V - TECHNOLOGY TRANSFER

TEAM APPROACH

TARGET COMPANIES

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MONITOR PERFORMANCE

MAXIMIZE USE

RESPONSIBILITIES, COSTS, BENEFITS

1. RESEARCH CORPORATION EXCLUSIVE LICENSING AGENT

2. RESEARCH CORPORATION ASSUMES ALL COSTS

3. ROYALTIES SPLIT 60/40

- working on being able to take an equity position

A Proposal to

The Experimental Technology Incentives Program

for Support of a

PROGRAM TO ENHANCE PATENT AWARENESS

AT EDUCATIONAL INSTITUTIONS

Submitted by:

Patent Programs
Research Corporation
405 Lexington Avenue
New York, New York 10017

Requested Starting Date:	June 1, 1974
Funding Requested:	$ 188,825.00
Duration of Program:	Three years
Date Submitted:	January 11, 1974

Principal Investigator:

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Willard Marcy
Vice President - Patents

Program Director:

Robert Goldsmith

Robert Goldsmith
Associate

Approved:

James S. Coles

J. S. Coles
President

Requested Starting Date: June 1, 1974

Statement of Purpose

The major purpose of this program is to develop an enhanced patent awareness at educational institutions.

To accomplish this we have selected eight academic institutions which we believe are a representative cross section of this Nation's universities, health science and medical schools and technology institutes. We are proposing a broad concept of an educational program to be undertaken at these eight institutions which we believe will greatly increase the awareness of patentable inventions by faculty researchers.

Such an awareness is expected to lead to both an earlier and more widespread identification of inventive concepts resulting from supported research, and a better understanding of the means available to bring these concepts to commercial realization for the benefit of the public.

Evaluation of the concepts and selection of those deemed suitable for further development will be made.

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Section A

Background

Introduction

Although the Government grants and contract system, introduced during World War II, has served Government, industry and universities very well with regard to its primary objective of discovering and developing new technology, it has been much less successful at fulfilling the secondary objective of transfer of this technology for ultimate use by the general public.

A number of substantial attempts have been made, and are continuing, by NASA, the Department of Defense and other mission-oriented agencies to accomplish the desired transfer with varying degrees of success. For the most part the new technology developed under contract from these agencies resulted from research done by industrial firms.

The Department of Health, Education and Welfare and the National Science Foundation, which give grants to universities and non-profit scientific institutions, have not mounted any similar large scale coordinated efforts to develop suitable means

for transferring technology developed as a result of their grants. Recently, both of these agencies have announced institutional patent agreements under which educational and scientific institutions having published patent policies are authorized to handle the transfer of new technology resulting from HEW and NSF grants. Under these agreements the responsibility is left to the grantee institution to identify and evaluate inventive concepts, decide and obtain whatever protection is possible under the patent laws, and develop and carry through effective programs to bring such concepts to the marketplace for the use of the general public.

Traditionally the university's missions are to impart knowledge to students, and, through research, to discover new truths. Neither administrators nor faculty members, generally, have been concerned with the public utilization of new inventions resulting from scientific and technological research. The results of such research usually have been published in order to inform the world, and, as a consequence, to bring professional recognition to the researcher and institution.

Neither HEW nor NSF have encouraged academic grantees to consider means for bringing new concepts into public use. However, new orientations placed on these agencies by Congress

and the Executive Branch have resulted in greater emphasis being placed on grantee institutions to provide an enhanced awareness of the need to accelerate the utilization of inventive concepts for the public benefit. The efforts of these agencies along these lines, plus other similar external influuences, have, in turn, led many members of the academic community to consider in greater depth and at considerable length their obligations to find effective ways to translate their research findings into useful commercial products.

Since one of the best ways to accomplish this result is to utilize the patent system, academicians are beginning to realize that, in the first place, the development of a patent awareness is an essential step. Secondly, an understanding of the mechanics for obtaining and licensing patents is necessary. And, finally, effectiveness in developing patented inventions depends on experience in entrepreneurial, financial, technical and marketing procedures.

With some twenty-five years experience in providing patent assistance services to the educational and non-profit scientific community, it has been our experience that these institutions, in general, have not been adequately motivated nor suitably equipped to carry through the multiplicity of necessary steps effectively.

At such institutions the recognition that an invention has been made is, in our view, the most important, yet one of the weakest, links in the transfer of new technology. An increased awareness of patents and their relationship to the transfer process is expected to improve both the quality and quantity of invention disclosures. Once such technology is identified and a thorough awareness of the demands of the patent route to public use is imparted, the problems inherent in the further steps needed to develop commercial products become more mechanical and are generally more easily amenable to solution.

This proposal is directed towards presenting and testing a systematic approach to the development of a patent awareness and the identification of inventive concepts at eight selected academic institutions.

It is anticipated that any successful procedures developed during the course of this work may be applicable, either directly or indirectly, to Government scientific and research laboratories and other scientific institutions as well.

approach to the development of a patent awareness and

Government Support of Academic Research and Development

By any measure the funding of research and development at United States universities and colleges by the Federal Government is enormous. The statistics for fiscal year 1972, collated by the National Science Foundation, show total Federal funding of $ 1.9 billion. Of this amount, $ 1.6 billion went to just 100 institutions while the remainder went to over 600 additional institutions. While an appreciable amount was spent for development costs in NASA and DOD supported research, the two basic science oriented agencies, NSF and HEW, accounted for $ 1.2 billion of the total.

Because academic researchers doing research under Government support are located at a number of institutions such Government funding in toto can be considered as support for a very large, very widespread research establishment. If such facilities were under industrial control, an elaborate, coordinated system for developing and transferring any new technology would be mandatory. However, the diversity of the academic community and the wide spectrum of technological advances uncovered make such a coordinated effort all but impossible to establish and administer.

Although the Government may obtain patent coverage on such advances, if and when they are reported as inventions, the principal patent policy generally used by the Government has been conceived as a protective measure designed primarily to keep others from gaining a possible favorable equity position in respect to inventions resulting from Government supported research. Little, if any, consideration is given to using the patent system advantageously to promote technology transfer, as is normally practiced by industrial companies. Using patents protectively is essentially using them as publications. This is an unnecessarily costly and complex procedure as compared to publishing in the technical or scientific literature.

Since a coordinated and systematic use of the patent system is believed to have been very beneficial to the industrial community, it seems logical to make the premise that the basic principles inherent in such a coordinated system would be applicable to and helpful in realizing the benefits from technology developed in the diffuse academic community.

Transfer of University Derived Technology

New technology developed at academic institutions cannot be made available by these institutions directly to the general public, as such institutions lack capital and financial, production and marketing skills. Any transfer of such new technology must be communicated first to some agency with capabilities in these directions, such as suitable public or private organizations, entrepreneurs or existing industrial organizations.

The traditional method of communication used by academic workers is publication in scientific and technical journals. Less frequently, and generally for a different purpose, that of reference or teaching, publication in books is used. Frequently, scientific and technical advances appear first in theses written in partial fulfillment of the requirements for an academic degree. Related to written articles are oral presentations given at meetings and symposia sponsored by scientific societies. At such meetings information is transferred through frequent informal meetings between academic and industrial scientists.

Another often used means is private written communication between individuals, or restricted distribution of reports directed to funding organizations.

Use of the patent system is, perhaps, the most effective way, in an economic sense, to transfer inventive concepts. While the patenting of technology is extensively used in industry, its use by academic investigators is minimal. This is so in spite of the fact that an issued patent, a form of intellectual property, by legal definition must be a complete disclosure of an invention.

New technology can also be communicated to others through the development of know-how, which is another form of intellectual property. Know-how may consist of engineering design, drawings, operating manuals and the like. These, like patents, can be transferred to others through licensing. Generally academic scientists themselves do not often develop detailed know-how about inventive concepts but, if they do, their know-how can be transferred to industry through consulting arrangements as well as by licensing.

Academic scientists generally feel, erroneously, that publication in the scientific or technical literature is sufficient to effect technology transfer. If additional steps are used, they are frequently limited to a few direct communications with specific individuals, usually on the initiative of the individual rather than the scientist-inventor.

can be transferred to others through licensing.

While consulting arrangements with industry are common, academic scientists generally limit such arrangements to theoretical discussions rather than discussions of practical matters. The main faculty goal is scientific discipline minded and education oriented career advancement, and little thought is given to technology transfer.

Even when Government granting agencies file for and obtain patent coverage on scientific advances resulting from academic research, little or no follow-through in transferring this technology takes place. Generally any efforts of this sort are confined to listing available patents for licensing in Government publications, such as the Federal Register, or the National Technical Information Service bulletins. If an interested party should chance on the listing and be interested enough to inquire as to licensing terms, the agency will provide a take-it-or-leave-it, non-exclusive, royalty-free standard license. Only very recently have exclusive royalty-bearing licenses been proposed, and the right of the Government to offer such licenses has now been challenged in the courts.

In contrast to this situation industrial companies provide very elaborate support to industrial scientist-inventors, not only legal talent but funds and expertise for further development

and marketing. Such companies also stand ready to furnish extensive capital and managerial talent to transfer newly developed technology to the marketplace for the benefit of the general public.

Academic inventors generally look at patenting and licensing as time consuming, unduly complicated, not worth the effort, an undesirable perversion of the scientific method and out-of-place in an academic atmosphere. Unrecognized by them are the broader economic aspects and social implications of their work. Nor do academic administrators, in general, feel that they are or may be obligated to foster the transfer of academically originated technology for the benefit of the public.

In a pragmatic sense, however, it is our belief based on our 25 years experience, that the transfer of technology from academic institutions, can be most effectively and efficiently accomplished through an active and highly motivated patenting and licensing program. Such activity would also include transferring know-how through consulting or licensing arrangements along with patented technology. Since licensing patents or know-how requires a unique combination of experienced individuals having legal, technical, business and entrepreneurial skills, it is seldom practiced successfully by individual academic inventors.

technology for the benefit of the public

Use of Patents in Transferring Academic Technology

Patents as a form of academic technology transfer possess many unique advantages. Patents are especially advantageous for inventions resulting from basic research since they can provide broad and economically important legal protection during the early and costly development steps. Academic inventions are largely undeveloped, and manufacturers are understandably reluctant to develop them into a marketable product or service without strong financial motivation. This is frequently true with pharmaceutical inventions where a manufacturer may have to make high-risk investments of up to seven to ten million dollars in order to satisfy Food and Drug Administration requirements before a product can be put on the market. Patent protection is essential to motivate a manufacturer to undertake this kind of risk.

An important characteristic inherent in the licensing of patents is the effectiveness of licenses in transferring inventions over relatively long periods of time. Patented inventions are licensable for the life of the patent, 17 years in the United States, even longer in many other countries. Frequently an undeveloped academic invention may not appeal to industry or have a ready market at the time the invention is

in order to satisfy Food and Drug Administration requirements

made. One example is the invention of the maser/laser by Charles Townes with Government support at Columbia University. At the time of its invention, in 1951, the maser was a very esoteric research device, which is still not in widespread use today. However, a subsequent variation, using light instead of microwave radiation, has developed into the widely used laser which is still covered by the same basic maser patent and is licensed by Research Corporation.

Another advantage of patents is that foreign patent rights provide unique ways of transferring U. S. technology to non-U. S. corporations. Many present inventions have a world-wide impact and this trend is increasing. Patents are especially well adapted to transferring rights from U. S. academic inventors supported by the U. S. Government to non-U. S. corporations. At present, this procedure is restricted by the protective Government patent policy which has treated these foreign rights as unimportant. For example, prompt publication before filing in foreign countries destroys most foreign rights as of the publication date; in the United States, however, patent rights can be obtained provided applications are filed within one year of the date of publication (in Canada the time limit is two years).

Royalties can be collected on foreign patent rights covering U. S. inventions used outside the country. In the past, many U. S. inventions, even those resulting from Government support, have been used overseas without any direct benefit being returned to the U. S. In fact, unpatented U. S. inventions made under Federal support may have inadvertently stimulated the development of new technology in foreign countries which then became competitive with U. S. industry.

Identifying Academic Inventions for Patenting

In general, at an academic institution an invention is first identified by the investigator himself. He may report this to the head of his department, the dean of his college or a designated administrator. Or, on his own initiative, he may submit a paper to a scientific journal describing the invention as a scientific contribution to the literature.

If the invention resulted from sponsored research, the invention is supposed to be reported to the sponsor, whether industrial or Government granting agency. In the case of Government supported research, fulfillment of this obligation appears poor at most institutions, and frequently, even when so reported further systematic steps to bring the invention to the

identified by the investigator himself. He may report this to

marketplace may not be taken. In the case of industrially supported research the inventor reports the work, but the company decides what to file a patent on, not the researcher.

At most institutions, unless the investigator himself identifies and reports an invention, it is buried in the investigator's notebooks, is lost in a thesis, or appears only in the scientific literature as a report on a scientific investigation. There is, generally, no review either by scientific peers or by superiors or administrators for patentable matter. Unless the invention is actually reported, no review is generally made by sponsors, either industrial or Government.

Even when identified and reported, the evaluation of the invention for patentability and commercial potential is frequently neglected at most academic institutions. Those inventions reported to Government sponsoring agencies may or may not be evaluated depending on the agency. In any event, at both academic institutions and at Government agencies little time is usually spent trying to decide whether, how and where to obtain patent coverage and to search out the best means for licensing any patents which might be issued covering academic inventions. Rather the Government agencies' main interest is to provide domestic patent protection as a preventive measure against the

filing by others of patent applications covering the same invention.

Under the terms of the Institutional Agreements between certain academic institutions and the Department of Health, Education and Welfare and the National Science Foundation, the institutions are authorized to proceed with patenting and licensing of Government-supported inventions, provided the institution has an approved patent policy and mechanism developed for obtaining patent coverage and licensing patents. Academic inventions resulting from industry-sponsored research are handled either by the sponsor or by the institution. Unsponsored inventions are handled either by the institution or by the inventor. In the light of the previously described difficulty in identifying such inventions, it is apparent that the inventor and the institution should develop to a high degree the techniques for identifying inventions based on a substantial awareness of the patent system and how it can be used to benefit the general public, at the very least to satisfy the requirements of the Institutional Agreements. Only then is it possible to begin further commercial development.

inventions are handled either by the institution or by the

Conclusion

The vast academic research community, developed to its present state primarily through massive Federal Government funding, is a very diverse and uncoordinated structure with regard to the transfer of technology inherent in patentable inventions. No systematic procedures are being used generally to identify inventions resulting from academic research so that these inventions can be made widely and promptly available for the public benefit. Drawing on extensive experience over the past 25 years, Research Corporation proposes to undertake to develop and test procedures to enhance the patent awareness of academic researchers and increase their knowledge of means for transferring technology, so that useful inventions can be identified for further evaluation and development.

Section B

Purpose of the Proposed Program

As mentioned in the previous section the annual Federal funding of research and development at academic institutions in the United States totals about 1.9 billion dollars.

The major purpose of the proposed program is to enhance the flow from the academic community to the industrial community of inventions and technological know-how that are a direct or indirect result of this Federal funding. The proposal outlines a procedure to provide and test a means for conveying to the academic community an awareness of the incentives provided by the patent system so that the knowledge and experience of the academic scientist can be brought into wide public use.

As disclosures of new inventions are developed during the course of this proposed contract, they will be submitted for evaluation as to patentability and licensability either to the sponsoring Government agency or to the university at which the research was performed.

In the case where the disclosure is turned over to the university, the university can turn over to Research Corporation

the responsibility for evaluation, patenting and licensing under the terms of our patent assistance agreements. This provides for evaluation, patenting and licensing at no further expense to the university or the sponsoring agency.

The university or the sponsoring agency would, of course, be free to retain the disclosure and provide the needed services themselves.

Section C

Anticipated Results

Broadly, it is our premise that enhancement of patent awareness at educational and scientific institutions will result in the following:

. . . The country as a whole will obtain a higher return on this nation's research investment. As new products and processes reach the marketplace new enterprises develop, providing increases in employment and tax revenue. Research funding must be analyzed and mined for the inventive ore that the funding has generated so that the maximum national benefit may be obtained.

. . . An increase in the number of opportunities that can be offered to industry will be attained thus taking advantage of the fruits of Government-sponsored research to expand the industrial base and expand productivity.

. . . Retention of foreign patent rights through early identification and evaluation of inventions before publication.

All too often these rights are now lost by premature public disclosure. Patent protection in foreign nations can enhance the inflow of dollars both to the patent holder in the form of royalty income as well as to the U. S. corporate licensees as profit on sales. In addition, expansion of foreign trade is expected to result.

. . . Improvement in the quality of life as a consequence of an increased number of inventions resulting from Government-sponsored academic research done in the health and medical sciences fields. Such inventions all too frequently lie fallow at present because medical researchers do not have an appreciation of the uses of the patent system and feel their responsibility ends with publications of their research findings.

. . . Provide feedback information which can be used as criteria in future programs for funding academic research. Those institutions and research workers which are most likely to produce the highest quality results will be more readily identified. In addition, the institutions and the researchers will become more aware of the uses to which their work can be put for greater public benefit.

The program proposed here is designed to accomplish, as a minimum, the following:

. . . Development of an awareness that inventions of value to the public, may be inherent in academic research projects.

. . . Definition, in general terms, of the factors that make an invention both patentable and licensable.

. . . Development of an understanding that publishing and patenting are compatible and not irreconcilable opposites, as is frequently felt to be the case by academic researchers.

. . . Presentation of the role of the patent system in developing new products or processes for the public benefit.

. . . Provision of descriptions of the various methods, other than patents for transferring technology.

. . . Encouragement of closer working relationship with Government granting agencies and industrial sponsors through

frequently, felt to be the case by academic researchers

development of a knowledge and understanding of the patent policies of the agencies and sponsors.

. . . Encouragement of a closer working relationship between institutional administrators and faculty researchers through development of a knowledge and understanding of the institutional patent policies and administrative procedures and responsibilities at individual institutions.

. . . Development of a broad understanding of technology transfer methods through presentation of actual case histories, including economic and other benefits accruing to the general public, the Government, the institutions, and the inventors.

. . . Development of both qualitative and quantitative measures of increases in numbers and value of inventive concepts from institutional research as a result of an enhanced patent awareness.

including economic and other benefits accruing to the general

. . . Development of appropriate and more effective mechanics for evaluating inventive concepts from educational institutions.

. . . Development of an awareness of means for carrying forward worthwhile inventive concepts to commercial use for public benefit.

Section D

Approach

Program Summary

The proposed program consists of four parts:

. . . a preliminary review of the ongoing research at the individual institution,

. . . an educational and indoctrination phase,

. . . a period of continuing intensive support, and

. . . preparation of a final report.

The preliminary review is visualized primarily as an orientation period for the institutional administrators and department heads as well as Research Corporation associates. At any given institution 1 1/2 days plus travel should suffice for this step.

The educational phase will take the format of general and specialized lecture-seminars followed by interviews with individual researchers. This phase at each institution should be completed in about 5 days.

The period of continuing support will extend over a 23 month period and be designed to uncover and evaluate actual inventive concepts. During this period refresher seminars or lectures may be given.

Data analysis and final report writing will require one month.

Since experience gained in mounting the program at the first two institutions will be used to modify the approach at the remaining institutions, the first year will be devoted primarily to two institutions. The remaining six institutions will be covered beginning in the second year. Thus, the overall time period for completion of the program is three years.

Results will be reported in interim quarterly summaries, as well as in a more detailed final report.

While the educational and indoctrination phase of the program is being prepared and carried out, some one-time expenditures will be required, but the total expenditure is

expected to be approximately evenly divided over the entire life of the program.

Preliminary Research Review

All institutions selected for inclusion in this program carry out a sizable amount of sponsored research and prepare annual reports. These reports generally contain the following information:

Department conducting the research

Title of the research project

Names of the principal investigators

Sponsor of the research

The report may also contain the amount of the funding and a brief description of the project.

As part of our study, preliminary visits will be made to the participating institutions to obtain and discuss the content of these reports with the administrative staff. Further study will be carried out by Staff Members at Research Corporation to select those projects which appear to have some promise of either leading to patentable inventions or to new and commercially useful technology. This study will serve to orient both Research Corporation and the institution's administrators and researchers

Sponsor of the

as to the most promising areas for further in-depth study, especially during the personal conference portion of the proposed program.

Lecture-Seminars

The preliminary visit and the study of the Sponsored Research Reports will provide an indication of those scientific disciplines within the participating institutions that are most likely to provide inventions.

A series of lectures combined with seminar presentations will be prepared by Research Corporation which will be specifically directed to those faculty researchers working in the disciplines indicated as a result of the Research Review. These seminars may also be organized on a department or school basis.

Specialist Consultants will be used in the preparation of the lectures and at least a portion of each lecture and seminar will be conducted by either the consultant or a Research Corporation staff member who is skilled in the general areas being covered. For example, a lecture-seminar aimed at the Biochemistry Department would be conducted by an individual with a professional background in biochemistry. Visual aids, such as slides, flip charts or videotapes may be used in both the

specifically directed to those faculty researchers working in the

lectures and seminars. The lecture presentations will be prepared as to be generally usable at all selected institutions but each lecture will be specifically tailored in certain details for the particular institution and/or department being visited.

The lecture-seminars will be presented first at one institution. Any constructive criticism or suggestions for changes will be considered and used to modify and refine the material before presentation at the second institution. After the completion of the second round of seminars the seminars will be conducted at two institutions simultaneously or nearly simultaneously with only a few additional minor changes in the presentation material.

Arrangements for the lecture-seminars will be made by the selected Department Chairman or Chairmen, who would establish a time for the first meeting, requesting all researchers in that department or discipline to attend. Note that at this time we will endeavor to reach all researchers, not just those selected from our review of research projects. Input from the attendees would then be solicited in order to determine the proper attendance at and detailed content of the following meetings.

Lecture-Seminar Content

The topics expected to be covered in the lecture-seminars will lie broadly in the following categories. Fine structure and actual content of the lectures will be developed within the next six to eight months.

General Lecture-Seminar

1. Inventions and scientific research.
2. Overview of technology transfer methods.
3. Overview of patent system.
4. Overview of Government and institutional patent policies.
5. Brief case history presentations.

Special Departmental or School Lecture-Seminars

1. Discussion of evaluation of inventions for patentability and commercial potential.
2. Discussion of patenting procedures.
3. Discussion of licensing procedures and other means for transferring technology.
4. Discussion of patent policies of various granting agencies, industrial companies and academic institutions. Contract and grants terms.

5. Discussion of differences in evaluating, patenting and licensing of inventions arising from research classified by discipline.

   Generally these meetings will be oriented towards one discipline at a time - chemical, mechanical or electrical. Additional meetings may be necessary to cover adequately medical schools or health science centers.

Each meeting will consist of a lecture of about one hour's length followed by a question and answer period of about one-half hour. The first meeting will be held in the morning after which a period of discussion will be devoted to scheduling attendance at the following meetings. Two meetings will then be held in the afternoon of the same day. The next series of five or more meetings will be scheduled as possible over the next 2 days. Thus all lecture-seminars will be completed within about a three day period. Additional ad hoc forum discussions will be scheduled as requested by individual or group researchers.

Attendance at the first meeting would be general, and would include, perhaps, up to 30 attendees. Subsequent meetings would be limited to no more than 10 attendees at each meeting so that

individual participation and interaction can take place more readily.

Individual Conferences

As a result of the study of the annual report of sponsored research projects and through interest generated at the general and departmental lecture-seminars, conferences between Research Corporation staff members and individual researchers will be conducted at each institution during the five day period. A further selection for such individual conferences will be made based upon studies of grants and contracts proposals and interim or progress reports on ongoing research. These one-to-one meetings are designed to develop both a better knowledge on our part of the nature and direction of the individual research project and also to develop a better rapport with the researcher himself. Historically, we have found that the establishment of a personal sense of mutual trust and respect between researcher and Research Corporation staff member overcomes some of the reluctance to properly disclose inventions. During these individual meetings the general material covered at the Symposium can be refined and related to the specific technical problem and individual researchers idiosyncracies. In addition it will be

possible to develop a time frame for future monitoring of the research process and establishing future meeting dates. Future telephone, letter and personal follow-up will be enhanced through this arrangement.

Continuing Support

We are convinced that this development of patent awareness must be a continuing affair. Attendance at lecture-seminars and immediate follow-up personal interviews while initially effective in enhancing or developing an awareness, unfortunately, in the long run the new knowledge is quite transient, lasting only weeks in some cases. To correct this a member of our staff will return to the institution at least two days per month for the first 12 months after the completion of the personal interviews and then 1 day per month for the remaining time of the contract, approximately 10 more months.

The institution would be requested to provide office space with telephone service in order to facilitate receipt of messages and provide adequate private meeting facilities.

As new projects are started the visiting associate would be able to initiate contacts at an early stage and continue the educational program. If, as a result of any major faculty

changes, added seminars are indicated as being desirable, these would be conducted.

Study of Attitude Change

Through the mechanism of a prepared questionnaire, an attempt will be made to determine whether there has been a change in knowledge and attitudes over the test period.

One questionnaire will consist of two parts; patenting facts and patenting attitudes, and be completed by the individual researcher prior to attendance at the lecture-seminars.

Another questionnaire, identical to the first as to patenting facts but different with regard to patenting attitudes, will be completed at the end of the test period.

Appropriate grade comparison between the two questionnaires on patenting facts and changes in attitude will be made. These comparisons will be classified by the department of the researcher, his institution, his discipline and other criteria.

Participating Institutions

Attached to this Proposal in Appendix A is a listing of the eight institutions which have been selected by Research Corporation for inclusion in this program. Copies of letters of acceptance from each institution are attached.

Section E

Cost Estimates and Budget

Personnel Costs

Overall costs for this project are based on the following hourly manpower charges for Research Corporation personnel:

Supervisory Personnel	$ 49.00
Associates	$ 35.00
Secretary/Stenographer	$ 12.00

Those hourly rates are inclusive of direct labor, overhead and general and administrative expenses. Since Research Corporation is a non-taxable, non-profit foundation, there is no allowance for either profit or a management fee in those rates.

Costs for Travel to Institutions

Listed in Appendix B are the estimated travel and per diem costs that would be incurred in visiting each of the eight selected institutions, traveling from New York, on an individual visit basis. These costs have been averaged in order to calculate the separate costs related to the specific steps

proposed in the program. The average cost per institution so calculated is $ 161.

Cost of Program

The following costs are estimated for the performance of this program at the eight institutions selected.

A. Preliminary Research Review

Per Institution:

Average One-Day Travel		$ 161
Institutional Visit	8 Hrs.@ $35	280
Study and Analysis of Data	4 Hrs.@ $35	140
Secretary	6 Hrs.@ $12	72
Total		$ 653
Total For Eight Institutions		$ 5,224

B. Preparation of Lecture-Seminar Material

Initial Presentation:

Supervising Associate	40 Hrs.@ $49	$ 1,960
Technical Associate	440 Hrs.@ $35	15,400
Secretary	100 Hrs.@ $12	1,200
Preparation of Visual Aids		1,500
Handout Material		2,500
Total		$22,560

Revision for Second Institution:

Supervising Associate	15 Hrs.@ $49	$ 735
Technical Associate	80 Hrs.@ $35	2,800
Secretary	20 Hrs.@ $12	240
Revision of Aids		300
Total		$ 4,075

Final Tailoring:

Supervising Associate	10 Hrs.@ $49	$ 490
Technical Associate	160 Hrs.@ $35	5,600
Secretary	100 Hrs.@ $12	1,200
Total		$ 7,290
Sub Total		$33,925

C. Conduct of a Lecture-Seminar

Average Daily Travel Cost		$ 161
Technical Associate	40 Hrs.@ $35	1,400
Per Diem Living Cost	6 Man-Days @ $30	180
Cost Per Institution		$ 1,741
Total Cost For Eight Institutions		$13,928

(Assuming an average of eight Lecture-Seminars per institution conducted over a period of three days.)

D. Individual Interviews

Technical Associate	32 Hrs.@ $35	$ 1,120
Per Diem Living Cost	(2 Men, 2 Days) @ $30/day	120
Secretary	16 Hrs.@ $12	192
Cost Per Institution		$ 1,432
Total Cost for eight Institutions		$11,456

(Assuming this lecture-seminar and the individual interviews can be completed within the same week starting on Monday and concluding on Friday, thus necessitating no additional travel costs.)

E. Continuing Support

23 Visits/Institution	@ $161/visit	$ 3,703
Technical Associate	280 Hrs.@ $35	9,800
Per Diem Living Cost	35 Man-days@ $30	1,050
Cost Per Institution		$14,553
Total cost for eight Institutions		$116,424

(Includes Research Corporation resident at the institution two consecutive days per month for 12 months followed by one day per month for next 11 months.)

F. Reporting

Eleven Quarterly Reports

Technical Associate	88 Hrs.@ $35	$ 3,080
Secretary	44 Hrs.@ $12	528
Total		$ 3,608

Total cost for eight Institutions $116,424

Data Analysis & Final Report

Supervising Associate	20 Hrs.@ $49	$ 980
Technical Associate	20 Hrs.@ $35	2,800
Secretary	40 Hrs.@ $12	480
Total		$ 4,065

Total Cost of Reports $ 7,868

G. Total Cost For Eight Institutions

A.	Preliminary Research Review	$ 5,224
B.	Preparation of Lecture-Seminar Material	33,925
C.	Conduct of Lecture-Seminars	13,928
D.	Individual Interviews	11,456
E.	Continuing Support	116,424
F.	Reports	7,868
	Total Cost of Program	$188,825

Section F

Evaluation

Short-Term Statistical Studies

Basically, information on numbers of identified invention disclosures will be gathered at each institution covering the two-year period prior to the lecture-seminars and for the two-year period afterwards. These two sets of data will be analyzed from several different points of view to give a quantitative overview of the effectiveness of the lecture-seminar-interview-continuing support approach.

These analyses will include, but not necessarily be limited to, "before and after" comparisons:

- Between departments, divisions, schools and/or disciplines within a given institution.
- Between different categories of institutions.
- Between various Government granting agencies.
- Of output of individual researchers.

- As related to the type of patent policy in effect: a) at the institution, and b) at the granting agency.
- As related to the existing structure at the institution available for identifying and evaluating inventive concepts.

All inventions disclosed at each institution during the two-year "after" period will be evaluated for patentability and commercial potential either by the institution or by Research Corporation. The number of potentially worthwhile inventions will then be analyzed in a manner similar to that outlined above and compared with similar information, if and as available, from the two-year "before" period.

Short-Term Qualitative Analyses

From the quantitative analyses above certain qualitative evaluations will be made. These evaluations will endeavor to answer such questions as these:

- Has the awareness program been more effective in one or more disciplines compared to another? At one type of institution more than at another? In one department or school as compared to another?

The two-year "before" period

- Is support from one granting agency more likely than another to produce useful inventive concepts?
- What characteristics possessed by individual researchers seem desirable in order to result in useful inventive concepts?
- What general research programs supported by Government granting agencies appear to have the highest potential for developing inventions of benefit to the general public?
- What features of existing patent policies, both institutional and Governmental, appear to encourage the identification of inventions? What features appear to suppress such identification?
- What appears to be the barriers minimizing or suppressing the identification of inventive concepts at educational institutions at a) the administrative level, b) at the academic level, and c) at the supporting agency level? How can these barriers be eliminated?

- What appears to be the best internal structure and best operating procedures for encouraging the identification and evaluation of inventions?

"Before and After" Attitudes

As mentioned in Section D, questionnaires will be prepared designed to determine whether a change in knowledge and attitude has been effected as a result of the program. Answers to these questionnaires will be provided by individual administrators and researchers. Comparative data so generated will be analyzed and conclusions drawn.

Long-Range Analyses

While it is outside the immediate scope of the program proposed herein, each invention selected as having some commercial potential should be followed through its development and commercial phases. Since this will cover a very long period of time, periodic reviews should be made every five years or so.

On those inventions handled by Research Corporation, such reviews are made on an annual basis, and are reported to the institution. Copies of these future annual reports could be forwarded to ETIP, if desired.

By carrying forward such reviews, in time, it should be possible to build a very substantial historical record which would be subject to analysis to discover the important factors which need to be taken into consideration in improving the flow of inventive concepts resulting from research in academic and scientific institutions.

Section G

Organization and Management

History of Research Corporation

Research Corporation was founded in 1912 by Dr. Frederick Gardner Cottrell, a scientist, educator and inventor, who donated rights under his basic patents on electrical precipitation as Research Corporation's initial endowment. Dr. Cottrell's concept (as reflected in the foundation's chartered purposes) was to use the income from his and other inventions to support scientific research at colleges and universities, and to help other inventors bring their ideas to fruition and into public use. As an academic scientist he recognized the great need for funds to support research in its initial stages. As an inventor he was also conscious of the problems faced by academic scientists whose occasional inventions frequently lay fallow for lack of a mechanism or agency for developing them to the point where they could be brought to the public as useful products or processes.

The Cottrell patents on electrical precipitation were developed by Research Corporation, first through licensing and

then through the establishment of an engineering and manufacturing organization. In 1954 this organization was separated from the parent corporation as Research-Cottrell, Inc., a wholly owned taxable subsidiary. Following a public offering of Research-Cottrell stock in 1967, two subsequent offerings and other stock distributions have reduced Research Corporation's ownership to about 16% at present. Approximately 60% of the foundation's income comes from its investments in a diversified portfolio and in Research-Cottrell. The balance of the foundation's income is derived from royalties on patents assigned to Research Corporation by educational and scientific institutions and by individual inventors who have followed Dr. Cottrell's precepts by donating patent rights to Research Corporation.

"Science, Invention and Society", enclosed herewith, gives in considerable detail, an historical picture of the foundation.

Activities of Research Corporation

Science Advancement Programs

The foundation distributes its entire net income as grants to universities, colleges and scientific institutions. Its grants support basic research in the natural sciences and practical programs of public health nutrition. Since its inception some $ 42 million has been awarded to hundreds of institutions, principally in the United States, to support the research of more than 4,000 scientists. Grants in the sciences are awarded primarily on the basis of scientific significance and the work proposed is expected to be innovative, imaginative and creative.

Considerable emphasis has been placed on the younger scientists and, more particularly in the post-World War II years, on those in liberal arts colleges and smaller universities. In some years, this concept has been expanded to support science broadly in these institutions. Presently the foundation's grants programs are at a rate of about $ 4 million a year. For many years the total of grants and expenses has exceeded income, the difference being taken from realized capital gains.

The following table details the grants which were given during the period 1967-1973.

Year	Grants	Excess of Grants and Expenses Over Income
1967	$4,660,225	$3,520,838
1968	2,009,939	884,535
1969	2,253,205	174,398
1970	3,499,730	73,259
1971	5,905,579	3,312,544
1972	3,476,380	1,247,198
1973	3,926,943	1,349,465

Patent Programs

General Background

During its formative and earlier years, Research Corporation rendered patent services to academic inventors and their institutions on a relatively informal basis. In the mid-thirties, however, a formal arrangement was made with Massachusetts Institute of Technology under which the foundation relieved M.I.T. of the expense of the complex problems involved in the patenting and licensing of inventions made by faculty members at the Institute. Similar agreements were entered into with several other institutions prior to World War II, but activity in this area was largely suspended during the war years.

Following the war, an increased interest by educational and scientific institutions in the usefulness of the foundation's patent services led Research Corporation to establish formally what is now known as its Patent Programs.

Agreements have now been entered into with more than 250 institutions which have recognized their need to have immediately available without charge specialized and skilled patent services not customarily available within their organizations. These

institutions felt that such functions would be more appropriately carried out by a specialized operating group, rather than becoming involved themselves directly with the evaluation, patenting and licensing of inventions resulting from faculty or staff research. Assigning these responsibilities to Research Corporation has allowed both faculty and administration to fulfill their duty to make available to the public useful results of scientific research, yet be relieved of most of the expense and effort required, thus conserving their resources for their primary functions, teaching and research.

Institutional Patent Agreements

These agreements provide that the institution may submit to Research Corporation any inventions made by its staff as in its sole discretion it may wish. The foundation agrees that it will evaluate these inventions for patentability and potential use by the public. If the evaluation is affirmative, and if Research Corporation offers to handle it, the invention may be assigned to Research Corporation, and the foundation proceeds to seek patents and license them to industry. If the evaluation is negative, the rights remain with the institution or sponsoring agency.

All the costs of evaluating invention disclosures, filing and prosecuting patent applications, and licensing issued patents are borne by Research Corporation. Certain special expenses, such as the cost of court litigation, are borne initially by the foundation but may be deducted, as indicated below, from any royalty income that may later be generated, if the institution has so agreed.

The agreements, in one form, provide that the inventor shall receive a percentage of the gross royalty receipts. This share, in most instances 10-15%, is in all cases established by his institution. The remainder usually is shared equally between the institution and the foundation, subject only to the prior deduction of any special expenses referred to above.

The second form of the agreement provides for payment, after special expenses, of 57 1/2% of the royalties received to the institution (which, in turn, may make some payment to the inventor) with 42 1/2% remaining with the foundation.

and the foundation, subject only to the prior

The following table represents the growth in the number of institutions with which invention administration agreements are in effect.

Year	Number of Institutions At Year End
1967	195
1968	206
1969	215
1970	219
1971	238
1972	250
1973	257

Related Services

Beyond the services rendered by the foundation's patent staff on specific inventions submitted, institutions are also advised on corollary patent matters related to the overall administrative procedures of the institution. Staff members are available at all times for discussion of such problems and make frequent visits to the institutions. The cost of this related service is borne by the foundation.

Invention Evaluation

In evaluating invention disclosures the patent staff uses as criteria:

. . . novelty and patentability, including patentability opinions from independent counsel in private practice,

. . . potential commercial usefulness and the prospects of inducing industry to develop and introduce the invention into public use, and

. . . other less tangible but substantial reasons for patenting, such as benefits to the public or broad scientific importance.

Since intimate familiarity with many fields is needed for this evaluation, the foundation's patent staff, which is scientifically trained, market oriented and highly experienced, is augmented by calling on the knowledge of the inventor and his colleagues, other technically trained or market oriented independent consultants, and industrial personnel with whom personal acquaintance has been developed over the years. Weighing information from such diverse sources, an informed

. . . other less tangible but substantial reasons for patenting,

decision is made as to whether an offer to accept an invention is justified.

Over the past seven years the foundation has evaluated a total of 3,017 disclosures, accepting 333 or 11%, as detailed in the following table:

Year	Disclosures Submitted	Disclosures Accepted
1967	366	45
1968	397	62
1969	417	49
1970	424	55
1971	442	54
1972	452	38
1973	519	30
Totals	3,017	333

Patent Prosecution

Upon assignment of an invention, Research Corporation retains patent attorneys in private practice to prepare, file and prosecute patent applications. The patent staff works closely with the inventor and patent counsel in preparation of applications, follows the course of prosecution, and becomes deeply involved in making decisions relating to interferences, appeals and similar matters that are not exclusively problems of patent law.

Research Corporation's efforts in handling academic inventions are characterized by unusual flexibility. Since an in-house staff of patent attorneys is not maintained, it is possible to retain various patent firms and individuals with expertise in any technological area. This is especially important where an extremely narrow or highly-specialized technology is involved.

Every assigned invention will, as a minimum, be the subject of a U. S. Patent Application. In those cases where a publication has not preempted foreign patenting rights and where there is sufficient economic justification, corresponding foreign applications are filed. About half the accepted disclosures satisfy these criteria for which an average of five foreign patent applications will be filed.

Patent Licensing

Research Corporation does not itself develop inventions assigned to it, nor does it provide funds to others for such development. Instead, it relies on the incentives provided by the patent system of the United States to induce industrial concerns, at their expense, to undertake the necessary further research, development, and marketing efforts which are invariably