $180,000 is required to establish the grant. This is characteristic of step funding: when a grant is first awarded the amount of the award is twice the amount authorized for expenditure during the first year. The grant would be written in the amount of $180,000 for the 3-year period beginning 1 March 1968; and authorized expenditures as a function of time would be stated as:

- $90,000 1 March 1968-28 February 1969
- $60,000 1 March 1969-28 February 1970
- $30,000 1 March 1970-28 February 1971

Additional funds are needed prior to 1 March 1969 to maintain the level of the first year. This first supplement to the original grant is shown in Figure 2, where $90,000 is provided; the funds are distributed in equal amounts over a 3-year period. The additional funds are highlighted in Figure 2 merely for clarity of illustration. In practice, when supplemental funds are added they become an integral and indistinguishable part of the total grant. Neither the agency nor the university should complicate the straightforward applicability of step funding by maintaining separate accounts for the individual supplements. The modified grant instrument reflects this action, specifying the addition of $90,000 in new money for the 3-year period beginning 1 March 1969. The revised expenditure schedule, combining both old and new monies, will read:

- $90,000 1 March 1969-28 February 1970
- $60,000 1 March 1970-28 February 1971
- $30,000 1 March 1971-29 February 1972

This same process may be repeated each year for as long as both the sponsor...
Fig. 3. Supplement to step funded grant and simultaneous increase in full annual level from $90,000 to $120,000. An increase in level requires funds in the amount required to extend at the original level, plus twice the amount of the increase. In this case: $90,000 + 2($30,000) = $150,000. Separation of the additional money into six parts is merely for discussion purposes (see text). The breakdown has no meaning for administrative purposes.

and the grantee agree that it is mutually advantageous. The pattern in the simple case discussed so far does not change; $90,000 is added each year and the annual level remains constant at that amount. The key to this straightforward procedure is in the rationale behind the expenditure schedules: they are intended to protect the steps from inadvertent advance use rather than being arbitrary dollar limitations. Thus, flexibility is increased and administration simplified when nominal amounts of money available but not used in a particular year may be automatically carried over for use in the next year. As a result, the investigator may actually have a slightly larger amount at his disposal than indicated by the schedule. Step funding is extremely flexible and the annual level may be changed as the progress of the research and the needs and desires of the sponsoring agency may dictate.

Changing the Level

Assume a grant has been extended once, as in Figure 2, and it is now desired to raise the full annual level of effort from the projected $90,000 to $120,000. As seen in Figure 3, the increase in level and the next yearly extension are made simultaneously on 1 March 1970. For calculation purposes only, consider that two segments of new funds are required: the $90,000 needed to extend the grant at the previous level, and $60,000 to initiate a new grant at the $30,000 annual level. Combining these segments yields the new funding pattern. The grant schedule for this supplement would be:

$120,000 1 March 1970-28 February 1971

$80,000 1 March 1971-29 February 1972

$40,000 1 March 1972-28 February 1973

The amount added to the grant is $150,000 and the period, of course, is from 1 March 1970 to 28 February 1973. Since the new annual level is now $120,000, further yearly extensions require only that amount. This two-part description of increasing the level illustrates the important point that raising the level requires a basic amount equal to the previous annual level, plus twice the amount by which the level is being raised. As seen from the above schedule, the distinction does not appear in practice; the increase is effected with a single grant supplement.

Alternatively, assume a grant has been extended once, as in Figure 2, and it is now desired to decrease the annual level of effort from $90,000 to $81,000. The decrease in level and the next yearly extension are made simultaneously on 1 March 1970 as shown in Figure 4. Note that the process of reducing the level is the exact opposite of increasing the level, in the sense that the new funds to be added will be equal to the previous annual level, less twice the amount of the reduction. Thus, in Figure 4, $72,000 has been added to reduce the level to $81,000. Now the grant schedule is:

$81,000 1 March 1970-28 February 1971

$54,000 1 March 1971-29 February 1972

$27,000 1 March 1972-28 February 1973

Subsequent extensions at this new level of $81,000 requires new funds in the amount of $81,000 each year. In keeping with the step concept note that a reduction beginning 1 March 1970 could actually range anywhere from $1,000 to $30,000, but the reduction would not result in a level less than the $60,000 guaranteed by the previous supplement (Fig. 2).

Probably the greatest source of confusion in understanding the application of step funding arises from failure to note the distinction between the actual amount of money provided by a step funded grant or a supplement in any particular year and the authorized full annual level of effort for that year. As may be seen from the preceding examples, these two figures are numerically the same only for the simple case of an established grant being extended at the annual level of the previous year. In other cases, chiefly when a step funded grant is first awarded or when the annual level is changed, the amount actually awarded and the authorized annual level can differ greatly. Further variation is found when a step funded grant departs from the classical 1:2:4:6 pattern; occasionally special arrangements of this type are required. For instance, a grant may be stepped to provide a gradually increasing level-of-effort as the work gains momentum during the first few years, or a special one-time supplement for purchase of a large equipment item may be superimposed on one of the steps. Here, special expenditure schedules must be worked out on a case by case basis in order to ensure that the step concept is maintained.

In addition to the supplementing actions described so far, step funded grants can, of course, be terminated. Thus, using Figure 4 as an example, assume that as the end of the fourth grant year, February 28, 1971, approaches, it becomes obvious that further funding is no longer warranted. The grantee would be notified of the decision prior to March 1971, so he could take appropriate plans for phasing out the work in an orderly fashion. In any event, the investigator would still have the steps of $54,000 and $27,000 to use during the 2-year period beginning 1 March 1971. The total life of the grant, therefore, would cover the 5-year period from March 1968 to March 1973.

The same considerations hold true for the grant depicted in Figure 3, except the amounts available during the two tapering off years are $80,000 and $40,000, respectively.

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Optimum returns on government sponsored research in universities are obtained from projects supported on a basis which allows continuity of effort. Step funding, as a mechanism for providing and stabilizing long-term efforts, has several advantages over other commonly used techniques for achieving longevity in research. The foremost advantage is that it guarantees the investigator time and funds to carry out plans made 3 years in advance.

The other major advantage accrues when the grant must be ended; a smooth, nontraumatic tapering off period of at least 2 years is available. From the government's standpoint, all of the advantages of 3-year funding are obtained without the disadvantage of the full cost of the grant being charged against the agency's funds for any single fiscal year.

Maximum effectiveness is obtained from the step funding technique when both university and agency personnel are fully conversant with its underlying philosophy, as well as with its detailed mode of operation. In particular, the step concept must be maintained even when reduced research budgets or the desire to accelerate efforts might create strong pressures to spend the steps in advance or otherwise foreshorten the 2-year tapering off period. It is under such circumstances that retention of the steps becomes even more important.

At present, step funding is known to be used only by the National Aeronautics and Space Administration and to a limited extent by the Department of Defense; while this discussion has been based solely on NASA's development and use of step funding, the concept and much of the detailed mechanics are broad enough to be applied by any public or private research-sponsoring organization which has the ability to fund grants for 3 years at a time.

W. A. GREENE

Editor's Note:
Mr. Greene is Chief of the Coordination Branch, Office of University Affairs, National Aeronautics and Space Administration, Washington, D.C.
Since this seminar is not designed as a procurement course no attempt is made to treat of the details of negotiation, of the standard clauses and provisions which need to be incorporated in contract or grant instruments, or the like. These will be found in NASA Procurement Regulations and, in the case of grants, also in the draft "Grant Negotiator's Guide," and the "NASA Grant Handbook."

Instead, consideration is limited to two aspects of negotiation most closely related to the seminar:

1. Role of the Technical Officer
2. Negotiations in the Context of NASA's University Policies

With respect to the role of the Technical Officer, perhaps the greatest contribution he can make to highly satisfactory negotiations is to ensure that the negotiator receives a highly satisfactory procurement package. This was discussed earlier.

Perhaps the next most important contribution the Technical Officer can make is to avoid undermining the negotiator by reaching a variety of informal "business agreements" with the Principal Investigator prior to initiation of the negotiations. This was also discussed earlier.

The third contribution which the Technical Officer can make is to be available for questions, meetings, and the like in connection with the negotiations.

Insofar as the negotiations themselves are concerned, the point of view which is expressed is that there be an exercise of judgement and an understanding of the university environment.

It is significant that in most industries of any size, negotiation teams are usually composed of high-powered key executives. Their prime motive is to obtain the best possible terms, schedules, conditions, and benefits for the company. Faced by this situation, the buyer is justified in driving as hard a bargain as possible, and in assuming the seller is well able to take care of himself.
Negotiation with a university is not quite comparable to negotiation with a business enterprise. Many universities today conduct their business management and administrative affairs in quite a sophisticated manner. But the motives and objectives of the university are quite different. In consequence, there is less reason for the buyer--NASA--to drive as hard a bargain as possible and assume that the seller--the university--will take care of himself.

In some areas, of course, there is little room for flexibility. The law says there must be compliance with Civil Rights regulations and that grants can't be given to universities which bar military recruiters from the campus. No amount of negotiation will change these.

Again, some items, such as automobiles, are not normally bought with grant funds, and no amount of philosophy will change this.

On the other hand, there are some areas where the exercise of judgment seems reasonable.

If a negotiator were involved in commercial negotiations involving a cost reimbursement type contract he would have every right to do whatever he could to bring costs down and keep them down. On the other hand, in negotiations with universities the audited indirect cost rate is usually accepted without endeavors to reduce it.

Cost sharing is another area of interest. Bureau of the Budget regulations require that the sharing be more than "token." Section 408 of the 1970 NASA Appropriation legislation suggests that the extent of cost sharing by the recipient of research support "reflect the mutuality of interest of the grantee or contractor and the Government in the research." A relevant Committee print suggests that "Cost sharing should generally be related to the amount of faculty salaries associated with the research project." The point to be made is that the environment for such negotiations is different from commercial negotiations and that the negotiator isn't quite faced with the same type of pressure to bring costs down.

One additional point which is relevant.
DISTRIBUTION OF INDIRECT COST RATES

<table>
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<tr>
<th>Negotiated Indirect Cost Rate Ranges Based On Salaries and Wages</th>
<th>Number of Institutions</th>
<th>Percentage of Institutions</th>
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<tr>
<td>Cost Sharing Percentage Ranges of Total Costs</td>
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<td>Approximate Percentage of Grants</td>
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<td>30 and above</td>
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Total: 426 grants, 100.0%
Since the research grant came into general use as a fairly simple document, it has been steadily accumulating special provisions and administrative requirements. Most of these are not statutory requirements, but reflect different agency policies, differing attitudes of individuals in various agencies who are in positions to establish or modify grant provisions; in some cases they are ad hoc reactions to isolated misunderstandings. Among the so-called mission-oriented agencies, the desire of individual monitors for close control of the research has also been a significant factor. The result has been an overall decrease in the simplicity and flexibility of research grants, and a substantial increase in the variety of rigidities and complications to be found among grants issued by different agencies, or in some cases, continued use of contracts for grant-type research.

NASA has managed to avoid most of these restraints on flexibility. But we must always remember that the very substantial amount of Federal funds flowing to universities is giving rise to serious fears that the Government will gain undue control over the whole system of higher education, and eventually subvert and manipulate it for partisan governmental purposes. Such a loss of independence of the universities would be a national catastrophe, and therefore all agencies carefully avoid any attempts at overt control. However, the composite of innumerable individual controls over apparently minor aspects of University operation does add up to a substantial and pervasive Federal influence on the independence, the objectivity, and the very nature of the university system.

***

Two points may be made in summary:

1. This again is a step in the life cycle of a research project in which the Technical Officer has a major role. The completeness of the procurement package he has prepared and the absence of prenegotiation "business agreements" will help the negotiations get off on the right track. The availability of the Technical Officer during the negotiations will help to keep them on the right track.

2. It is highly desirable that the negotiator remember that negotiations with universities should be carried on
in the light of NASA's policies of strengthening universities wherever possible and not in the light of a competitive business environment.
This seminar unit is not designed to consider technical administration in the sense of technical details but rather in connection with the overall philosophy of NASA's relationship with universities.

The first point to be stressed is that all program- or project-oriented research at universities must be premised on the benefits of the research to NASA's assigned missions and responsibilities. This point emerges quite clearly in NPD 8320.1, NASA's basic policy statement with regard to university relationships:

"Universities are considered as partners with government and industry in the nation's aerospace program. NASA's objective is to have them bring their scientific, engineering, and social research competence to bear on aerospace problems and on the broader social, economic, and international implications of NASA's technical and scientific programs. All of NASA's affairs with universities should be conducted in a way that strengthens the universities' educational capabilities and assures maximum benefit to NASA and the universities."

With recognition of this fact there must also be recognition of the continuing responsibility on the part of NASA to assure itself as to the benefits of the ongoing research.

Illustratively, the Administrator testified as follows before Congress in 1969:

"NASA encourages unsolicited proposals from universities so that we have the opportunity to select those ideas with the greatest promise for advancing the national aerospace effort. These proposals are evaluated by scientific and technical experts in NASA to ensure that we recognize and select for support those of the highest merit, that the investigator is particularly qualified, that the research will contribute to or have potential for contributing to NASA program objectives, and that the efforts are commensurate with the cost.

"A NASA technical officer is assigned to each project to ensure that the study is carried out along the lines set
forth in the accepted proposals, that high quality effort is maintained, that the results are made available to NASA in a timely fashion for further application to the solution of our problems, that expenditures are reasonable and, perhaps most importantly, that the university investigator has a point of contact within NASA for obtaining current information on NASA's evolving research needs as they affect his own research. Through these management techniques of initial careful selection and subsequent continuous technical monitoring, NASA ensures that the grants and contracts it supports with universities make the maximum contribution to the national aerospace effort."

The last paragraph summarizes five purposes of technical monitoring, which can clearly be stipulated as among responsibilities of the Technical Officer.

However, the degree of supervision which the Technical Officer proposes to exert to assure that he achieves these objectives is a separable matter.

Five levels of possible interaction between the Technical Officer and the Principal Investigator can be projected:

1. The investigator is allowed to conduct the research generally as proposed with minimal contact from the sponsoring group within NASA.

2. NASA-investigator contacts are frequent for the purposes of information transfer, and perhaps minor guidance from NASA.

3. The NASA technical officer works closely with the investigator, requiring frequent briefings on new developments as they occur.

4. The project has such a direct relationship to immediate needs that NASA must participate extensively in the progress and direction of the research ("exercise control") and to a large extent set the scheduling of the work.

5. Direction, control and content of the work is with NASA, either as the result of
funding a project for services supplied on demand, or of funding a proposal for one thing and then making the investigator do something else.

The first two would probably reflect a grant situation and the last three a contract. Level 5, although conceivable, would be diametrically opposed to NASA's philosophy for dealing with universities.

In essence, technical administration has at least five objectives and can be carried out at various levels of interaction, generally dependent on whether immediate responsibility for the work has been retained by NASA (contract) or shifted to the university (grant).

A variety of problems have arisen from time to time in the technical administration of contracts. Two may be mentioned here; others will be discussed in subsequent seminar units.

One obvious problem has arisen in situations in which the Technical Officer and the Principal Investigator have tended to switch their intended roles. The Technical Officer has failed to exercise the expected leadership in a contract situation or the Principal Investigator in a grant situation. As a result a reversal of roles has occurred by default. Illustratively, the draft "Grant Negotiator's Guide" outlines one facet of the problem as follows:

"NASA assumes that the grantee institution and the Principal Investigator operating within the policies of the grantee institution are in the best position to determine the means by which the research may be conducted most effectively. Accordingly, the primary responsibility for the administration of any grant is borne by the grantee institution. NASA does not desire to take any action which will in any way diminish the responsibility of the grantee institution and its investigators for making sound scientific and administrative judgments. Grantees are encouraged to seek the advice of NASA on problems that may arise. Such advice does not in any way imply that the responsibility for final decision has shifted to NASA."

A somewhat analogous situation may arise when the Technical Officer finds himself pressed for results and a short-term payoff. Ideally, the Technical Officer should
serve as a transmitter of information both to and from the principal investigator. He helps to guide (but not direct) the investigation in most meaningful and useful directions by explaining the problem to whose solution the study may contribute; he serves as a sounding board against which the investigator may try out the potential value of concepts or techniques. However, in a mission-oriented agency the responsibilities of the various technical officers are relatively narrow. Most of them are either current or recent researchers in their own right, and the temptation to sacrifice altruistic philosophy on the altar of immediate results is often overwhelming. As a result the Technical Officer may attempt to take over the project and act as its principal investigator himself, and effectively reduce the academic scientist to the role of laboratory assistant; or, he may attempt to institute short term changes in the direction or points of emphasis in the project without any recognition of the inertias inherent in the academic year and of graduate students using sub-elements of the project for their thesis research. Such a lack of understanding obviously can have a very strong implication in the relationship between the sponsoring agency and universities.

Again, each research contract or grant carries with it certain stipulated reporting requirements. Hopefully, these are not so onerous as to divert to report writing effort which could better be devoted to research. Nevertheless, once accepted by both parties, they do become an obligation. Obviously it will be difficult to apply the results of the work to the timely solution of NASA's problems if reports are missing or inadequate.

NASA SP-7034—"Guidance for Technical Monitors of Research and Development Contracts"—treats of this matter in some detail. Revision is under way to include reference to other types of research agreements, such as grants.

* * *

In summary, it has been pointed out that Technical Administration is another step in the life cycle of a sponsored research project in which the Technical Officer must play a major role.

As a minimum, regardless of the type of research instrument, he is responsible for assuring that each study:
1. Is carried out along the lines set forth in the initial proposal;

2. That high quality effort is maintained;

3. That the results are made available to NASA in timely fashion for solution of its problems;

4. That expenditures are reasonable; and

5. That the university investigator has a point of contact within NASA for obtaining current information on NASA's evolving research needs as they affect his own research.

The degree of interaction required to achieve these and other objectives—such as responsive reports—will vary from situation to situation. Nevertheless all are responsibilities incumbent upon the Technical Officer and which he cannot abdicate. Needless to say, all are also expected to be carried out within the context of NASA's policies relative to university relationships.
As with negotiation, business administration is a subject for which the Contracting Officer has major responsibility but regarding which he must place substantial reliance on the Technical Officer. Relevant questions may be directed initially to either the Technical Officer or the Contracting Officer, and the best judgement of both will at times be required to provide a satisfactory answer.

Slide 127 is an illustration prepared some time ago by a university administrator to depict interactions as he saw them. The solid arrows represent strong interactions that at least in principle are well defined. Formal documents follow these channels. The dashed arrows represent weaker but often crucial interactions that are set up with varying degrees of formality in order to sustain the formal channels.

Here is what he had to say about the chart:

"Like any other faculty member, I was aware of some of the problems within the university concerning the incomplete understanding between the administration and the faculty on research matters; I suspected that analogous problems might exist within the government agency. But what I did not realize was that each of these two sets of internal problems generates far more grief than do the interface contacts. In fact, whenever an interaction problem arises, it usually reflects unresolved conflicts within the university, within NASA, or within both. It is natural of course that as the roles of the universities and of the agencies evolve, strains occur as both groups seek to develop mechanisms for coping with their new responsibilities and their new interactions. What is seldom realized is how much of the strain builds up because of inflexibility or unimaginativeness within each organization, and how little is to be attributed to the relations between the organizations."

This unit is not directed to the details of business administration. Rather, it is designed to cover some of the problems that have arisen in the past and to illustrate how a cooperative relationship between the Technical Officer and the Contracting Officer can serve to ameliorate these. This with appreciation that grants for research with univers-
DESCRIPTION, ANALYSIS, AND EVALUATION OF NASA-UNIVERSITY INTERACTION

**University**
- Business Functions (Business Manager, Director of Research Development)
  - Technical Function (Principal Investigator)

**NASA**
- Business Functions (Negotiator, Procurement Officer, Auditor)
  - Technical Function (Evaluator, Technical Monitor)
ieties cannot be administered mechanically; the procurement regulations, management manual issuances, and various guidelines provide a basic administrative framework, but in the final analysis the NASA representatives must have a clear view of the broader implications of university support, and a willingness to exercise judgment and flexibility in applying the regulations.

Administration may be conveniently divided into three main areas: Approvals which must be handled in an enlightened manner within the flexibility of the grant, such as to enhance the research effort while simultaneously protecting the government's interests; departures from the usual grant terms or normal practices to accommodate special research-related circumstances; and clear and concise communications with grantees which promote smooth working relationships through the development of mutual understandings of how NASA does business with universities.

Approvals. Two items might be mentioned with respect to approvals: payments and equipment.

Payments on contracts are made after the submission of vouchers at stipulated intervals; payments on grants are made quarterly, in advance, on the basis of grantee estimates of needs, after the first payment which is made in accordance with agreements during negotiation. Technical Officers on occasion have concurred in contract payments without having a full understanding of progress, performance, etc. The Technical Officer cannot escape his obligation to ensure that "expenditures are reasonable." Certainly this means keeping broadly abreast of the continuing relationship between performance and payments.

On the matter of equipment, PR's and grant boilerplate contain adequate detail on the ground rules; however, they provide little insight as to the underlying philosophy involved. The policy is straight-forward: Equipment is provided under grants for two purposes: To give the investigator the tools to do the job and to assist the university in building its capabilities to perform future research and to train students. Therefore, it follows that NASA should be liberal in allowing purchase of equipment actually needed by the investigator.

In view of NASA's desire to build institutional competence, the normal tendency upon grant termination should be to leave the equipment with the university. Plans to with-
draw equipment need to be thoroughly investigated to determine if the university can productively use the items and if the withdrawn equipment will really be put to a useful purpose elsewhere. Thus, recapture of title to general purpose items, viz., oscilloscopes, test equipment, etc., should be rare. See PRD 69-13, included in Unit 20.

It should also be recognized that prompt action on equipment requests is in order; delays in purchase approval for key items will often set back a project as much as the extended absence of the principal investigator. This is particularly true of items not listed in the original budget; these are often the ones needed as the result of an unpredictable emergency, or an unforeseeable turn in the progress of the work. Research is that way; the administrator must recognize it and act accordingly.

Deviations. A second major area of administration concerns deviations from terms, procedures or normal practices. It is important in such cases that the facts be considered in light of both the usual requirements and the flexibility NASA desires the university investigators to have. The guiding principle, as with approvals, is to seek the approach which will benefit the research most--or put it another way, disrupt the research the least, while at the same time doing what must be done in a sound, business-like fashion.

Communication. The third prime area of grant administration is communication, lack of which has from time to time created some difficult problems.

Proposal budgets are expected to include and separately identify the cost of all necessary travel, domestic and foreign. After award of a grant or contract, authorization for specific domestic travel is not required; however, any foreign travel, even though essential to the research effort, and described in the original proposal, must be approved on an individual trip basis, by the NASA Contracting or Grants Officer before the trip is made. Too often this fact does not seem to be communicated adequately.

Another area which appears to suffer from lack of adequate communication is the matter of the departure of a Principal Investigator from the grantee institution. This occurs frequently and is a particularly sensitive matter. It is fraught with possibilities of misunderstandings and
strained relationships among all parties concerned. Delicate and perceptive handling is required.

Certain popular misconceptions inevitably arise in cases of this nature:

1. The university may not realize it must suggest a new Principal Investigator for NASA approval, and, if approval is not given, grounds exist for revocation of the grant.

2. The university, the investigator and the NASA Technical Officer may not realize that a grant cannot be transferred from one institution to another. That is, the investigator must submit a new proposal from his new institution; it is subject to all of the review procedures as is any proposal. The lead times in receiving new funding may be underestimated.

3. The investigator and his institution may not realize their responsibilities for complying with the final technical reporting requirements on the old grant.

4. The investigator may be under the mistaken impression that since he had a grant at university A it is inevitable--indeed his right--that he be given a new grant at university B.

5. The Technical Officer often incorrectly assumes an old grant can be de-obligated and the funds re-obligated to a new institution with little trouble and on a short time scale.

6. Where equipment is involved, the investigator may think it is his property and can be just taken along in his baggage, the university may not realize that as the grantee it has a significant voice in the release of the equipment, and the NASA Technical Officer may not be aware of agency policies regarding recapture of title.
In essence, cases involving the departure of an investigator require a great deal of attention and understanding, particularly if a smooth interface is to be obtained where NASA desires to continue the research at the new institution. Early communication of the ground rules is imperative.

* * *

The objective of this seminar unit has been twofold:

1. To demonstrate that business administration of a university research project is a matter of team play, i.e., that both the Technical Officer and the Contracting Officer do have roles to play; and

2. That these roles should be played in full recognition of all elements of NASA's university policies.

The enunciation of broad policies is necessary, but in last analysis it is the totality of the daily administrative actions and decisions of literally hundreds of individuals within NASA which has a profound effect on--and even defines to the world--that nebulous quality known as the NASA-university relationship.
In large measure the question of continuation is primarily related to grants. There will undoubtedly be situations in which NASA will want to consider extending a contract but the problem is forced on it with respect to grants because of the nature of funding procedures. Even if step funding is being used there will still be an annual decision to make, i.e., whether to replenish the funds each year or to let the grant taper off over the next two years.

There is perhaps no area in NASA-University relationships with as great a potential for mischief as this one, largely because a delay in formalizing the decision to continue can force a university either to take steps to dismantle a project or to obligate some of its own funds as a stop-gap measure in the hope that NASA will eventually approve continuation. When one considers that consideration must be given annually to whether or not to renew some 700-800 grants, it is not difficult to see what consternation can arise in the university community if decisions are delayed in only ten percent of the cases.

The ground rules for requesting continuation of a project are clear enough and are stated as follows in the draft "Guide to Policies and Procedures for Sponsored Research."

"NASA considers requests for continuation of grants or contracts in much the same manner as proposals for new endeavors. Accordingly, such requests should contain similar technical and budgetary information as an original proposal. They should also include a summary of work accomplished to date and the costs incurred. These requirements are often satisfied by including recent status and updated technical and financial reports.

"They should be submitted at least four months before the termination date of the existing agreement if uninterrupted support is desired. It is important that a renewal proposal and its transmittal letter clearly show that they concern extension of an existing grant or contract and identify it by its NASA number."

Once in the system, the requests are handled in the manner described in Unit 10, except that normally the re-
quest would go only to the program office or installation currently sponsoring the research, rather than to all elements in NASA which might otherwise be interested.

The seminar is not designed to treat of the elements which enter into the technical decision as to whether to continue the grant or contract, other than to emphasize that the decision should be made against the background of policy stated in NPD 8320.1:

"University research activities of a continuing nature shall be supported by suitable long-term funding arrangements (e.g. step funding) whenever funds and circumstances permit."

A very basic problem, however, is the management problem of how to get a timely enough decision on continuation of a project to assure funding before the anniversary date on which the project either expires or step funding drops to a 2/3rds level. Four points might be made:

1. The Principal Investigator is responsible for initiating the continuation proposal and for initiating it on time.

2. It would be helpful if the Technical Officer would take it on himself to remind the Principal Investigator that a continuation proposal is due. This is certainly not an obligation on the Technical Officer's part, but rather one of the steps any prudent man would take to assure that research under his sponsorship was being properly handled.

3. Once the continuation request has been received by the Technical Officer, he has a responsibility to develop his recommendations as promptly as possible; and

4. If NASA continues to have situations in which universities are forced into corners in which they must either reduce work or carry it with their own funds, NASA is eroding the foundations of the very relationships which it is trying to strengthen.

One other point deserving mention is "no cost extension." Since research is notoriously hard to cost, there will occasionally be situations which are the obverse of the above, i.e. the project has come down to its anniver-
sary date but there are still some unused funds—which the Principal Investigator believes could be usefully applied. This fits into one of the administrative categories mentioned in the last unit—accommodation to special research related circumstances—and is normally approved when justified.

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In summary—as in the instance of initial evaluation—the decision to continue a grant or contract is one heavily dependent on the recommendation of the Technical Officer. Furthermore, he has a formal responsibility to make this decision as promptly as possible once a request is before him, and an informal responsibility to see that the request arrives before him with adequate lead time.
Closing a project could occur in any of three ways:

1. Completion of all research
2. Expenditure of all funds and election by NASA not to continue research
3. Termination for default or for convenience of the Government

This unit is not intended to treat of the technical factors which might lead a Technical Officer to recommend either of the latter two actions. Nor is it intended to deal with the documentation which is the responsibility of the Contracting Officer for closing the books on a research contract or grant.

Instead, it is directed to a few administrative points regarding which the role of the Technical Officer is a decisive one:

First is the matter of timing, particularly in regard to point 2. Unit 19 emphasized the importance of a decision to continue by the anniversary date of a grant, so the university would not have to obligate its own money to keep a project going while awaiting a reply to the proposal. This is doubly important if there is a chance the work will not be continued since then the university will risk losing its money by keeping the project going while awaiting a decision.

A second point, which is relevant to any of the three actions, relates to reports. All research contracts and grants carry requirements for status and technical reports. Even where research has been negative, reports are important since both within NASA and in the broader realm of government and academic research other men may be working on allied problems and useless duplication of effort may sometimes be avoided. Assuring that adequate reports are provided—whatever the reason for closing the research—would seem a basic responsibility of the Technical Officer.

The recommendation to close out a research grant or contract could come either from NASA or from the University itself. The Technical Officer may simply be unable to find money to continue the research, he may have concluded that
the recipient university was unable to carry out the projected work, or a breakthrough somewhere else may have actually negated the need for the research.

On the other hand the university itself is expected to communicate with NASA whenever it has reason to believe that circumstances may necessitate revocation. It is expected that the most common cause would be inability to carry out the research for which the award was made or to adhere to the other conditions set forth in the research instrument. As a general rule, the availability of the services of the Principal Investigator named in the instrument is a decisive factor in NASA's decision to make an award. Consequently, NASA should be informed immediately whenever it appears that the Principal Investigator will find it impossible to continue to direct the research. The Technical Officer would then be faced with the need for a recommendation as to a proper course of action.

Under any of the three situations described above a question is bound to arise as to the disposition of equipment purchased in order to carry out the research, particularly if revocation is necessitated by departure of the Principal Investigator.

PRD 69-13, included in your text, and Sections 408 and 506 of the NASA Grant Handbook contain detailed information covering policies and procedures related to equipment. Additional policy has been laid down in a letter from the Assistant Administrator for University Affairs, dated April 8, 1969, of which a copy has been included in your text. The letter reads in part:

"The cost of equipment that NASA grantee institutions must purchase in order to conduct research under a NASA grant may be paid out of grant funds. Title to the equipment vests in the grantee institution, but NASA has the option of recovering title to items costing individually more than $1000.

"A primary factor in the decision is the grantee institution's desire to retain the equipment, and the use that the institution will make of it. If the grantee indicates that he cannot use the equipment effectively and has no desire to retain it, and the genuine need for the equipment exists on another NASA project, recovery of title by NASA is indicated. However, if the grantee institution desires to retain the equipment for either self-supported or sponsored research, the burden of proof that recovery is warranted rests on those who wish to transfer the equip-
ment. Factors that should be considered include, but are not necessarily limited to, the following:

"Does the present grantee have and expect to maintain a capacity for relevant research or education that would benefit from use of the equipment? Would this capacity be compromised by loss of the equipment?

"Are students using the equipment for research to meet degree requirements?

"Would the lack of confidence implied by NASA withdrawal of the equipment compromise the grantee's ability to obtain other research support?

"Is either the grantee or the proposed recipient an emerging institution or a strong, well-equipped institution? What is the relative institutional impact?

"How would NASA's relations with various external communities be affected by withdrawal of the equipment over the grantee's objection?

"In evaluating the costs and the benefits of equipment recovery and transfer, it is essential that all costs and benefits--for NASA, the general public, and both of the institutions; short and long-range; tangible and intangible--be fully and objectively considered. Given such consideration, the recovery of title to equipment needed by a grantee will indeed be unusual."

Three additional points should be made:

Although step funding a grant shows clearly that continued support is anticipated, continuation is not mandatory; i.e., it is not required that a renewal proposal be accepted. However, in order to phase out a step-funded grant with less than five years of support (including the final two years of reduced support by step funds) it must be shown that the particular support termination is in the best interest of the Government, and the action must be reviewed by the Assistant Administrator for University
Affairs. A decision to cease support of a step-funded grant does not affect the obligations made previously, and ordinarily the grant will receive two years of reduced support following rejection of a renewal proposal. Step-funded grants may, of course, be terminated at any time for cause or by mutual consent, and the obligations rescinded in accord with the terms of the grant instrument.

Secondly, if the grant or contract is to be terminated by rescinding it prior to completion of the work, the Technical Officer should participate actively in negotiating the termination conditions. If the project is to be terminated by non-renewal at the conclusion of current funding, the Technical Officer should so inform both the Principal Investigator and the NASA contracting officer as far as possible in advance of conclusion.

Again, and this would be at a later point in time, the Technical Officer should notify the Grant or Contracting Officer and Oua when the project is actually finished, i.e. when the technical work is completed, and final official close-out procedures should start. This notification is important for overall agency management information.

The final step in the life cycle of a research project should be the dedication of some time to project evaluation. From NASA's mission-oriented point of view, how successful was the work? Did it achieve the objectives of the original proposal? What contribution did it make to ongoing programs? What foundation did it lay for future programs? From the University's point of view, how useful was the work? Did it strengthen teaching capabilities? How many theses, dissertations, reports, publications, etc. did it encourage? What has the nation gained from the work?

There is presently no standard NASA form for such evaluation although Program Offices or Field Centers may have developed their own. But as a minimum, where thousands of dollars and hundreds of man hours have been expended on a project it does seem deserving of at least a Memorandum for the Record, evaluating results.

In closing the project, as he did in recommending its initiation, the Technical Officer has a major role to play, including recommending termination before the work is completed.

Among his responsibilities are:
1. A prompt decision, when called for, as to whether to close the project

2. Development of termination conditions

3. Notification of final completion of work

4. Assurance of excellence of reports

5. Recommendation on disposition of equipment

6. Evaluation of final results

In carrying out these responsibilities the expectation is that the special nature of the University will be recognized.
TO: Distribution
FROM: Y/Assistant Administrator for University Affairs

SUBJECT: Title to Grantee Equipment

Problems have arisen out of several recent NASA actions to recover title to grantees' equipment, that indicate a common misconception of the circumstances justifying title recovery.

The cost of equipment that NASA grantee institutions must purchase in order to conduct research under a NASA grant may be paid out of grant funds. Title to the equipment vests in the grantee institution, but NASA has the option of recovering title to items costing individually more than $1000. (A regulation is being prepared for issuance by the Headquarters Procurement Office, covering vesting of title and title acquisition by NASA in more detail.) The fact that title automatically vests in the grantee is a clear indication from NASA that title normally is intended to remain with the grantee. The recovery option retained by NASA provides a mechanism for handling those unusual cases in which the public interest will best be served by moving the equipment to a different location.

The problems that have arisen apparently were aggravated by the mistaken impression on the part of the Principal Investigator or of NASA personnel, that the Principal Investigator has some kind of overriding claim on the equipment, and can take it with him automatically when he transfers to another institution. This simply is not true. Grants are made to institutions, not individuals. If the Principal Investigator leaves, the institution may propose a new Investigator to continue the project. NASA may, but is not obligated to, extend further support in this situation, but it will not reclaim any of the research equipment for transfer to the new institution's new Investigator or elsewhere unless it can be shown clearly that maximum overall benefit would result from such a transfer.

A primary factor in the decision is the grantee institution's desire to retain the equipment, and the use that the institution will make of it. If the grantee indicates that he cannot use the equipment effectively and has no desire to retain it, and a genuine need for the equipment exists on another NASA project, recovery of title by NASA is indicated. However, if the grantee institution desires to retain the equipment for either self-supported or sponsored research, the burden of proof that recovery is warranted rests on those who wish to transfer the equipment. Factors that should be considered include, but are not necessarily limited to, the following:

1) Does the present grantee have and expect to maintain a capacity for relevant research or education that would benefit from use of the equipment? Would this capacity be compromised by loss of the equipment?
2) Are students using the equipment for research to meet degree require-
ments?

3) Would the lack of confidence implied by NASA withdrawal of the equip-
ment compromise the grantee's ability to obtain other research support?

4) What is the actual value of the used equipment? Is its age or condition
such that it would not be trusted by a new group? Is it so specialized,
by modification or otherwise, that effective utilization requires a staff
already familiar with its operation?

5) Will it be completely utilized at the new location, or will it be can-
nibalized of essential components?

6) How does its usefulness at the new location compare with the usefulness
of new equipment? Would new equipment, either more or less elaborate,
provide a better fit with the requirement at the new location?

7) What is the total cost of transfer, including not only removal, trans-
portation and rehabilitation of premises, but also disruption of opera-
tion, possible equipment damage, and administrative costs? What re-
mainable ancillary or supportive equipment would be rendered useless?

8) Is either the grantee or the proposed recipient an emerging institution
or a strong, well-equipped institution? What is the relative institutional
impact?

9) How would NASA's relations with various external communities be affected
by withdrawal of the equipment over the grantee's objection?

In evaluating the costs and the benefits of equipment recovery and transfer,
it is essential that all costs and benefits -- for NASA, the general public,
and both of the institutions; short- and long-range; tangible and intan-
gible -- be fully and objectively considered. Given such consideration, the
recovery of title to equipment needed by a grantee will indeed be unusual.

Whenever a NASA Technical Officer learns that a Principal Investigator on
one of his projects is contemplating relocation, he should promptly inform
the Investigator that neither the grant nor the equipment will follow him
automatically: the nature and amount of support that may be provided at
the new location will be evaluated as a new start on the basis of a proposal
from the new institution, and requests for equipment transfer will be examined
especially closely.

Francis B. Smith
ITEM I--TITLE TO GRANTEE EQUIPMENT

1. Scope. This Item I sets forth NASA policies governing title to equipment acquired by grantees with research grant funds, and procedures for transfer of title to such equipment to NASA.

2. Authority. Pursuant to 42 U.S.C. 1892, the authority to make grants or contracts for scientific research at nonprofit educational and scientific institutions or organizations includes discretionary authority: "to vest in such institutions or organizations, without further obligation to the Government, or on such other terms and conditions as the agency deems appropriate, title to equipment purchased with such grant or contract funds."

3. Background. Support of research in educational institutions provides substantial long-term and indirect benefits as well as the immediate research results. In addition to the obvious academic advantages of such support, individual and institutional capabilities to perform relevant research are enhanced, and the number of scientists and graduates with research interests in areas of concern to the nation generally, and to NASA in particular, is increased. Adequate modern research equipment in universities serves to maximize these direct and supplemental benefits.

Every NASA-funded university research project represents an area of mutual interest in which the university has, and expects to maintain, a capacity for research and education. The research equipment that it acquires has, therefore, an especially high potential for continuing effective use at the acquiring institution. The legitimate interests of both NASA and the university, as well as the long-term national interest, require that any decision by the agency to take title for the purpose of transferring grantee equipment to another location reflect careful consideration of all relevant factors. This should include comparison of
the expected beneficial use at the present location with that expected at the new location, possible deleterious effects of removal, and the administrative and relocation costs involved.

4. Policy. The following policies will be reflected, as appropriate, in the negotiation and the documentation of NASA research grants and grant supplements issued subsequent to this directive and in related correspondence:

a. Title to equipment purchased with grant funds vests in the grantee institution, and the equipment does not automatically follow the Principal Investigator when he leaves the institution. Title to Government-furnished equipment remains with the Government.

b. NASA may require transfer to the Government of title to individual items of equipment or coherent systems (subparagraph h) of major equipment (purchased at a cost of more than $1,000) at any time, but no later than 180 days after receipt by NASA of the final equipment inventory report for the grant.

c. Title to minor equipment items (costing individually $1,000 or less) is not subject to transfer to the agency, except under the conditions of subparagraph h, below.

d. NASA procedure does not require a grantee to transfer title to grant-acquired equipment directly to another actual or potential grantee or contractor. Such transfers ordinarily are accomplished by the Government taking title and issuing the equipment to the second institution as Government-furnished equipment.

e. NASA normally will not recover equipment that a grantee desires to retain, for reissuance to another institution or to a NASA installation, unless it is specifically required for NASA work at the new location. Exceptions will be made only in highly unusual situations where title transfer is clearly in the best interests of the Government.

f. Cost sharing by NASA and a grantee in the acquisition of individual items or coherent systems (subparagraph h) of equipment, in response to a statutory requirement for cost sharing or in any way that could result in joint ownership, shall normally be avoided.

g. When cost sharing by NASA and a grantee in the acquisition of a major equipment item or coherent system cannot be avoided, and the NASA contribution will exceed $1,000, agreement regarding NASA retention of its option to take title and the conditions under which the option (if retained) will be exercised shall be reached and documented prior to purchase. NASA shall have no option to take title if its contribution is $1,000 or less.

h. When two or more components are fabricated into a single coherent system, in such a way that the components lose their separate identities and their separation would render the system useless for its original purpose, the components will be considered as integral parts of a single system. If such a system includes grantee-owned components (for cost sharing or other purposes), paragraph g, above, applies. The requirement that NASA seek agreement to retain its option to take title shall further apply where it is expected that one or more grant-acquired components costing $1,000 or less will be fabricated into a single coherent system costing in excess of $1,000. However, an item that is
used ancillary to a system, without loss of its separate identity and usefulness, will be considered as a separate item and not as an integral component of the system.

5. Procedures.

a. When a decision is made to revoke or discontinue support of a grant, the Grants Officer shall notify the grantee in writing of the requirement under the grant for submission of a final inventory report of major purchased equipment (individual items or coherent systems costing more than $1,000) and Government furnished equipment.

b. When the cognizant NASA Technical Officer or Program Manager desires that NASA take title to a major item of grantee purchased equipment, he shall request the Grants Officer to obtain information regarding the grantee's desire to retain the equipment, the use to which it would be put in the absence of further NASA support of the grant, and any substantial deleterious effects of removal of the equipment.

c. The Grants Officer shall obtain the information, and provide copies to the Technical Officer and the Office of University Affairs for their coordinated review and recommendation regarding acquisition of title. The Technical Officer shall inform the Grants Officer of his recommendation by means of a memorandum concurred in by the Office of University Affairs.

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ALTERNATE SOURCES PROCUREMENT
The Government does not commit itself to procure any supply or service from any particular offeror by the issuance of this solicitation. The Government reserves the right to reject any and all offers received, or any part or parts thereof and to satisfy its total requirements, or any part thereof, from other sources. Such alternate sources include, but are not limited to:

(a) Equipment becoming excess to the Government's needs which is owned by the Government, or in which the Government has accrued equity due to past rentals paid.

(b) Equipment obtained by lease or purchase from sources other than the manufacturer thereof.
(a) Equipment, which, because there is a substantial number of like individual components, lends itself to separate procurement (e.g. tape drives, disc drives, disc packs, etc.).

Offerors are requested to state in their proposals the extent to which such courses of action would affect any commitment made by the offeror as to performance of the proposed system, or as to any aspect of pricing.

While the foregoing will be appropriate and sufficient for a majority of ADPE procurement actions, it is possible that some modification may be desired or required to meet the particular need of a specific procurement.

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<thead>
<tr>
<th>Change</th>
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George J. Vecchietti  
Director of Procurement

NAS-NQ
ITEM I--TITLE TO GRANTEE EQUIPMENT

1. Scope. This Item I sets forth NASA policies governing title to equipment acquired by grantees with research grant funds, and procedures for transfer of title to such equipment to NASA.

2. Authority. Pursuant to 42 U.S.C. 1892, the authority to make grants or contracts for scientific research at nonprofit educational and scientific institutions or organizations includes discretionary authority:

   "to vest in such institutions or organizations, without further obligation to the Government, or on such other terms and conditions as the agency deems appropriate, title to equipment purchased with such grant or contract funds."

3. Background. Support of research in educational institutions provides substantial long-term and indirect benefits as well as the immediate research results. In addition to the obvious academic advantages of such support, individual and institutional capabilities to perform relevant research are enhanced, and the number of scientists and graduates with research interests in areas of concern to the nation generally, and to NASA in particular, is increased. Adequate modern research equipment in universities serves to maximize these direct and supplemental benefits.

   Every NASA-funded university research project represents an area of mutual interest in which the university has, and expects to maintain, a capacity for research and education. The research equipment that it acquires has, therefore, an especially high potential for continuing effective use at the acquiring institution. The legitimate interests of both NASA and the university, as well as the long-term national interest, require that any decision by the agency to take title for the purpose of transferring grantee equipment to another location reflect careful consideration of all relevant factors. This should include comparison of
the expected beneficial use at the present location with that expected at the new location, possible deleterious effects of removal, and the administrative and relocation costs involved.

4. Policy. The following policies will be reflected, as appropriate, in the negotiation and the documentation of NASA research grants and grant supplements issued subsequent to this directive and in related correspondence:

a. Title to equipment purchased with grant funds vests in the grantee institution, and the equipment does not automatically follow the Principal Investigator when he leaves the institution. Title to Government-furnished equipment remains with the Government.

b. NASA may require transfer to the Government of title to individual items of equipment or coherent systems (subparagraph h) of major equipment (purchased at a cost of more than $1,000) at any time, but no later than 180 days after receipt by NASA of the final equipment inventory report for the grant.

c. Title to minor equipment items (costing individually $1,000 or less) is not subject to transfer to the agency, except under the conditions of subparagraph h, below.

d. NASA procedure does not require a grantee to transfer title to grant-acquired equipment directly to another actual or potential grantee or contractor. Such transfers ordinarily are accomplished by the Government taking title and issuing the equipment to the second institution as Government-furnished equipment.

e. NASA normally will not recover equipment that a grantee desires to retain, for reissuance to another institution or to a NASA installation, unless it is specifically required for NASA work at the new location. Exceptions will be made only in highly unusual situations where title transfer is clearly in the best interests of the Government.

f. Cost sharing by NASA and a grantee in the acquisition of individual items or coherent systems (subparagraph h) of equipment, in response to a statutory requirement for cost sharing or in any way that could result in joint ownership, shall normally be avoided.

g. When cost sharing by NASA and a grantee in the acquisition of a major equipment item or coherent system cannot be avoided, and the NASA contribution will exceed $1,000, agreement regarding NASA retention of its option to take title and the conditions under which the option (if retained) will be exercised shall be reached and documented prior to purchase. NASA shall have no option to take title if its contribution is $1,000 or less.

h. When two or more components are fabricated into a single coherent system, in such a way that the components lose their separate identities and their separation would render the system useless for its original purpose, the components will be considered as integral parts of a single system. If such a system includes grantee-owned components (for cost sharing or other purposes), paragraph g, above, applies. The requirement that NASA seek agreement to retain its option to take title shall further apply where it is expected that one or more grant-acquired components costing $1,000 or less will be fabricated into a single coherent system costing in excess of $1,000. However, an item that is
used ancillary to a system, without loss of its separate identity and usefulness, will be considered as a separate item and not as an integral component of the system.

5. Procedures.

a. When a decision is made to revoke or discontinue support of a grant, the Grants Officer shall notify the grantee in writing of the requirement under the grant for submission of a final inventory report of major purchased equipment (individual items or coherent systems costing more than $1,000) and Government furnished equipment.

b. When the cognizant NASA Technical Officer or Program Manager desires that NASA take title to a major item of grantee purchased equipment, he shall request the Grants Officer to obtain information regarding the grantee's desire to retain the equipment, the use to which it would be put in the absence of further NASA support of the grant, and any substantial deleterious effects of removal of the equipment.

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George J. Becchetti
Director of Procurement
21 - THE ROLE OF THE TECHNICAL OFFICER

Two of the points the seminar has endeavored to emphasize have been:

1. The need for the Technical Officer to appreciate the nature of NASA's commitment to the university community; and

2. The need for the Technical Officer to understand the procedures which have been developed to assure that relationships with NASA strengthen university capabilities and assure maximum benefit to NASA.

Against this background the seminar has attempted to illustrate the all-pervasive nature of the Technical Officer's responsibilities with regard to each step in the life cycle of a university research project.

For example,

In connection with enunciation of NASA's needs:

1. Awareness of the ways in which these needs are communicated to the University community; and

2. Personal participation, either in the preparation of written materials or in personal discussions with University investigators as a means of publicizing NASA's interests.

In connection with the pre-proposal period:

1. The provision of guidance in a number of areas.

In connection with the evaluation of unsolicited proposals:

1. The need to evaluate proposals in the light of their benefits to participating universities as well as to NASA.

In connection with proposal acceptance or rejection:
1. The need to return the Form 884 with affirmative or negative judgments in the least possible time; and

2. The need to assure that required documentation in support of a procurement package is adequate, complete, and forwarded promptly.

In connection with funding:

1. The necessity for assuring the reasonableness of budgeted items.

In connection with step funding:

1. Recognition of the use of this procedure as a means of long-term funding of appropriate research activities.

In connection with selection of a support instrument:

1. An understanding of the factors militating in favor of a grant or a contract.

In connection with negotiation:

1. The importance of the procurement package;

2. The dangers of prenegotiation business agreements;

3. The importance of cooperation with the Contracting Officer.

In connection with technical administration, the responsibility of the Technical Officer for assuring that each study

1. Is carried out along the lines set forth in the initial proposal;

2. That high quality effort is maintained;

3. That the results are made available to NASA in timely fashion for solution of its problems;

4. That expenditures are reasonable; and
5. That the university investigator has a point of contact within NASA for obtaining current information on NASA's evolving research needs as they affect his own research.

In connection with business administration:

1. Continuing support of the Contracting Officer in recognition of all elements of NASA's university policies.

In connection with the decision to continue a grant or contract:

1. An informal responsibility to assure that continuation requests arrive with adequate lead time; and

2. A formal responsibility to assure that decisions are made promptly.

In connection with closing the project:

1. A need to make a prompt decision;

2. Determination of termination conditions;

3. Notification of final completion of work;

4. Responsibility for the excellence of final reports;

5. Responsibility for recommendations as to whether equipment is to remain with a grantee;


In Unit 12, in discussion of some of the ways in which Technical Officers could assist NASA in resolving certain of its problems, mention was made of the needs of endeavoring to:

Assure, wherever possible that projects do assist in strengthening the educational capabilities of universities in stipulated ways;

Assure the provision of adequate information to prospective investigators;

Avoid undermining your negotiator;

Avoid promises which may be broken;
Avoid overly explicit guidance;

Endeavor to make the accept/reject decision within 30 days; and

Assure the procurement package is complete.

Subsequently reference was made of the need to:

Recognize that negotiations with universities will differ from those with industry.

Recognize that a composite of individual--and minor--constraints on university research soon adds up to a substantial Federal influence on the independence of the university system.

Avoid a reversal of roles with the Principal Investigator.

Remember the injunction to ensure that "expenditures are reasonable."

Be aware of the problems which can arise when a Principal Investigator moves from one University to another.

In summary, the seminar has emphasized that the responsibility of the Technical Officer extends really to every step in the life cycle of a research grant or contract. The ultimate success of NASA's university program is dependent almost entirely on the care and judgement with which each individual Technical Officer--and his peers--take steps to assure that the myriad decisions they must make in connection with any university research project take due account of the objectives and the goals of NASA's university program.
Do you believe this letter gives you adequate authority and understanding insofar as your responsibilities as a Technical Officer are concerned? If not, how would you recommend modifying it?