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Sometimes an Editorial

More is Better

Now HP 250 and HP 300 users and more HP 3000 users build our membership. Welcome!

The reason for our existence as an entity is still the same: "Information Through Interface and Involvement." We gain from one another's contributions irrespective of our applications.

New focus groups are anticipated, such as the current effort of educational users under the direction of Jan Stambaugh, Chairman of the Educational Users Special Interest Group. We can expect more intensive contributions as a result of the increased interaction.

Individual participation at regional and international meetings brings benefits to you as others benefit from you. You can't afford to be on the sidelines because there's too much information out there that can help you professionally, while at the same time you improve your organization.

This Journal is also part of that interface and involvement; it is our common medium—and its effect is rapid and widespread: Journal communicates with all the members. Use it—we are authors all. Each one of us is the technical resource; without you there are only empty pages. Send your typed articles to the Executive Office and we'll take care of the rest. And if you have a program to contribute, send it to the Executive Office.

More is better—if we are not anonymous.

Featured Articles/3000

Real-Time-Computing in an HP 3000/21MX Network

by Klaus Rebensburg
Prozebrechnerverbund der Technischen Universität Berlin
(IAG PDV TUB)

The Real-Time-Computer-Network of the TU-Berlin consists of up to 12 (now 8) HP 21MX real-time-systems in star-configuration with a central HP 3000 CX computer (planned Series II) working in on-line functional cooperation. The HP 21MX satellites are autonomous systems for real-time-computing, digital control and data acquisition, and are used as masters for dedicated microprocessor systems.

The central-system HP 3000 (host) is used for on-line program-development in Real-Time Cross-FORTRAN IV for the satellite-operating-systems like RTE-C, Real-Time-BASIC, simulation and statistics.

HP 3000 BS-Queue is used for data transfer, CS for time-sharing and cross-program-development.

Real-time-activities and terminal-communication to the HP 3000 are handled simultaneously by multiprogramming on the satellite side.

Contents:
I. Background/Situation
II. Coordination of real-time-activities in TUB
III. Network-realization, hardware/software
IV. Experience and Future

I. Background/Situation

In the process of coordinating and concentrating know-how, hardware and software, to save money and man-power in the application of real-time-systems, the Technical University of Berlin started planning a computer-network in 1973 for at least 5 users who intended to buy a new system.

The users are institutes of different disciplines like electronics, DC/AC motor-control, materials testing, psychology, breweries, machine-construction, process-control, ergonomics.

The local distance between these institutes is 100 m up to 8 km. Communication is restricted on telephone-connection up to 4800, 9600 Baud.

A further aspect was the financial situation of The University. An economical solution of the problem had to be found.

Statistics had shown that the final investment for autonomous real-time-systems was between 80.000,—DM up to 500.000,—DM. Due to the financial situation of the institutes; this investment used to be spread over several years.

As a result, expenditures were for items such as small programmable (old fashioned) calculators with expensive peripherals, mag tape, plotter, analog and digital interfaces and displays, whose power couldn't grow with the problems which had to be solved with them.

II. Coordination of Real-Time-Computing-Activities

Due to the fact that an important part of the price for a real-time-computer had to be spent for peripheral devices such as discs, mag-tapes, line-printers and plotters, and because the TU determined that for useful work with real-time-systems these devices were needed and had to be bought sooner or later, sharing of these components was one of the principles of the conception of the overall plan.

Another consideration was the typical situation at universities, where cooperation and reasonable sharing of resources and know-how among different disciplines is insufficient.

Hardware- and software-comfort also had to be made available for users with a small amount of individual investment. Intensity and efficiency of the use of real-time-systems had to be increased.

Last, but not least, a reduction in the costs for computer-systems services (7 to 12% of the price) was expected.

III. Network-Realization - Hardware/Software

The detailed projects and configurations at the different institutes will not be dealt with in this article. A typical real-time-system consists of a mini-computer with display, α-numeric or graphic, analog and digital subsystems.

The following eight users are at this time connected with the central HP 3000:

- Institut für Arbeitswissenschaft
- Institut für Brauereitechnologie
- Institut für Elektronik
- Institut für Elektrische Maschinen
- Institut für Werkstofftechnik
- Institut für Psychologie
- Institut für Maschinenkonstruktion
- Institut für MeB- und Regelungstechnik

Most HP 21MX satellites are core-resident-systems RTE-C, RTE-B) 2 disc-oriented-systems RTE, RTE-III (May77).

Satellites are connected via asynchronous modem interfaces, modem (GDÜ), and telephone wire (2-wire full-duplex). On the central HP 3000 the modem is connected with the terminal-multiplexer.

Essential Features of the TUB-Network:

The HP 21MX and HP 3000 work in functional cooperation:

The HP 21MX-computers are used for real-time-computing, digital control and data acquisition, and are masters for subordinated microprocessor-systems. Program-to-program data transfer with high priority (BS queue) is possible between satellites. Devices on the central computer can be handled from the satellite. Without disturbing running processes on the satellite, users are able to use the time-sharing-system of the HP 3000 with the same priority for program development (cross-software) in satellite-terminal-mode (TMOD). Users have full MPE-facilities.

The HP 3000 is provided with 100 MByte disc, 2 magtapes, paper-tape-punch and reader, line-printer, plotter and 16-terminal multiplexer.

Program to program calls from a satellite:

LOPEN	Start of communication
LCLOS	End of communication
FOPEN	Open file on central
FCLOS	Close file on central
FCONT	Control file
FWIND	Rewind file
FSTAT	Read from file HP 3000
FWRIT	Write to file HP 3000
FLOAD	Load file to satellite
FSTRM	Start job on central

Software used in the TUB computer-network:

HP 3000:

Cross-Realtime-FORTRAN IV
Cross Loader for HP 21MX
Cross Assembler for HP 21MX
Cross Assembler for microprocessors INTEL 4040, 8080 Motorola MES 6800, DEC LSI 11
Real-Time-Programmable Controller for 16 Bit parallel Communication (1 satellite)
EDIT 3000
SPL 3000
Cross-System Generator for Real-Time BASIC HP 21MX
Cross-System Generator for RTE-C HP 21MX
Simulator of HP 21MX
FORTRAN 3000
BASIC 3000
CDL (Compiler Description Language - C.H.A. Koster)
CDL → SPL Compiler for IBM 370
IBM 2780/3780 RJE (June 77)

HP 21MX:

Real-Time-Executive Core Based System (RTE-C)
Real-Time-Executive BASIC
RTE-III (May 77 - 1 satellite)

(For Hardware Configuration — see page 4.)

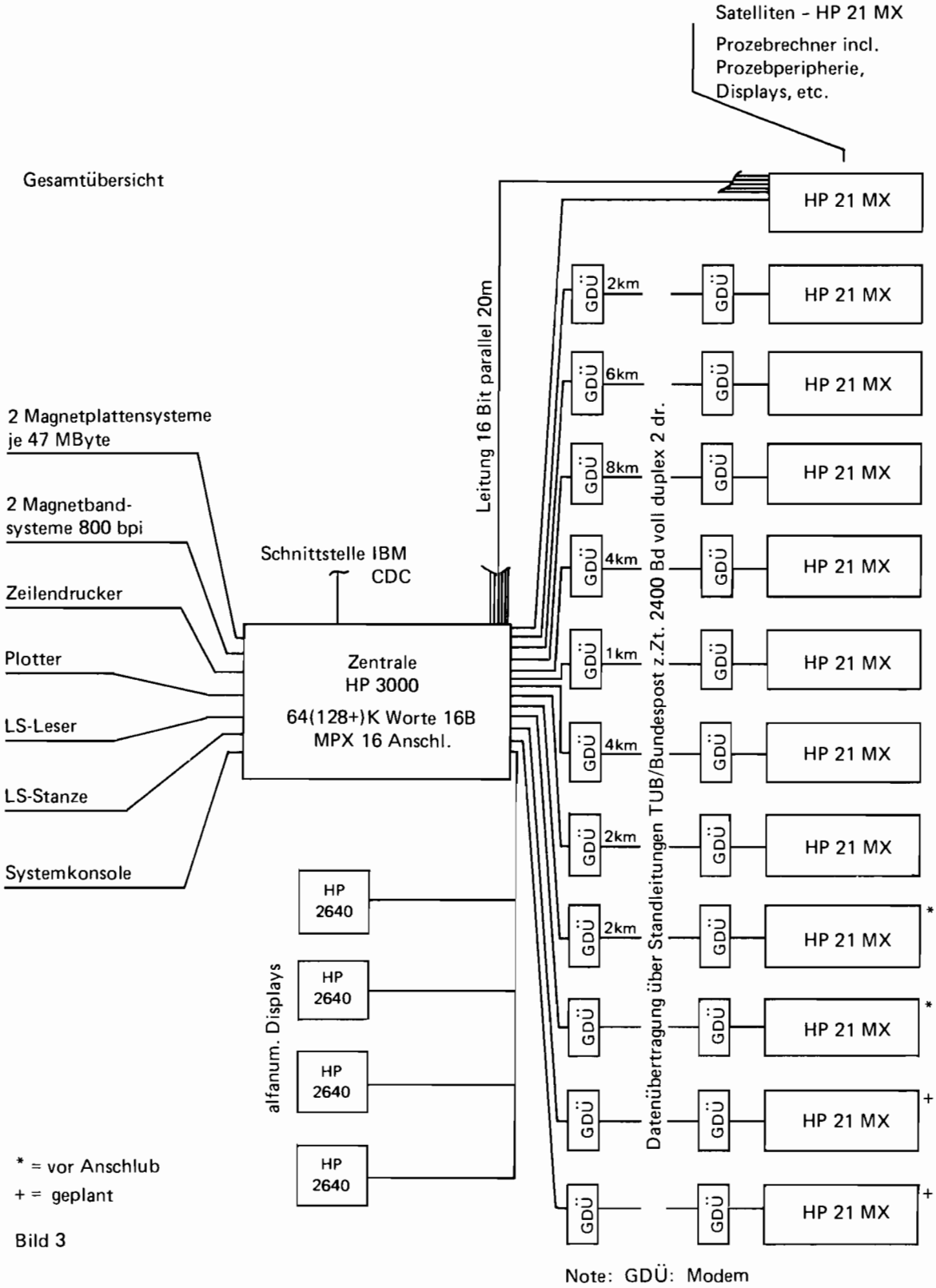
IV. Experiences and Future

Dates and facts:

System-planning-phase, comparison	1973/1974
Order	March 1975
Installation at TUB	August 1975
End of test-phase BVB*	beginning of 1976
Price central computer HP 3000 CX incl. 5 satellites	< 1.5 Mio DM
The most important competing products 1973-1974	DEC 11/45 - 11 E10 SIEMENS 330/320
Number of satellites HP 21MX (May 77)	8
Maximum planned for this system	12 (+4 displays)
Communication via multiplexer asynchronous	2400 Baud (planned) 4800 synchronous)
Connection HP 3000 to other computers	IBM 370/158 TUB (June 1977) CDC 6500/CYBER TUB planned (no software)
Special hardware for this network	HP-Standard hardware was used
Special software for this network	MPE 3000 not modified (except addition of CCE, modification of PTAPE) HP 21MX-communication programs and driver made by HP-Germany for this project

* *BVB: Besondere Vertragsbedingungen des Bundes*

HARDWARE CONFIGURATION
REAL-TIME-COMPUTER
NETWORK / TECHNISCHE UNIVERSITÄT BERLIN (As of 3/77)



* = vor Anschlub
\+ = geplant

Bild 3

Working period of HP 3000	day and night 24 hrs./day
Number of groups on HP 3000	66
Average load of HP 3000	3 to 7 users/jobs simultaneous

Experiences with HP 3000 CX in this application:

- HP 3000 CX is heavily loaded with 5 and more connected simultaneous working users
- Response-time is critical under this condition—upgrade necessary
- Reliable hardware—very few serious errors-no data loss! Errors: disc errors (very few), system halts, hanging devices (MPX) and sessions, line-printer
- Software:
  Mysterious bounds violations independent of the running subsystem or program
- Communication-Software-Errors on HP 21MX-side
- Criticism on Error Messages SPL and FORTRAN 3000
- Some problems with file incompatibility between HP 21MX cross-software and Cross-Loader

Experiences with manufacturer HP:

- Once upon a time (1974/1975) Hewlett-Packard Germany was flexible enough to realize a "not always HP-standard software solution."
  Are they still today?
- Funny answer to our bug-reports from HP-USA.
- Hardware-service Berlin – No problem.

Future

Introduction of the high level real-time language PEARL (*P*rocess and *E*xperiment *A*utomation *R*ealtime *L*anguage).

HP 3000 Series II.

Faster communication.

Integrating this network into Berlin Computer Network WRB.

Using peripherals of satellites as peripherals of Central.

• • •

Tape Operations Made Simple for Users = FREED Disc Space

by Jukka Harju
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PREFACE

The daily users of the HP 3000 installation at the Helsinki School of Economics represent various levels of knowledge and computing experience. In addition to the computer centre personnel, The Centre is used by teachers and research workers of the school and a number of outsiders who buy computing resources.

The tape operations under the MPE operating system are fairly easy. This, however, has not stimulated users - at least teachers and research workers - to use tapes. The files have been kept solely on discs and the practice seemed to be increasing.

This forced us to create the TAPELIB system described on the following pages. Its purpose was to unify the tape conventions and, at the same time, simplify tape operations. On the other hand, the owners of the tapes are registered, and the information concerning the date and purpose of the latest use of each tape is kept up-to-date.

STRUCTURE OF TAPELIB

TAPELIB consists of the TAPELIB program and two ASCII files.

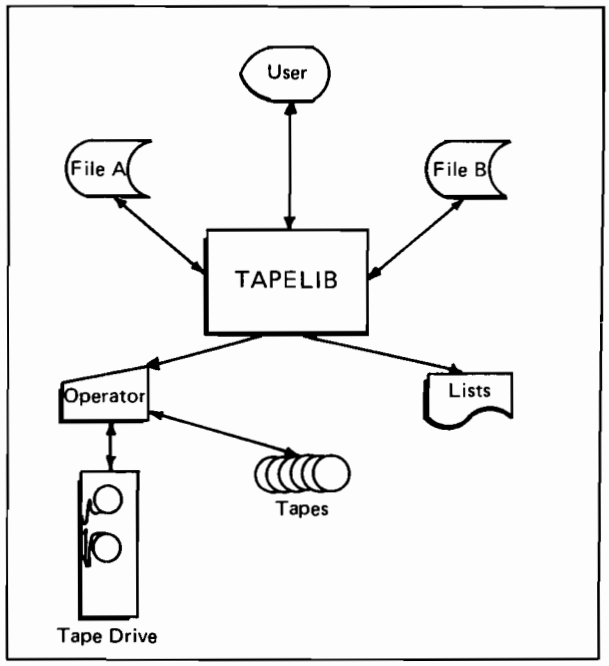
A. Interactive program TAPELIB

1. Main program
   —source file TLS
2. TAPELIB subprogram library
   —source files TLSUBS, PVMF
3. Procedures for executing MPE commands (in SL.PUB.SYS at the Helsinki School of Economics)
   —procedure MPE (source: MPES)
   —logical procedure MPEL (source: MPES)

B. HELP command data file TAPEHELP

C. Tape log TAPEFILE

The role of TAPELIB:



File A (TAPEFILE) contains one record for every tape created. The record description:

field	information
1-5	tape number, form: Txxxx, xxxx=number given by TAPE
7-10	length of tape (ft.)
12-29	creator of tape (USER.ACCT)
30-46	date and time of creation
63	purpose of latest operation S for STORE operation R for RESTORE operation
64-67	number of times the tape has been used

File B (TAPEHELP) contains information given by HELP command. TAPEHELP was created by EDITOR.

Both file A and B are kept in PUB.SYS with lock words.

The TAPELIB software uses the following MPE commands: FILE, STORE, RESTORE, PURGE, LISTF, and TELLOP.

The STORE and RESTORE operations are performed for the group into which the user has been logged. This sets certain requirements for the ACCOUNT GROUP-USER structure. At the H.S.E. each user (except the computer centre personnel) is provided with a group of his own, thus having to take care of his own files only.

The types of output produced by TAPELIB on terminal or line printer are:

- standard MPE 'STORE/RESTORE' listing
- standard MPE 'LIST,1' listing
- tape directory listing
- user information from tape log (TAPEFILE)

When TAPELIB is used, the console operator must reply to a tape request in order to facilitate the following:

- creation of a new tape (the information is written to TAPEFILE)
- deletion of an old tape (the corresponding record is deleted from TAPEFILE)
- use of a tape for a STORE or RESTORE operation
- listing of a tape directory

USE OF TAPELIB

TAPELIB is initiated from the terminal by the command

```
:RUN TAPELIB.PUB.SYS
```

to which the system replies

```
HKKK TAPE LIBRARY - JH & ATS WED, FEB 23, 1977, 1:45 PM
=
```

After the equal sign ('='), commands allowed by TAPELIB can be written. 'HELP' command produces a listing of all the commands known to TAPELIB.

HELP command listing:

Control is passed back to the operating system by writing E or EXIT.

TAPE

The user is allowed to request a tape of his own or a system backup tape:

```
=TAPE T0004          === user tape, number T0004
=
```

or

```
=TAPE DUMP           === a system backup tape
=
```

The TAPELIB command has been executed when the following '=' sign is written on the terminal. After this, other TAPELIB operations can be executed.

TELLOP

A message can be sent to the operator:

```
=TELLOP WHERE ARE YOU YOU BAT
=
```

NEWTAPE and PURGETAPE

A new tape is created by the "NEWTAPE xxxx" command, in which xxxx is the length of the tape in feet. At the moment, tape lengths of 400, 600, 1200 and 2400 are allowed at H.S.E.
Creation of a new tape:

```
=NEWTAPE

MISSING LENGTH
=NEWTAPE 1200
...EXPECTING CONSOLE REPLY
```

A message will be written on the console:

```
?MS/9:45/ S295/24/** TL ** NEWTAPE T0013
LENGTH 1200 (S5)
```

to which the operator must reply

```
=REPLY 24,T0013      (24 = PIN number)
```

to facilitate creation.

The message:

```
TAPE T0013 CREATED
```

is written on the terminal to confirm the creation.

The NEWTAPE command implicitly contains the corresponding TAPE command.

Purging an existing tape (i.e., erasing its record from TAPEFILE) is performed by the "PURGETAPE Txxxx" command. PURGETAPE also requires a console reply.

STOREG and RESTORE

All the files in the group are copied on the tape defined by the TAPE command:

```
=STOREG
. . .EXPECTING CONSOLE REPLY
```

The form of the console reply is the normal type

```
=REPLY PIN,LDN      (LDN is the logical device number
                     of the tape drive)
```

After the operation, a standard MPE 'STORE;SHOW' listing is obtained on the terminal:

```
FILES STORED = 5

   FILE      .GROUP   .ACCOUNT   LDN   ADDRESS
   LAP2GEN   .YLE     .TUT       1     %27441
   LAP3GEN   .YLE     .TUT       1     %31533
   LAP4GEN   .YLE     .TUT       1     %32734
   LENGEN    .YLE     .TUT       2     %4720
   LMUUTOS   .YLE     .TUT       2     %4211

FILES NOT STORED = 0

=
```

The RESTORE command is available for returning files from tape to disc. Option '@' returns all the files stored on the tape. The files desired can also be defined in a list separated by commas (,). In this case, a semi-colon will terminate the list. After the semi-colon, the LDN can be specified to direct the files to the disc drive desired. Logical device numbers 1 and 2 are allowed in the H.S.E. TAPELIB.

Example:

```
=RESTORE THIS,THUS,BANG;1
. . .EXPECTING CONSOLE REPLY
```

The terminal will wait until the operation is completed. The following output will be written on the terminal:

```
FILES RESTORED = 3

   FILE   .GROUP   .ACCOUNT   LDN   ADDRESS
   THIS   .YLE     .TUT       1     %27441
   THUS   .YLE     .TUT       1     %31533
   BANG   .YLE     .TUT       1     %47112

FILES NOT RESTORED = 0
```

Note: the TAPELIB RESTORE operation is performed by using the corresponding MPE RESTORE command with KEEP option.

PURGE and KEEP

PURGE and KEEP commands are used to purge files from discs. PURGE deletes all the files given the option '@' or the files specified in a list separated by commas and terminated by a semi-colon.

Example:

```
=PURGE THIS,THUS;

PURGE THIS
PURGE THUS          All other files in the group will re-
=                   main undeleted.

=KEEP THIS;

PURGE THUS          THIS is kept - all other files in the
PURGE BANG                         group are deleted.
=
```

LISTT, LISTF, LISTD

The LISTT command is used to list tape log information from TAPEFILE:

```
=LISTT Txxxx;LP
=
```

specifies that information concerning tape number xxxx is listed on the line printer. 'DP' directs the output to the terminal, 'BO' produces both of them.

Information gained from LISTT output consists of the following:

- —tape number
- —length of tape (ft.)
- —creator of tape (USER.ACCOUNT)
- —date and time of creation
- —date and time of latest STORE/RESTORE operation
- —number of times the tape has been used

```
=LISTT GOSTA.KIR;LP
```

LISTF command produces a standard MPE'LISTF,1' listing for the group to which the user has logged on.

Example:

```
=LISTF
ACCOUNT=  TUT          GROUP=   YLE
FILE NAME  CODE ----------LOGICAL RECORD----------
                    SIZE TYP    EOF     LIMIT
LAP2GEN             80B  FA      69        69
LAP3GEN             80B  FA      81        81
LAP4GEN             80B  FA      76        76
=
```

The LISTD command outputs a list of the files on the tape defined by the TAPE command:

```
=TAPE TØØ23
=LISTD;LP
=
```

• • •

Word Processing as Data Processing*

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The Multnomah County Education Service District is a regional intermediate agency, offering services to the twelve school districts in Multnomah County. The administration of the ESD wanted to implement a word processing system for its internal organization, with the possibility of offering this service to the business offices of the local school districts at later time.

After examination of both stand-alone systems and software packages available for the HP 3000, we decided to buy the Editor/Scribe from the Los Altos Research Center (LARC). We had two reasons for deciding to go with a package on the 3000. First, we had the software in house already and had been using it for program development for several months. This made the additional cost of implementation relatively small. Second, the feeling was that no matter what stand-alone system we bought, it would be obsolete within a very short time. This could be avoided by using a package on a general-purpose machine.

Hardware

It was necessary for us to acquire more terminals to support the system. For the initial data entry and editing we leased Lear Siegler ADM-3 terminals. These are the classic dumb terminals and they do live up to their name.

For typewriter quality output we have several daisy wheel printers. All of these have the ability to print using either a fabric ribbon or a carbon ribbon. Either continuous forms or single sheets may be used. When a carbon ribbon is used, the print quality is comparable to that produced on a typical office electric typewriter.

We have examined most daisy wheel terminals on the market. There is wide variation in quality among the manufacturers and even among the individual units from a single manufacturer. We have two Qume Sprint 5 terminals in house. One works fine. The other is a lemon and has to be coerced to produce acceptable quality output.

Other terminals we have (or will have shortly) are an Anderson Jacobson 832 and an Agile. The AJ832 seems to be designed for very heavy-duty use. The Agile has capabilities we have not found in any other daisy wheel terminal. For example, the Agile has the "intelligence" to do proportional spacing when right justifying text.

This paper was originally presented at the Northwest Regional Users' Group Meeting, February 2, 1979.

Software

The primary word processing software is the LARC Editor/Scribe. The system consists of two main parts. There is an editor similar to the standard HP Editor, but with more capabilities. The other part is Scribe, the text formatter part of the package. It gives you the traditional text formatting capabilities. These include line justification, automatic centering and underlining, and page headings and footings.

We are also using a terminal spooling package called RSPOOL from DataCon of St. Helens. With RSPOOL we can treat any terminal as a spooled device. This allows us to have several CRT terminals sharing one daisy wheel printer. The spooler acts very much like the standard MPE spooling system. If a document is sent to a printer that is ready, the document starts to print immediately. If the printer is busy or otherwise not ready, the document is held until the printer is ready. Then it will start to print automatically.

Things We Wouldn't Do Again

We selected the LSI ADM3 terminals because they were cheap and they seemed to have everything we needed. We have discovered though, that they do lack some features which are very nice to have for word processing. For example, they do not have a backspace key. Of course, you can always type a control-H, but it is not as convenient. Another problem with the ADM3 is that lower case characters are hard to read. This has an effect on operator efficiency.

We now have on order the new HP 2621 terminals as replacements for the ADM3's. They seem to have the features which we need. They also have a very readable character set.

Another problem we had was the result of the way we handled the first major project. We attempted to do something too big and too complex. We were going to enter and edit the administrative policies of the organization. This was a book about 200 pages long in a rather complicated format.

We compounded this problem by thinking we could get away with using just the very simplest features of the system. We hoped that this would cut down on training time and let our operators become productive more quickly. What happened, though, was that it would have been easier to do the project by hand rather than by attempting to use the system in such a limited manner.

As a result, we ended up going back and redoing a lot of the document to take advantage of the system. The moral here is that if you are going to use a complex system, you are probably ahead to invest the time and effort needed to be able to use the more sophisticated features of the system.

Working with LARC

There was one problem that faced us immediately when trying to train new people how to use the LARC word processing system. There was no adequate documentation. The documentation supplied by LARC is intended for programmers and hence is rather technical in nature. It is unsuitable to give to a secretary who has never touched a CRT keyboard before.

So, we developed two manuals ourselves. One is a training manual oriented toward the secretary. This manual assumes no prior data processing or computer experience. The other manual is a command summary modeled after the HP Editor/3000 manual. [We are making these manuals available to others. Contact me for further information.]

As a side note, these manuals were produced using LARC. This was an excellent application for word processing. We went through several major revisions on each of the manuals. There is no way we would have done that much editing if we had been typing them by hand.

Training

We are training secretaries with no previous word processing or data processing experience how to use LARC. There is a wide variation in how quickly a person learns the system. We have had some users who were doing very sophisticated things with the system after a couple of weeks. On the other hand, we have some users who still are not comfortable with the log-on procedure after six months.

There are two factors which affect how quickly a person becomes productive with word processing. The most important is motivation. If the person is against the idea from the beginning, progress will be slow. The second factor is simply how much time a person can spend using the system. We have some who will work with the system for maybe two or three days at a time. Then three weeks may pass before they get back to using word processing. By then, they have to start the learning process again. They never get off the first part of the learning curve.

What compounds the problem of training is the complexity of LARC itself. It is very versatile with lots of commands and features. But that also makes it more difficult to learn and to use.

Problems in Organization

No matter what type of word processing system you use, the most important key to its success is how it is integrated into the organizational structure. We had two options in organizing word processing. First, we could set up a word processing center. Work would flow into the center, be processed by full-time word processing technicians, and then go back to the originator. This method would give us tight control over the entire process. The people doing the work would be experts spending all of their time using word processing. The problem with this method is that it removes control from the individual departments. The word processing technicians may know the equipment and the system, but they do not necessarily know the jargon or quirks that a departmental secretary would know. They also may not be in a position to set priorities in a meaningful manner.

So, we took the second option. Our word processing system is decentralized. Eventually we will have several work stations scattered throughout the building. Each work station will consist of one or more CRT's and one typewriter quality terminal printer. The person responsible for the document will be the one doing the word processing. Typically, this means that each department will have at least one secretary proficient in the use of the system.

There are, of course, problems with this type of organization. There are more people to train. And since there are many users, each doing a little bit of word processing, very few become real experts in the use of the system.

But the advantages of this type of organization are important to us. Control is given back to the people who are doing the work. The user response to the concept of word processing is more positive when it is presented as just another tool that can be used in getting the work done, rather than a mystical system imposed on them from the outside.

At this time, all of our word processing users are internal. Next year we will offer this service to the business offices of the twelve school districts in Multnomah County. Overall, our users are pleased with the word processing application. We consider this internal piloting to be a success and expect the implementation of word processing for the local districts to be a smooth process.

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Film Booking, Distribution, and Return Processing Using Bar Code Labels*

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The Audio Visual Department of the Multnomah County Education Service District is primarily concerned with the booking and care of their library of more than six thousand films.

Approximately 85 schools request films, with about 90,000 requests each year. Most schools are on either a Monday/Thursday delivery schedule, or a Tuesday/Friday delivery schedule. In other words, a film that goes out to a school on Friday should be returned on Tuesday. The same film may go out again on Thursday. The film librarian must know about any overdue films as soon as possible, so that the offending school may be notified to return the film. Each film must be cleaned and rewound before it goes out again.

The film booking was originally automated in 1968 using an IBM 1401 system. It was subsequently converted to COBOL on IBM equipment and then to HP 3000 COBOL in 1977. This system was a card input, batch system that was run at night. The user was unable to easily tell if a film was available until after the night's run. Some bookings took two days to be processed since the edit errors were not corrected until the next day. It also became necessary to renumber the films using a five digit number instead of a four digit number. Since the film master file was a direct access file that used film number as the record address, the five digit number forced a change in access method.

This paper was originally presented at the Northwest Regional Users' Group Meeting, February 2, 1979.

A decision to redesign and rewrite the Audio Visual System was made on the basis of these and other problems. The new system was to address three major areas.

1. The ability to book films online so that the status of any film was instantly available.
2. The ability to process the returned films into the system in a timely manner.
3. The ability to update the film master file online and to see the film information on request.

In order to facilitate the online processing and to allow for five digit film numbers, we are using KSAM files and DEL screens. The online program has three screens; the menu screen, the booking screen, and the film master file maintenance screen. The film librarian books films as the requests are received. The program edits the request information and attempts to book the film. If the film is not available on the date requested, the system responds with the next open date and the last open date between the current day and the requested day. The librarian may book for either of these dates or continue with the next request. The booking screen may also be used to show bookings that are on the system or to cancel existing bookings.

The film master file maintenance screen is used to show, add, delete, or change the information on the film master. The film master records contain all of the information about a film including a 350 character abstract describing the film contents. This information is used to generate the film catalog that the schools use to order films.

The decision to use KSAM instead of IMAGE was based mostly on the need for generic keys. There have been occasions when this decision, though necessary, was regretted. Our initial use of KSAM was quite positive, although online response time was not as good as hoped. The response times improved when we removed some of the keys from our files. Keys with very many duplicate entries should not be used since the time needed to maintain the key structure quickly destroys any advantage gained. However, when we began having system crashes, we soon discovered that KSAM files are frequently left in an unusable state after a system failure. The only way to get back online was to reload the file or files affected. Since the booking file was updated constantly during the day, it was nearly always unusable after a crash. This file contained from 20 to 30 thousand records and initially took four or five hours to reload. This meant that the user was unable to book films for the rest of the day. We were able to recover 'lost' records by moving the MPE end-of-file pointer to the end of the good data. We still had to reload to recover the key file. Unfortunately, we had a problem that was causing frequent system crashes. We also had a bad winter, including a record breaking ice storm, that caused a larger than number of power failures. KSAM reloads became a recurring nightmare. Fortunately for our sanity, HP issued MPE III with a new version of KSAM. This version reduced the reload time for the booking file from 6500+ CPU seconds to about 1500 CPU seconds. The hardware was also fixed and system crashes decreased significantly.

We recently installed MIT 1906 with some new KSAMUTIL commands that enable you to determine whether your file is damaged and what the damage is. If the MPE and KSAM end-of-file pointers are not consistent, the MPE pointer will be adjusted automatically. We have had occasion to use these features and were able to recover the film master file without a reload. We have also begun to log the booking transactions each day. This will allow us to process the transaction file against the backup instead of reloading. We are much more comfortable with KSAM now.

It was decided to use a bar code scanning device and bar code labels on the film cans to process the returned films. This gives the film library technician the ability to read the label on each film can as the return delivery is made. When all the films are scanned, the system prints a report of all returned films and all overdue films.

The numbers of the returned films may also be entered manually if a bar code label is not readable. The bar code reader we use is an Intermec model 9210. It has an RS232C interface and uses a Ruby Wand light pen. The labels are in Code 39 which is full alphanumeric. The reader is read by an SPL program whic builds a file of the numbers scanned. This is then processed against the booking file to flag the films as returned.

Checking-in up to 700 returned films used to take most of the morning for two technicians. Using the bar code reader has reduced this time to one or two hours with one technician. We have recently completed an inventory of the films in the library using the bar code reader. 6,393 films were inventoried in about five hours. This process was estimated to have taken as much as a week to do manually.

We are presently involved in producing the film catalog. We are using LARC EDITOR/SCRIBE word processing system to print the catalog from the information on the film master file. It will be printed on our Agile word processing printer. This will give us a photo ready copy.

We are nearly through an entire year with the new system and are looking forward to the next year. We hope to improve response time and add some management information reports. We will also be converting the DEL processing to VIEW 3000. Our experience with using so many new things (to us) was a little wild, but we have learned a great deal. This system was our initial use of KSAM, DEL, and the bar code reader.

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User and Operator Training*

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Abstract

This paper covers the user and operator training procedures utilized by the Real-Time Data Processing Center (R-TDPC) at Hughes Aircraft Company in Fullerton, California. All new users to the system *must* take the one hour procedures indoctrination course given by the Operations Coordinator unless they have taken either of the two HP 3000 evening courses offered by the Hughes Aircraft Advanced Technical Education Program. An operator's training program is offered for those who wish to become system operators.

After having noted the extreme inefficiency of a new user trying to acquaint himself with the HP 3000 computer without any prior knowledge of the system, it was decided to institute a short new user training program in the R-TDPC at Hughes Aircraft Company. The new user training session takes approximately one hour and is given by either the Operations Coordinator and System Operator. This session is required of all new users who haven't taken either of the two ATEP courses discussed later in this article. An outline of the user training program is given in APPENDIX A. The purpose of the program is two-fold. First, it is important to give the new user enough information so that he can log-on to an interactive session and communicate successfully with the computer on an elementary level. The second goal is to show the new user the extent of the peripheral devices available to him and where the various hardware device and software subsystem reference manuals are kept. It is very important to not overburden the new user with too much information because he simply won't remember all of it. It has been found that a short one hour indoctrination course followed by subsequent help when specific problems arise, optimizes the speed with which a new user becomes comfortable using the HP 3000 computer.

In addition to the short indoctrination course mentioned above, there are two courses offered by the Hughes Advanced Technical Education Program (ATEP). Both courses consist of eight two-hour sessions over an eight-week period. Any new user taking either of these courses does not need to take the mandatory one hour indoctrination course. The two courses are similar in nature except that one is designed for new users with little or no previous programming experience and the other is configured for those with moderate programming ability using either BASIC or FORTRAN. An outline for the former is given in APPENDIX B while an outline of the latter course is given in APPENDIX C.

Reprinted from SCRUG 78, The Meeting Abstracts and Proceedings of HP Southern California Regional Users Group.

The operator training program was devised to train already knowledgeable users in the many facets of operating and controlling an HP 3000 computer. An outline of the operator training program is given in APPENDIX D. Usually the training is given in a series of one hour sessions. The number of sessions required depends on how rapidly the operator trainee masters the information.

In an effort to optimize user usage of the HP 3000 computer, the R-TDPC provides it users with the necessary Hewlett-Packard software reference manuals. There is a master reference manual set that is available to all users in the center but all of these manuals must remain in the center. The R-TDPC also purchases from HP and gives to the users those manuals that the individual user requires to do his work. The center tries to discourage the users from requesting manuals that they don't need. The Operations Coordinator keeps a small stock of the most commonly requested manuals on hand. Others are ordered as needed.

The R-TDPC maintains a filing cabinet for users with the following information in it:

1) Hardware operating and reference manuals
2) Examples of software techniques.

A User's Notice written by the System Operator is sent each month to all R-TDPC users informing them of any change or updates to the system hardware or software. As can be seen, every effort is made to first train new users to use the R-TDPC HP 3000 computer and then provide them with all possible information to maximize their further system.

Appendix A. User Training

A. R-TDPC and HP 3000 System Overview and Procedures
   a) User Training Syllabus (FR 77-14-169)
   b) Using the HP 3000 (03000-90121)
   c) Using Files (30000-90102)

B. Use of Terminals
   a) CRT
   b) Terminet
   c) Terminet with modem

C. MPE Dialog Interaction
   a) :JOB, :EOJ, :HELLO, :BYE, :DATA, :EOD
   b) H^{C},X^{C},Y^{C},BREAK,RESUME
   c) :TELLOP,:TELL,:SHOWJOB,:SHOWOUT, :SHOWIN,:SHOWDEV
   d) Error messages (ref.: Error Messages and Recovery Manual (30000-90015)
   e) :STREAM command
   f) Prompt characters (MPE vs Subsystems)

D. Files
   a) File domains
      i) Groups vs accounts
      ii) Security

b) File name
  i) :FILE (file reference, ;DEV=, ;REC=, ;DISC=, ;SAVE)
  ii) :BUILD
  iii) :PURGE
c) File backreference
  i) :RENAME
  ii) :RESET
  iii) :SAVE
d) File errors

E. Editor
a) Line numbers vs unnumbered
b) /A, /D, /C, /M, /L, /K, /T

F. Fortran
a) Sample program
b) :FORTRAN– :PREP– :RUN
c) :FORTPREP– :RUN
d) :FORTGO

G. Basic

H. Utilities
a) :STORE
b) :RESTORE
c) :RUN FCOPY.PUB.SYS
d) :RUN SORT.PUB.SYS
e) :RUN CARDIN.PUB.SYS
f) :RUN LISTEQ.PUB.SYS

I. Libraries
a) HP 3000 Contributed Library
b) R-TDPC Utilities Library
c) HP 3000 Reference Manual Library
d) IBM 370 SCILIB

J. Plotting
a) HPPLOT (Basic)
b) PLOT7202
c) VERSAPLOT

K. Peripherals
a) Line printer
b) Versatec
c) Paper tape punch
d) Paper tape reader
e) Digitizer
f) Keypunch

L. Spooling

Appendix B. ATEP 446—Introduction to HP 3000 for Inexperienced Programmers

Lesson 1
- What is programming?
- FORTRAN Introduction
  - Data Types
  - Arithmetic Expressions
  - Logical Expressions
  - FORTRAN Statements
  - FORTRAN Language Structure

Lesson II
- R-TDPC Orientation
- HP 3000 System Orientation
- User-System Interface
  - Logon
  - STUDENTQ
  - Game
  - Terminal Use

Lesson III
- FORTRAN
  - Input
  - Output
  - Looping/Iteration DO Statements
- EDITOR, Part IA
- FORTGO
- :FILE FTNO&;DEV=LP

Lesson IV
- FORTRAN
  - Arrays
  - DO loops
  - READ & WRITE Statements, unformatted
- Flow Charting

Lesson V
- EDITOR, Part IB
- Files, Part I

Lesson VI
- FORTRAN
  - Output formatting
    I,F,E,D,A,implied DO,carriage control
  - Input of information
  - Direct file IO
  - Subroutines & block data

Lesson VII
- Computer Science, Syntax
- FORTRAN
  - Compile,Prep,Execute
  - Troubleshooting
  - Traceback
- SORT
- FCOPY

Lesson VIII
- Digitizer
- Plotting
- R-TDPC Subsystem Overview
- Software Libraries
- HP 3000 User Groups

Appendix C. ATEP 446—Introduction to HP 3000 for Experienced Programmers

Session I
- Introduction to HP 3000 Computer System
  - ATEP 446 Introduction
  - User Examples—Interactive and Batch
  - Introductions—Who is Who?
  - Course Orientation
  - Handouts and Manuals

- HP 3000 System Overview
- HP 3000 Computer Centers
- HP 3000 Users Group
- Student Accounting

Session II
- BASIC Simple Examples
- MPE Commands and Error Messages
- User Procedures for Keypunch, Card Reader, Line Printer
- FORTRAN Simple Examples
- Computer Science—Fundamentals
- System Accounting
- HP 3000 Architecture
- User Problems

Session III
- EDITOR, Part I
- File System Part I
- Editor Features
  - Editing—add, modify, list, insert, replace, delete, and move lines
  - File Manipulation—generate new text, merge text, save text, and temporarily hold text
  - EDITOR Control—set line length, left margin, right margin, etc.
  - Special—use command file, use user procedure, conditional editing, and search techniques

Session IV
- EDITOR, Part 2
- HP 3000 Program Process
- FORTRAN Program Process
- FORTRAN Programming Technique
- MPE, Part B (Spooling)
- Computer Science Concepts, II, Syntax

Session V
- HP 3000 FORTRAN
  - Description
  - Use
  - Techniques
- Utility
  - File Copy . . . . . :RUN FCOPY.PUB.SYS
  - Sorting . . . . . :RUN SORT.PUB.SYS
  - Merging . . . . . :RUN MERGE.PUB.SYS
- FORTRAN Summary
  - Introduction
  - Data Elements
  - Expressions
  - Assignments
  - Declaration Statements
  - Control Statements
  - Main Program Statements
  - Subprogram Statements
  - Functions
  - Input/Output Statements
  - Format Statements
  - File Facility
  - Compiler Commands
  - SPL Program Units
  - Subsystem Control
  - Compiler Messages
  - HP 3000 vs IBM/370 FORTRAN
  - ANSI Standard FORTRAN

Session VI
- MPE, Part C
  - Messages
  - Dialog
  - Abort Message
  - Tombstone
- Files System, Part 2
- FORTRAN
  - Files
  - IO
- Troubleshooting
  - Program/System Problems
  - System/Subsystem Problems
  - FORTRAN Debugging
  - BASIC Debugging
  - Stack Size and Related Problems
- File Utilities

Session VII
- Computer Science III—Computer Languages, Timeshare
- MPE, Part D
  - System Information
  - Spoofle Control
  - Fences and Priorities
  - LOGON Parameters
  - Accounts—Groups—Users
- HP 3000 BASIC Language—Description and Techniques
- Computer Science IV—Code and Data Segments
- Segmentation
- Program Design and Development Considerations
- Documentation—User and Documentation
- DP Center Security

Session VIII
- Plotting
- RJE to IBM370 and HP 3000
- Data Collection
- Data Base Management—IMAGE, QUERY
- HP 3000 Subsystems
- R-TDPC Library, Software and Techniques
- Programming Techniques
- Intrinsics, System and Compiler
- Advanced HP 3000 Usage

Appendix D. Operator Training

Introduction: Standard User Training

A. System Backup Procedure
- a) Why SYSDUMPS are made and access to files on them
- b) Where the SYSDUMP mag tapes are kept
- c) Procedures for daily SYSDUMP
- d) Procedures for weekly SYSDUMP
- e) Procedures for monthly SYSDUMP
- f) Why REPORTS are made
- g) Where the listings for the REPORTS and SYSDUMPS are kept and how

B. R-TDPC Manuals Library
   a) Where kept
   b) How to check out
   c) Procedures for adding new manuals

C. Memory Dump Procedures
   a) Why Performed
   b) How Performed
      i) Instructions on system console
   c) Difference between octal and decimal numbers

D. Startup Procedures
   a) Warm
      i) MPE from disc
      ii) Saves input and output spoofles
   b) Cool
      i) MPE from disc
      ii) Does not save spoofles
   c) Cold
      i) MPE from tape
      ii) Where to find cold load tape
   d) Reload
      i) MPE and system files from tape
      ii) Relationship between RELOAD and SYSDUMP tapes
      iii) Why RELOAD
   e) Instructions on System Console for Warm, Cool, and Cold Starts

E. Peripheral Equipment Supplies, Maintenance, and User Access
   a) Line Printer
      i) Replacing paper
      ii) Replacing ribbon
   b) Terminet
      i) Replacing paper
      ii) Replacing ribbon
      iii) Term = 6 (logon—except system console)
   c) CRT
      i) Term = 10 (logon - 2640A)
      ii) Term = 4 (logon - 2600A)
   d) Mag Tape Units
      i) Cleaning (1-2 times per day)
      ii) How to check out tapes
      iii) Magnetic tape parity
   e) Paper Tape Punch
      i) How to replace paper tape
   f) How to order R-TDPC supplies
   g) Where to order R-TDPC supplies

F. Operator Commands—System Monitor and Control
   a) A list of commands is on the system console
   b) How to use each command and what it means

G. System Control and Management
   a) JOBFENCE = 5 day (8:00-17:00 Monday-Friday)
      = 0 night (all other times)
   b) OUTFENCE = 5 day (8:00-17:00 Monday-Friday)
      = 1 night (all other times)
   c) JOBS with a CPU time of less than 100 sec. can be run in the CS subque, otherwise DS is used.
   d) Alter JOB/SESSION limit depending on sluggishness of system (default JOB=3, SESSION=15)
   e) BS Subqueue—priority (limited)—who and why
      CS Subqueue—default or sessions
      DS Subqueue—default for jobs

H. System Troubleshooting
   a) System Problem Log
   b) System Degradation Log
   c) Looping (lights flashing)
   d) Pauses (lights not flashing)
   e) Slow response
   f) No CST entries
      i) Deallocate files
   g) No PCB entries
      i) Wait a few minutes and try again
   h) No disc space
      i) Purge files
   i) Peripheral device monitoring
      i) Problems
      ii) How to clear
   j) Hung terminal

I. User Problem Troubleshooting
   a) How to use peripheral devices
   b) File equations
   c) Hung files

J. Become familiar with all utility type programs in PUB.SYS and UTIL.SYS
   a) Why they are used
   b) How they are used

K. System Mag Tape Library Maintenance
   a) Where tapes are kept
   b) How they are maintained
      i) STORE
      ii) RESTORE
   c) How often they are updated
   d) Which groups are updated
   e) Which groups exist solely on mag tape

L. Accounting
   a) NEWACCT
   b) NEWGROUP
   c) NEWUSER
   d) Accounting card decks
      i) Maintenance
      ii) Updating
      iii) What they are used for
   e) User Listings and Summary Records

M. Program Listings
   a) LIBPROC.SYS
      i) What kind of files
      ii) Where kept
      iii) When updated
   b) LIBPROG.SYS
      i) What kind of files
      ii) Where kept
      iii) When updated

c) System SL Listings
   i) Where kept
   ii) When updated
d) Index Files
   i) What kind of files
   ii) Where kept
   iii) When updated

N. IO Configuration Changes
   a) How to change
      i) Coolstart
      ii) Coldstart
      iii) Sysdump followed by a coldstart
   b) Listings
      i) Where kept
      ii) Made after each configuration change
      iii) Card deck used for listing

O. System Software Changes
   a) MPE
   b) Subsystems
   c) Library Routines
      i) SL
      ii) USL

P. Register and Displays

Q. Operations Syllabus for Reference

R. System Operations Optimization

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Featured Articles/300

The HP 300

by Chris Sauer
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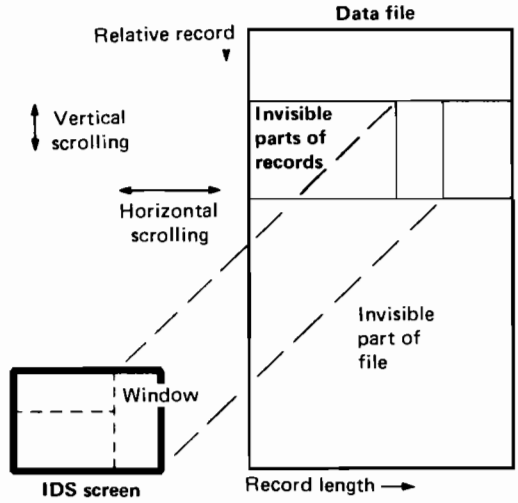
GSD's new Office Information System, the HP 300, is the beginning of a new product line. From the early days of its design 5 years ago, its orientation has been toward bringing computer power into the office or department to assist in daily system operations and management decision-making.

The five key points of an Office Information System are:

- Local control - local data base and processing power.
- Dedicated processing - core applications pre-programmed by a computer professional.
- Operatorless - EDP staff or trained full-time 'computer operator' *not* necessary for daily operations.
- Programmerless - information is directly accessible by the decision-maker.
- Office environment - designed for inclusion in the user's office as easily as other office equipment.

The most visible and unique feature of the HP 300 is the system console which is called the Integrated Display System (IDS). The IDS is the main point of focus of the system. Up to sixteen 264X or 262X application terminals may be under the control of jobs launched from the IDS. The key features of the IDS are:

- Softkeys - dynamically labeled to provide pushbutton function selection for the application or system user.
- Windows - the IDS screen may be divided into multiple 'mini-display screens' to concurrently display several different kinds of information while each is independently controlled.
- File viewing - files can be 'attached' to a window with the records of the file displayed in consecutive rows of the window.
- Horizontal and vertical scrolling - regardless of actual window width, files may be scrolled horizontally to view records up to 160 characters long. Vertical scrolling moves the window 'up or down' over the attached file.



Viewing a data file

The core of the System Software on the HP 300 is a multiprogramming, multitasking virtual memory operating system. The file system supports seven different file structures including a 'memory' file structure which is used in program-to-program communication. Image/300 is a data base management system similar to Image/3000. Current languages include Business Basic and RPG II.

The HP 300 is enclosed in cabinetry about the size of a 3-drawer file cabinet. This unit contains an SOS CPU, 256K- to 1024K byte error correcting main memory, a 12M byte Winchester disc drive, a 1M byte flexible disc drive, and IDS with keyboard. Additional disc drives can be added up to 260M bytes. System configuration can also include two 2631A printers.

The designers of the HP 300 drew upon 6 years of experience with the HP 3000; experienced in powerful and sophisticated computer technology, their goal was to couple this technology with an easy-to-use man-machine interface to create a business system for the office environment.

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Tips and Techniques/3000

Improving Performance of IMAGE Applications†

by Frederick R. White
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ABSTRACT:

The performance of an IMAGE application is constrained by external, as well as internal, contention for memory, CPU, I/O and other resources.

Some solutions to these problems are offered with special emphasis on those relating to IMAGE.

"Global optimization" is the key to improving performance of critical jobs/sessions.

ASSUMPTIONS

1. You have, or anticipate having, a performance problem.
2. You are able to determine that this problem occurs when the system is
   - Memory-bound or
   - CPU-bound or
   - I/O-bound or
   - Other resource-bound
3. You have already determined that this problem is not due to poor data base design, poor program design, or to such obviously poor practices as
   - Excessive process creation/killing
   - Excessive file opening/closing
   - Excessive stack size alteration
   - Failure to combine small code segments
   - Failure to share code segments
   - Segments with loosely bound modules

SOLUTIONS TO MEMORY-BOUND PROBLEMS

1. Increase real memory size.
2. Decrease total size of frequently used code segments.
   - Decrease number of active jobs/sessions
   - Lower priorities of non-critical jobs/sessions
3. Decrease total size of frequently used data segments.
   - Decrease size and/or number of file buffers
   - Decrease size and/or number of data base buffers*
   - Decrease size and/or number of data bases*
4. Decrease interference between active jobs/sessions
   - Larger time quantums
   - Perform "unnecessary" locking*
   - Perform locking at unnecessarily high levels*

*Applicable to IMAGE.

SOLUTIONS TO I/O-BOUND PROBLEMS

1. Improve I/O speeds.
   - Get faster discs
   - Get more discs
   - Distribute files across discs*
   - Minimize arm contention* (lock at higher level than necessary and/or lock unnecessarily and/or lower priorities of non-critical jobs/sessions)
2. Minimize redundant I/O activity.
   - Decrease size, and increase number, of IMAGE buffers*
   - Minimize IMAGE buffer thrashing* (lock at higher level than necessary and/or lock unnecessarily and/or lower priorities of non-critical jobs/sessions)
3. Reduce amount of non-critical I/O.
   - Lower priorities of non-critical jobs/sessions
   - Lower job limit

*Applicable to IMAGE.

SOLUTIONS TO CPU-BOUND PROBLEMS

1. Get a faster CPU.
2. Reduce CPU contention.
   - Lower priority of non-critical jobs/sessions which are heavy CPU users
   - Lower job/session limits
3. Eliminate CPU usurpation.
   - Lower the time quantum

SOLUTION TO OTHER RESOURCE-BOUND PROBLEMS

1. Avoid exclusive use of critical resources.
   - Don't lock unless you must*
2. Minimize the scope of exclusively used resources.
   - Lock only what you must*
3. Minimize the duration of the exclusive use of resources.
   - Don't lock until you must*
   - Unlock as soon as possible*
4. Balance the contention for differing resources so that jobs/sessions with equal priority will be dispatched with acceptably comparable frequencies.
   - Perform "unnecessary" locking*
   - Perform unnecessarily high locking*

*Applicable to IMAGE.

†*Reprinted from SCRUG 79, the Meeting Abstracts and Proceedings of HP Southern California Regional Users Group.*

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The Changing World of COBOL*

by Greg Gloss
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ABSTRACT: The specifications of the COBOL language, both the ANSI standard and the HP implementation, are continuously evolving. This paper covers some of the new features in ANSI COBOL-74 along with how HP COBOL users will be able to convert. The directions the ANSI COBOL committee is taking with the next version of the COBOL standard are also discussed.

NEW FEATURES

Two new I/O modules have been added to the ANSI standard to allow processing of indexed and relative files. The ORGANIZATION clause in the SELECT clause is used to specify the new file types:

ORGANIZATION IS INDEXED or
ORGANIZATION IS RELATIVE

Indexed (KSAM) files use a record key which is also specified in the SELECT clause:

RECORD KEY is data-name

Relative files are similar to random files in COBOL-68 in that a record number is used to select a record. However, Relative I/O allows you to (logically) delete records and to detect inactive records when reading.

The I/O modules now allow a file-status item to be specified which will be automatically set to indicate either successful completion or the reason for failure of an I/O operation.

The SORT/MERGE module allows multiple input files for sorting, an alternate collating sequence to be specified, and a MERGE verb.

The library module now allows multiple COPYLIB files and the COPY statement can now appear anywhere a character-string or a separator may occur except within another COPY statement. Multiple COPYLIB files are specified by qualifying the text-name with the library-name:

COPY DATADEFS OF COPYLIBA

Two new string manipulation verbs have been added to the Procedure Division. The STRING statement provides juxtaposition of the partial or complete contents of two or more data items into a single data item. The UNSTRING statement causes contiguous data in a sending field to be separated and placed into multiple receiving fields.

Three new forms of numeric display data types have been defined:

SIGN IS LEADING
SIGN IS LEADING SEPARATE CHARACTER
SIGN IS TRAILING SEPARATE CHARACTER

These data types can be used in arithmetic operations.

The arithmetic statements (ADD, COMPUTE, DIVIDE, MULTIPLY, and SUBTRACT) now allow multiple receiving fields after the GIVING (or before the = in the case of COMPUTE).

CONVERSION CONSIDERATIONS

[Note: All information in this section with respect to HP plans for COBOL-74 is tentative and subject to change.]

HP does not plan to remove any functional capabilities from its COBOL compiler even though the ANSI 1974 standard deleted the Random I/O module and replaced the EXAMINE statement with a new INSPECT statement. There may be a need to make some source program modifications due to new reserved words and/or the deletion of the NOTE and REMARKS paragraphs. A conversion guide describing these changes and a program to detect these items is planned. A listing of new reserved words is included in Appendix A.

The U.S. Government has prepared a document entitled "AIDS FOR COBOL PROGRAM CONVERSION" (FIPS PUB 43) which specifies the differences between the two versions of the ANSI standard. Copies are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. (SD Catalog Number C13:52:43).

THE NEXT COBOL STANDARD

The ANSI X3J4 Technical Committee is in the process of defining the next version of the COBOL standard. Some of the new features being discussed are:

a. CODASYL Data Base facility
b. Reference Modification (A (3:5) means an item starting with the third character of A and with a length of 5 characters).
c. 48 levels of subscripting
d. In-line PERFORM statements
e. New scope terminators (such as END-ADD to be used after an ON SIZE ERROR Option within another conditional statement).
f. USAGE BIT

The next standard will probably designate certain items which are planned for deletion in the following standard. Items which may be phased out or deleted include:

a. 77 and 66 level data items
b. LABEL RECORDS Clause/VALUE of Clause
c. ALTER Statement
d. PICTURE Character A
e. Most IDENTIFICATION DIVISION Paragraphs

Reprinted from SCRUG 79, the Meeting Abstracts and Proceedings of HP Southern California Regional Users Group.

APPENDIX A

The following Reserved Words have been added to ANSI COBOL in the 1974 Standard:

ALSO	LENGTH
BOTTOM	LINAGE
CANCEL	LINAGE-COUNTER
CD	MERGE
CHARACTER	MESSAGE
CODE-SET	NATIVE
COLLATING	ORGANIZATION
COMMUNICATION	OVERFLOW
COUNT	POINTER
DATE	PRINTING
DAY	PROCEDURES
DEBUG-CONTENTS	QUEUE
DEBUG-ITEM	RECEIVE
DEBUG-LINE	REFERENCES
DEBUG-NAME	RELATIVE
DEBUG-SUB-1	REMOVAL
DEBUG-SUB-2	REWRITE
DEBUG-SUB-3	SEGMENT
DEBUGGING	SEND
DELETE	SEPARATE
DELIMITED	SEQUENCE
DELIMITER	SORT-MERGE
DESTINATION	STANDARD-1
DISABLE	START
DUPLICATES	STRING
DYNAMIC	SUB-QUEUE-1
EGI	SUB-QUEUE-2
EMI	SUB-QUEUE-3
ENABLE	SUPPRESS
END-OF-PAGE	SYMBOLIC
EOP	TABLE
ESI	TERMINAL
EXCEPTION	TEXT
EXTEND	TIME
INITIAL	TRAILING
INSPECT	UNSTRING

The following words are tentatively planned for HP extensions to COBOL at a future date. This list is subject to change.

C01	EBCDIC
C02	EXCLUSIVE
C03	EXDATE
C04	FREE
C05	INTRINSIC
C06	LABELS
C07	NOLIST
C08	SEQ
C09	SW0
C10	SW1
C11	SW2
C12	SW3
CONDITION-CODE	SW4
CONDITIONALLY	SW5
SW6	UN-EXCLUSIVE
SW7	VOL
SW8	WHEN-COMPLIED
SW9	

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Using "Control-Y" in COBOL*

by John A. Maus
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We all know the value of being able to type a "Control Y" into an executing program in order to alter its flow of execution. When the program senses Cntrl-Y it might give us some status information or abort its current function or some such thing.

However, if you write COBOL programs to be used interactively, you will discover that COBOL has no direct way to "arm the Cntrl-Y trap." One may not directly call the system intrinsic "XCONTRAP" from COBOL to accomplish this since that SPL routine requires "integer by value" arguments and COBOL passes arguments by reference.

It turns out that FORTRAN does possess a means of arming the Cntrl-Y trap facility very simply. I have taken advantage of this and used it to provide a Contrl-Y capability in COBOL by simply making my COBOL program a "subroutine" called by FORTRAN. The FORTRAN main program is very short. It may look like this:

```
$CONTROL USLINIT
   ON CONTROLY CALL COBOLCNTRLY
   CALL COBOLMAIN
   STOP
   END
```

The COBOL program might look something like this:

```
$CONTROL SUBPROGRAM
   IDENTIFICATION DIVISION.
   PROGRAM-ID. COBOLMAIN.
   .
   .
   .
   CONTROL-Y-HIT.
      ENTRY "COBOLCNTRLY".
      .
      .
      .
      GOBACK.
   .
   .
   .
   END-OF-JOB.
      GOBACK
```

Reprinted from SCRUG† Newsletter, May '79
†Southern California Regional Users Group

The FORTRAN main program will arm the Cntrl-Y trap procedure to "point" the COBOL paragraph "CONTROL-Y-HIT." When Cntrl-Y is typed, the COBOL subprogram will suspend itself and begin execution of the paragraph. When "GOBACK" is encountered, control will return to that point in the COBOL program that was being executed prior to sensing Cntrl-Y.

This procedure is reasonably straight-forward and does not require the creation of an SPL routine to interface between COBOL and the intrinsic "XCONTRAP."

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Summary of Terminal Type Characteristics

by Madeline Lombaerde
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In response to popular request for a summary of terminal characteristics as specified by 'TERMTYPE,' the following table is reproduced from Communications Pocket Guide, HP Publication number 30000-90105, page B-4.

TERMINAL TYPES TABLE

Terminal Model	Type	Will Cursor Backspace?	Response To ctl-H (delete)	Responds To Form Feed (%14)	Requires Time Delay?	Number of Time Delay Characters (#LF/#CR) By Speed (CPS) 240	120	60	30	15	10	Parity Checking?[e]
ASR 33	0	no	\(%134)	no (LF used)	yes	-	-	-	-	-	0/1	yes
ASR 37	1	yes	LF	yes	yes	-	-	-	-	0/2	-	yes
ASR 35	2	no	\	yes	yes	-	-	-	-	-	0/1	yes
Execuport	3	yes	LF	yes	yes	-	-	-	0/5	0/3	0/1	yes
DataPoint	4	yes	ctl-Y (EM)[h]	no (LF used)	yes	4/0	4/0	4/0	4/0	4/0	0/0	yes
Memorex 1240	5	yes	LF	yes	yes	-	-	3/15	1/11	1/8	1/8	yes
TermiNet	6	yes	LF	yes	yes	-	13/0	-	8/0	5/0	3/0	yes
MiniBEE	9	yes	null	yes	yes	4/0	4/0	4/0	4/0	4/0	4/0	yes
HP 2640B/44/45	10[a]	yes	null	yes	no[b]	0/0	0/0	0/0	0/0	0/0	0/0	yes
HP 2640A/44/45 (full enter)	11[c]	yes	null	yes	no[b]	0/0	0/0	0/0	0/0	0/0	0/0	yes
HP 2645K (8-bit word)	12[d]	yes	null	yes	no[b]	0/0	0/0	0/0	0/0	0/0	0/0	no[g]
Telenet Pseudo Term	13	yes	null	yes	no	0/0	0/0	0/0	0/0	0/0	0/0	yes
Multipoint[f]	14	N/A	N/A	N/A	N/A	-	-	-	-	-	-	yes
HP 2635 (8-bit word)	15[d]	yes	LF	yes	no[b]	0/0	0/0	0/0	0/0	0/0	0/0	no[g]
HP 2635 (7-bit word)	16	yes	LF	yes	no[b]	0/0	0/0	0/0	0/0	0/0	0/0	yes
Undefined	31	no	\	yes	yes	4/0	4/0	4/0	4/0	4/0	0/0	yes

NOTE:
a. With program control of block mode.
b. Uses ENQ/ACK handshake when write to terminal is greater than 80 characters, else sends DC1 charecters for handshaking.
c. Without program control of block mode.
d. 8-bit word with no parity.
e. Input parity checking is normally disabled; enable with FCONTROL 24.
f. Does not use ATC.
g. 8-bit data.
h. Non-displayable.

Author's Notations:

The characteristics are primarily:

1. What the allowable speeds for the terminal are
2. How long to delay, to allow a CR or LF to complete. Certain handshaking and form-feed characteristics are also set by the terminal type.

Type 31 was added to the table by the author. It is considered "undefined"; this type is used if no ;TERM= parameter is given at log-on and no default terminal type was specified for that device at system configuration.

The specifications for type 31 are: no cursor backspace, backslash in response to CTL H, responds to form feed, requires time delay, can do parity checking, and has same speeds and time delay characters as type 4 (Datapoint).

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Editor Hints

by Ed Splinter
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A lot of users employ the "CHANGE" command in EDITOR to locate each occurrence of a character string. They do so by changing the character string to itself and specifying "ALL" as the range.

This method has two disadvantages. First, it is too easy to mistype the "TO" character string and end-up actually changing the text. Secondly, it takes time to actually change every occurrence that is found back to itself.

The "USE" Command offers a way around both of these problems plus simplifies the typing needed to find any character string. The following "USE FILE" can be used to locate all occurrences of any character string. Time is set to 200 so that the procedure does not time-out for a large listing.

```
FINDQ FIRST;
S  SHORT;
S  TIME=200;
Q  $ENTER CHARACTER STRING
     "BETWEEN QUOTES".$;
Z::=;
WHILE;
   BEGINQ;
   FINDQ Z::;
   END;
   LIST *;
YES;
```

Enter through EDITOR and save as: KEEP FIND, UNN

```
/TEXT EXPANDSO
/USE FIND
ENTER CHARACTER STRING
    "BETWEEN QUOTES".
ENTER Z::=
"FREAD"
    81      FREADDIR,
    88      FREAD,
   499      FREADDIR
```

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20 Tips and Techniques/300

Forms/300

by Marcia Schorer
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The official, first-release HP 300 Computer System (A.01.01) includes the Forms Utility, a standalone program that allow creation of forms to be used programmatically for input or output of data from a terminal or console.

Typically, as a program executes, an operator is presented with information or queries via a form on the display screen and/or returns information by entering data in unprotected fields of the form. The forms are designed through the use of HP 300 editing features and video enhancements.

Forms are most valuable in RPG II application programs, but programs in Basic/300 can access them via ICALL statements to system services.

The following paragraphs briefly describe the mechanism (1) for creating forms and (2) for using them in RPG II and Basic programs. More detailed information is available in the HP 300 Forms Manual.

Creating Forms

To enter the Forms environment, enter the command

```
RUN FORMUTIL (MANAGER)
```

(It is suggested that each system manager copy the program to the PUBLIC domain, making the program available to all PUBLIC domain users via a simple RUN command.)

The user is prompted to enter the name of a form file—either an existing one (perhaps to modify a form) or a new one. Once a name is entered, softkeys are available to see a list of forms, to see the field attributes of a form, to print the list of forms or list of field attributes, or to display an existing or new (empty) form.

When creating a new form, HP 300 editing features and video enhancements are used to design the form on the IDS screen. Softkeys are available to define the unprotected fields (areas where the operator will receive or put information), and to store the form when it is complete. The user assigns a name to the form and defines attributes of the unprotected (I/O) fields.

A program that later uses the form will consider the unprotected fields (areas of I/O) of one form to constitute one record. This means that the program reads and writes data to one record buffer per form. The contents of the record buffer are copied, field-by-field, into the data fields on the screen, or the data entered into the fields displayed on the screen is copied into corresponding fields in the record buffer. (In the first case, the form is performing output, and in the second, it is performing input.) The field attributes provide automatic mapping of the position of a field in the record buffer, to the I/O position displayed in the form on the

screen. (You may define field attributes or accept default attributes.)

The form is stored, along with any number of others, in a form file. Usually, one file is associated with a program.

Using Forms in RPG II

The RPG II/300 language provides easy means for invoking a form and performing I/O using the form. Under file specifications, the user defines a terminal or console as a form-using device and names the form file to be used. Under output specifications, the user provides instructions to the program to identify and output a form and to position the cursor in the record buffer. Under input specifications the user provides for operator input.

See the HP 300 Forms Manual for detailed programming instructions and a sample program.

Using Forms in Basic/300

A forms file is accessed from a Basic/300 program using the ICALL statement. Three callable system services pertain to Forms: display a form, input a record from a form, and output a record to a form.

More programming is required to use forms from Basic than from RPG II (consequently, RPG programs are anticipated to be the major users). The calls to system services are numerous (one for every maneuver) and each call requires a list of parameters. In addition, a user must specifically open the terminal and the forms file, dimension an I/O buffer, and identify fields as substrings or provide packing and unpacking of record data.

See the HP 300 Forms Manual for details on using forms from a Basic program. In addition, the HP 300 System Services Guide (ordered separately*) documents the system services used for forms, and contains a section on calling system services from Basic.

More Information

The HP 300 Forms Manual is in a basic manual set supplied with the system and is part of the package for RPG software ordered separately. If additional copies are desired, it may be ordered as part number 31445-90002.

**Available as part of a set, HP Product Number 31387A, HP 300 Applications Guide.*

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HP 300 Rules for Using Escape Sequences on the HP 2631A Printer

by Phil Taylor
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Programmatic control over print compression/expansion, auto-underline, horizontal tabulation, variable vertical pitch and vertical forms control on the 2631A is via escape sequences that are unique to the 2631A. Many of these sequences are not compatible with other devices and none of these exist on other line printers. Consequently, the use of any of these sequences is not recommended for *any other device*; moreover, if a problem is encountered with these escape sequences, it is not a computer problem. Use *only* the following:

Esc Y	Display functions mode on.
Esc Z	Display functions mode off.
Esc 1	Tab set.
Esc 2	Tab clear.
Esc 3	Clear all tabs.
Esc ([nl]	Select primary character set.
Esc) [nl]	Select secondary character set.
Esc & k[nl]	Print mode selection (normal, expanded, compressed).
Esc & d[nl]	Underlining

All vertical forms control should be avoided as future printers of this type will no longer offer the feature. They are:

Esc & 1[nl] d/D	Alter printer response to line feed characters.
Esc & 1[nl] v/V	Select VFC channel.

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How to Program Non-Printing Passwords on the IDS

by Dave McClellan
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The Integrated Display System (IDS) is perhaps the most significant contribution of the HP 300. The example below shows one way to take advantage of some of its features.

Applications running on the IDS often require password protection. Since the IDS echoes all data typed at the keyboard, and there is no "half duplex" mode as there is with terminals, how do users protect the password from someone looking over their shoulders?

This problem can be solved using the unique "non-terminating softkey" capability of the IDS. All softkeys are set to non-terminating mode when the IDS is first opened. Then, after each input operation is completed in Basic, the program can call the system service which returns the numbers of any softkeys pressed an odd number of times during the last input operation (TMKNEXT). The number of keys pressed, combined with the order in which they were pressed, can be used as a "password" for the application.

The program fragment below illustrates the technique. Note that standard Basic I/O may still be used! Non-terminating softkeys and other IDS features are discussed in the HP 300 Display Systems Application Guide (31000-90008).

```
 10  INTEGER File'id, Key'number
 20  !
 30  ICALL FOFILEID(-5),File'id                          ! File ID number of '*
STD
 40  !
 50  Loop:       PRINT "Enter password:";                ! Prompt for password
 60              LINPUT A$                               ! This input is not used
 61  !
 70  Get'key:    ICALL TMKNEXT (File'id, Key'number)     ! Get next key pressed
 80              IF Key'number = 0 THEN GOTO Loop        ! Go again
 90              PRINT "key"; Key'number; "was pressed"
100              GOTO Get'key
110  END
```

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Contributed Library Corner

HP 3000: How to List Your Product in the INFOBASE

by Wayne Holt
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Beginning with Release 04 of the Contributed Library, an INFOBASE of software has been distributed on magnetic tape. This data base contains abstracts of all free software in the Library. Many people are not aware that it also includes software that is for sale (Clearing House).

This listing service is provided at no cost to the advertiser. After all, the membership of our group is as anxious to find Vendors of HP 3000 software products as the Vendor is to find the User. All fee-paid software has a special category code (30) in the INFOBASE. It is easy for a User in need of a particular type of software to specify the appropriate classification code plus Category 30 when running the ABSTRACT program to obtain a list of all vendors of that type of product. The abstracts can contain up to 250 characters of "advertising."

The only problem with this scheme is that it is only effective if the Vendors use the service. That, of course, is the reason for this article - Vendors of HP Software, take note - we want your listing!

Here are the instructions for obtaining a listing in the INFOBASE. On Company letterhead, provide the following information:

1. Program or Package name. (8 characters)
2. One line description of the Package or Program. (40 characters)
3. Abstract of Program or Package. (250 characters)
4. Any special considerations, i.e., language, series type, etc.
5. Authorization to include the listing in the INFOBASE.

Some additional points should be considered. The Program or Package name must not duplicate *ANY* name already in the INFOBASE (sorry, first come, first served). The 250 characters (not words!) are split into 5 lines of 50 characters each. We will enter it just the way you submit it, so hyphenate and punctuate carefully. Otherwise, it may look a bit strange. Send the letter to the

Executive Director
HP General Systems Users Group
Suite 414, Empire Towers
7300 Ritchie Highway
Glen Burnie, Maryland 21061

The listing will appear in the next release of the Library. You will be contacted once a year thereafter concerning renewing the listing. This will prevent "deadwood" listings from building up in INFOBASE.

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Establishing The HP 300 Contributed Library

by Mary Griffin
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Work is now underway to establish a GSD Users Group Contributed Program Library for the HP 300. To help get the library started we solicit your contributed programs (on a flexible disc); we'll have them put on file, and return to you a flexible disc that has your program plus all other contributed programs that have been received. There will be no charge for the HP 300 Contributed Library until September 1 - but you can't get a copy unless you contribute a program! Send it to Rella M. Hines, Executive Director, HP General Systems Users Group, Suite 414, Empire Towers, 7300 Ritchie Highway, Glen Burnie, MD 21061.

The Contributed Program Library for the HP 3000 has been very successful and a valuable benefit of the General Systems Users Group membership - let's get the HP 300 version going!

The Clearing House

Equipment For Sale

10 HP 2640B CRT Terminals
including 4KB Memory Module
128 character set
Display enhancements
Line drawing set

These terminals all qualify for HP Maintenance.

Please contact: Bob Scavullo
Noesis Computing Company
615 Third Street
San Francisco, CA 94107
(415) 495-7440

• • •

3 HP 2645A CRT Terminals
including 128 character set
Display enhancements
Line drawing set

1 7925S 120 MB Disk Drive

1 30411B Field Installed Memory Expansion Kit for Series II Model 6, includes one 64KB Memory Board

3 30008A 64KB Memory Modules

All the above equipment qualifies for HP Maintenance.

Please contact: Hal Cumming
The Hunger Project
1735 Franklin Street
San Francisco, CA 94109
(415) 775-8100

• • •

Special Project

IMAGE Database Schema Survey

by Editor

According to John Page (GSD Lab.) the Database Management Lab. at GSD has need for some data relating to the way users are designing IMAGE databases. Certain design decisions in future products will be needed to incorporate user data, such as the following:

a) How many datasets in a typical database?
b) How big are the datasets?
c) What is the record length distribution?
d) Which are the most popular datatypes?
.
.
etc.

If you wish to participate in this effort, send a mag tape with your schemas stored on it. GSD will then analyze all the schemas received and compile the statistics needed. Here's what to do:

a) Make a :STORE tape containing all your schemas in source form. Any density will do (1600 preferred) and you can use any account/group/creator since the lab. will use the RESTORE program to retrieve the files.

b) Mail the tape to:
Mike Huey Bldg. 48 North
Hewlett-Packard Company
General Systems Division
19447 Pruneridge Avenue
Cupertino, California 95014

Send only schemas for databases that are actually in operational use, since experimental and test databases are often unrealistically small and this would pollute the dataset size statistics.

If you are interested in the results, make a note on the tape and if there is sufficient interest, they will be published in the Users Group Journal.

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