

AD-A261 416

SECURITY CLASS



## REPORT DOCUMENTATION PAGE

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| 1a. REPORT SECURITY CLASSIFICATION<br><b>SECRET</b><br>MAR 9 1993                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                         | 1b. RESTRICTIVE MARKINGS                                                                                                                |                      |
| 2a. SECURITY CLASSIFICATION AUTHORITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                         | 3. DISTRIBUTION / AVAILABILITY OF REPORT<br><b>DISSEMINATION STATEMENT A</b><br>Approved for public release<br>Distribution Statement A |                      |
| 2b. DECLASSIFICATION / DOWNGRADING SCHEDULE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                         | 5. MONITORING ORGANIZATION REPORT NUMBER(S)<br>N00014-92-J-1638                                                                         |                      |
| 4. PERFORMING ORGANIZATION REPORT NUMBER(S)<br>628410                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                         | 7a. NAME OF MONITORING ORGANIZATION<br>Office of Naval Research                                                                         |                      |
| 6a. NAME OF PERFORMING ORGANIZATION<br>Rensselaer Polytechnic Institute                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 6b. OFFICE SYMBOL<br>(If applicable)    | 7b. ADDRESS (City, State, and ZIP Code)<br>33 Third Avenue, Lower Level<br>New York, NY 10003-9998                                      |                      |
| 6c. ADDRESS (City, State, and ZIP Code)<br>110 Eighth Street<br>Troy, NY 12180-3590                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                         | 9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER<br>N00014-92-J-1638                                                                     |                      |
| 8a. NAME OF FUNDING / SPONSORING ORGANIZATION<br>Office of Naval Research                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 8b. OFFICE SYMBOL<br>(If applicable)    | 10. SOURCE OF FUNDING NUMBERS<br>PROGRAM ELEMENT NO. PROJECT NO.                                                                        |                      |
| 8c. ADDRESS (City, State, and ZIP Code)<br>33 Third Avenue, Lower Level<br>New York, NY 10003-9998                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                         | 93-04594                                                                                                                                |                      |
| 11. TITLE (Include Security Classification)<br>ONR Summer Scholars for the 1992 PREFACE Program                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                         |                                                                                                                                         |                      |
| 12. PERSONAL AUTHOR(S)<br>Smith, Mark D.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                         |                                                                                                                                         |                      |
| 13a. TYPE OF REPORT<br>Final Technical                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 13b. TIME COVERED<br>FROM 5/92 TO 12/92 | 14. DATE OF REPORT (Year, Month, Day)<br>1992, December 31                                                                              | 15. PAGE COUNT<br>37 |
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| 17. COSATI CODES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                         | 18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)                                                       |                      |
| FIELD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | GROUP                                   | SUB-GROUP                                                                                                                               |                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                         | Pre-college; Engineering Enrichment Academic Summer Program                                                                             |                      |
| 19. ABSTRACT (Continue on reverse if necessary and identify by block number)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                         |                                                                                                                                         |                      |
| <p>PREFACE, a two-week residential program for disadvantaged students, women and members of ethnic minority groups historically underrepresented in scientific, technological and engineering professions, will celebrate its fifteenth summer program in 1992. PREFACE is designed to facilitate a broader and deeper understanding of engineering and related professions, career options, and the kinds of competencies and expectations of engineering faculty and professionals on the collegiate and practitioner levels. The most unique feature of PREFACE is its linking the development of engineering professionals (theoretical) and the practice and application of engineering and scientific principles (practical). Participants have the opportunity to learn what engineering is from experts in the various fields of engineering and observe how principles of engineering are applied in industrial and research settings. This summer experience serves to clarify the kinds of knowledge and skills essential to successfully complete an engineering degree.</p> <p>( OVER )</p> |                                         |                                                                                                                                         |                      |
| 20. DISTRIBUTION / AVAILABILITY OF ABSTRACT<br><input checked="" type="checkbox"/> UNCLASSIFIED/UNLIMITED <input type="checkbox"/> SAME AS RPT. <input type="checkbox"/> DTIC USERS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                         | 21. ABSTRACT SECURITY CLASSIFICATION                                                                                                    |                      |
| 22a. NAME OF RESPONSIBLE INDIVIDUAL<br>Mark D. Smith, Asst. Dean of Students, OMSA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                         | 22b. TELEPHONE (Include Area Code)<br>(518) 276-6272                                                                                    | 22c. OFFICE SYMBOL   |

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19. ABSTRACT (Continued)

Participants are selected from a nation-wide pool of applicants and spend two weeks on the Rensselaer Campus attending lectures, demonstrations, visiting research and industrial facilities, learning interactive computer graphics using ProEngineer applied to solving an engineering problem, and interacting with faculty, engineering professionals, Rensselaer undergraduate / graduate students and peers. These experiences provide a valuable base from which to plan appropriate academic coursework during their senior year in high school, clarify what engineering is and how it is applied to solving 'real-world' problems, and realize that engineering and related professional careers are within one's grasp.

The Office of Naval Research supports twenty (20) participants as "ONR Scholars" for the two-week program.

# FINAL TECHNICAL REPORT

Office of Naval Research  
Agreement No. N00014-92-J-1638  
RPI Project No. 6-28140

The PREFACE Program is a two-week residential summer program designed to provide an introduction to engineering experience for members of ethnic minority groups, women and disadvantaged students historically underrepresented in the engineering professions. There were twenty-nine participants in the 1992 PREFACE Program; twenty of which were designated ONR Scholars (Appendix I, Enrollment Profile). There were 357 applicants in this year's pool, lower than previous years as we experience a decline in interest in science and engineering professions and a smaller pool of students in the Class of 1993. Despite this decrease in the applicant pool, Rensselaer was accepted thirty-five students to yield twenty-nine participants for the 1992 PREFACE Program. Of the 29 participants, nine (9) were African American, six (6) Latino, twelve (12) Caucasian, and one (1) Native American. There were twenty-three (79%) female and six (21%) males, which is consistent with previous years. There were fourteen states represented by the participants. The largest number of participants were from New York (10), followed by Maryland (3), then Texas, Colorado, Florida and Puerto Rico each with two participants, and Illinois, Maine, Michigan, Mississippi, North Dakota, Rhode Island, Vermont, and Washington each with one participant. It is gratifying to note that we are able to generate considerable interest in PREFACE on a national scale.

Academically, participants' average on the SAT-Verbal was 529 and SAT-Math was 594 combined SAT average of 1123, exceeding the national average. These scores are consistent with the quality of young people attracted to the PREFACE Program. Participants' secondary school performance exceeded our expectations. Of the 29 participants, 23 were from public high schools, 5 from private secondary schools, and 1 from a state-wide, residential science and technology high school (Illinois). For the 1992 participants, their collective high school average was 3.90 / 4.00 scale; average high school rank in class was 94.2 %tile with 17 participants ranked in the top 10 of their high school classes. Overall, this class was exemplary by virtue of their selection for PREFACE and enthusiasm for learning they brought to the program.

The principal goals of PREFACE were to facilitate a broader and deeper understanding of engineering professions, career options, and the kinds of competencies and expectations of engineering faculty and professionals on the collegiate and practitioner levels. To this end, participants were exposed to a range of activities, lectures and discussions relevant to developing appropriate connections between the sciences, mathematics, engineering and practical applications of knowledge to solving real-world problems (APPENDIX II, PREFACE Program Schedule). The intention and focus of the collective experience was to demonstrate by example and description the diversity of scientific and engineering professions, the linkage between academic and practical application of knowledge, and the importance of developing style of problem solving consistent with and appropriate for the solution of novel and undefined problems. Participants had a unique opportunity to clarify their own goals and interests by exploring with experts in their respective fields the kinds of knowledge and problem solving skills critical to successfully meeting the demands and expectations of a rigorous engineering curriculum.

Historically, PREFACE participants have had the opportunity to explore the application of computer graphics to address a problem situation while learning to use sophisticated software in an engineering environment. This year participants used ProEngineer to design an attachment device to hold the auxiliary air breather to a scuba divers body so it will not drag across the sea bottom getting caught on rocks or coral. Participants worked in teams to design and construct an actual working model of an attachment device for scuba divers. Examples of their work and reports are attached in Appendix V. This experience enabled participants to have a greater understanding of the 'engineering process' by demonstrating the process from problem formulation and definition through the design and reporting of a potential solution. Two designs were selected and a model constructed using the computer-aided manufacturing (CAM) laboratory.

Each summer, PREFACE participants visit a major research and development center to observe and interact with principal scientists and engineers. The intent of this visit is to obtain a more intimate and representative view of doing science and engineering in the 'real world' working on practical problems. This year's visit was to the Naval Air Warfare Center, Warminster, Pennsylvania. Dr. J. J. DeLuccia coordinated the visit and provided introductory remarks and

orientation to the center. Participants visited five laboratories ranging from research on ceramic materials to rust inhibitors. Each laboratory provided a hands-on demonstration of the research being done, rationale for exploring the problem situation, and important commercial applications of the solution to the problem(s) being researched. Participants were impressed with the nature of the research endeavors and potential commercial applications. More importantly, participants were able to discuss why and how the individual scientists and engineers chose to focus on these topics, their educational background and training, and its relevance to working in these laboratories. Participants also visited the Franklin Institute, a hands-on science museum, located in Philadelphia.

Participants in the 1992 PREFACE Program were able to demonstrate a strong motivation toward developing the kinds of skills and knowledge appropriate for pursuing careers in engineering, the sciences and technological professions. Each participant, on their evaluation of PREFACE, indicated an increased resolve and confidence in their ability to acquire and apply knowledge toward engineering and related professions. The success of PREFACE is based on the capability and commitment of faculty and staff at Rensselaer to provide high quality academic and support services to participants in the summer experience. This commitment continues to be demonstrated as participants successfully complete the program and enter prestigious colleges across the nation. All twenty-nine (29) participants chose to be interviewed by Rensselaer's Undergraduate Admissions staff while in attendance for the summer program. Nineteen have applied to Rensselaer and 8 have been accepted as of January, 1993. It should be noted that seventeen (17) 1991 PREFACE Program participants were admitted to Rensselaer for the Fall 1992; six of which are currently attending. Of the six, two were awarded \$10,000 scholarships from IBM for four years. The principal reason for choosing Rensselaer as their college of choice remains their participation in PREFACE. We look forward to the continued success of the PREFACE Program in the years to come.

#### SUMMARY OF RESULTS FROM THE PREFACE PROGRAM SURVEY

Each year a survey of participants is conducted to assess project effectiveness and services (APPENDIX IV, 1992 PREFACE Program Evaluation Form). In general, participants find the program to be extremely helpful in facilitating their understanding of engineering and science on

the college level. Of the 29 participants, 80% rated the Academic and Team Competition components as excellent opportunities to learn about engineering, computing and science processes. The Field Trips and Social/Cultural Events were rated as excellent/good for all participants. The following comments represent the majority opinions of the participants:

This has been a very valuable experience for me. It has answered a lot of questions and made me realize the potential us "women" really do have in a challenging career. (Jessica Michel, Livermore Falls High School, Fayette, ME)

I believe this (PREFACE) has been very educational and informative. I have had an experience these past two weeks that will stay with me for the rest of my life. (Melissa Dellith, Oneonta High School, Oneonta, NY)

.... the exposure I got from PREFACE of actual, hands on engineering and computing gave me a much clearer understanding of the kind of engineer I hope to be. (Nneka Hanshaw, Oxford High School, Oxford, MS)

This (PREFACE) was a wonderful opportunity to receive a detailed introduction to engineering as well as a meaningful look at the different perspectives of science / engineering that were generated the past two weeks. This is unequivocally one of the most memorable experiences of my life. (Meredith Morgan, Champlain Valley Union High School, Shelburne, VT)

This assessment demonstrates the impact and success of the PREFACE experience. Each participant states that participation in PREFACE enables them to attain a higher level of achievement, increased perseverance, and improved self-confidence to pursue their dream of a career in an engineering, scientific or technological profession. In comments regarding the project activities, all felt that having lecture/demonstrations, tours of research facilities, and visits to practicing engineers in industrial settings, significantly clarified and enhanced their understanding of scientific, technological and engineering careers in a way that could not have occurred without participation in PREFACE. Participants declared that, had he/she to do it all over again, he/she would attend PREFACE. The comments and rate of response are gratifying and demonstrate the success of the Program.

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| <i>A-1</i>                           |                                                  |

# SUMMARY OF EXPENDITURES

## ONR SUMMER SCHOLARS FOR 1992 PREFACE PROGRAM

Agreement No. N00014-92-J-1638

RPI Project No. 6-28140

|                                            | <u>ONR</u><br><u>FUNDS (20)</u> | <u>RPI</u><br><u>CONTRIBUTION (9)</u> | <u>TOTAL (29)</u>  |
|--------------------------------------------|---------------------------------|---------------------------------------|--------------------|
| <b>PROFESSIONAL PERSONNEL</b>              |                                 |                                       |                    |
| Project Director (M. Smith)                | n/c                             | n/c                                   | n/c                |
| Dorm Director (O. Portugues)               |                                 | \$ 1,500.00                           | \$ 1,500.00        |
| Tutor Counselors (5 @ \$600.00 each)       | \$ 1,800.00                     | 1,200.00                              | 3,000.00           |
| Computer Graphics Support (J. Linz)        | <u>1,000.00</u>                 | <u>          </u>                     | <u>1,000.00</u>    |
| <b>TOTAL, PROFESSIONAL PERSONNEL</b>       | <b>\$ 2,800.00</b>              | <b>\$ 2,700.00</b>                    | <b>\$ 5,500.00</b> |
| <b>FRINGE BENEFITS (23.5 %)</b>            |                                 |                                       |                    |
|                                            | n/a                             | <u>\$ 141.00</u>                      | <u>\$ 141.00</u>   |
| <b>TOTAL, FRINGE BENEFITS</b>              |                                 | <b>\$ 141.00</b>                      | <b>\$ 141.00</b>   |
| <b>OTHER DIRECT COSTS</b>                  |                                 |                                       |                    |
| Participant Support Costs -                |                                 |                                       |                    |
| Room: \$ 68/wk x 29 students x 2 wks.      | \$ 2,720.00                     | \$ 1,224.00                           | \$ 3,944.00        |
| Board: \$ 135.70/wk x 29 students x 2 wks. | 5,428.00                        | 2,442.00                              | 7,870.00           |
| Travel: \$ 372/student x 29 students       | 7,438.00                        | 3,347.00                              | 10,785.00          |
| Books & Supplies: \$ 138 x 29 students     | 1,614.00                        | 2,387.00                              | 4,001.00           |
| Computer Usage: \$ 93/stud. x 29 students  |                                 | 2,687.00                              | 2,687.00           |
| Health Fee: \$ 13.50/student x 29 students |                                 | 391.00                                | 391.00             |
| Staff Support Costs -                      |                                 |                                       |                    |
| Room: \$ 73/wk x 3 wks. x 4 Staff          |                                 | 960.00                                | 960.00             |
| Board: \$ 74/wk x 3 wks x 4 Staff          |                                 | 950.00                                | 950.00             |
| Postage, Telephone & Duplication Costs     | <u>          </u>               | <u>1,435.00</u>                       | <u>1,435.00</u>    |
| <b>TOTAL, OTHER DIRECT COSTS</b>           | <b>\$17,200.00</b>              | <b>\$15,824.00</b>                    | <b>\$33,024.00</b> |
| <b>INDIRECT COSTS</b>                      |                                 |                                       |                    |
|                                            | n/a                             | n/a                                   | n/a                |
| <b>TOTAL PROJECT COSTS</b>                 | <b>\$20,000.00</b>              | <b>\$18,665.00</b>                    | <b>\$38,665.00</b> |

PREFACE PROGRAM COST PER STUDENT:      \$ 1,333.28

TOTAL, PROJECT COSTS:      \$ 38,665.00

# APPENDIX I

## 1992 PREFACE PROGRAM

### OFFICE OF NAVAL RESEARCH SCHOLAR ROSTER

| NAME              | STATE | SEX | ETHNICITY |
|-------------------|-------|-----|-----------|
| Brown, Michelle   | WA    | F   | C         |
| Caraballo, Anita  | CO    | F   | H         |
| Dellith, Melissa  | NY    | F   | C         |
| Faniyi, Joy       | MD    | F   | B         |
| Gehrke, Kelly     | ND    | F   | C         |
| Hanshaw, Nneka    | MS    | F   | B         |
| Jones III, Ernest | MD    | M   | B         |
| Lee, Cherri       | NY    | F   | NA        |
| Lorenzo, Aaron    | FL    | M   | H         |
| Morgan, Meredith  | VT    | F   | C         |
| Rios, Francisco   | TX    | M   | H         |
| Rodriguez, Mara   | PR    | F   | H         |
| Russell, Amy      | IL    | F   | H         |
| Shelley, Felicia  | TX    | F   | B         |
| Somers, Joseph    | FL    | M   | B         |
| Takatani, Sarah   | NY    | F   | AA        |
| Travier, Damien   | NY    | M   | B         |
| Tyler, Kelly      | RI    | F   | B         |
| Weir, Barbara     | NY    | F   | C         |
| Williams, NuRocha | NY    | F   | B         |

NOTE: (B) African American; (H) Hispanic; (C) Caucasian; (AA) Asian American;  
(NA) Native American/Alaskan Native

**APPENDIX II**  
**PREFACE Program Schedule**  
**July, 1992**

**MONDAY, JULY 13**

**8:30 - 9:00**  
**SA 2715**

**Orientation**  
Dr. Paul Derusso, Associate Dean, School of Engineering  
Mr. Norman Burnett, Associate Dean of Students and  
Director of the Office of Minority Student Affairs

**9:00 - 10:00**  
**SA 2715**

**Computer Lecture**  
John Kolb, Director, Engineering Computing Services (ECS)

**10:00 - 11:00**  
**CII 3130/JEC 3210**

**Computer Session--Introduction to RCS Workstations**

**11:00 - 12:00**  
**CII 3051**

**Discussion: Civil Engineering**  
Mr. Robert Dunn, Civil Engineering

**12:00 - 1:00**  
**BARH Dining Hall**

**Lunch**

**1:00 - 2:00**  
**CII 3045**

**Computer Graphics Lecture: Pro/ENGINEER**  
Hugo Walpurgis, CAD/CAM Engineer, ECS

**2:00 - 3:15**  
**CII 3130/JEC 3210**

**Computer Session: Pro/ENGINEER**  
Hugo Walpurgis, CAD/CAM Engineer, ECS

**3:30 - 4:30**  
**CC 308**

**PHYSICS Magic Show**  
Annette Oritelli, Department of Physics

**5:00 - 6:00**  
**BARH Dining Hall**

**Dinner**

**6:00 - 8:00**  
**CII 3130/JEC 3210**

**Computer Session: Pro/ENGINEER**  
Hugo Walpurgis, CAD/CAM Engineer, ECS

**9:00 - 10:00**  
**BARH**

**Group Meeting**

**TUESDAY, JULY 14**

**8:30 - 9:00**  
**SA 2715**

**Group Meeting**

**9:00 - 10:00**  
**SA 2715**

**Computer Lecture: MATLAB**  
Nabil Hijazi, Lead Consultant, ECS

**10:00 - 12:00**  
**CII 3130/JEC 3210**

**Computer Session: Introduction to MATLAB**

**12:00 - 1:00**  
**BARH Dining Hall**

**Lunch**

**1:00 - 2:30**

**Tour of LINAC Center**

Elaine Belokopitsky, Nuclear Engineering

**2:45 - 4:00**  
**CII 3045**

**Professional School Orientation:**

Dean Donald Watson, School of Architecture

Dr. Michael Halloran, Associate Dean, School of Humanities &  
Social Sciences

Dr. Barry Taylor, Director of Student Programs, School of Management

**4:00 - 5:00**  
**CII 3130/JEC 3210**

**Computer Lecture & Session: MATLAB .m Files**

Nabil Hijazi, Lead Consultant, ECS

**7:00 - 8:30**  
**CC 337**

**Meet the Administration**

Dr. Lee Wilcox, Vice President for Student Affairs

Dr. Alan Meltzer, Professor of Physics & Director,  
Rensselaer Learning Center

**8:30 - 9:30**  
**BARH**

**Ice Cream Social**

**WEDNESDAY, JULY 15**

**8:30 - 9:00**  
**SA 2715**

**Group Meeting**

**9:00 - 10:00**  
**SA 2715**

**Computer Lecture: BBN/Slate Spreadsheets**

Debra Wentorf, Technical Writing Assistant, ECS

**10:00 - 11:00**  
**CII 3130/JEC 3210**

**Computer Session: Using MATLAB Data In BBN/  
Slate Spreadsheets**

**11:00 - 12:00**  
**SA 2715**

**Discussion: Electrical and Computer Systems Engineering**

Dr. Bruce Carlson, Electrical, Computer, & Systems Engineering

**12:00 - 1:00**  
**BARH Dining Hall**

**Lunch**

**1:00 - 2:15**  
**CC 308**

**Chemistry Lecture / Demonstration**

Dr. Robert Reeves, Chemistry Department

Linda Rickus, Chemistry Department

**2:30 - 3:30**  
**MRC 148A**

**Tour of Materials Engineering Laboratory**

Dr. Roger Wright, Professor of Materials Engineering

**3:30 - 4:30**  
**Union Shellnut Gallery**

**Lecture: Group Participation and Organization**  
Linda McCloskey , Director, Center for Student Leadership  
Jane Watson, Director, Student Activities

**4:30 - 5:30**  
**CII 3130/JEC 3210**

**Computer Session: Introduction to BBN/Slate**  
**Word Processing & Graphics**  
Debra Wentorf, Technical Writing Assistant, ECS

**7:00 - 8:30**  
**BARH**

**Admission and Financial Aid**  
Dean Eddie Knowles, Dean of Students, Rensselaer  
Mr. Tyrone Jordan, Associate Dean of Admissions and Financial Aid  
Ms. Lucia Alcantara, Assistant Dean of Admissions and Financial Aid  
Ms. Ginny Crotty, Associate Director of Financial Aid

**8:30**  
**BARH**

**Pizza Party**

**THURSDAY, JULY 16**

**8:30 - 9:00**  
**SA 2715**

**Group Meeting**

**9:00 - 10:00**  
**SA 2715**

**Computer Lecture: Group Project Assignment**  
Hugo Walpurgis, Engineering Computing Services  
Debra Wentorf, Engineering Computing Services

**10:00 - 11:00**  
**CII 3130/JEC 3210**

**Computer Session: Sample Report Simulation**

**11:00 - 12:00**  
**CII 3051**

**Problem Solving: Thinking To Learn**  
Mark Smith, Assistant Dean of Students/Director of Academic  
Support Programs

**12:00 - 1:00**  
**BARH Dining Hall**

**Lunch**

**1:00 - 3:30**  
**CII 3130/JEC 3210**

**Computer Session**

**5:00 PM**

**Departure for *NAVAL AIR WARFARE CENTER***

**FRIDAY, JULY 17**

**9:00 - 2:00**

**Naval Air Warfare Center, Aircraft Division**  
**Warminster, PA**

**SATURDAY, JULY 18**

**SUNDAY, JULY 19**

**MONDAY, JULY 20**

8:30 - 9:00  
SA 2715

Group Meeting

9:00 - 10:00  
SA 2715

Computer Lecture: Group Project Meetings  
All Instructors

10:00 - 11:00  
CII 3130/JEC 3210

Computer Session: Pro/ENGINEER  
Hugo Walpurgis, CAD/CAM Engineer, ECS  
[ Groups will rotate out for shop sessions ]

11:00 - 12:00  
CII 3051

Discussion: Mechanical Engineering  
Dr. Richard Smith, Associate Professor of Mechanical Engineering

12:00 - 1:00  
BARH Dining Hall

Lunch

1:00 - 2:00  
CII 3045

Discussion - Biomedical Engineering  
Dr. Jonathan Newell, Professor of Biomedical Engineering

2:00 - 3:00  
CII 3045

Computer Lecture: Group Project Meetings  
All Instructors

3:00 - 5:00  
CII 3130/JEC 3210

Computer Session: Group Projects -- Proposal  
All Instructors

6:00 - 8:00  
CII 3130/JEC 3210

Computer Session: Group Projects -- Proposal  
All Instructors  
\*\* PROPOSALS DUE BY THE END OF SESSION \*\*

**TUESDAY, JULY 21**

8:30 - 9:00  
SA 2715

Group Meeting

9:00 - 10:00  
SA 2715

Computer Lecture: Group Project Meetings, Questions &  
Discussion  
All Instructors

10:00 - 12:00  
CII 3130/JEC 3210

Computer Session: Group Projects -- Begin Design  
All Instructors

12:00 - 1:00  
BARH Dining Hall

Lunch

1:00 - 2:00  
CII 3045

Tour of Mechanical Engineering Laboratory  
Dr. Richard Smith, Associate Professor of Mechanical Engineering

2:30 - 3:00  
CII 3045

Discussion: Aeronautical Engineering and Space Technology  
Dr. Robert Loewy, Professor of Mechanical Engineering, Aeronautical  
Engineering & Mechanics and Director, Rotocraft Technology Center

**WEDNESDAY, JULY 22**

8:30 - 9:00  
SA 2715

Group Meeting

9:00 - 10:00  
SA 2715

Computer Graphics Lecture  
Hugo Walpurgis, Engineering Computing Services  
Debra Wentorf, Engineering Computing Services

10:00 - 12:00  
CII 3112

Session on Computer Graphics

12:00 - 1:00  
BARH Dining Hall

Lunch

1:00 - 2:00  
CII 3045

Discussion: Industrial and Management  
Engineering  
Dr. Jorge Haddock, Professor of Industrial and Management Engineering

2:00 - 3:00  
CII 3045

Tour: Center for Industrial Innovation and Center for  
Integrated Electronics  
Dr. Christopher LeMaistre, Director, CII & CIE

5:00 - 6:00  
Rensselaer Union

Steak Bar-B-Q: Faculty, Students, Guests and Staff

**THURSDAY, JULY 23**

8:30 - 9:00  
SA 2715

Group Meeting

9:00 - 11:30  
Walker Lab 307

CHEMISTRY COMPETITION  
Mark Smith, Assistant Dean of Students/Director of Academic  
Support Programs

11:30 - 12:15  
CII 3130/JEC 3210

Computer Session: Group Projects -- Work Time  
All Instructors

12:15 - 1:00  
BARH Dining Hall

Lunch

1:00 - 2:00  
CII 3130/JEC 3210

Computer Session: Group Projects -- Work Time

2:00 - 5:00

General Electric--Silicones Division, Waterford, NY  
Environmental Engineering, Chemical Engineering, and Waste  
Water Management Departments

**FRIDAY, JULY 24**

8:30 - 9:00  
SA 2715

Group Meeting

9:00 - 12:00  
CII 3130/JEC 3210

Computer Session: Group Projects -- Work Time  
All Instructors  
\*\* GROUP WRITTEN REPORTS DUE BY NOON \*\*

12:00 - 1:00  
BARH Dining Hall

Lunch

1:00 - 2:30  
CII 3045

Center for Manufacturing Productivity & Advanced  
Technology: Computer Simulation

3:00 - 4:30  
CII 3130/JEC 3210

Computer Session: Course / Instructor Evaluations  
All Instructors

6:30 - 9:00  
SAGE Dining Hall

FAREWELL BANQUET & GRADUATION

SATURDAY, JULY 25

DEPARTURE FOR HOME !!!!

## APPENDIX III

### LIST OF POSTSECONDARY INSTITUTIONS ATTENDED BY PREFACE PROGRAM PARTICIPANTS

(1987-92 PREFACE PROGRAM PARTICIPANT SURVEY)

Cooper Union  
Columbia University  
Georgia Institute of Technology  
George Washington University  
University of Michigan  
Carnegie Mellon University  
Rensselaer Polytechnic Institute  
Carleton College  
Harvard University  
Stanford University  
Texas A & M University  
Massachusetts Institute of Technology  
University of California - Berkeley  
Johns Hopkins University  
SUNY-Buffalo  
Virginia Tech  
Rice University  
University of Virginia  
University of Missouri - Kansas City Medical School  
Florida State University  
University of Alabama  
Princeton University  
Iowa State University  
University of Southern California  
Duke University  
Northwestern University  
U.S. Military Academy  
U.S. Naval Academy  
U.S. Air Force Academy

## APPENDIX IV

### 1992 PREFACE PROGRAM EVALUATION

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_  
Street City State Zip Code

1. Using the scale given below, assess each session attended during the PREFACE Program based on your perception of its value to yourself and the class in general. Write the number from those listed in the scale on the blank alongside each session.

#### SCALE

- (1) Excellent
- (2) Good
- (3) Poor Presentation, but Important Information
- (4) No value, drop from the program

#### a. Academic Component

- \_\_\_\_\_ Computer Lectures and Sessions on the Terminals
- \_\_\_\_\_ Aeronautical Engineering
- \_\_\_\_\_ Civil Engineering
- \_\_\_\_\_ Tour of LINAC, Nuclear Engineering
- \_\_\_\_\_ Admission and Financial Aid Information Session
- \_\_\_\_\_ Electrical, Computer and Systems Engineering
- \_\_\_\_\_ Chemistry Lecture/Demonstration
- \_\_\_\_\_ Materials Engineering Laboratory
- \_\_\_\_\_ Problem Solving: Thinking to Learn
- \_\_\_\_\_ Mechanical Engineering
- \_\_\_\_\_ Biomedical Engineering
- \_\_\_\_\_ Physics Magic Show
- \_\_\_\_\_ Industrial and Management Engineering
- \_\_\_\_\_ Center for Manufacturing Productivity & Advanced Technology - Computer Simulation

## SCALE

- (1) Excellent
- (2) Good
- (3) Poor
- (4) No Value, drop from the program

### b. Field Trips

- \_\_\_\_\_ Naval Air Warfare Center , Philadelphia, PA
- \_\_\_\_\_ Franklin Institute of Science & Technology , Philadelphia, PA

### c. TEAM Competitions

- \_\_\_\_\_ Chemistry Laboratory Competition
- \_\_\_\_\_ Computer Design Project
- \_\_\_\_\_ Egg Drop
- \_\_\_\_\_ Marble Launch

### c. Social/Cultural Events

- \_\_\_\_\_ Ice Cream Social
- \_\_\_\_\_ Pizza Party
- \_\_\_\_\_ Steak Bar-B-Q
- \_\_\_\_\_ Farewell Banquet

**In items 2 - 5, comment on your views of the PREFACE experience, its strengths and weaknesses and recommendations for change in future years. Your comments, suggestions and critique of your PREFACE experience will influence the planning and revision for the 1993 PREFACE Program.**

- 2. Based on your experiences during PREFACE, describe the strengths of the program.
- 3. Based on your experience during PREFACE, describe any weaknesses in the program.
- 4. Reflecting on your experience during PREFACE, what recommendations or changes would you suggest for the program that would improve and/or make it more meaningful for future participants?
- 5. If you had it all to do over again, would you choose to attend PREFACE at RPI?  
Why or why not?

### EDUCATION PLANS:

Name of college/university you plan to apply for Fall, 1993: \_\_\_\_\_

What is your intended major? \_\_\_\_\_

What is your career goal? \_\_\_\_\_

## APPENDIX V

### PREFACE PARTICIPANTS' PROJECT TEAM REPORT -- AN EXAMPLE

# **INVENTIVE SCUBA GEAR MODIFICATION**

**\*\*\*\*\***

**Group #8**

**Shelly Shea**

**Nneka Hanshaw**

**July 24, 1992**

## DESIGN SUMMARY

Underwater diving is a sport that many people enjoy. However, as with any other type of sport, danger often accompanies the pleasure. The alternate regulator that divers use which is attached to the air tank hangs dangerously low and becomes a potential hazard. As a result, a clip has been designed to place on the side of the alternate regulator so that it will hook on to the front of the diver's air jacket. In addition to the reasons for designing the clip, how we designed it benefits not only the divers themselves but also other divers as well.

This clip has been designed for several reasons. First and foremost, it gives divers a place to put their alternate regulators. Keeping the air hose from getting tangled in sea obstacles is yet another reason. Third, the mouthpiece avoids being torn and damaged which ultimately means money spent to fix it. Finally, it puts the alternate regulator in a highly visible, accessible area.

Another important aspect of the clip is how it is designed. The clip is attached to the side of the mouthpiece with a waterproof epoxy. The clip itself is made out of hard plastic which seems to hold up better than metals in any type of water. The general shape of the clip favors that of a walkman's. This new design, however, has a curved, ribbed interior to create a stronger hold to keep the entire apparatus from dropping off the diver's jacket upon his/her entry into the water. It is not, however, so strong that it won't come off in an emergency.

This revolutionary concept benefits not only the divers themselves but other divers also. The divers who have experienced the problem of the alternate regulator dragging heretofore won't have to worry about that problem anymore. When the clip is properly used, it reduces the risk of destroying the mouthpiece and possibly even the air hose. Moreover, easy access is of major importance to the diver in need of air, and this device secures its availability.

The reasons for designing the clip, the design itself, and the benefits could make the difference between a safe dive and a dangerous one. With the new clip in place, divers can free up their minds to take in more of nature's underwater world. This new device ultimately makes that possible.

# PROBLEM STATEMENT

The alternate regulator on scuba diving suits often presents a problem to divers. The tube trails behind the divers and latches on the surrounding sea environment causing potential hazards. In the following report, my colleague and I have devised what we feel is a working solution to this predicament.

## ASSEMBLY INSTRUCTIONS

1. Form a clip from plastic in the shape shown in the following diagrams. The plastic must be slightly flexible but sturdy enough to withstand the weight of the regulator and additional forces such as any drag from the diver's motion and/ or underwater sea pressure.
2. Attach the clip to the mouthpiece at the location marked with an X on Figure: 4 with an epoxy glue. The epoxy should be a strong adhesive, and it should be waterproof.
3. The clip will attach to any of the available buckles on the air vest. This will allow the diver to determine the most comfortable location of the regulator, and safety will still be maintained.

# BILL OF MATERIALS

| Reference # | Quantity | Part Designation | Material | Note                |
|-------------|----------|------------------|----------|---------------------|
| 1           | 1        | clip             | plastic  | ----                |
| 2           | 1        | glue material    | epoxy    | epoxy is waterproof |
| 3           | 1        | buckle           | aluminum | ----                |

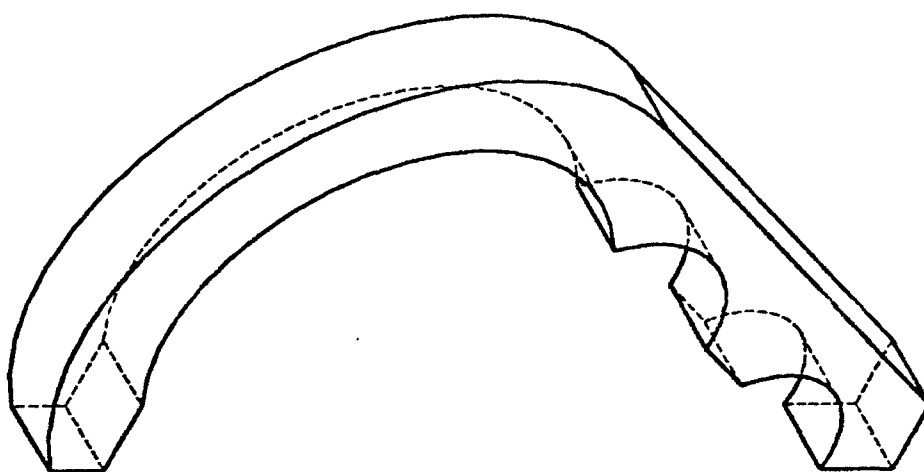


Figure: 1  
NAME : CLIP  
TYPE : STD

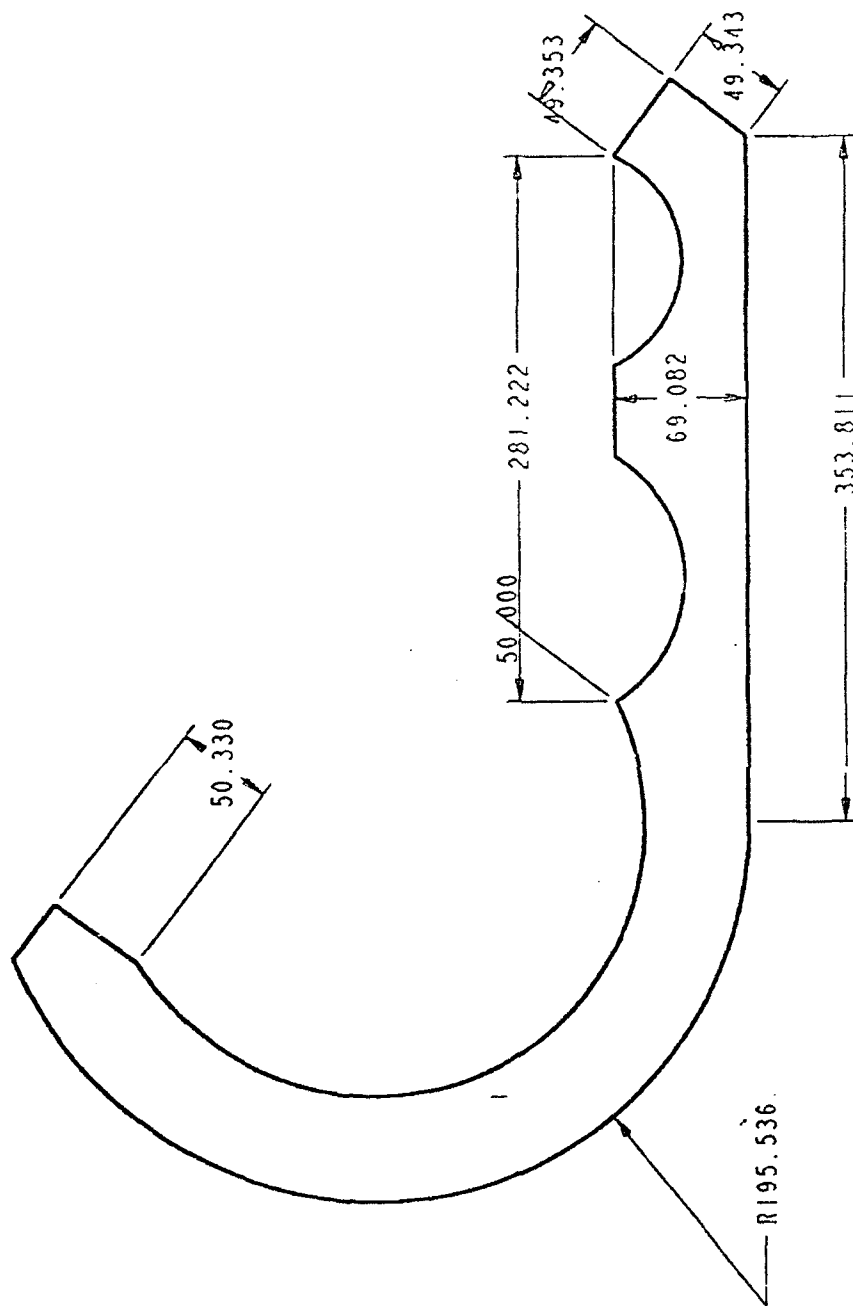


Figure: 2  
NAME : CLIP  
TYPE : STD

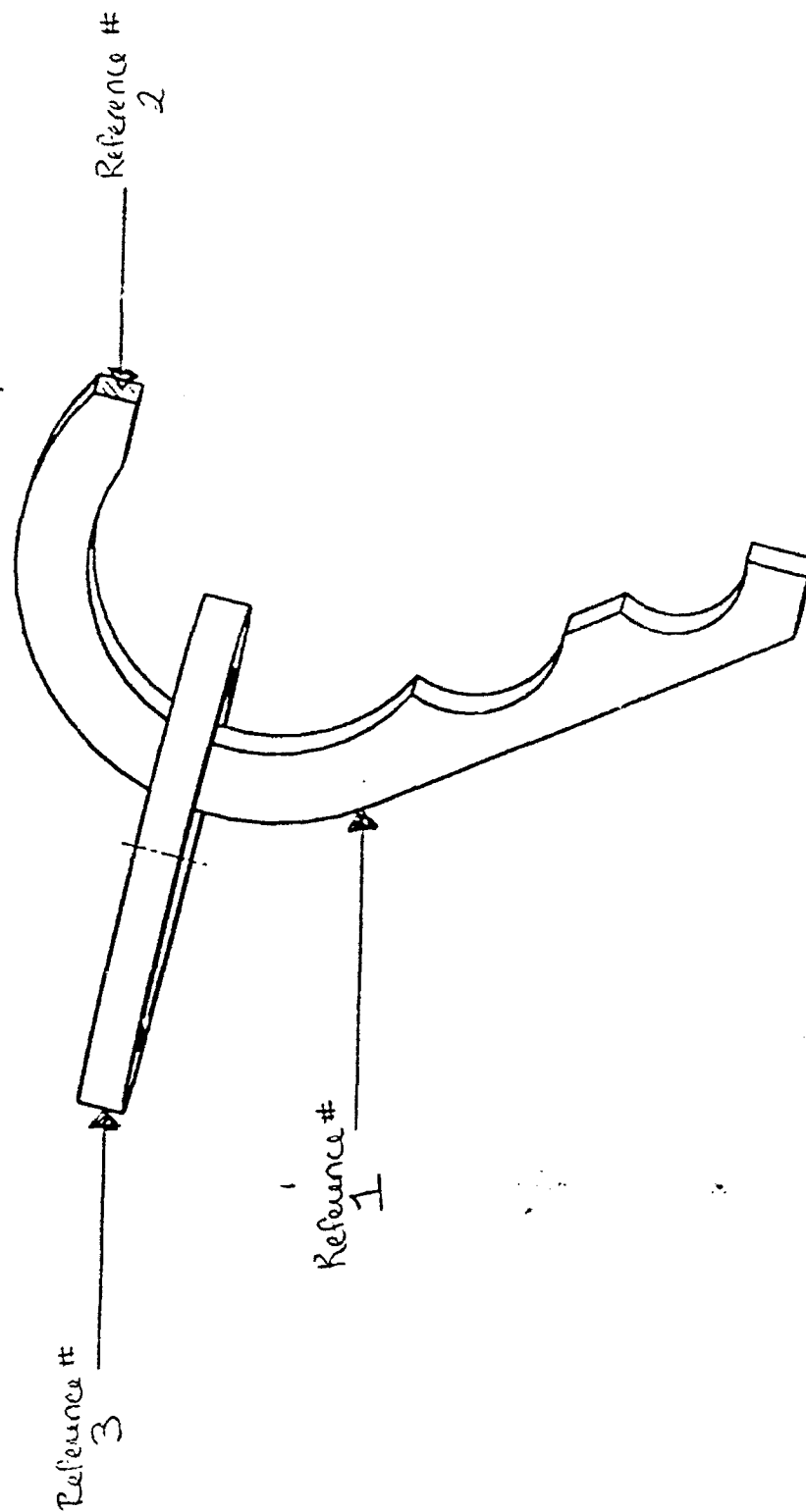
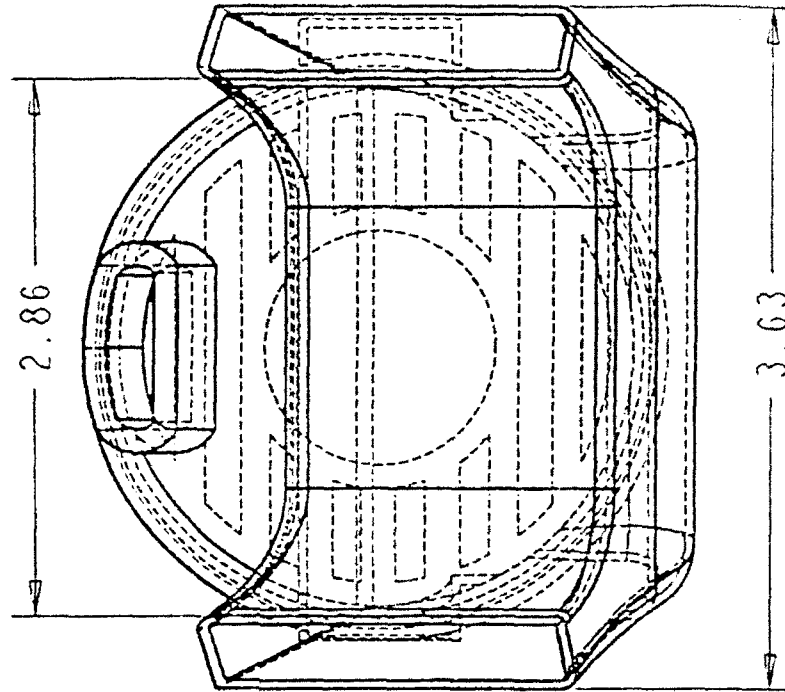
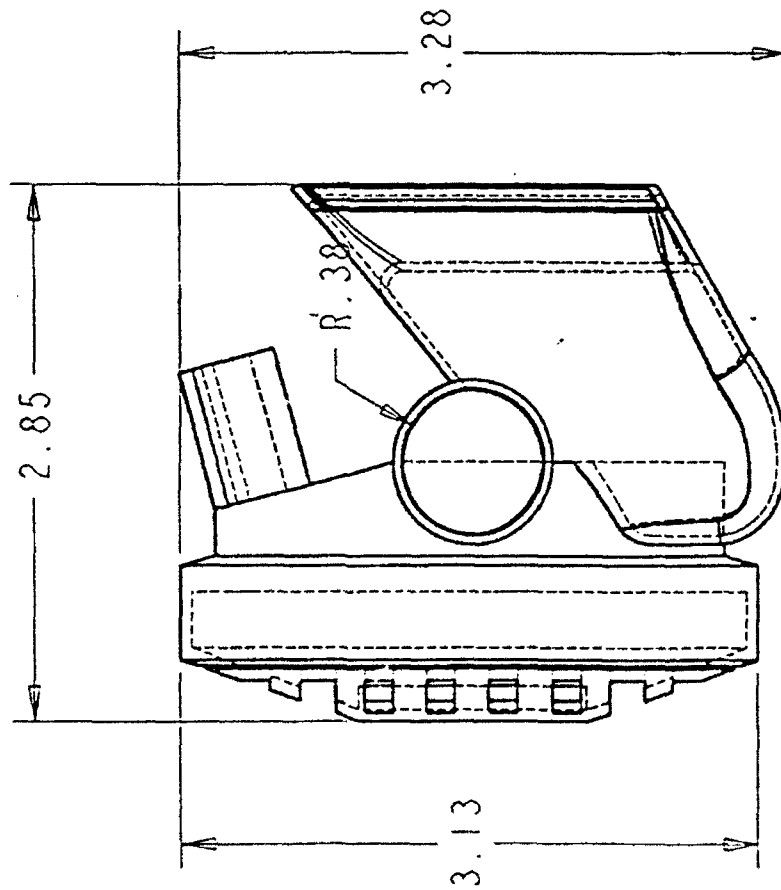
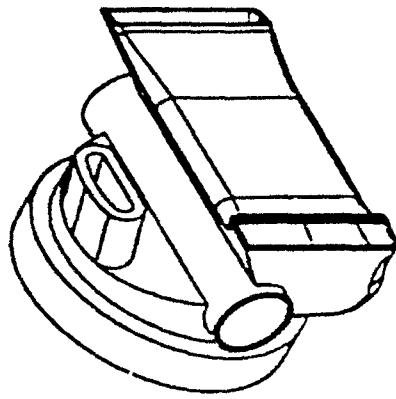


Figure 3



Rensselaer Polytechnic  
Institute

Title  
Regulator

Dr By:  
Appr By:

Date

Scale

Drawn By

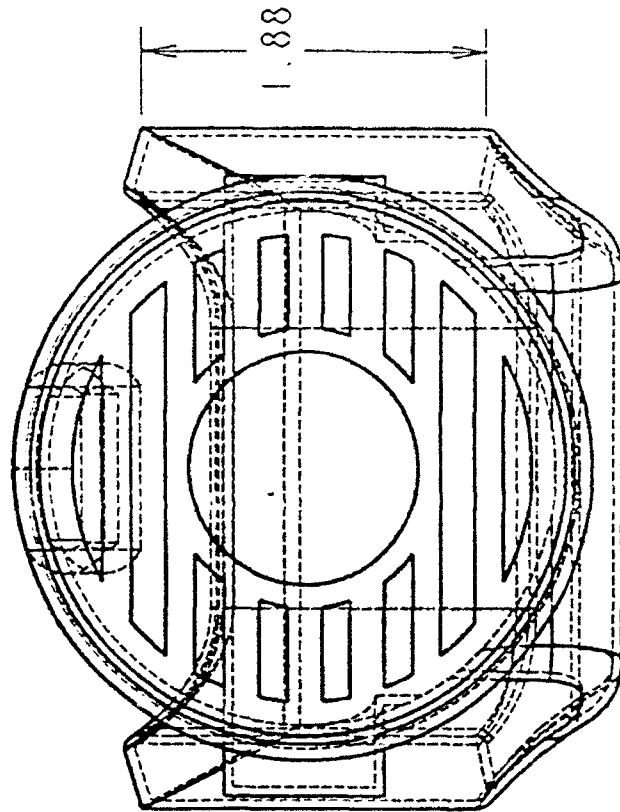
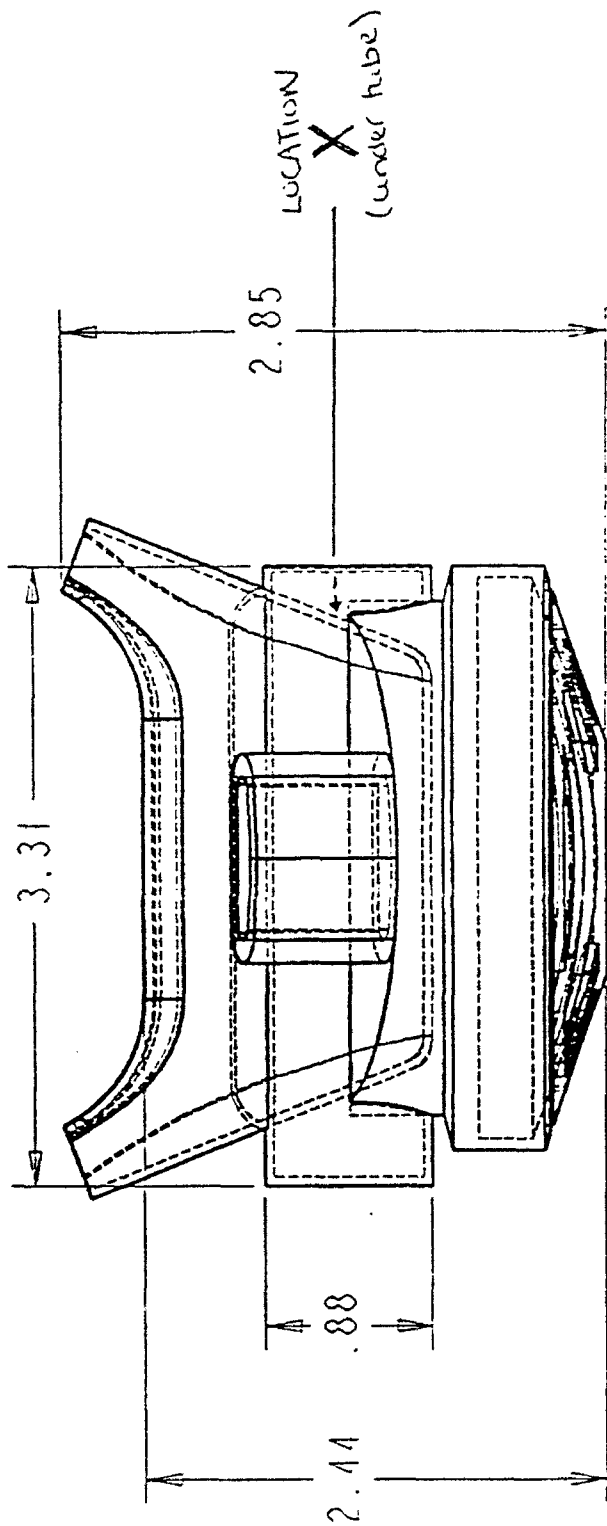


Figure 9

# Scuba Retainer Design

Dylan A. Thomas Memorial Preface  
Program Engineering Team

Project Coordinators:

Aimee Matuszak

Meredith Morgan

**Dylan A. Thomas Memorial Preface Program**

**Main Building**

**1066 Johnson Street**

**Troy, New York 12180-3590**

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**Date:** 22 July 1992

**Subject:** Scuba retainer design

**Introduction:**

This is a presentation of the newly designed retainer for the emergency respirator part of standard scuba diving equipment. Utilizing the productive expertise of the engineering team at the Dylan A. Thomas Memorial Preface Program, this innovative design will prove to be economical and more efficient than previous designs.

Our largest contractor of emergency regulator retainers in 1992 is Waterworld. World-wide, users of our contractors' completed scuba gear have complained of the annoyance the emergency respirator has caused. The previous retainer design has proven to be inefficient during prolonged use and is faulty concerning the forces acting on a diver during scuba activity. The previous design did not allow the regulator to be easily accessible. During an emergency, the previous design was often unreliable, frequently causing life-threatening situations.

The remodeled design presented in this report is easily accessible while being cost effective and able to withstand the pressure of impact with the surface of the water upon entry. The design is effective in retaining the regulator during rigorous underwater activity, a major complaint of the previous apparatus. The

new design allows for reliable mobility through any aquatic environment, keeping the regulator clean while still being easily accessible. Users of the previous design often complained of the high maintenance cost due to the deterioration of the apparatus after continual harsh exposure to the aquatic floors.

Enclosed in this report is a design description and assembly instructions. Included in the presentation package are illustrations of the new design and a Bill of Materials. This is the information needed for a sufficient understanding of the device created by the engineering team at the Dylan A. Thomas Memorial Preface Program. If questions should arise, please contact the coordinators at the above address.

### **Design Description:**

The design for the component to be added to scuba diving equipment utilizing a steel oxygen tank consists of a magnetic box with dimensions 3.460 inches x 4.120 in. x 3.320 in. (refer to figure 1). The box, being a ceramic magnet, will withstand the pressures and drag forces prevalent during any scuba activity due to the strong attraction between the steel tank and the material of the magnetic box. The ceramic magnet will not corrode in either fresh or salt water environments.

Located on the side nearest to the diver (the side facing the direction of motion which the diver guides), exists a durable holding apparatus for the regulator allowing for easy entrance and removal of the device. On this side of the magnetic box, the surface has been removed and has been replaced with a rubber material serving as an inlet/outlet for the emergency regulator apparatus. This apparatus is located within a narrower frame of the magnetic box at a dimension of 0.06 cubic inches. The rubber material is arranged vertically from the top to the bottom of the box and serves as a woven passage strong enough to retain the regulator during rigorous underwater activity. The vertical dimension of the two rubber adjoinments is 2.90 inches, the horizontal is 3.21 in., the depth of each rubber section is 1.0 in, and the distance between each individual segment is 0.264 in. (refer to figures 2 and 3). The rubber interface is connected to the magnetic box with silicon which

acts as an effective support material and maintains its structure and effectiveness in the water. The material is a stiff design that requires some force for entry and exiting. However, this force is not excessive but rather it is an effective strength to provide the holding interface between the magnetic box and the regulator.

### **Assembly Instructions:**

1. The hollow, ceramic, magnetic box is to be 3.460 in. x 4.120 in. x 3.320 in. The magnetic strength of the box should be confirmed before distribution to public use. Should the strength be ineffective in maintaining a strong bond to the steel tank through scuba tests and environmental challenges, the product's magnetism should be increased.
2. The rubber interface consists of ten individual segments that together form the strong interface serving as the inlet/outlet for the regulator. Two sets of five segments each should be attached in a manner that allows the segments to compliment each other in position (that is, they are woven together in the opposite direction). The assembled interface is attached to the magnetic box 0.06 cubic inches within the entrance to the open surface by means of silicon gel capable of withstanding the harsh environment of the waters and serving as a reliable and durable connecting material (refer to figure 4).
3. A final confirmation of the magnetism of the box and its ability to retain the regulator with a firm grasp should be completed before the box is introduced to the general public.

### **Conclusion:**

This is the presentation of a newly-modeled retainer for the emergency regulator part of standard scuba diving equipment. Presented by the Dylan A. Thomas Memorial Preface Program team of engineers, this design is more effective in storing the emergency regulator for easy accessibility to both the diver and partner team. The magnetic box is a reliable retainer that adapts to the aquatic environment sufficiently, it is economical, and it is a simple design ideal for mass production and distribution.

Once again, should questions arise concerning the design, please contact the Preface engineering team.

**Aimee Matuszak**

*Aimee Matuszak*

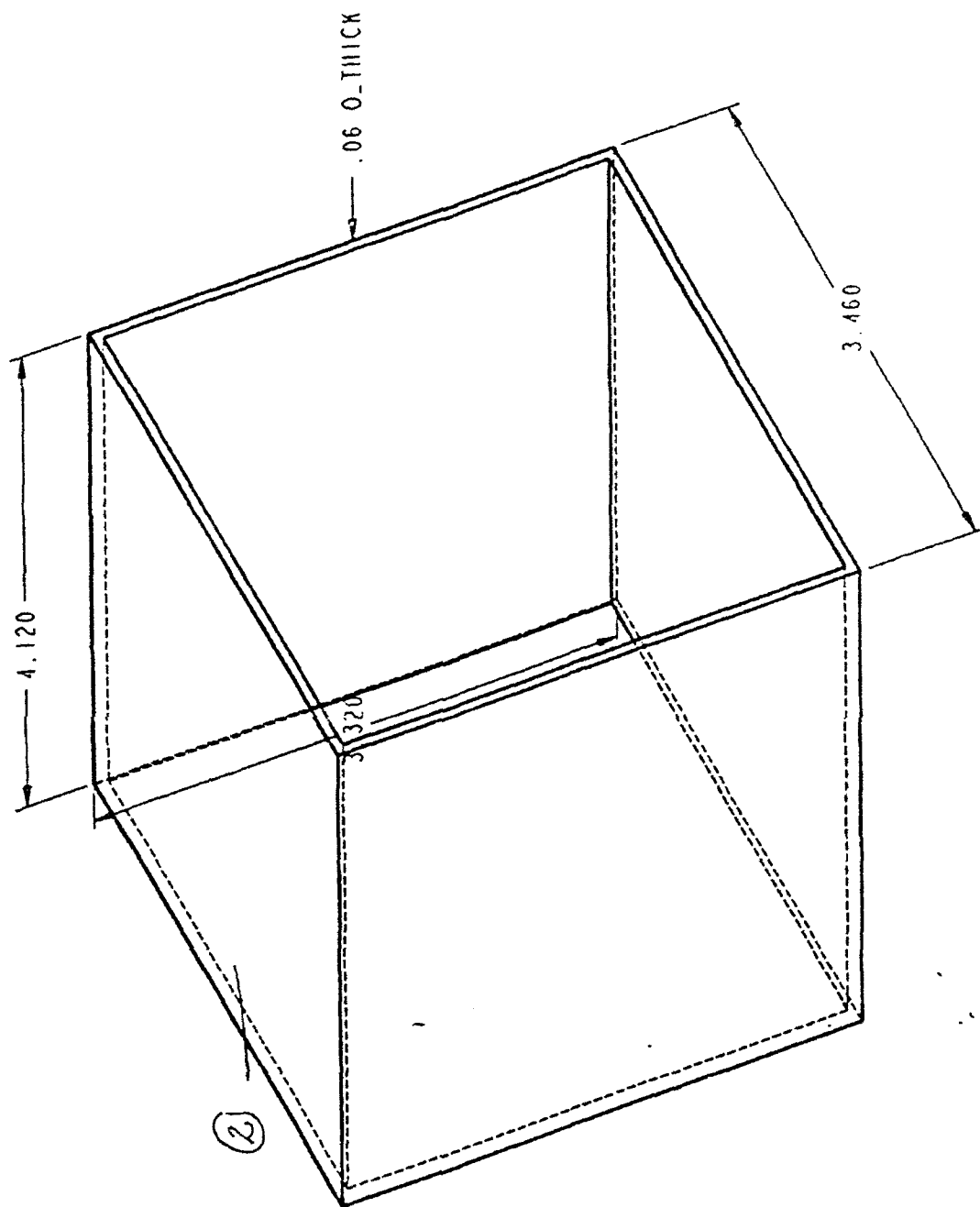
**Meredith Morgan**

*Meredith Morgan*

**Project Coordinators**

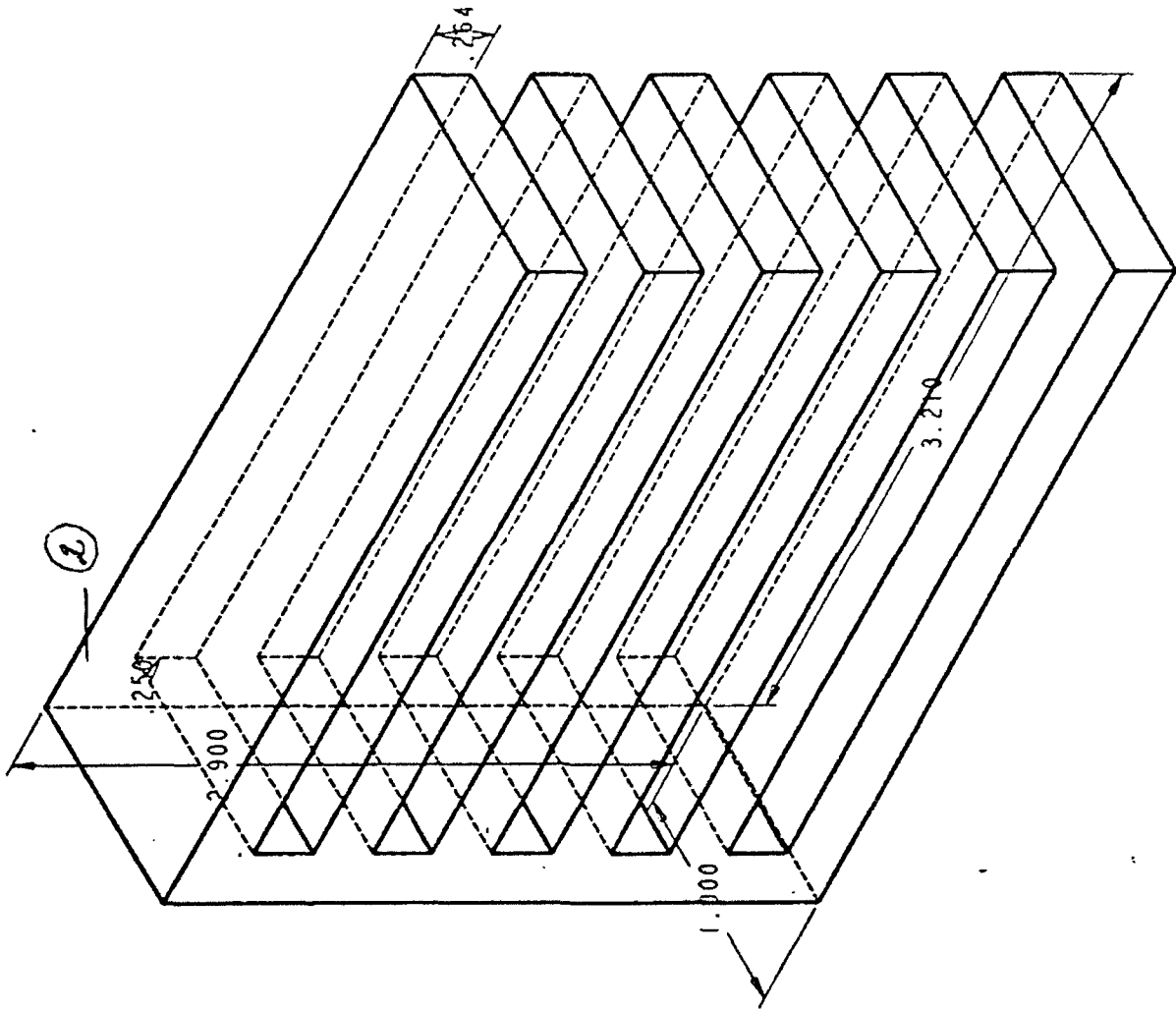
Bill of Materials  
Scuba Retainer Design  
Dylan A. Thomas Memorial Preface Engineering Team

| Reference Number | Quantity | Part Designation | Material       |
|------------------|----------|------------------|----------------|
| 1                | 2        | Interface        | Rubber         |
| 2                | 1        | Magnetic Box     | Ceramic Magnet |

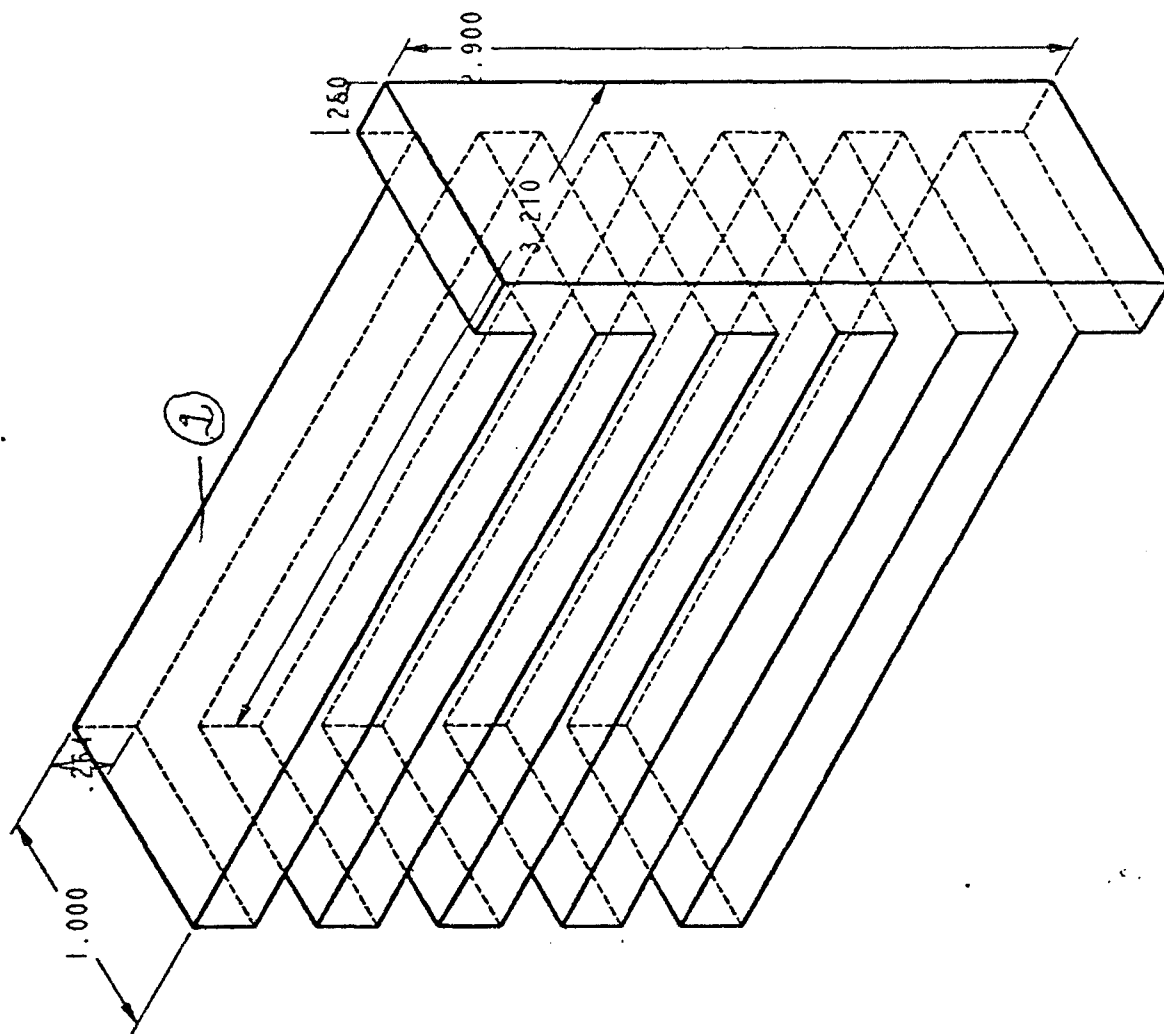


NAME : DESIGN  
TYPE : STD

Figure 1.



NAME : FINGERI  
 TYPE : STD  
 Figure 2



NAME : FINGER2  
TYPE : STD

Figure 3

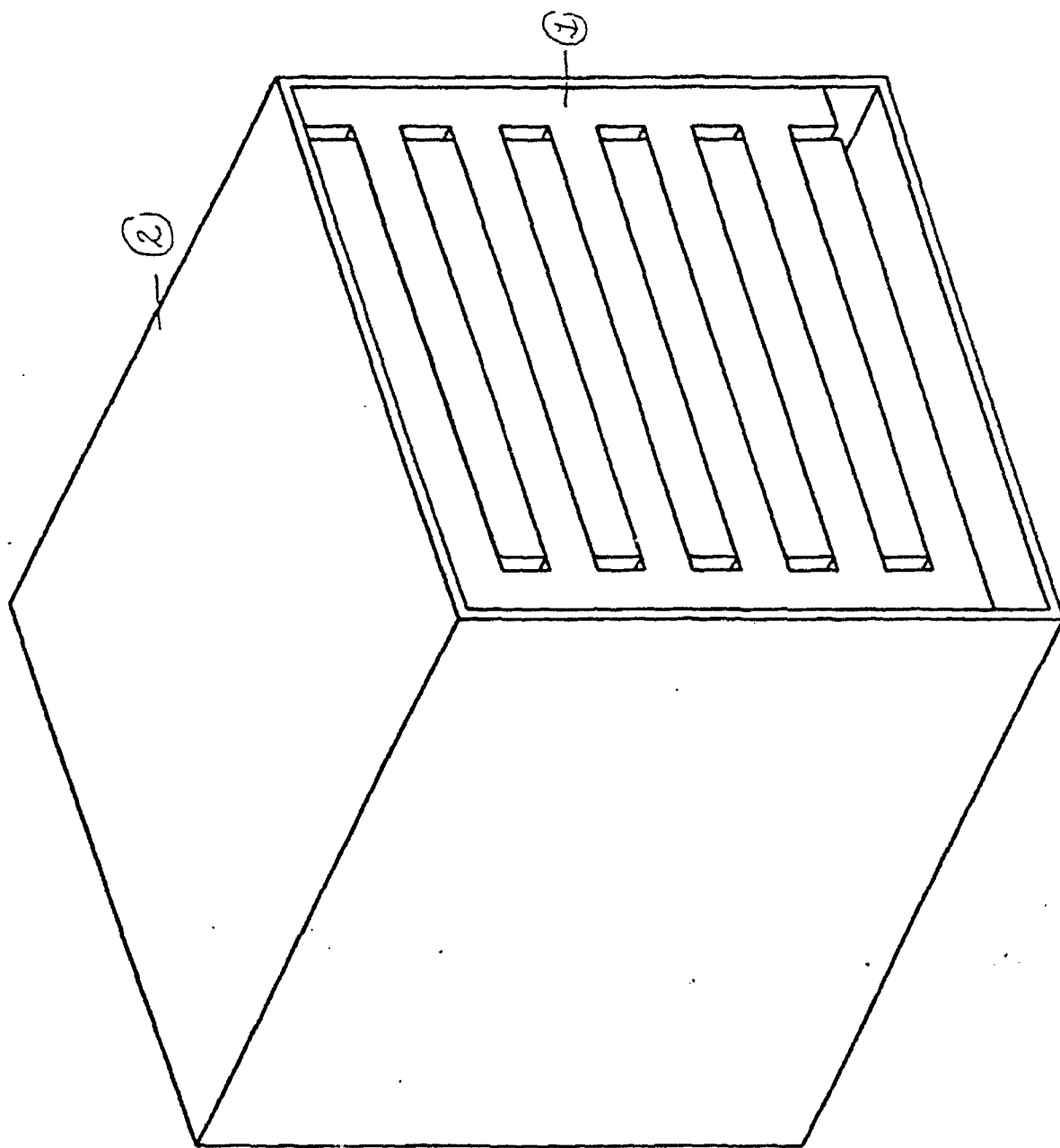


Figure 4