Patentability depends on whether invention meets statutory requirements

- Does it satisfy criteria?
- Is it novel, useful, nonobvious?

Commercial potential depends on:

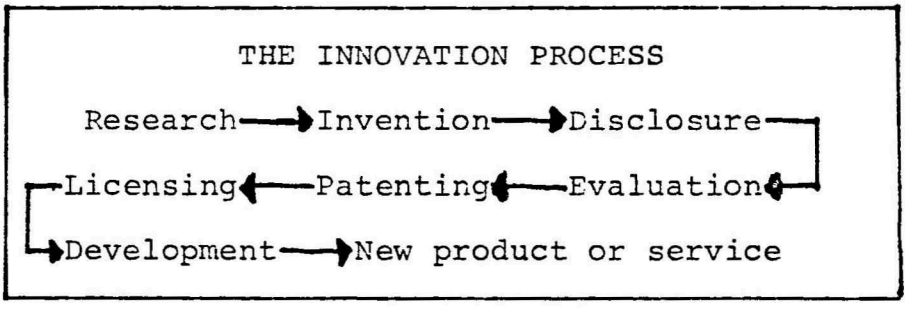
- Whether patent rights can be licensed
- Market size expectation
- How market size affects decision

Acceptance decision by patent committee means:

- Assignment of invention to university or its designee
- Further responsibility for patenting and licensing belongs to university or its designee

Bringing It All Together

(Slide 11)



The innovation process consists of:

- Series of connected steps
- Any break in chain interrupts process

Faculty researcher is involved in research, invention and disclosure

Recognizing an invention is the crucial step

- Is there an easily identifiable signal (manuscript)?

Review any publication less than one year old

- Does it describe an invention?
- Should it be disclosed to university patent committee?

Support will be provided in a continuing effort to identify inventive concepts

- Team members conducting this experiment will be available by mail or phone and on campus on a regularly scheduled basis.

- Call Mrs. Mary Gordon (Mr. Raymond J. Woodrow's secretary) at 2-3097 for an appointment with a team member.

IMPORTANT - PLEASE TAKE A MOMENT AND FILL OUT THE ATTACHED QUESTIONNAIRE

INVENTION SEMINAR QUESTIONNAIRE

Please answer the brief questions below (use reverse side if needed). Questionnaires will be collected at the close of the seminar program.

Name_____ Title_____

Department_____ Office location_____

University telephone number_____

What are your current major research interests?

What seminar topics do you wish to discuss in detail with us during our visits?

What current research and/or possible inventions would you like to discuss with us during our visits?

Please give us the names of any of your colleagues who you believe might be interested in this program.

What comments and suggestions do you have for conducting or improving these seminars and the program of which they form a part?

Thank you for your assistance.

UNIVERSITY OF MARYLAND
College Park

INVENTION SEMINAR WEEK
March 17-21

Seminars for faculty, staff members, graduate students and other interested persons will be held as part of a program sponsored by the National Science Foundation to develop at educational institutions an enhanced understanding of the patent system as a technology transfer mechanism. Such an awareness is expected to lead to an earlier and more widespread identification of inventive concepts resulting from University research. The means available to bring these concepts into public use will be explored. You are encouraged to attend your departmental seminar, or to participate in another if more convenient.

■ Monday, March 17

For:	Time:	Place:
Food Science	10:00 A.M.	Animal Sciences Center, Room 3105
Agronomy, Botany	1:15 P.M.	H. J. Patterson, Room 1109
Dairy Science, Veterinary Science, Poultry Science, Animal Science	2:00 P.M.	South Administration, Room 2118

■ Tuesday, March 18

Agricultural Engineering, Civil Engineering	9:00 A.M.	Shriver Laboratory, Room 1112
Microbiology, Entomology	2:00 P.M.	South Administration, Room 2118

■ Wednesday, March 19

Zoology	10:00 A.M.	South Administration, Room 2118
Chemical Engineering	1:30 P.M.	Chemical Engineering, Room 2117
Chemistry	2:00 P.M.	Chemistry Building, Room 0106

■ Thursday, March 20

General Open Seminar	10:00 A.M.	South Administration, Room 2118
Department of Physics and Astronomy	4:00 P.M.	Physics and Astronomy, Room Z1410

■ Friday, March 21

Textiles and Consumer Economics, Aeronautical Engineering	11:00 A.M.	South Administration, Room 2118
Electrical Engineering	2:00 P.M.	Engineering Classrooms, Room J2152

Conducted by Research Corporation
a foundation for the advancement of science

RESEARCH CORPORATION

A FOUNDATION FOR THE ADVANCEMENT OF SCIENCE

Invention Questionnaire

I. Descriptive

1. Title of invention

2. Brief description. Is the invention a new process, composition of matter, a device or one or more products? A new use for, or an improvement to, an existing product or process?

Use page 4 and additional sheets to elaborate, or attach descriptive materials.

3. From the description, pick out and expand on novel and unusual features. How does the invention differ from present technology? What problems does it solve, or what advantages does it possess?

This optional working form is provided by Research Corporation as an invention disclosure aid. If desired by the institutional representative, the completed form may serve as an initial disclosure to Research Corporation. Copies should be retained by the institutional representative and the inventor(s).

4. If not indicated previously, what are possible uses for the invention? In addition to immediate applications. are there other uses that might be realized in the future?

5. Does the invention possess disadvantages or limitations? Can they be overcome? How?

6. Enclose sketches, drawings, photographs and other materials that help illustrate the description. (Rough artwork, flow sheets, Polaroid photographs and penciled graphs are satisfactory as long as they tell a clear and understandable story.)

II. Other Pertinent Data

1. Are there publications—theses, reports, preprints, reprints, etc.—pertaining to the invention? Please list with publication dates, and attach copies insofar as possible. Include manuscripts for publication (submitted or not), news releases, feature articles and items from internal publications.

   a.

   b.

   c.

   d.

2. Are laboratory records and data available? Give reference numbers and physical location, but do **not** enclose.

3. Are related patents or other publications known to the inventor? Please list.

4. Date, place, and circumstances of first public disclosure.

5. Was the work that led to the invention sponsored? If yes, attach copy of contract or agreement if possible, and fill in the appropriate blanks below.

   a. Title of Government agency Contract No.

   b. Name of industrial company

   c. Name of university sponsor

   d. Other sponsor(s)

6. Any commercial interest shown at this stage? Name companies and specific persons if possible.

   a. Do you know of other qualified firms? Please list.

7. Name(s) and title(s) of inventor(s)

   a.

   b.

   c.

   (Contact for more data Telephone)
   (name)

8. Mailing address for inventor(s)

   (department and institution)

   (street and number) (city and state) (zip code)

9. Signature(s) of inventor(s) and date

   a. (date)

   b. (date)

   c. (date)

10. Institutional representative

    (please type name and title)

    (signature) (date)

    (department and institution) Telephone

    (street and number) (city and state) (zip code)

(contact for more data

Use the space below and additional sheets to elaborate on answers to questions and to provide any other helpful data.

Address correspondence to:

Patent Programs
Research Corporation
405 Lexington Avenue
New York, N. Y. 10017

Patents' Benefit to Inventor, University, and Society Stressed In Seminar Series

The December 1974 *Chronicle* introduced to the University graduate community the experimental "patent awareness programs" currently underway at eight universities in the country, including the University of Maryland. Operating on the basic assumptions that more inventions can arise from university research than are currently being patented and that these inventions can be put to practical use, Research Corporation, through a three year, $198,700 grant from the National Science Foundation, is conducting the four phase program, which includes a review of ongoing institutional research, a seminar series designed to educate university staff about patent procedures, a program of continuing support through monthly visits to the campuses by patent associates employed by Research Corporation, and a report of results at the program's conclusion.

Other participating institutions hosting teams from Research Corporation are the Polytechnic Institute of New York, Princeton University, the University of Michigan, the University of Washington, the University of Georgia, Case Western Reserve University, and Virginia Polytechnic Institute and State University.

The program aims at an earlier and more widespread identification of inventive concepts, which will guard against the possibility that important discoveries will be lost to the public, shorten the time between early observations and practical embodiments of innovative concepts, and increase the practical productivity of federal funds devoted to research. Currently over two billion dollars a year in federal funds are going into support of the university research endeavor. The academicians' increased awareness of proper patenting procedures might result in profits of more immediate social consequence from such an enormous investment.

A patent is a grant by a government to an inventor giving him the right to exclude others from making, using or selling his invention for a definite time period. In the United States, the grant is given in exchange for a full disclosure of a new, useful, and nonobvious invention.

A misconception prevalent in academic circles is that patenting precludes publishing and vice versa. This notion is not true; patenting and publishing need not be mutually exclusive if the proper time sequence is followed. If the patent application is filed before the submission of a manuscript for publication, the inventor derives full benefits from both actions.

Publishing without simultaneous patenting means that the right to patent is lost in a short time, six months for West German and Japanese patents and one year for patents in the United States. At this point, the invention, through publication, becomes part of the public domain, and the absence of a preferred market position may deter a commercial firm from risking capital when development costs are high.

Dr. Robert M. Williams of Research Corporation points out that in many cases, there is an extremely high risk and high cost in taking a product idea and "getting it to market." There is often serious conflict between innovation and public safety, and the inventor often has insufficient funds to carry through necessary testing and experimentation to ensure acceptability for public use. "The function of the patent," says Williams, "is to equilibrate the conflict between public safety and innovation . . . to reward the innovator."

Patenting provides incentives to industry to develop; gives the public new products and processes not otherwise available; may provide financial return to the inventor; allows for the retention of control by the patentee to prevent abuse; disseminates knowledge; and stimulates and supports further research by others.

In mid-March, four patent associates from Research Corporation spent two weeks at the University giving seminars to groups of faculty and students in areas of research which have high invention potential. Dr. Abraham Bavley, Mr. Robert Goldsmith, Mr. Bernard Kosloski, and Dr. Williams will return to the campuses periodically to follow through on the third phase of the program.

Unfortunately, the attendance at seminars at the University of Maryland was not as great as had been originally hoped for, despite considerable advance notice given in various campus publications. In several instances, only two or three department members were present for the departmental seminar presentations. Fairly heavy turnouts were recorded at seminars for the Departments of Chemical Engineering (12), Electrical Engineering (17) and Physics and Astronomy (17) at College Park. At Baltimore, twenty-five faculty members and students attended the seminar for the School of Pharmacy; Dr. Bavley notes that this was "a mag-

nificent turnout . . . potential inventions surfaced right at the meeting."

Additional opportunities will be available for those faculty members and students who were unable to attend the seminar series for their department. The third phase of the project will continue for several months, providing support in a continuing effort to identify inventive concepts. Research Corporation team members conducting the experiment in patent awareness will be available on the University campuses May 19 and 20, June 16 and 17, and the third Monday and the following day of subsequent months. Faculty members and graduate students doing research are urged to initiate contact with the team members concerning possible patentable ideas, regardless of how far-fetched they may sound. The benefits of a successfully licensed patent to the inventor, the institution, and the general public can be extraordinary.

The Chronicle *hopes to follow the progress of the patent awareness program through its final phases, providing the University community with coverage of patentable ideas brought to light by Research Corporation's efforts.*

-- The Editor

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May 1975, Vol. VIII, No. 3
University of Maryland

G. M. Stadler

FEB 22 1983

RESEARCH CORPORATION

6840 EAST BROADWAY BOULEVARD, TUCSON, ARIZONA 85710 602/296-6165

John P. Schaefer, Ph.D.
President

February 8, 1983

Mr. Bruce Gelb
Bristol-Myers Company
345 Park Avenue
New York, N.Y. 10022

Dear Bruce:

It is my understanding that on Friday the 4th NIH published in the Federal Register our petition to extend the period of exclusivity for the cis-platinum license. Both positive and negative comments are being solicited over the next 60 days and several months may pass before a final resolution is possible. I have also been told that NCI has only given the petition its lukewarm support and, further, that Michigan State University is reluctant to back our request formally because of possible negative publicity. Both of these developments could turn out to be substantial problems. I am genuinely concerned about the outcome of this process because of the negative effect it could have for both of our organizations and the public in general.

A focused program that would specifically expand the utility of cis-platinum and overall attack the problems of cancer diagnosis and treatment is what is truly needed. Our two organizations could combine efforts and achieve this objective despite the present situation, which I do not regard optimistically.

Mick Stadler on two separate occasions has outlined his thoughts on how we might be able to both leverage our present situation and provide an extremely attractive "backstop" even if the petition process turns out to be negative. Unfortunately, we have not received a formal response from Bristol-Myers to this proposal. Thus, I have decided to outline the merits of our proposed approach for your review.

The basic concept of an expanded relationship would be a new joint venture company owned by Bristol-Myers, Research Corporation and private investors. It is our feeling cis-platinum could form the basis of a new company and assure the generation of substantial private capital (via an R & D partnership) for investment in other cancer-related technologies developed at Research Corporation's associated universities. These investments would be determined jointly. Further, the new company would assume (under similar terms and conditions) the same financial

commitment ($28 million that Bristol is presently willing to make if the petition is granted) to further research and develop other indications for cis-platinum's use in the treatment of cancer. Funds for this commitment by the new company would come out of present and future profits from the sale of cis-platinum. Bristol would become the new company's exclusive manufacturer/marketer of the company's present and future products.

This relationship would be consummated by a cost-plus contract between the new company and Bristol (Note: The plus portion of the contract would be designed to give Bristol some percentage of the "net profit" which is achieved through the sale of cis-platinum.) Finally, Bristol would be provided with an option to "buy out" both Research Corporation and the private investors with Bristol's stock if second and/or third-round financing is necessary and sought via some subsequent standard form of equity financing.

It would be the intent of the new company to raise $30-50 million from private/institutional investors via a specially designed R & D limited partnership. This partnership would not only provide the investor with tax sheltering and a sharing of royalties to some fixed amount, but would also provide the investor with equity using pre-tax dollars. It is our feeling that if the new company were structured as described, the leverage aspects would be both apparent and attractive to all parties. Assuming the maximum amount of funds were raised, the new company would have approximately $80 million for investment in cancer research. These funds would be expended (or committed) over the next five years as follows:

$30,000,000 for research on the use of cis-platinum in other cancer indications

$35,000,000 on future identified and agreed upon cancer related technologies

$12,000,000 on presently identified Research Corporation technologies

$3,000,000 for the administration and management of the new venture.

[Note: Under Bristol's cost-plus manufacturing/marketing contract, when a funded research project reaches a certain defined stage, the project would be taken "inside-Bristol" for further development and/or final FDA approval.]

Research Corporation would agree to:

1. Issue a license to the new company for cis-platinum and collect the present 10% royalty for distribution to the platinum companies and Michigan State University.

2. Provide the new company with a "right of first refusal" to take a royalty-bearing license on any of its cancer-related technologies (as defined) from its present 300 university clients. (Over the last few years these clients have averaged 25-30 invention disclosures in the cancer area.)

3. Provide the new company with a right of first refusal to a royalty-bearing license to technologies developed from the British Cancer Campaign. This organization annually spends approximately $36,000,000 on cancer related research in England and has recently become a Research Corporation client.

4. A right of first refusal to a royalty-bearing license to present Research Corporation technologies which include four to five extremely promising inventions:

   A. Palladium related anti-cancer agents developed at LSU and have demonstrated approximately 1,000 times more potency than similar cis-platinum compounds in equivalent tests.

   B. Palladium derived compounds developed at Michigan State University by Dr. Rosenberg.

   C. Dehydroxepiandrosterone (DHEA) analogs as anti-cancer agents without estrogenic effects (developed at Temple University.)

   D. Hexamethylmelamine (HMM) analogs and related compounds having anti-tumor properties as well as metal chelating properties and which are more water soluble (developed by the Mayo Clinic.)

   E. A complex consisting of platelet derived tumor growth factor and anti-tumor drugs (developed at Pennsylvania State University).

F. A new series of cis-platinum compounds with anti-tumor activity (developed at the University of Vermont.)

5. Also available for inclusion is a multi-university research team organized and dedicated to the development of the following projects:

A. Human Breast and Lung Cancer Therapy Program - development of antigen-vaccine and intratumor immuno-chemo therapy drugs and therapeutic protocols for lung and breast cancer. This program has both medium and long-range aspects. Clinical trials with a lung tumor antigen-vaccine are already in progress. Breast cancer vaccine and intratumoral or intracavity drug clinical studies could begin within two years.

B. Cancer detection and monitoring using tumor-specific antibody immunoassays - this project will utilize the unique antigen and antibody preparations from satellite research groups for the major human solid tumors: breast, colon/rectal, lung.

C. Antibody targeted antibiotics for Ophthalmic Pseudomonas infections - Pseudomonas infections of the cornea epithelium are the most common type of damaging ophthalmic bacterial infections and are especially difficult to treat because of rapid dilution of drugs in the eye. Using antibodies to a bacterium, drug-antibody preparations offer the promise of far more effective therapy at lower dosages of such drugs as gentamicin.

D. Intratumor immunochemotherapy of canine mammary and equine sarcoid tumors.

E. Feline leukemia/viremia program.

[Note: These projects and the philosophy of the multi-university research team is described in the attached memorandum entitled Targeted Pharmaceuticals, Inc.

Bristol would agree to:

1. Have the present cis-platinum license transferred to the new company.

utilize the unique antigen and antibody preparations from

2. Identify terms for a manufacturing/marketing cost-plus contract to handle the products of the new company.

3. Provide the new company with some management and research development services and support.

4. Provide some form of financial commitment to the new company's research program.

The investors would provide approximately $30-50 million of research funding.

The parties would receive:

1. Research Corporation:

A. 40-45% of the new company's equity.

B. Royalties on licensed technologies.

2. Bristol:

A. 45% of the new company's equity.

B. An option to acquire all of the new company's equity from Research Corporation and investors.

C. A cost/plus contract which would entitle Bristol to make some percentage of the profits of marketed technologies.

3. The investors:

A. Tax sheltering for their R & D investment (approximately 80-85% with a total investment would be deductible with leverage of approximately two to two and one-half in the first year).

B. Royalties of approximately 1-2% of the net sales of <u>each supported</u> project until one and a half times their investment is returned.

C. Ten to fifteen percent of the new company's equity.

Bruce, I really believe that the above proposal has extraordinary merit and would like you and your staff to consider it carefully. Both of us have a tremendous stake in cis-platinum, as does the public, and it would be tragic to lose the leading edge that now exists. The general concept outlined has the merit of strengthening Bristol's position in the field of cancer research, opens new avenues to promising anti-cancer technologies, gives Bristol the inside track on new discoveries, and multiplies the amount of funding that would normally go into cancer research. In addition, if handled well, it should result in a tremendous amount of positive publicity for your company and the commitment that you have made to research on the number one health concern in the world. In short, <u>everybody wins</u>!

Time is running out and we should make a decision while we are still in an offensive posture. Let me hear from you soon and let me know if you want to proceed. I am willing to dedicate as much time to this as necessary and I am confident that by working together, we can bring the pros and cons of the above approach into sharp focus and map a course of action.

Yours sincerely,

John P. Schaefer

JPS/sk

cc: George M. Stadler
Mitchell Liftig

SUMMARY OF NYIT TECHNOLOGIES
PROPOSED FOR FUNDING:
-fiber optics display panel
-solid state light modulator
-high definition television system

OVERVIEW

Background

There is a revolution starting in the television field which will have a great impact on both the broadcast television industry and the movie industry. The promise of "high resolution" or "high definition" television ("HDTV") is on the verge of becoming a reality. The present limitations on its introduction include: 1) the need to reduce the required bandwidth for transmission over allocated channels, 2) the need to have a broadcast system which is compatible with the present NTSC standard, 3) the need for high brightness, compact projection systems with the necessary resolution, and 4) the need for large screen "hang-on-the-wall" displays. The programs being undertaken at the New York Institute of Technology ("NYIT") Science and Technology Research Center address each of these needs.

The three technologies of New York Institute of Technology that are summarized herein can be initially understood in the context of a compatible high definition television broadcast and display system, in which each technology can play an important role. The attached sketch illustrates the system.

In the sketch, a scene at a broadcast studio is viewed by a

high definition TV camera and encoded for broadcast using the encoder portion of the NYIT HDTV system. At the home receiver end, a consumer without an HDTV decoder can still obtain, without degradation, a conventional television picture at standard resolution. However, if equipped with an NYIT HDTV decoder, the full high definition TV signal can be recovered for display. In particular, an NYIT solid state light modulator is shown as being used in obtaining a small bright high definition image from the HDTV signal, and an NYIT fiber optics display panel is shown as being employed to present a magnified ("large screen") image.

It is emphasized that although each of the three described technologies cooperates with and complements the others, each of the technologies has commercial applications in vast markets independent of the other technologies. For example, the compatible high definition television encoder/decoder system could operate for home receiver or movie theatre application in conjunction with any type of high resolution display, the fiber optics display panel could operate as a high-contrast flat-panel display for a home or office computer or television display, in conjunction with various types of image sources or generators, not necessarily developed by NYIT; and the solid state light modulator can operate to produce a large projected image, such as for home, business, or theatre projection television systems.

The Inventor of the Technologies - Track Record

The three subject technologies were invented by Dr. William E. Glenn. Since 1975, when he established the NYIT Science and

Technology Research Center in Dania, Florida, Dr. Glenn has directed the Research Center. Dr. Glenn was previously Vice President and Director of Research at CBS Laboratories (1967 - 1975), and before that he was employed at G.E. Research Labs.

Dr. Glenn, who received a Ph.D. in electrical engineering from the University of California at Berkeley and holds 86 U.S. patents, has a long track record of inventing and developing commercially successful products. While at G.E. Research Labs, Dr. Glenn invented a large screen television projection system that has been marketed for years by G.E. That system utilizes an electrically deformable material in producing an image. The material is "written on" with an electron gun. (The Glenn solid state light modulator, which is one of the technologies hereof, uses a different type of electrically deformable material, and the electron gun is not needed. A solid state semiconductor chip is used instead.) In 1978 Dr. Glenn received an "Emmy" from the National Academy of Television Arts and Sciences for his invention, while at CBS, of a system for improving the quality of television pictures. The system is now in widespread use throughout the world. While at NYIT Dr. Glenn invented and directed the development of ultrasonic medical imaging technology that was licensed by NYIT to Boehringer Mannheim and marketed under the trademark "Biosound". Although this equipment was only first offered for sale during 1979, sales have already reached the rate of about $10 million per year.

The Research Center

The present NYIT Science and Technology Research Center facility in Dania, Florida, includes about 10,000 square feet of office and scientific lab space plus approximately 1,000 square feet of fully equipped machine shop available at the site. The Research Center also has access to an additional 5,000 square feet of building space on the property. The Research Center currently employs 21 people full time, including 10 scientists and engineers, and 10 associate engineers and technicians.

FIBER OPTICS DISPLAY PANEL

The Invention

The invention is a flat configuration fiber optics display panel that uses thousands of hair-like fiber optics strands to carry light from a tiny image to the display screen viewing surface where the image is magnified to many times its original size. The panel can be made by a patented process of wrapping "ribbons" (of side-by-side individual fibers) around black plastic spacers to form a "sandwich" that is cut into four thin wedge-like display panels. A small bright input image must be provided at the input port of the display panel. For video signal driven applications (e.g. television or computer terminals with full graphics capability) the image can be generated, for example, by the NYIT solid state light modulator, or (less preferably) by a small cathode ray tube. For applications where the image to be magnified is already available (such as in slide or movie film or microfilm viewing), a bulb or other light source is all that is needed. For application in data terminals with only character display requirements, a monoscope can be used for image generation.

Advantages

The display panel is thin, flat and lightweight, and should be manufacturable in quantity at low cost. (The material cost, all plastic, is very low). A large display panel (for example, three feet high by four or five feet wide) would only need to be

about an inch thick, and could hang on the wall like a picture. An important feature of the panel is that it exhibits superior performance in an environment of high ambient light which allows it to be comfortably viewed in a bright room or outdoors. It is also rugged and not subject to the risk of breakage that characterizes glass tube displays. The panel's life is unlimited, and performance does not degrade with time.

Markets

The potential markets for use in television, computer and data terminals, and movie, slide, and microfiche viewers is vast, and even a modest percentage of market penetration would involve large dollar volume. Also, high definition television images are of interest only if displayed on a screen large enough to allow appreciation of the high definition in the picture. This renders the fiber optics display panel particularly attractive for use in a high definition television system.

Patents

NYIT owns U.S. Patent No.'s 4,116,739 and 4,208,096 which respectively cover the display panel itself and a method of making it, and there are corresponding patents or patent applications in Canada, Britain, Holland, Japan, and West Germany. NYIT also has a number of invention disclosures pertaining to improvements in possible panel fabrication techniques.

Status of Development

NYIT has fabricated two crude hand-made fiber optics display panels to demonstrate feasibility. Initial work has also been done in investigating and experimenting with fiber optic ribbon production and handling.

Proposed Program Under Phase I Funding

The next major developmental task required to bring the panel to a commercially viable product is the refinement of techniques for automating the manufacture of fiber optic ribbons with high accuracy and repeatability. It is planned to undertake extensive experiments during this program to develop and refine the most promising techniques available to date for making continuous ribbon. Ideally, the technique should be capable of providing fiber optic ribbon with approximately 600 to 1000 fibers per width, with fiber-to-fiber spacing held to within 1/20 diameter over its length and with a fiber size of less than .003 inches (ideally, 0.001 inches). The NYIT Research Center has been evaluating three potential methods of providing continuous fiber optics ribbon; these are: a) extruding and calandering, b) skiving - sheets of laminates and c) splitting sheets of core material and then coating the core material into a ribbon with a compatible cladding material. Noteworthy is that there potentially exists several combinations of plastic materials which are optically compatible to provide the correct matches of indices of refraction to ensure an optically efficient ribbon. Some plastics are more tolerant of different processes than others. For example, for extrusion the melting points of the two

plastics must be compatible to allow co-extrusion through a common die. Therefore, the general objective of the proposed program is to perform continuing experiments with various plastics, in concert with investigating the three above-listed techniques for producing ribbon. Specifically, the following tasks are proposed:

Task #1

Continues Investigation of Potential Methods of Producing Continuous Fiber Optic Ribbon

Program Period - 9 months

Program Personnel - Approximately One (1) Man Year (0.975)

Program Cost - $65,400.

Task Objective: To evaluate in detail the three (or more) above-listed potential methods of providing continuous fiber optics ribbon to the necessary tolerances at a cost effective rate. Emphasis will be given to the method which appears to provide the most promise.

Task #2

Evaluation and Test of Appropriate Plastics

Program Period - 6 to 8 months

Program Personnel - Approximately 1/3 Man Year

Program Cost - $23,600.

Task Objective: To evaluate the various combinations of plastics which can be used in concert with Task #1. above. In addition, optical properties of the plastics will be evaluated and

various compounds tried, i.e., UV inhibitors, optical brightness, etc.

Task #3

Evaluation and Test of Various Epoxies (Glues) and Plastic Spacer Materials.

Program Period - 6 to 8 months

Program Personnel - Approximately 1/10 Man Year

Program Cost - $8,900.

Task Objective - To continuously evaluate epoxies and/or glues to ensure their compatibility with the various plastics evaluated in Task 2. The resultant adhesive must be quick drying, be inert to the selected plastics and must not alter the optical properties of the ribbon.

Task #4

Define, locate and evaluate sources for equipment and facilities for both ribbon and ribbon winders.

Program Period - 4 to 5 months

Program Personnel - Approximately 0.2 Man Years

Program Cost - $12,000.

Task Objective: The overall objective of the first three tasks is to develop a technique for providing in laboratory quantities high quality fiber optics ribbon. The objective of this phase is to find sources of supply and equipment to allow the scaled up production of larger quantities of fiber optics ribbon. In addition, techniques and sources will be eval-

uated for the next phase which would include the automated winding and stocking of the ribbon into panels.

SOLID STATE LIGHT MODULATOR

The Invention

The invention employs a solid state semiconductor chip to provide a charge pattern that is used to deform a material having a light modulating surface thereon. When a bright light source impinges on the surface of the deformable material, and then passes through a simple optical system consisting of a series of opaque stripes, a bright image is obtained. The image can, for example, be presented as a large projected image on a wall or projection screen, or can be applied directly as a small bright image to the input port of the fiber optics display panel which efficiently provides magnification and high contrast.

Advantages

The solid state light modulator requires no electron gun or envelope for obtaining a charge pattern, and can therefore be expected to be much less expensive, have longer life, be much smaller, and consume much less power than the light valve that Dr. Glenn originally developed at G.E. and which G.E. currently markets. As in the G.E. system, the light source can provide very high brightness, such as by using an arc lamp.

Markets

In addition to its application as a bright image source input for the fiber optics display panel, with its attendant

efficiently provides magnification and high contrast.

large market (see above), the solid state light modulator has potentially enormous markets, in its own right, in the field of projection television for home, commercial, and theatre use. Again, the tie-in as a display for high definition television, e.g. for home use or for broadcast distribution of movies to theatres, is quite compelling.

An interesting advantage of combining this type of display with the HDTV broadcast system described below, relates to the need for a video frame store in the HDTV decoder of the bandwidth reduced transmission system. The solid state light modulator chip is also a frame store which can be used in the processing required in the decoder.

Patents

NYIT holds an exclusive license, in the field of real imaging, in Glenn U.S. Patent No. 3,882,271, which issued May 6, 1975, and is the basic patent covering the Glenn solid state light modulator. There are no foreign counterparts. NYIT has a number of invention disclosures on refinements of the solid state light modulator, and plans to file U.S. and then foreign patent applications based on these disclosures.

Status of Development

In our research to date, modulator membranes have been made which were driven by a monoscope and which achieved over 200 to 1 contrast ratio at 50 volts excitation, and gave a light efficiency of about 60%. This voltage range is achievable with

current solid state technology but to date we have not attempted to produce a chip that will modulate the membrane. The light modulators made by NYIT were not adequately clean and were not produced with consistent performance from sample to sample. Membrane life has not been measured. There is no known physical reason why the life should be limited; however, this would be an important consideration in the process development.

Proposed Program Under Phase I Funding

To achieve the desired end goal of a high definition TV system employing a fiber optics display panel magnifier (hang-on-the-wall TV) requires a high brightness image generator. All the electronics employed in today's TV processing and receivers are presently solid state devices except for the CRT (cathode ray tube). It is therefore apparent that next generation TV systems should employ a solid state replacement for a CRT primarily because of the systems limitations imposed by CRT's which include limited brightness, low contrast, large size (bulky) and limited viewing area (i.e., 25 inches).

The following proposed program for the continued development of the NYIT solid state light modulator is presented assuming Evans & Sutherland (or equivalent) is funding concurrently the industrial version of the device. Therefore the tasks proposed are deemed necessary to address questions which will be evolved related to a consumer product.

Task #1

Evaluation, test and iterative design of the processes involved

[illegible] it is therefore

in making membranes suitable for long life.

Program Period - 9 to 10 months

Program Personnel - 0.38 Man Years

Program Cost - $25,400.

Task Objective: To supplement the process development task for the membrane material to ensure life cycles consistent with a consumer product. (Industrial product life of say 1,000 hrs. may be acceptable while in excess of 3,000 hrs. may be required for consumer product).

Task #2

Supplemental evaluation and process determination and process control for establishing membrane parameters necessary for consumer products.

Program Period - 7 to 9 months

Program Personnel - 0.375 Man Years

Program Cost - $24,000.

Task Objective: The primary thrust of the E&S supported activity is to demonstrate laboratory feasibility. The object of this task is to concurrently provide the process refinements and tests and evaluation to ensure that a feasibility device could be developed into a mass produced consumer product.

Task #3

Preliminary concept and design considerations of optical system

compatible with the solid state light modulator and fiber optics display panel.

Program Period - 4 to 6 months

Program Personnel - Approximately 0.12 Man Years

Program Cost - $15,600.

Task Objective: To perform a conceptual design configuration study and develop a specification for a consumer oriented optical transfer system. For example, consideration of glass optics (industrial) versus plastic (inexpensive, consumer) optics and the resultant ramifications examined.

HIGH DEFINITION TV SYSTEM

The Invention

Through extensive psychophysical measurements of vision, NYIT has determined that a large portion of the information that is now transmitted in television cannot be seen by the human eye. We have devised a transmission system which removes, from the transmitted signal, information that the eye cannot see. The receiver decodes this transmission and, using digital processing and a frame store, reconstructs a high resolution moving image that cannot be distinguished from an image which normally would require three times the bandwidth. Half of this transmission is a standard 525 line signal that a standard receiver can pick up and display as a standard television image. A high definition receiver, using the special processing, can reconstruct an image with twice the vertical resolution and three times the horizontal resolution to give a wide screen motion picture resolution display.

Advantages

The substantial saving in bandwidth can be utilized in many ways. The ramifications for broadcast high definition television are obvious, especially in the compatible broadcast system that is covered by NYIT's patent applications. This system allows consumers without HDTV equipment to receive HDTV broadcasts without degradation at conventional resolution on their TV sets. Consumers who own a decoder, however, will be able to recover and

display high definition television. Best of all, there will be a minimization of the precious bandwidth used by the broadcaster. The invented technique can also be used to record HDTV on a standard broadcast quality tape recorder for display in lieu of motion picture film (e.g. on HDTV light valve projectors of the type now available from G.E.). The invented processing may also be used to encode three standard TV channels for transmission within one channel.

Patents

There are two pending U.S. patent applications which cover the NYIT compatible high definition television encoding and decoding system. The applications were filed less than one year ago, and NYIT plans to file, within the one year period allowed by the international Convention, corresponding foreign patent applications in at least Europe and Japan. A further U.S. patent application, covering refinements of the encoding and decoding system, is currently being prepared.

Markets

If the NYIT compatible HDTV broadcast system (or a related system covered by NYIT patents) were adopted as a broadcast industry standard (which can never be assured, until it happens), the revenues from selling or licensing HDTV decoders for home use could be enormous. The markets relating to bandwidth savings for cable and satellite transmissions, as well as other applications, are also very substantial.

Status of Development

NYIT has constructed a system which demonstrates the feasibility of the technique in a monochrome system at 525 line resolution, and plans to extend the process to color and 1050 line resolution in the future.

Proposed Program Under Phase I Funding

The next significant developmental task related to the demonstration of a bandwidth reduced HDTV system includes the refinements of the present algorithm in black and white and the expansion of the system to include color. Significantly the present state of development has been based on numerous in-house measurements of psychophysical responses. Therefore optimization of the system suggests continued psychophysical measurements in concert with the iterative design implementation and evaluation of the resultant algorithms. Historically, any bandwidth reduction or compression technique results in part in some visual artifacts under certain conditions. These artifacts, once recognized and evaluated, can usually be suppressed or avoided by modifications and/or additional algorithms. It is important that the system be evolved in a manner which will allow the independent evaluation of the experimental algorithms to insure that the resultant HDTV system will be artifactfree. Toward this end, the following tasks are proposed.

Task #1

Refinement of the Black and White (Luminance) Algorithms

of the system suggests continued psychophysical

to Determine the Maximum Bandwidth Reduction

Program Period - 7 to 8 months

Program Personnel - Approximately 0.6 Man Years

Program Cost - $39,400

Task Objective - The present demonstration system demonstrates approximately a 3 to 1 reduction capability in the necessary bandwidth to transmit a standard TV picture. Other versions of the basic algorithm need be evaluated to establish the basic overall efficiency of the technique. Factors to be considered include additional bandwidth reduction, artifacts and the complexity of the mechanization. Expansion of the system to higher resolutions will also be evaluated.

Task #2

Conversion of the Present Demonstration System to Include Color

Program Period - 9 to 10 months

Program Personnel - Approximately 0.75 Man Year

Program Cost - $51,400.

Task Objective - To expand the present mechanization to include the processing of color information. This includes the evaluation of the various processing and associated algorithms as derived from the psychophysical measurements.

Task #3

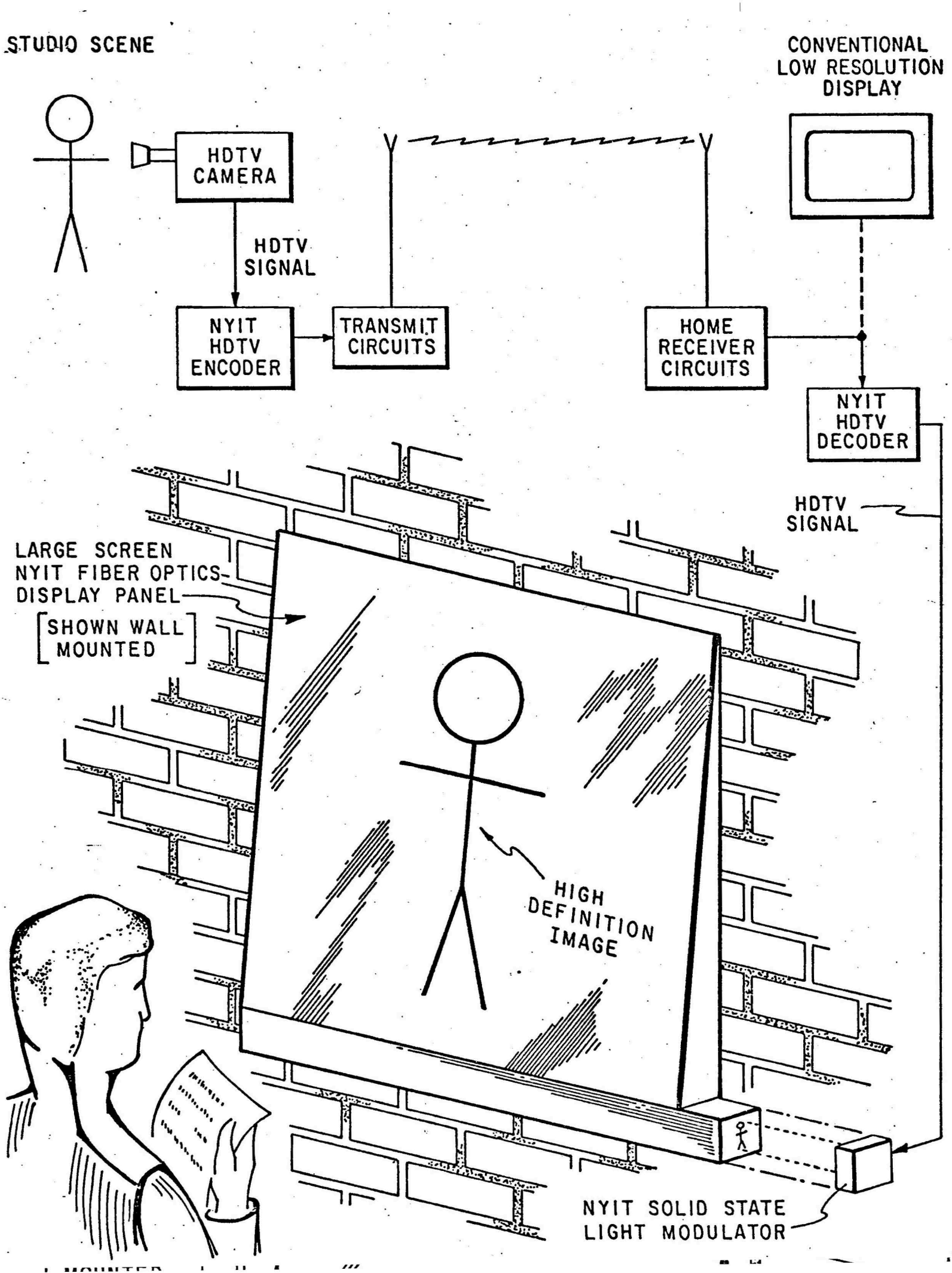
Continuation of and the additional analysis of the on-going psychophysical measurements.

Program Schedule - 6 to 7 months

Program Personnel - Approximately 0.3 Man Years

Program Cost - $30,200

Task Objective - To provide iterative criteria for design consideration for Tasks #1 and #2 above, including spatial and temporal frequency consideration, color sensitivity and masking.


STUDIO SCENE
CONVENTIONAL LOW RESOLUTION DISPLAY
HDTV CAMERA
HDTV SIGNAL
NYIT HDTV ENCODER
TRANSMIT CIRCUITS
HOME RECEIVER CIRCUITS
NYIT HDTV DECODER
HDTV SIGNAL
LARGE SCREEN NYIT FIBER OPTICS-DISPLAY PANEL
[SHOWN WALL MOUNTED]
HIGH DEFINITION IMAGE
NYIT SOLID STATE LIGHT MODULATOR

PREPARED FOR INTERNAL USE ONLY
NOT FOR DISTRIBUTION

IIMS ASSOCIATES

(A New York Limited Partnership)

$3,300,000 Minimum--20 Units

$6,600,000 Maximum--40 Units

THE PARTNERSHIP

The Partnership will be formed to conduct research and development, experimentation and continued commercialization of technology relating to cancer treatment by hyperthermia (heat) devices.

THE GENERAL PARTNER

The General Partner will be a newly formed wholly-owned subsidiary of the International Institute for Medical Sciences (IIMS). IIMS is engaged in development, production and sale of hyperthermia equipment. Since acquiring the rights and know-how relating to this emerging technology from the inventor in 1980, IIMS has placed ten machines in research and clinical settings where they have been used both to treat patients and to gather data on the safety, dosage and effectiveness of the method.

The results to date are very encouraging. Early minimal side effects have been overcome. In some cases all evidence of cancer has disappeared from the patient. Hyperthermia has been used both alone and in conjunction with chemotherapy and radiation therapy. The traditionally conservative medical community has begun to recognize that hyperthermia may well be an effective weapon against certain cancers, joining surgery, radiation and chemotherapy as a primary treatment method.

OBLIGATIONS OF THE GENERAL PARTNER

-- IIMS will contribute its technology, know-how, information and expertise and all its rights to patents both issued and pending. It will receive back a non-exclusive license to manfacture, sell and use equipment based upon this technology.

-- IIMS will contribute 1% of the capital contributed by the other partners - up to $66,667.

THE GENERAL PARTNER

-- IIMS will manage the enterprise at cost to the Partnership of $50,000 per year.

-- As a licensee, IIMS will pay royalties to the Partnership of 23% of its revenues from the sale of hyperthermia products.

THE RESEARCH AND DEVELOPMENT PROGRAM

IIMS Associates will enter into research and development contracts with 30 prominent medical research institutions, providing each with $50,000 per year for three years to further investigate the use of hyperthermia as a treatment for cancer and develop optimum treatment protocols for hyperthermia alone and in combination with other treatment modalities. Each of the research institutions which participates in the program will agree to lease a hyperthermia machine from IIMS for $65,000 per year.

The primary objectives of the program will be:

-- Advancing the development of the initial line of hyperthermia delivery systems.

-- Evolution of a new line of advanced equipment embodying the application and concepts discovered and developed under the research contracts.

-- Design and implementation of controlled studies leading to pre-market approval by the FDA of equipment using the Partnership technology.

If the Research and Development program is successful, the Partnership will undertake to license IIMS, and others if necessary, to manufacture and sell hyperthermia equipment for investigational and therapeutic use.

ECONOMIC POTENTIAL

If the Research and Development program is successful and the Partnership's technology of hyperthermia becomes an accepted cancer therapy, and if this equipment is leased to a substantial number of hospitals, the investors could receive a return of as much as 4-5 times their cash investment from leasing alone. Other commercial opportunities will, of course, be explored.

INVESTMENT CONCEPT

Participation with pretax dollars in a venture with a leader in the use of hyperthermia as a cancer treatment.

controlled studies leading to pre-

TERMS OF THE OFFERING

Managing Agents:

Expected Closing Date: December 31, 1982

Proceeds Raised from the Limited Partners:
Minimum - $3,300,000
Maximum - $6,600,000

Unit Size:
$165,000 Payable
$ 65,000 in cash at closing
50,000 October 1, 1983
50,000 October 1, 1984
$165,000

Deductions: Approximately 90% of the cash invested in 1982, 1983 and 1984.

Additional Assessments: None

Commissions:

Suitability: Investors must have a net worth of at least $1,000,000 or income during the last two years and expected during the current year in excess of $200,000.

Blue Sky Requirements: Offering is expected to be available for sale in most states.

SHARING ARRANGEMENT

Until Cumulative Distributions equal:
The amount of capital contribution
99% to the Limited Partners
1% to the General Partner

Until Cumulative Distributions equal:
350% of capital contribution
75% to the Limited Partners
25% to the General Partner

Until Cumulative Distributions equal:
1000% of capital contribution
50% to the Limited Partners
50% to the General Partner

Thereafter:
20% to the Limited Partners
80% to the General Partner

Red Line
1/22/82

COPY NO.___

PRIVATE PLACEMENT MEMORANDUM
January 12, 1982

C O N F I D E N T I A L

CATRIX RESEARCH LIMITED PARTNERSHIP

RECEIPT FOR OFFEREES

Receipt is hereby acknowledged of a confidential Private Placement Memorandum dated January 12, 1982, for the sale of Limited Partnership Interests in CATRIX RESEARCH LIMITED PARTNERSHIP, ("Partnership"). The undersigned agrees not to reproduce, duplicate or deliver such Memorandum without the prior written consent of the Partnership. This offering has not been registered with the Securities and Exchange Commission nor with certain state securities agencies in reliance upon an exemption relating to private offerings. The Partnership is relying, in part, upon representations made by offerees and their advisers in claiming such exemptions. The undersigned makes the representations set forth in the Subscription Agreement, including that:

The undersigned, by virtue of personal knowledge and experience in business and financial matters, is capable alone without the aid of an offeree representative of evaluating the merits and risks of investing in, and understands the risks involved in investing in research and development programs.

_____
Initial if applicable

The undersigned is able to bear the economic risk of the investment inasmuch as the undersigned (i) has a net worth of at least the greater of three times his proposed investment or $500,000, exclusive of the personal assets excluded below, and is in a Federal income tax bracket of 50% or higher, (ii) or has a net worth of at least $750,000. (Net worth shall not include homes, furnishings or automobiles.)

_____
Initial if applicable

Each offeree or his representative may request an opportunity to interview authorized representatives of the Partnership in connection with any aspect of this offering and to receive explanations of the terms and conditions of this offering or additional information about any of the partners involved.

EXECUTION OF THIS RECEIPT DOES NOT CONSTITUTE ANY COMMITMENT TO PURCHASE THE LIMITED PARTNERSHIP INTERESTS OFFERED IN THE PRIVATE PLACEMENT MEMORANDUM.

_____
Signature

Dated:_____

[Please Print]

Name _____

Address _____

...investing in research and development programs.

COPY NO.___

PRIVATE PLACEMENT MEMORANDUM
January 12, 1982

C O N F I D E N T I A L

CATRIX RESEARCH LIMITED PARTNERSHIP

RECEIPT FOR INVESTMENT ADVISORS

Receipt is hereby acknowledged of a confidential Private Placement Memorandum, dated January 12, 1982, for the sale of Limited Partnership Interests in CATRIX RESEARCH LIMITED PARTNERSHIP, (the "Partnership"). This offering has not been registered with the Securities and Exchange Commission nor with certain state securities agencies in reliance upon exemptions relating to private offerings. The Partnership is relying in part on representations made by offerees and their advisors in claiming such exemptions.

1. The undersigned represents that he has such knowledge and experience in financial and business matters that he is capable of evaluating the merits and risks of the prospective investment.

2. The undersigned further understands and acknowledges that the Memorandum may not be reproduced or duplicated, and may not be shown nor distributed to any other person for any reason whatsoever except to a prospective investor who shall have been approved by the General Partner and shall have completed and executed the Receipt for Offerees annexed hereto and forwarded such receipt to the Partnership.

3. The undersigned agrees that, in the event he is acting as an Offeree Representative, he will first furnish a complete offeree representative statement to the offeree and to the Partnership.

EXECUTION OF THIS RECEIPT DOES NOT CONSTITUTE ANY COMMITMENT TO PURCHASE THE LIMITED PARTNERSHIP INTERESTS OFFERED IN THE PRIVATE PLACEMENT MEMORANDUM.

_____
signature

Dated:_____

[Please Print]

Name _____

Address _____

_____

Red line

CONFIDENTIAL
PRIVATE PLACEMENT MEMORANDUM
January 12, 1982

CATRIX RESEARCH LIMITED PARTNERSHIP

Private Placement of

A Minimum of $627,200
and
A Maximum of $3,200,000

Offered In

Limited Partnership Units of

$160,000
($156,800 if paid in full upon subscription)

[Payable as set forth herein]

Unless the minimum number of Units are subscribed for, this Offering will terminate on March 15, 1982. In the event that at least the minimum number of Units are subscribed for and accepted the offer may be closed at any time. Thereafter, additional Limited Partners may be admitted by the General Partner until the maximum number of units is sold but no additional subscriptions will be accepted after March 15, 1982.

THESE LIMITED PARTNERSHIP INTERESTS ARE BEING OFFERED PURSUANT TO AN EXEMPTION PROVIDED BY SECTION 4(2) OF THE SECURITIES ACT OF 1933, AS AMENDED (THE "ACT"). THE SECURITIES DESCRIBED HEREIN HAVE NOT BEEN EXAMINED, APPROVED OR DISAPPROVED BY THE UNITED STATES SECURITIES AND EXCHANGE COMMISSION. A PROSPECTIVE INVESTOR WILL NOT BE PERMITTED TO PARTICIPATE UNLESS HE AND/OR HIS QUALIFIED REPRESENTATIVE HAS THE REQUISITE KNOWLEDGE AND EXPERIENCE TO PROPERLY EVALUATE THE RISKS OF THIS INVESTMENT AND THE PROSPECTIVE INVESTOR HAS SUFFICIENT MEANS TO BEAR ITS ECONOMIC RISKS FOR AN INDEFINITE PERIOD. NO MARKET FOR THE UNITS WILL DEVELOP AND TRANSFER OF THE UNITS IS SUBJECT TO SEVERAL SIGNIFICANT RESTRICTIONS INCLUDING COMPLIANCE WITH FEDERAL AND STATE SECURITIES LAWS, THE INTERNAL REVENUE CODE AND MATTERS CONTAINED IN THE LIMITED PARTNERSHIP AGREEMENT, INCLUDING THE CONSENT OF THE GENERAL PARTNER. IN NO EVENT MAY AN INVESTOR SELL HIS UNITS UNLESS SUCH UNITS ARE REGISTERED UNDER THE ACT OR AN EXEMPTION FROM SUCH REGISTRATION BECOMES AVAILABLE TO HIM. THE GENERAL PARTNER DOES NOT ANTICIPATE THAT SUCH EXEMPTION WILL BECOME AVAILABLE.

THE PARTNERSHIP HAS NOT APPLIED FOR A RULING FROM THE INTERNAL REVENUE SERVICE AS TO ITS STATUS AS A PARTNERSHIP FOR FEDERAL INCOME TAX PURPOSES. THE PARTNERSHIP INTENDS TO RELY UPON AN OPINION OF COUNSEL.

THIS OFFERING IS CONDITIONED UPON THE SALE OF AT LEAST 4 LIMITED PARTNERSHIP UNITS. THE FUNDS RECEIVED FROM THE SALE OF UNITS WILL BE HELD IN ESCROW BY THE ESCROW AGENT, AND WILL BE REFUNDED IN FULL TO SUBSCRIBERS WITHOUT INTEREST AND WITHOUT DEDUCTION FOR EXPENSES IN THE EVENT THE MINIMUM OFFERING IS NOT CLOSED BY MARCH 15, 1982.

after additional Limited Partners may be admitted by the General Partner