391088 90
PD-AAX-128

TIPAN

Transformation and Integration of the Provincial Agricultural Network

Northwest Frontier Province, Pakistan

Office of International Agriculture
University of Illinois at Urbana-Champaign

In collaboration with
Southern Illinois University at Carbondale

PDAAH-122

CONSULTANT REPORT - GARY V. JOHNSON

MICROCOMPUTER SERVICE AND SOFTWARE

12 OCTOBER - 7 NOVEMBER 1987

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

391-0488-C-00-5001-00

C20-November 1987

Consultant's Report -- Gary V. Johnson
Microcomputer Service and Software
12 October - 7 November 1987

Prior to my arrival in Pakistan, the scope of work for my assignment to the TIPAN project had two objectives--clear up the problems with the Zenith 241 AT compatible microcomputers and facilitate a resolution to the service problem of these microcomputers. Upon arrival in Pakistan this scope of work had been augmented to include:

1. Resolve problems with the microcomputers and their related equipment at the Northwest Frontier Province (NWFP) Agricultural University (AU) at Peshawar.

2. Facilitate the resolution of problems regarding warranty and future service of microcomputer equipment.

3. Installation and introduction to new software and hardware arriving from the USA.

4. Facilitate the introduction of microcomputers to the research stations of the NWFP.

5. Help to determine the future needs for microcomputers and the direction of microcomputing at the NWFP AU.

Before discussing the degree of accomplishment of these various tasks while in Pakistan, it is valuable to review the background to these items.

Background

Shortly after the installation of the 11 IBM PC AT computers at NWFP AU in February 1986, it was determined that there was a need for additional microcomputers at the AU and that microcomputers should also be placed at the agricultural research stations in the NWFP, which were soon to become part of the University. It was determined after discussions between the University of Illinois staff, the in-country TIPAN team, and USAID personnel that an additional 38 AT computers should be purchased and shipped to NWFP AU. Of this number nine would be placed in various research stations in the NWFP once these stations were merged into the university. Along with these microcomputers, the number of RBS uninterrupted power sources and of software packages available at the NWFP AU also would be substantially increased. Additional equipment and software for the reproduction of computer graphics with slides--Polaroid Palette--was to be added to the AU's computer lab.

Given problems of obtaining service of the original IBM equipment by IBM Pakistan, it was determined that the microcomputers would either be purchased locally in Pakistan or procured from a U.S. company that would ensure service in Pakistan. After careful evaluation Zenith Data Systems model 241 PC AT compatibles were chosen over locally purchased IBM PC

ATs. Zenith's microcomputers were considered superior to the equivalent IBM model for three reasons--they had superior performance at the time, they were considerably less expensive, and Zenith would warranty these machines for one year versus the 90 day warranty given by IBM. While initially Zenith had difficulties in establishing in-country service, Zenith determined that EGS Ltd. of Islamabad had sufficient technical skills to provide the necessary service. EGS had been recommended to Zenith by Anthony Kerber, a TDY in Peshawar assigned to the AU computer lab, and the resident TIPAN Team Leader. EGS had been servicing the IBM microcomputers at AU and had performed well.

It had been the intention of the Illinois TIPAN team members that the new computer hardware and software would be installed while Anthony Kerber was still in Pakistan. At that time I would join him there to help in the installation and the instruction of the staff of the computer lab in the use of both the hardware and software. However, due to a large number of factors--delays in receipt of both software and hardware at the University of Illinois, delay in the merger of the agricultural research stations and the NWFP AU, and personal reasons--Anthony Kerber returned to Carbondale before any equipment or software could be shipped. The equipment arrived at the NWFP AU in two shipments. The first shipment was of ten microcomputers and the necessary RBS units by air in early 1987. The second shipment of the remaining equipment without the Polaroid Palette was later in 1987 by sea. This method of shipping was adopted over the objections of the University of Illinois TIPAN staff. It was determined by the resident TIPAN Team Leader that, given EGS's record, the aid of personnel from the University of Illinois would not be needed for the installation of this equipment.

Upon arrival of the second shipment of equipment a number of problems began to emerge. Many of the RBS systems did not appear to function, and the Zenith computers appeared to be plagued with minor but annoying problems. Discussions with Control Technology indicated two sources for the problems with RBS systems. First, degradation of the batteries due to exposure to temperatures above 105° F could be the root of some of the problems. Second, the TRIAC, which switches the RBS system between line voltage and the invertor (batteries), may be from a faulty batch supplied by Motorola. Control Technologies supplied the necessary technical information to diagnose the problem and procedures and parts to rectify the problem to the University of Illinois TIPAN staff. This information was relayed to the TIPAN team in-country. Inquiries regarding Zenith's warranty by USAID, the resident TIPAN team, and EGS were answered both by the University of Illinois TIPAN staff and Zenith. Technical questions from the in-country TIPAN team and EGS were directed to Zenith for direct communications to EGS. These efforts by the University of Illinois TIPAN staff failed to resolve the above microcomputer problems. This coupled with the pending shipment of the new software to the NWFP AU prompted the Office of International Agriculture at the University of Illinois to use their own funds to send me to NWFP AU to evaluate the problems and rectify them.

Each of the remaining portions of my report outlines the degree to which the five revised tasks in my scope of work were accomplished.

Resolution of Problems with Microcomputers and Their Related Equipment

Zenith Microcomputers

Zenith Data Systems had provided me with two sets of new boards for the model 241. Each set consisted of a central processing unit (CPU) board, an input-output (IO) board, and a memory expansion board. Installation of these boards represents the nearly complete replacement of the CPU unit of the microcomputer. If replacement of these boards resolved all problems with the Zenith microcomputer then Zenith would replace the boards in the other 36 machines. Upon arrival in the computer laboratory, I was informed by both Inamul Haq, the director of the lab, and the representative from EGS that the Zenith's had a bad reputation regarding their performance. In particular there were four main complaints.

1. The memory cards in five of the machines were not accessed properly by the CPU, resulting in memory error messages on the crts (we had been apprised of this problem by telex earlier).

2. There were bad sectors on the hard disks that came with the Zenith's but none on the IBMs[1].

3. The lithium battery on the Zenith units were dead with little or no use[2].

4. There were problems with IO to several of the printers in the lab.

The first problem I was unable to assess given that the boards had been removed prior to my arrival. However, in setting up the hard disks of the machines, which had not been done properly, I noted that upon finishing the setup procedure I received a memory parity error on the crt. This came during a call to save the existing parameters for the

---

[1]Both floppy diskettes and hard disks are physically structured to receive data. A disk can be thought of as a phonograph record. A cylinder of the disk is like a single grove around the circumference of the disk. Each cylinder is further divided into sectors where each sector represents 512 bytes of information.

[2]The battery powers the CMOS memory chip that stores the setup information on the configuration of peripherals associated with the computer.

Disk Operating System (DOS) partitions for the hard disk in memory. Upon installation of the new board sets this problem didn't reoccur. I therefore conclude that the new boards resolve all memory problems.

Regarding the second problem of the existence of bad sectors on the Zenith hard disks, this problem reflects a lack of understanding on the part of the NWFP AU computer personnel and sloppy software on the part of IBM. The placing of the magnetic recording medium of the platens of the hard disk is never perfect, therefore the existence of bad sectors on a hard disk is virtually a certainty. As a general rule bad sectors are intolerable given three conditions--there is less than 1-1 1/2 percent of total disk space in bad sectors, bad sectors do not occur near the zero track of the hard disk, and the number of bad sectors does not grow over time. While the first condition is an approximate one, the second and third conditions are not. If bad sectors occur near the zero track the disk will not have error free boot, directory, and file allocation table (FAT) areas. Bad sectors in these areas cannot be fenced off properly by DOS and the information placed in them will not be properly retrievable. If on the other hand the number of bad sectors grows over time it reflects degeneration of the magnetic coating of the platens. While this eventually happens to all hard disks, it should not happen until after five to ten years of use. The Zenith hard disks exhibited none of the above three conditions. Further, upon testing of the IBM PC ATs with a more exacting test than that provided in PC DOS (Norton Utilities 4.0 disk test program), most of the IBM PC ATs exhibited bad sectors. One IBM hard disk even failed completely during my stay.[3]

The third problem, failure of the lithium batteries in the Zenith ATs, reflects the same heat problem during shipping as in the RBS units. While these batteries are inordinately expensive, they are no more so than the lithium battery in the IBM ATs. The suggestion by EGS to modify the battery circuit and replace the lithium cells with nickel-cadmium rechargeable cells is not a solution to the problem. Rechargeable cells suffer from what is known as the hysteresis effect. Simply stated this effect is the shortening of battery life as the battery is recharged when not fully discharged. Since the computer would be trickle charging the battery when it was in use, and the battery would not fully discharge overnight hysteresis effect would occur and the battery would ultimately fail to save the setup information. Thus, the lithium cell is a better solution to the problem than a rechargeable cell. The life of the lithium cells, rated at two years, can be prolonged. If upon reaching the work place or computer laboratory the computer(s) is (are) switched on and left on battery life will be prolonged. This occurs because a diode in the battery circuit switches the load on the battery to main power source when the computer is on. It should be noted from this that short battery life will occur with prolonged nonuse of the computer.

---

[3]To some extent this should be expected, given the poor performance regarding reliability that IBM's hard disks made by CDC have had.

Finally the fourth problem, difficulties with IO to some printers, did not occur during my stay in Peshawar. I did, however, note improper setting of several programs for the printer attached to the computer. Whether this is the problem that led to the complaints or a coincidence is difficult to ascertain.

In light of the aforementioned memory problem I recommended that Zenith send the remaining 36 sets of boards to replace those currently in the machines. I am confident that EGS under the supervision of Inamul Haq is capable of the replacement operation, given the boards did not arrive in Pakistan prior to my leaving the country. The replaced boards should be shipped to:

Mr. Larry Liddle
Zenith Data Systems
1900 North Austin Avenue
Chicago, IL 60639

The packing list should indicate that the boards being returned to Zenith are in exchange for replacement boards issued against Heath Company invoice number AP-92644.

RBS Systems

There were two complaints regarding the Control Technology RBS systems--they failed to work, feeding power to WAPDA when voltage dropped[4], and when they did work they failed to catch the Zenith microcomputers, i.e., the computer rebooted (restarted) upon resumption of power. The first problem was completely resolved by replacement of the TRIAC on the 600 KVA units and the replacement of the batteries where necessary. On the 750 KVA units all that was necessary for correction of the problem was the replacement of the batteries. The second problem eluded correction during my stay in Pakistan. Control Technologies is making up three new control boards for testing and will ship them as soon as possible to see if they correct the problem. EGS now has a complete set of working drawings and specifications and should be able to handle any further modifications to the RBS units. Given that the 90-day warranty has long since expired on the RBS units and the fact that these units caught the Zenith microcomputers in U.S. tests, their aid in solving these problems is most commendable.

---

[4]Control Technology stated that this was not unusual, since the European model was designed with a 30-60 volt back pressure and a current of 1 or 2 milleamps. The units in Pakistan were recording current rates well above this. When informed of this Control Technology indicated that this was a result of the TRIAC failing.

Resolution of Warranty Problems and Future Service of Microcomputers

Both my first and last acts of my consultancy in Pakistan has been to visit EGS in Islamabad. At EGS I have dealt with two of the three principal owners--Fida Hussain Raja, Managing Director, and Agha Hassan Akram, Chief Engineer. All my dealings with these individuals has indicated a high degree of technical skills and ability to get the job done. My initial problem was convincing Mr. Fida Hussain Raja that Zenith meant exactly what their correspondence and ours had stated. Zenith intends to honor its warranty of the TIPAN microcomputers. To be fair, EGS was not alone in this belief in that similar doubts were in the minds of the USAID officials involved here. Given that Zenith is the only microcomputer company that a) will honor its warranty outside the boundaries of the country where it is purchased and b) doesn't require the microcomputer to be returned to point of purchase for warranty repairs, one can understand their skepticism. With the aid of the letter to me from Robert M. Poznanovich, Regional Director of the Central Region, Zenith Data Systems dated October 7, 1987 and a copy of the Zenith Limited Warranty and Service Information, I was able to convince EGS and USAID that Zenith would back up their warranty.

A second problem regarding warranty service was not as easily dispelled. EGS with some justification had not billed Zenith for warranty repairs. The justification for this action was two-fold. First, Zenith was a large company in a foreign land that may or may not pay for warranty repairs but USAID and TIPAN were in Pakistan and needed EGS's services and might pay up. Second, Zenith had not had communications with EGS regarding how billing should be done. As Maurice Fleming stated to me, the hope of USAID allowing TIPAN to pay for warranty service on the Zenith microcomputers was nonexistent. Furthermore Mr. Fleming stated that the last two contracts with EGS were not valid since they had not followed proper USAID procedure.

Two different approaches were used simultaneously for solving this latter problem. First, a new contract was negotiated with EGS for servicing TIPAN's microcomputer equipment. This contract has two clauses not in the first contract--warranty repairs on Zenith equipment is to be billed to Zenith and that the RBS units are not under warranty. Negotiations on this contract were on November 6, 1987. The contract will subsequently be given to Maurice Fleming to obtain USAID approval, and once approved, signed by Dr. Russell T. Odell as Interim TIPAN Team Leader. Second, TIPAN and the University of Illinois will work in concert to provide the necessary information to EGS to properly bill Zenith for the warranty repairs. Part of this information has been transmitted to EGS via a telex from me. Part still needs to be transmitted to EGS from the Office of International Agriculture at the University of Illinois. The combination of the above two approaches should eliminate the problem.

Regarding future service of microcomputers at the NWFP AU, costs need to be contained. This is not to say that service contracts are to be avoided but that money on such contracts needs to be carefully spent. In my opinion the need for on-site and a minimum one day down time for all computers at the AU has diminished with the increase in the number of computers. Certain computers need to be maintained in the current manner, e.g., those containing such records as student records, payroll etc. Other machines definitely need on-site service, e.g., those at the research stations, but not a minimum one day down time. EGS suggested that for the microcomputers in the computer laboratory they would reduce their standard charges by 50% if rules requiring that a minimum of 75% machines to be working at all times and a one week maximum down time for any given machine were adopted. This looks like a good area for cost savings.

Another future need is to involve the AU in service contract negotiations. This will allow the administration of the university to plan for the future when TIPAN no longer pays these bills. Dr. Russell T. Odell was successful at beginning this process by having Dr. Khattak appoint Inamul Haq to sit in on the preliminary negotiations with EGS. Mr. Haq made several useful suggestions during those discussions.

Installation and Introduction of New Software

Of all the tasks set out in the revised scope of work, this is the most incomplete. While the software had arrived during my stay in Peshawar and I did install it in nearly all machines on campus, the instruction of the faculty and staff in its use was not accomplished. This task needs to be done and should comprise part of the scope of work for a future short-term TDY.

Introduction of Microcomputers to NWFP Research Stations

Upon arrival at the NWFP AU this task seemed the most remote in its chances of successful completion. While money existed for renovations of rooms for microcomputers as per specifications laid out in the consulting report by Anthony Kerber, no work had commenced. After discussions beween Mr. Siddiq, Director of Research, Dr. Khattak, Vice Chancellor; Dr. Russell T. Odell, and myself, Dr. Odell and myself were able to get assurances from Dr. Khattak that work would proceed on two stations (Tarnab and Pirsabak).

Inamul Haq and I visited both stations, chose a room for renovation, and drew up a modified set of specifications for the renovation. (See attached letter to Abdul Qadim Syed, Director, Agricultural Research Institute, Tarnab, for an example of the proposed modifications). While the work had not been completed at either station, work was under way and I have complete confidence in Inamul Haq's ability to carry out the installation. I, also, should state that Inamul Haq is perfectly

qualified to carry out the installation at all subsequent stations. My only concern is the reluctance on the part of the Director of Research and the AU to spend the money allocated for this purpose.

Future Directions for Microcomputing at the NWFP AU

The future directions for microcomputing fall into the categories of training of personnel, new equipment, and new software. While three individuals were sent to AIT in Bangkok for training and this was a worthwhile experience, there is a shortage of trained computer personnel at the NWFP AU. Of the three that were sent to AIT, one is dead, one is out of country for degree training, and the other is in the laboratory at IDS. This latter individual is not helping to take the load off the personnel in the Computer Laboratory. In light of this shortage I recommend two more individuals for short-term outside training--Zaki Ulla, a new faculty member with an M.Sc. in Computer Science, and Sayed Rehman, a laboratory assistant to Inamul Haq. As part of their outside training they should attend the Zenith Data Systems repair training course. The expectation is that they will not do all computer repairs themselves but rather will use the training to become more familiar with the hardware and better able to distinguish repairs requiring EGS's services and things that they can do themselves. Since this training is only provided in the U.S., they should go to the States for training. Their training should also include use of software programs available at the NWFP AU. Training should take place in the summer and Inamul Haq should be provided with substitute laboratory assistants during their stay abroad.

There is a need for high quality printed output at the NWFP AU. This output is needed in the area of graphics for inclusions in reports and in the outreach program for developing of materials for farmers. While these needs could be fulfilled by several single purpose items like letter quality printers and multi-pen plotters, laser printers could accomplish both tasks at roughly the price of 50-100% of the cost of one of the single purpose items. I am therefore recommending the purchase of three of these laser printers--one for joint use by the TIPAN Office and Outreach program, and one in each of the computer laboratories. Service for such printers already exists in Pakistan.

There is also a need for two different types of software on the NWFP AU campus. One type is specialized publishing packages such as Ventura Publisher by Xerox, and second is computer languages for teaching and research. Although Fortran and Cobol compilers already exist on campus, there is a need to expand the number of compilers to include Basic and Pascal. There is much more work being done in these latter two languages for microcomputers than is being done in either Fortran or Cobol. These languages are also better suited for teaching programming in the more modern structure manner currently in use in the U.S.

20 October 1987

Abdul Qadim Syed, Director General
Agricultural Research Institute
Tarnab (Peshawar)

Dear Mr. Abdul Qadim Syed:

I wish to thank you for your kind hospitality regarding my visit yesterday. Mr.Inamul Haq and I appreciated your help in locating where the microcomputer should be placed.I am writing to help clarify preparations for the computer room. I will elaborate on several points regarding changes that we require.

1. Power. There is a need for three different power circuits in the proposed room. The first circuit is for the computer, the printer, the voltage regulator, and the power backup unit. The power for this circuit should come directly from the outside power transformer and there should be nothing else on this line. The second circuit within the room is for the air conditioning/heating unit alone. The third and final circuit should be for the lights and other wall outlets for non air conditioning computer appliances (the ceiling fan for example). Electrical outlets should be of best foreign made).

2. Doors. The exterior door (on the wall away from the Director General's office) should be walled up. The other doors in the other door opening should be removed and replaced by a single solid panel door with a spring loaded closure. The door should have a dust proof sweep on the bottom and proper dust proof sealing around the other edges.

3. Flooring. Vinyl flooring is required to minimize dust . Flooring should be laid over the existing floor after cleaning it. Vinyl flooring of maximum width available in the market is required.

4. Windows. A second frame and glazing should be placed inside the existing windows. All windows should be sealed. Before glazing the second set of windows, the existing windows should be cleaned inside and out. Curtains should then be hung over the double glazed window opening. The curtains should not interfere with the air conditioner.

5. Lighting. Adequate lighting needs to be supplied for the computer room. Existing lighting should be removed and replaced with Phillips tube lights.

6. Air Conditioning and Ceiling Fans. The air conditioner should be a minimum of 1½ ton unit capable of both heating and cooling. The unit should be placed in the upper part of the existing window opening and be properly sealed. The existing ceiling fans should be replaced with a single new one.

7. Walls and Ceiling. The existing walls and ceiling should be scraped and cracks and other surface defects filled with plaster and

smoothed for painting. Two coats of paint should be used. White wash should not be used in the computer room.

8. Roof. The roof needs to be repaired to stop future water damage.

9. Movable Equipment. The following items should be purchased for exclusive use in the computer room:

3 bids

1-1,000 watt vacuum cleaner;
1-Stavol unit at least 600 watts;
1-Zenith 241 microcomputer with keyboard, cpu and monitor;
1-IBM Proprinter with cable connection; and
1-Control Technology A600 RBS power backup unit.
1-An electrical class fire extinguisher of medium size.
1-Backup portable 3 KVA generator.

The TIPAN project will supply the Zenith computer, IBM proprinter, and Control Technology A600 RBS power backup unit directly.

10. Other Equipment. A table for the microcomputer, at least three chairs, a work table, a stool for the RBS power backup unit, and two wooden almirans will be required. These can be ordered as per the instructions of Inamul Haq from the Agricultural University.

All expenses for the remodeling and all items except the Zenith microcomputer, IBM Proprinter, and Control Technology A600 RBS power back up unit should be purchased by the Agricultural University. The air conditioning unit will be reimbursed by the TIPAN project. A request for other unusual expenses may be submitted to the TIPAN project. It is up to the discretion of the TIPAN project as to whether these requests will be honored.

Sincerely,

Gary D. Johnson

cc R. Odell
G. M. Khattak
M. Saddiq
Inamul Haq