memory as temporary store, such as for image rotation, this is intolerable and we prefer to talk directly to the device. Such mapping is dangerous, as it allows a user program to take over the whole machine because mapping registers and mode register (processor status) are themselves available for modification. But a privileged operation is required before the mapping is useable. In one case we have used this feature to run a stand-alone program from an image on disc file.

CONCLUSION

We have had good service from the two operating systems RT-11 and RSX-11M. To be able to control a very mixed collection of peripherals from Fortran programs which are largely transportable from the CYBER 76 is ideal in our environment. It is easy to find flaws and bugs in both systems and their support programs. These are gradually fixed by DEC, and in the meantime one learns to program around the problems. Compared to large machine software there is a certain lack of polish, which is probably not helped by the proliferation of different operating systems and compilers for the PDP-11. Some of these are DOS (now defunct), CAPS11, MUMPS11, RT-11, RSTS, RSX-11M (and D) and IAS. There are also two quite different Fortran compilers available under RSX-11M. In addition to minor software problems our hardware has in the past given us a lot of trouble, though for a year it has been reasonably reliable. May this continue.

END

NINE MONTHS OF LABOUR AT SAIL

A brief introduction to the Stanford Artificial Intelligence Laboratory

P. W. Milne

Database Systems Group
DCR Canberra

"To Stanford University's Artificial Intelligence Laboratory, in the hills behind the campus, to visit a professor of computer science. The books on his shelves include **101 things to make with human skin** *and* **Learn counterfeiting at home.** *A notice proclaims: 'When in charge, ponder. When in trouble, delegate. When in doubt, mumble.' There is also a THINK notice, upside down."*

- Silicon Valley Diary, The Times

The A.I. lab. is housed in the D.C. Power building (nothing to do with electricity), a semi-annular wooden barn-like structure atop a hill on Stanford land behind the campus. A bicycle ramp runs up the steps allowing one to ride right to the front entrance, from whence, on a clear day, you may see San Francisco's city skyline to the north and the mountains across the bay to the east. The building is in an advanced state of decay and a move to campus later this year, though resisted by many of the lab's "hackers", seems inevitable.

To the Australian visitor who arrived toward the end of the Californian summer, the dried grass and gum trees surrounding the lab. seemed reminiscent of landscapes back home - missing were the flies and sheep. Gum trees grow tall and straight in California, presumably because they thrive on the climate and the lack of natural enemies.

Lab. residents consist of A.I. hackers, music hackers (unpopular with A.I. hackers because they use lots of machine time), robots, and various animals (e.g., Marathon the SAIL cat, a Frisbee fetching dog etc.). Facilities include the Prancing Pony (a computer controlled food vending machine), a Pepsi machine stocked with Coke and Dr. Pepper, a piano, and a sauna. A skateboard was available for intra-lab. travel.

Because of the lab's remoteness from food sources and the unusual working hours of its inmates, a refrigerated food vending machine was rented. This arrangement proved to be less than successful as not everyone liked the food the vending machine company stocked it with; often the food was stale or had run out. Having insufficient or inappropriate change to operate the machine was also a problem.

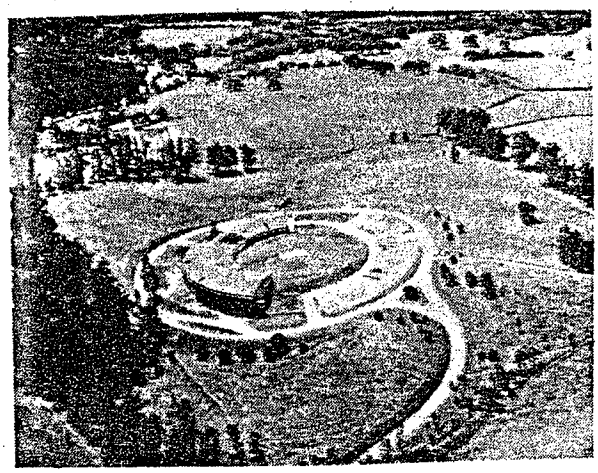
The lab. purchased the machine and now stocks it with gourmet food from various delicatessens, Mexican food, natural yogurt, and three brands of beer. Thus the Prancing Pony was born.

To make a purchase you press a button to bring your selection behind the computer controlled door. On a nearby Teletype you charge the purchase to your account and the computer opens the door. A microwave oven is used for heating food.

A "gambler mode" is available for those who wish to live dangerously; the Pony will flip you double or nothing for the cost of your purchase. It is supposed to play a fair game. The musicians use this option significantly more than others. Pony accounts are generated by the computer each month.

Before it sells you beer the Pony checks its records for your age; no one under 21 will be sold beer.

The lab. has the following computers: PDP-6, KA-10, KL-10. These machines share 2 million words of memory - this timesharing system NEVER swaps! A few years back the lab. designed a fast successor to the KI-10 (called the SUPERFOONLY - adverb from FOO). DEC "bought" the design and turned it into the KL-10 and SAIL got its KL-10 as payment. DEC gave the KA-10 to the Boston Pops Orchestra for music research (and, presumably a tax write-off for DEC). Well the BPO apparently were not quite sure what to do with it, so it finished up in the hands of the Computer Music Group at SAIL. All the computers run 7 days a week, 24 hours a day and are maintained by SAIL with remarkable success.



Stanford Artificial Intelligence Laboratory.

The system is totally interactive oriented. No card reader has ever been connected to it. There are no printing terminals in the lab. as the editor, displays, and system, are so good that you can really treat your files as if they were books on your shelf. It is claimed that the system has never lost a file and this is quite likely true.

Displays consist of keyboards (they use an "extended" ASCII) and TV monitors driven off a video disc. Every terminal is thus a graphics display as well - you can also watch what various robot's TV camera eyes are "seeing", or watch regular TV programs (that is if you don't mind a green picture). Displays may be mapped by control sequences to view other "channels" on the disc. This is handy for discussing bugs ..."have a look at my channel and tell me what's going on". If you want you can create a "ring" of channels and switch round the ring using control sequences. This is useful for doing things like editing a source file on one channel then switching to the next channel on your ring which is logged into whatever is going to make use of your just edited source.

There are audio channels that you can also map to your display's speaker using control sequences. Telephone paging can be "ORed" with your selection of Bay area FM radio stations or the Computer Music Group's synthesiser. If computer mail arrives for you, or output you have spooled is starting or finishing printing, the machine bleeps you.

To log-in you grab an available terminal, which will be displaying the status of all jobs currently running on the system. You can tell that a terminal is free by the "TAKE ME I'M YOURS" message it will be submissively displaying. One can create a setup file which does various things for you at log-in, e.g., select your favourite radio station (e.g., KARA in Santa Clara - they play 50's oldies), or print a fortune cookie or porno message etc. You are then offered the chance to read NEW mail which has arrived since your last log-in, then follow any general notices. These may include birthday greetings, T.G.I.F., IT'S PAYDAY!!! etc.

Once logged in one might run HOT to watch on a split screen the latest N.Y. Times and AP wire stories being entered. Alternatively, one could run NS, the news service program and scan the last few days worth of wire stories. There is never much about Australia though. Actually, you can specify categories of stories, reviews etc. you are interested in by building up an interests profile and thus create your own customised newspaper. You can even arrange to be bleeped when an incoming story matches one of your interests. It is interesting to watch a "hot" story developing on the wire service e.g., when the mayor of San Francisco was gunned down.

Nearly all the system documentation is easily accessible on-line, as well as several books: Wuthering Heights, Grimms' Fairy Tales, a guide to good eating places (called YUMYUM) made up of lab. peoples' comments, a recipe book (again made up of contributions from lab. people and from the news service), and bulletin boards of various sorts e.g., gripes, general, social. There is a computerized bookmark feature so that the system remembers just where you were last looking in a file.

SAIL does have a line printer, but it is hardly ever used. To print something one uses the XGP Xerographic printer and one of several excellent typesetting languages. The XGP produces fast cheap multi-font output of excellent quality. Beautiful letters

could be done on it: the Stanford University letterhead being just one of many fonts available.

Other interesting features of the SAIL computer system include: E their excellent video editor, the computer mail system, TEX the mathematical typesetting program developed by Don Knuth for producing his books and now adopted by the American Maths Soc., and ARPANET - to which SAIL is connected thus allowing access to computers all over the US.

In summary then, the highlights of the visit were (in order):-

- the beauty of Yosemite
- seeing Jane Fonda
- talking to Tom Lehrer
- learning how to correctly pronounce "Knuth" from the ultimate authority
- being told the origin of the name of "Canberra" by Don Knuth
- surviving the Tidal Wave at Great America.

Note: Peter Milne of DCR Canberra recently returned from a visit to SAIL where he worked with David Luckham's Program Verification Group on the development of a Pascal program verifier.

END

FACOM M-190 IMPRESSIONS

P.P. Hanlon

FACOM Support Group
DCR, Canberra

There have been many enquiries concerning performance of the FACOM M-190. In this informal article, our experiences with the machine are related in order to keep *Newsletter* readers abreast of developments in this area. Installed equipment consists of an M-190 CPU with 4 megabytes of storage, a dozen demountable disc spindles each of 200 megabyte capacity, four nine-track tape drives operating at 6250/1600 bits per inch, a single 1600/800 tape drive and fast line printer and card reader. Three interactive terminals are connected for use by operators and for developmental staff. A communication controller is being installed which will increase this capacity to sixteen ports.

The equipment was installed in late January. It occupies about 100 sq. metres of floor space, is air-cooled and consumes approximately 70 kW of electricity. In the first few days of operation this increase in site electrical consumption caused a defective site circuit breaker to fail and the response of the machine to unscheduled power-down was tested. No faults were induced and normal service was quickly resumed after power restoration. In the subsequent months, hardware failures have been virtually non-existent. It is also fair to comment that our usage of mass storage has been light, and consequently appraisal of this hardware is regarded as preliminary. The tape drives have been used to a moderate extent within the M-190 system itself and also for information interchange with the Cyber 76. Our experience is completely favourable and two aspects merit further comment. Firstly 6250 BPI recording has been uneventful, and its capacity improvements are particularly useful in routine back-up of disc storage. Secondly self-loading tape mounting is extremely reliable and no dexterous expertise is required for this operation. The overall impression of hardware reliability is excellent.

The machine operates on an enhanced IBM-370 instruction set. These FACOM enhancements are primarily concerned with privileged instructions and with paging hardware, but the applications programmer at assembler level notices minor improvements such as ability to load words at byte rather than word boundaries. As expected in a byte-oriented machine, character manipulation is strongly catered for in the instruction set. In this area the M-190 is particularly competitive with the Cyber 76 in terms of execution time, and vastly superior in terms of the simplicity of instruction sequence necessary to perform the character operation.

At the FORTRAN level, one is struck by a lack of facilities to which one has become accustomed on the CSIRONET Cyber 76. Into this category fall library functions such as AND, OR etc., other extended features of CDC FORTRAN, and finally the word size itself, which tends to make alphanumeric comparisons more laborious to program. A basic set of FORTRAN-callable routines which exploits the sophisticated set of hardware instructions for character manipulation could be simply produced, and would overcome most restrictions of the language. On the other hand, the 8-bit byte provides inherent upper/lower case facilities and one would expect to be able to develop text-editing applications without difficulties associated with this type of application on the Cyber 76.

A strong point in favour of this machine is its ability to execute applications produced for IBM target machines - a very wide range of university and research institution software is available at a low