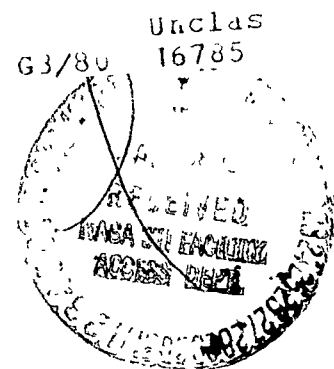

FINAL REPORT
FOR THE 1985
NATIONAL AERONAUTICS AND SPACE
ADMINISTRATION'S SUMMER HIGH SCHOOL
APPRENTICESHIP RESEARCH PROGRAM
(SHARP)

Contract No. NASW-4037

(NASA-CR-176472) THE 1985 NATIONAL
AERONAUTICS AND SPACE ADMINISTRATION'S
SUMMER HIGH SCHOOL APPRENTICESHIP RESEARCH
PROGRAM (SHARP) Final Report (Tresp
Associates, Inc.) 65 p HC A04/MF A01

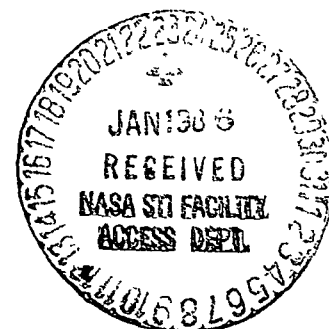
N86-17213



November 29, 1985

Prepared By:

Tresp Associates, Inc.
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Silver Spring, MD. 20910
(301) 495-7700



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November 29, 1985

Mr. Roscoe Monroe (LEF)
SHARP Program Manager
Educational Affairs Division
National Aeronautics and
Space Administration
400 Maryland Ave., SW Room 6052
Washington, D.C. 20546

Dear Mr. Monroe:

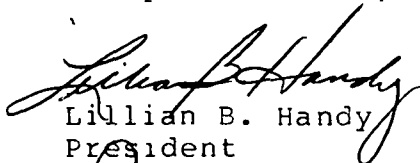
Enclosed is the Final Report for the 1985 Summer High School Apprenticeship Research Program (SHARP). The SHARP Program completed its sixth year with notable success.

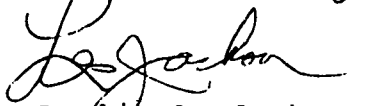
The program once again selected outstanding students and presented them with challenging opportunities to learn, earn, and contribute to NASA's research agenda in science and engineering. And once again, the apprentices rose to the occasion and made significant contributions on a variety of research projects.

Our first large group of former apprentices graduated from college this summer and entered the workforce. In the follow-up evaluation, we were pleased to note that of 22 former apprentices with full-time jobs, 16 or 73% had taken a position in the field of science or engineering, including two who were hired by NASA. The first fruits of the program have been harvested; next year is expected to produce even more significant results.

We enjoyed working with you and all the other talented and dedicated people involved with making the SHARP dream come true.

Very truly yours,
Tresp Associates, Inc.


Lillian B. Handy
President


Leslie A. Jackson
Program Manager

Enclosure.

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EXECUTIVE SUMMARY

In 1985, a total of 126 talented high school students gained first hand knowledge about science and engineering careers by working directly with a NASA scientist or engineer during the summer. This marked the sixth year of operation for NASA's Summer High School Apprenticeship Research Program (SHARP). The major priority of maintaining the high standards and success of prior years was satisfied.

The following eight sites participated in the Program: Ames Research Center, Ames' Dryden Flight Research Facility, Goddard Space Flight Center, Goddard's Wallop Flight Facility, Kennedy Space Center, Langley Research Center, Lewis Research Center, and Marshall Space Flight Center. Tresp Associates served as the SHARP contractor and worked closely with NASA staff at headquarters and the sites just mentioned to plan, implement, and evaluate the program.

Planning. The 1984 SHARP Guidelines were revised; minor changes were made. The revised guidelines were used by those responsible for managing the Program at the national and center levels (i.e., the management team). The SHARP Guidelines covered program plans, delivery, administration, evaluation, and reports.

The annual SHARP Planning Conference, which was held in Hampton, Virginia, and hosted by the Langley Research Center Public Affairs Office, March 28-30, 1985, was attended by 19 management team members. The Conference allowed attendees to share experiences and ideas and discuss ways to improve the Program. A Planning Conference Report was prepared. At the center level, each center summarized its plans in a one page Center Plan.

Delivery. The eight SHARP sites recruited and selected high school students with an interest in and aptitude for science and engineering careers. The students took part in a challenging eight to ten week paid research apprenticeship. After an orientation period, the students spent 80% or more of their time in the laboratories working on their research projects with their mentors. The rest of the time was spent on reports, counseling, field trips, and other enrichment activities.

The composition of the group was as follows:

Females	60%
Males	40%
Minorities	62%
First Time SHARP Students	84%

Other tasks undertaken included the development of a Press Kit and a General Information Kit for use by the management team. Two newsletters were written and distributed to the SHARP team. Also, 131 colleges and universities identified by this year's students received information about SHARP and the students. The deans of these institutions were asked to send information to the students about their undergraduate science and engineering programs.

Administration. Tresp Associates provided administrative support that facilitated the planning, implementation, and evaluation of SHARP. Key administrative policies and procedures were detailed in the SHARP Guidelines. Monthly progress reports were submitted and quarterly progress meetings were held in Washington, D.C.

Evaluation. The End-of-the-Program Evaluations showed that each group involved in SHARP -- students, NASA program staff, NASA mentors, faculty coordinators, and others -- felt very positive about the Program and wanted to see it continue and expand.

The Follow-up Evaluation on SHARP students from 1980 to 1984 revealed that 76% of the students who were in college were majoring in science or engineering; and 17 of the 19 students who have graduated, have earned degrees in science or engineering. Of the 22 former apprentices with full-time jobs, 16 or 73% had taken a position in the field of science or engineering. Two of the 16 (13%) took a position with NASA.

Recommendations for SHARP '86 and Conclusions. The only recommendation is that the annual planning conference be held in January, 1986 at the Jet Propulsion Laboratory so as to allow each center to start its planning for SHARP early and enable the management team to learn about and enjoy the historic Uranus Encounter first hand.

In conclusion, we are pleased to say that the priority of maintaining the high standards of excellence for which SHARP has become noted has been accomplished. Everyone associated with SHARP -- especially the students, mentors, and management team -- should feel proud and should be congratulated for a job well done.

I. INTRODUCTION.

The 1985 Summer High School Apprenticeship Research Program (SHARP) began December 1, 1984, and ended November 29, 1985. This marked the SHARP Program's sixth year of providing talented high school students with an opportunity to gain first-hand knowledge about science and engineering careers by working directly with a NASA scientist or engineer during the summer. Eight NASA sites participated in SHARP:

1. Ames Research Center (Moffett Field, CA)
2. Ames' Dryden Flight Research Facility (Edwards, CA)
3. Goddard Space Flight Center (Greenbelt, MD)
4. Goddard's Wallops Flight Facility (Wallops Island, VA)
5. Kennedy Space Center (Kennedy Space Center, FL)
6. Langley Research Center (Hampton, VA)
7. Lewis Research Center (Cleveland, OH)
8. Marshall Space Flight Center (MSFC, AL).

A total of 126 students participated in paid research apprenticeships at these sites. Tresp Associates served as the contractor for the Program. Contract staff worked closely with NASA staff at Headquarters and the eight participating sites to plan, implement, and evaluate the Program.

NASA's Educational Affairs Division identified the following priorities for SHARP:

1. Improved program planning.
2. Improved capabilities for disseminating program information.
3. A comprehensive, uniform evaluation of program costs and benefits.

The 1985 program year was to be a year of maintaining an established and successful program.

In this final report, you will see that, overall, these priorities were achieved. The remainder of the report is divided into these sections:

- II. Planning
- III. Delivery
- IV. Administration
- V. Evaluation
- VI. Recommendations for SHARP '86 and Conclusions
- VII. Appendix

This report includes material from the Centers' Final Reports submitted at the end of the program year. The following section addresses Planning.

II. PLANNING

At the national level, planning for the 1985 SHARP Program was concentrated in two areas: a set of guidelines and a planning conference.

Guidelines. The 1985 guidelines were similar to the 1984 guidelines. Specific guidance and examples were provided for these areas:

1. Program Plans
2. Program Deliverables and Administration
3. Program Evaluation and Reports.

However, minor changes were made in 1985. These changes included the following:

1. A revised end-of-the-program evaluation form
2. A revised follow-up evaluation.

After the guidelines were reviewed at the planning conference, they were revised, approved, printed, and distributed to SHARP management team members. A representative page from the SHARP guidelines is shown in Exhibit 1 at the end of this section.

Planning Conference. The 1985 SHARP Planning Conference was held in Hampton, Virginia, March 28-30, 1985. The conference was staged under the auspices of the Educational Affairs Division, Elementary and Secondary Programs Branch, NASA Headquarters, and was hosted by the Langley Research Center Public Affairs Office. The objective of the conference was to bring the SHARP management team together to review, discuss, and modify the SHARP guidelines; provide an opportunity for the attendees to share experiences and ideas; and obtain recommendations and suggestions from the center faculty coordinators and representatives on ways to improve the program. A total of 19 persons attended, representing NASA Headquarters; Ames Moffett; Ames' Dryden Flight Research Facility; Goddard Space Flight Center (Greenbelt and Wallops); Kennedy Space Center; Langley Research Center; Lewis Research Center; Marshall Space Flight Center; and Tresp Associates, Inc.

A planning conference report was prepared, approved, printed, and distributed to SHARP management team members. At the center level, each center summarized its plans in a one page Center Plan. The next section of this report is Delivery.

EXHIBIT 1: REPRESENTATIVE PAGE FROM SHARP GUIDELINES

2.1 Objectives, Component, and Organization Chart

NATIONWIDE OBJECTIVES

DESCRIPTION

The nationwide objectives of SHARP for this fiscal year are to:

1. Introduce and expose 125 talented, under-represented minorities and women at the high school level to scientific and engineering careers at NASA through a structured work experience with a NASA scientist or engineer.
2. Strengthen the Program through improved planning, dissemination of information, and evaluation of costs and benefits.
3. Expand SHARP to include more students.

As a result of this career exploration program, these students will be better able to make decisions about science and engineering careers on the basis of first-hand information and experience.

<u>TASKS (T) AND DELIVERABLES (D)</u>	<u>LEAD PERSON*</u>	<u>SCHEDULE</u>
T-1 Review existing nationwide objectives, with input from headquarters and centers	Contractor Program Manager	Oct
T-2 Recommend and finalize nationwide objectives for new FY	Contractor Program Manager	Nov-Jan
D-1 Nationwide objectives (as part of Guidelines)	Contractor Program Manager	Nov 30 (Draft)
		Jan 31 (Final)

ADDITIONAL INFORMATION

Each center or facility will have its own set of objectives, as will be explained later.

* Recommended lead or primary responsibility

III. DELIVERY

This section is divided into three parts: summer program, newsletter, and public information.

Summer Program. The eight SHARP centers recruited and selected students who demonstrated an interest in and aptitude for science and engineering careers. A profile of the 125 students who participated in SHARP '85 is presented in Exhibit 2 at the end of this section.

After an orientation period, the students spent 80% or more of their time in the laboratories, working on their research projects with their mentors. The rest of the time was spent on reports, counseling, field trips, and other enrichment activities. A center by center list of students, projects, career interests, mentors, and management team members is shown in Exhibit 3 at the end of this section. A one page summary of each center's summer program can be found in the Appendix.

Newsletters. Two newsletters were written, approved, printed, and distributed to the SHARP team. All centers contributed stories or information to the newsletters, which carried July and August datelines. Representative pages from the newsletters are included in Exhibits 4 and 5 at the end of this section.

Public Information. Two information kits were developed and included in the SHARP guidelines for use by all management team members. The first kit was a Press Kit and the second a General Information Kit. The kits could be used as they were or could be modified or supplemented to meet a particular need. Several centers decided to issue news releases and did receive coverage in the local media.

In addition, information on SHARP and the 1985 apprentices was sent to 131 colleges and universities identified by the apprentices. The deans of these institutions were asked to send information on their science and engineering programs to the apprentices, and some of them have written us to confirm that this was done. A copy of the letters sent to colleges and samples of those received from colleges are included in Exhibits 6 to 9. A list of the colleges and universities contacted is presented in the Appendix. The next section of this report is Administration.

EXHIBIT 2: PROFILE OF SHARP '85 STUDENTS

CENTER	<u>NUMBER OF STUDENTS</u>
AMES MOFFETT	19
AMES DRYDEN	10
GODDARD	25
GODDARD WALLOPS	5
KENNEDY	12
LANGLEY	15
LEWIS	20
MARSHALL	20
 TOTAL	 126

SEX	NO.	PERCENT	RACE	NO.	PERCENT
Female	76	60	American Indians or Alaskan Natives	0	0
Male	50	40	Asians or Pacific Islanders	18	14
TOTAL	126	100	Blacks	61	48
			Whites	45	36
ETHNICITY			Others	2	2
Hispanic Origin	8	6	TOTAL	126	100
Not of Hispanic Origin	118	94	PROGRAM STATUS		
TOTAL	126	100	New or First Time	106	84
			Returning	20	16
			TOTAL	126	100

EXHIBIT 3: SHARP '85 APPRENTICES AND MANAGEMENT TEAM MEMBERS

A total of 125 apprentices at eight sites worked on their summer projects under the careful supervision of their mentors and management team members, as noted below.

Ames Research Center:Moffett (Mountain View, CA)

<u>Apprentice</u>	<u>Project</u>	<u>Career Interest</u>	<u>Mentor</u>
1. Arcelo, Vincent	Biomedical Research	Math/Computer Programming	Bruce Halpryn
2. Bautista, Joel	Space Operations	Engineering	Robert Jackson
3. Cabana, Graciela	Telecommunications System Development	Undecided	Dr. Harry Jones
4. Dombroski, Ann	Materials & Test Engineering	Aerospace Engineering	Howard Nelson
5. Hanson, Allison	Electronic Instrument Service	Engineering	Robert Reutter
6. Jacoby, Margret	Mechanical Systems	Engineering	Dennis Matsuhiro
7. Kennedy, Philippe	Space Human Factors	Undecided	Marc Cohen
8. Kenoly, Jacqueline	Biomedical Research	Medicine	Bruce Halpryn
9. Kim, Jennifer	Aerospace Human Factors Research	Engineering	Yvonne Clearwater
10. Kwan, Bruce	Electrical Systems	Electrical Engineering	Reginald King
11. Lee, Kelly	SIRIF Study	Engineering	Walter Brooks
12. McKissick, Ransome	Life Sciences	Medicine	Dr. Henry Leon
13. Moortgat, Kathy	Electronic & Optical Engineering	Engineering	Jon Bader
14. Salazar, Ron	Extraterrestrial Research	Computer Programming	William Likens
15. Sanders-Depue, Dorin	Theoretical Studies	Undecided	Bruce Smith

16. Sarmiento, Russell	Aerospace Human Factors	Engineering	Scott Fisher
17. Szeto, Claire	Life Sciences	Engineering	Dr. Henry Leon
18. Wallach, Deborah	Aerospace Human Factors	Computer Science	Andrew Watson
19. Yen, Michael	Neuroscience	Medicine	Pat Cowings

Management Team - Sylvia Stanley, Chief, Training and Special Programs Branch; Garth Hull, Educational Services Officer; B. Michael Donahue, Educational Services Officer; Patricia Powell, Faculty Coordinator; Anthea Charles, Administrative Support

Ares' Dryden Flight Research Facility (Edwards, CA)

<u>Apprentice</u>	<u>Project</u>	<u>Career Interest</u>	<u>Mentor</u>
1. Ambre, Lisa	Vibration Experiments	Science	Mike Kehoe
2. Amy, Anilda T.	Flight Support Work	Mechanical Engineering	Bill Albrecht
3. Evans, Alison	Battery Information Management System	Electrical Engineering	Al Stewart
4. Fox, Richard	Speed-Altitude Determinations	Electrical/Mechanical Engineering	Ehemberger/Larson
5. Greiner, Laura	X-29 Control System	Medicine/Engineering	Trindal Maine
6. Interrante, Robert	Computer Model of Plexiglass Structure	Chemistry & Medicine	Jerald Jenkins

7. No, Monica	Fill Data Calibrations	Engineering	Darla Duke
8. Putnam, Brant	Computer Interactive Program	Medicine	Terry Montgomery
9. Van Norman, Timothy	Evaluation of Computer Programs	Electrical Engineering	Glenn Bever

Management Team - Gary Layton, Deputy Chief, Research Engineering;
Robert Garza, Faculty Coordinator

Goddard Space Flight Center (Greenbelt, MD)

<u>Apprentice</u>	<u>Project</u>	<u>Career Interest</u>	<u>Mentor</u>
1. Allen, DeAnna	Image Analysis	Engineering	Charles Cosner
2. Ballaóe, Bret	Earth Resources	Science	Emmett Chappelle
3. Blocker, Ananias III	Central Data Services	Computer Science	Dr. Joseph King Steve Perego
4. Boyd, Beltoor	Interplanetary Physics	Physics	Dr. Keith Ogilvie
5. Bugg, Michael	Solar Physics	Astronautics	Richard Schmadebeck
6. Bullock, Veronica	Commercial Programs	Computer Science	Sidney Alterescu
7. Exum, Cecil III	Severe Storms	Biochemical Engineering	Leland L. Dubach Ida Hakkarinen
8. Ficklin, Chon	Business Management	Corporate Law	Carol Arkwright
9. Fowler, Angela	Cosmic Radiations	Astronomy/ Chemistry	Dr. Jonathan Ormes Dr. Robert Streitmatter
10. Freeman, Kevin	Computer Systems Management	Journalism	Jack Balakirsky
11. Howard, Otis	Shuttle Payload Design	Electrical Engineering	Roy McIntosh

12. Kerr, James Jr.	Data Management Systems	Engineering & Computer Programming	Henry Linder
13. King, Dawan	Experimental Instrumentation	Pediatrics	James Smith
14. Loney, Derek	Extraterrestrial Physics	Aeronautical Engineering	Dr. Bertram Donn
15. Matthews, Lisa	Support Systems	Chemical Engineering	Paul Ondras Irvin Linares
16. Minor, Bryan	Software Development	Gynecology	Betsy Edwards
17. Park, Jennifer	Geodynamics	Chemical Engineering/Medicine	Dr. Chopra Ma
18. Randall, Laura	Data Systems	Electrical Engineering	Edward Zenker
19. Rollins, Pamela	Planetary Magnetospheres	Aerospace Engineering	Dr. Mario Acuna
20. Southerland, Paula	Advanced Missions Analysis	Mechanical/Civil Engineering	Dr. Stephen Paddock
21. Thomas, Hans	Structure and Mechanical Design	Electrical Engineering	George Gerondakis
22. Williams, Erik	Atmospheric Chemistry Dynamics	Undecided	Dr. Jack Kaye
23. Williams, Kathleen	Antenna Technology	Chemistry/Engineering	Robert Jackson
24. Williams, Kimberly	Central Data Services	Undecided	Dr. Joseph King Steve Peregoy
25. Woodland, Stephanie	Central Data Services	Business	Valerie Thomas Cathy Hoxie

Management Team - Elva Bailey, Educational Programs Officer; James Mundy, Equal Opportunity Programs Officer; James Chapman, Equal Opportunity Programs Officer; Cyn Hadnott, Faculty Coordinator; Mar-jeau Barret, Assistant; Michelle Ferrier, Historian

Goddard's Wallops Flight Facility (Wallops Island, VA)

<u>Apprentice</u>	<u>Project</u>	<u>Career Interest</u>	<u>Mentor</u>
1. Collins, Jackie	Air Aerosol Content	Computer Science	Dr. Dave Oberholtzer
2. Norman, Steven	Jet Fuel Analysis	Pharmacology/ Medicine	John Murrell
3. Pettit, Tyeast	Software Systems for work Order Documentation	Computer Programming/ Electrical Engineering	Randy Odom
4. Santiano, Daniel	Laser Physics Applications	Computer Engineering	Wayne Wright
5. Savage, Perdita	Instrumentation Systems for NASA Storr Hazzards Project	Engineering/Law	Tom Savage John Gerlach

Management Team - Joyce Milliner, Program Coordinator, Public Affairs;
Patsy Cantor, Administrative Assistant

Kennedy Space Center (Florida)

<u>Apprentice</u>	<u>Project</u>	<u>Career Interest</u>	<u>Mentor</u>
1. Albright, Maurice	The Effect of Electromyostimulation on Length, Strength, and Size	Medicine	Mary Frey
2. Brinson, Ashton	Format for the Launch Processing System	Mathematics/ Chemistry	Robert Tooley
3. Chewing, Lynn	Computer Program for Data	Mathematics	Glenn Seaton
4. Grzeszczak, Robert	Fish Community Responses to Environmental Perturbations Produced by Launches of Space Transportation System	Biology	Ross Hinkle

5. Lindsey, Molly	Stability Predictions on Long Term Data	Engineering	John Riley
6. Johnston, Jennifer	Particulate Deposition Resulting from Launches of Space Transportation System	Limnology	Ross Hinkle
7. Phillips, Damon	Plans for Recovery Data System	Engineering	John Knight
8. Pickar, Amy	Electrostatic Robotic Test Cell	Biology/Chemistry	Bob Luken
9. Thompson, Tracy	Fiber Optic Testing Program	Science	Mike Padgett
10. Ting, Paul	KSC Blocker Develop- ment: Intergration and Check Out	Computers	Al Ordonez
11. Tolley, Renee	Interelmental Inferences Spectral Background for Several Elements When Analyzed for Inductively Coupled Plasma Atomic Emission Spectrometry	Oceanography	Lee Underhill
12. Weaver, Dana	Plant Microbes Inter- action in Conrol Environment Life Support System (CEISS)	Biology	Dick Strayer

Management Team - Raymond Corey, Education Program Officer; June Buchanan,
Student Programs; Barbara Grant, Faculty Coordinator

v.

Langley Research Center (Hampton, VA)

<u>Apprentice</u>	<u>Project</u>	<u>Career Interest</u>	<u>Mentor</u>
1. Block, Michelle	Digital Data Acquisition	Aerospace/ Aeronautical Engineering	Michael Chapman
2. Ford, Pamela	Experimental Flight Systems	Engineering	Gilbert Haynes
3. Freeman, Andrea	Computer Systems	Computer Science	Jeff Cleveland
4. Fullwood, Darron	Pressure & Flow Measurement	Engineering	Michael Mitchell
5. Holt, Amanda	Laser Systems Measurement	Engineering	David Schryer
6. Hugo, Anna	Gas Parameters Measurement	Aerospace Engineering	James Meyers
7. Jones, Cassandra	Data Management	Computer Science	Michelle Taylor
8. Kuo, Catherine	Fault Tolerant Systems	Computer Science	Charles Husson
9. Nucup, Jane	Aerosol Research	Computer Science	Leonard McMaster
10. Peters, Kerry	Fault Tolerant Systems	Aeronautical Engineering	George Finelli
11. Pogorzelski, Henry	Applied Materials	Aeronautical Engineering	Dr. Sheila Long & Dr. Edward Long
12. Ramsey, Karen	Spacecraft Analysis	Aeronautical Engineering	Melvin Ferebee
13. Reves, Laura	Aerothermodynamics	Chemical Engineer	Dr. Leonard Melfi
14. Thornton, Shannon	Flight Dynamics	Mechanical Engineering	Joseph L. Johnson
15. Yip, Thomas	Computer Science & Applications	Computer Science	Geoffrey Tennille

Management Team - A. Gary Price, Head, Office of External Affairs; Roger Hathaway, Education Specialist; Walt Darden, Faculty Coordinator; Pat Foretich, Administrative Support

Lewis Research Center (Cleveland, OH)

<u>Apprentice</u>	<u>Project</u>	<u>Career Interest</u>	<u>Mentor</u>
1. Ammons, Jodi	Aerodynamic Research	Science	R. Shyne
2. Austin, John	Optical Instrument Research	Chemical Engineering	F. Seasholtz
3. Blair, Janet	Structural Ceramics Research	Aeronautical Engineering	F. Hurwitz
4. Butts, Tamala	Advanced Polymers Research	Chemical Engineering	M. Meador
5. Chandler, Jeffery	Structural Ceramics	Engineering	G. Baalini
6. Chang, Martin	Architectural Design	Physics	D. Lauderdale
7. Cole, Sharon	Optimization/ Composites Research	Chemical/ Electrical Engineering	C. Cinty
8. Don, Ken	Auxiliary Propulsion Research	Electrical Engineering	T. Hardy
9. Gandarilla, Wilmer	Security Research	Computer Engineering	R. Mohr
10. Garrett, Michael	Surface Science Research	Computer Engineering	T. Spalvins
11. Kirby, Kammie	Solid State Device Research	Engineering	K. Basin
12. Nicholson, Melisa	System Dynamics Research	Science	M. Nall
13. Nudelman, Eric	User Information (computers)	Computer Science	C. Farrell
14. Oliver, Denise	Turbine Engine Research	Chemical Engineering	C. Norgren
15. Prather, John	Icing Research	Mechanical Engineering	R. Shaw
16. Quinones, Martina	Solid State Research	Science	J. Warner
17. Sears, Rochelle	Solidification Fundamentals	Engineering	R. Jecn

18. Tisdale, Curtis	Stirling Engine Research	Micro/Electrical	J. Schreiber
19. Valentin, Ivette	High Temperature Analysis	Avionic/Electronic	J. Caruso
20. Young, Alicia	Icing Research	Architectural Engineering	D. Anderson

Management Team - R. Lynn Bondurant, Jr., Educational Services Officer;
Judith A. Fudd, Educational Services Office; Glendell J. Nailing, Faculty Coordinator

Marshall Space Flight Center (Huntsville, AL)

<u>Apprentice</u>	<u>Project</u>	<u>Career Interest</u>	<u>Mentor</u>
1. Aytch, Annary	Systems Analysis & Integration	Engineering/Law	Robert Crumbley
2. Bently, Blake	Space Science	Aerospace Engineering	Dr. M.J. Hagyard
3. Collins, Joseph	Information & Electrical Systems	Electrical Engineering	Donald E. Griner
4. Franklin, Keri	Systems Dynamics	Electrical Engineering	Homer Pack
5. Hardin, Janet	Space Science	Computer Science/Engineering	Allen Gary
6. Harris, Judise	Systems Dynamics	Biomedical Engineering	Dr. Richard Blackslee
7. Hoffran, Melanie	Systems Analysis & Integration	Marine Biology	David Shipman
8. Jones, Terrell	Instrumentation	Computer Science Software Engineering	Bobby B. Henson
9. Kransteuber, Amy	Space Science	Engineering	Dr. Robert Snyder
10. McCarty, Mark	Planning & Control	Biomedical Engineering	Don Wohleber

11. Mooknerji, Sangeeta	Materials & Processes	Biomedical Engineering	W.E. Hill
12. Moritz, Stewart	Space Science	Physics	Dr. Martin Weisskopf
13. Outland, Monica	Systems Analysis & Integration	Biomedical Engineering	Alberta Quinn
14. Patton, Rita	Information & Electrical Systems	Electrical Engineering	John Davis
15. Roberts, Kathryn	Space Science	Engineering	Dr. Charles Meegan
16. Smith, Regina	Materials & Processes	Engineering/Computer Science	Joseph H. Scollard
17. Thongs, Melanie	Materials & Processes	Biophysics	Richard Parr
18. Townley, Sandi	Materials & Processes	Engineering	Carl M. Wood
19. Williams, Daryl	Environmental Testing	Computer Science	David W. Watson
20. Williams, Karen	Structures & Propulsion	Medicine/Law/Math/Communications/Computer Science	Arthur S. Kirkindall

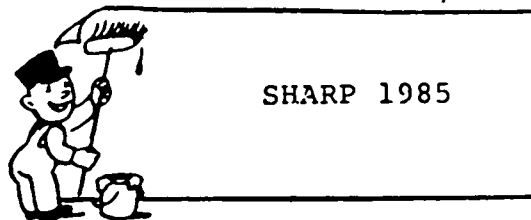
Management Team - C. Donald Bean, Director of Personnel; Clyde Foster, Director, Equal Opportunity Office; George Newby, Personnel Office; Charles Hester, Personnel Office; Jimmy Pruitt, Education Specialist; Evalyn Humphrey, Faculty Coordinator

SHARP

NASA
National Aeronautics and
Space Administration

Summer High School Apprenticeship Research Program

July 1985



SHARP '85

1985 marks the sixth year for SHARP, with numerous NASA centers as program participants. This summer SHARP students will serve apprenticeships at the following eight locations.

Site	Students
1. Ames Research Center--Moffett (Mountain View, CA).....	20
2. Ames' Dryden Flight Research Facility (Edwards, CA)....	10
3. Goddard Space Flight Center (Greenbelt, MD).....	25
4. Goddard's Wallops Flight Facility (Wallops Island, VA). 5	
5. Kennedy Space Center (Florida).....	12
6. Langley Research Center (Hampton, VA).....	15
7. Lewis Research Center (Cleveland, OH).....	20
8. Marshall Space Flight Center (Huntsville, AL).....	20
Total	127

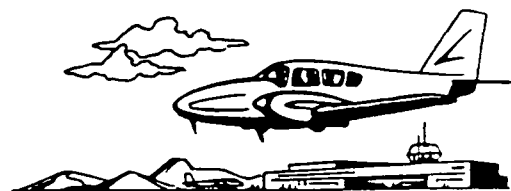
Ames Moffett and Lewis are conducting the Program for nine weeks, while each of the other sites will participate for an eight week period.

Ames Moffett held a reunion for the 1984 SHARP students in May, and other centers are making plans to do so in the near future.

The SHARP Program contractor for 1984-85 is Tresp Associates, Inc., a management and engineering firm located in Silver Spring, Maryland.

SPOTLIGHT ON THE LEWIS PROGRAM

The 1984 Christmas holiday season was a special time for apprentices from the 1984 Summer High School Apprenticeship Research Program (SHARP) at Lewis Research Center. A Christmas dinner, in Cleveland, brought them together again and provided the opportunity for renewed interaction. Much of the discussion



SHARP

NASA
National Aeronautics and
Space Administration

Summer High School Apprenticeship Research Program

August 1985



PLAYING TO WIN

by **Michelle Ferrier, SHARP Historian, Goddard Space
Flight Center: Greenbelt**

Keith Lloyd Phillips came to the Goddard SHARP Program in 1983 with high academic standards and a keen interest in science and mathematics. I remember visiting him at his job site in the Cosmic Ray Laboratory. Keith was engaged in graphing the total error margins for the Cosmic Ray particle data ... for the fourth time! When I asked him why he kept redoing it, he answered, "I hate erasing, so if one line doesn't look smooth, I do it over again."

Besides allowing him to explore various career fields, SHARP also gave Keith the chance to expand socially and build his self-confidence. "I met people who were really interested in my career field and were helpful in giving a little insight about it," he says. "SHARP helped me to be 'ahead of the game' when I returned to school in the fall. In classes like A.P. Physics and Calculus, I knew a lot about what was being taught and better understood what was being taught because I had seen applications of these courses at Goddard."

Keith entered the 11th grade at Frank W. Ballou Senior High School and applied his new confidence and his old competitive spirit to work in school activities. He excelled on both athletic and intellectual levels. He was a member of the track and bowling teams, as well as "Its Academic" and the Physics team. He became president of the National Honor Society and of the Math-Engineering Technological Society (METS). This was all in his role as a civilian.

In his military role, Keith was equally ambitious. He was Commander of the Junior ROTC - Air Force Branch, at Ballou. He next became Commander of all the ROTC programs - Army, Navy, Air Force and Marines - in the Washington Metropolitan Area. When he became "Colonel", he achieved the distinction of being the highest ranking Junior ROTC cadet in Washington, DC history. And all before his 18th birthday!

When I really got to know Keith during his second summer at Goddard, I vacillated between admiration and the realization that he was only human (Oh, well, he'll never admit to it). His true gift, I knew, lay in his single-mindedness.



National Aeronautics and
Space Administration

Washington, D C
20546

Reply to Attn of LE

Dean
Undergraduate School of
Engineering

Dear Dean:

The National Aeronautics and Space Administration (NASA) operates a Summer High School Apprenticeship Research Program (SHARP) which is geared to students who have demonstrated a special aptitude for and interest in careers in science and engineering. As participants in SHARP, students obtain first-hand experience in their field of interest by working directly under the supervision of a NASA scientist or engineer. This unique opportunity assists them with their career decisions and advancement. We are requesting that you forward information regarding your undergraduate programs to the students who completed SHARP '85.

A total of 125 young people took part in the recent eight-week program. Only students with strong academic and extracurricular backgrounds were accepted. Most of this year's outstanding SHARP participants are now high school seniors. The program is especially designed to attract under-represented minorities and women into the fields of science and engineering.

Enclosed you will find two lists: one indicates the career preference of each student; the other contains each student's mailing address. Also included is an overview sheet describing the 1985 SHARP Program. We feel that the information you send to these students will be most helpful to them in making their career and school decisions.

Sincerely,

Curtis M. Graves
Acting Director
Educational Affairs
Division



National Aeronautics and
Space Administration

Washington, D C
20546

Reply to Attn of LE

Dean
Undergraduate School of
Science

Dear Dean:

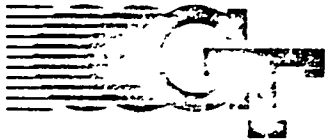
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Sincerely,

Curtis M. Graves
Acting Director
Educational Affairs
Division



Office of the Dean
College of Engineering
Georgia Institute of Technology
Atlanta Georgia 30332
(404) 894-3354
TELEX 542507 GTRC OCA ATL
FAX (404) 894-3120

GEORGIA TECH 1885-1985

DESIGNING TOMORROW TODAY

September 17, 1985

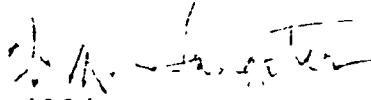
Mr. Curtis M. Graves
Acting Director
Educational Affairs Division
National Aeronautics and Space Administration
Washington, D.C. 20546

Dear Mr. Graves:

Thank you for the information regarding the NASA SHARP Program and the list of prospective students indicating interest in the fields of science and engineering. Appropriate information on Georgia Tech's undergraduate programs will be forwarded to these students.

Your interest in Georgia Tech is greatly appreciated.

Sincerely yours,


William M. Sangster

WMS/skb



THE JOHNS HOPKINS UNIVERSITY · BALTIMORE, MARYLAND 21218

OFFICE OF ADMISSIONS

September 20, 1985

Mr. Curtis M. Graves
Acting Director
Educational Affairs Division
National Aeronautics and Space Administration
Washington, D.C. 20546

Dear Mr. Graves:

Many thanks for sending the 125 names from the SHARP program to Johns Hopkins. I will be sending a prospectus and application materials to each of these students.

Best wishes for continued success with the program.

Sincerely,

A handwritten signature in ink, appearing to read "Jerome D. Schnydmann".

Jerome D. Schnydmann
Director of Admissions

JDS:emp

cc: Dean Welch

IV. ADMINISTRATION

This section on administration covers four topics: work schedule, administrative support, monthly progress reports, and quarterly progress meetings.

Work Schedule. The twelve-month Work Schedule has been completed, with the exception of the final Financial Management Report, which will be completed and submitted on or about December 31. A copy of the work schedule is included in Exhibit 10 at the end of this section.

Administrative Support. Tresp Associates provided administrative support that facilitated the planning, implementation, and evaluation of the SHARP Program. Key administrative policies and procedures were detailed in the SHARP Guidelines.

Monthly Progress Reports. Tresp Associates prepared monthly progress reports that summarized programmatic and administrative activities, accomplishments, and problems, along with budget information on SHARP.

❖

Quarterly Progress Meetings. NASA and Tresp Associates representatives met quarterly in Washington, D. C., to discuss work completed and planned, as well as specific opportunities and issues related to SHARP that needed to be addressed. The next section of this report is Evaluation.

EXHIBIT 10: SHARP WORK SCHEDULE (Revised April 5, 1985)

TIME FRAME (REPORTING PERIOD)	1	2	3	4	5	6	7	8	9	10	11	12	13
December 1, 1984 - November 30, 1985	12-1 to 12-22	12-23 to 1-19	1-20 to 2-16	2-17 to 3-16	3-17 to 4-13	4-14 to 5-11	5-12 to 6-8	6-9 to 7-6	7-7 to 8-3	8-4 to 8-31	9-1 to 9-28	9-29 to 10-26	10-27 to 11-30
Letter of Authorization Signed.....	▲												
Contract Signed.....				▲									
Initial Report.....						▲							
Task 1.0 PROGRAM PLANNING.....													
1.1 Revision of Program Guidelines and Planning Conference Documents					C		▲						
D Revised SHARP Program Guidelines							▲						
D Planning Conference Report.....							▲						
Task 2.0 PROGRAM DELIVERY AND EVALUATION.....													
2.1 Public Information.....													▲
2.2 Summer Program.....											▲		
2.3 Comprehensive, Uniform Evaluation of SHARP.....											▲		
D Press Kit.....													
D General Information Kit.....													
D Roster of Participating Centers, Apprentices, and Mentors.....									▲				
D Newsletter.....									▲				

Symbols

- C = Planning Conference
- D = Deliverable
- Q = Quarterly Progress Meeting

SHARP WORK SCHEDULE (Revised April 5, 1985)

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Task 3.0 PROGRAM ADMINISTRATION.....													△
3.1 Work Schedule					▲								▲
3.2 Administrative Support													▲
3.3 Monthly and Quarterly Progress & Financial Management Reports													▲
3.4 Quarterly Progress Meetings							Q			Q			▲
D Work Schedule.....					▲					▲			▲
D Monthly Progress Reports.....		▲		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
D Monthly Financial Management Reports.....		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
D Quarterly Progress Reports.....													▲
Task 4.0 FINAL REPORT.....													▲
4.1 Final Report.....													▲
D Final Report.....													▲

Symbols

- C = Planning Conference
- D = Deliverable
- Q = Quarterly Progress Meeting

V. EVALUATION

Two types of evaluation of the SHARP Program were conducted during the year. The first was an End-of-the-Program Evaluation completed by those involved with the 1985 Program. The second was a Follow-Up Evaluation on former SHARP students (1980 to 1984) at the eight participating centers. These evaluations are discussed below.

A. End-of-the-Program Evaluation for 1985. The benefits and costs of this year's SHARP Program and specific ratings and comments are summarized in Exhibit 11 at the end of this section. The evaluation indicates that the primary objective of introducing and exposing talented high school students to engineering and scientific careers at NASA through a structured apprenticeship experience was achieved.

B. Follow-Up Evaluation. The accomplishments and career paths of students who participated in the Program from 1980 to 1984 are summarized in Exhibit 12, at the end of this section. Of the 407 students contacted, 223 or 55% responded. Of the 186 students who indicated they were in college, 141 or 76% were pursuing science or engineering college degrees. Of the 19

former apprentices who had earned one or more degrees, 17 or 89% had a degree in science or engineering. And of 22 former apprentices with full-time jobs, 16 or 73% had taken a position in the field of science or engineering. The 16 who indicated they worked in science or engineering positions were employed as follows:

	<u>No.</u>	<u>Percent</u>
NASA	2	13
Other Federal Agency.....	8	50
Private Company	<u>6</u>	<u>37</u>
Totals	16	100

Specific information on each former apprentice who graduated and/or held a full-time job is presented in Exhibit 12 at the end of this section. The next section of the report is Recommendations for SHARP '86 and Conclusions.

EXHIBIT 11: END-OF-THE-PROGRAM EVALUATION SUMMARY FOR 1985

Benefits

- o 126 talented high school students were exposed to science and engineering careers at NASA; 79 of the 126 (62%) were minorities; and 76 of the 126 (60%) were women.
- o The Program was strengthened through improved planning, dissemination of information, and evaluation of costs and benefits (Planning Conference, Guidelines, Center Plans, Newsletters, Information Kits, oral and written communications, and uniform evaluations).
- o Many NASA projects received valuable research assistance, once again.
- o This year's SHARP Program has helped reach the long term goal of increasing the pool of qualified potential applicants for future NASA employment in the fields of science and engineering: 17 former apprentices held one or more degrees in science or engineering and 2 of the 16 who held a position in the field of science or engineering worked for NASA.

Costs

- o The average NASA payroll cost (direct labor and fringe benefits), for student employees was \$139.40 per week per student; students worked from 8 to 10 weeks during the summer, depending on the site.
- o The average cost per student for contract support was \$1,968.33 per student for the program year.

RATINGS AND COMMENTS

Rating Range: Excellent Very Good Average Below Average Poor
 10 9 8 7 6 5 4 3 2 1

QUESTIONS	Ratings					NASA Program Staff
	Students	Faculty Coordinators	Mentors			
o What overall rating would you give the SHARP Program?	9	9	9			9
o How would you rate the overall effectiveness of the mentors?	9	9				9
o How would you rate the overall effectiveness of the faculty coordinator?	9		9			9
o What was the level of enthusiasm shown by the student apprentices?		9	9			9

Selected Comments

- o The SHARP Program is a great learning experience.
- o Would like to see the program extended to 10 weeks.
- o Would like to have more time to visit the students' work sites.
- o More time at Planning Conference to exchange ideas with other Faculty Coordinators.
- o It was a pleasure to have an intelligent, motivated student working with me for the summer.

EXHIBIT 12: FOLLOW-UP EVALUATION SUMMARY FOR 1980-84

Part A: Science and Engineering Overview

	Number	Percentage
1. Respondents (Former Apprentices)		
a. No. of evaluation respondents	223	55%
b. No. of evaluation non-respondents ..	184	45%
c. Total no. in evaluation.....	407	100%
2. Currently in Undergraduate School		
a. No. with science or engr. major	141	76%
b. No. with other major	45	24%
c. Total no.	186	100%
3. Currently in Graduate School		
a. No. in science or engr. fields	4	100%
b. No. in other fields	0	0%
c. Total no.	4	100%
4. Graduates (college and/or graduate school)		
a. No. with science or engr. degree(s)..	17	89%
b. No. with other degree(s)	2	11%
c. Total no.	19	100%
5. Full Time Employment		
a. No. in science or engr. positions ...	16	73%
b. No. in other positions	6	27%
c. Total no.	22	100%

PART B: GRADUATES

NO.	NAME	CENTER	COLLEGE/UNIVERSITY	DEGREE			MAJOR/FIELD
				SCI/FNGR	OTHER	TYPE	
1	Cox, J.	ARC:M	Univ. of CA-Riverside	X		R.S.	Biochemistry
2	Thompson, K.	ARC:M	Univ. of So. Calif.	X		B.S.BMF	Biomedical Ingr.
3	Myricks, T.	GSFC:G	Mass. Inst. of Tech.	X		B.S.	Electrical Engr.
4	McKenna, M.	KSC	Coast Guard Academy	X		BSFF	Electrical Engr.
5	Voor, D.	KSC	Brevard Community College	X		A.A.	Pre-Engineering
6	Allen, D.	LaRC	VPI & SU	X		D.S.	Chemical Engr.
7	Bachman, S.	LaRC	Univ. of Virginia	X		B.S.	Aerospace Ingr.
8	Harris, M.	LaRC	Virginia Tech.	X		B.S.	Biochemistry
9	Hayes, D.	LaRC	Virginia Tech.	X		B.S.	Electrical Engr.
10	Heggen, J.	LaRC	Florida Inst. of Tech.	X		R.S.	Chemical Engr.
11	Labadan, J.	LaRC	VPI & SU	X		R.S.	Industrial Engr.
12	Nguyen, L.	LaRC	Nelson Community College	X		A.A.	Electronics
13	Popernack, T.	LaRC	Virginia Tech.	X		R.S.	Mechanical Engr.
14	Shriver, P.	LaRC	Eastern College		X	R.A.	English
15	Welch, H.	LaRC	VPI & SU	X		R.S.	Electrical Ingr.
16	Wiley, F.	LaRC	VPI & SU	X		R.S.	Computer Science
17	Thornton, T.	LaRC	Univ. of Pennsylvania		X	BA/MA	Regional Science
18	Lang, D.	MSFC	Univ. of Alabama-Huntsville	X		R.S.	Electrical Ingr.
19	Nicola, J.F.	MSFC	Univ. of Virginia	X		R.S.	Computer Science

PART C: EMPLOYMENT

NO.	NAME	CENTER	EMPLOYER	POSITION		
				SCI/ENGR	OTHER	DESCRIPTION
1	Thompson, K.	ARC:M	United States Navy	X		Naval Aviator
2	Siebert, A.	ARC:DFRF	Millers Outpost		X	Dept. Manager
3	Broadnax, M.	GSFC:G	Patuxent River Naval Computer Center	X		Computer Science Trainee
4	Myricks, T.	GSFC:G	U. S. Air Force	X		Systems Engineer
5	Watkins, R.	GSFC:G	Naval Research Lab	X		Computer Science Trainee
6	Price, C.	GSFC:WFF	United States Navy	X		Unspecified
7	McKenna, M.	KSC	U. S. Coast Guard	X		Unspecified
8	Voor, D.	KSC	Harris Corporation	X		Co-op Engineer
9	Pachmann, S.	LaRC	U. S. Air Force	X		Aerospace Engr.
10	Labadan, J.	LaRC	Norfolk Naval Shipyard	X		Indus. Engineer
11	Macaulay, K.	LaRC	Wyle Laboratories	X		Draftsman
12	Nguyen, L.	LaRC	Langley Research Center	X		Electrical Engr. Technician
13	Shriver, P.	LaRC	Hampton Christian School		X	Teacher
14	Terrell, K.	LaRC	Southland Corporation		X	Desk Clerk
15	Walston, S.	LaRC	Newport News Shipbuilding Yard		X	Designer
16	Villey, P.	LeIC	General Electric		X	Software Quality Assurance Techn.

PART C: EMPLOYMENT

NO.	NAME	CENTER	EMPLOYER	POSITION		
				SCI/FNGR	OTHER	DESCRIPTION
17	Thornton, T.	LeRC	Hammer, Siler, & Assoc.		X	Research Assoc.
18	Pramlett, M.	MSFC	Chrysler Corporation	X		Co-op Engineer
19	Ellison, D.	MSFC	United States Navy	X		Electrical Engr.
20	Lang, D.	MSFC	Teledyne-Brown Engineering	X		Engineer III
21	Nicola, J.E.	MSFC	Kennedy Space Center	X		Aerospace Techn.
22	Smith, R.E.	MSFC	Intergraph Corporation	X		Electrical Engr. Programmer

VI. RECOMMENDATIONS FOR SHARP '86 AND CONCLUSIONS

Only one recommendation is made for the 1986 program year:

Hold the annual planning conference in January 1986, in conjunction with the Uranus Encounter at Jet Propulsion Laboratory.

Holding the planning conference at this time will serve two purposes. First, it will enable the SHARP management team to plan the 1986 program with a fairly reasonable amount of lead time, and second, the management team will be able to learn about and enjoy the historic Uranus Encounter first hand.

Ideally, the planning conference should be held in October or November. In this way, evaluations and impressions of the prior year will still be fresh in everyone's mind, and the management team would have an opportunity to consider changes to the program and other important programmatic matters. Also, an earlier planning conference would allow each center to start its planning work as early as November or December with clear, definite program information in hand.

For SHARP, the 1985 program year was a year of maintaining an established and successful program. A new class of apprentices has been groomed and sent on its way. The former apprentices have been tracked and their accomplishments in school and

the work force are noteworthy. Of the graduates, a large percentage of them hold degrees in science or engineering and have taken a science or engineering position. In addition, most of these graduates have taken positions with NASA or other Federal government agencies. Everyone associated with SHARP -- especially the students, mentors, and management team members -- should feel proud and should be congratulated for maintaining the high standards of excellence for which SHARP has become noted.

VII. APPENDIX

Summaries of the 1985 SHARP Program at Participating Centers

Ames Research Center (Moffett Field, California)

Six years ago, in October 1979, President Carter signed an Executive Order appropriating special funds for SHARP. President Reagan, recognizing the inherent merits of SHAPP, gave the program his seal of approval for continued success by continuing government funding. Pursuant to the President's directive, Ames Research Center conducted its fifth SHARP Program for minority youth.

Twenty high school students with an orientation toward science and mathematics participated in a ten week NASA-Ames Research Center sponsored program during the summer of 1985 (June 17 - August 16).

The objective of SHARP is to recognize high school juniors who have demonstrated unusual academic ability in the sciences and mathematics. Twenty talented students, who will be seniors in high school in September, were chosen to participate in SHARP '85. Mentors were selected to provide students with "first-hand" experiences in a research and development environment. This allows each student the opportunity to "try out" his or her tentative career choice.

In the ten weeks of their employment, the student trainees have made important and very significant contributions to the ongoing research here at ARC, and have also provided additional staff assistance where needed. In addition to their research posts, the schedule of the students included field trips to universities and private industries doing similar research, special lectures on topics of research at Ames, individual and group counseling sessions, written research papers, and oral reports. The hope is that each of these activities has made each student feel a part of the exciting happenings in space research and exploration.

The space age has seen the frontiers of knowledge and technology extended beyond the wildest dreams of our forefathers. Today's science fiction will seem common-place in the twenty-first century. The engineer of today and tomorrow will face incredible and fascinating challenges. SHARP's goal is to enable women and minorities to be a vital part of the science and engineering team that will solve these challenges. The long-range goal of SHARP is to contribute to the future pool of expert scientists and engineers.

Ames' Dryden Flight Research Facility (Edwards, California)

Ten highly talented students selected from the surrounding area schools participated in the eight week Ames/Dryden sponsored SHARP program during the summer of 1985. During the month of March information about the 1985 SHARP program was distributed to nine schools situated within commuting distance of the Dryden Flight Research Facility. The school personnel were instructed to identify talented up-coming seniors interested in science and engineering and to make known to these students the benefits derived from participating in the SHARP program. The schools were also instructed to encourage women and minorities to apply.

The ten students selected to participate came highly recommended by their teachers and counselors. Preference was given to those students who had attained outstanding scholastic records. In addition to scholastic achievement, factors such as willingness to work, determination, attitude, and the potential for benefiting from the the program were taken into consideration in the final selection.

It was the objective of NASA, by having the students work along-side engineers and scientists on on-going projects, to have them acquire a deeper and broader appreciation for science and engineering. It was hoped that this experience would also stimulate the students to seriously consider career choices in these areas.

At the end of the program, final written reports were submitted and oral presentations were made by each student. These reports, containing the results of the research or project, were made before all of the mentors and SHARP participants as well as parents and interested individuals.

Goddard Space Flight Center (Greenbelt, Maryland) and Goddard's Wallops Flight Facility (Wallops Island, Virginia)

Twenty-five science, engineering, and math oriented high school students at Goddard Space Flight Center and five at Wallops Flight Facility participated in the eight week Summer High School Apprenticeship Research Program.

These students represented school districts in Washington, D.C., Montgomery County, Howard County, Prince Georges County, Accomack County, Worcester County, and North Hampton County.

They were assigned mentors in the areas of engineering, related sciences (e.g., chemistry, physics, earth science, geology, solar physics), systems analysis, telecommunications, statistics, and computer sciences.

This was the sixth year for the SHARP Program at Goddard and the fourth year at Wallops.

While at Goddard/Wallops, each participant has exposure to the daily operations of technical projects under the mentorship of NASA engineers and/or scientists.

The mentor serves as a role model and the participants gain valuable information regarding career choices and exploration from the mentor. They learn about specific skills and training requirements and experience on-the-job training demands, such as, project completion, deadlines, interpersonal relationships, work scheduling, proficiency, and worker expectations.

In addition to the laboratory work, the apprentices were exposed to enrichment activities that included field trips to a private industry site, a career workshop, career day (which included distinguished speakers and a technical career panel), individual counseling sessions, and guest lectures.

Climaxing their apprenticeship experiences, the participants reported the results of their research projects in a formal setting to Goddard Space Flight Center lab directors, branch chiefs, mentors, school administrators, and parents. Their reports were poster presentations (which included their objective for the summer and other pertinent information) that they presented orally at the VIP Night on August 13, 1985. Wallops Flight Facility participants presented oral reports at their VIP Night on August 15, 1985.

A highlight of the SHARP Program at Goddard this year was our first annual reunion, held on July 25, 1985. Participants included past and present SHARP students, mentors, coordinators since 1980, NASA officials, and friends of SHARP.

Eighty-three students have participated in SHARP/Goddard; and eleven in SHARP/Wallops. The neighboring school districts that have contributed are Accomack County, Baltimore City, Howard County, Montgomery County, North Hampton County, Prince Georges County, Worcester County, and Washington, D. C.

All of the SHARP participants have gone on to college after high school. The colleges/universities represented include such distinguished ones as: Cornell University, Brown University, United States Naval Academy, United States Air Force Academy, Massachusetts Institute of Technology, Princeton University, Harvard University, Vassar College, Boston University, George Washington University, University of Virginia, and the University of Pennsylvania.

We have had two participants complete their college requirements, both in electrical engineering. One graduated from the Massachusetts Institute of Technology and one from the University of Pennsylvania. Both are now second lieutenants in the Air Force.

Thirteen more participants are expected to graduate by June of 1986.

With the follow-up study provided by our SHARP Historian this summer, it was revealed that 82% of SHARP participants have continued with math and science related fields such as engineering, physics, computer sciences, biology, mathematics, and medicine; 13% have decided to major in areas of business, communications, and economics; and 5% are still presently undecided in their career goals.

All of this is testimony to the dedication and talent of what SHARP is and what SHARP does through efforts of the SHARP management team and the SHARP participants.

Of the 30 participants this summer, 14 were new to SHARP and 16 returned from last year. Of the 16 returnees, 14 have completed the SHARP program and are enrolled at the following universities: Goldey Beacon, Hampton University, Princeton, George Washington University, Morehouse College, Brown University, and the University of Maryland, to name a few.

Of the 14 participants who were new to SHARP, one is an early admittee to Princeton University and the others are eligible to return to the program next summer.

Kennedy Space Center (Kennedy Space Center, Florida)

The 1985 Summer High School Apprenticeship Research Program (SHARP) began on June 17, 1985, with twelve academically talented students from Orange and Brevard County School Districts. Each student was assigned a mentor and a research project, in the closest possible area to his or her expressed interest. The students worked an eight hour day, Monday through Thursday, with their mentors. On Friday they spent four hours with their mentors and four hours in seminars and/or on field trips.

At Kennedy Space Center, 1985 was a special year. The SHARP students had an opportunity to fly to Washington, D.C. with the Center Director. This was a real honor. Mentors who had served for five years also traveled with the group. At NASA Headquarters, the KSC students attended a seminar with other students from the Lewis Research Center. During this joint seminar, the students heard two lectures on the Space Station, shared information on their research projects, and discussed their experiences. The afternoon was spent on a tour of the Air and Space Museum, including viewing the new film, "The Dream is Alive." Students and mentors alike found the trip an experience that will be remembered for a long time.

The 1985 SHARP students participated in numerous activities, such as tours of the High Bay area of the Operations & Checkout Building, and an extensive tour of the facilities at Kennedy Space Center. The students had an opportunity to view the launchings of the 51-G and 51-F Space Shuttle missions. One student even had a seat (with his mentor) on the control panel in the Launch Control Center. Other students viewed the launches from various points at the Center. The KSC Toastmasters provided their expertise, time, and efforts in the Youth Leadership Seminars, and in preparing the students for the Final Presentation Day.

The summer of 1985 also marked the five-year reunion of the Class of 1980. The reunion was held at Spaceport USA. Students from all SHARP classes were invited. The attendees shared experiences with each other, participated in seminars given in the Exploration Station, had lunch together, viewed the new film "The Dream is Alive," and saw the videotape made in 1984 on the SHARP program. The attendance was excellent, in that each SHARP class was well represented.

The program concluded on August 9, 1985, with the closing ceremony held in the Mission Briefing Room of the Operations & Checkout Building. The program included oral presentations given by the students, presentation of certificates, special awards, and a luncheon. Guests included the Assistant Deputy Director of Kennedy Space Center, the Director of Public Affairs, the Chief of the Education and Awareness Branch of Public Affairs, staff members, Science Supervisors from Preverde and Orange County School Districts, NEWMAST Teachers from Georgia and Florida, parents of the SHARP students, and NASA personnel.

The exposure to the "real world" of science and technology received by these students has been an enriching experience that will be valuable to them throughout the remainder of their individual educational programs. The long range goal of SHARP is to contribute to the future recruitment of scientists and engineers needed by NASA and the nation as a whole. Several students have stated that their work at Kennedy Space Center has made a tremendous impact on their career goals. Some students commented that the program helped to enlighten them concerning the many opportunities in the world of science, while others stated that it gave them a firmer foundation to build upon.

Langley Research Center (Hampton, Virginia)

The 1985 NASA Langley Summer High School Apprenticeship Research Program (SHARP) was conducted between June 24, 1985, and August 16, 1985. The fifteen students who participated were from the Hampton Roads area, which includes the jurisdictions of: Newport News, James City County/Williamsburg, York County, Virginia Beach, and Cheseapeake.

All students were assigned to an active research program and were sponsored by NASA engineers. The student research experiences involved graphic analysis, data reduction, and/or systems testing or analysis. Each student was responsible for providing the entire group with an oral presentation of his/her work during the program. Highlights of the summer program included a tour of Goddard Space Flight Center, Greenbelt, Maryland. We also served as hosts to the SHARP groups from Lewis Research Center (Cleveland, Ohio), Goddard Space Flight Center (Greenbelt, Maryland) and Wallops Flight Facility (Wallops Island, Virginia).

The second SHARP reunion was held in August, with sixteen former SHARP participants returning. Some had finished college, some were still college students, and some would begin their collegiate careers during the fall of 1985. Additionally, the Closing Ceremony was held on the afternoon of the final day, with NASA personnel, school administrative personnel, parents, and friends in attendance.

Lewis Research Center (Cleveland, Ohio)

Twenty science and math oriented high school students participated in a nine-week NASA Lewis Research Center (LeRC) sponsored program during the summer of 1985 (June 17 to August 16). These young people represented schools in the Cleveland-Cuyahoga County area and participated in a nine-week program as apprentices, each working directly under the supervision of an LeRC engineer or scientist. This was the fifth year that the program was conducted at LeRC.

The program objective was to provide the students with a working and learning experience in a laboratory environment that would give them a deeper and broader appreciation for engineering, science, and technology. A concurrent objective was to stimulate their interest in the development of career choices.

In addition to the laboratory work, the apprentices were exposed to enrichment activities that included guest lecturers from public and private universities, minority engineers and scientists, film reviews, career awareness programs, field trips, and various other types of academic explorations.

Culminating their work-study experiences, the apprentices reported the results of their research projects in a formal setting to lab directors, branch chiefs, and mentors, as well as to school system administrators, counselors, teachers, parents, and other guests. Their reports were prepared under the guidance and supervision of their mentors, with assistance from the faculty coordinator. Included in their presentations (oral and written) were numerous positive illustrations of how participation in the program influenced their career plans and aspirations.

All of the students came highly recommended by their school principals, school counselors, and/or school teachers, and all had attained outstanding scholastic records, with high aptitudes in science and mathematics.

The SHARP Program at NASA LeRC has been successful in providing high school students with in-depth exposure to research and development and it has been successful in stimulating and motivating their interest in science and engineering.

Marshall Space Flight Center (Huntsville, Alabama)

One of the most significant investments coming out of the George C. Marshall Space Flight Center (MSFC) is the continuation of the Summer High School Apprenticeship Research Program (SHARP). When one looks for evidence of the Center's commitment to its future, one has to agree that the opportunity for a high school student to explore his/her career interest alongside an active researcher is an immensely valuable experience, and the returns are immeasurable. Such is true of twenty, academically talented, high school seniors from the public, private, and parochial schools of Huntsville and Madison County.

For eight weeks the SHARP apprentices have participated in the ongoing investigations in seven of Marshall's science and engineering laboratories. They have had the opportunity to test their interest in science, mathematics, and engineering.

During their week of orientation activities, the apprentices participated in a day-long computer science workshop provided by the Marshall Center's Computer Complex. This experience was extremely helpful in that all the students later interfaced with a variety of computers during their daily work in the laboratories.

The apprentices spent 90% of their time in the laboratories. The remaining 10% was spent in scheduled, weekly meetings with enriched study activities facilitated by the faculty coordinator. Guest lecturers described the major projects ongoing at Marshall: Space Transportation System (STS), Spacelab, Space Telescope (ST), Robotics, and the Space Station project, to name a few. Further, the study sessions led to the publication of the students' Newsletter, Abstracts, and Research Papers.

Culminating their work-study experience, the apprentices reported the results of their research projects in a formal setting to MSFC lab directors, division heads, the student advisors, school system administrators, counselors, and their parents. Their reports were prepared under the guidance and supervision of their student advisor, with assistance from the faculty coordinator. Included in their presentations were numerous positive illustrations of how participation in this program influenced their career plans and aspirations.

All of the student participants came highly recommended by their school principals and/or counselors and all have outstanding scholastic records.

This is the fifth summer the program has been conducted at the Marshall Space Flight Center. During the Closing Review program, a SHARP participant from the original group (1960) presented a follow-up report on the "first SHARP class." In his summary he confirmed our belief that SHARP has had a significant impact on the young people who have been part of the program. He reported that more than 80% are attending college and studying engineering and mathematics.

The SHARP program has helped to satisfy a need to provide indepth exposure in research and development to the young people of this area. This experience has reinforced the participants' interests in science and engineering and raised them to higher levels of motivation. By sponsoring this program, the Marshall Space Flight Center has made a very worthwhile investment in the Center's future.

LIST OF COLLEGES AND UNIVERSITIES IDENTIFIED BY APPRENTICES

AND

CONTACTED BY NASA

Alabama A&M University
Box 284
Normal, AL 35762

American University
4400 Massachusetts Ave., NW
Washington, D.C. 20016

Amherst College
Amherst, MA 01002

Auburn University
202 Martin Hall
Auburn, AL 36849

Bethany Nazarene College
6729 N.W. 39th Expressway
Bethany, OK 73008

Birmingham-Southern College
800 8th Avenue West
Birmingham, AL 35254

Boston College
Lyons Hall 120
Chestnut Hill, MA 02167

Boston University
121 Bay State Road
Boston, MA 02215

Bowie State College
Jericho Park Road
Bowie, MD 20715

Brown University
Box 1876
Providence, RI 02912

Bryn Mawr College
Bryn Mawr, PA 19010

California Institute of Technology
Pasadena, CA 91125

California Poly. State Univ.
3801 Temple Avenue
Pomona, CA 91768

California Polytechnic State
University-San Luis Obispo
San Luis Obispo, CA 93407

California State University
5151 State University Drive
Los Angeles, CA 90032

Carnegie-Mellon University
5000 Forbes Avenue
Pittsburgh, PA 15213

Case Western Reserve University
Cleveland, OH 44102

Clark College
240 Chestnut Street, SW
Atlanta, GA 30314

Cleveland State University
Cleveland, OH 44102

Columbia University
303 Lewisohn Hall
New York, NY 10027

Cornell University
Ithaca, NY 14850

Dartmouth College
Hanover, NH 03755

Devry Institute of Technology
1350 Alum Creek Drive
Columbus, OH 43209

Drexel University
32nd and Chestnut Streets
Philadelphia, PA 19104

Duke University
2138 Campus Drive
Durham, NC 27706

Elon College
Elon College, NC 27244

Embry-Riddle Aeronautical University
Star Route, Box 540
Bunnell, FL 32010

Emory University
308 Administration Building
Atlanta, GA 30322

Fisk University
17th Avenue North
Nashville, TN 37203

Florida A&M University
Tallahassee, FL 32307

Florida Institute of Technology
150 West University Boulevard
Melbourne, FL 32901

Florida State University
Tallahassee, FL 32306

Georgetown University
37th & O Streets, NW
Washington, DC 20007

George Washington University
725 - 23rd Street, NW
Washington, DC 20006

Georgia Military College
201 East Green Street
Milledgeville, GA 31061

Georgia Institute of Technology
225 North Avenue
Atlanta, GA 30332

Goldey Beacon College
Wilmington, DE 19804

Hampton University
Hampton, VA 23668

Harvard University
Cambridge, MA 02138

Harvey Mudd College
Claremont, CA 91711

Howard University
2400-6th Street, NW
Washington, DC 20059

Jacksonville State University
Jacksonville, AL 36265

Johns Hopkins University
Garland Hall, 34th & Charles Sts.
Baltimore, MD 21218

Lamar University
P. O. Box 10009
Beaumont, TX 77710

Lambuth College
Lambuth Boulevard
Jackson, TN 38301

Loma Linda University
Riverside, CA 92515

Loyola Marymount University
Los Angeles, CA 90045

Massachusetts Institute of Tech.
77 Massachusetts Avenue
Cambridge, MA 02139

Massachusetts Maritime Academy
P. O. Box D
Buzzards Bay, MA 02532

Middle Tennessee State University
Murfreesboro, TN 37132

Mississippi State University
P. O. Box 5268
Mississippi State, MS 39762

Morris Brown College
643 Martin L. King, Jr. Drive, NW
Atlanta, GA 30314

New Jersey Institute of Technology
Newark, NJ 07102

New York University
P. O. Box 909, Cooper Station
New York, NY 10276

North Carolina Agricultural &
Technical State University
Greensboro, NC 27411

North Carolina State University
at Raleigh
Raleigh, NC 27607

Northrop University
Inglewood, CA 90306

Notre Dame University
Notre Dame, IN 46556

Northwestern University
633 Clark Street
Evanston, IL 60201

Oberlin College
Oberlin, OH 44074

Ohio State University
Columbus, OH 43210

Pennsylvania State University
201 Shields Bldg., Box 3000
University Park, PA 16802

Princeton University
Box 430
Princeton, NJ 08544

Purdue University
Lafayette, IN

Queens College
1900 Selwyn Avenue
Charlotte, NC 28274

Rensselaer Polytechnic Institute
Troy, NY 12181

Rhodes College
2000 North Parkway
Memphis, TN 38112

Rice University
P. O. Box 1892
Houston, TX 77251

Rochester Institute of Technology
Rochester, NY 14623

Salisbury State College
Salisbury, MD 21801

San Diego State University
San Diego, CA 92182

Shorter College
Rome, GA 30161

Southern College
P. O. Box 30
Collegedale, TN 37315

Southern Methodist University
Box 296
Dallas, TX 75275

Southwestern Adventist College
P. O. Box 567
Keene, TX 76059

Stanford University
Stanford, CA 94305

St. Louis University
St. Louis, MO 63103

Swarthmore College
Swarthmore, PA 19081

Syracuse University
Syracuse, NY 13210

Tennessee State University
3500 John Merritt Blvd
Nashville, TN 37203

Tennessee Technological University
Cookeville, TN 38501

Texas A&M University
College Station, TX 77843

Trevecca Nazarene College
Nashville, TN 37203

Trinity University
715 Stadium Drive
San Antonio, TX 78284

Tufts University
Medford, MA 02155

Tulane University
New Orleans, LA 70118

Tuskegee University
Tuskegee, AL 36088

United States Air Force Academy
Colorado Springs, CO 80840

United States Naval Academy
Annapolis, MD 21402

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Box UA
University, AL 35486

University of Alabama/Birmingham
University Station
Birmingham, AL 35294

University of Alabama/Huntsville
Huntsville, AL 35899

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120 Sproul Hall
Berkeley, CA 94720

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405 Helgard Avenue
Los Angeles, CA 90024

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P. O. Box 25000
Orlando, FL 32816

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100 French Hall
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4200 Connecticut Avenue, NW
Washington, DC 20017

University of Florida
Gainesville, FL 32611

University of Georgia
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Athens, GA 30602

University of Hawaii at Manoa
2530 Dole Street, Rm C-200
Honolulu, HI 96822

University of Houston
1 Main Street
Houston, TX 77002

University of Maryland
University Blvd & Adelphi Road
College Park, MD 20740

University of Miami
P. O. Box 248025
Coral Gables, FL 33124

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230 Williamson Hall
Minneapolis, MN 55455

University of Mississippi
University, MS 38677

University of Montevallo
Montevallo, AL 35115

University of North Alabama
Florence, AL 35632

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Charlotte, NC 28213

University of the Pacific
Stockton, CA 95211

University of Pennsylvania
1 College Hall
Philadelphia, PA 19104

University of Pittsburgh
Bruce Hall, 2nd Floor
Pittsburgh, PA 15260

University of Rochester
Rochester, NY 14627

University of Santa Clara
Santa Clara, CA 95053

University of the South
Sewanee, TN 37375

University of South Alabama
AD 170
Mobile, AL 36688

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P. O. Box 77952
Los Angeles, CA 90007

University of Texas
Austin, TX 78712

University of Tulsa
Tulsa, OK 74104

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Charlottesville, VA 22903

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Nashville, TN 37212

Vassar College
Poughkeepsie, NY 12601

Villanova University
Villanova, PA 19085

Virginia Polytechnic Institute
and State University
Blacksburg, VA 24061

Walla Walla College
College Place, WA 99324

Wellesley College
Wellesley, MA 02181

William and Mary College
Williamsburg, VA 23185

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