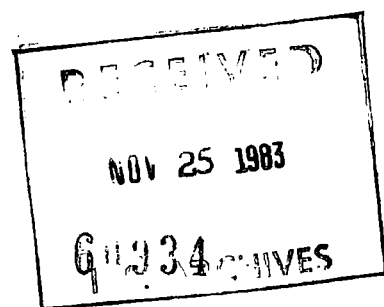


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REPORT ON

AUTOMATION OF THE PAPUA NEW GUINEA INFORMATION NETWORK



Alan Green

October 1983

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Summary of report

- 1 In response to a formal submission to the International Development Research Centre (IDRC) for the funding of a proposed Papua New Guinea Information Network, I undertook on behalf of the IDRC a consultancy with a view to examining the computer hardware and software requirements of the project.
- 2 Accordingly, I travelled to Port Moresby between 10 - 18 September, 1983 and met with the staff of the University of Papua New Guinea (UPNG) Library and the UPNG Computer Centre.
- 3 While the specific concerns were the development of the Retrospective Bibliography of Papua New Guinea (RBPNG), the Papua New Guinea Retrospective Periodical Index (PNGRPI) and the New Guinea Periodical Index (NGPI), much of the discussion was of a broader nature as to the benefits, and problems, which automation might bring to the UPNG library.
- 4 Response to the idea of some form of automation was generally positive, but there was a concern as to the lack of experience with automation amongst the library staff, and that this might prove to be detrimental to the successful development of automation within the library.
- 5 Both the Law and Medical librarians saw automation within the UPNG Library as the first step toward regional networks within their disciplines in the western South Pacific.
- 6 There was considerable concern expressed over the question of copyright as it relates to the New Guinea Microfiche Project (NGMP). PNG does not have a copyright law, but it was felt that any apparent abuse of copyright may adversely affect the steady flow of gift material into the Library's collections.
- 7 The use of the PRIME 250 with its text management system (TEXT) was found to provide a suitable environment for the creation and maintenance of the Retrospective Bibliography of Papua New Guinea records.
- 8 Both the proposed Papua New Guinea Retrospective Periodical Index and the New Guinea Periodical Index could be run on the PRIME 250, or the TRS-80, but only in an upgraded configuration of either machine. The former because of pressure of use from existing applications, and the latter because of insufficient processing power. Both systems would require the addition of a data base management system plus some application specific software to support the library/index system.

- 9 Since PNG has little experience with library automation the development of a local system would seem unlikely. Any software purchased to support the PNG Information Network should, as well as running on the available equipment, be supported in PNG by the supplier, or a competent agent.
- 10 The printing options for bibliographies and indexes are really a question of the cost of printing. Camera ready copy can be produced from the letter quality printers attached to the PRIME and the TRS-80, but the use of a computer based printing system to which input is via tape (or diskette) offers greater flexibility in the use of fonts, type size, style and format.

Recommendations

- 1 - that the production of the Retrospective Bibliography of Papua New Guinea proceed as planned using the TEXT software on the PRIME 250, and that quotations be obtained from a selection of printers to determine which output option should be used.
- 2 - that the investigation of an integrated library system be further developed;
 - a. ideally, a system that can progress from a micro to minicomputer environment,
 - b. and/or a system which can be installed in stages as needs and funds permit.
- 3 - that, in the instance of the purchase of an integrated library system, its development be confined to an autonomous area within the UPNG Library, such as the Medical Library, and to the support of specific projects, such as the periodical indexes, until a body of knowledge of that system has been established.
- 4 - that the concept of the Papua New Guinea Information Network be expanded to incorporate the idea of regional networks in law and medicine.
- 5 - that the cost of upgrading the PRIME 250 to a 550 be weighed against the notion expressed in (4), and the potential flow on of benefits to the services of the UPNG Library.

The University of Papua New Guinea Library

- 1 The University of Papua New Guinea (UPNG) Library consists of a main library on the university campus, and two branch libraries, these being the Medical Library situated at the Port Moresby General Hospital and the Goroka Teachers College Library at Goroka. The main library has a bookstock of some 300,000 volumes with the Medical Library and the Goroka Teachers College Library having 33,000 and 38,000 volumes respectively.
- 2 The university is primarily a teaching university with faculties of Arts, Education, Science, Law, Agriculture and Medicine. It has some 1300 students and a faculty staff of 145.
- 3 The library itself has a total staff of 63 of which 15 are professional positions and 28 are library assistant positions. In line with government policy, positions within the library are progressively being 'localized', with seven nationals already occupying senior positions.
- 4 Library acquisitions currently run at 8000 monograph and 2000 serial titles per year - mostly in English language. The New Guinea Collection, however, attempts to purchase everything relevant to PNG published both at home and overseas.

Library Survey

- 1 By way of comment on the effectiveness of the library within the university it is interesting to note the findings of a recent survey of library usage (1) in which 80% of students surveyed rated the library services as generally good or excellent.
 - (1) Latukefu, Ruth A. Student library users at UPNG in 1982. UPNG Library / Department of Anthropology and Sociology. Joint Occasional Paper, No. 1. 1983.

The UPNG Computer Centre

- 1 The university computer centre has recently been revived with the purchase of a PRIME 250-II mini computer. A detailed list of its configuration is given in Appendix 2.
- 2 Computer Centre policy, and use, is determined by the Computer Centre Committee which represents the various sectional interests of the university. It is worth noting that the committee's chairman is the University Librarian, Alan Butler.

- 3 The centre itself has a professional staff of two: the Computer Centre manager who has been with the university for four years, and a programmer who has been at the centre since 1981.
- 4 The physical environment of the centre can best be described as adequate but small. If the centre follows the typical pattern of most computer installations, and experiences a rapid increase in usage, it will almost certainly outgrow its current site within two to three years.
- 5 It is intended to develop most applications as online systems with student records being the first major project. Current software run on the system includes BMPD, a statistical package, and TEXT, a text management/word processing package. A general ledger/accounting package is to be added in 1984. The intended applications using this software already account for all the existing storage on the system and any further developments by way of a library application would require an immediate increase in disk storage.
- 6 The PRIME 250 receives regular preventative maintenance (PM) and there is an engineer on call at all times. System backup is conducted every Wednesday based on a three generation cycle of tapes. As the development of various applications increases on the computer, so too will the frequency of backup have to increase. Many software packages have their own transaction log and backup facilities built into them, which is a feature of primary importance to any online system, and in particular a library system.
- 7 I noted that there was no provision for offsite storage of any of the current backup tapes. It was agreed that the library would create a small storage area for such tapes as it is an air conditioned building and close to the computer centre.

Papua New Guinea Information Network

The PNG Information Network is a three part proposal consisting of:

the Retrospective Bibliography of Papua New Guinea,

the New Guinea Periodical Index / Papua New Guinea Retrospective Periodical Index, and,

the New Guinea Microfiche Project.

Retrospective Bibliography of Papua New Guinea (RBPNG)

- 1 This is a personal compilation by the University Librarian and contains over 20,000 items dealing with PNG on all subjects, with the exception of journal articles and ephemera. Its period of coverage is from the earliest published records on PNG up to 1981 when the National Bibliography of Papua New Guinea was commenced.
- 2 It is envisaged that the published format of the Retrospective Bibliography will consist of a subject main sequence containing the full citation of each record, and author, title, geographic, language, chronological and publisher indexes.
- 3 As it stands at present the compilation of entries is complete and the main sequence is already in its sorted order ie. the cards have been manually sorted - which, given the nature of the records, their number, and the personal knowledge of much of the material held by the compiler, would seem to be the quickest way to achieve the desired order.

New Guinea Periodical Index (NGPI)

- 1 The New Guinea Periodical Index aims to bring together in one annual publication all articles published about New Guinea (ie. the geographic areas known as PNG and Irian Jaya) anywhere in the world. It is arranged alphabetically with entries under author and subject.
- 2 Wherever possible the UPNG Library attempts to obtain copies of all articles, which are listed in the New Guinea Periodical Index, for its Papua New Guinea Collection.

Papua New Guinea Retrospective Periodical Index (PNGRPI)

- 1 The PNG Retrospective Periodical Index is seen as a companion to the New Guinea Periodical Index and is intended to cover all journal articles dealing with PNG up to 1982 - some 20,000+ items.
- 2 The cut-off date of 1982 is flexible for the idea is based upon the automation of the New Guinea Periodical Index with the Retrospective Index in reality being a cumulative listing of all the citations from earlier indexes, which have been keyed into the periodical index database.

New Guinea Microfiche Project (NGMP)

- 1 This is a two part scheme, in which it is envisaged that first, all retrospective government publications and other items which are outside the scope of copyright would be copied, and second, all newly received material which is listed in the New Guinea Periodical Index is copied.

The Role of the Papua New Guinea Collection

- 1 The UPNG has in its PNG Collection one of the best collections on New Guinea in the world. It attempts to collect comprehensively all relevant material on PNG and actively seeks out publications from government departments, statutory bodies, research groups and visiting scholars, as well as using the traditional sources such as published bibliographies.
- 2 It is therefore not surprising that 85% of the material listed in the Retrospective Bibliography of Papua New Guinea (which is thought to contain citations to 90% of the material published on PNG up to 1980) can be found in the Papua New Guinea Collection.
- 3 Similarly, the 20,000 journal articles in the PNG Collection will form the basis of the Retrospective Periodical Index, in the same manner as new material forms the basis for the New Guinea Periodical Index.
- 4 So it can be seen that, clearly, any proposal to provide an automated system to support the PNG Information Network is equally a proposal to automate the catalogue of the Papua New Guinea Collection.
- 5 The logical extension of this is fairly easy to make given that the catalogue entries for all material in the PNG Collection also appear in the library's main catalogue, automation of the PNG Collection opens the door to automation of the whole library.

The Law Library and the Medical Library

- 1 The collections of both the Law and Medical Libraries of the UPNG are the most comprehensive in their respective disciplines within the western South Pacific region.
- 2 At the third meeting of the Pacific Island Law Offices, Suva, Fiji, 27 June to 1 July 1983, the UPNG put forward a proposal for a 'Pacific Law Centre'. The strength of the Law Library's collection formed a key part of this proposal, and automation is seen by the Law Librarian as an effective means of making these resources available to the regional users.

- 3 The Medical Library operates as an autonomous unit within the UPNG Library and controls its own acquisitions, cataloguing and collection. The status of its role as a de facto national medical library was enhanced by its designation during 1982 as the National Focal Point for Medical Information by the World Health Organization.
- 4 With a collection of 33,000 volumes it is seen as the ideal test environment for the introduction of an integrated library system to the university, as well as improving its effectiveness as a resource centre for medical information.

UPNG Library - the current position of automation

- 1 The library purchased a Tandy TRS-80 Model II microcomputer, with a daisy wheel printer, with a view to using it to produce the Retrospective Bibliography of Papua New Guinea.
- 2 Prior to this the library had been using similar machines belonging to other departments of the university, but demand for these machines had grown to the point where the library was finding its access to them being progressively restricted.
- 3 During the early part of 1983 data entry of the RBPNG records progressed steadily - until disaster struck. At the point where about 3000 records had been keyed - after the presentation of the PNG Information Network proposal to IDRC but before my arrival in September - a malfunction in the disk drive was discovered. The fault had remained hidden for some time and resulted in the corruption of the data written to diskette. When the drive was repaired it was discovered that none of the diskettes could be read on this or any other machine. Unfortunately, the extent of the corruption also included the backup copies of the data.
- 4 It should be noted that the provision of technical support by Tandy in this instance was poor, and it was generally felt by the staff of the library that a more competent engineer would have been able to prevent the loss of the data.
- 5 This experience with the TRS-80 highlights one of the great fears of automation, that of a long term hidden fault which corrupts the data processed by the system. It is a particular danger with single drive machines. It is also an object lesson in the provision of adequate backup of files.
- 6 As a result of this setback the University Librarian decided to cut his losses with the Tandy and begin

afresh with data entry on the PRIME 250 using the TEXT word processing software.

- 7 This decision simultaneously changed the orientation of my terms of reference.

UPNG Library - the environment for automation

- 1 The university has its own computer centre with a PRIME 250-II mini computer, and an experienced staff to run it. Superficially this looks attractive, but the machine in its current configuration and with the already planned workload is too small to run any software specifically intended for library processing. To do so the 250 would have to be upgraded to a 550 plus the addition of another 300 MB disk - see Appendix 3 for details.
- 2 Within the library itself, experience with automation is extremely limited and this is almost entirely restricted to the non-national staff. Only two nationals, the Chief Cataloguer and the Serials Librarian have had any contact with automated library systems. The policy of 'localization' of positions is not likely to improve the situation as the contracts of non-nationals expire and they are replaced by locally trained people.
- 3 In recognition of the lack of expertise, the library is currently advertising a new position of library systems/programmer. But as it is the first such position in the country there is no local body of knowledge for the occupant to draw upon. The position will however be of great value to the Library, and the pioneer work done for the UPNG will undoubtedly form the basis of the future development of library automation in PNG.
- 4 While noting this, the fact remains the UPNG has currently little or no experience with library automation, which makes the likelihood of developing any software locally extremely remote. So the only realistic option is the purchase of an existing software package for which support can be guaranteed.
- 5 It should also be noted that if the UPNG Library goes ahead with any degree of library automation on the PRIME 250, whether large or small, it needs a guarantee of the provision of computing facilities. The fact that the University Librarian is the chairman of that Computer Centre Committee does not ensure the continuing provision of services, despite the fact that it has been responsible for the existing level of access to the computer currently enjoyed by the library.

UPNG Library - the future direction of automation

The following section is intended to provide a specific response to each term of reference set out for this consultancy.

It attempts to take into account the situation as it exists at present, or at least as I perceived it, at the UPNG Library and in the country generally. Therefore any recommendations or comments made here should not be taken in isolation from the perspective delineated in the preceding parts of this report.

A - to travel to Port Moresby, PNG and visit the University of Papua New Guinea.

A1 I spent 9 days in PNG from the 10th to 18th of September 1983 inclusive. During the course of the consultancy, meetings were held with the staff of the UPNG Library, the University Computer Centre and the Librarian of the University of Technology. A schedule of these meetings is given in Appendix 1.

B - to determine whether the hardware proposed by UPNG will be sufficient to carry out the processing required.

B1 If the library was intending to continue the use of the TRS-80 II - which it does not intend to do - the proposed upgrade of this machine as detailed in Appendix 4 would be adequate for the processing of the RBPNG, and in the short term the New Guinea Periodical Index. It may also be able to cope with the Retrospective PNG Periodical Index although all three would not be able to reside on the system at the same time.

B2 In the more expansive perspective of supporting an ongoing PNG Information Network an upgrade for the PRIME 250-II mini computer has been proposed. This did not feature in the original submission to IDRC, because the events which precipitated this change of thinking were yet to occur, that is, the disk drive malfunction of the TRS-80 which resulted in the loss of RBPNG input.

B3 The proposed upgrade for the PRIME 250-II is to increase the power of the CPU to bring it up to the power of a PRIME 550 and the addition of another 300 MB disk. See Appendix 3 for details. This would result in a configuration of sufficient power and storage to support an integrated library software package with network potential.

- C - to present alternative strategies for processing the material, and to recommend a procedure which will fulfil objectives of this project in an efficient and effective manner.
- C1 The revised position adopted by the UPNG Library for processing the RBPNG seems to be a quite effective approach.
- C2 The text management software (TEXT) on the PRIME 250 is quite suitable for the data entry requirements of the RBPNG. The TEXT software does not have its own sort facility, but it is possible to pass data from TEXT to other work areas of storage, sort it, and return the sorted records to the TEXT environment. This would be a simple task for the Computer Centre to implement.
- C3 As previously noted, the main subject sequence of the RBPNG has already been sorted and is therefore being keyed in order. The various indexes, which will have a much simpler format than the main sequence, can be entered sequentially into their respective files and sorted by program in the manner outlined above.
- C4 Processing of the RBPNG will have to be carefully staged for the volume of data even when broken down into its various sequences will place an unacceptable demand upon available online storage. The TEXT software provides for effective archive and backup of files so no difficulties are envisaged with the system.
- C5 The processing of either the Retrospective Papua New Guinea Periodical Index or the New Guinea Periodical Index, however, calls for the use of more sophisticated software than a text processing system. It would not be viable to consider processing either of these indexes without the use of a database management system - which is the concern of the next term of reference.
- D - to determine whether existing software packages available for a Radio Shack microcomputer can be used or modified to carry out the necessary processing, and to recommend such a package if appropriate. In addition, to estimate the resources required for software development or adaptation ...
- D1 The proposed upgrade of the TRS-80 II to a Model 16 should enable it to support a wide range of software.
- D2 Tandy provide a number of database packages such as PROFILE for their machines. In its most powerful form PROFILE III PLUS enables the user to define data entry screens, data base records of up to 1020 characters in length with up to 99 fields per record, and up to five different output formats.

- D3 Despite claims to the contrary, some computer experience would be needed to make effective use of this software. Such expertise could be provided by the UPNG Computer Centre and the task would certainly be within the scope of the proposed systems/programmer position in the library.
- D4 However, a database management system on the TRS-80 can only be viewed as an interim measure. It could initially support the periodical indexes but they would quickly outgrow this environment from the point of view of storage, and the system could not handle the complexity of a MARC (Machine Readable Cataloging) record.
- D5 The introduction of the concept of MARC at this point may be confusing, for, while MARC formats specify the coding of bibliographic records for monographs, serials, cartographic materials, films, music and sound recordings, they do not cover component parts which is the problem faced by periodical indexes. MARC is mentioned here because of its relationship to database library systems and the suggestion is that the concept and value of MARC record exchange should be considered in the data base design.
- D6 The use of MARC records does not mean the system must process data internally in the MARC format, nor does it impose the complexity of all the defined data fields of a specific format upon the user of the system, but simply that the system be able to accept the input, and generate the output, of MARC records.
- D7 Although there are no MARC formats specifically designed to handle component parts of records, there is no barrier to doing so in an inhouse system. The Australian Public Affairs Information Service (APAIS) is an example of such a development. It uses locally defined fields for data which is not defined in the Australian MARC Specification (AUSMARC).
- D8 It should be noted, that the Australian Bibliographic Network (ABN) has a database of 2.8 million MARC records, and, as the network supports dial-up users, it is technically possible for the UPNG to have online access to this vast source of bibliographic information.
- D9 In Australia, North America and Europe, there are a number of MARC based library systems which are designed to allow expansion from small to large scale systems - from micro to mainframe computers. As noted earlier, it would be a waste of resources for a country with such limited experience in library automation as PNG to 're-invent the wheel' by attempting to develop its own such system.

- D10 Before going on to examine two specific examples the next term of reference needs to be addressed.
- E - to examine the possibility of transferring records from the Radio Shack microcomputer to the UPNG PRIME 250 for the purpose of carrying out the required sorts on that machine, or for the eventual transfer of the entire file for retrieval purposes
- E1 Fate has already determined the method of transfer of records from the TRS-80 to the PRIME 250.
- E2 Nevertheless, the fact remains that the University has a number of TRS-80 machines and has developed a degree of expertise on their use; it is also likely to stay with PRIME equipment for the next few years. Allied with this is the availability of the ARCNET software which will enable TRS-80's to be run as a network, and software which will enable this network to communicate with the PRIME. It is therefore not unreasonable to envisage a library system based upon either or both types of computer.
- E3 It should be noted, that the Papua New Guinea University of Technology, situated in Lae, also has a PRIME computer installation and has expressed an interest in any software which may be developed to support the PNG Information Network proposal.
- E4 There are two integrated library systems which will run on PRIME computers, they are ADLIB and CTI. PRIME in Australia has recently dropped support for ADLIB which leaves CTI as the only product which would both run on the PRIME and be supported in PNG.
- E5 There is currently no working example of CTI in Australia - in fact most of the sales staff of PRIME were not aware of its existence - so I was not able to see it in operation. I was eventually able to acquire a copy of the CTI Product Profile. This I compared with an impressive Australian developed system, TECHNOCRAT - see Appendix 5 - which I have seen in operation.
- E6 Both systems are remarkably similar in system design and offer similar features:
- Authority control
 - Cataloguing subsystem
 - Enquiry subsystem
 - Public access catalogue
 - Item and system parameter maintenance
 - Patron files
 - Acquisition subsystem
 - Circulation subsystem
 - Serials Control

CTI also offers an Audio Visual Material Booking subsystem.

- E7 Both systems feature an online diagnostic ability and TECHNOCRAT has been able to resolve 90% of the problems encountered in its installations via the telephone, with the obvious savings in downtime. They also claim to be able to be run on a microcomputer without any reduction in system features.

- E8 Both systems offer output products and reports tailored to individual installations. In the case of TECHNOCRAT any formats developed for a user which are suitable for general use are made available free of charge. I do not know if CTI has the same policy.

- E9 I also have not been able to establish on which microcomputers CTI will run. TECHNOCRAT has been written for the Data General range of mini and micro computers.

- E10 The staged development of a system such as CTI would seem to offer the most practical approach to meeting both the short and long term aims of automation within the UPNG library.

- E11 A possible pattern of development could be to take a self-contained unit of the library, such as the Medical Library, and use this as the learning environment while taking one or two of the functions of the main library, the most obvious ones being the periodical indexes, and developing these on the system at the same time.

- E12 I would therefore recommend that a further investigation of such systems be undertaken. Such a task is very much within the ambit of the proposed systems/programmer position within the library.

- F - to locate an appropriate device for printing the bibliographies and indexes with sufficient quality to permit production of camera ready copy, and to recommend procedures for accessing this device

- F1 There are a number of possible output options for the RBPNG and the periodical indexes.

- F2 The Daisy Wheel II printer which is attached to the TRS-80 gives acceptable quality for photo reproduction. Since the shift of processing to the PRIME 250 the RICOH letter quality printers attached to this system produce a good quality image and will be used if the option of camera ready copy is pursued. This would be the cheapest method of preparing copy for printing.

- F3 The most expensive option, and the one which will provide the best quality print, is to write the data to tape (floppy disk can also be processed by many printers) and send it to a printer for computer typesetting.
- F4 Another option, somewhat closer to the middle ground on cost and quality, is to process the same tape (or disk) on a system such as a Laser printer. These printers can dynamically generate font changes, changes in print size, column layout, proportional spacing all combined with a sharp printed image.
- F5 One of the advantages of using a computer based printing system is that once the job profile has been set up only the copies needed are printed. If the demand increases for a product the tape is simply rerun to produce the extra copies.
- F6 The option used for the printing of the RBPNG and Periodical Indexes will obviously depend upon cost. The former I would suggest demands a better quality print than the latter - which may also be a candidate for Computer Output Microfiche (COM) fiche.

APPENDIX 1

Schedule of Meetings

Monday, 12 September

8.00 am Alan Butler, University Librarian
1.30 pm Mohammed Choudry, Computer Manager
Francis Salia, Programmer
3.00 pm Stephen Wright, Reader Services Librarian

Tuesday, 13 September

8.00 am Alan Butler, University Librarian
1.30 pm Jacqui Elliott, Law Librarian

Wednesday, 14 September

8.00 am Christine Barclay, Librarian
New Guinea Collection
1.30 pm Joe Mount, Acquisitions Librarian

Thursday, 15 September

8.00 am Alan Butler, University Librarian
12 noon Peter Hoare, Medical Librarian

Saturday, 17 September

8.00 am S. A. Patchett, University Librarian,
PNG University of Technology, Lae.

APPENDIX 2

UPNG Computer Centre - Hardware Configuration

PRIME 250-II CPU with one MB of memory

1 virtual storage storage panel

1 CRT consol

1 300 MB disk with controller

1 asynchronous multi-line controller
(16 lines)

1 9 track 800/1600 BPI tape drive

1 300 lpm printer (128 character set)

28 terminals

4 letter quality printers (RICOH RP1600 RS 232-C
with 124 character set)

Programming languages:

COBOL FORTRAN PASCAL BASIC V/M ASSEMBLER

APPENDIX 3

Cost of hardware upgrade for UPNG PRIME 250-II

(Prices are indicative only and are in Australian dollars.)

PRIME 550 CPU	\$85,000
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less a trade in allowance on the 250 based upon the following formula (\$23,000 x FACTOR) where the FACTOR is:

75% for a machine 1 - 2 years old,

50% " " " 2 - 3 " "

25% " " " 3 - 4 " "

(Given that the UPNG machine is less than one year old the trade in allowance should be \$17,250.)

less trade in allowance	-	\$17,250
cost of CPU upgrade	=	\$67,750
plus cost of 1 x 300 MB disk	+	\$29,820
TOTAL COST OF UPGRADE	=	\$97,570

APPENDIX 4

Cost of proposed upgrade of TRS-80 II microcomputer

(Prices are in Australian dollars.)

Existing configuration:

1 Tandy TRS-80 Model II, with one disk drive, 64K RAM, and an attached Daisy Wheel II printer.

The proposed upgrade:

Upgrade kit (Model II to 16) 26-6010	\$2,499
Internal memory expansion (128 K) 26-60162	\$1,800
Primary hard disk (8 MB) 26-4150	\$5,999
2 secondary hard disk (8 MB each) 26-4151	\$4,990
1 terminal 26-6050	\$1,499
TOTAL	\$16,787

(Total hard disk would be 24 MB with a possible disk storage on this configuration of 32 MB. This configuration would also support a third terminal.)

Data Base Management Software:

PROFILE III PLUS	26-1593	\$349.95
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ARCNET hardware:

TRS-80 ARCNET board (for Model 12 or II) 26-6501	\$699.00
TRS-80 File Processor Software 26-6502	\$599.00
TRS-80 ARCNET hubs:	
Active (connects 7 TRS-80's) 26-6508	\$1,499.00
Passive (connects 3 TRS-80's) 26-6504	\$149.00

APPENDIX 5

Integrated Library Management System - CTI

CTI is supported by PRIME Computer of Australia Ltd.,
Churches Centre, Belconnen, ACT. 2617 AUSTRALIA (Ph. (062)
51 5388)

CTI consists of a Data Base Manager and six subsystems which
can either, be purchased separately, or as a package. (CTI
is written in BASIC.)

(Prices are in Australian dollars.)

Data Base Manager	\$30,000
Subsystems:	
- circulation control	\$10,000
- audio visual materials booking	\$10,000
- acquisitions	\$10,000
- serials controls	\$10,000
- cataloguing	\$10,000
- online catalogue	\$10,000
TOTAL	\$90,000

TECHNOCRAT

TECHNOCRAT is a product of Software Specifics International
Pty. Ltd., 10 Prospect Hill Road, Camberwell, Victoria 3124
AUSTRALIA (Ph. (03) 82 8205)

Prices (which includes the hardware) range from approximately
\$40,000 to \$180,000 depending upon the installation and
hardware configuration. (TECHNOCRAT is written in BASIC.)

