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NASA CR-159903

FINAL REPORT

Covering the period April 14, 1977 to August 31, 1978

NASA GRANT NO. NAS5-24101

A Research Feasibility Study Proposal for Conducting Experimental Research in Curriculum Sharing Via Communications Technology Satellite Among Institutions Having Large Minority Enrollments

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

by

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September, 1978

(NASA-CR-159903) A RESEARCH FEASIBILITY
STUDY PROPOSAL FOR CONDUCTING EXPERIMENTAL
RESEARCH IN CURRICULUM SHARING VIA
COMMUNICATIONS TECHNOLOGY SATELLITE AMONG
INSTITUTIONS (North Carolina Agricultural



ACKNOWLEDGEMENT

The author wishes to acknowledge with great appreciation the technical and non-technical assistance, cooperation and support given to this feasibility study by the large number of representatives from universities, industrial and research organizations and individuals.

Interested persons from ten universities plus the Chicago, Illinois Board of Education cooperated to form the Consortium for Satellite Utilization for Minority Education, (CONSUME) resulting in the Coordinators Conference at NC A&T State University and the subsequent proposal to NIE. Collection of data and information as well as utilization of the CTS satellite ground stations was facilitated by NASA officials, technical personnel and resource persons from the Office of University Affairs, the Office of External Affairs at Langley Research Center, Goddard Space Flight Center, Lewis Research Center, Ames Research Center, the Space Communications Research Center and Bell Northern Research Ltd. in Ottawa, Canada, and the Mississippi Authority for Educational Television (SECA).

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ABSTRACT

This report covers research studies and activities under NASA Grant NAS5-24101, "A Research Feasibility Study Proposal for Conducting Experimental Research in Curriculum Sharing Via Communications Technology Satellite Among Institutions Having Large Minority Enrollments" covering the period from April 14, 1977 to August 31, 1978. The purpose of this study and the resulting experimental satellite demonstration was to test the applicability of the tele-conference method of curriculum sharing as well as the sharing of scientific research results between universities and industrial organizations in relation to other techniques and methods. Because one of the major objectives of this study was to increase the number of minority engineers and scientists holding both undergraduate and advanced degrees in the nation, the study involved both minority and predominantly white institutions of higher education across the nation. After querying more than twenty universities, ten universities agreed to cooperate with NC A&T State University in an effort to increase the number of minority scientists and engineers in the USA via the utilization of the communication features of satellites. The cooperating universities formed the Consortium for Satellite Utilization for Minority Education (CON-SUME) to meet this objective. A "Coordinators Conference on Applications of Satellites in Education and Curriculum Sharing" was held on July 7-8, 1977 at NC A&T State University to exchange information and ideas and to map procedures.

On February 7 and 9, 1978, a satellite demonstration experiment in curriculum sharing and scientific research results between NC A&T State University, Jackson State University, Bell Northern Ltd. in Canada, Stanford University including representatives from Rockwell International Science Center was conducted. NASA's Communications Technology Satellite was used in this telecommunications experiment in conjunction with ground stations located at NASA Ames Research Center in Mountain View, California, Communications Research Center in Ottawa, Canada, The Mississippi Authority for Educational Television (SECA) at Jackson, Mississippi and NASA's Portable Earth Terminal located at Greensboro, North Carolina.

This report covers definitive details of the research activities, experiments and studies in curriculum sharing, the techniques, interconnections and equipment utilized as well as suggested methods and recommendations based on the results obtained for a continuation of innovative applications of satellite technology in higher education at NC A&T State University.

INTRODUCTION

The use of satellites for communications purposes is nothing new. Most of us know that satellites are used to bring us coverage of the Olympics and other special events happening thousands of miles away. The greatest advantage of satellite communications is that, theoretically, every home receiver could become its own ground station. However, the cost would be too expensive for literally every owner. Instead, most direct reception facilities will probably be located at community centers, schools and similar group-viewing locations. Although effective advantages of using satellites for communications can be an expensive venture costing millions of dollars, recent experiments performed by NASA and commercial firms have indicated that costs can be greatly reduced by using high powered transmitting satellites in the Gigahertz range resulting in lower cost ground stations.

In remote areas of the United States and Canada, the population density is not sufficient for the presently used large ground receiving stations required for today's communication satellites to be economically feasible. In the early sixties, NASA launched SYNCOM with a power less than 10 watts, therefore requiring terminals at a cost of some 4 to 5 million dollars. With successive launching of more powerful satellites, the commercial satellite Intelsat-IV reduced terminal costs to tens of thousands, and with the launching of NASA's ATS-6 in 1974 and the CTS (which was used in the NC A&T State University demonstration), ground terminals in the range of \$4,000 to \$5,000 could be used. The CTS uses a 200 watt traveling wave power amplifier tube and, therefore, is the most powerful communications satellite currently in use by NASA.

An excellent example of satellite application to solve a national problem in education is exemplified in the Appalachian Educational Satellite Project (AESP). Consideration of a brief history of this project and the conclusions reached based upon it should give some background and insight into some of the procedures and problems NC A&T State University could expect if the decision is made to use satellite technology. The educational objective of this project was to improve the effectiveness of the classroom teacher through in-service teacher training in reading and career education. When one considers the geographically large inaccessible area and the associated low population density of Appalachia, the problem was one which would seem to lend itself to a satellite delivery system of educational training materials.

NASA's ATS-6 Satellite was launched on May 30, 1974 and was used to conduct the Appalachian Educational Satellite Project. The satellite could transmit to most of the North American continent since it had two footprints each 1,000 miles long by 300 miles wide. During the 1974-75 school year, AESP offered graduate credit courses in Career Education for junior and senior high school teachers. The results, conclusions and subsequent evaluations of this project were significant:

- 1 - TV reception equipment required was inexpensive, costing approximately \$4,000 per site, compared to hundreds of thousands of dollars for previous satellite reception systems.
- 2 - It is technically feasible using satellite delivery and inexpensive ground reception equipment to provide graduate education courses to students scattered over large geographical areas.
- 3 - Course participants preferred the satellite-delivered courses to on-campus courses.
- 4 - Site representatives who are non-content experts can administer these courses if provided with sufficient instructions and easy access to the Resource Coordinating Center via two-way radio.
- 5 - The cost for development and delivery of programs during the initial 27 months of the AESP was competitive with similar courses on a university campus.

A careful study of various reports and information on the AESP Project was useful in finding an effective approach to the Feasibility Study which could involve NC A&T State University in satellite applications to enhance and improve its educational programs and research activities.

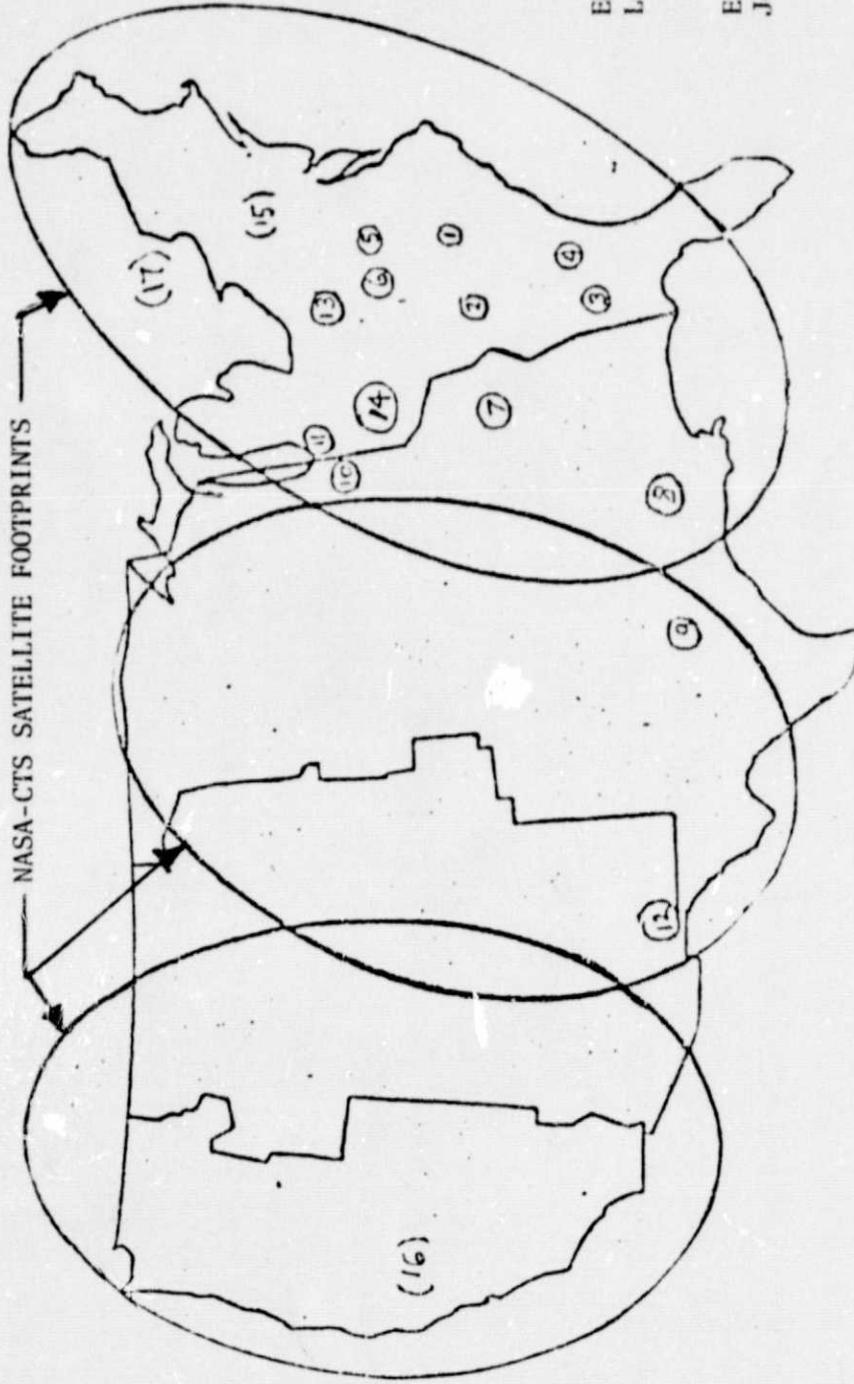
BACKGROUND ON NC A&T STATE UNIVERSITY SATELLITE INVOLVEMENT

In 1975 it was obvious that minority involvement in the space program was nil - there were no women or black astronauts; there were no minority organizations or educational institutions involved in the various satellite experiments and demonstrations then being conducted on NASA's satellites. This omission of minority participation in modern space technology was noted by both NASA and responsive faculty and administration at NC A&T State University. The idea of A&T along with other minority and non-minority institutions of higher education becoming users of NASA's satellites in curriculum sharing or other experiments was presented to NASA officials. As a result, Benjamin O. Smith of NASA Langley Research Center's Office of External Affairs became a resource person to assist A&T in participating in the satellite program. Late in 1975 a meeting was held at A&T with representatives from NASA Headquarters in Washington, DC, Langley Research Center, Bennett College and A&T, including the author of this report. Dr. Wasyl M. Lew, Manager of NASA satellite programs, gave a presentation explaining satellite applications and some of the current experiments, demonstrations, and procedures to be followed in becoming a satellite user or demonstrator. Subsequent meetings were held at A&T and in Washington in efforts to gain additional information, financial assistance and direction.

Dr. Suresh Chandra, Dean of School of Engineering, provided funds for the author to attend an NIE sponsored conference on Educational Applications of Satellites in Arlington, Virginia, February 2-3, 1977. A proposal seeking financial assistance from NASA to perform a satellite feasibility study written by Marvin Watkins, Joseph Bennett, Director of Career Education and Leo Williams, Jr. was submitted to NASA in 1976. The proposal underwent countless revisions and additions but finally resulted in a NASA contractual award to A&T, effective April 14, 1977. The feasibility study was to involve possible satellite applications in two basic areas: Education and Engineering. Investigations were begun on the possibility of curriculum sharing in Education among, not only minority institutions, but also non-minority colleges and universities with large numbers of minorities enrolled. On the Engineering side, it was decided to investigate the possibility of using the satellite to increase the number of minority engineering graduates in the country. This was a practical undertaking for a minority university since statistics had shown that the six predominately black Engineering schools had graduated more minority engineers than all universities in the nation combined.

Steps were taken to contact the institutions shown in Fig. 1 in an effort to develop a two pronged motivational program under the pseudonyms MINPREP (Minority Pre-Engineering Program)

Fig. 1 INSTITUTIONS INVOLVED IN NC A&T STATE UNIVERSITY SATELLITE FEASIBILITY STUDY



ENGINEERING:
Leo Williams, Jr.

EDUCATION:
Joe Bennett

- | | | |
|--------------------------------------|---------------------------------------|--------------------------|
| (1) A&T | (8) SOUTHERN UNIVERSITY (LSU) | (15) CORNELL UNIVERSITY |
| (2) ROSMAN, NC | (9) PRAIRIE VIEW A&M (TEXAS A&M) | (16) STANFORD UNIVERSITY |
| (3) TUSKEGEE | (10) UNIV OF ILLINOIS/URBANA | (17) CARLTON UNIVERSITY |
| (4) ATLANTA UNIV (GA INSTIT OF Tech) | (11) IIT-CHICAGO (UNIV OF ILL CIRCLE) | (OTTAWA, CANADA) |
| (5) HOWARD UNIVERSITY | (12) NEW MEXICO STATE/LAS CRUCES | |
| (6) GODDARD SPACE FLIGHT CENTER | (13) WESTINGHOUSE (CARNEGIE-MELLON) | |
| (7) TENNESSEE STATE (VANDERBILT) | (14) PURDUE UNIVERSITY | |

and MINGREP (Minority Graduate Engineering Program). It was envisioned that the CTS satellite could be used to implement such a program since audio-video information could be transferred between the areas covered by any two footprints shown in the figure. Such a network could be used on a time sharing basis to share with other universities across the nation educational and research information as well as cultural and artistic programs from all schools and departments at A&T.

By means of on-site visits, telephone contacts, written communications and questionnaires, interactions between representatives from more than 20 universities were initiated in efforts to arrive at suitable arrangements and mechanisms to achieve the goals and objectives of the feasibility study. Interested universities and organizations were asked to appoint representative coordinators and arrangements were made to have a Coordinators Conference to work out details and to write a proposal in response to an RFP from the National Institute of Education, DHEW. From those involved in the feasibility study, representatives from ten institutions (including minority and predominantly white universities) plus the Chicago Board of Education formed with A&T a Consortium for Satellite Utilization for Minority Education (CONSUME). The purpose of this organization was to make use of satellites in finding, motivating and screening high aptitude women, black, Spanish surnamed, native Americans and other minorities who may, as a result of the program, successfully complete undergraduate and graduate engineering courses in the colleges and universities of this nation. A list of the consortium institutions, personnel and coordinators is presented on page 11.

A PROPOSED NASA SATELLITE - CONSUME DELIVERY NETWORK

A Coordinators Conference on "Applications of Satellites in Education and Curriculum Sharing" was planned and conducted at A&T on July 7-8, 1977 to finalize plans for submission of a proposal to NIE entitled "A Planning Proposal to Increase the Number of Minority Engineers in the USA Via Communications Satellites in Education." ⁵ Fig. 2 shows the member institutions involved as well as the CTS antenna beam footprints on the USA which would be required for the project operation. Although coordinators located at each university were to be responsible for the management of project activities at their respective sites, A&T was to have the responsibility for overall management and coordination of the project.

The educational institutions which will form the program

CTS ANTENNA BEAM FOOTPRINTS DEPLOYED FOR THE PROPOSED CONSUME SATELLITE DELIVERY SYSTEM

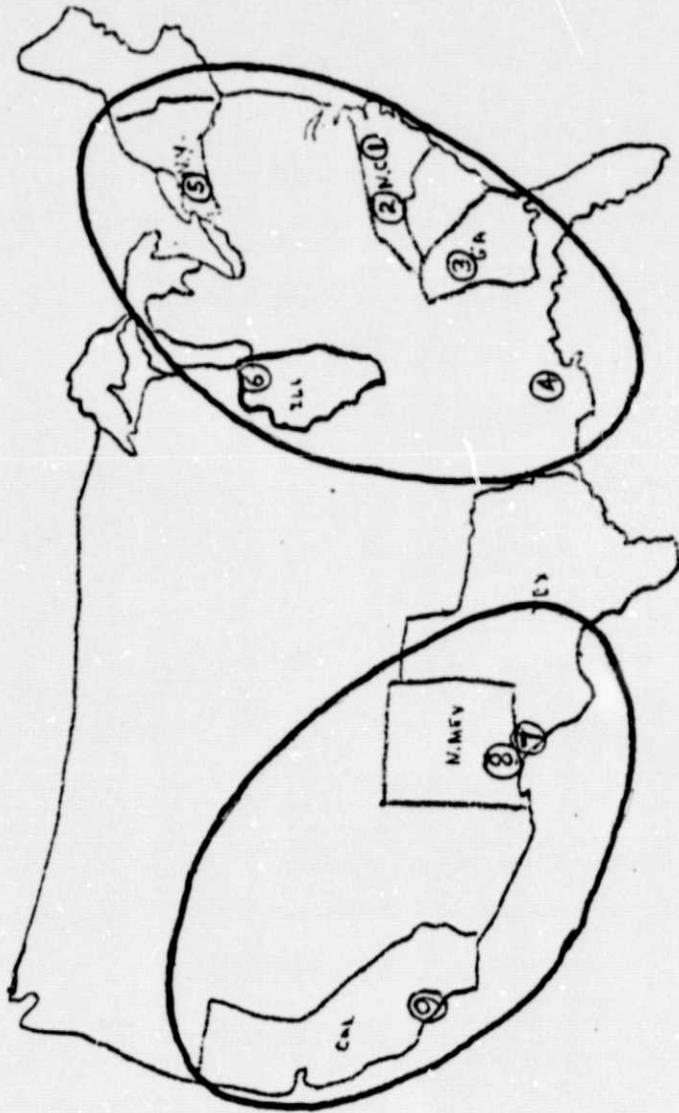


Fig 2. Consortium for Satellite Utilization for Minority Education (CONSUME)

EASTERN REGION

1. NC A&T State University Greensboro, North Carolina
2. Goddard Space Flight Center Millimeter Wave System at Rosman, North Carolina
3. Atlanta University Atlanta, Georgia
4. Southern University Baton Rouge, Louisiana
5. Cornell University Ithaca, New York

MIDWESTERN REGION

6. Greater Chicago Area Program (GCAP)
 - a) University of Illinois Champaign-Urbana
 - b) University of Illinois Chicago Circle
 - c) Northwestern University Evanston, Illinois
 - d) Illinois Institute of Technology Chicago, Illinois
 - e) Chicago Board of Education

WESTERN REGION

7. University of Texas El Paso, Texas
8. New Mexico State University Las Cruces, New Mexico
9. California State University Los Angeles, California

delivery centers for the Eastern, Midwestern and Western regions are indicated. Ideally, it would be most desirable to have a comprehensive terminal (CT) located at each university in the Eastern and Western Regions and one at a central location in the Chicago (GCAP) area so that each consortium institution would have the capability to receive and transmit audio and video signals. If such were the case, the cost of hardware and software could be excessive. The greater bandwidth requirements would also be undesirable. It would seem more practical to initiate a planning phase with two comprehensive terminals in the Eastern Region located at A&T and Cornell with backup capability located at Rosman, North Carolina and two intensive terminals (IT) located at Atlanta University and Southern University. One (CT) terminal would suffice in the Midwestern Region due to the high density target learner/users in the GCAP area. In the Western Region only one (CT) terminal located at New Mexico State University at Las Cruces, New Mexico and one (IT) terminal each at California State University at Los Angeles and the University of Texas at El Paso would be required. Using this configuration, audio-video programs both "live" and "canned" could originate in any region, be received by all institutions in the Consortium simultaneously, and, with properly designed electronics, each institution could respond audibly to the originating program center or to each other.

It was proposed that local high school centers be equipped with closed circuit TV wiring and be tied into its associated CONSUME university receiving terminals, either electrically or by telephone lines. Most of the universities in the Consortium and some of the associated high schools have closed circuit TV systems as well as TV studios in their media communications departments. Through local telephone lines or special audio links between high schools and CONSUME terminals, the various high schools could interact with the instructor at a program initiation point anywhere within the delivery system. The system also allows for "piggy backing" with commercial TV and radio stations. As an example of this, Clark College's Mass Media Communications Department at Atlanta University has a standing arrangement with several commercial radio stations and five or more television stations which would allow CONSUME programs to cover a large portion of the state of Georgia with the objective of motivating black minorities; New Mexico State University's on-campus radio/TV station KRWG AM/FM TV has a cable tie-in with an educational network which reaches approximately 80% of the state population (including a third of the state's high schools with 90% of the state's high school population). There are more than 100,000 Mexican Americans and a large percentage of the native American population living in New Mexico.

CONSUME INSTITUTIONS PERSONNEL AND COORDINATORS

1. Atlanta University Center
Atlanta, Georgia 30310
Mr. Calvin Espy*
Director, Dual Degree Program
Dr. Charles Meredith, Provost
Mr. Bill Ransom
Mass Communications
2. California State University/LA
Los Angeles, California 90032
Dr. Leslie Cromwell, Dean
School of Engineering
Martin S. Roden, Assoc. Dean*
Alfred H. Fritz
Wade Bunting (Research)
3. Cornell University
College of Engineering
Carpenter Hall
Ithaca, New York 14853
Dr. Richard H. Lance, Assoc. Dean*
4. Illinois Institute of Technology
Chicago, Illinois 60616
Dr. Edwin Steubin, Math. Dept.**
Mr. Nathaniel Thomas
Director of Admissions
5. New Mexico State University
Office of the Dean
Las Cruces, New Mexico 88003
Dr. C. Quentin Ford, Assoc. Dean*
6. NC A&T State University
Greensboro, North Carolina 27411
Prof. Leo Williams, Jr. E.E. Dept.***
Dr. David Klett, M.E. Dept.*
Dr. Lee K. Stefanakos, E.E. Dept.*
7. Northwestern University
The Technical Institute
Evanston, Illinois 60201
Dr. William T. Brazelton, Assoc. Dean
8. Southern University
College of Engineering
Baton Rouge, Louisiana 70813
Prof. James E. Cross, Chairman*
E.E. Department
9. University of Illinois
at Chicago Circle
College of Engineering
Chicago, Illinois 60680
Dr. Richard M. Michaels*
Urban Systems Laboratory
Mr. Clifton Powell,
Asst. to the Dean
10. University of Illinois
at Urbana-Champaign
College of Engineering
Urbana, Illinois 61801
Mr. Paul E. Parker, Asst.
Dean***
11. University of Texas at
El Paso, School of
Engineering
El Paso, Texas 79968
Dr. Anthony Tarquin,
Asst. Dean*

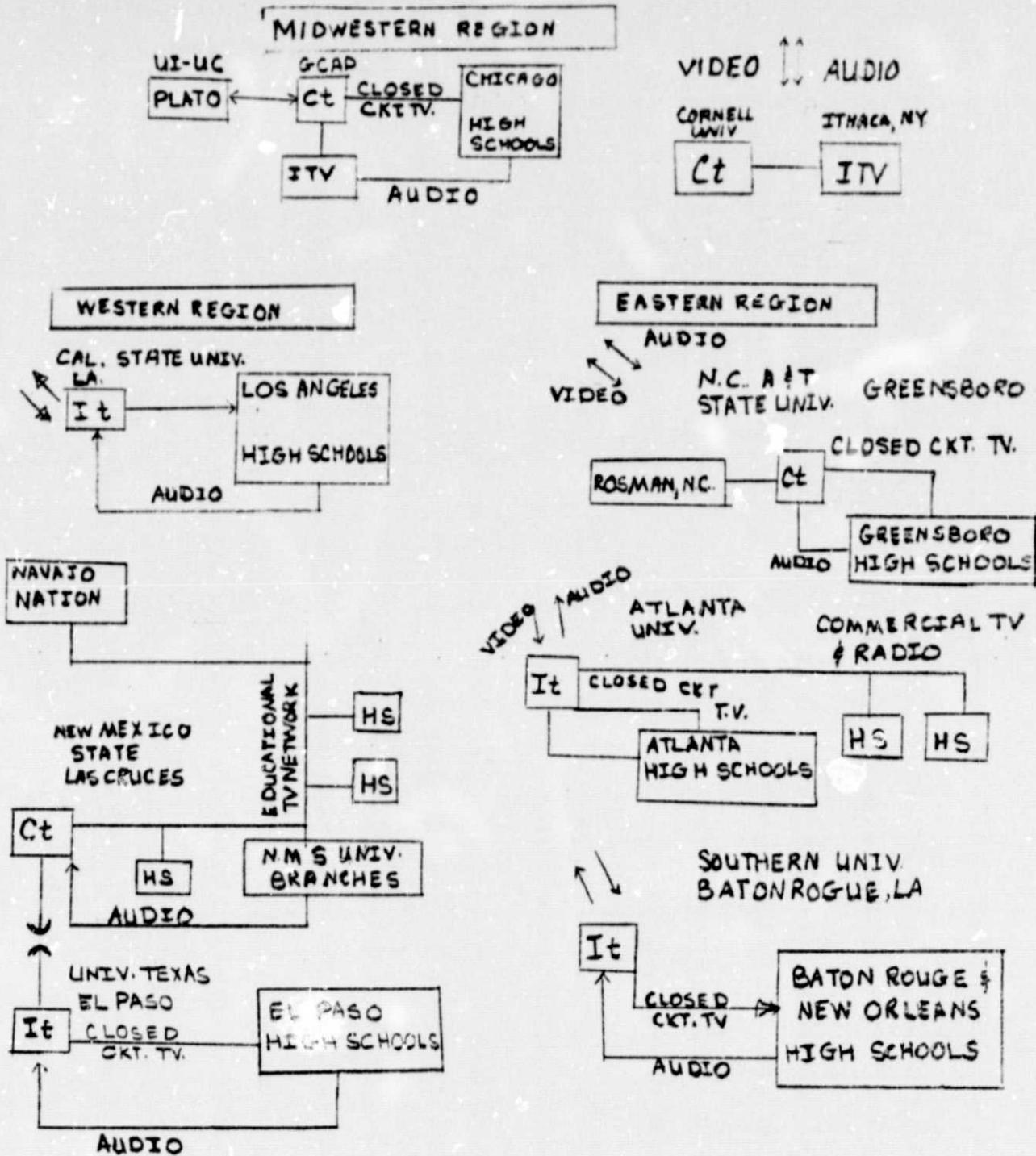
*Coordinator

**Coordinator, Greater
Chicago Area Program
GCAP Consortium***Principal Investigator
and/or Project Director

A block diagram of the NASA CTS CONSUME Delivery Network is shown on page 13. This diagram should make it easier to visualize the strong capabilities for program and curriculum sharing among the schools in the Consortium and the required high school involvement.

It is essential that high school teachers be oriented toward the problems of minority students in engineering and science as well as the career opportunities available to engineering graduates. They would then be able to identify students with potential for engineering professions and be better qualified to prepare students at the high school level for taking the additional mathematics and science required. Efforts must also be generated to reduce the isolation of capable minority students from the science and mathematics courses in predominantly non-minority high schools. Reciprocal programs must be developed for teacher and parent awareness which can help the bilingual programs being developed across the country. It is felt that the planned satellite communication facility between predominantly black institutions and institutions with large minority enrollments forming regional centers throughout the country to make use of unified programming and activities via satellite would be effective in meeting the objectives of this program. The arrangement of the Consortium makes it highly feasible and practical to transmit bilingual educational materials as well as provide for the native American, hispanic groups and blacks at both the high school and college levels. This Delivery Network also provides a mechanism whereby small engineering colleges (especially the predominantly black institutions) can receive the benefit of research oriented graduate programs from some of the leading institutions and thus upgrade their advanced programs.

BLOCK DIAGRAM OF PROPOSED CONSUME DELIVERY NETWORK



HS - HIGH SCHOOL OR CENTER
 → ← MICROWAVE LINK

SATELLITE TERMINALS

VIDEO ↔ AUDIO ↔ Ct - COMPREHENSIVE TERMINAL

VIDEO ↔ AUDIO ↔ It - INTENSIVE TERMINAL

VIDEO - RECEIVE
 AUDIO - TRANSMIT

THE NC A&T STATE UNIVERSITY BASED CTS SATELLITE
DEMONSTRATION EXPERIMENT

A working committee was formed in August, 1977 for the purpose of planning an actual satellite demonstration experiment which would be based at NC A&T State University. The committee was chaired by the author and consisted of Phil Jeter, Director of A&T's Television Studio, Marvin Watkins of Research Administration, Joseph Bennett, Director of Career Education, Drs. Winser Alexander and Lee Stefanakos of Electrical Engineering, Ben Smith of NASA Langley Research Center at Hampton, Virginia and Eloise Sanders, Secretary for the feasibility study. Weekly meetings were held with the objectives of designing and executing a meaningful satellite demonstration using NASA's CTS Satellite and thereafter to evaluate the results. Such a demonstration if well planned and executed and centered at A&T would not only add credibility but would also give an indication as to whether A&T could sustain a viable program involving applications of satellite technology in research and curriculum sharing in Education and Engineering as postulated in the original proposal.

There were numerous problems which had to be solved if these objectives were to be realized: (1) satellite time had to be obtained, (2) the required transmitting and receiving equipment had to be acquired, (3) suitable participants had to be found and committed, (4) these participants must also possess or have available the capability of satellite uplink and/or downlink equipment and studio facilities at each location, (5) suitable viewing area for the interested public would be desirable, (6) definite programs of participant interaction timed almost to the second would be required, (7) the numerous technical problems and details associated with the actual transmission such as electrical power requirements, connections, telephone installations and coordination between transmitters and receivers at the various locations as well as a pretimed deployment schedule for the satellite antennas had to be worked out, (8) and the list went on and on...ad infinitude.

The committee members went to work making various contacts via telephone, letter writing and on-site visits. The following results were obtained:

1 - A satellite program in curriculum sharing between A&T and Jackson State University in Jackson, Mississippi was developed. The program would involve the Chemistry and Mass Media Communications Departments of the two universities and their Advanced Institutional Development Programs. Contacts were made with officials of the

Southeastern Educational Communications Association (SECA) at their headquarters in Columbia, SC and arrangements were made with the Mississippi Authority for Educational Television to use their studio and the CTS receiving terminal in Jackson, Mississippi.

2 - Plans were made to share research results and techniques between A&T and Bell Northern Research, Ottawa, Canada. NSF sponsored research in metallic oxide switching material was being conducted at A&T as well as solar cell research sponsored by Rockwell International. It was felt that an effective and beneficial exchange of information via the audio-video capabilities of the CTS satellite could be realized.

3 - A motivational presentation to provide information and encouragement of minority undergraduate engineering and physics students to pursue graduate work in these areas was organized. This part of the program would highlight an exchange via satellite between recent minority graduates in engineering and physics who were currently enrolled in graduate programs at Stanford University and undergraduate students with similar majors at A&T.

4 - Permission was obtained from Pat Donoughe, Director of CTS projects at NASA Lewis Research Center in Cleveland, Ohio to use its Portable Earth Terminal (PET). This mobile earth station would be used on A&T's campus to provide uplink/downlink capability with the CTS. Not only could it transmit and receive audio-video information directly to and from the satellite (and hence between all other participants in the United States and Canada) but at the same time it could record audio-video information at both receiving and transmitting sites and simultaneously display TV picture and sound at the two locations. Four engineers were utilized in its operation. A visit was made by the author to Charleston, SC to witness an on-site CTS live demonstration by the Medical University of South Carolina in which the PET was employed. The purpose of this visit was to provide information on electrical power and special telephone requirements as well as physical location for proper line-of-sight between the PET and CTS for its successful operation during the demonstration on A&T's campus.

5 - Bradford Gibbs, Chief of Communications Branch at NASA Ames Research Center in Mountain View, California was contacted and agreed to provide almost eight hours of satellite time from his ongoing experiment. He was also instrumental in providing a studio for our subsequent involvement with Stanford University and Rockwell International. He provided uplink/downlink capability as well as satellite relay responsibilities between A&T and CTS. George Davies, Director of Space Communications Program Office in Ottawa, Canada was contacted and agreed to provide the matching satellite uplink/downlink requirements as well as a studio for our participants at Bell Northern Research Ltd. in Ottawa. An additional two hours of satellite time was also contributed by Canadian satellite experimenters which permitted us to have the required spacecraft checkout on February 3, 1978, thereby extending the effective use of our on-the-air program time.

The first history making international satellite transmission and reception directly from NC A&T State University's campus via satellite actually occurred on Friday, February 3, 1978. In the forenoon on that day, a two hour checkout was made of A&T's TV Studio equipment, its interconnections to the PET, the PET's transmission to and from CTS, transmitters and receivers at NASA Ames Research Center in California and at the Space Communications Center in Ottawa Ontario, Canada, spacecraft control transmitters at Lewis Research Center in Cleveland, the SECA receiver in Jackson, Mississippi and landlines and speaker telephones at all locations. Technical adjustments were made in power levels, transmission frequencies and CTS antenna bore angles to establish the required footprints on sites in Canada and the United States of America, adequate volume levels to decrease objectionable feedback levels, etc. The PET is shown in Fig. 3. stationed on A&T's campus. The checkout was hailed as successful and was the first indication that satellite communications at A&T was feasible and that "Scrub Action" (i.e., the untimely termination of the demonstration due to malfunctions to avoid danger or damage to the CTS spacecraft) would probably not have to be taken. Fig. 4 gives an overall view of the locations involved in this experiment. Although Goddard Space Flight Center in Greenbelt, Maryland was not involved in the actual demonstration program, Varice Henry of NASA's Telecommunications Branch at that location had been asked to videotape portions of the as-transmitted program for evaluation purposes. These video tapes would, in effect, be indicative of the reception anyone could receive with low cost TV receiver terminals in approximately 60% of the United States and adjacent Canadian territories. The black dots on the map in this

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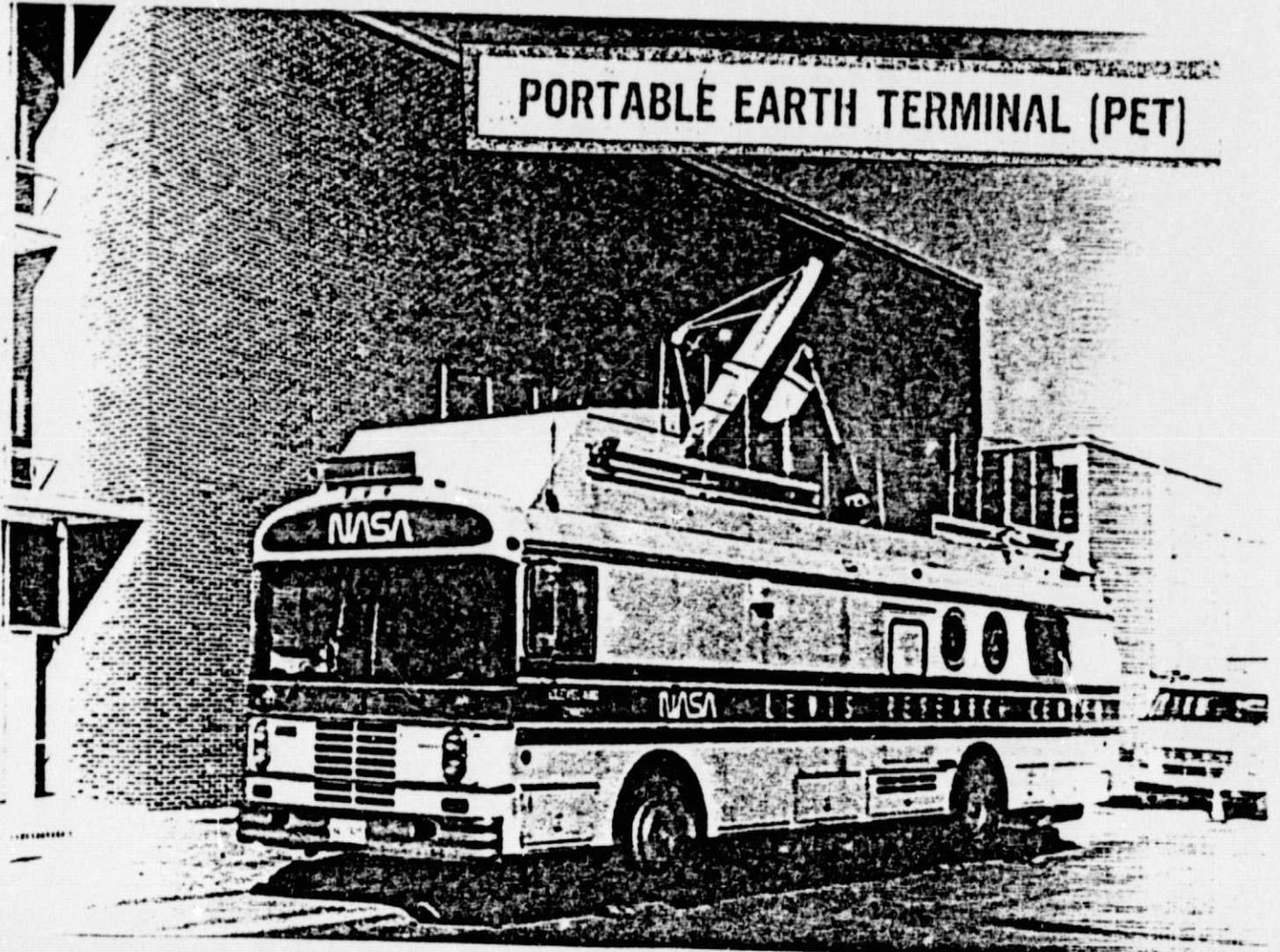


FIG. 3 PORTABLE EARTH TERMINAL WITH ANTENNA DEPLOYED FOR TRANSMISSION AND RECEPTION OF AUDIO-VIDEO SIGNALS BETWEEN NC A&T STATE UNIVERSITY AND NASA'S COMMUNICATIONS TECHNOLOGY SATELLITE ON FEBRUARY 3-9, 1973

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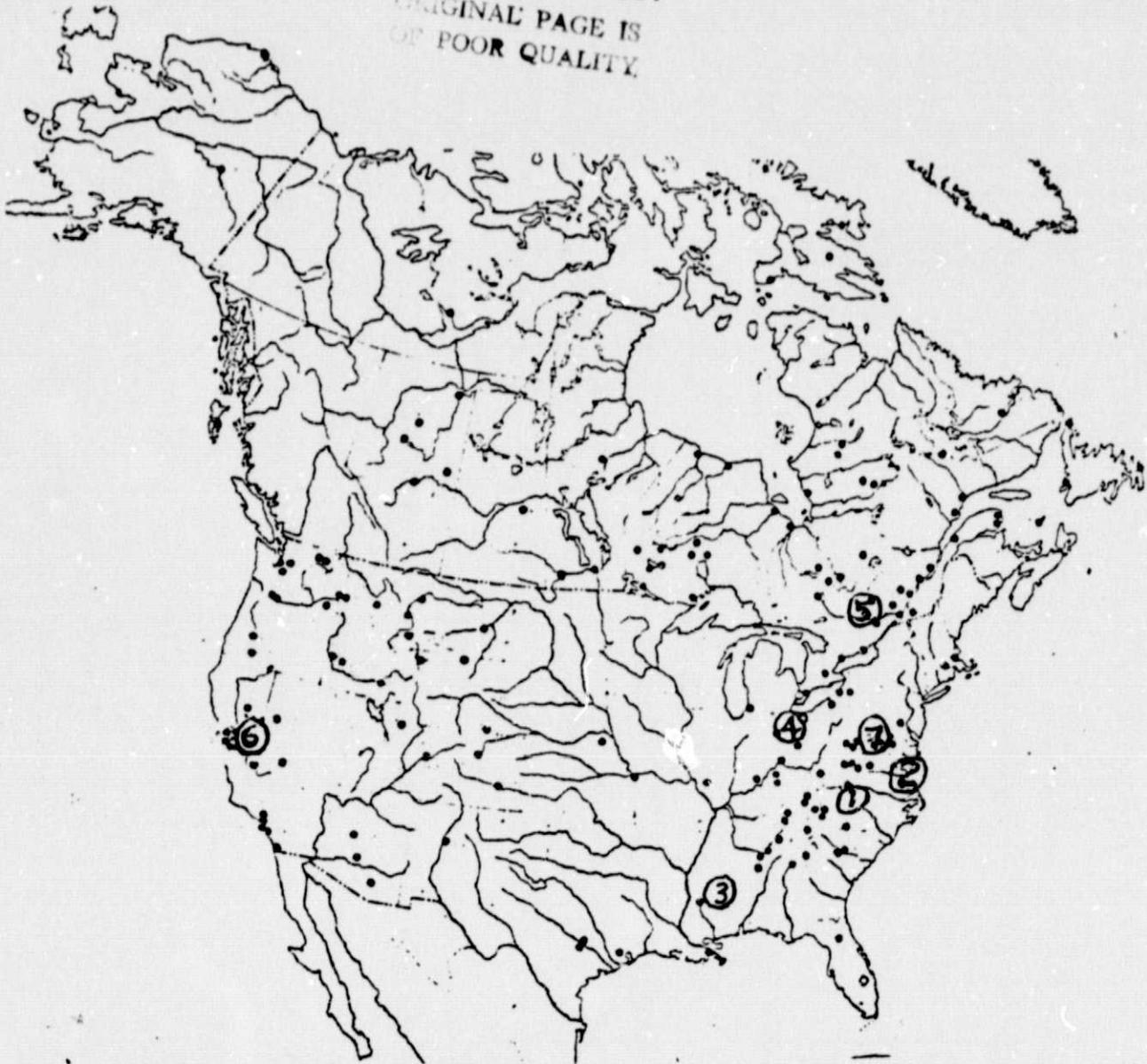


Fig. 4 LOCATION OF PARTICIPANTS IN THE NORTH CAROLINA A&T STATE UNIVERSITY - NASA SATELLITE DEMONSTRATION EXPERIMENT

- | | |
|---|---|
| 1. North Carolina A&T State University
Greensboro, North Carolina | 5. Bell-Northern Research,
Space Communications
Research Center, Ottawa
Ontario, Canada |
| 2. NASA Langley Research Center
Hampton, Virginia | 6. NASA Ames Research Center,
Mountain View, California
Stanford University
Rockwell International |
| 3. Jackson State University, SECA,
Mississippi Authority for Educational
Television | 7. NASA Goddard Space Flight
Center, Greenbelt, Mary-
land |
| 4. NASA Lewis Research Center
Cleveland, Ohio | |

figure indicate the geographic locations of current CTS users in the United States and Canada.

It was most desirable and our original intent to have two-way audio-video transmission between all participants for the complete demonstration. However, because the up/down link facility at Rosman, NC was inoperative and for other technical reasons, the demonstration was forced into the following modes of operation:

MODE I: Audio-video transmission from A&T to Jackson State; landline talk-back from Jackson State to A&T

This meant that participants at Jackson State University could see and hear the participants at A&T but they had to use landline telephones to respond to participants at A&T. In other words, Jackson State could not transmit from their location because the SECA terminal in use there was a receive-only terminal. The program consisted of a Mass Communication Curriculum Development panel discussion between Mass Communication Departments of the two universities. On the second day of the experiment, this arrangement was repeated and involved demonstrations of curriculum and information sharing on AIDP and Chemistry research programs at both universities. Some problems encountered with the telephone lines underscored the need for transmitting and receiving stations at each location in the network because the satellite can be used to transmit multiple two-way audio signals, thus eliminating the expense of the more costly landline telephone charges.

MODE II: Sequential two-way audio-video transmission between A&T and Bell Northern Research in Ottawa, Canada; landline talk-back

In this mode of operation, participants could see each other at both locations and talk to each other via the satellite one way and via telephone both ways. Since only one transmitter could be operative at any given time, actual presentations had to be made in a sequential manner. Three to five minutes were required to reduce the power of one transmitter and to increase the power of another. This communications experiment was practical in that scientists at Bell Northern were interested in metallic oxide and thick film microelectronics research currently in progress in the Electrical Engineering Department at A&T. The slide and video tape presentations permitted a useful exchange of research results without making expensive and time consuming trips between the two institutions. Both days of the experiment employed this mode of satellite delivery and part of the last day was used for evaluation purposes.

MODE III: Instantaneous two-way audio video transmission between A&T and Stanford University

This mode of operation was the most effective one since participants at both locations could see and hear each other at the same time. For all practical purposes, it was as though they were in the same room instead of being as they were, thousands of miles apart. Additionally, participants in Canada could monitor the program but could not interact except by land-line telephone. Since two recent A&T graduate students in Electrical Engineering and Physics currently working on advanced degrees at Stanford participated in this program, the useful exchange of ideas and advice given between students at A&T and Stanford on a one-to-one basis was a delightful and motivationally effective experience. The practical aspects of this satellite delivery was apparent in the exchange of scientific information on research in connection with the Rockwell Solid State Laboratory at A&T and Rockwell scientists in California relative to solar cell research. Engineers and scientists at A&T and Rockwell International have been making trips back and forth between their two locations for some time. Obviously, a satellite delivery system of this type between the two could save valuable time and money.

The complete program and satellite transmission schedule is included in the appendix of this report.

EVALUATION OF THE A&T SATELLITE DEMONSTRATION

Evaluation of the experiment is based upon media coverage, feedback from the local community, University employees and students, observations of participants and support personnel, video tape recordings at A&T, Goddard Space Flight Center in Greenbelt, Maryland and at NASA Ames Research Center in Mountain View, California. ^{10-A}In addition to these sources, approximately 100 questionnaires were completed by members from all of the above mentioned groups.

Various aspects of the demonstration were covered by local television stations as far as 25 miles from the campus. Television coverage was excellent - the longest report on coverage being more than three minutes. Radio coverage was good. Some radio and TV stations as far as 75 miles from Greensboro were given interviews by phone on the various aspects of the demonstration, especially its purpose and measures of its success. All local newspapers covered the demonstration, placing emphasis on particular factors such as the accomplishment as a whole, the PET

and its crew of engineers, student involvement, the educational and research benefits, etc. An auditorium with a seating capacity of more than 200 persons, adjacent to the University TV Studio, was equipped with TV monitors so that the University community as well as the townspeople could observe both transmissions and receptions. During the first day the video reception was excellent but the audio reception was poor due to improper electrical connections, undesirable audio effects caused by feedback loops formed between the satellite audio transmission and telephone landlines being used. However, reception on the second day was much improved after rectification of some of the apparent problems.

About 100 people responded to the questionnaire shown on the following page. Relative to the quality of transmission and reception, 16% said it was excellent, 38% said good, 12% responded fair, 8% responded poor and 26% did not respond. The average preparation time by participants was about 15 hours. Relative to the most effective part of the demonstration, the following responses most elaborated on (in the order of importance) were given:

- 1- The satellite production itself 20%
- 2- Students interacting with other students 15%
- 3- Question and answer discussions between locations 13%
- 4- Exchange of scientific information.. 12%

The respondents' opinions expressed most in answer to number 10 on the questionnaire were:

- 1- Fantastic technical development for the school
- 2- Interactions of students should be an advantage for future use

Some felt that more time should have been spent on some parts of the demonstration and others felt that less time should have been spent on other parts; there were, of course, differences of opinions by some on the same topics.

PLEASE RETURN BY
MARCH 1, 1978

QUESTIONNAIRE
NASA-A&T-JACKSON STATE-BNR-STANFORD CTS SATELLITE DEMONSTRATION
February 3-9, 1978

In order to provide the evaluation requested by NASA, we request that ALL participants in the referenced program, selected observers and monitors complete this questionnaire and return it to Leo Williams, Jr., Electrical Engineering Department, NC A&T State University, Greensboro, NC 27411 at your earliest convenience.

1. Your Name _____ Organization _____
Address _____ Phone _____
2. Times of your observations and/or participation. Please check.

Friday 2/3	Tuesday 2/7	Thursday 2/9
check-out	8:30-9:30 _____	8:30-9:30 _____
11:00-11:30	9:30-11:00 _____	9:30-10:30 _____
_____	11:00-12:30 _____	10:30-11:30 _____
3. Approximate amount of time you spent in preparation for the demonstration _____ hours
4. Did you note interest manifested by others? Yes ___ No ___ by:
Students ___ Faculty ___ Industrial ___ Media ___ Other ___
5. What is your feeling as to response of individuals to the demonstration (a) in your organization or dept. _____
_____ (b) outside your organization or dept. _____
6. What was the most effective part of the demonstration? _____
_____ least effective? _____
7. How can satellite telecommunications be used in your (or other) organization(s)?
8. Was there media coverage at your location? Radio ___ TV ___
Newspaper ___ Other ___ Please attach clippings.
9. What was the quality of transmission or reception:

At Your Location	From Other Locations
Audio _____	Audio _____
Video _____	Video _____
10. Please give your candid critique of the overall telecommunications experiment below. Suggestions for improvement, additions, areas of use, etc., would be greatly appreciated. Use over side if needed.

We appreciate your participation and response to this query.

A general overview of the results of video taping parts of the demonstration simultaneously at three different locations is given on the following page for the first day of the demonstration. Although some of the same difficulties occurred on the second day, the overall performance was much better on the second day. Relatively little time was available for checking out temporary wiring which was required for interconnections between the University TV studio, the PET and the auditorium which was wired for public viewing. Naturally this would account for some of the problems and undesirable results obtained.

The applications of satellites in business, education, the entertainment field and news coverage^{3,4} is growing rapidly. Teleconferencing is expected to save both time and expense when compared to the alternative of travel over long distances. Students and faculty members at universities who are privileged to participate and to be involved in this relatively new technology can both directly and indirectly contribute to its successful application. The demonstration held at A&T was far from perfect, but one hastens to say that it was successful in that the technology was demonstrated to be both feasible and practical. The next most obvious question is, Where do we go from here?

VIDEO TAPED RESULTS OF NCA&T-NASA CTS SATELLITE DEMONSTRATION FEBRUARY 7, 9, 1978

Tuesday, February 7, 1978

TIME - EVENT	PET tape at A&T Greensboro, NC	GSFC tape Greenbelt, MD	Ames video Mountain View, CA
8:30 - 9:30 a.m. Sign on, Introductions, Overview MODE I Mass Media Programs and Curricula	Audio/video - Good except "echo" effects; transmission improved with time; no video on tape, audio excellent	No tape	No tape
9:30 - 10:05 a.m. Metallic Oxide and Opto- Electronics Research A&T-Bell Northern Research MODE II A&T to BNR	Audio/video - Good; laboratory slides clear and readable	Audio and video - excellent	Audio/video - Good
10:05 - 11:00 a.m. MODE II BNR to A&T	Video tape copy from CRC to A&T excellent; much static (decreases with time); slides not readable (improved with time)	Audio and video - excellent	Audio/video - excellent
11:00 - 11:30 a.m. Minority graduate stu- dents at Stanford Uni- versity & undergraduate students at A&T MODE III	Audio at A&T not clear at times; video - good	Audio/video - Good Audio interrupted	Audio/video - excellent
11:30 - 12:15 p.m. Solid State Electronics Rockwell International & A&T MODE III Sign Off	Audio/video Good		

SIGNIFICANCE OF THIS STUDY - FUTURE SATELLITE APPLICATIONS

Insofar as the educational aspect of satellites is concerned, satellites can be regarded as part of the advanced broad and narrow band electronic communications technologies which can be exploited in the same way computers are used in instructional content and management. Green and Lazarus indicate that educational innovation spreads slowly, if at all, with geographic distance cited as one of the chief inhibitors of the spread of worthwhile innovations⁽³⁾. Thus satellite technology can be used to bridge the geographical barrier and assist in the spread of innovation.

North Carolina A&T State University is one of several predominantly black colleges and universities in the process of currently developing programs in mass communications, e.g., advertising, broadcasting, journalism and public relations. Like many programs, A&T's was started by a federal AIDP grant and supplemented via a grant from a private foundation. One of the problems the program faces is recruiting good students, retaining them and finding internships to prepare them for entry into the labor force in their chosen areas. Obviously, the satellite opens up new vistas in curriculum sharing using television to enrich education without being bound by geographical constraints. Future applications of satellites as they apply to mass communications could occur on several levels. Students were used to function as production crews for the programming originated by the University. A permanent terminal installation at the University would enable students in mass communications to gain valuable and consistent production experience in a variety of situations. This experience could be used in the same manner as internships are which is to prepare students for jobs via practical experience.

One of the problems the demonstration disclosed was that A&T has an inadequate program delivery system because the UTVS is a closed circuit operation which extends throughout one building. Because of this and the fact that other classrooms were being used on the days of the experiments, special viewing facilities had to be arranged in an adjacent building. This would not have been necessary if the closed circuit system was more extensive and accessible to other parts of the campus. If programs like Agriculture, Community Mental Health, Career Education, Mass Communications and Transportation are to be included, the program delivery system would have to be expanded. Since the UTVS occupies part of the first floor in Crosby Hall, it cannot serve as a program origination center and a viewing area simultaneously. Another deficiency the demonstration

pointed out was that portable program production capability is needed because it allows the incorporation of program material which cannot be brought to the Studio. An example of this would be Engineering experiments and other research which involves objects or equipment which are not mobile. Expansion of the closed circuit facility and a mobile production van would solve these two problems.

An excellent possibility of satellite use at A&T is in the area of Agriculture. A&T is a member of a consortium which consists of Tennessee State University, Georgia State University and the University of Tennessee at Knoxville. One of the consortium's functions is to interchange information on agricultural problems, activities and accomplishments. By utilizing the Communications Technology Satellite this interchange could occur in question and answer sessions or presentations without expense of traveling to any of the locations. Another possibility in this area would be that since all the institutions in the consortium are in the same satellite footprint, the consortium could be easily expanded to include other universities in the Northeast, Far West, Southwest and Midwest. In the area of Community Mental Health which is a relatively new and growing venture at A&T, 20 or more students and faculty members rent a bus and travel long distances, e.g., to Meharry Medical School in Nashville, Tennessee to get practical experience in their related areas of concentration. A satellite delivery system could save time, energy and still be effective in imparting actual on-the-scene observations of the results of shock treatments, therapeutic exercises, practical applications of electronic instrumentation, biofeedback, etc., using audio-video satellite delivery.

In any event, the author feels that this new technology could be developed and applied here at A&T. Funding is of prime importance in the realization of a successful venture. However, the detailed information presented provides an approach to possible funding for such a venture.

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APPENDIX

1-A

COORDINATORS CONFERENCE
on
APPLICATIONS OF SATELLITES
IN EDUCATION AND CURRICULUM SHARING

Sponsored by

NORTH CAROLINA
AGRICULTURAL AND TECHNICAL STATE UNIVERSITY
and
NATIONAL AERONAUTICAL AND SPACE ADMINISTRATION

July 7-8, 1977

N.C. A&T State University
Greensboro, NC

THEME: Applications of satellites in
increasing the number of minority
Engineering/Science graduates in the
USA, and to showcase professional,
cultural and artistic achievements of
minority persons throughout the nation

PROGRAM AND ACTIVITIES

Thursday, July 7

Registration & Hospitality Hour 8:30-9:30
Room 126-128

Plenary Session 9:30-11:00
Little Theatre-Crosby Hall Communications Bldg.
Moderator Leo Williams, Jr.
Professor & Project Director
Electrical Engineering Dept.
NCA&TSU

Introduction of Guests and NCA&TSU
Participants

Welcome and Remarks Dr. L.C. Dowdy, Chancellor
NCA&TSU

Comments & Observations Dr. Dudley G. McConnell
Assistant Associate Administrator
for Space Applications, NASA
Washington, DC

Mr. Benjamin O. Smith
Office of External and Community Affairs
NASA-Langley Research Center
Hampton, VA

Mr. Samuel H. Johnson - Director
National Scholarship Service and
Fund for Negro Students (NSS-FNS)
Atlanta, GA

Mrs. Yvonne Clark
Mechanical Engineering Dept.
Tennessee State University
& Society of Women Engineers

Background of the CTS Project, Overview of the
Conference, Objectives Prof. Leo Williams, Jr.

Introduction of Coordinators

Coordinators' Orientation & Organization 11:30

Lunch 12:30

Cosmos Restaurant 709 E. Market St.
(by invitation only)

Coordinators' Work Session #1 2:00-4:30
Rooms 126-128 Barnes Hall

Friday, July 8

Coordinators' Work Session #2 8:30-10:30
Rooms 126-128 Barnes Hall

Refreshments & Break 10:30-10:45

Summary & Conclusion 11:30-12:00

LIST OF INVITED PARTICIPANTS

Atlanta University Center	Calvin L. Espy *
California State University (Los Angeles)	Charles Meredith
	Leslie Cromwell
	Martin S. Roden
	Alfred H. Fritz *
	Wade Bunting
Colorado State University	Lionel V. Baldwin
Cornell University	Richard H. Lance *
	Eugene Wilson
Georgia Institute of Tech.	Fred Schutz, Jr.
Howard University	Eugene M. Deloatch
	James W. Sennott
Illinois Institute of Tech.	Nathaniel Thomas
	Edwin Steuben *
New Mexico State University	C.Q. Ford *
N.C. A&T State University	Leo Williams, Jr. *
	Joseph Bennett *
	Phillip Jeter *
	Lois Kinney *
	Winser Alexander *
	Reginald Mitchiner
	William J. Craft *
	E.K. Stefanakos *
	David Klett
Northwestern University	William Brazelton
Prairie View A&M University	A.E. Greaux
Purdue University	J.C. Hancock
Southern University	James E. Cross *
Tennessee State University	S.S. Devgan
Tulane University	Hugh A. Thompson
Tuskegee Institute	Z.W. Dzbczak
University of Illinois (Chicago Circle)	Richard M. Michaels
University of Illinois (Urbana)	Clifton Powell
University of Texas at El Paso	Paul E. Parker *
Vanderbilt University	Anthony Tarquin *
	Howard L. Hartman

* Persons who actually attended.

5-A

APPLICATIONS OF SATELLITES
in
EDUCATION AND CURRICULUM SHARING,
INDUSTRIAL AND UNIVERSITY RESEARCH

Sponsored by

NORTH CAROLINA
AGRICULTURAL AND TECHNICAL STATE UNIVERSITY

and

NATIONAL AERONAUTICAL AND SPACE ADMINISTRATION

February 7, 9, 1978

Crosby Hall
A&T University Television Studio
N.C. A&T State University
Greensboro, NC

A satellite demonstration experiment in curriculum sharing and scientific research results between North Carolina A&T State University, Jackson State University, Bell-Northern Ltd, Stanford University including representatives from Rockwell International Science Center is to be presented. NASA's Communications Technology Satellite will be used in this telecommunications experiment in conjunction with ground stations located at NASA Ames Research Center in Mountain View, California, Communications Research Center in Ottawa, Canada, The Mississippi Authority for Educational Television, (SECA) at Jackson, Mississippi and NASA's Portable Earth Terminal at Greensboro, North Carolina

S C H E D U L E

NASA CTS Satellite Demonstration Experiment in Curriculum Sharing and Scientific Research between NCA&TSU, Jackson State University, Bell-Northern Research, Stanford University and Rockwell International on February 7, 9, 1978

Tuesday, February 7, 1978 8:30 a.m. - 12:15 p.m. EST

8:30-8:40 Antenna adjustment and spacecraft checkout
Audio-video transmission from NCA&TSU, Greensboro, NC to Jackson State University, Jackson, MISS (SECA)
Talk-back from Jackson State to A&T via landline speaker telephone

SIGN ON

8:40-8:50 Introductions (live)
Prof. Leo Williams, Jr. Electrical Engr. A&T 2.5 min.
Dr. L.C. Dowdy, Chancellor A&T 2.5 min.
Mr. Jack VanNess, NASA 2.5 min.
Dr. John Peoples, President, Jackson State 2.5 min.
(via phone)

8:50-9:30 Mass Media Programs and Curricula
Richard Moore, Program Director, Mass Communication Curriculum Development A&T
Omega Wilson, Coordinator, Mass Communication Program A&T
Michael Hailey, Reporter, Burlington, NC Times
Isabelle Johnson, Senior student A&T

Dr. Johnny E. Tolliver, Head, Dept. of Mass Communications, Jackson State University
(via telephone from Jackson State)

9:30-9:40 Antenna adjustment
Two-way audio-video transmission between NCA&TSU, Greensboro, NC and Bell-Northern Research Ltd., Ottawa Ontario, Canada: Metallic Oxide and Opto-Electronics Research

9:40-9:50 A&T Participants: (live)
Leo Williams, Jr., Prof. Electrical Engr. 10 min.
Raymond Koske - E.E. Lab. Assistant, Student
Diane Allison - E.E. Lab. Assistant, Student
Myron Powell - M.E. Lab. Assistant, Student
Cheryl Watson - Math. Lab. Assistant, Student

9:50-10:05 Video tape - A&T Microelectronics and Metallic Oxide Laboratory 15 min.

10:05-10:20 Interactive question/answer/comments 15 min.

10:20-10:45 Research in Electro-Optics and Solid State at Bell-Northern Ltd. Participants: 25 min.
Dr. H.M. Naguib
Dr. A.H. SpringThorpe
Dr. Dick Dymant
Dr. William Westwood

Videotape

10:45-11:00	Interactive question/answer/comments Speaker phone between A&T and NASA Ames	15 min.
11:00-11:20	Minority graduate students at Stanford University in Science and Engineering: Tom Harrison - PhD Candidate Walter Lowe - Solid State Physics (B.S. in Physics, NCA&TSU) Robert Copeland - Electrical Engineering (B.S.E.E., NCA&TSU)	20 min.
11:20-11:30	Discussion between students at A&T and Stanford University	10 min.
11:30-12:00	Two-way audio-video transmission between NCA&TSU, Stanford University and Rockwell International Speaker phone between NCA&TSU and BNR, Ottawa Dr. Jim Harris, Rockwell International Science Center, Thousand Oaks, California Lecture: Liquid Phase Epitaxy, and Solid State Dr. Jim Meindl, Professor of Electrical Engineering Stanford University	30 min.
12:00-12:12	Discussion, question-answer interaction	12 min.
12:12-12:15	ACKNOWLEDGEMENTS - SIGN OFF	3 min.

Thursday, February 9, 1978 8:30 a.m. - 1:30 a.m. EST

8:30-8:40	Antenna adjustment and spacecraft checkout Audio-video transmission from NCA&TSU, Greensboro, NC to Jackson, State University, Jackson, MISS (SECA) Talk-back from Jackson State to A&T via landline speaker telephone	
8:40-8:43	Introduction Joseph A. Bennett	3 min
8:43-9:05	Ongoing Programs and Research in Chemistry Dr. William DeLauder, Chairman, Chemistry Dept. A&T Dr. James Perkins, Chairman, Chemistry Dept. Jackson State University	
9:05-9:08	Introduction Joseph A. Bennett	3 min.
9:08-9:30	Advanced Institutional Development Programs at Minority Institutions Dr. Willie T. Ellis, Asst. Vice Chancellor of Academic Affairs & Coordinator of Advanced Institution Develop- ment Program A&T Dr. Oscar Rogers, Dean, Graduate School & Coordinator of Advanced Institution Development Program Jackson State University	
9:30-9:40	Antenna adjustment Two-way audio-video transmission between NCA&TSU, Greens- boro, NC and Bell-Northern Research Ltd., Ottawa, Canada: Metallic Oxide Research and Opto-Electronics Research	

9:40-10:15 Continuation, feedback and evaluation of transmission on 1-7-78
10:15-10:45 Two-way audio-video transmission between NCA&TSU and Stanford
University
Speaker phone between NCA&TSU and BNR
Solid State Technology at NCA&TSU
Dr. Winser Alexander, Chairman Electrical Engineering Dept.
A&T
Dr. E.K. Stefanakos - E.E. Dept. A&T
Mr. Tom Baker - E.E. Dept. A&T
10:45-11:20 Dr. Jim Meindl, Electrical Engineering, Stanford University
Video tape - Integrated Circuits Laboratory, Stanford Electronics
Laboratory
Evaluation, Discussions
11:20-11:30 ACKNOWLEDGEMENTS SIGN OFF

. Coordinators, Resource & Technical Personnel

NC A&T State University

Phillip Jeter-Director, A&T University T.V. Studio
Eloise Sanders-Secretary, CTS Project
Marvin Watkins-Research Administration
Guy Loftin-University Television Studio
Dr. Isaac Barnett-Safety & Driver Education
Prof. A.E. Streat-Architectural Engineering
Zebedee Hicks-Architectural Engineering

Stanford University

Dr. Kenneth Downs

Jackson State University

Dr. Estus Smith-Vice Pres. For Academic Affairs
Dr. D. Holloway-Asst. Vice Pres. for Acad. Affairs
Dr. Robert Smith-Dean, School of Arts & Sciences

Southern Educational Communications Association(SECA)

Dr. Robert Glazier-President
F. Lee Morris-Principal Investigator
A.C. Allen-Director, Southern Carolina Education

Mississippi Authority for Educational Television

Dave Wilson-Engineer
Bill Haller-Engineer

Communications Research Center

George Davies-Director
Ron O'Connor

National Aeronautics & Space Administration (NASA)

Patrick Donoughe, Lewis Research Center-CTS Manager
Jack VanNess-Langley Research Center
Benjamin Smith-Langley Research Center
A. G. Price-Langley Research Center
Guy Gurski-Lewis Research Center
Ervin Edelman-Cleveland Research Center
Bradford Gibbs-Ames Research Center
Garth Hull-Ames Research Center
Varice Henry-Goddard Space Flight Center

Portable Earth Terminal Engineers (PET)

Ken Asbury Lou Basalice
Joe Fiala Clarence Neumann

C8 Greensboro Daily News, Thurs., July 7, 1977

Class By Satellite Aim Of Officials Meeting At A&T

A national network of classes by commercial satellite is the aim of a pilot program being initiated today by A&T State University.

Officials of 11 universities from throughout the nation are meeting in Barnes Hall to get the project under way.

Leo Williams, director of the project, said the university and the National Aeronautics and Space Administration (NASA) will cooperate to investigate the use of satellites for teaching and research.

According to Williams, the project is designed to help increase the number of minority college students studying in the field of engineering. He said both predominantly white and predominately black colleges will be involved in the program.

Williams said it is envisioned that commercial satellites might be effectively used in a variety of ways in education, including the sharing of curriculum, advertising and in audio-video communication.

Addressing today's meeting will be Dr. Dudley G. McConnell, assistant associate administrator for NASA, and Benjamin O. Smith of the Office of External and Community Affairs for NASA's Langley Research Center.

C2 The Greensboro Record, Wed., July 6, 1977

A&T gets role in satellite test

A&T State University and the National Aeronautics and Space Administration (NASA) will join in a pilot project to test the use of commercial satellites for teaching and research.

Officials of 11 universities will open a two-day meeting on the project in Barnes Hall at A&T Thursday at 9:30 a.m.

"This project could open new vistas of coordinated teaching and education using satellite technology," said Leo Williams, an A&T engineering professor who will direct the project.

According to Williams, the project is designed to help increase the number of minority college students studying in the field of engineering. He said both predominantly white and predominantly black colleges will be involved in the program.

A&T, one of the six predominantly black colleges with an engineering program, will coordinate the project for the 11 schools across the nation.

Williams said it is envisioned that commercial satellites might be used in the field of education, including the

sharing of curriculum, advertising and in audio-video communication.

The representatives meeting at A&T will form a consortium to test the feasibility of using satellites. A&T expects to later submit a proposal to the National Institute of Education for funding for a communication satellite project.

Officials participating in today's program include Dr. Dudley G. McConnell, assistant associate administrator for NASA; and Benjamin O. Smith of the office of external and community affairs for NASA's Langley Research Center.

The AFRO - American, WK. 7
 JULY 17-23, 1977
 YOU KNOW BECAUSE YOU READ THE AFRO

~~Baltimore, Md.~~ BALTIMORE, Md.

A-T, NASA to test teaching by satellite

GREENSBORO, N.C. — A and T State University will join with the National Aeronautics and Space Administration (NASA) in a pilot project to test the use of commercial satellites for teaching and research in a network of minority colleges.

Officials of 11 universities from throughout the nation held a two-day meeting in Barnes Hall at A and T recently to initiate the project.

"This project could open new vistas of coordinated teaching and education using satellite technology,"

said Leo Williams, an A and T engineering professor who will direct the project.

According to Williams, it is designed to help increase the number of minority college students studying in the field of engineering.

He said both predominately white and predominately black colleges will be involved in the program.

A and T, one of the six predominately black colleges with an engineering program, will coordinate the project.

Williams said it is envisioned that commercial satellites might be effectively used in a variety of ways in the field of education, including the sharing of curriculum, advertising and in audio-video communication.

He said the satellite will possibly be used to screen minority students for the possible study of engineering.

ORIGINAL PAGE IS
OF POOR QUALITY.

Class-by-satellite

GREENSBORO RECORD 7-20-77
p. D-2

A&T target February

BY ROXIE F. HUGHES
Record Staff Writer

The engineering class-by-satellite is expected to be at A&T State University by February of 1978, according to Leo Williams, project director.

The coordinators of the Consortium of National Satellite Utilization for Minority Education (CONSUME) have spent years planning the program which is, for the first time, based on a predominantly black university campus.

According to Williams, the next step is getting the "Portable Earth Terminal" which is an experimental bus containing equipment used to send signals via satellite to other schools in the CONSUME project.

Although the bus is already booked in many areas, Williams expects it to reach A&T by February.

The CONSUME project involves curriculum-sharing among 10 universities throughout the U.S. that have a large number of minority students in engineering.

Some of these include Northwestern University, the Atlanta University Center, Cornell, and Southern University.

Williams said that the program is designed to motivate minority students in engineering science areas by showcasing the professional achievements of minority persons.

Using monitors and radio receivers, the schools will be able to share lectures and demonstrations. "Students will also be able to interact with instructors through te-

LEO WILLIAMS,
PROJECT DIRECTOR

'Portable terminal'
next pressing need



lecommunications," said Williams.

Williams believes the program will reduce the high failure rate among minorities in universities which he says have failed in the past to identify the special needs of minorities.

The CONSUME program has far-reaching effects and is also working on the high school level, according to Williams.

"For example, there are 18 high schools in Chicago that have special programs to motivate over 16,000 minority students toward engineering careers," said Williams.

"The students meet weekly to work on science projects, to go on field trips and to hear lecturers."

The program also extends to the high school teacher, according to Williams.

13-A

THE A&T REGISTER

"COMPLETE AWARENESS FOR COMPLETE COMMITMENT"

GREENSBORO, N.C. FRIDAY, JANUARY 20, 1978

A&T Homebase For Experiment

A national experiment which promises to beam classroom instruction via satellite to two colleges, 3,000 miles apart, will be held at A&T State University early next month.

A&T has been selected by the National Aeronautics and Space Administration (NASA) to test the feasibility of curriculum and research sharing by means of satellite.

Leo Williams, professor of electrical engineering and director of the project, is being kept quite busy these days preparing for the test demonstrations to be held on the campus February 7 and 9.

According to Williams, the project is being watched with interest by educators and scientists across the nation.

He said the February demonstrations will consist

of the passing of information between A&T and California's Stanford University; an exchange between A&T and Jackson State University, the transmission of information from the Bell Northern Research Limited of Ottawa, Canada to A&T and to California.

Williams said Stanford will be sending information about its research in solid state technology. A&T last February opened the Rockwell Solid State Electronics Laboratory in its Engineering School.

A&T and Jackson State University will exchange information about the two universities' mass communications programs.

The idea, says Williams, is to see if it will be practical for universities to share their curricular offerings and

research projects via satellite.

A portable earth terminal will be set up just outside Crosby Hall, which contains A&T's television studio. Williams said the programs originating at A&T, will be beamed to NASA's Communication Technology Satellite (CTS), located more than 22,000 miles above the

(See Satellite, Page 8)

Satellite To Relay Decision

(Continued From Page 1)
earth.

A signal will then be relayed by the satellite to the three out-of-state locations.

Williams said the transmission could be received by stations located in almost two thirds of the United States.

Working with Williams on the project are Varice Henry of the Goddard Space Flight Center, Guy Gurski of NASA's Lewis Research Center and officials of Rockwell International in California.

Two recent A&T graduates, Robert Copeland and Walter Lowe, now at Stanford, will assist with the project.

ORIGINAL PAGE
OF POOR QUALITY

The Mortarboard

A FACULTY - STAFF REVIEW

North Carolina A&T State University, Greensboro, N. C.

Vol. III No. 10 February 1, 1978

A&T To Test Instruction By Satellite on February 6

A national experiment, in which classroom instruction will be beamed by satellite to two colleges 3,000 miles apart, will be held at A&T State University early next month.

A&T has been selected by the National Aeronautics and Space Administration (NASA) to test the feasibility of curriculum and research sharing via satellite.

Leo Williams, a professor of electrical engineering and director of the project, is being kept quite busy these days preparing for the test demonstrations to be held Feb. 7 and Feb. 9.

According to Williams, the project is being watched with interest by educators and scientists across the nation.

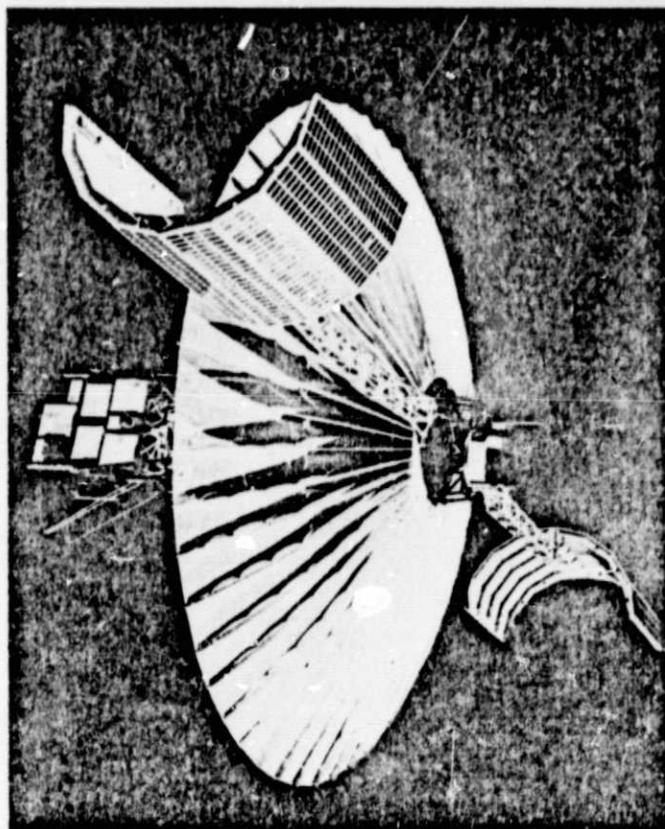
He said the demonstrations will consist of passing information between A&T and California's Stanford University, and an exchange between A&T and Jackson State University in Mississippi.

Other transmissions will be between the Bell Northern Research Laboratory in Ottawa, Canada and A&T, and an exchange between the huge Rockwell International in California and A&T.

Williams said Stanford will be sending information about its research in solid state technology. Last February, A&T opened the Rockwell Solid State Electronics Laboratory.

A&T and Jackson State will exchange information about the two universities' mass communications programs.

"The idea," says Williams, "is to see if it will be practical for colleges and research facilities to share their curricular offerings and research by means of satellite."



A portable earth terminal will be set up at A&T for the test transmissions. Dr. Lewis C. Dowdy, chancellor, will open the communications network.

Williams said the programs originating at A&T, will be beamed to NASA's Communication Technology Satellite (CTS), located more than 22,000 miles above the earth.

A signal will then be relayed by the satellite to the three out-of-state locations.

Williams said the transmissions could be received by stations located in almost two-thirds of the United States.

Working with Williams on the project are Varice Henry of the Goddard Space Flight Center, Guy Gurski of NASA's Lewis Research Center and officials of Rockwell International in California.

Two recent A&T graduates, Robert Copeland and Walter Lowe, now at Stanford, will assist with the project.

COMMUNITY **Scene**

Section C—Page 3

Thursday, February 2, 1978

Satellite to relay A&T programs and research

Next Tuesday and Thursday mornings, some of A&T State University's programs and scientific research will be broadcast by satellite.

A series of telecommunications programs in curriculum sharing and scientific research between the university and other universities and industrial organizations at remote locations in the United States and Canada will be broadcast via NASA's Communications Technology Satellite located 22,500 miles above the earth.

The telecasts, originating from A&T, will be transmitted directly to the satellite by means of NASA's Portable Earth Terminal which will be located in the campus adjacent to the university's television studio. •

Program signals will be picked up by the satellite and relayed to Jackson State University in Mississippi, Bell-Northern Research Ltd. in Canada, Stanford University and Rockwell International in California. This will make it possible for the participants in each location to view and communicate with each other.

The demonstration experiment is coordinated by Leo Williams Jr., Joseph Bennett and Phil Jeter, all members of the university's staff.

Professor Williams said this is a "first" for A&T and that the use of satellites could play a meaningful role in the future effectiveness of other university programs at A&T.

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Astronaut Will Help A&T Launch Program

A&T News Bureau

A host of officials, including one of the first three blacks chosen for the astronaut program, will help A&T State University launch a space satellite program Tuesday.

Present at the 8:30 a. m. ceremony in Crosby Hall will be Air Force Maj. Frederick D. Gregory, who is enroute to Houston to begin his space training.

This will be the first time that a predominantly black college has been involved in such a program, said Benjamin Smith, a community relations official of the NASA's Langley Research Center. Smith said the purpose of the experiment is to stimulate the interest of minority students in science.

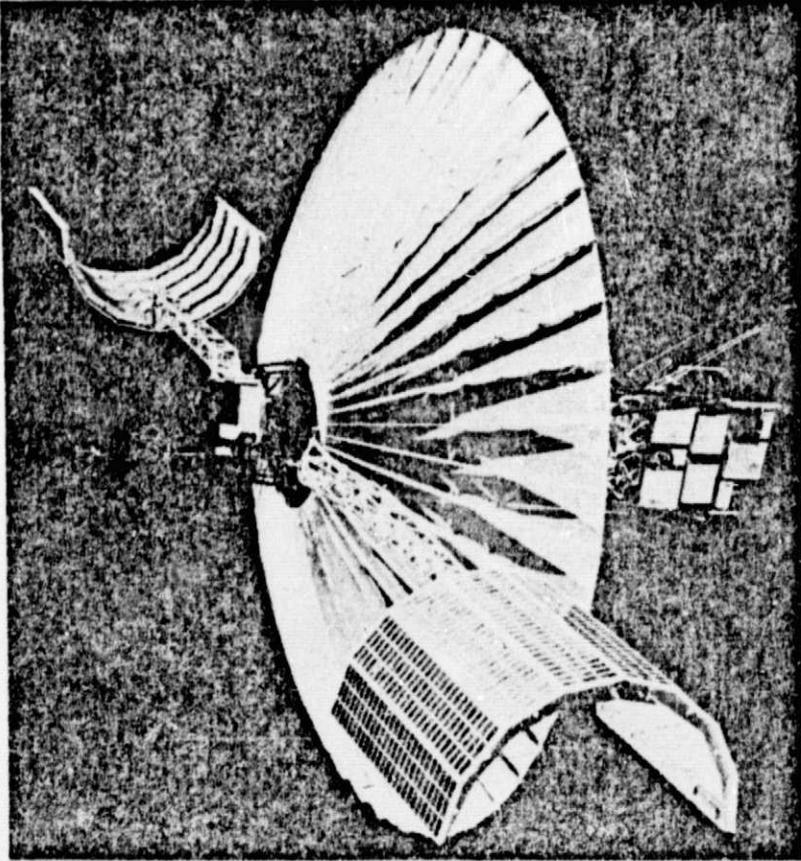
Astronaut Gregory, a native of Washington, D. C., will participate in the project which will seek to transmit classroom instruction and research information via satellite across the nation.

Gregory is a graduate of the U. S. Air Force Academy and has served in recent years as a rescue test pilot. He was a helicopter rescue pilot in Vietnam, and has flown 38 different kinds of aircraft. He is married, and has two children.

On Tuesday, transmission will take place between A&T and the Bell Northern Research Laboratory in Ottawa, Canada. Information will also be passed between A&T and the Rockwell International Laboratory in California and between A&T and Stanford University in California and Jackson State University in Mississippi.

Other NASA personnel participating in the demonstration will be Dr. J. E. Duberg, deputy director of the Langley research center; Patrick Donoghue of the Lewis Research Center; Varice Henry of Goddard Flight Center and Ervin Edelman of the Cleveland Research Center.

Leo Williams, professor of engineering at A&T, is director of the program. Dr. Lewis C. Dowdy, chancellor, will open the communications network.



Satellite To Be Used In A&T Program

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THE GREENSBORO RECORD
2-7-75

A&T joins space age program

BY ERNIE NEFF
Record Staff Writer

A&T State University joined the space age this morning.

Not only was a brand new astronaut on hand at the university, but for the first time officials of A&T were speaking via satellite communication to other schools around the country.

A&T Chancellor Lewis Dowdy, one of the first speakers in a television relay via satellite to Jackson State University in Mississippi, called it "a signal day for us at A&T State University... Today we sought a new mode of communication from man to man to improve our society."

The two-day satellite communication program at A&T, sponsored by a grant from the National Aeronautics and Space Administration, is the first to originate at a predominantly black university, according to NASA officials. This morning, A&T had several hours use of a Communications Technology Satellite orbiting about 22,300 miles above earth. A mobile NASA transmission station brought to A&T made the communication possible.

A&T officials and students were scheduled to contact officials and students at Jackson State, Bell-Northern Research Ltd. in Canada, and Stanford University in California to demonstrate how curriculum and scientific research information can be exchanged by satellite communication. Contact will be made again Thursday morning.

"The students were very excited about this," Dowdy told a NASA official shortly after the first transmission. "Just think of these kids that did not have a chance to participate in this upper echelon of their society before."

The satellite demonstration, he said,

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Talking space

From left, Maj. Gregory, NASA official John Duberg, Williams

Staff photo by Dave Nicholson

Dowdy hails new program as signal step at A&T

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will give students at predominately black A&T a chance to get in on "the majority culture" for the first time.

Leo Williams, a professor of engineering who is director of the space project, said one major purpose is to interest students in engineering and science.

There was a lot of excitement among the participants this morning, and the presence of Maj. Frederick D. Gregory, one of America's first three black astronauts, was not the least cause of the excitement.

Gregory, who spoke briefly during the first transmission to Jackson State, will be trained as a space shuttle pilot when he is transferred to Houston to begin training.

He said he had always wanted to be an astronaut, but was afraid he wouldn't make it because he might be getting too old. He's 37 now, and until a new group of 35 astronauts was chosen recently, none had been picked since 1967.

He had spent 13 years in the Air Force, serving recently as a test pilot. In Vietnam, he was a helicopter rescue pilot.

"As far as I'm concerned, this is just a next step," Gregory said. "It's almost

like transferring from one job to another."

Though he says the new assignment to NASA as an astronaut is just another step, he admitted he was surprised at the reaction people have when they meet someone who might be flying into space. "Many people say don't forget me," he said. "And I won't forget anybody."

Gregory expects to make many public appearances like the one today through the end of March. In July, he will be transferred from Langley Research Center to Houston.

The new astronaut expects to go into space in mid 1980, a year after the first test flight of the space shuttle. He figures it will take to mid 1980 for him and the other new astronauts to be trained.

His training and experience in 40 different types of aircraft should stand him in good stead when he pilots a space shuttle. Though the shuttle is launched like a space ship, it returns as a plane and actually lands on an airstrip. It can be used over many times, he reported.

Gregory does not think being picked as one of the first black astronauts is that big a deal. "I don't consider it as a significant achievement. I'm sure they chose the most qualified. I would very much not like sitting next to someone who was a token," he said with a grin.

A&T Enters The Space Age With Satellite Relay Program

BY DAVID S. GREENE
Daily News Staff Writer

Today through Thursday, N.C. A&T State University will join a space-age communications network to demonstrate sharing of classroom instructions and research information with other institutions.

One of America's newest astronauts, Maj. Frederick D. Gregory, who will soon enter training as a pilot for the space shuttle system, and other representatives of the National Aeronautics and Space Administration will be at A&T this morning when the network goes on the air.

Actually, the network broadcasts will be bounced off a Communications Technology Satellite between mobile units on earth, one of which is at A&T. The satellite, launched at

most two years ago, is about 22,300 miles above earth and is in an orbit synchronized with earth's rotation.

Joe Fiala of NASA's Lewis Research Center in Cleveland, Ohio, project director for NASA, said the mobile terminal on the A&T campus was engineered mostly from "in-house equipment." But he estimated that a permanent unit with similar capabilities would cost about \$50,000 "in today's dollars."

Fiala, who said NASA does not feel it has fulfilled its mission until it demonstrates practical benefits from its satellite program, said the solar-powered satellite and the ground unit, known as a Portable Earth Terminal, are little affected by earth weather or solar flare activity.

Why was A&T picked for participation in the demonstration?

Benjamin Smith of NASA's Langley Research Center at Hampton, Va., and a communications technology satellite manager, said A&T was the place he found with "the most people willing to grind out the work and get the job done."

Smith, who came up with the space-age network idea in response to "management challenges," turned a question back to a student newspaper reporter, asking: Had she ever "heard of a black school being involved in a

satellite demonstration before?" She answered "no." He inquired if she had not felt "a little bit left out," and she nodded.

Besides, Smith said, he found his supervisor "sensitive" to the need for inclusion of minority campuses in space-age technology.

Leo Williams, professor of electrical engineering at A&T and director of the space network project there, said Monday the project has been a "feasibility study" under a \$30,000 grant from NASA. A principal purpose of the project, he said, is to interest more minority students in engineering and science.

Williams said when the study is complete, consideration could be given to economic factors in setting up at A&T a permanent broadcasting station that could use satellites.

Gregory (one of three black astronauts recently selected by NASA), A&T Chancellor L.C. Dowdy and NASA representatives will participate in the first broadcast of the demonstration, beginning at 8:30 this morning. The audio-video transmission will be received, via the satellite, at Jackson State University at Jackson, Miss., where reply transmissions to A&T will originate.

Later in the morning, the satellite communications link will be established between A&T and Bell-Northern Research Ltd. at Ottawa, Canada, for a discussion of metallic oxide and microelectronics research.

Other transmissions will link A&T with Rockwell International Science Center and Stanford University in California.

Williams termed the three days the portable earth terminal unit will be at A&T as "really, a working demonstration." He said he believes the "check-out" of the system has already proved its feasibility.

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Greensboro Daily News, Tues., Feb. 7, 1978 **B3**



Staff Photo By Jimmie Jeffries

Joe Fiala Explains Unit To Duane Clark, A&T Senior From Laurens, S.C.



THE A&T REGISTER

"COMPLETE AWARENESS FOR COMPLETE COMMITMENT"

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VOLUME XLIX NUMBER 37 NORTH CAROLINA AGRICULTURAL AND TECHNICAL STATE UNIVERSITY GREENSBORO, N. C. TUESDAY, FEBRUARY 7, 1978

PET To Send Messages From Crosby TV Lab

By Eric Howell

The Portable Earth Terminal (PET), is a portable satellite communications terminal that is presently located on A&T's campus in the parking lot behind Crosby Hall. PET is receiving transmission from the Communications Technology Satellite (CTS), which is the world's most powerful satellite located 25,000 miles above the earth.

Today at 8:30 a.m., transmission began between A&T and the Bell Northern Research Laboratory in Ottawa, Canada; Jackson State University, in Jackson Mississippi; and Stanford University in California. On Thursday transmission will resume again from A&T.

Present at the ceremony in Crosby Hall today was Air Force Major Frederick D. Gregory who was one of the

three Blacks chosen for the astronaut program.

"This will be the first time that a predominantly Black college has been involved in such a program," said Benjamin Smith, a community relations official of the NASA's Langley Research Center. Smith said the purpose of the experiment is to stimulate the interest of minority students in science.

Leo Williams, professor of engineering at A&T, is the director of this program. Dr. Lewis C. Dowdy, chancellor of the university, opened the communications network.



Leo Williams [Middle] and other officials from NASA discuss the procedure that will be used today.

A&T Educates With Satellite

BY VALERIE PUTNEY
Staff Writer

The future arrived at A&T State University this week.

Parked outside the Crosby Communications building is an impressive-looking mobile home with a dish-like transmitter on its roof. Painted in familiar NASA red & white, its called PET, or Portable Earth Terminal. Inside is a complex array of electronic microwave transmission equipment and four operators.

With PET, A&T was enable, for the first time, to communicate simultaneously with receivers in Canada, Mississippi and California—a solar powered CTS satellite, a co-project of NASA and Canada's Bell Northern Research Ltd.

This week's transmission served to demonstrate the feasibility of using communications satellites in education putting a larger number of geographically-isolated students in touch with centrally-located knowledge and equipment.

According to Project Director Leo Williams, professor of electrical engineering at A&T, "Our primary purpose was to motivate young people—especially minorities—to get into the engineering field, and to increase the number of minority scientists and technologists in this country."

Two years ago, Williams and representatives of ten other technical universities across the nation put together a proposal advancing the idea of curriculum sharing via satellite. NASA approved the idea last April, resulting in a \$30,000 grant contract for the

week-long feasibility study now in progress.

"There were two major obstacles," said NASA's community relations specialist, Benjamin Smith. "They were: getting PET and getting satellite time."

The satellite, launched two years ago into orbit 22,500 miles above the equator, has been used on alternate days by Canadians and Americans. It was booked solid, until NASA's Ames Research Center in California donated their time to A&T and its Minority-education consortium.

Bell Northern got involved when they read an article by Prof. Williams on his microelectronics research, which was one of the messages transmitted over the satellite. They linked up with a nearby Communications Research Center in Ottawa; Jackson State University in Mississippi hooked into a receiver-only mode, and Stanford University in California linked into the network with talk-back capabilities. These were the first receivers of A&T's satellite messages.

PET, on a demonstration tour of the country, was sent to the A&T campus in time for the satellite hook-up, scheduled for Tuesday and Thursday of this week. Once wired into the A&T television studio, it was ready to transmit within ten minutes. Since Jackson State was in the receiver-only mode, originators at A&T were standing by to phone their Mississippi counterparts long-distance when the signal had been sent, to make sure they were receiving it. The call never got through; but the satellite itself "worked beautifully", according to

Smith.

The broadcast demonstrated how a single school could share its latest programs and classes with far-flung students who otherwise would not have access to them. Substantial savings in travel time, duplication of equipment and long-distance telephone calls could be realized.

"Literally millions of people could receive the information," said Prof. Williams, citing the Appalachian satellite project which trained over 1,200 teachers scattered over the south from one TV studio at the University of Kentucky.

NASA's representative termed this week's demonstration "exceptionally successful." Already the project has captured the interest and imaginations of A&T faculty--and students. Smith said he was heightened to hear curious students ask of the NASA technicians, "How do I get to be one of you?"

If put into practice, curriculum-sharing by satellite could ultimately add much-needed manpower to America's scientific pool, pulling in to its wake the minority students who were the focus of the A&T project.

Williams enumerated the many applications a satellite could have to education. Among them: With \$50,000, A&T could install a transmitting/receiving facility, and establish microwave links with UNC-G and any other school within a 30-mile radius (line-of-sight). He spoke of other school systems experimenting with mass electronic communications such as a Chicago consortium receiving transmissions from the Sears building.

Five Chicago colleges are among CONSUME's nine stations. The western region, under one beam footprint from space, includes the University of Texas, California State and New Mexico State. Under the eastern footprint are: A&T, Atlanta Southern, Corness Universities, the Goddard Space Flight Center at Rosman, N.C., and the Chicago group. Many other schools could eventually be included.

According to A&T Mass Media instructor Omega Wilson, the communications satellite could radically change the face of modern education. It is uncertain which direction such a system will take, but the first, giant step has been taken this week at A&T State.

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Experts Discuss Teaching by Satellite—The opening session of the curriculum-sharing demonstration featured a panel discussion by (from left) Frederick D. Gregory, NASA Space Shuttle astronaut; Dr. John E. Duberg, associate director of the Langley center; Dr. L. C. Dowdy, Chancellor of N.C. & A&T; and Leo Williams, professor of electrical engineering.

Satellite Teaching Tried at North Carolina University

A demonstration of curriculum sharing, using television and NASA's Communications Technology Satellite, recently was conducted at the North Carolina A&T State University in Greensboro. The demonstration, planned by NASA's Langley Research center, represented a "first" for the predominantly black college participating in the educational experiment.

Two days of telecasts originated from the university were transmitted to the satellite located 22,500 miles above the Earth, by NASA's portable Earth terminal, a ground-based communications system contained in a trailer. The program signals were relayed from the satellite to Jackson State University, Miss.; Bell-Northern Research Ltd. in Ontario, Canada; Stanford University and Rockwell International in California. Participants in each location were able to see and communicate with each other.

The program was funded by a NASA contract to investigate the feasibility of using satellites in sharing curriculum information, research techniques and results. Included in the demonstration session was a question and answer session with Frederick D. Gregory, a recently selected NASA Space Shuttle astronaut.

Almost seven hours of satellite time was made available by the Ames center, which controls the CTS. The Lewis center is responsible for the portable earth terminal.