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**TIPAN**

**Transformation and  
Integration of the  
Provincial  
Agricultural  
Network**



**Northwest Frontier Province, Pakistan**

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**Office of International Agriculture  
University of Illinois at Urbana-Champaign**

**In collaboration with  
Southern Illinois University at Carbondale**

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CONSULTANT REPORT - GARY V. JOHNSON

MICROCOMPUTING

FEBRUARY--MARCH 1986

Submitted to  
the Northwest Frontier Province  
Agricultural University  
Peshawar, NWFP, Pakistan

and

the U.S. Agency for International Development  
Mission to Pakistan

A Report of Contract No. 391-0488

by  
Office of International Agriculture  
University of Illinois at Urbana-Champaign  
Southern Illinois University at Carbondale

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## ABSTRACT

With the official opening of the computer laboratory at the Northwest Frontier Province Agricultural University on 3 March 1986 the initial phase of the microcomputer program at that university came to a close. While the closure completed two of five tasks of the TIPAN computer teams during its TDY, it did not complete them all. The computer team had as its goal the completion of five tasks.

- The initial installation of microcomputers and their peripherals.
- The installation of the software and its configuration for each microcomputer and its peripherals.
- Design and aid in the implementation of the various databases needed at the NWFP AU and by the resident TIPAN team, e.g., student admission records, grades, faculty and staff personnel records, participant training records, financial records, etc.
- Introduction of the faculty and relevant administrative staff to the microcomputer and its uses.
- Evaluate future needs regarding equipment, software, personnel, and facilities with regard to both the NWFP AU, as well as the outlying agricultural research stations that will be merging with the university.

The first two tasks were completed with the opening of the laboratory. While the third task was begun, it was not completed during my stay in Pakistan. A further discussion of what needed to be done and what was accomplished can be found in the consultant report of Zainul Azizan.

Completion of the last two tasks has led to a series of recommendations regarding the short-term training of staff to operate the computer laboratory, the need for additional microcomputer equipment and software at the University, and microcomputer needs of the research stations once they are integrated into the University. The main recommendations are:

- 1) Inamul Haq be named director of microcomputing at the University,
- 2) Three to five on-campus faculty be sent for short-term microcomputer training and additional trainees from the research stations should be identified,
- 3) An additional laboratory be created prior to the construction of the Learning Resource Center exclusively for research use,
- 4) Access to the faculty research laboratory be awarded on a basis of the merit of proposals submitted by the faculty, and

- 5) An additional 29 microcomputers, their peripherals, and software be purchased immediately for use at the Northwest Frontier Province Agricultural University and its research stations at a total cost of \$180,083.

## I. INTRODUCTION

With the official opening of the computer laboratory at the Northwest Frontier Province Agricultural University (NWFP AU) on 3 March 1986 the first phase of the microcomputer program at that university came to an end. While the opening of the laboratory was a major achievement of the TIPAN computer team during its TDY at the NWFP AU, it was not the team's only task. The computer team had as its goal the completion of five tasks.

- The initial installation of microcomputers and their peripherals.
- The installation of the software and its configuration for each microcomputer and its peripherals.
- Design and aid in the implementation of the various databases needed at the NWFP AU and by the resident TIPAN team, e.g., student admission records, grades, faculty and staff personnel records, participant training records, financial records, etc.
- Introduction of the faculty and relevant administrative staff to the microcomputer and its uses.
- Evaluate future needs regarding equipment, software, personnel, and facilities with regard to both the NWFP AU, as well as the outlying agricultural research stations, that will be merging with the university.

As leader of the TIPAN computer team, my duties were to participate in some of the above tasks, to direct the team with regard to all tasks and coordinate its activities with the NWFP AU, the resident TIPAN team, and U.S. Agency for International Development. The TIPAN computer team consisted of Inamul Haq (NWFP AU), Zainul Azizan (consultant from Malaysia), Anthony Kerber (Southern Illinois University), and myself.

In the remainder of the report I will expand upon each of the above tasks. The next section will deal with the initial installation of the hardware and software into the microcomputing facilities at the university. The third section of the report will deal with the design and implementation of the various data bases needed at the NWFP AU and by the resident TIPAN team. The fourth section will deal with the introduction of the faculty and relevant administrative staff to microcomputing. The final section will deal with the future microcomputing needs of the NWFP AU as the merger of the university with the provincial research stations occurs.

## II. INSTALLATION OF HARDWARE AND SOFTWARE AT THE NWFP AU

Upon the arrival of the TIPAN computer team an inspection of the computer laboratory was made. The laboratory was completed as per original specifications except for the placement of the outlets three feet from the floor on the walls instead of in the floors. This change was an improvement over the original design from the standpoint of safety given that voltage at the outlets was 240 volts.

During the initial installation of the microcomputers and their peripherals another change was made in the computer laboratory, the installation of four socket switch blocks between work stations<sup>1</sup>. This change was necessary because the monitors and printers operate at 110 volts rather than 240 volts required by the central processing unit (CPU) of the microcomputer. The laboratory in its present configuration allows the use

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<sup>1</sup>The term work station as used here includes the central processing unit of the microcomputer, monitor, keyboard, and printer. The work station occupies a table, which had been constructed in Pakistan to my specifications.

of one uninterrupted power source (UPS) for two work stations. These UPSs are presently placed on the floor, between work stations, and underneath the switch blocks.

After the installation of the switch blocks in the laboratory the assembling and testing of the microcomputers and their peripherals was undertaken.<sup>2</sup> Of the 11 microcomputers shipped from Illinois, three failed diagnostic tests. Two of the microcomputers had failures associated with the hard disk drive or the disk controller card. The third microcomputer had a faulty power source. By the interchanging of components the TIPAN computer team was able to concentrate the failed parts in a single CPU. Two IBM Pro printers also failed and were inoperable.

All of the faulty equipment was taken to IBM at Islamabad for repair. This equipment was picked up by a driver two weeks later. In general the impression of the TIPAN computer team was that IBM Pakistan was not very interested in servicing equipment not sold by them. IBM's parts policy is to import just enough spares to cover anticipated failures in microcomputers that they import. While the servicing is done in Islamabad, parts are stored in Karachi. This geographic distribution of parts and repair facilities leads to delays and, since there are no duties on microcomputers or their parts, is not very efficient.<sup>3</sup> This experience suggests that repair of equipment should be done by a third party rather than IBM.

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<sup>2</sup>The specifications and quantities of the equipment brought to the NWFP AU in this initial phase of microcomputerization is given in Appendix A.

<sup>3</sup>This behavior cannot be justified by an argument that the bulk of the sales are in Karachi, since the repair facility is in Islamabad. In fact informal research seems to support a position that the bulk of the IBM microcomputers are in the Islamabad, Peshawar, and Lahore areas. It does appear that many of these microcomputers were not sold by IBM Pakistan.

Further discussion of this matter will appear in the final section of this report.

The second of our five tasks, the loading of the software and its configuration for the microcomputers and peripherals, went smoothly. This result stemmed from the familiarity of the computer team with the software prior to arriving in Pakistan.<sup>4</sup>

While the original plan for disposition of the microcomputers at the NWFP AU had called for nine in the computer laboratory, one in the Institute for Development Studies (IDS), and one in the Registrar's office, it became evident that changes in the location of equipment would be necessary. The number of microcomputers and peripherals in the computer laboratory was reduced to eight. The two remaining operational microcomputers were temporarily housed at the USAID staff house in Peshawar for use by the TIPAN computer team for development of the various databases, and lecture notes and lesson plans. With the acquisition of his own microcomputer by Anthony Kerber and the completion of his TDY by Mr. Azizan these last two microcomputers will be moved to the NWFP AU. Since our stay at the NWFP AU, the need for computerization of the offices of the resident TIPAN team has become apparent. One of the microcomputers from the USAID staff house will be moved into these offices at the university. The other microcomputer at the staff house will be placed in the administrative offices at the university to facilitate the construction of the various databases. Finally, the microcomputer in Islamabad for repairs will be placed in IDS upon its return.

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<sup>4</sup>For a listing of the software and a brief description of each program see Appendix B.

After initial start up of the computer laboratory it became clear that the interruption of power due to load shedding by WAPDA was going to severely reduce the effectiveness of microcomputers at the NWFP AU. This problem was rectified to some extent by placing the computer laboratory on the power grid for the university's diesel generator. Connection to the generator was not a complete solution to the problem, however, because if WAPDA cuts back to single phase transmission of power the university's generator can not be started. The complete resolution of the power problem for the computer laboratory was achieved by prompt purchase of a 6.5KVA Honda portable gasoline generator for the laboratory. The NWFP AU's prompt response to the power problem indicates the faculty's and administration's enthusiasm for microcomputers.

### III. THE DESIGN AND IMPLEMENTATION OF DATABASES

Next to the introduction of microcomputers themselves to the NWFP AU, the initial design and construction of databases to be used by the university and the resident TIPAN team will have the greatest long-term impact on the university. It is my feeling that the administration and faculty of the university have grasped the potential usefulness of databases without really understanding the need for careful design. While this lack of understanding regarding careful data base design is not unusual, the need for good design is especially important at the NWFP AU for successful introduction of this new technology.

The databases being designed for the NWFP AU are given in Table 1 and those for the resident TIPAN team in Table 2. The main responsibility for the design of the databases was placed on Mr. Zainul Azizan. Mr. Azizan

**Table 1.  
Databases  
for  
The Northwest Frontier Province  
Agricultural University**

1. Student admissions
2. Student grades
3. Faculty personnel records
4. Financial records
5. Equipment inventory

**Table 2.  
Databases  
for  
The Resident TIPAN Team**

1. Participant training
2. Equipment inventory
3. Financial records

has built databases for the Office of International Agriculture and Office of International Student Affairs at the University of Illinois at Urbana-Champaign, as well as for other organizations. Anthony Kerber participated in the database design effort and has taken primary responsibility for the design of the participant training database.

The only difficulty with database design has been with regard to the design of financial databases for both the NWFP AU and the resident TIPAN team. None of the software purchased for the TIPAN project is flexible enough to deal with the current budgeting practice.<sup>5</sup> Both Mr. Azizan and I will evaluate software on return to our respective countries to rectify this problem. It may be necessary for a financial consultant to be sought with regard to choosing the correct software. For further detail regarding database design and implementation see Mr. Azizan's report to the NWFP AU.

#### IV. INTRODUCTION OF THE FACULTY AND ADMINISTRATIVE STAFF TO MICROCOMPUTING

After the initial setup of the microcomputing laboratory an introductory course on microcomputing was given for the faculty and administrative staff. This course was comprised of four sessions--a general session attended by all the participants, and three laboratory sessions, attended by sixteen participants at a time, focusing on the software programs available to the NWFP AU. Because the university was closed due to a student strike, not all faculty were present. Attendance varied over the sessions between approximately 50 and 75 participants. The initial faculty response to the course was enthusiastic. During these

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<sup>5</sup>The accounting codes for the NWFP AU are required by Pakistani law and cannot be adjusted without revision of the law.

introductory sessions faculty began to bring data from their experiments to be analyzed. This introductory course was useful in that it pointed out the low level of typing skills among the NWFP AU's faculty and staff and their interest in data analysis. This information is extremely useful to Mr. Kerber and Mr. Inamul Haq in their preparation of future lesson plans. As a result, the first extended lessons for the university's personnel will focus on the statistical program.

The introductory session also made it clear to the university administration, the resident TIPAN team, and the TIPAN computer team that the current laboratory facility and staff to run it was inadequate for the instruction of students and the use by faculty for research. Therefore it was decided that for the remainder of this spring term classes would be held only for the faculty. Although this limitation of use was forced on the microcomputer program, it is beneficial because it is vital for the long-range success of the computer program at the NWFP AU that the faculty understand the capabilities of microcomputers. The restriction will help the faculty in the eventual integration of microcomputers into their courses and will prove useful to the students even though it sets back the start of computer courses one semester.

During this same period night classes were conducted in the microcomputer laboratory for members and family of the resident TIPAN team, and USAID staff. These courses focused primarily on word processing with a brief introduction to use of spreadsheets and database management program. The course was highly successful.

During the final week of my stay at the university Mr. Kerber and Mr. Inamul Haq began classes on use of the statistical program for the

microcomputer. This gave me one more opportunity to be impressed with Mr. Haq's facility with the microcomputers and his teaching ability.

#### V. FUTURE MICROCOMPUTING NEEDS AT THE NWFP AU

Regarding the future microcomputing needs at the NWFP AU there are several issues to be discussed--staffing levels, equipment needs, and the computerization of the NWFP research stations once they are merged with the university. While each of these issues are multifaceted and are interrelated, focusing on each one separately in this final section will allow the significant aspects of each issue to be analyzed.

##### Staffing Levels

The difficulties with the class on the statistical program is illustrative of the problem associated with the staffing levels for microcomputing at the NWFP AU. The problem is associated with the lack of trained personnel. The problem was most apparent when Mr. Anthony Kerber became ill. Because computer classes require two instructors at all times Mr. Kerber's illness forced the cancellation of classes for that day. The problem has been further magnified because Mr. Haq has been given other duties at the university unrelated to the computer laboratory. Mr. Haq and Mr. Kerber are also responsible for overseeing the completion of the construction and the day to day operation of the databases. The staffing problem will become greater with the departure of Mr. Kerber in November.

While an increase in staffing would help eliminate the current problem, other measures need to be taken as well. Mr. Haq needs to be freed from his noncomputer related duties as much as possible. Also, initially he and Mr. Kerber need to have sufficient time away from micro-

computer courses to prepare lesson plans and evaluate their teaching of the faculty, and to train the clerical staff for inputting information into the various databases and retrieving information from the databases.

To provide the needed time for other microcomputer duties I have recommended to Mr. Haq and Mr. Kerber that the microcomputer lab open at 9:00 a.m. each day that the university is in session. This will give them time to test the work stations each morning and prepare for the day's classes. Also no microcomputer classes should be held after 2:00 p.m. This will allow those attending the courses to have access to the microcomputer until 4:00 p.m. each day. During this free access time only one of the supervisory personnel need be in the laboratory providing the other individual with time for the other microcomputer duties. Additionally, as discussed earlier, I am recommending that in this spring semester classes for the faculty only be given every other week. During the weeks when classes are not held small groups or individual instruction of key administrative personnel can be undertaken, and open access can be provided to the faculty for use of the microcomputers for their research.

In addition to the above measures I am recommending the sending of three to five additional personnel to the Asian Institute for Technology (AIT) for short-term training as soon as possible. If this training is limited to less than three months even those scheduled for degree programs in the future could be sent. The training course at AIT should be designed to give the individuals involved an understanding of the equipment and software being used at the NWFP AU. The individuals trained would aid in the teaching of microcomputers, would help in the supervision of the computer laboratory during periods of open access, and act as

microcomputer resource persons to the department in which they are faculty. The individuals chosen for training should come from a variety of departmental backgrounds.

A final recommendation regarding staffing is that Mr. Inamul Haq be named director of the microcomputer laboratory and microcomputing at the NWFP AU. The value of following this recommendation is four-fold. First, as the computer laboratory staff increases in size greater coordination and supervision of their activities will be required. Second, as the importance of microcomputing grows for the administration, research, and teaching of the NWFP AU, greater time will be needed to supervise these various activities and oversee maintenance and purchase of equipment and software. Third, the appointment of Mr. Haq would improve the morale of those faculty and staff who have completed short-term training. Finally, and of great importance, Mr. Haq has clearly demonstrated his organizational and leadership skills and facility with the use of microcomputers. These traits make him ideal for the proposed post.

#### Equipment

The experience of this TDY indicates the need for an increase in the number of microcomputers and their peripherals, expansion of microcomputer facilities outside the computer laboratory prior to the construction of the Learning Resource Center, and the need for an alternative power supply for existing and future equipment. The effectiveness of the computer laboratory needs to be increased if it is to be capable of dealing with 150 students a semester. Effectiveness would improve with the provision of an AT for every student and an increase in the number of work stations in the laboratory. To accomplish this I recommend that two IBM PCATs be placed at

every work station and that two additional work stations be added. This will require the purchase of 12 new IBM PCATs and will allow classes of up to 20 students during each period.

The increase in the number of microcomputers in the laboratory would help with the teaching load but it would not take care of the problem of conflict between faculty and student use of the microcomputers during open access periods. This problem could be solved by the purchase of six additional IBM PCATs for research use and the placement of these machines in space available in the computer laboratory in IDS. These additional machines would be open to the entire faculty of the NWFP AU on the basis of proposal merit. They should be accessible to those at the research stations as well as on-campus faculty.

To administer such a system, I propose the formation of a committee to oversee microcomputer research use comprised of the Pro-Vice Chancellor, the Director of Microcomputing, and one department chair to be designated by the research directorate. The latter individual would serve a two year term. In order to obtain access to research machines a faculty member would have to develop a plan of research demonstrating his/her need for microcomputing services and submit it to the above committee at the beginning of each academic year. At the end of each year or upon completion of a project a faculty member using these research machines would have to file a short report of accomplishments. This proposed structure would aid in the allocation of a scarce resource, and also improve the faculty's skills with regard to the careful planning of research. The number of faculty allowed access to the research microcomputers should be managed to insure their full usage.

In addition to above 18 microcomputers I am recommending purchase of an additional five for on-campus installation. One of these units will be added to the existing unit in the offices of the resident TIPAN team. One would be placed in the financial offices of the university. The remaining three microcomputers would be held in reserve to act as backups. Six microcomputers are recommended for first phase installation at the research stations. Detailed specifications and approximate budget for the above expansion are given in Appendix C.

Finally, given the need for repair and maintenance of the microcomputers and their peripherals, local purchase of the IBM PCATs would be desirable. Locally purchased equipment would function at 240 volts and eliminate the need for step down transformers. However, given the price differential between purchase at the University of Illinois and in Pakistan local purchase is not a viable alternative. I do believe that local service is desirable but not from IBM Pakistan. Mr. Keroer and I have remained in contact on this issue and I support his judgement regarding who should provide this service in Pakistan. Furthermore, he and I strongly recommend the negotiating of a service contract to cover all the microcomputers and their peripherals at the NWFP AU. Given the heavy workload on the NWFP AU microcomputers and the bottlenecks resulting from long down-time of these machines, a service contract is important to the performance of this technology at the university. With the construction of the Learning Resource Center and the employment of a technician this need for a service contract should be reevaluated.

Computerization of the NWFP Agricultural Research Stations

The computerization of the research stations should proceed in phases. For the first phase, it is recommended that two computers be installed at Tarnab and one at each of the following stations: Pirsabak, D.I. Khan, Mingora, and Mardan. Each installation should include auxiliary power and air conditioning. This recommendation is based on the observations of myself or other TIPAN computer team members who visited four of the stations. To aid the managers in their understanding of the usefulness of microcomputers I recommend a one day training session at the computer laboratory for the managers of the major stations plus one or two other individuals from the stations. The research directorate and the resident TIPAN team should provide a list of those from the several stations who should be invited to attend.

## APPENDIX A

## Specifications of the Equipment Installed by the TIPAN Computer Team

<u>Number</u>	<u>Description of Item</u>
7	IBM PCATs with 512 kilobytes of memory, one 1.2 megabyte floppy diskette drive, 20 megabyte hard disk, keyboard, 80287 math co-processor, monochrome-printer adapter card, serial/parallel adapter, and monochrome monitor
2	IBM PCAT with 512 kilobytes of memory, one 1.2 megabyte floppy diskette drive, one 360 kilobyte floppy diskette drive, one 20 megabyte hard disk drive, keyboard, 80287 math co-processor, enhanced graphics adapter, serial/parallel adapter, and monochrome monitor
2	IBM PCAT with 512 kilobytes of memory, one 1.2 megabyte floppy diskette drive, one 360 kilobyte floppy diskette drive, one 20 megabyte hard disk drive, keyboard, 80287 math co-processor, monochrome-printer adapter card, and monochrome monitor
2	IBM Proprinters and printer cables
3	Epson LX80 Spectrum printers and printer cables
6	IBM Graphics printers and printer cables
	spare monochrome printer adapter board and spare 80287 math co-processor
6	400 watt power conditioning units to eliminate surge and spikes, and to provide auxiliary power during outages

## APPENDIX B

Software Installed  
at the  
Northwest Frontier Province Agricultural University

<u>Type of Software</u>	<u>Description</u>
Word Processing	WordPerfect 4.1 is the word processing software chosen for the NWFP AU. It is a professional word processing package that is of the "what you see on the screen is what you get on the printed page." It is highly recommended by computer software magazines such as INFO World and PC. It has the advantage of being able to take directly inside itself information that has been generated by the other types of programs available at the NWFP AU.
Spreadsheet	Spreadsheet programs allow the manipulation, tabulation, and display of information--both numerical and alphanumeric. These types of programs can be used for tasks ranging from electronic grade books to the mathematical manipulation of data for or from statistical analysis. The program chosen for use at the NWFP AU is Lotus version 2.0, the recognized leader of the spreadsheet programs.
Statistical	Systat version 2.1 was chosen as the software program for statistical analysis because it is one of the few microcomputer programs in this area that has a wide range of sophisticated techniques to suit a wide range of academic disciplines. It has split plot analysis and randomize block anova/manova often used by the biological sciences, as well as the various regression techniques widely used in the social sciences. Although it was written as a microcomputer program, it is currently being adapted for use on mainframe computers because of its versatility and user friendliness.
Data Base Management	Knowledgeman was chosen as the data base management program because of its flexibility, its ability to exchange information with the other programs in use at the NWFP AU, and its menu driven operation. This latter feature was unique at the time of its choice and is particularly important to first-time computer users.

## APPENDIX C

Description of Proposed New Equipment  
and  
Budget

<u>Number of Items</u>	<u>Description of the Item</u>	<u>Budgeted Amount</u>
28	IBM PCATs with 512 kilobytes of RAM memory, one 1.2 megabyte floppy diskette drive, one 360 kilobyte floppy diskette drive, one 30 megabyte hard drive, 80287 math co-processor, enhanced graphics adapter, monochrome monitor, printer cable, and Epson Spectrum LX 80 printer with tractor feed. (\$4,948.00 each)	\$138,544
1	IBM PCATs with 512 kilobytes of RAM memory, one 1.2 megabyte floppy diskette drive, one 360 kilobyte floppy diskette drive, one 30 megabyte hard drive, 80287 math co-processor, enhanced graphics adapter, enhanced color display, printer cable, and Epson Spectrum LX 80 printer with tractor feed.	\$ 5,349
40	Everex Magic expansion cards to bring all computers up to the 640 kilobyte RAM memory limit allowed by the disk operating system. (\$75.00 each)	\$ 3,000
64	64 kilobyte memory expansion kits to populate the Everex Magic expansion cards. (\$20.00)	\$ 1,280
17	400 watt power conditioning units that provide protection from line surges and spikes, and auxiliary power during outages. (\$600.00)	\$ 10,200
26	WordPerfect version 4.1 word processing software package. (\$125.00 each)	\$ 3,250

26	Lotus version 2.0 spread sheet software program. (\$220.00 each)	\$ 5,720
26	Systat version 2.1 statistical software program. (\$290.00 each)	\$ 7,540
26	Knowledgeman version 2.0 data base management software program. (\$200.00)	\$ 5,200
	<b>Total</b>	<b>\$180,083</b>

In addition, five 3.0 KVA generators and five air conditioners should be procured locally for the research stations.