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1st set of dividers

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Documentation, eg: (from [400,444])
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Mathematical Reasoning Group

[400,405]	Alan Bundy	1500 blocks	
[400,421]	Programs	2000 blocks	(infin)
[400,422]	Richard O'Keefe	1500 blocks	
[400,431]	Kay Herries	1000 blocks	
[400,434]	Chris Mellish	1500 blocks	
[400,440]	Jane Hesketh	1000 blocks	
[400,441]	Lawrence Byrd	1500 blocks	
[400,442]		0 blocks	(infin)
[400,443]	Bill Clocksin/Rob Milne	1000 blocks	
[400,444]	Library	5000 blocks	
[400,445]	Visitor	1000 blocks	
[400,446]		1000 blocks	
[400,3720]	Mary-Ansela	1000 blocks	
[400,4320]	Impress	1000 blocks	
[400,4321]	Leon Sterling	1500 blocks	
[400,4322]	Bernard Silver	1500 blocks	
[400,4323]	Press	1000 blocks	
[400,4324]	Lincoln Wallen	1000 blocks	
[400,4325]	Luis Jenkins	2500 blocks	
[400,4326]	Dave Plummer	1000 blocks	
[400,4327]	Maarten van Sommeren	1000 blocks	
[401,401]	Visitor	1000 blocks	
[401,402]	Visitor2	1000 blocks	

Useful Telephone numbers (mainly DEC10 oriented)

Machine room	70-2904
ERCC Comms	70-2737
Ansaphone	9-668 2547
Keith Farvis	70-2661
Dave Mercer/John Payne	70-2627
Jeff Phillips/Roger Hare	70-2619
Janet Dalitz	70-2925
Charles Mackinder	70-2926
Callum Young	70-2617
Frank Barratt	70-2604
HPS terminal room	6445
HPS node	6443
Lawrence Byrd	6831
FH terminal room	2298
Robert Rae	2555
CS terminal room	70-2790
KB terminal room	70-2801
CAAD	4566

DSKA:THINGS[400,441,INFO]

A list of documentation etc that is available at HPS that we find essential.
==========

(NB: It is important that all the followins be as up to date as possible)

Dictionary
Wall hansinss
ASCII character codes (in decimal, octal, binary and ascii)
Prolos evaluable predicate list
Useful Telephone numbers

TOPS10 Commands manual
TOPS10 Utilities manual
TOPS10 Monitor Calls manual
LINK10 manual
MACRO manual
TECO manual
System reference manual

Complete Edinbursh Installation manual
Network documentation for SRCNET, UC-LONDON, ARPANET

Prolos manuals
POP2 book and current suide
LISP manuals (Rutsers etc)

FINE manual
TEC124 manual
ECCE manual

SCRIBE manuals
Listins of all Scribe database files (.DEV,.MAK,.LIB,.TFO,.REF)

BLISS 10 manual
SIMULA manuals
IMP manuals
MIC documentation
COJOB documentation
FMS documentation
SUBFIL documentation
TELL documentation
BACKUP documentation
MAKLIB documentation
DDT documentation
File Daemon documentation

CIFER manual

READ.ME[400,444] Updated: 1 July 81

[400,444] is the Mecho/Press project library area. This file provides pointers to other files for more information on the various facilities it provides.

If you intend to use this library, and you are not already known to us, then please send a message to [400,441] (Lawrence Byrd) so that you can be put on the mailing list for changes etc.

EXE.DOC[400,444]	describes all the programs available.
MIC.DOC[400,444]	describes all the mic macros available.
PATHS.HLP[400,444]	describes how to initialise path definitions.
JUNK.DOC[400,444]	describes a few other useful files.
MACROS.DOC[400,444,TEC] and EI.DOC[400,444,TEC]	describe Lawrence's macros etc for the TEC124 editor (a better version of teco). All the "ei" macros are kept in the directory [400,444,TEC].
PROLOG.NEW[400,444]	describes all the new features present in the latest version of DEC10 Prolog held in [400,444].
UTIL.HLP[400,444,UTIL]	lists all the Prolog utilities available in the program UTIL. The sources of all the UTIL modules are kept in the directory [400,444,UTIL].
MAKSYS[400,444]	provides a simple program database for Mecho/Press project Prolog systems; which will allow them to be automatically reloaded when the Prolog system is changed.

This file describes all the EXE programs that live in the Mecho library area ([400,444]). Given Magic Bits and the appropriate SYS: path definition these will all appear as commands to you. ALL the documentation refered to below, and that includes this file itself, can be found in the Hope Park Square terminal room (so don't print your own copies unless really necessary). Some of these programs are just links to other (often system) programs with perhaps some CCL entry preparation thrown in. The MACRO sources for these are kept in [400,444,MAC]. These links are usually only a page long and are easy to copy for links to other things if needed.

General utilities

CD <place>
: Change directory to some path.
This is now a proper monitor command with the exe file in sys:
The documentation is in HLP: (and DOC:), just type "help cd".

CAN
: This cleans up your area by deleting various files for you.
It currently tries to delete: *.BAK[-], PROLOG.LOG[,],
*.FIN[,] and *.BAK[,]. Ie it deletes the bak files from your
current path and cleans up your home directory as well.

EDX
: This is Lawrence's POP2 editor + goodies. One day it will be a nice version of DOPE, but currently it is an undocumented collection of rubbish.

F <file>
: Run FINE on a file. F has the nice features of adding a period to the file name if needed, and remembering the last file F'ed so that "F" without a file name uses that last file.

QQ
: Run QUOLST (quick convenience)

SETPATH
: Set up path definitions. This calls PATH and tells it to use "paths.ccl" to define path logical names. Ie it simulates the action that normally occurs with our login switches (see PATHS.HLP[400,444] for details). It can be used at any time to update your path definitions, for example: if you have changed your paths.ccl. Notice that it will use the first "paths.ccl" it finds, which may not be your own one if you have CD'd to some other place. It is usually a good idea to CD home before using SETPATH. Alternatively it is sometimes useful to CD to someone else's directory and use SETPATH if you want to set yourself up with their standard paths.
Note that SETPATH is always incremental - unless redefined, old paths won't go away.

T
: Run TEC124 (quick convenience).
See MACROS.DOC[400,444,TEC] if you are a serious tec124 user.

TALK
: A program which allows cross talk between several users. This is more convenient than doing SENDs if you have a lot to say - especially if there are more than two people involved. Just type "TALK" - it is self documenting. All users currently running the program will share a conversation: anything anybody types appears on all the other terminals. It is often useful to do ".send 66 type 'run mec:talk' " at people who

you are SENDing with if you would prefer TALK but they don't know about it (66 is arbitrary in this example - substitute their actual tty number).

XREF — Run PLL:XREF (quick convenience).
This is the Prolog Cross Referencer. Documentation is in PLL:XREF.HLP.

Language Systems

MUTIL — Minimal UTIL. This is the Prolog system plus a subset of the Mecho project utilities package. It doesn't include: READIN, MULTIL, LONG and TIDY.

UTIL — Utilities package. This is the Prolog system plus all of the Mecho project utilities package, which includes all sorts of things - including, notably, the rational arithmetic package (LONG). Documentation is somewhat lacking but the file UTIL.HLP lists all of the procedures both by module and alphabetically. The directory [400,444,UTIL] contains all the source files which you can look at. Most routines are only a couple of lines long anyway and are easy to understand.

PROLOG — The current version of DEC10 Prolog. This is kept in [400,444] to give us control of when it changes.

PLCOMP — This is the overlay for the Prolog compiler. You NEVER need to run it directly.

Mecho/Press project systems

INTERP — Semantic Interpreter.
(Converts parse-trees to assertions).

MECHO — Problem Solver.
(Solves mechanics problems).

PRESS — Press Algebra System.
(Solves equations etc).

ROB — Deterministic Parser.
(Parses natural language sentences).

This file describes all the MIC macros that live in the Mecho library area ([400,444]). Providing [400,444] in in your library search list all these can just be called as "/<name>" in the usual way.

/ALL — Extends search list by adding DSKC: and DSKE:. Useful when trying to access files from areas not on your normal disk (ie DSKA:). "/all none" will contract the search list by removing these devices.

/C <command> — Spawn coJob to perform command. A coJob is set up, with a little initialisation (probably bussy at the moment) and then the command is executed. The command can be anything but if it is complicated then you should surround it with angle brackets ("<" and ">") otherwise mic will not pass it as a single argument to /C. A log will be made in COJOB.LOG

/E <file> — Run FINE on the file. This has been superceded by the F program (see EXE.DOC[400,444]) but may be useful for PPNs without Magic Bits.

/EDIT — Run Aaron Sloman's version of the POP2 editor.

/F — Run Alan Mycroft's FRIEND program. This lists the users of the system in a pretty way excluding system jobs and other junk that SY tends to show. You can also add a line in your switch.ini file limiting what PPNs are shown (see SWITCH.INI [400,441] for an example).

/LIMIT <n> — Set your virtual memory limit to nK words. It is unclear whether this is a useful thing to do on the new machine (KL). If no argument is given (ie "/limit") then your current limit is just reported.

/NEW — Do a DIR listing of all your new files. This runs DIR so that it shows all the files in your area, or any SFD in your area, which are on DSKA: (only) and have been created since yesterday.

/P — Call PATH so that it lists all your current path (logical name) definitions. (See also PATHS.HLP[400,444] for more details on initialising these).

/PLIB — Produce an alphabetical listing of the Mecho Predicate Library This uses PLIB.FL as a list of Predicate Library files to be searched. If you have your own version this will be used instead of the standard one in PLIB:. The result will appear in the file PLIB in your current path.

/S <file> — Spawn a coJob to SCRIBE a file. A coJob is set up and initialised and then SCRIBE is run on the file specified. Note that the initialisation involves moving SCRA: to the front of your search list so that any new files will set created on SCRA: and not DSKA: (however if a file, the .AUX or .MEM for example, already exists on DSKA: then the new version will end up on DSKA: as well - overwriting the old). A .LOG file will be produced and its name is based on the file name given to /S

/SCRA <file> Copy the file from DSKA: to SCRA: and delete the version on DSKA:. A file specification with wild cards can also be used (but not a list).

/SE <file> Short FINE edit. This calls FINE on a file but restricts the window size to 4 lines before reading in the file. You may find this useful for very quick edits where you don't want the whole screen set up (especially if you intend to search into the file to do the fix, which would redisplay the whole screen again).

/SORT <file> Sort a file line by line into alphabetical order. This calls CSORT (see EIM documentation) with appropriate switches.
It is currently rather restricted: the file should not have an extension, the output file then has extension .SRT, and only the first 10 characters are considered for the sort. I may think about improving this if people want something better.

/SPACE Call DIR so that it just shows the (allocated) space used by files in your UFD, and contained SFDs, on DSKA:.
Also: "/SPACE ppp" shows the space for some other programmer number in your project, and "/SPACE ppp,dskc:" uses the specified device (DSKC: in example) instead of DSKA:. Thus "/SPACE ,all:" can be used to check the space occupied by your files on all devices.

Other spurious files in [400,444]

ECCE.CMD — Initialisation for ECCE. Defines the ECCE macros as follows:

```
x = Show window around current line (6 up, 6 down)
y = Show big window below current line (21 down)
z = Show last 6 lines of file and do a GO
```

Windows are shown with the current line displayed as "**HERE**" (this string should not occur in the file!). The initialisation also switches on %f (full verification) and prints the first line of the file (which you will see before the edit starts).

SAVE.CCL — For BACKUP: assuming your tape has been mounted as MT: then "@save" should be used as your first command to backup to prepare the tape for saving stuff. (Interchange mode is set and the tape is wound to EOT).

STORE.CCL — For BACKUP: like save.ccl - "@restore" will prepare the tape for restoring (tape is rewound to beginning).

DSKA:MACROS.DOC[400,444,TEC]

Documentation for Lawrence's TEC124 macros

TEC124 is a very much better version of the editor TECO. Information on it can be found as follows:

First read "TECO Programmer's Reference Manual" (Digital)
This describes the original version of TECO.

Then look at DOC:TEC124.RND (needs runoff'ing)
This describes all the changes between the old TECO and TEC124.

There is also a help file to be got by typing "HELP TEC124".

The only problem with using TEC124 (or TECO) as an editor is its curious notion of "pages". This can be got over (and any commands to do with pages ored), by always loading the complete file into the buffer. There is a macro provided which does this (MA) and this should be used at the beginning of every edit.

BEGIN

This file explains my system of TEC124 macros.
You can obtain access to my macros by taking a copy of the file DSKA:TECO.INI[400,441] and placing it in your login directory.
This will produce the following effects whenever you run TEC124:

Various Q registers will be initialised with macros (see below).
Your default area for EI (file) macros will become [400,444,TEC].
The ES flag is set so that after searches the line is printed with a "^" marking the pointer.
A message "[TECO.INI loaded]" will be printed.

macros available fall into two groups:

1) The Q register macros which are run by calling the initialised registers. These are described below and a list can be printed out within TEC124 by calling Q register "H" (MH).

2) The EI macros which are stored in files in [400,444,TEC] and are run by typing "ei <name>$$". A list of all those currently available can be printed by typing "ei help$$", and this also describes the function of each of them. The file which is typed in this case can be found in the file EI.DOC[400,444,TEC].

Q register Macros

(Miscellaneous)

MH - Help. Prints list of macros.
MA - Append. Appends all the rest of the file into the buffer.

It also makes sure that form feeds are retained.

ME - End of line. Moves pointer to the end of the current line.

MP - Print. Types out the current line with a "^" to mark the pointer.

(Block Moves)

Q registers 1, 2 and 3 are used for this. Q1 and Q2 are used to mark a block of text in the buffer (Q1 < Q2). (Note: ".U1" places the value of ".", which is the current position, into Q1. This is the number of characters from the beginning, so watch out if you insert/delete more text!). Q3 is used to store picked up text.

MG - Grab. Place the text marked by Q1 and Q2 into Q3. This overwrites the contents of Q3 but leaves the text in the buffer.

MS - Suck. Do a Grab but then delete the text from the buffer as well.

MK - Kollect. Like a Suck except that Q3 is not overwritten, rather the text ends up at the end of what was there already.

MJ - Jerk. Like a Kollect except that the text ends up at the front of what was already in Q3.

, - Drop. Drop the contents of Q3 into the buffer at the current position. The pointer ends up at the end of this text. The contents of Q3 are not affected.

ML - Mark. Set Q1 and Q2 so that they mark the current line. The line is then printed and the pointer is left at the beginning of the line.

(Command Editing)

Q registers 8, 9 and 0 are used for this. Q8 and Q9 are used to store the original pointer position and end of buffer. Q0 is used to store the command being edited. The idea is that you can place your last command into Q0 using *0, and then use the following macros to place it in the buffer so you can edit it, and then put it back into Q0 so it can be executed (M0). The command (Q0) is placed right at the end of the buffer, however the contents of the buffer are still there! Make sure you don't accidently mangle it!

MI - Into command edit. Remember the current position, then go to the end of the buffer and drop Q0. Print what is dropped and leave the pointer at the beginning of this (This position, which was the old end of buffer, is marked by Q9 which you can use to get you back to the top of the command (Q9J))

MM - Into eMpty command edit. Like MI except that Q0 is emptied first.

M0 - Out of command edit. Place the command (Q9,Z) back into Q0 and delete it from the end of the buffer. Then return to the position where you came from originally.

MT - Type. Type out the command and move the pointer back to the top of the command (Q9J).

(Stack Popping)

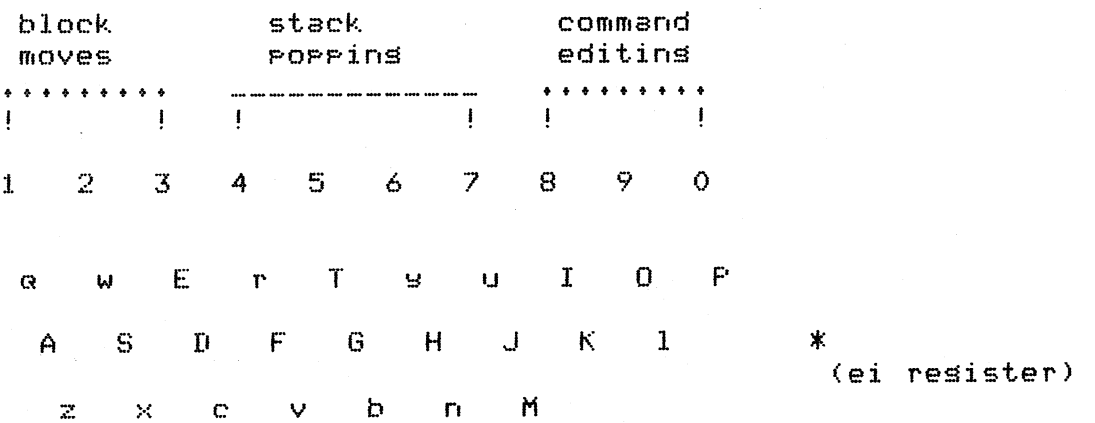
Q registers 4, 5, 6 and 7 are used for this. They will all contain text. Q4 is a prefix string, Q5 is the stack, Q6 and Q7 are destinations which are updated when the stack is popped. The stack in Q5 is thought of in terms of lines - each line is a single stack entry.

MF - Pop stack. The stack in Q5 is popped. Q6 is overwritten with the line from the top of the stack, and Q7 is overwritten

with a a string constructed by tacking the prefix (Q4) onto the front of Q6 and an <escape> onto the end. MF will also return a value: True (-1) if the pop was successful, and False (0) if there was nothing on the stack.

The intended purpose of this macro is to allow one to go through a list of files (the filenames being placed one per line in Q5) by repeatedly calling MF and then M7 until MF fails. (Note that "MF;" will exit iterations when the stack runs out). The prefix in Q4 should be the TECO I/O command you want performed (it is initially "ER"). Since an <escape> is tacked onto the end of Q7, its text ends up as a macro which performs the operation on the file! Q6 can be used if you just want the top line of the stack (you are not munching files) or if you want to print the filename out (Q6=). There are some EI macros which use MF ("ei search$$", "ei roll$$"); look at these for hints.

Well - thats the end of that! You will notice that this has used up a lot of Q registers! But its not that bad: Q1 -> Q0 can be used for other things when you are not using the particular macros which use them, and you can always rewrite Q registers you are not actually using. (But don't expect EI macros to work if you do this! However "ei teco$$" can be used to reinitialise the Q resistes if needed). Here is a quick visual guide to what's used up. Upper case means initialised, lower case means free.



EI macros

Type "ei help$$" to get a list of these. Note that EI macros will often assume the presence of the Q register macros described above. (See the file EI.DOC[400,444,TEC]).

END

Buss, sussestions and monies to:

Lawrence Byrd
Dept. of Artificial Intellisence
Hope Park Square
Edinburgh

ERCC DEC10: [400,441]

Lawrence's TEC124 macro library.

NB: Many of these macros are very special purpose. This is because I knock them together as I need them, and have no time to waste generalising and cleaning them up.

It is thus also the case that they are unlikely to be particularly robust. While none of them cause me any problems I can offer no guarantees as to what they will do.

ei aj$$ — Display a file a page at a time. Beeps (^G) are sent to indicate the current state - one beep means another page to come, three beeps means nothing left. Type <LF> for the next page or <ESC> to abort/finish. Anything else (eg space) will redo the beeps and it is usually a good idea to do this before each page (due to buffering three beeps at the end of the previous page can sound like one). At the end of the macro (after <ESC> at any stage) the buffer will be empty. I use this for printing single sheet letters etc on the AJ printer (hence the name). (Destroys buffer).

ei bibk$$ — Collect (using MK) the SCRIBE bibliography entry surrounding the pointer. This is currently very simplistic and assumes that there are no internal @ symbols. This has turned out to be true most of the time I have used it.

ei blat$$ — Go through file offering to delete lines. Type a <SPACE> to keep the line displayed or <ESC> to stop. Anything else will delete the line. The line displaying currently assumes a CIFER terminal.

ei change$$ — Program for producing command files for use with the MAGtape program CHANGE. Follow the instructions. (Destroys buffer).

ei date$$ — Insert todays date into the buffer at the current position. The month is inserted by name (eg "January").

ei depage$$ — Depage a buffer containing form feeds into lots of little files - PAGE1, PAGE2 etc. (Destroys buffer).

**ei eb$$** — Ask the user for a file name (using ei string$) and EB it. The old contents of the buffer are flushed. The file name provided is remembered in Q6 and the EB command itself is remembered in Q7. This macro was written to provide an easy way of setting up Q6 with the current file name so that things like ei fine$ could be used easily. (Destroys buffer)

ei f$$ — Do an EX and Jump to the FINE editor. (Exits tec124)

ei fine$$ — Write out the buffer and Jump to the FINE editor with the file whose name is in Q6. (This is done by setting up a TMP

file for FINE and using CCL entry). Q6 can be set up either by hand, or from stack popping, or by using "ei eb$" (above). (Exits tec124)

ei fls$$ — Convert a file produced by "dir /i" into a CCL file suitable for use by PRINT. Prompts for the file name (using ei eb$ and thus ei string$), does the transformation and exits with EX. Note that the path parts etc are stripped out (by ei nice$). (Exits tec124)

ei help$$ — Print this documentation!

ei lc$$ — Lower case from pointer to end of buffer.

ei lines$$ — Give the number of lines in the buffer (has buss/funnies - I keep meaning to rewrite this...)

ei nice$$ — Clean up a buffer, which is assumed to contain a file produced by a "dir /i". All directory references are removed and the file is lower cased (ei lc$). The pointer is left at the top.

ei prolog$$ — The latest version of TECO Prolog. The current version is compatible, in some respects, with Prolog-10 version 3. (Destroys buffer)

ei qr$$ — Query Replace. Prompts for old and new strings and does a FINE style Query Replace through the buffer(from pointer). Terminate the strings with <ESC>. ^G at any stage will abort. Type "?" for query options.

ei roll$$ — Start rolling through a list of files to be edited. Q5 should contain a list of filenames (one per line). The Q register N is loaded with a macro which will,write out the last file and (fully) read in the next one using EB. MN therefore rolls you through the files. ei roll$$ will have rolled in the first one to start with. (Destroys buffer).

ei rthru$$ — Apply Q0 to all the files in Q5 (one file name per line). This is like ei thru$ except that files are ER'd, M0 is performed, and the buffer flushed. Ie Nothing is written back to the files.

ei search$$ — Search through a list of files for some string. ei string$ is used to read a string from you and this is searched for in the list of files in Q5. Files are ER'd and searched until the string is found. Recalling starts with the next file. (Destroys buffer).

ei stamp$$ — Time stamp the buffer. If the first ten lines of the buffer contains the string "Updated:" (either case), then the text following this on that line will be replaced by a time stamp for the current time and day (using ei date$).

ei string$$ — Prompts for a string, reads it in from the terminal and places it in Q0. This macro handles <RUBOUT> and ^H (both of which delete the last character typed) but no other deletion handling. Type <ESC> to finish the string or ^G to blow the macro up (with a spurious error). ^G will also prevent this macro from returning to any macro which called it (eg such as

some of the other ones documented here).

ei subit$$ — Prompts for a file name (using ei eb$ and thus ei string$), edits the file by doing ei nice$ and adding the file name to the top of the file and then jumps to FINE with the file using ei fine$. The intention here is that the monitor command "dir /i xxx.sub=" can be used to start building a .SUB file, this macro cleans it up a bit and leaves you in FINE to finish it off. I find myself doing this quite a lot. (Exits tec124)

ei swini$$ — Distribute the "General items" section of SWITCH.INI[400,441] to the other members of the Mecho project. (Destroys buffer).

ei tabout$$ — Tabout out the end of a line to the tabstop given as an argument. This macro expects a numeric argument which is taken as a tabstop where tabstops occur every 8 characters. Tabs are inserted at the end of the current line until the end of the line reaches the specified tabstop. For serious use this macro should probably be placed in a Q register (eg: "ep tabout$ [*]x" to move it into QX and then, eg, 6MX to call it).

ei teco$$ — Initialisation of all Lawrence's standard Q register macros. Can be used to re-initialise if necessary.

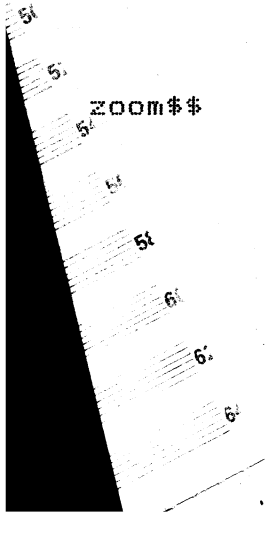
ei thru$$ — Apply the macro in Q0 to all files in the list in Q5 (one file name per line). Files are EB'd and M0 is performed before writing them back out. (see also ei rthru$).

ei tp$$ — Produce SSNAME listing from a full BACKUP directory listing. Buffer should contain a file produced by the "print" BACKUP command. It will be transformed into a 'pretty resume'. (Destroys buffer).

ei uc$$ — Upper case from pointer to end of buffer.

ei use$$ — Use files from some MAS file. This prompts for a name (using ei string$) and looks for a file called <name>.sub. This file is read into Q5 with certain lines truncated/deleted Lines containing ";;" are completely deleted, lines containing just ";" are truncated from just before the ";", and all lines have trailing blanks removed. This allows one to use a .SUB file as both a file for use by SUBFIL, and -using this ";;" convention- as a file listing an interesting sequence of files for editing macros. (I have found that the .SUB file usually lists files you don't want considered while editing and I mark these lines with ";;").

zoom$$ — Type out buffer (from pointer), stop when a character is typed on the terminal - leaving the pointer on the final line shown. (NB It can take about a page before it notices!!)



PATHS.HLP[400,444] Updated: 1 July 81

Add the following line to your switch.ini file to initialise paths on login:

```
login /run:path /runoffset:1 /tmpfil:pth:"@paths.ccl"
```

There is a default paths.ccl file in [400,444] which will get used if you don't have your own (providing you also have a 'login /lib:[400,444]' switch set in switch.ini as well so that it can be found. Note that this lib definition may then get replaced by a definition in paths.ccl etc).

There is a program in [400,444] called "setpat" which will simulate the action of the login switch above at any time during a session. Use this if you have updated your paths.ccl. To make sure it finds the right one (your one) you should probably CD back to your directory before calling setpath.

There is mic macro "/p" in [400,444] which calls path so that it prints out a list of all the paths you currently have defined.

Files you should look at in [400,444] are:

PATHS.HLP	-	this file
PATHS.CCL	-	default initialisation (basic + press.pth)
MECHO.PTH	-	indirect to this for Mecho definitions
PRESS.PTH	-	indirect to this for Press definitions
ALL.PTH	-	indirect to this for both the above

If you don't understand what the hell is going on in these files then either study the documentation for PATH (available in one of the EIM folders in the HPS terminal room, or more generally from user support), or talk to Lawrence ([400,441]).

```
;; PATHS.CCL[400,444]
;;
;;              This is the default paths initialisation for people who
;;              don't have their own paths.ccl file.
;;              see PATHS.HLP[400,444] for how to set this called at login.
;;
lib:/search = [400,444]
sys: = [400,444], dske:[1,5], dske:[1,4]
@press.pth[400,444]                                ; Default is for Press users
```

```
;; MECHO.PTH[400,444]
;;
;;                Standard path definitions for Mecho users
;;
util: = [400,444,util]
mecho: = [400,441,mectop,mecho]
plib: = [400,441,mectop,plib]
plcode: = [400,441,mectop,plcode]
p100: = [400,441,p100]
```

```
;; PRESS.PTH[400,444]
;;
;;                Standard path definitions for Press users
;;
util: = [400,444,util]
press: = [400,421,press]
match: = [400,421,press,match]
arith: = [400,421,press,arith]
extras: = [400,421,press,extras]
impres: = [400,4321,impres]
homos: = [400,4322,homos]
```

```
;; ALL.PTH[400,444]
;;
;;              Standard path definitions for both Press and Mecho users
;;
;                                               Mecho
mecho: = [400,441,mectop,mecho]
plib: = [400,441,mectop,plib]
plcode: = [400,441,mectop,plcode]
p100: = [400,441,p100]
;                                               Press
@press.pth
```

```
; SWITCH.INI[400,441] - Lawrence's initialisations

login /name:"Lawrence" /lib:[400,444] /defprot:005
login /scan /new /mail:names /dskful:pause /pase /lc
login /run:path /runoffset:1 /tmpfil:pth:"@paths.ccl"
login:cojob /lib:[400,444] /defprot:005  /scan /new /notice:never
direct /alloc
print /noheader
friends [*,*]
tell /dispose:delete
                                        ; Here are some example CD entries

cd/protections:(self=005,group=005,others=000)
cd/name:(alan=[400,405])
cd/name:(chris=[400,434])
cd/name:(leon=[400,4321])
cd/name:(bernard=[400,4322])
cd/name:(henry=[4060,4060])
cd/name:(prolog=[400,447,prolog])
cd/name:(pll=[140,143])
cd/name:(pop=[140,141])
   name:(mo=[400,405,mymech,mymofi])
c  name:(co=[400,405,mymech,coast])
cd/name:(tec=[400,444,tec])
cd/name:(mac=[400,444,mac])
tell/group:(lusers=AllofUs+Bowen)

; General Items                                          Updated: 18 May 81
;
;       These entries are shared by all members of the Mecho project
;       Changes will be automatically distributed to your own switch.ini
;       files (overwriting previous section) so don't put stuff in here.
;       If you would like additional entries added talk to Lawrence.

cd/name:(doc=[400,421,doc])
cd/name:(bib=[400,444])

; NB previous cd entries replaced by logical path names (see mec:paths.hlp)

tell/group:(AllofUs=MechoProject+PressProject)
   l/group:(MechoProject=Alan+Chris#M+Lawrence#B+Rob#M+Richard)
t  l/group:(PressProject=Alan+Leon+Bernard+Richard+Lawrence#B)
tell/group:(AI2#Students=[400,445])
tell/group:(Alan#Bundy=[400,405])
tell/group:(Chris#Mellish=[400,434])
tell/group:(Lawrence#Byrd=[400,441])
tell/group:(Rob#Milne=[400,443])
tell/group:(Richard#OKeefe=[400,422])
tell/group:(Leon#Sterling=[400,4321])
tell/group:(Bernard#Silver=[400,4322])
tell/group:(Kay#Herries=[400,431])

tell/group:(Henry#Thompson=Thompson)
tell/group:(David#Warren=Warren)
tell/group:(Fernando#Pereira=Pereira)
tell/group:(Ferndo=Pereira)
tell/group:(Robert#Rae=Rae)
tell/group:(Aaron#Sloman=Sloman)
tell/group:(Jeff#Phillips=Phillips)
```

(slightly out of date)

```
tell/group:(Box=Service#Box)
tell/group:(Hassle=Payne+Mercer+Lawrence#B)
tell/group:(Hackers=Fernando#P+Chris#M+Lawrence#B+Richard+Rob#M+Henry)
tell/group:(HPSUsers=AllofUs+Fernando#P+David+Henry+[750,766])
tell/group:(PrologUsers=AllofUs+Fernando#P+David+Bowen)
```

This file contains information on how to load from scratch various Prolog programs used by the Mecho and Press projects. It allows programs to be automatically reloaded when significant changes occur to the Prolog system or the UTIL library. If you wish to take advantage of this facility please add entries for your own programs along the lines of the current entries. Note that each field must be defined on a separate line with a colon after its name. The followings fields are currently in use:

program:	The normal name of the program
owner:	The person nominally responible for it
tell:	The TELL name of people to be informed of the load
path:	The path to be CD'd to before trying to load
load:	A DEC10 command which will perform the load - this will usually be a call to a MIC file.
note:	A comment (see below)

It is currently important that all the fields be defined and that they occur in the right order. Please be careful about this.

The MIC file should be available in the path and should perform all the necessary work to load the program from a fresh Prolog state and to save the core_image into the suitable place. Note that if your program is normally closed up in a MAS file then the MIC macro should make sure it sets exploded and then closed up again at the end. Most of the MIC files used below follow certain conventions of mine, in particular they make strenous attempts to catch errors, and they react to being given the argument "auto". See me if you would like a similar sort of thing built for your program (they tend to be rather hairy to write).

The following information also contains a note: field which is a comment giving some idea of where the component files are to be found. The terms "open" and "closed" mean available as individual files, and collected up in a MAS file respectively. (Eventually this information could be formalised a bit better...)

M..no and Press project programs
==========

$$start$$

program: UTIL
owner: Lawrence
tell: Lawrence#Byrd
path: [400,441,util]
load: /util auto
note: Always open

program: MUTIL
owner: Lawrence
tell: Lawrence#Byrd+Leon#Sterling
path: [400,441,util]
load: /mutil auto
note: Always open

***rogram:	MECHO
owner:	Lawrence
tell:	MechoProject
path:	[400,441,mectop]
load:	/mecho auto
note:	Usually closed in mecho.mas

program:	ROB
owner:	Rob
tell:	Rob#Milne+Chris#Mellish
path:	[400,443,sram]
load:	/makrob auto
note:	Usually most files closed in rob.mas

program:	PRESS
owner:	Leon
tell:	PressProject
path:	[400,421,press]
load:	/press auto
note:	Currently open across many different paths

[illegible]gram:	IMPRES
[illegible]er:	Leon
tell:	Leon#Sterling
path:	[400,4321,impres]
load:	/impres auto
note:	Open across various paths

program:	XREF
owner:	David
tell:	Bowen+Lawrence#Byrd
path:	[140,143]
load:	/xref auto
note:	Open (with some .def files lying about)

```
; PRESS.MIC  -  Load Press       '<silence>
;
;       This junk allows for automatic loading believe it or not
;
;       Call as:        /press          - to load press (normal use)
;                       /press auto     - used by MAKSYS
;
.on error:backto death
.error ?
.on operator:backto death
.operator !
.goto cont
death::
*^C
*^C
.if ($a = "auto") .let e1 = "error"
! PRESS.MIC  HALTED
.mic return
cont::
.let y = $date.[-4,20], d = $date.[1,"-"]+" "+$y.[1,"-"]+" "+$y.[-4,4]
.if ($d.[1] = "0") .let d = $d.[2,20]

  .n util[400,444]  '<revive>                    ; Must use UTIL
* :- [filin],
* :- version(''Press Algebra System  ('d)
*Copyright (C) 1981 Dept. Artificial Intelligence, Edinburgh''),
* :- asserta( version_date('''d'') ),
* :- ok.
.save press[400,444]
```

```
; MECHO.MIC  -  Load Mecho       '<silence>
;
;       This Junk allows for automatic loading believe it or not
;
;       Call as:        /mecho          - to load mecho (normal use)
;                       /mecho auto     - used by MAKSYS
;
.on error:backto death
.error ?
.on operator:backto death
.operator !
.goto cont
death::
*^C
*^C
.if ($a = "auto") .let e1 = "error"
! MECHO.MIC HALTED
.mic return
cont::
.let y = $date.[-",20], d = $date.[1,"-"]+" "+$y.[1,"-"]+" "+$y.["-",4]
.if ($d.[1] = "0") .let d = $d.[2,20]
  if ($a # "auto") .goto L1
   redir  '<revive>
*dska:[400,441,mector,xmakx]
*^C
.cd 400,441,mector,xmakx
.subfil
*mecho.mas
*^C
L1::
;
;                                       Use UTIL
.run util[400,444]  '<revive>
* :- [mecho],
* :- version(''Mecho Problem Solver ('d)
*Copyrisht (C) 1981 Dept. Artificial Intellisence, Edinburgh''),
* :- core_image, display(''Mecho Problem Solver  ('d)''), ttynl,
*     reinitialise.
.save mecho[400,444]
.if ($a # "auto") .goto L2
  'el *.*[400,441,mector,xmakx]
   j 400,441,mector
.del xmakx.sfd
L2::
```

```
; UTIL.MIC  -  Load Util          '<silence>
;
;       This junk allows for automatic loadins believe it or not
;
;       Call as:        /util           - to load util (normal use)
;                       /util auto      - used by MAKSYS
;
.on error:backto death
.error ?
.on operator:backto death
.operator !
.goto cont
death::
*^C
*^C
.if ($a = "auto") .let e1 = "error"
! UTIL.MIC HALTED
.mic return
cont::
.let y = $date.[-4,20], d = $date.[1,"-"]+" "+$y.[1,"-"]+" "+$y.[-4,4]
.if ($d.[1] = "0") .let d = $d.[2,20]
^
                                    Use latest version of Prolog
.run prolog[400,444]  '<revive>
* :- [util].
* :- version(''Utilities Package  ('d)
*Copyright (C) 1981 Dept. Artificial Intelligence, Edinburgh'').
* :- core_image,
*    display(''Utilities Package  ('d)''), ttynl,
*    display(''[Now includes LONG and TIDY]''), ttynl,
*    reinitialise.
.save util[400,444]
```

```
; MUTIL.MIC  -  Load Mutil       '<silence>
;
;       This junk allows for automatic loadins believe it or not
;
;       Call as:        /mutil          - to load mutil (normal use)
;                       /mutil auto     - used by MAKSYS
;
.on error:backto death
.error ?
.on operator:backto death
.operator !
.goto cont
death::
*^C
*^C
.if ($a = "auto") .let e1 = "error"
! MUTIL.MIC HALTED
.mic return
cont::
.let y = $date.[-"-",20], d = $date.[1,"-"]+" "+$y.[1,"-"]+" "+$y.["-",4]
.if ($d.[1] = "0") .let d = $d.[2,20]
^
                                        Use latest version of Prolog
.run prolog[400,444]  '<revive>
* :- [mutil].
* :- version(''Minimal Utilities Package  ('d)
*Copyright (C) 1981 Dept. Artificial Intelligence, Edinburgh'').
* :- core_image,
*    display(''Minimal Utilities Package  ('d)''), ttynl,
*    reinitialise.
.save mutil[400,444]
```

```
; MAKROB.MIC    -  Load ROB form scratch  '<silence>
;
;       This MIC file is for automatic loadins of Rob's parser
;       (Please tell Lawrence if this is chansed sisnificantly)
;
;       Call as:        /rob            - to load rob (normal use)
;                       /rob auto       - used by MAKSYS
;
.on error:backto death
.error ?
.on operator:backto death
.operator !
.soto cont
death::
*^C
*^C
.if ($a = "auto") .let e1 = "error"
! MAKROB.MIC HALTED
.mic return
cont::
.let y = $date.[-",20], d = $date.[1,"-"]+" "+$y.[1,"-"]+" "+$y.[-",4]
  'f ($d.[1] = "0") .let d = $d.[2,20]
   ' ($a # "auto") .soto L1
.credir  '<revive>
*dska:[400,443,sram,xmakx]
*^C
.cd 400,443,sram,xmakx
.subfil
*rob.mas
*^C
L1::
;
;                                   Use Latest Prolos
.run prolos[400,444]  '<revive>
* :- [rob].
* :- version(''ROB - Deterministic Parser ('d)
*Copyrisht (C) 1981 Dept. Artificial Intellisence, Edinbursh''),
* :- ok.
.save rob[400,444]
.if ($a # "auto") .soto L2
  'el *.*[400,443,sram,xmakx]
   j 400,443,sram
.del xmakx.sfd
L2::
```

```
! MAKSYS.EM : Compile the MAKSYS file into an appropriate MIC file
!
!                                                    Lawrence
!                                                    Updated: 11 May 81



                        ! Top level

function maksys;

   vars MICBuffer                          ! Construct MIC file in here
        Pros Tell Path Load;               ! For field values of each entry

        QUIET;

        new_buffer() -> MICBuffer;
        it([mec:maksys.]);                 ! Initial PED buffer

        do_maksys();

        In MICBuffer do op([maksys.mic]); enddo;
        daz();
end;


                        ! Do the transformation inside above setup

function do_maksys;

   vars Found;

        ja(); sf('$$start$$');

        findnext() -> Found;
        while Found do
                setfields();
                dropfields();
                findnext() -> Found;
        enddo;

        polishoff();
end;


                        ! Find next program entry

function findnext => Result;

        ml(1);
        sft('program:') -> Result;
        if Result then ml(-1) close;
end;


                        ! Get the necessary fields
                        !  NB order unimportant, but they must be there

function setfields;
```

```
   vars Top;                                  ! Top of entry

        cp -> Top;
                  sef('program:'); curfield() -> Pros;
        jc(Top); sef('tell:');   curfield() -> Tell;
        jc(Top); sef('path:');   curfield() -> Path;
        jc(Top); sef('load:');   curfield() -> Load;
end;

function curfield => Field;

   vars Start;

        while cc =< 32 do mc(1) enddo;
        cp -> Start;
        mel(0);
        mc(-1); while cc =< 32 do mc(-1) enddo; mc(1);
        rw(Start,cp) -> Field;
end;


                          ! Create the risht MIC file entries in the MICBuffer

function dropfields;

        In MICBuffer do

itext(

'.cd @Path
.let e = "ok"
@Load
.if ($e # "error") .soto TELL
.tell ''b
Problem while loadins @Pros
^Z
.soto NEXT
TELL::
.tell @Tell

^`ros reloaded at ''<time> on ''d

^Z
NEXT::
');
                  enddo;
end;


                          ! Add finishins touches

function polishoff;

        In MICBuffer do

ja();
in('; MAKSYS.MIC
;
.error ?
.on error:backto death
```

```
.goto cont
death::
! MAKSYS HAS DIED - BAD NEWS
.mic exit
cont::
.let b = "Lawrence$Byrd"
.let y = $date.["-",20], d = $date.[1,"-"]+" "+$y.[1,"-"]+" "+$y.["-",4]
.if ($d.[1] = "0") .let d = $d.[2,20]
');

                    enddo;
end;
```

```
; MAKSYS.MIC
;
.error ?
.on error:backto death
.goto cont
death::
! MAKSYS HAS DIED - BAD NEWS
.mic exit
cont::
.let b = "Lawrence#Byrd"
.let y = $date.[-1,20], d = $date.[1,"-"]+" "+$y.[1,"-"]+" "+$y.["-",4]
.if ($d.[1] = "0") .let d = $d.[2,20]
.cd [400,441,util]
.let e = "ok"
/util auto
.if ($e # "error") .goto TELL
.tell 'b
Problem while loading UTIL
^Z
.goto NEXT
TELL::
.tell Lawrence#Byrd

UTIL reloaded at '<time> on 'd

^Z
NEXT::
.cd [400,441,util]
.let e = "ok"
/mutil auto
.if ($e # "error") .goto TELL
.tell 'b
Problem while loading MUTIL
^Z
.goto NEXT
TELL::
.tell Lawrence#Byrd+Leon#Sterling

MUTIL reloaded at '<time> on 'd

^Z
^T::
.cd [400,441,mector]
.let e = "ok"
/mecho auto
.if ($e # "error") .goto TELL
.tell 'b
Problem while loading MECHO
^Z
.goto NEXT
TELL::
.tell MechoProject

MECHO reloaded at '<time> on 'd

^Z
NEXT::
.cd [400,443,sram]
.let e = "ok"
/makrob auto
```

```
.if ($e # "error") .goto TELL
.tell 'b
Problem while loading ROB
^Z
.goto NEXT
TELL::
.tell Rob#Milne+Chris#Mellish

ROB reloaded at '<time> on 'd

^Z
NEXT::
.cd [400,421,press]
.let e = "ok"
/press auto
.if ($e # "error") .goto TELL
.tell 'b
Problem while loading PRESS
^Z
.goto NEXT
TELL::
  .ll PressProject

PRESS reloaded at '<time> on 'd

^Z
NEXT::
```

```
! XREF.TEC : Macro to perform Prolog declarations updating after an XREF

                                                    Lawrence
                                                    Updated: 12 August 81
!

! Buffer should start containing filename
  Also set QZ if runoff should be called

        Q1   =  pointer
        Q2   =  pointer
        Q3   =  position save state (after FILE while searhing for block)

        Q6   =  filename
        Q7   =  :er/:eb constructed command

        QU   =  result of last :er/:eb performed in an M7 command
        Q8   =  True/False flag indicates success of last major operation.
        Q9   =  Result flag (level 1)
        Q0   =  Result flag (level 2)

        QQ   =  Current declaration block
        QX   =  rest of declaration file
        QZ   =  Flag - whether to run runoff on exit
!

-1eu    ! Seems to be wrong otherwise !
1<
hx6 Ji:er^[ zJ i

^[Uu^[ hx7 hk m7 qu"U ^A
Cannot find Declarations file: ^A q6= 0;'
^A
XREF file updater
^A
ma hxx
   < HK sx J
     sFILE^[ ; .u1 me .u2 q1,q2x6 i

  Uu^[ .u2 q1J i:eb^[ q2+3u2 q1,q2x7

      -1u8  q1u3
      :s%declarations%^[U9
           q9"U 0u8'
           q9"S 01 .u1 :s%end%^[U0
                       q0"U 0u8'
                       q0"S 1 .u2'
             '
      q8"F ^A
** Fatal Error
   Invalid Declarations file: ^A q6= ^A   File Position: ^A q3= 0;'

     q1,q2xQ  0,q2k hxx
     HK
^A
^A  0,q6= ^A ^A
     -1u8
     m7 qu"U ^A  ** read failure ^A 0u8'
        qu"S ma :s%declarations%^[U9
                q9"U J :s%here%^[U0
```

```
                        @0"U ^A  left alone ^A 0u8'
                        @0"S 01k sQ'
                    '
                @9"S 01 .u1  :s%end%^[U0
                        @0"U ^A  ** no matchins %end% ^A 0u8'
                        @0"S 1 .u2 @1,@2k sQ'
                    '
            '

    @8"T hp :efU9
          @9"U  ^A  ** write failure
** Fatal Error - unrenameable TMP file produced accidentally
   Processins stops
^A 0;'
          @9"S ^A  OK ^A'
       '
    @8"F ek'
  >

>
  \

Exit

^A
@Z"T led sys:runoff^[ ^ARunoff:
^A'
^Z
```

```
% Prolog Cross-Reference Program %

% Compiler declarations %

 :- public load/1.
 :- public go/0.

 :- op(1050,xfy,->).
 :- op(500,fy,@).

 :- mode append(?,?,?).
 :- mode back(+).
 :- mode caller(+,+,+,+).
 :- mode callers(+,+,-).
 :- mode complain(+).
 :- mode crecord(+,+).
 :- mode definition(+,+).
 :- mode defn_file(+,-).
 :- mode do_imports(+).
 :- mode do_publics(+).
 :- mode entries(+,+).
  - mode exhaust(+).
 :- mode exts(+,+,+).
 :- mode fentries(-).
 :- mode front(+,+,+).
 :- mode getentries(+,-).
 :- mode getexts(+,-).
 :- mode getfrom(+).
 :- mode goal(?,-).
 :- mode goal0(+,-).
 :- mode got_defn(+,-).
 :- mode head(+,+,-,-).
 :- mode imports1(+).
 :- mode indirect(+).
 :- mode load(+).
 :- mode lt2(+,+,+,+).
 :- mode lte(+,+).
 :- mode mark_interpreted(+).
 :- mode member(?,+).
 :- mode multiple_defn(+,+,-,-).
 :- mode note(+).
 :- mode notin(+,+).
 :- mode number_length(+,-).
 :- mode one_imp_decl(+).
 :- mode one_pub_decl(+).
 :- mode outglobals1(+).
 :- mode outputdclrs(+).
 :- mode output1(+,+).
 :- mode output2(+).
 :- mode partition(+,+,-,-).
 :- mode process(+,+).
 :- mode publics1(+).
 :- mode qsort(+,-,+).
 :- mode readtonl(-).
 :- mode actionchar(+,-).
 :- mode readtonl0(-).
 :- mode reply(+).
 :- mode see_chek(+).
 :- mode tell_chek(+).
 :- mode warn(+,+).
```

```
 :- mode widen(?,-).
 :- mode writeprred(+,+).
 :- mode writes(+).
 :- mode yesno(+,?).

%Data for user definitions.
%The followins terms may be recorded usins a predicate as the key:
%
%       $system          for built-in predicates.
%       $known(Where)    for predicates known to be defined in "Where".
%       $applies(P,T)    for predicates P which apply one of their arsuments T
%       $called          for predicates which are called from other places


% Load in definition file containins system or known predicates,
%  or operators

load([F,.,L]) :- !, ( load(F) ; true), !, load(L).
load([]) :- !.
load(File) :- !,
        see_chek(File),
        repeat,
          read(T),
        (T=end_of_file; note(T), fail),
        seen.

                        % Process terms in definition file.
note(system(P)) :- !, crecord(P,'$system').
note(known(P,Where)) :- !, crecord(P, '$known'(Where)).
note(op(Prec,Assoc,Name)) :- !, call(op(Prec,Assoc,Name)).
note(applies(P,T)) :-  recorda(P, '$applies'(P,T),_), !.
note(called(P)) :- mark_interpreted(P).

% data
%   $caller(Called_Predicate, Callins_Functor, Callins_Arity, Where_Defined)
%                       %  Held on key: Called_Predicate.
%                       %  $caller(P,F,N,I) means P is called by F/N in file I.
%   $defn(File, Predicate)
%                       %  Held on key: Predicate.
%                       %  $defn(I,P) means P is defined in I.
%   $file(File)
%                       %  Held on key: $file(_).
%                       %  $file(F) means F is a file.
%   Predicate
%                       %  Held on key: $pred
%                       %  pred(G,M) means G/M was defined OR used.

% Top level and creatins initial database %

so :- nolos, 'LC',
   repeat, ttynl, display('Next file: '), ttyflush,
   readtonl(Ch),
   reply(Ch), !.

% check for indirection: @<filename> %

reply([]) :- !,collect,!.
reply([64|Ch]) :- !,
   name(F,Ch), indirect(F).
reply(Ch) :- name(F,Ch), setfrom(F).
```

```
% set file names from indirect file %

indirect(C) :- see_chek(C), repeat, dofile, !, fail.

dofile :- readtonl(Ch), !, name(F,Ch),
   display('Next file: '), display(F), ttynl,
   setfrom(F).
dofile :- seen.

% Savins current input file, process Prolos code in file F %

setfrom(F) :- seeins(G), see_chek(F),
   recordz('$file'(_),'$file'(F),_),
   repeat, exhaust(F), !,
    seen, see(G), fail.

% Process each clause, T, in file F %

exhaust(F) :- read(T), expand_term(T,T1), process(T1,F), T=(end_of_file).

  ocess((P:-Q),I) :- !, head(P,I,F,N), soal(Q,G), caller(G,F,N,I).
process((:-G),_) :- !, call(G).
process((?-G),_) :- !, call(G).
process(end_of_file,_).
process(P,I) :- head(P,I,_,_).

% Record the fact that P is a predicate & that it is defined in I.
%   Return the principal functor of P (F) & its arity (N).

head(P,I,F,N) :- functor(P,F,N), functor(G,F,N), definition(G,I), !.

% Fail if soal uninstantiated (how can this happen?). Otherwise return most
%   seneral term havins the principal functor & arity of each soal in the
%   clause (successively on backtrackins). Isnore system predicates.

soal(G,_) :- var(G), !, fail.
soal(G,G1) :- soal0(G,G1).

soal0((G,_),G1) :- soal(G,G1).
  al0((_,G),G1) :- !, soal(G,G1).
oal0((G;_),G1) :- soal(G,G1).
soal0((_;G),G1) :- !, soal(G,G1).
soal0(X^P,G) :- !, soal(P,G).
soal0(else(G,_),G1) :- soal(G,G1).
soal0(else(_,G),G1) :- !, soal(G,G1).
soal0(then(_,G),G1) :- !, soal(G,G1).
soal0((G->_),G1) :- soal(G,G1).
soal0((_->G),G1) :- !, soal(G,G1).
soal0(not(G),G1) :- !, soal(G,G1).
soal0(\+(G),G1) :- !, soal(G,G1).
soal0(call(G),G1) :- !, soal(G,G1), mark_interpreted(G1).
soal0(basof(_,Gs,_),G) :- !, soal(Gs,G), mark_interpreted(G).
soal0(setof(_,Gs,_),G) :- !, soal(Gs,G), mark_interpreted(G).
soal0(G,_) :- recorded(G,'$system',_), !, fail.
soal0(G1,G2) :- recorded(G1,'$applies'(G1,P),_),                % No cut here
   widen(P,P1), soal(P1,G2),
   mark_interpreted(G2).
soal0(G,G).
```

```
% Record that P is a predicate and that it is defined in file I %
definition(P,I) :- recorded(P,'$system',_), !,
   warn(P,'already defined as a system predicate'), fail.
definition(P,I) :- crecord('$pred',P), crecord(P,'$defn'(I,P)).

% Record that P is a predicate called by  F/N in file I %
caller(P,F,N,I) :- functor(P,Pf,Pn), functor(P1,Pf,Pn),
                   crecord('$pred',P1), crecord(P1,'$caller'(P1,F,N,I)).

% Record that P is called by the user or outside its file of
% definition, and hence must be public

mark_interpreted(P) :- caller(P,'<user>',0,undefined).

% Record term Q on key P unless already recorded %
crecord(P,Q) :- recorded(P,Q,_), !.
crecord(P,Q) :- recordz(P,Q,_), !.

                        % Increase arity of predicate by specified amount
widen(A+_,_) :- var(A), !, fail.        % NB also covers variable as first ars
 iden(A+Offset,A1) :- !, functor(A,F,N1), N2 is N1+Offset, functor(A1,F,N2).
.iden(A,A) :- !.

% Collecting up %

% data
%   $ext(File, Predicate)
%                        %  Held on key: File,
%                        %  $ext(I,P) means P is an external (import) of I
%   $entry(File, Predicate)
%                        %  Held on key: File,
%                        %  $entry(I,P) means P is an entry (export) of I

collect :-
   fentries(L),          %  Make list of all predicates with all associated data
   qsort(L,L1,[]),       %  Sort them
   repeat, nl,
     display('Output to: '),              %  Request output file name
     ttyflush,
     readtonl(Chars), name(File,Chars), %  Read file name from terminal
     tell_chek(File), !,                %  Repeat if file not found
   output1(File,L1),                    %  Output cross-reference list
      told,                             %
   tmpcor(tell,rno,Chars),              %  Set up tempcor file
   outslobals.                          %  This will run runoff

% Find entries, Search throush all encountered predicates %

fentries([e(F,N,f(I,Cs))|L]) :- recorded('$pred',P,Ptr), erase(Ptr),
   functor(P,F,N),
   defn_file(P,I), callers(P,I,Cs),
   ((I=undefined,warn(P,'not defined')); true),
   ((Cs=[],warn(P,'not called')); true),
   multiple_defn(P,[I],L,L1),
   ((nonvar(L),warn(P,'multiply defined')); true), !,
   fentries(L1).
fentries([]).

defn_file(P,I) :- sot_defn(P,I), !.
defn_file(P,undefined).
```

```
sot_defn(P,I) :- recorded(P,'$defn'(I,P),_).
sot_defn(P,I) :- recorded(P,'$known'(I),_).

multiple_defn(P,List,[e(F,N,f(I,[]))|L],L1) :-  % Look for multiple defns
   sot_defn(P,I), notin(I,List), !,
   functor(P,F,N),
   multiple_defn(P,[I|List],L,L1).
multiple_defn(P,_,L,L).

notin(X,List) :- member(X,List), !, fail.
notin(_,_).

% Return a list of all callers of the procedure P
%   This procedure does not fail (returns empty list)

callers(P,I,[c(F,N)|Cs]) :- recorded(P,'$caller'(P,F,N,J),Ptr),
   erase(Ptr), !,
   exts(I,J,P),
   callers(P,I,Cs).
 `llers(_,_,[]).

% Record externals. P is defined in I (entry or export), used in J
%  (external or import)
exts(I,I,_) :- !.
exts(I,undefined,P) :- !, entries(I,P).
exts(I,J,P) :- entries(I,P), crecord(J,'$ext'(J,P)).

% record entries %
entries(undefined,_) :- !.
entries(I,P) :- crecord(I,'$entry'(I,P)).

% imports and exports wanted? %
ifexts :-
   yesno('List imports and exports',yes).

% build list of externals %
setexts(F,[e(G,N,f(I,_))|Exts]) :- recorded(F,'$ext'(F,P),Ptr),
   erase(Ptr), !,
   functor(P,G,N),
   defn_file(P,I),
   setexts(F,Exts).
setexts(_,[]).

% build list of entries %
setentries(F,[e(G,N,_)|Ents]) :- recorded(F,'$entry'(F,P),Ptr),
   erase(Ptr), !,
   functor(P,G,N),
   setentries(F,Ents).
setentries(_,[]).

% Quick sort of functor entries %

qsort([X|L],R,R0) :-
   partition(L,X,L1,L2), qsort(L2,R1,R0),
   qsort(L1,R,[X|R1]).
qsort([],R,R).

partition([X|L],Y,[X|L1],L2) :- lte(X,Y), !,
   partition(L,Y,L1,L2).
```

```
partition([X|L],Y,L1,[X|L2]) :- partition(L,Y,L1,L2).
partition([],_,[],[]).

lte(e(A1,N1,_),e(A2,N2,_)) :- lt2(A1,N1,A2,N2).

lt2(A,N1,A,N2) :- !, N1=<N2.
lt2(A1,_,A2,_) :- A1 @< A2.

% Output %

output1(File,Dbase) :- repeat, ttynl, display('Width: '),
   ttyflush, readtonl(Chars),
   (name(Width,Chars), integer(Width), Width>50, Width<150, !;
    complain(['50 < Width <150']) ),
   ttynl, display('Title: '), ttyflush, readtonl0(Title),
   write('.nap .ps 58;'), write(Width), nl,
   write('.rm '), write(Width), nl,
   write('.lm 0 .ts 24,38'), nl,
   write('.no flags all'), nl,
   write('.title '), writes(Title), nl,
   write('.s 2 .c'), nl,
   write('**********************************'), nl,
   write('.c'), nl,
   write('* PROLOG CROSS REFERENCE LISTING *'), nl,
   write('.c'), nl,
   write('**********************************'), nl,
   write('.s 2 .c'), nl, writes(Title), nl,
   write('.s 3 .nf'), nl,
   tab(2), write('PREDICATE'), tab(15), write('FILE'),
   tab(11), write('CALLED BY'), nl,
   write('.f .s 3'), nl,
   write('.lm 38'), output2(Dbase).

output2(Dbase) :- member(e(F,N,f(I,Cs)),Dbase),
   front(F,N,I), back(Cs), fail.
output2(_).

front(F,N,I) :- nl,
   write('.p -38,1,1'), nl,
   writepred(F,N),
   put(9), write(I), put(9), !.

back([]) :- !.
back([c(F,N)|Zs]) :- writepred(F,N),
   put(32), back(Zs), !.

% Produce lists of imports and exports if wanted.
% Afterwards, call RUNOFF to process the cross reference listing

outglobals :-
   ifexts, !,            %  List of imports and exports required for each file?
   repeat,
   display('Output to: '),
   ttyflush,
   readtonl(Chars),
   name(File,Chars),
   tell_chek(File), !,
   decls_to_one_file,
   told,
   outglobals1(Chars).
```

```
outslobals :- !,                                % no extra list wanted
   run('sys:runoff',1).                         %  run runoff

% If imports and exports have been listed, do we want to
% update the declarations in the files? If so, call TECO
% before calling RUNOFF for the cross reference listing.
% The XREF-TECO macro looks in each file, replacing any existing
% declarations with new ones. The declarations block replaced is defined
% as being:     Either 1) The first block delimited by lines containing
%                              "%declarations%"          - top
%                              "%end%"                   - bottom
%               Or, if there is no such block then
%                       2) The first line containing "%here%"
%               If neither condition is satisfied then the file is left alone.

outslobals1(FileString) :-
   yesno('Alter existing files',yes), !,
                                                % Calling TECO is hairy
   append(FileString,"$-1uZeixref$",BottomBit),
   append("Sxx/inp$ekau-124""Neiteco.tec[400,444,tec]$'i",BottomBit,Horrific),
   tmpcor(tell,edt,Horrific),
   run('sys:tec124',1).

outslobals1(_) :-
   run('sys:runoff',1).

decls_to_one_file :-
   recorded('$file'(_),'$file'(F),P),           %  Yes, find a file in database
   erase(P),                                    %  Erase it
   write('FILE  '), write(F), nl, nl,
   outputdclrs(F), nl, nl,
   fail.
decls_to_one_file.

% Output 'public' and 'import' declarations for a file
% Declarations start with '%declarations%' and end with '%end%'

outputdclrs(F) :-
   setexts(F,Lx),                               %  List its imports
   setentries(F,Le),                            %  List its exports
   qsort(Lx,Lsx,[]),                            %  Sort import list
   qsort(Le,Lse,[]),                            %  Sort export list
   write('%declarations%'), nl, nl,
   do_publics(Lse),
   do_imports(Lsx),
   write('%end%'), nl.

do_publics([]) :- !.
do_publics([E|L]) :-
   write(':- public'), nl, one_pub_decl(E), publics1(L), nl.

   one_pub_decl(e(F,N,_)) :- put(9), put(9), writepred(F,N).

   publics1([E|L]) :- !, put(44), nl, one_pub_decl(E), publics1(L).
   publics1([]) :- put(46), nl.

do_imports([]) :- !.
do_imports(L) :-
   write('% imports:'), nl,
   imports1(L), nl.
```

```
imports1([]).
imports1([E|L]) :- one_imp_decl(E), imports1(L).

   one_imp_decl(e(F,N,f(I,_))) :-
      put(37), put(9), put(9), writepred(F,N),
      name(F,Na), length(Na,N1),
      number_length(N,N2), tab(24-N1-N2-1),
      write('(from '), write(I), put(41), nl.

   number_length(N,1) :- N<10, !.
   number_length(N,2) :- N<100, !.
   number_length(N,3).

% Utilities for input/output %

writepred('<user>',0) :- !, write('<user>').
writepred(F,N) :- write(/(F,N)).

readtonl(Cs) :- get0(C),
   actionchar(C,Cs).

actionchar(31,[]) :- !.
actionchar(26,_) :- !, fail.
actionchar(C,Cs) :- C=<32, !, readtonl(Cs).
actionchar(C,[C|Cs]) :- !, readtonl(Cs).

readtonl0(Cs) :- get0(C),
   (C=:=31, !, Cs=[];
    C=:=26, !, fail;
    Cs=[C|C1], readtonl0(C1) ).

writes([]) :- !.
writes([C|Cs]) :- put(C), writes(Cs).

member(X,[X|_]).
member(X,[_|L]) :- member(X,L).

append([],X,X).
append([A|B],C,[A|D]) :- append(B,C,D).

yesno(Question,Answer) :-
   ttynl, display(Question), display('? '), ttyflush,
   readtonl(Ans),
   (Ans=[Y|_], (Y=:="y"; Y=:="Y"), !, Answer=yes;
    Answer=no ).

complain(L) :-
   ttynl, display('% '),
   (member(Text,L), display(Text); ttynl), fail.

                        % See file or complain if it doesn't exist
see_chek(File) :-
        ( nofileerrors  ;  fileerrors, complain([File, ' not found']) ),
        see(File), !, fileerrors.

                        % Open file for output or complain
tell_chek(File) :-
        ( nofileerrors  ;  fileerrors, complain(['Can''t open ', File]) ),
        tell(File), !, fileerrors.
```

```
                    % Give a warning about a predicate

warn(P,State) :-
   display('** WARNING: '), display(P),
   display(' is '), display(State), nl.
```

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PROLOG CROSS REFERENCE PROGRAM

Source: David Bowen and the Mecho group
Program Issued: May 1981
Documentation: May 1981

Description

XREF is a cross-reference program which produces an alphabetically ordered list of predicates, giving the file in which each is defined and a list of all the predicates which call it. If required, it also gives a list of all the imports and exports for each file, i.e. the global predicates used and defined in each file. Output is produced in an appropriate format for RUNOFF, the text processing program.

The user may extend the program by providing a definition file. This can specify system predicates (for which cross-referencing is not required), operators, known predicates (for which definitions need not be provided), and predicates which take other predicates as arguments and cause them to be called.

2. How to Use the Program

The simplest way to use the program is to type

```
run PLL:XREF
```

The prompt "Next file:" then appears and a file name may be typed in, followed by a carriage-return. The prompt is then repeated so that as many file names as desired may be entered. If a number of file names are listed on a file called FOO, say, then they can all be entered at once simply by typing

```
@FOO
```

When all the required files have been entered, this input phase is terminated by just typing a carriage-return by itself.

The user is subsequently prompted for an output file name, and a title and required text width for the output. He is then asked whether a lists of imports and exports are required, and should type the single letter "y" (or "yes") if they are.

The executable version of XREF, of which the use has been described, makes use of a set of definitions which may be found in PLL:XREF.DEF. These define the standard system predicates, for which cross-referencing is not required. e.g.

```
system(fail).
system(length(_,_)).
```

indicate that **fail** with no arguments and **length** with two arguments are built-in predicates.

The user may provide his own definition file(s). To do this it is necessary to run the Prolog interpreter and to re-compile XREF. The top-level predicate **load** is then available to read in definition files. e.g.

```
.run prolog
?- compile('PLL:XREF').
?- load(['MYFILE.DEF', 'PLL:XREF.DEF']).
?- go.
```

load takes either a list of file names or a single file name as its argument. **go** starts the cross-reference program which then runs as described above.

Apart from the definition of system predicates, three other kinds of terms are allowed in a definition file. These are of the form

```
op(<priority>, <associativity>, <operator symbol list>).
known(<predicate>, <where defined>).
applies(<term>, <term>).
```

The **op** terms simply declare operators as in the normal way except that they take the form of assertions rather than goals (the preceding ':-' is omitted). It is not necessary to declare operators in the definition file unless their use precedes their declaration in the files to be processed. **known** avoids the need for reading in the full definitions of standard predicates. It simply tells the program where a particular predicate is defined. **applies** can be used to indicate that a given predicate takes some other predicate as an argument and causes that predicate to be called. For example, suppose there is a user-defined predicate **maplist** which takes a predicate and two lists as arguments e.g.

```
maplist(foo,L1,L2)
```

and produces a list of which the i-th element is the result of applying the predicate to the i-th elements of each of the lists. The appropriate entry in the definition file is

```
applies( maplist(Pred,L1,L2), Pred+2 ).
```

This expresses the fact that the first argument of **maplist** is a predicate and that it is to be called with two additional arguments, i.e. the above call of **maplist(3)** results in calls **foo(2)**. The '+2' would be omitted if **maplist** caused **foo** to be called with no additional arguments, i.e. if **foo(0)** was to be referenced. Note that if **maplist** is called with a variable as its first argument, the cross-referencer cannot determine what predicate(s) are to be called and so no special action is taken.

3. Storage Requirements

The Prolog system requires 30K words. Another 15K words suffice to run the compiled version of XREF on a small program.

```
/* XREF.DEF - system definitions for use with XREF.PL.

                                                    Updated: 20 May 81

   These are the functors that have special sisnificance as
   predicates
*/

system([_|_]).
system(abolish(_,_)).
system(revive(_,_)).
system(incore(_)).
system(asserta(_,_)).
system(asserta(_)).
system(assertz(_,_)).
system(assertz(_)).
system(retract(_)).
system(clause(_,_,_)).
system(clause(_,_)).
system(recorda(_,_,_)).
   tem(recordz(_,_,_)).
system(recorded(_,_,_)).
system(instance(_,_)).
system(erase(_)).
system(true).
system(lensth(_,_)).
system(name(_,_)).
system(op(_,_,_)).
system(var(_)).
system(atom(_)).
system(!).
system(statistics).
system(statistics(_,_)).
system(functor(_,_,_)).
system(call(_)).
system(expand_term(_,_)).
system(debus).
system(debussins).
system(display(_)).
   tem(set(_)).
system(set0(_)).
system(leash(_)).
system(nl).
system(nodebus).
system(print(_)).
system(put(_)).
system(skip(_)).
system(tab(_)).
system(trace).
system(ttyflush).
system(ttyset(_)).
system(ttyset0(_)).
system(ttynl).
system(ttyput(_)).
system(ttyskip(_)).
system(ttytab(_)).
system(write(_)).
system(writeq(_)).
system(ancestors(_)).
system(depth(_)).
```

```
system(maxdepth(_)).
system(subgoal_of(_)).
system(abort).
system(arg(_,_,_)).
system(assert(_)).
system(atomic(_)).
system(basof(_,_,_)).
system(break).
system(close(_)).
system(compare(_,_,_)).
system(compile(_)).
system(consult(_)).
system(core_image).
system(current_atom(_)).
system(current_functor(_,_)).
system(current_predicate(_,_)).
system(current_op(_,_,_)).
system(fail).
system(fileerrors).
system(gc).
   tem(gcguide(_)).
system(halt).
system(integer(_)).
system(keysort(_,_)).
system(listing).
system(listing(_)).
system(log).
system(mode(_)).                    % not an evaluable predicate
system(nofileerrors).
system(nogc).
system(nolog).
system(nonvar(_)).
system(numbervars(_,_,_)).
system(phrase(_,_)).
system(prompt(_,_)).
system(public(_)).                  % not an evaluable predicate
system(read(_)).
system(reconsult(_)).
system(rename(_,_)).
   tem(repeat).
system(restore(_)).
system(save(_)).
system(see(_)).
system(seeing(_)).
system(seen).
system(setof(_,_,_)).
system(sort(_,_)).
system(tell(_)).
system(telling(_)).
system(told).
system(trimcore).
system(portray(_)).
system(end_of_file).
system('LC').
system('NOLC').
system(\+_).
system(spy _).
system(nospy _).
system(_=_).
system(_ is _).
```

```
system(_==_),
system(_\==_),
system(_=..._),
system(_<_),
system(_>_),
system(_=<_),
system(_>=_),
system(_@<_),
system(_@=<_),
system(_@>=_),
system(_@>_),
system(_^_),
system(_=\=_),
system(_=:=_),
system(run(_,_)),
system(tmpcor(_,_,_)),
```

```
/* UTIL.DEF : XREF definitions for UTIL procedures

                                                    Lawrence
                                                    Updated: 14 June 81
*/


% UTIL operators

op( 1100,xfy,(\\) ).
op( 950,xfy,# ).
op( 850,xfy,& ).
op( 710,fy,[not,thnot] ).
op( 700,xfx,\= ).

op( 300,fx,edit ).
op( 300,fx,redo ).
op( 300,fx,tlim ).
op( 300,fx,ton ).
op( 300,fx,toff ).


% UTIL procedures

known(      &(Goal1,Goal2),                                  utility ).
  applies( &(Goal1,Goal2), Goal1 ).
  applies( &(Goal1,Goal2), Goal2 ).
known(      \=(X,Y),                                         utility ).
known(      \\(Goal1,Goal2),                                 utility ).
  applies( \\(Goal1,Goal2), Goal1 ).
  applies( \\(Goal1,Goal2), Goal2 ).
known(      any(Goallist),                                   utility ).
  % Hairy applies...
known(      append(List1,List2,List3),                       utility ).
known(      apply(Pred,Args),                                utility ).
  % Hairy applies...
known(      bindins(N,Goal),                                 utility ).
  applies( bindins(N,Goal), Goal ).
known(      casserta(X),                                     utility ).
  own(      cassertz(X),                                     utility ).
  own(      csensym(Prefix,PossVar),                         utility ).
known(      check_exists(File),                              utility ).
known(      checkand(Pred,ConJ),                             utility ).
  applies( checkand(Pred,ConJ), Pred+1 ).
known(      checklist(Pred,List),                            utility ).
  applies( checklist(Pred,List), Pred+1 ).
known(      clean,                                           utility ).
known(      close(File,Old),                                 utility ).
known(      concat(Atom1,Atom2,Atom3),                       utility ).
known(      continue,                                        utility ).
known(      convlist(Pred,List1,List2),                      utility ).
  applies( convlist(Pred,List1,List2), Pred+2 ).
known(      delete(File),                                    utility ).
known(      diff(X,Y),                                       utility ).
known(      disJoint(List),                                  utility ).
known(      edit(File),                                      utility ).
known(      error(Format,List,Action),                       utility ).
  applies( error(Format,List,Action), Action ).
known(      file_exists(File),                               utility ).
known(      findall(Var,Goal,List),                          utility ).
```

```
  applies( findall(Var,Goal,List), Goal ).
known(     flag(Flag,Old,New),                                    utility ).
known(     for(N,Goal),                                           utility ).
  applies( for(N,Goal), Goal ).
known(     forall(Goal1,Goal2),                                   utility ).
  applies( forall(Goal1,Goal2), Goal1 ).
  applies( forall(Goal1,Goal2), Goal2 ).
known(     gcc(Goal),                                             utility ).
  applies( gcc(Goal), Goal ).
known(     gensym(Prefix,Var),                                    utility ).
known(     intersect(Set1,Set2,ISet),                             utility ).
known(     last(Element,List),                                    utility ).
known(     listtoset(List,Set),                                   utility ).
known(     mapand(Pred,ConJ1,ConJ2),                              utility ).
  applies( mapand(Pred,ConJ1,ConJ2), Pred+2 ).
known(     maplist(Pred,List1,List2),                             utility ).
  applies( maplist(Pred,List1,List2), Pred+2 ).
known(     member(Element,Set),                                   utility ).
known(     memberchk(Element,Set),                                utility ).
known(     mlmaplist(Pred,Lists),                                 utility ).
  applies( mlmaplist(Pred,Lists), Pred+1 ).
known(     mlmaplist(Pred,Lists,Vin,Vout),                        utility ).
  applies( mlmaplist(Pred,Lists,Vin,Vout), Pred+3 ).
known(     mlmaplist(Pred,Lists,V),                               utility ).
  applies( mlmaplist(Pred,Lists,V), Pred+2 ).
known(     mlmember(Elements,Lists),                              utility ).
known(     mlselect(Elements,Lists,Rests),                        utility ).
known(     nextto(X,Y,List),                                      utility ).
known(     nmember(Element,Set,N),                                utility ).
known(     nobt(Goal),                                            utility ).
  applies( nobt(Goal), Goal ).
known(     not(Goal),                                             utility ).
  applies( not(Goal), Goal ).
known(     numlist(N1,N2,Numberlist),                             utility ).
known(     occ(X,Term,N),                                         utility ).
known(     open(File),                                            utility ).
known(     open(Old,File),                                        utility ).
known(     pairfrom(List,A,B,Rest),                               utility ).
known(     perm(List1,List2),                                     utility ).
known(     perm2(X,Y,A,B),                                        utility ).
known(     prconJ(ConJ),                                          utility ).
known(     prexpr(Expr),                                          utility ).
known(     prlist(List),                                          utility ).
known(     read_in(Sentence),                                     utility ).
known(     redo(File),                                            utility ).
known(     remove_dups(List,Set),                                 utility ).
known(     rev(List1,List2),                                      utility ).
known(     select(Element,List,Rest),                             utility ).
known(     seteq(Set1,Set2),                                      utility ).
known(     some(Pred,List),                                       utility ).
  applies( some(Pred,List), Pred+1 ).
known(     subgoal(exact,Goal),                                   utility ).
known(     sublist(Pred,List1,List2),                             utility ).
  applies( sublist(Pred,List1,List2), Pred+1 ).
known(     subset(Subset,Superset),                               utility ).
known(     subst(Substitution,Old,New),                           utility ).
known(     subtract(Set1,Set2,Subset),                            utility ).
known(     sumlist(NumList,Sum),                                  utility ).
known(     thnot(Goal),                                           utility ).
  applies( thnot(Goal), Goal ).
```

```
known(      tlim(Tlimit),                                   utility ).
known(      ton(Name),                                      utility ).
known(      toff,                                           utility ).
known(      toff(Name),                                     utility ).
known(      trace(Format,Condition),                        utility ).
known(      trace(Format,List,Condition),                   utility ).
known(      ttyprint(X),                                    utility ).
known(      union(Set1,Set2,USet),                          utility ).
known(      variables(Term,VarSet),                         utility ).
known(      writef(Format),                                 utility ).
known(      writef(Format,List),                            utility ).
```

```
/* XREF.DEF - system definitions for use with XREF.PL.

                                                    Updated: 20 May 81

   These are the functors that have special significance as
   predicates
*/

system([_|_]).
system(abolish(_,_)).
system(revive(_,_)).
system(incore(_)).
system(asserta(_,_)).
system(asserta(_)).
system(assertz(_,_)).
system(assertz(_)).
system(retract(_)).
system(clause(_,_,_)).
system(clause(_,_)).
system(recorda(_,_,_)).
system(recordz(_,_,_)).
system(recorded(_,_,_)).
system(instance(_,_)).
system(erase(_)).
system(true).
system(length(_,_)).
system(name(_,_)).
system(op(_,_,_)).
system(var(_)).
system(atom(_)).
system(!).
system(statistics).
system(statistics(_,_)).
system(functor(_,_,_)).
system(call(_)).
system(expand_term(_,_)).
system(debug).
system(debugging).
system(display(_)).
system(set(_)).
system(set0(_)).
system(leash(_)).
system(nl).
system(nodebug).
system(print(_)).
system(put(_)).
system(skip(_)).
system(tab(_)).
system(trace).
system(ttyflush).
system(ttyset(_)).
system(ttyset0(_)).
system(ttynl).
system(ttyput(_)).
system(ttyskip(_)).
system(ttytab(_)).
system(write(_)).
system(writeq(_)).
system(ancestors(_)).
system(depth(_)).
```

```
system(maxdepth(_)).
system(subgoal_of(_)).
system(abort).
system(ars(_,_,_)).
system(assert(_)).
system(atomic(_)).
system(basof(_,_,_)).
system(break).
system(close(_)).
system(compare(_,_,_)).
system(compile(_)).
system(consult(_)).
system(core_image).
system(current_atom(_)).
system(current_functor(_,_)).
system(current_predicate(_,_)).
system(current_op(_,_,_)).
system(fail).
system(fileerrors).
system(gc).
system(gcguide(_)).
system(halt).
system(integer(_)).
system(keysort(_,_)).
system(listing).
system(listing(_)).
system(log).
system(mode(_)).                    % not an evaluable predicate
system(nofileerrors).
system(nogc).
system(nolog).
system(nonvar(_)).
system(numbervars(_,_,_)).
system(phrase(_,_)).
system(prompt(_,_)).
system(public(_)).                  % not an evaluable predicate
system(read(_)).
system(reconsult(_)).
system(rename(_,_)).
system(repeat).
system(restore(_)).
system(save(_)).
system(see(_)).
system(seeing(_)).
system(seen).
system(setof(_,_,_)).
system(sort(_,_)).
system(tell(_)).
system(telling(_)).
system(told).
system(trimcore).
system(portray(_)).
system(end_of_file).
system('LC').
system('NOLC').
system(\+_).
system(spy _).
system(nospy _).
system(_=_).
system(_ is _).
```

```
system(_==_),
system(_\==_),
system(_=..._),
system(_<_),
system(_>_),
system(_=<_),
system(_>=_),
system(_@<_),
system(_@=<_),
system(_@>=_),
system(_@>_),
system(_^_),
system(_=\=_),
system(_=:=_),
```

DSKA:PROLOG.CNG[400,444] Updated: 20 August 81

This file lists the changes/fixes made in versions of DEC10 Prolog. The most recent version (currently) always lives in the Mecho Library area [400,444]. The system version is apt to be a somewhat earlier version. If you intend to use the most recent version then please TELL [400,441] so as to get on the mailing list since the version in [400,444] can suddenly change without prior warning. For this reason you may prefer to use the system version (in SYS:) since it will change less often, and always with plenty of warning.

DEC10 Prolog version 3.35 in [400,444]
10 August 81

This history starts here.
The documentation for this version is scattered across the following files:

DOC:PROLOG.DOC	(Original documentation)
DSKA:GUIDE3.MEM[400,447] DSKA:DEBUG.MEM[400,447]	(Version 3 documentation)
DSKA:PROLOG.CNG[400,444]	(List of most recent changes - this file)
DSKA:PROLOG.NEW[400,444]	(Documentation for recent changes)

One day the documentation will be rewritten and all this information gathered together.

New and Changed Features of DEC-10/20 Prolog version 3.35

NB: See DSKA:PROLOG.CNG for a history of changes.

1. Strategy for Global Stack Garbage Collection

The evaluable predicate 'gcguide' has been redefined. It has now the form

```
gcguide(Function,Old,New)
```

Function can be 'margin', which is the number of free pages below which garbage collection is always tried, or 'cost', which is the percentage of runtime the user accepts to be consumed on garbage collections. The 'margin' value is initially 50 pages, the 'cost' 10 percent. When the procedure is called, the current value corresponding to Function is unified with Old, and New is stored as the new value. If New is not an integer or it is out of range, the call fails.

2. Undefined Predicates

The interpreter can optionally catch calls to predicates that have no clauses. The state of the catching facility is can be :-

* 'trace', which causes calls to predicates with no clauses to be reported and the debugging system to be entered at the earliest opportunity;
* 'fail', which causes calls to evaluable predicates to fail just as before (the default state).

The evaluable predicate

```
unknown(OldState,NewState)
```

unifies OldState with the current state and sets the state to NewState. It fails if the arguments are not appropriate. The (old) evaluable predicate 'debugging' will now print the value of this state along with its other information. Please note that there is a time (NOT space) overhead of about 70 % when running interpreted programs with the facility enabled ('trace' state). It is hoped that this facility will be improved in the future.

3. Two Argument Save

The evaluable predicate

```
save(File,Return)
```

saves the current system state in File just as 'save(File)', but in addition unifies Return to 0 or 1 depending on whether the return from the call occurs in the original incarnation of the state or through a

call 'restore(File)' (respectively).

4. Running Other Programs

The evaluable predicate

```
run(Program,Offset)
```

runs the program in file Program, starting at offset Offset.
Program should be an atom and Offset an integer (eg run('sys:direct',0)).
The usual Prolog restrictions on file names apply to Program (ie PPN's or paths are NOT understood. Device names are however, and if you are using TOPS10 version 7.01 you will find that using logical names is a good fix - see the PATH system command).
It is not known whether this facility will work under TOPS-20, as it relies on the TOPS-10 system call RUN.

5. Setting up TMPCOR files

e evaluable predicate

```
tmpcor(IO,TmpFile,Tmpdata)
```

will read/write tmpcor files. IO can be one of {see,tell} but currently only tell (writing tmpcor files) is implemented. TmpFile is an atom with a 3 character name and TmpData a list of ASCII character codes (written easily as a double quoted string "<characters>"). If IO = tell then the ASCII characters are written to the appropriate tmpcor file. If the tmpcor file cannot be set up then a disk file JJJnnn.TMP is used in the usual way (JJJ is your job number, and nnn = TmpFile). This evaluable predicate is intended for use with run/2 since many programs can be given startup instructions via tmpcor files when started at their CCL entry point - ie offset 1 (eg tmpcor('edt',"Sfoobaz.pl$"), run(teco,1)).
See the TOPS10 manuals for more information on tmpcor files and CCL entry.
It is not known whether this facility will work under TOPS-20, as it relies on the TOPS-10 system call TMPCOR.

6. Initialisation

The interpreters initialisation sequence has been extended so that it is now possible to restore a previous save state. The sequence is now:

```
            If prolog.bin exists then restore('prolog.bin')
 otherwise  If prolog.ini exists then consult('prolog.ini')
 otherwise  start normally.
```

The evaluable predicate:

```
reinitialise
```

can be used to force these startup actions at any time.
This is a useful step after returing from a core_image. Eg:

```
?- core_image, display('My Program'), ttynl, reinitialise.
```

The prolog.bin facility is likely to be useful in conjunction with the run/2 evaluable predicate (see above),especially if you can set the other

program to run Prolog again when it finishes. For such uses the save/2 evaluable predicate should be used to save the state (into prolog.bin) since you will need to distinguish returning from the initial save, and the restore after Prolog is re-run.

7. Banners and copyright messages

A new convention for such messages has been set up. Prolog will display its own banner when initially run but not at any time after this (unless asked with 'version'). This allows your programs to display their own banners after restore, core_image and reinitialise.

The evaluable predicate

```
version
```

will display the banners (which probably includes copyright messages) for all the component parts of the current system.
The evaluable predicate

```
version(Mess)
```

adds a new message to Prolog's list of messages for component parts. Mess should be an atom. The standard Prolog starts with only one component part message (its own), but users can use version(Mess) to add their own as they build on top of previous systems. Note that this process is always incremental (messages cannot be removed).

8. Extra options for ^C and debugging

A few options have been added to the ^C handler and the debugging packages as follows:

^C handler

a	-	Will try and abort the interpreter as soon as possible

Debugging

x	-	The 'x' option should now work better (but not yet completely optimally)
;	-	redo: At an EXIT port, force a move to the REDO port
[	-	Consult user

9. Break levels

The interpreter now indicates your current break level (ie depth of nested breaks) by printing the break level before the final yes/no response to questions. Eg, at break level 2 this would look like:

```
| ?- true.

[2] yes
| ?-
```

At level 0 (top level) this indicator is ommited (and output looks the same as in previous versions).

10. Image Terminal Output

It is now possible to output image mode (8 bits) characters to the controlling terminal. Any call

```
ttyput(C)
```

with C>127 or C<0 will output the 8 low order bits of C to the terminal, bypassing the log file, and without buffering. Thus the following call will send all characters C, without altering or losing them:-

```
ttyput(8'300000+C)
```

Although, in theory, this facility makes the new system incompatible with previous ones, it is not expected that many existing programs will hit the incompatibility. The purpose of image mode terminal output is to make it possible to write certain graphics applications in Prolog. This way of implementing it is of course an unprincipled kludge, but it was felt that there wasn't enough demand for the facility to justify monopolising useful predicate names for this purpose.

... Print and Portray

The pretty print procedure 'print' has been redefined so that it will call portray at every level of the term being printed. So now print(X) will:

```
write out X if X is a variable (so portrays never have to
                                catch variables).
otherwise call portray(X)
    if this succeeds then assume X has been printed
    else recurse and print the rest of the term
        (unless X is atomic, in which case just write X).
```

So now print can be left to print most of the term, handling brackets, operators and so forth nicely - and you can just catch the bits you want done specially with portray.

.e that on lists ([_|_]) print will first give the whole list to portray, but after this it will only give each of the (top level) elements to portray. Ie, portray will not get all the tails thrown at it (this could be described as a 'MAPCAR' effect).

PRESS. BIB

```
@comment[ PRESS.BIB - Bibliography file for the Press Project ]

@string(DAI="Dept. of Artificial Intelligence, Edinburgh")
@string(IJCAI="International Joint Conference on Artificial Intelligence")
@string(IRIA="Institut de Recherche d'Informatique et d'Automatique")
@string(AISB="Society for the Study of
Artificial Intelligence and Simulation of Behaviour")

@comment{Marker for AAAaaa}

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   key = "Aubin",
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   title = "Some generalization heuristics in proofs by induction",
   booktitle = "Actes du Colloque Construction: Amelioration et verification
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   organization = "",
   editor = "Huet, G. and Kahn, G.",
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   omment{Marker for  BBBbbb}

@book{barnard,
   key = "Barnard and Child",
   author = "Barnard and Child",
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   author = "Bartlett",
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   key = "Belovari & Campbell",
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_/ PROLOG in symbolic computing",
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   title = "Application of mechanical theorem proving
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   organization = "C.N.R.S.",
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   author  = "Berliner, H.J.",
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   title = "Some necessary conditions for a master level chess program",
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   year = 1977,
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   author = "Bledsoe, W.W.",
   title = "The Sup-Inf method in Presberger Arithmetic",
   institution = "Math. Dept., U. of Texas",
   year = 1974,
   number = "ATP-18",
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@article(bledsoe-survey,
   key = "Bledsoe",
   author = "Bledsoe, W.W.",
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   month = "August")

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   author = "Bledsoe, W.W. and Bruell, P.",
   title = "A man machine theorem proving system",
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   booktitle = "Procs of IJCAI3",
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   editor = "Nilsson, N.",
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   title = "Variable elimination and chaining in a resolution-based
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   institution = "Math. Dept., U. of Texas",
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   title = "Natural Language input for a computer problem solving system",
   school = "MIT",
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   author = "Bobrow, D.G., Kaplan, R.M., Norman, D.A., Thompson, H.
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   title = "Gus, a frame-driven dialog system",
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   number = 1)

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   title = "Artificial Intellisence and Natural Man",
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@phdthesis(brazdilthesis,
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    title = "A model for error detection and correction",
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    key = "Brazdil",
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    booktitle = "AISB/GI",
    organization = AISB,
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    author = "Brown, F.M.",
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    year = "1977",
    note = "A shortened version appeared in IJCAI5",
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    number = 34,
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    title = "Artificial Intelligence and Learning Strategies",
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    author = "Bundy, A.",
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    pages = "pp 130-138")

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    note = "An expanded version is available from Edinburgh as DAI
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    year = "1975" )

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    institution = DAI,
    year = 1977,
    number = 45,
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    key = "Bundy",
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    author = "Bundy, A.",
    title = "Computational models for problem solving",
    publisher = "The Open Univ. Press",
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    booktitle = "Learning and Problem Solving (part 3)",
    note = "units 26-27 of the Open University Cognitive Psychology
    Course = D303")

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    author = "Bundy, A.",
    title = "An elementary treatise on equation solving",
    key = "Bundy",
    institution = DAI,
    type = "Working Paper",
    number = 51,
    year = "1979" )
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@techreport(OccPaper22,
   key = "Bundy",
   author = "Bundy, A.",
   title = "Additional AI1 problem solving notes",
   institution = DAI,
   year = 1980,
   number = 22,
   month = "September",
   type = "Occasional Paper")

 @TechReport(interval,
   key = "Bundy",
   author = "Bundy, A.",
   title = "A Generalized Interval Package and its use for Semantic
                Checking",
   institution = DAI,
   month = "March",
   year = 1981,
   type = "Working Paper",
   number = 86)

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   author "Bundy, A., Byrd, L., Luger, G., Mellish, C., Milne, R.
and Palmer, M.",
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   key = "Bundy et al",
   institution = DAI,
   type = "Working Paper",
   number = 50,
   year = "1979" )

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   author "Bundy, A., Byrd, L., Luger, G., Mellish, C., Milne, R.
and Palmer, M.",
   title = "Solving Mechanics Problems Using Meta-Level Inference",
   booktitle = "Procs of the sixth",
   organization = "IJCAI, Tokyo",
   note = "Also available from Edinburgh as DAI Research Paper No. 112",
   year = "1979")

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   key = "Bundy, Byrd and Mellish",
   author = "Bundy, A., Byrd, L. and Mellish, C.",
   title = "Special Purpose, but Domain Independent Inference Mechanisms",
   institution = DAI,
   month = "?",
   year = "1982",
   type = "Research Paper",
   number = 999,
   note = "Accepted for ECAI-82")

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   key = "Bundy and Silver",
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   title = "Homogenization:  Preparing Equations for Change of Unknown",
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   booktitle = "IJCAI7",
   editor = "Schank, R.",
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   note = "Longer version available from Edinburgh as DAI Research Paper
   No. 159",
   year = "1981")

@techreport(induct,
   key = "Bundy & Silver",
   author = "Bundy, A. and Silver, B.",
   title = "A critical survey of rule learning programs",
   institution = DAI,
   year = 1981,
   number = 169,
   type = "Research Paper",
   note = "To appear in Proceedings of ECAI, 1982")
@comment{note = "Submitted to the Artificial Intelligence Journal"}

@TechReport(impress,
   key = "Bundy and Sterling",
   author = "Bundy, A. and Sterling L.S.",
   title = "Meta-level Inference in Algebra",
   institution = DAI,
   month = "September",
   year = "1981",
   type = "Research Paper",
   number = 164,
   note = "Presented at the workshop on logic programming
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@TechReport(press,
   author = "Bundy, A. and Welham, B.",
   key = "Bundy and Welham",
   title = "Using meta-level descriptions for selective application of
multiple rewrite rules in algebraic manipulation",
   institution = DAI,
   year = 1979,
   type = "Working Paper",
   number = 55,
   month = "May" )

@article(meta,
   author = "Bundy, A. and Welham, B.",
   key = "Bundy and Welham",
   title = "Using meta-level inference for selective application of
multiple rewrite rules in algebraic manipulation",
   Journal = "Artificial Intelligence",
   year = 1981,
   volume = 16,
   number = 2)

@book(burnside,
   key = "Burnside and Panton",
   author = "Burnside, W.S. and Panton, A.W.",
   title = "The theory of equations",
   publisher = "Longmans, Green & Co.",
   year = 1881)

@inproceedings(byrd,
   key = "Byrd",
   author = "Byrd, L.",
   title = "Understanding the control flow of PROLOG programs",
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   booktitle = "Proceedings of the Logic Programming Workshop",
   year = 1980,
   editor = "Tarnlund, S.",
   pages = "127-38")

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   author = "Byrd, L. and Borning, A.",
   title = "Extending Mecho to Solve Statics Problems",
   organization = AISB,
   booktitle = "Proceedings of AISB-80",
   year = "1980",
   editor = "Hardy, S.",
   note = "Also available form Edinburgh as DAI Research Paper No. 137")

@techreport(version3,
   key="Byrd et al",
   author="Byrd L, Pereira F and Warren D",
   title="A guide to Version 3 of DEC-10 Prolog",
   institution="Dept of Artificial Intelligence, University of Edinburgh",
   number="Occasional Paper 19",
   year=1980,
   month="Jul")

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@book(cardan,
   key = "Cardan",
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   title = "The Great Art or the rules of Algebra",
   publisher = "The MIT Press",
   year = 1968,
   note = "Translated from the Italian (Ars Magna 1545) by Witmer, T.R")

@unpublished(carry,
   key = "Carry et al",
   author = "Carry L.R., Bernard, J. and Lewis, C.",
   title = "Psychology of Equation Solving: An information processing study",
   note = "A grant proposal to NSF in which it is proposed to use PRESS as the
  sis of a Psychological model",
   year = 1978)

@book(chang-lee,
   key = "Chang and Lee",
   author = "Chang C-L. and Lee R. C-T.",
   title = "Symbolic logic and mechanical theorem proving",
   publisher = "Academic Press",
   year = 1973)

@inproceedings(charniak,
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   author = "Charniak, E.",
   title = "Computer solution of calculus word problems",
   organization = "IJCAI",
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   year = "1969",
   editor = "Walker, D.E. and Norton, L.M.",
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@article(lambda,
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   key = "Church",
   author = "Church, A.",
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   pases = "56-68")

@TechReport(clark,
   key = "Clark",
   author = "Clark, K.L.",
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   month = "December",
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   number = "79/59")

@book(primer,
   key = "Clocksin and Mellish",
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   title = "Prosrammins in Prolos",
   year = 1981,
   publisher = "Springer Verlas")

@techreport(htsiwp,
   key = "Coelho et al",
   author = "Coelho, H., Cotta, J.C. and Pereira, L.M.",
   title = "How to solve it with PROLOG",
   institution = "Laboratorio Nacional de Ensenharia Civil",
   year = 1980)

@techreport(drasons,
   key = "Cohen",
   author = "Cohen, H.A.",
   title = "The art of snarins drasons",
   institution = "La Trobe University",
   year = 1974,
   note = "A revised version of LOGO Workins Paper No. 28 AI Lab MIT.")

@unpublished(cohen,
   key = "Cohen",
   author = "Cohen, H.A.",
   title = "Grokkins - The Martian way, Workshop XI",
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   note = "MIT undersraduate tutorial handout in which provins trisonometric
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@techreport(colmerauer,
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   title = "Un systeme de comunication homme-machine en Francais",
   institution = "Universite d'Aix Marseille",
   year = 1973,
   type = "Rapport")

@book(conte,
   key = "Conte and de Boor",
   author = "Conte, S.D. and de Boor, C.",
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    title = "Elementary Numerical Analysis",
    publisher = "McGraw-Hill Kogakusha",
    year = "1972")

@inproceedings(cooper,
    key = "Cooper",
    author = "Cooper, D.C.",
    title = "Theorem proving in arithmetic without multiplication",
    publisher = "Elsevier, New York",
    booktitle = "Mach. Intell. 7",
    year = 1972,
    editor = "Meltzer, B. and Michie, D.",
    pages = "pp 91-99")

@unpublished(cotton,
    key = "Cotton",
    year = 1977,
    note = "Letter describing plans to include instruction in PRESS
processes in remedial Mathematics CAI system",
    author = "Cotton, J.W.",
    title = "Personal communication")

@techreport(cotton-evans,
    key = "Cotton et al",
    author = "Cotton, J., Byrd, L. and Bundy, A.",
    title = "How can Alsebra steps be learned by students with
only arithmetic skills",
    institution = DAI,
    year = 1981,
    number = 84,
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@techreport(dahl,
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en vue de sa consultation en langue naturelle",
    institution = "Universite d'Aix Marseille",
    year = 1976,
    type = "Rapport")

@article(darlington,
    key = "Darlington",
    author = "Darlington J.",
    title = "An Experimental Program Transformation and Synthesis System",
    Journal = "Artificial Intellisence",
    volume = 16,
    year = 1981,
    pages = "1-46",
    number = 3,
    month = "August")

@article(mycin,
    key = "Davis et al",
    author = "Davis, R., Buchanan, B.G. and Shortliffe, E.H.",
    title = "Production rules as a representation for a knowledge-based
consultation program",
    Journal = "Artificial Intellisence",
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   year = 1977,
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   volume = 8)

@inproceedings(teiresias,
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   author = "Davis, R. and Buchanan, B.G.",
   title = "Meta-level knowledge: overview and applications",
   organization = "IJCAI",
   booktitle = "Procs of 5th",
   year = "1977",
   editor = "Reddy, R.",
   pages = "920-927")

@techreport(logoprimer,
   key = "du Boulay and O'Shea",
   author = "du Boulay, B. and O'Shea, T.",
   title = "How to work the LOGO machine",
   institution = DAI,
   year = 1976,
   number = 4,
   month = "November",
   type = "Occasional Paper")

@inproceedings(metaprimer,
   key = "du Boulay and O'Shea",
   author = "du Boulay, B and O'Shea, T.",
   title = " Seeing the works: A strategy for teaching interactive programming"
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   organization = "",
   booktitle = "Proceedings of the Workshop on Computing Skills and
Adaptive Systems",
   year = 1978,
   address = "Liverpool",
   month = "March",
   note = "also available as DAI working paper no. 28")

@article(duboulay,
   key = "du Boulay",
   author = "du Boulay, B.",
   title = "Teaching teachers mathematics through programming",
   Journal = " International Journal of mathematics Education in
Science and Technology",
   year = 1979,
   note = " also available as DAI Research Paper no. 113")

@TechReport(dekleer,
   key = "De Kleer",
   author = "De Kleer, J.",
   title = "Qualitative and quantitative knowledge in classical mechanics",
   institution = "MIT AI Lab",
   year = "1975",
   type = "AI-TR-352")

@book(brainstorms,
   key = "Dennett",
   author = "Dennett, D.C.",
   title = "Brainstorms: Philosophical Essays on Mind and Psychology",
   publisher = "Harvester Press",
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   year = 1979)

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   key = "Evans",
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   journal = "J.S.C.C.",
   year = 1964,
   month = "April")

@comment{Marker for  FFFfff}

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   key = "Fateman",
   author = "Fateman, R.J.",
   title = "Essays in Algebraic Simplification",
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   note = "also available as MAC TR-95")

@InProceedings(feisenbaum,
   key = "Feisenbaum",
   author = "Feisenbaum, E. A.",
   title  = "Themes and case studies of Knowledge Engineering",
   publisher = "Edinburgh Univ. Press",
   booktitle = "Expert systems in the micro-electronic age",
   year = 1979,
   editor = "Michie, D.",
   pages = "3-25")

@techreport(friend,
   key = "Friend",
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   title = "Programs students write",
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   number = 257)

@MastersThesis(funt,
   key = "Funt",
   author = "Funt, B. V.",
   title = "A procedural approach to constructions in Euclidean geometry",
   school = "University of British Columbia",
   month = "October",
   year = 1973)

@inProceedings(futo,
   key = "Futo et al",
   author = "Futo, I., Darvas, F. and Szeredi, P.",
   title = "The application of PROLOG to the development
of QA and DBM systems",
   booktitle = "Logic and databases",
   organization = "Plenum Press, New York",
   pages = "pp 347-375",
   editor = "Gallaire, H. and Minker, J.",
   year = 1978)
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   year = 1963,
   editor = "Feisenbaum and Feldman",
   booktitle = "Computers and Thousht",
   pases = "134-52")

@inbook(selernter2,
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   author = "Gelernter, H. et al",
   title = "Empirical explorations of the Geometry theorem-provins machine",
   publisher = "McGraw Hill",
   year = 1963,
   editor = "Feisenbaum and Feldman",
   booktitle = "Computers and Thousht",
   pases = "153-63")

@article(silmore-method,
   key = "Gilmore",
   author = "Gilmore, P.C.",
   title = "A proof method for quantificational theory",
   journal = "IBM J Res. Dev.",
   year = 1960,
   pases = "28-35",
   volume = 4)

@article(Gilmore,
   key = "Gilmore",
   author = "Gilmore, P.C.",
   title = "An examination of the Geometry theorem-provins machine",
   journal = "Artificial Intellisence",
   volume = 1,
   year = 1970,
   pases = "171-87")

@PhDThesis(soldbers,
   key = "Goldbers",
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   title = "Computer assisted instruction: The application
of theorem provins to adaptive response analysis",
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   month = "May",
   year = 1973,
   note = "Also published as IMSSS Stanford Technical Report 203")

@TechReport(soldstein,
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   number = 280)

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   key = "Good & London",
   author = "Good, D.I. and London, R.L.",
   title = "Computer interval arithmetic: definition and proof of correct
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   journal = "JACM",
   year = 1970,
   volume = 17,
   number = 4,
   pages = "603-612")

@book(lcf,
   key = "Gordon et al",
   author = "Gordon M.J., Milner A.J., and Wadsworth C.P.",
   title = "Edinburgh LCF - A mechanised logic of computation",
   publisher = "Springer Verlag",
   year = 1979,
   series = "Lecture Notes in Computer Science",
   volume = 78)

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@book(halliday,
   key = "Halliday",
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   title = "Physics",
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@MastersThesis(hammond,
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   author = "Hammond, P.",
   title = "Logic Programming for Expert Systems",
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   year = "1980")

@article(haviland,
   key = "Haviland et al",
   author = "Haviland, S.E. and Clark, H.H.",
   title = "What's new? Acquiring new information as a process in
 comprehension",
   journal = "Journal of Verbal Learning and Verbal Behaviour",
   volume = 13,
   pages = "512-521",
   year = 1974)

@inproceedings(solux,
   key = "Hayes",
   author = "Hayes, P",
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   organization = "Czech. Academy of Sciences",
   booktitle = "Proc. of MFCS Symposium",
   year = 1973)

@inbook(hearn,
   key = "Hearn",
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   title = "REDUCE: A user-oriented interactive system for
Algebraic simplification",
   publisher = "Academic Press, New York",
   year = "1967",
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   booktitle = "Interactive systems for experimental Applied Mathematics",
   pages = "79-90")

@incollection(herbrand,
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   title = "Researches in the theory of demonstration",
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1879-1931",
   publisher = "Harvard Univ. Press",
   year = 1930,
   address = "Cambridge, Mass",
   editor = "van Heijenoort, J",
   pages = "525-81")

@techreport(lushres,
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@article(howe,
   key = "Howe and O'Shea",
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   title = "Learning Mathematics through LOGO",
   journal = "SIGCUE Bulletin",
   year = 1978,
   number = 12)

@TechReport(huet74,
   key = "Huet",
   author = "Huet, G.P.",
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   year = 1974,
   type = note de travail,
   number = "A 055",
   month = March)

@TechReport(huet,
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to term rewriting systems",
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IRIA, France",
   month = "August",
   type = "Rapport de Recherche",
   number = 250,
   year = "1977")

@book(humphrey,
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    year = "1957")

@book(hofstadter,
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@book(kleene,
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    year = 1967)

@InCollection(knuth-bendix,
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    author = "Knuth, D.E. and Bendix, P.B.",
    title = "Simple word problems in universal algebra",
    booktitle = "Computational problems in abstract algebra",
    publisher = "Pergamon Press",
    year = 1970,
    editor = Leech, J.",
    pages = "pp 263-297")

@TechReport(kowalski,
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    author = "Kowalski, R.",
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    number = 75,
    year = 1974)

@book(kowalskibook,
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    publisher = "North Holland",
    year = 1979)

@TechReport(kowalski-hayes,
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    institution = DAI,
    year = 1974)

@article(slres,
    key = "Kowalski and Kuehner",
    author = "Kowalski, R.A. and Kuehner, D.",
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   journal = "Artificial Intelligence",
   year = 1971,
   volume = 2,
   pages = "227-60")

@comment{Marker for  LLL111}

@book(lakatos,
   key = "Lakatos",
   author = "Lakatos, I.",
   title = "Proofs and refutations: The logic of Mathematical discovery",
   publisher = "Cambridge University Press",
   year = 1976)

@techreport(lansley,
   key = "Lansley",
   author = "Lansley, P.",
   title = "Language acquistion through error recovery",
   institution = "Carnegie-Mellon University",
   year = 1981,
   number = 432,
   month = "June",
   type = "CIP Working Paper")

@TechReport(larkin,
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 California",
   year = "1977")

@TechReport(larkinMcD,
   key = "Larkin",
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   year = "1978")

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   year = "1979")

@PhDThesis(lenat,
   key = "Lenat",
   author = "Lenat D.B.",
   title = "AM: An Artificial Intelligence approach to discovery in
Mathematics as Heuristic Search",
   school = "Stanford",
   month = "July",
   year = 1976,
   note = "Available from Stanford as TechReport AIM 286")

@book(loveland,
   key = "Loveland",
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   title = "Automated theorem proving: A logical basis",
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    publisher = "North Holland",
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    series = "Fundamental studies in Computer Science",
    volume = 6)

@article(overbeek,
    key = "Lusk and Overbeek",
    author = "Lusk, E. and Overbeek, R.",
    title = "Experiments with Resolution-based theorem-proving algorithms",
    journal = "Comp. Math. with Appls",
    year = "to appear 1980")

@comment{Marker for  MMMmmm}

@book(lispmanual,
    key = "McCarthy et al",
    author = "McCarthy, J., Abrahams, P.W., Edwards, J.E., Hart, T.P. and
Levin, M.J.",
    title = "LISP 1.5 Programmers Manual",
    publisher = "The MIT Press",
    year = 1962)

@article(mcdermott,
    key = "McDermott",
    author = "McDermott, D.",
    title = "Artificial Intelligence meets natural stupidity",
    Journal = "Sigart Newsletter",
    year = 1976,
    number = 57,
    month = "April")

@techreport(non-mono,
    key = "McDermott & Doyle",
    author = "McDermott, D. and Doyle, J",
    title = "Non-Monotonic Logic I",
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    year = 1978,
    number = 486,
    month = "August",
    type = "AI Memo")

@TechReport(macsyma,
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    author = "Mathlab Group",
    title = "MACSYMA Reference Manual",
    institution = "MIT",
    year = "1977")

@inproceedings(markusz,
    key = "Markusz",
    author = "Markusz, Z.",
    title = "How to design variants of flats using the programming
language PROLOG based on mathematical logic",
    booktitle = "Proc. IFIP 77",
    organization = "North Holland",
    pages = "pp 885-889",
    year = 1977)

@TechReport(marples,
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   author = "Marples, D.",
   title = "Arsument and technique in the solution of problems in Mechanics
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   year = "1974",
   type = "CUED/C-Educ/TRI")

@inproceedinss(martin,
   key = "Martin and Fateman",
   author = "Martin, W.A. and Fateman, R.J.",
   title = "The MACSYMA system",
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   booktitle = "2nd Symposium on Symbolic Manipulation",
   year = "1971",
   editor = "Petrick, S.R.",
   pases = "59-75")

@techreport(mellish,
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   number = 48,
   type = "Workins Paper")

@phdthesis(mellish2,
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   title = "Copins with uncertainty: Noun phrase interpretation and
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   school = "Dept of Artificial Intellisence, University of
      Edinbursh",
   year = 1980)

@inproceedinss(meltzer,
   key = "Meltzer",
   author = "Meltzer, B.",
   title = "The use of Symbolic Losic in provins Mathematical theorems
by means of a disital computer",
   orsanization = "Sprinser Verlas",
   booktitle = "Foundations of Mathematics: Symposium papers
commemoratins the sixtieth birthday of Kurt Godel",
   year = 1969,
   editor = Bulloff, J.J., Holyoke, T.C. and Hahn, S.W.",
   pases = "39-45",
   note = "Also available from Edinbursh as DCL Memo No. 21")

@book(mendelson,
   key = "Mendelson",
   author = "Mendelson, E.",
   publisher = "van Nostrand Reinhold Co.",
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@PhDThesis(moorethesis,
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   title = "Computational Logic: Structure sharing and proof of
program properties, part II",
   institution = "Univ. of Edinburgh",
   year = 1974,
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from Xerox PARC, Palo Alto as CSL 75-2.")

@techreport(merlin,
   key = "Moore and Newell",
   author = "Moore, J. and Newell, A.",
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   year = 1973)

@techreport(milne,
   author = "Milne, R.",
   key = "Milne",
   title = "A Framework for Deterministic Parsing Using Syntax and Semantics",
   institution = "Department of Artificial Intellisence, University of
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   year = 1980,
   number = 64,
   type = "Working Paper")

@inproceedings(milne2,
   key = "Milne",
   author = "Milne, R.",
   year = 1980,
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   organization = "AISB",
   booktitle = "AISB 80 Conference Proceedings")

@inproceedings(milne3,
   key = "Milne",
   author = "Milne, R.",
   year = 1980,
   title =  "Parsing Against Lexical Ambiguity",
   booktitle = "Proceedings for COLING 80",
   organization = "")

 -hdthesis(Mitchellthesis,
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  author = "Mitchell, T.M.",
  title = "Version Spaces: An approach to concept learning",
  school = "Stanford University",
  year = 1978)

@inproceedings(mitchell,
   key = "Mitchell et al",
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   title = "Learning problem-solving heuristics through practice",
   booktitle = "IJCAI-81",
   organization = IJCAI,
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@techreport(chat,
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   author="Warren D H D, Pereira L M and Pereira F",
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   author = "Warren, D",
   title = "An Improved Prolog Implementation which optimises tail recursion",
   organization = "",
   booktitle = "Proceedings of the Logic Programming Workshop",
   year = 1980,
   editor = "Tarnlund, S.",
   note = "Also available as DAI Research Paper 141")

@inproceedings(alternative,
   key        =  "Mellish",
   title      =  "An alternative to structure sharing in the implementation of
                  a Prolog interpreter",
   author     =  "Chris Mellish",
   organization = "",
   booktitle = "Proceedings of the Logic Programming Workshop",
   year = 1980,
   editor = "Tarnlund, S.",
   note = "Also available as DAI Research Paper 151")

@inproceedings(flow,
   key = "Byrd",
   author = "Byrd, L.",
   title = "Understanding the control flow of PROLOG programs",
   organization = "",
   booktitle = "Proceedings of the Logic Programming Workshop",
   year = 1980,
   editor = "Tarnlund, S.",
   pages = "127-38",
   note = "Also available as DAI Research Paper 150")

@inproceedings(MI10,
   key="Warren D H D",
   author="Warren D H D",
   title="Higher-order extensions to Prolog - are they needed?",
   booktitle="Tenth International Machine Intelligence Workshop,
              Cleveland, Ohio",
   publisher="",
   year=1981,
   month="Apr",
   note = "Also available as DAI Research Paper 154")

@misc(debrecen,
   key="Tarnlund",
   author="Tarnlund S-A (ed.)",
   title="Proceedings of the 1980 Logic Programming Workshop,
         Debrecen, Hungary",
   howpublished="[Dept of Computer Science, University of Stockholm]",
   year=1980,
```

```
   month="Jul")

@article(alc,
   key="Kowalski",
   author="Kowalski R A",
   title="Algorithm = logic + control",
   journal="CACM",
   volume=22,
   number=7,
   pages="424-436",
   year=1979,
   month="Jul")

@book(KowalskiBook,
   title = "Logic for Problem Solving",
   author = "Robert Kowalski",
   key = "Kowalski",
   publisher = "North Holland",
   year = 1979)

@book(solveit,
   key="Coelho et al",
   author="Coelho H, Cotta J C and Pereira L M",
   title = "How to solve it with Prolog",
   publisher="Laboratorio Nacional de Engenharia Civil, Lisbon",
   year=1980)

@book(primer,
   key = "Clocksin and Mellish",
   author = "Clocksin, W.F. and Mellish, C.S.",
   title = "Programming in Prolog",
   year = "in preparation",
   publisher = "")



@Comment[ Prolog & NL in Edinburgh ]

@article(dcgs,
   key="Pereira & Warren",
   author="Pereira F C N and Warren D H D",
   title="Definite clause grammars for language analysis
          - a survey of the formalism and a comparison with
          augmented transition networks",
   journal="Artificial Intelligence",
   volume=13,
   pages="231-278",
   year=1980,
   note="Also available as DAI Research Paper 116")

@inProceedings(xgs,
   key="Pereira",
   title="Extraposition Grammars",
   author="Pereira F",
   Booktitle="Proceedings of the Logic Programming Workshop",
   editor="Stan-Ake Tarnlund",
   year=1980,
   month="Jul",
   note="Held in Debrecen, Hungary")
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@techreport(cannes,
   key="Warren",
   author="Warren D H D",
   title="Efficient processing of interactive relational database queries
          expressed in logic",
   institution=DAI,
   type = "Research Paper",
   number = 156,
   year=1981,
   note="[To be submitted to the 1981 Conf on Very Large Databases]")

@techreport(chat80,
   key="Warren & Pereira",
   author="Warren D H D and Pereira F C N",
   title="An efficient easily adaptable system for interpreting natural
          language queries",
   institution=DAI,
   type = "Research Paper",
   number = 156,
   year=1981,
   note="[To be submitted to IJCAI-81]")


@Comment[ Other Prolog systems ]

@techreport(unixprolog,
   key = "Clocksin & Mellish",
   author= "Clocksin W F and Mellish C S",
   title = "The UNIX Prolog System",
   institution = DAI,
   type = "Software Report",
   number = 5,
   year = 1980,
   month = "September")

@mastersthesis(roberts,
   key="Roberts",
   author="Roberts G M",
   title="An implementation of Prolog",
   school="Dept of Computer Science, Univ of Waterloo, Canada",
   year=1977)

@inproceedings(cdlprolog,
   key="Szeredi",
   author="Szeredi P",
   title="Prolog - a very high level language based on predicate logic",
   booktitle="2nd Hungarian Conference on Computer Science, Budapest",
   year="1977",
   month=Jun)

@inproceedings(icprolog,
   key="Clark",
   author="Clark K",
   title="The control component of a logic program",
   booktitle="Expert Systems in the Micro-Electronic Age",
   editor="Michie D",   year=1979,
   month=Jul)

@misc(emasprolog,
   key="Damas",
```

```
   author="Damas L",
   title="[Information about EMAS Prolog is available from its author]",
   howpublished="Dept of Computer Science,  University of Edinburgh")

@book(fortran,
   key="Battani and Meloni",
   author="Battani G and Meloni H",
   title="Interpreteur du langage de programmation Prolog",
   publisher=marsai,
   address=luminy,
   year=1973)

@book(bruynooghe,
   key="Bruynooghe",
   author="Bruynooghe M",
   title="An interpreter for predicate logic programs : Part 1",
   publisher="Applied Maths & Programming Division",
   address="Katholieke Univ Leuven, Belgium",
   year=1976,
   month=oct,
   note="Report CW 10")


@Comment[ More remote papers ]

@techreport(mastermind,
   key = "Emden",
   author = "van Emden M H",
   title = "Relational programming illustrated by a program for the game
of Mastermind",
   institution = "Dept. of Computer Science, University of Waterloo",
   number = "Report CS-78-48",
   year = 1978)

@techreport(permont,
   key = "Pereira and Monteiro",
   author = "Pereira L M and Monteiro L F",
   title = "The semantics of parallelism and co-routining in logic programming",
   institution = "Div. Informatica, L.N.E.C., Lisbon",
   number = "Proc. 03/13/5570",
   year = 1978,
   note = "Presented at Colloquium on Mathematical Logic in Programming,
Salgotarjan, Hungary, September 1978")

@techreport(lush,
   key = "Hill",
   author = "Hill R",
   title = "LUSH resolution and its completeness",
   institution = DAI,
   number = "DCL Memo 78",
   year = 1974)

@techreport(plasp1,
   author = "Kowalski R A",
   title = "Predicate Logic as Programming Language",
   key = "Kowalski",
   institution = DAI,
   number = "DCL Memo 70",
   year = 1973,
   note = "Appears in Procs. IFIP 1977")
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@techreport(alsol68moss,
   author = "Moss C D S",
   title = "A New Grammar for Alsol 68",
   key = "Moss",
   institution = "Dept. of Computing and Control, Imperial College, London",
   number = "Report 79/6",
   year = 1979)

@techreport(warrlan,
   author = "Warren D H D",
   title = "A System for Generating Plans",
   key = "Warren",
   institution = DAI,
   number = "DCL Memo 76",
   year = 1974)

@techreport(earleyded,
   author = "Warren D H D",
   title = "Implementation of an Efficient Predicate Logic Interpreter Based
on Earley Deduction",
   key = "Warren",
   institution = DAI,
   number = "Research Proposal to the Science Research Council",
   year = 1975)

@techreport(emden75,
   author = "van Emden M H",
   title = "Programming with Resolution Logic",
   key = "Emden",
   institution = "Dept. of Computer Science, University of Waterloo",
   number = "Report CS-75-30",
   year = 1975)

@techreport(emden77,
   author = "van Emden M H",
   title = "Computation and Deductive Information Retrieval",
   key = "Emden",
   institution = "Dept. of Computer Science, University of Waterloo",
   number = "Report CS-77-16",
   year = 1977)

@techreport(andreka,
   author = "Andreka H and Nemeti I",
   title = "The Generalised Completeness of Horn Predicate Logic as a
Programming Language",
   key = "Andreka and Nemeti",
   institution = DAI,
   number = "Research Report 21",
   year = "1976")

@book(dwissins,
   key="Dwissins",
   author="Dwissins D L",
   title="A knowledge-based automated message understanding methodology
          for an advanced indications system",
   publisher="Operating Systems Inc, 21031 Ventura Boulevard, Woodland Hills,
             California 91364",
   year=1979,
   month=feb,
```

```
    note="Technical Report R79-006"),

@book(motorola,
    key="Colmerauer et al.",
    author="Colmerauer A, Kanoui H and van Caneghem M",
    title="Etude et realisation d'un systeme Prolog",
    publisher=marsai,
    address=luminy,
    year=1979,
    month=may)

@inproceedings(warplanc,
    key="Warren",
    author="Warren D H D",
    title="Generating conditional plans and programs",
    organization="AISB Summer Conference, Edinburgh",
    year=1976,
    month=Jul)

@inproceedings(compded,
    key = "Hayes",
    author = "Hayes P J",
    title = "Computation and Deduction",
    organization = "MFCSS Conference, Czechoslovakian Academy of Sciences",
    year = 1973)

@techreport(cordell,
    key = "Green",
    author = "Green C",
    title = "The application of theorem proving to question-answering systems",
    institution = "Artificial Intelligence Group, Stanford Research Institute",
    number = "Technical Note 8",
    year = 1969)

@article(vncomputer,
    key="Backus",
    author="Backus J",
    title="Can programming be liberated from the von Neumann style?",
    Journal="CACM",
    Volume="21",
    number="8",
    pages="613-641",
    year=1978,
    month=aug)

@book(sycophante,
    key="Bergman and Kanoui",
    author="Bergman M and Kanoui H",
    title="Sycophante: Systeme de calcul formel et d'interrogation symbolique
           sur l'ordinateur",
    publisher=marsai,
    address=luminy,
    year=1975,
    month=oct)

@book(inlsubset,
    key="Colmerauer",
    author="Colmerauer A",
    title="An interesting natural language subset",
    publisher=marsai,
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```
   address=luminy,
   year=1977,
   month=oct,
   note="[To appear in CACM]")

@misc(darvas,
   key="Darvas et al.",
   author="Darvas F, Futo I and Szeredi P",
   title="Logic based program system for predicting drug interactions",
   howpublished="Int. J. of Biomedical Computing, 1977")

@inproceedings(markusz,
   key="Markusz",
   author="Markusz Z",
   title="Designing variants of flats",
   organization="IFIP Conference",
   year=1977)

@article(unification,
   key="Robinson J A",
   author="Robinson J A",
   title="A machine-oriented logic based on the resolution principle",
   journal="JACM",
   volume=12,
   number=1,
   pages="227-234",
   year=1965,
   month=dec)

@mastersthesis(scheme,key="Steele",year=1978,month=may,
   author="Steele G L",
   title="RABBIT: A Compiler for SCHEME",
   school="MIT",
   note="AI-TR-474")

@book(prolog,
key="Roussel",author="Roussel P",year=1975,
title="Prolog : Manuel de Reference et d'Utilisation",
publisher=marsai,
address=luminy)

@inbook(mgg,
key="Colmerauer",
author="Colmerauer, A.",
title="Metamorphosis Grammars",
publisher="Springer-Verlag",
year=1978,
editor="L .Bolc",
booktitle="Natural Language Communication with Computers",
note="First appeared as an internal report, 'Les Grammaires de Metamorphose',
in November 1975")

@book(dahl,
key="Dahl",
author="Dahl, V.",
title="Un systeme deductif d'interrogation de banques de donnees en
Espagnol",
publisher=marsai,
address=luminy,
year=1977)
```

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@techreport(mecho,
   author "Bundy, A., Byrd, L., Luser, G., Mellish, C., Milne, R.
and Palmer, M.",
   title = "Mecho: A program to solve Mechanics problems",
   key = "Bundy et al",
   institution = DAI,
   number = "Working Paper No. 50",
   year = "1979" )

@Inproceedings(metamecho,
   author = "Bundy, A., Byrd, L., Luser, G., Mellish, C., Palmer, M.",
   title  = "Solving mechanics problems using meta-level inference",
   key    = "Bundy et al",
   booktitle = "Proceedings of the 6th",
   organization = IJCAI,
   year   = 1979,
   pages  = "1017-1027",
   note   = "Also available as DAI research paper 112" )

@techreport(grant,
   key = "Welham and Bundy",
   author = "Welham, R and Bundy, A.",
   title = "Equation solving: A progress report",
   institution = DAI,
   year = "1978",
   number = "Working Paper No. 29",
   month = "June")

@article(press,
   author = "Bundy, A. and Welham, B.",
   key = "Bundy and Welham",
   title = "Using meta-level inference for selective application of
multiple rewrite rules in algebraic manipulation",
   Journal = "Artificial Intelligence",
   year = "in press 1981",
   note="Also available as DAI Research Paper 121")

@techreport(eder,
   title = "A Prolog-like Interpreter for non-horn Clauses",
   author = "Eder, Gottfried.",
   year = "1976",
   key = "Eder",
   number = "Research Report no. 26",
   institution = DAI)

@techreport(geom1,
   title = "Geometry Problem Solving",
   author = "Welham, Bob.",
   year = "1976",
   key = "Welham",
   number = "Research Report no. 14",
   institution = DAI)

@techreport(geom2,
   title = "GEOM : A Prolog Geometry Theorem Prover",
   author = "Coelho, H., Pereira, L.M.",
   year = "1976",
   key = "Coelho et al",
   institution = "National Laboratory of Civil Engineering, Lisbon, Portugal")
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```
@techreport(Tarnlund,
   title = "Logic Information Processing",
   author = "Tarnlund, Sten-Ake.",
   year = "1975",
   key = "Tarnlund",
   institution = "Dept. Computer Science, University of Stockholm, Sweden")

@Inproceedings(Gallaire,
   title = "Issues in controlling a deduction process in a declarative mode.",
   author = "Gallaire, H., Lasserre, C.",
   year = "1979",
   key = "Gallaire et al",
   organization = IJCAI)


@techreport(bruynooghe78,
   key = "Bruynooghe",
   author = "Bruynooghe M",
   title = "Intelligent Backtracking for an Interpreter of Horn Clause Logic
Programs",
    nstitution = "Afdeling Toegepaste Wiskunde en Programmatie,
Katholieke Universiteit Leuven, Belgium",
   number = "Report CW 16",
   year = 1978,
   note = "Presented at Colloquium on Mathematical Logic in Programming,
Salgotarjan, Hungary, September 1978")

@techreport(gus,
   author = "Mellish, C.",
   title = "An approach to the GUS travel agent problem using PROLOG",
   year = "1977",
   key = "Mellish",
   institution = DAI,
   number = "Working Paper No. 19",
   month = "February")
```

```
@Comment[ HPSLET.MAK                HPSLetter

        Special letter format for use with HPS large paper.
        This should be used with the device AJ12Letter.
        See HPSLET.HLP for documentation.

                                                Updated: 3 September 81
]

@Marker(Make,HPSLetter)
@Style(Spacing 1,Spread 1,Indentation 3)
@Set(Page = 1)

@Define(Ends, Nofill, LeftMargin 0, RightMargin 0,
        Break, Spaces Kept, BlankLines Kept)
@Define(Body, Fill, LeftMargin 0, RightMargin 0,
        Break, Above 1, Below 1,
        Spaces Compact, BlankLines Break)
@Define(Annotations,Nofill,LeftMargin 0,Break,BlankLines Kept,
        RightMargin 0,Spaces Kept,fixed -4)
@Equate(Annotation=Annotations)
  .fine(PS=Body,Above 1,Below 1)
@Define(Bye=Ends,LeftMargin 4inches,Above 2)

@String(Ext='')
@TextForm(Top=
"



                        @Parm(Ext,default=@Value(Ext))

    @Parm(Date,default='@Value(Date)')


")
@TextForm(Dear = "
 Dear @Parm(text),
@Begin(body,EofOK)
")
 Textform(Sincerely=
 @Begin(Bye)
 Yours Sincerely,



  @Parm(text)
@End(Bye)
")
@Begin(Text,Font CharDef,FaceCode R,EofOK)
@Begin(Ends,EofOK)
```

```
@Comment[ MYHPSL.MAK                HPSLetter

                Lawrence's version of HPSLET.MAK

                                                    Updated: 3 September 81
]

@marker(Make,MyHPSLetter)
@string(Ext='6296')

@comment[ Stuff from HPSLET: ]

@Style(Spacing 1,Spread 1,Indentation 3)
@Set(Page = 1)

@Define(Ends, Nofill, LeftMargin 0, RightMargin 0,
        Break, Spaces Kept, BlankLines Kept)
@Define(Body, Fill, LeftMargin 0, RightMargin 0,
        Break, Above 1, Below 1,
        Spaces Compact, BlankLines Break)
@Define(Annotations,Nofill,LeftMargin 0,Break,BlankLines Kept,
        RightMargin 0,Spaces Kept,fixed -4)
@equate(Annotation=Annotations)
@Define(PS=Body,Above 1,Below 1)
@Define(Bye=Ends,LeftMargin 4inches,Above 2)

@TextForm(Top=
"


                        @Parm(Ext,default=@Value(Ext))

    @Parm(Date,default='@Value(Date)')


")
@TextForm(Dear = "
 Dear @Parm(text),
@Begin(body,EofOK)

@Textform(Sincerely=
"@Begin(Bye)
 Yours Sincerely,



  @Parm(text)
@End(Bye)
")

@comment[ new stuff: ]

@Textform(MySincerely="@Sincerely(Lawrence Byrd)")
@Textform(Lawrence="@Sincerely(Lawrence Byrd)")

@Begin(Text,Font CharDef,FaceCode R,EofOK)
@Begin(Ends,EofOK)
@Top()
```

```
@Comment[ AJ12LE.DEV                AJ12Letter

        Device definition for the AJ using a 12 point pitch mounted
        with HPS large size headed paper. This is really only an
        adjusted LPT definition so it is not clever about the AJ
        in any way.

        Most environments have been fixed to Above 1 and Below 1 as well.

                                                    Updated: 3 September 81
]

@Marker(Device,AJ12Letter)

@Declare(DeviceTitle="Anderson Jacobson",
         GenericDevice="LPT",
         FinalName="#.MEM")
@Declare(Driver LPT,Hunits inch,Hraster 12,Vunits inch,Vraster 6)
@Declare(Overstrike available,Barecr available)
@Declare(Underline Available,UnderScoreCharacter="_")
@Declare(ScriptPush Yes)
  ase(Draft,
    1 "@Declare(TopMargin 0,
                BottomMargin 0,
                LeftMargin 0,
                LineWidth 72,
                PaperLength 58)
        @Message( ** Draft ** )
",
    else "@Declare(TopMargin 1inch,
                BottomMargin 1.2inches,
                LeftMargin .8inches,
                LineWidth 6.8inches,
                PaperLength 11.3inches)
          @Declare(Backspace available)
" )

@DefineFont(CharDef,R=<ascii "LPT">,Y=<ascii "YLPT">)
@DefineFont(UserFont)
@Define(C,Capitalized,TabExport)
 efine(R,Underline off,Capitalized off,Overstruck 0,TabExport)
Define(I,Underline Alphanumerics,Capitalized off,TabExport)
@Define(Y,FaceCode Y)
@Define(B,Overstruck 2,Capitalized off,TabExport)
@Define(P,Use B,Use I,TabExport)
@Define(U,Underline NonBlank,TabExport)
@Define(UN,Underline Alphanumerics,TabExport)
@Define(UX,Underline All,TabExport)
@Define(Plus,Script +1,TabExport)
@Define(Minus,Script -1,TabExport)
@Define(W,Spaces NoBreak,TabExport)
@Define(F0,TabExport)@Define(F1,TabExport)@Define(F2,TabExport)
@Define(F3,TabExport)@Define(F4,TabExport)@Define(F5,TabExport)
@Define(F6,TabExport)@Define(F7,TabExport)@Define(F8,TabExport)
@Define(F9,TabExport)
@Define(T=R)
@Equate(G=noop,Z=noop,A=noop,V=C)

@Counter(Page,Numbered <@1>,Referenced <@1>,Init 1)
@Define(Hds,Fixed 0,Nofill,LeftMargin 0,RightMargin 0,Spread 0,Indent 0,
```

```
          Spacing 1,
          UnNumbered,Underline off,Use R,Initialize "@TabClear()",
          TabExport False)
@Define(Fts=Hds,Fixed -1)
@Define(Text,Fill,Justification,Spaces compact,Break)
@Define(Multiple,Indent 0,SpecialCase OpenBefore)
@Define(Transparent)
@Define(Group,Group,Break)
@Define(Float,Float,Break)
@Define(Bpage,FloatPage,Break,Continue)
@Define(Pspace,Break,Above 0,Below 0,Group,Nofill,LeftMargin 0,RightMargin 0)
@Define(Verbatim,Break,Continue,Nofill,Spaces Kept,
          Above 1,Below 1,BlankLines kept,Spacing 1)
@Define(Format,Break,Continue,Nofill,Spaces Kept,
          Above 1,Below 1,
          BlankLines kept,Spacing 1,Justification off)
@Define(Insert,Break,Continue,Above 1,Below 1,LeftMargin +4,RightMargin +4,
          spacing 1,BlankLines kept)
@Define(Center,Break,Continue,Above 1,Below 1,Spacing 1,
          LeftMargin 0,RightMargin 0,TabExport False,
          Centered,BlankLines kept,Initialize "@TabClear()")
  efine(Flushright=center,FlushRight)
@Define(Flushleft=Format,LeftMargin 0)

@Define(MajorHeading,Use Center,Continue off,Use B,Use C,Need 1inch,
          TabExport False)
@Define(Heading,Use Center,Continue off,Use B,Use C,Need 0.8inch,
          TabExport False)
@Define(SubHeading,Use Insert,Indent 0,LeftMargin 0,Continue off,Use UX,
          Need 0.7inch,TabExport False)
@Define(Display,Use Insert,Nofill,Use R,Group,Blanklines Kept,Spaces Kept,
          TabExport False)
@Define(Example,Use Insert,Nofill,Spaces Kept,Group,Blanklines Kept)
@define(FileExample,Break,CRbreak,LeftMargin 16,Justification Off,
          Spaces Kept,LeadingSpaces Kept,Fill,BlankLines Kept,Indent -10,
          Spacing 1,Spread 0,Above 1,Below 1)
@Define(OutputExample=Verbatim,LeftMargin 2)
@Equate(InputExample=OutputExample)
@Define(ProgramExample=Example)

  efine(Itemize,Break,Continue,Fill,LeftMargin +5,Indent -5,
          RightMargin 5,numbered <- @,* >,NumberLocation lfr,
          BlankLines break,Spacing 1,Above 1,Below 1,Spread 1)
@Define(Enumerate,Use Itemize,LeftMargin +6,Indent -6,
          Numbered <@1. @,@a. @,@i. >)
@Define(Description,Break,Continue,Fill,Above 1,Below 1,LeftMargin +16,
          Indent -16,Spaces tab,Spacing 1)
@Define(Quotation,Use Insert,Fill,Use R,BlankLines break,
          Spaces Compact,TabExport False,Indent 3)
@Define(Verse,Use Insert,Fill,Spaces Kept,Justification off,Crbreak,Use R,
          TabExport False,indent -3,Spread 0,LeftMargin +8)
@TextForm(Bar="@begin(format)@tabclear()@&-@end(format)")
@Define(Fnenv,Use Text,Above 1,Foot,Use R,LeftMargin 0,RightMargin 0,Indent 2,
          Spread 1,TabExport False,UnNumbered,Spacing 1,Break off)
@Define(FootSepEnv,Break,SaveBox <FootSep>,Nofill,LeftMargin 0,Above 1,Below 1)
@Equate(Enumeration=Enumerate,Itemization=Itemize)
```

How to get complete (nice) listings of a BIB database

```
@make(text)
@device(lpt)

@style(Bibselect=Complete, References=Magic)
@Use(Bibliography="papers.bib")

@center[@b(
THE MECHO PROJECT

Research Papers and Working Papers


)]
@bibliography
```

All entries

Use my ref. format (PTO)

a heading

```
@Comment[ Copyright (C) 1979 Brian K. Reid ]

@marker(References,Magic)
@Comment{

Bibliography format definition for standard open-format alphabetic
references.
}

@Style(Citations=4, Bibsequence=numeric, StringMax=2000)
@Define(L1,LeftMargin 15,Indent -15,Above 1,Break)
@Define(L2,LeftMargin 18,Indent -3,Above 0,Break)

@LibraryFile(Standard)

@Enter(Text,Spacing 1,Spread 0,Spaces Tab,Justification off,Fill)
@Process(Bibliography)
@Leave(Text)
```

For complete BIB listings
MAGIC.REF[400,4

HLP:CD.HLP Updated: 8 July 81

NAME

CD - Change Directory

SYNOPSIS

cd Destination

DESCRIPTION

CD allows you to move around easily between different directories and SFD's (sub file directories). If it can find the destination it will change both your default path and your default (file) protection. Normally you only have to give an SFD name, for example the command:

.cd papers

(NB This mode of using CD may not work immediately for you. If not, then see the file CD.NEWS[400,444]). This command will change your path to [,,papers] if you have PAPERS.SFD in your directory. However, not only does CD notice SFD's straight in front of you (in your current path) it will also search around for the Destination. For example having moved to [,,papers] the command "cd prolog" will move you (change your path) to [,,prolog] if you have PROLOG.SFD in your top directory (UFD). In general CD will try the following (in the given order):

1. Look in SWITCH.INI[,] to see if Destination is defined to be some arbitrary path. (This enables you to set up useful mnemonic names for interesting places).

2. Look to see if the appropriate SFD can be found as a daughter, sister or aunt to the current path (i.e. looking all the way up to the UFD).

3. Look for the SFD in your own top level directory, if that has not already been done (i.e. you may be in some other directory completely and wish to return).

4. Look to see if there is a similar "logical path name" defined (i.e. one with the same name) and use the (first) path associated with that. (See the PATH command for details on logical path names and how to set them up. They enable one to refer to arbitrary paths like devices, and this meshes nicely with CD's ability to move you there. Note that they are different from a variety of confusingly similar TOPS10 'features' such as logical ASSIGNed names and ersatz devices. CD extension to ersatz device names is being considered.)

If this search fails then CD will leave you where you started. The full details of this search strategy do not need to be remembered; most of the time you will find that CD does exactly what you want. CD always prints a final message telling you where you have ended up, as well as showing other information, such as your new default protection (see below). In addition CD will also accept full path expressions (TOPS10 standard), E.g:

```
.cd 123,456,util,fns
.cd ,,xyzzy
```

The usual abbreviations may be used and the square brackets are optional (they were not used above). The followins conveniences are also available:

```
.cd          ; Home (your top level directory)
.cd -        ; Current path
.cd +        ; Top level directory of current path
.cd ^        ; Up one SFD from current path
```

Thus the command "cd" on its own will always return you to your own directory. The command "cd -" is useful for seeins where you currently are.

CD will also chanse your default file protection every time you move. The need for this stems from TOPS10's primitive notions of file ownership. If you create a file in a directory of another PPN then the file effectively ends up owned by that PPN, the Self field now refers to him and the Group or Others field to you! You will not be able to read/edit/delete the file unless the Group or Others protection field allows it. Most people's normal default protection does not allow Others to do all these thinss. Thus you will be unable to manipulate files you yourself have created. To maintain control of files you create it is necessary to create them with more lax protections if you are not in your own directory. These circumstances, and inconveniences, are very common within any sroup of collaboratins users. CD solves these problems by maintainins your default protection for you. If you do not have an explicit CD protection specification in your SWITCH.INI then CD uses a default stratesy, which involves lookins at your 'losin/defprot' switch if you have one, and works as follows:

		given login/defprot:xyz	otherwise
(moved to)	Self =	xyz	055
(moved to)	Group =	00z	005
(moved to)	Others =	000	000

These labels have the obvious interpretation of destination paths which share your programmer number (Self), or project number (Group), or neither (Others). This stratesy may seem a bit complicated, but in practice you will find that it means that CD will behave sensibly and the whole business of protections can be forsotten and left in its care. The losin/defprot switch is a standard losin switch (badly documented however) which acts at losin time to set your jobs initial default protection. An example would be:

```
losin /defprot:055
```

It is a sood idea to have one of these in your SWITCH.INI, even if you wish to keep the overly paranoid current system default (which is 057). This is because CD's default stratesy if this is missins will not keep your protection at 057.

Note that it is always possible to overide all this default activity by an explicit specification in your SWITCH.INI, and in addition to setting up your protection chansins stratesy, your SWITCH.INI can also be used for definins names for useful destinations (as mentioned

above), and giving default settings for various switches. SWITCH.INI specifications are quite important for convenient use of CD among collaborating users. The best way to understand what these SWITCH.INI entries should look like is to examine someone else's SWITCH.INI file which uses CD definitions (a reference is given below). However a complete specification of CD's operation, and use of SWITCH.INI, is given in DOC:CD.DOC (but this is rather hard work).

SEE ALSO

DSKA:SWITCH.INI[400,441]	- for examples of CD definitions
DSKA:CD.NEWS[400,444]	- for recent news about CD (read this!)
DOC:CD.DOC	- CD's specification
DEC10 Commands manual	- especially the Introduction sect. 1.4.2
SETSRC program	- a painful way of changing paths
PATH command	- for manipulating "logical path names", it also changes paths (but is stupid about it).
DEC10 Monitor calls manual	- to see how awful it all is

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Bugs, suggestions and monies to [400,441] (on ERCC DEC10) please.

NOTE

DSKA:CD.NEWS[400,444] Updated: 8 July 81

This file will contain odd bits of news about CD. However it is not really our intention to make any changes to the current version.

News 1

CD has now been placed in SYS:, however we have been unable to persuade the system staff to make it a full monitor command. For many of you the method of use documented will not work. Ie:

```
.cd foo
?cd?
```

Just produces the error message as shown. For immediate use you will therefore have to use the following, less convenient, method:

```
.r cd; foo
```

However, there is a fix to this problem. The systems staff have incorporated a slight change in the TOPS10 command scanner which allows programs which aren't proper monitor commands to be run as if they were. What happens is that when you type:

```
.hello
```

the system realises that it isn't a command and it tries to do ".r sys:hello" instead. This means that any program in SYS: will effectively become a command. In particular, of course, it means that CD can be used as if it was a command - which is how it should be used.

In order for this to work for you must have a certain privilige bit set for your PPN. This can only be done by contacting User Support (Jeff Phillips in particular) and asking them to fix this up for you. This facility seems to be going by the name of "Magic Bits" at the moment (so that's what to ask for). If you are a member of a group of users then it is undoubtably nsible to ask for "Magic Bits" for all the PPN's of your group at the same time.

I apologise for the additional hassle involved in using CD properly but the matter is beyond my control.

News 2

This is not about CD, but rather about the consequences of setting Magic Bits set up for your PPN. You should only bother to read this if you are interested in squeezing the maximum user-assistance out of TOPS10. In the new 7.01 monitor there is a facility called "logical names" which is a (hacked up) add on to device names, ersatz devices and so forth. The principle way of using them is through the PATH command. For example:

```
.path stuff: = [400,441,bin]
```

sets up STUFF: as a logical name which stands for the disk area [400,441,bin]. Most of the file system will treat this name just like a device, for example in commands like:

```
.ty stuff:ppns          ; types the file ppns[400,441,bin]
```

This will also work inside programs, editors and so forth. Note also that:

```
.cd stuff
```

will work, moving you to [400,441,bin] (this feature is documented in HLP:CD.HLP. Note that no colon should be used with the name stuff in this case).

The really interesting gimmick is that you can a) Redefine SYS: to point to arbitrary bits of the filing system; b) Redefine your library path in the same way; and c) Specify that either or both of these involve LISTS of many different paths.

The combination of Magic Bits (all programs in SYS: are commands), logical names (SYS: can point anywhere, eg your libraries), and CD; produces a very powerful way of using the system.

. . example the following commands:

```
.path sys: = dska:[400,444], dske:[1,5], dske:[1,4]
.path lib:/search = dska:[400,441,bin], dska:[400,444]
```

would allow me to run programs from my library ([400,444]) and from normal SYS: (the two dske: places are the normal new: and sys:), all as if they were commands (given Magic Bits). Files in both [400,441,bin] and [400,444] would be available as library files, ie I wouldn't have to specify any directory to read them etc.

We find these facilities incredibly useful, and think that you probably will too. For further details consult the following (I do not have time to write the missing documentation):

1) Ask User Support for a copy of the documentation for the PATH command (only they have the new 7.01 manuals).

2) Take a look at the files:

```
READ.ME[400,444]        ; Top of the tree for docm on our
                        ;  library area. Following this will
                        ;  give some idea of how we use it.
PATHS.HLP[400,444]      ; Explains how to set up path
                        ;  definitions at login.
```

If you have questions concerning CD, or if you would like a copy to take it elsewhere, then send me a message via:

```
.tell byrd

 <message>
^Z
```

Good luck

Lawrence

[This file gives a detailed specification. For user documentation see
the file -

HLP:CD.HLP

or just type "help cd"]

Specification for the "CD" program.
==========

This program was originally intended to replace a primitive MIC macro which changed paths in a simple fashion. Its aim is to provide a convenient way of moving from one SFD to another, or indeed to any other PPN or path. It should also handle automatic default protection changing and defined names on a per user basis (using switch.ini).

The main features of the program are as follows:

1) The program is intelligent about finding SFDs. This involves looking in SWITCH.INI[,], searching through daughter, sister and aunt SFDs, and trying the user's PPN (if the current path is not rooted there already), checking out logical path names etc. This will enable the the use of just a simple (mnemonic) name for most of the destinations a user will normally want to get to.

2) Changes of the Job's default protection (for files) are handled in a reasonable way. When moving to a path which is not under ones own PPN, it is necessary to "free" ones protection so that files created there can be deleted. Specification of the appropriate protection is via SWITCH.INI[,].

3) The program ALWAYS reports on the final destination and the new default protection (whether they have changed or not).
If any problems are encountered, the user's path and protection are left as they are, so that the user can examine the problem and try again. Reasonably specific error messages should help pin down the problem.

This specification was originally formed before the PATH command was available, however we had the documentation for it and it was decided that the facilities of CD were much to be preferred. A conscious design decision was that CD should provide a powerful, conceptually coherent, model for moving around the file system. It should not try to offer all the facets of the PATH UUO (a la SETSRC, PATH) since we feel that that offers a very poor conceptual model. Far too many different things are bundled into it.
CD does one job, but does it properly.

Note: This specification has been updated to be a reasonably accurate description of the program as written. Hence (and regrettably) it is slightly more complicated than the original.

How to use CD.
==========

The program can be run by one of:

.cd <input> - if command

```
.r cd;<input>          - if in SYS:

.run cd;<input>        - otherwise
```

depending on where the program is and how it is set up. We shall henceforth assume that CD is set up as a command for that is by far the most effective way of using it. The form of <input> is the same regardless of which method is used. CD will also work (scanning the new command line) if it is started, continued or reentered; however this is unlikely to be of much importance if CD is set up as a command.

The <input> can be of the following form:

(All grammars are in a BNF like formalism where non-terminals are in angle brackets, and terminals are between single quotes. "|" stands for disjunction and concatenation is represented by spaces between items. Braces ({,,}) indicate that some component may be repeated (>=0). All terminals have been written in lower case, but CD actually regards upper and lower case as identical in every circumstance.

```
<input> ::= <path spec> <protection> <switches>

<path spec> ::= <lbrak> <base and trail> <rbrak>

<lbrak> ::= '[' | <empty>

<rbrak> ::= ']' | <empty>

<base and trail> ::= <base> <trail>
                   |  <empty>

<trail> ::= { ',' <sfd name> }

<base> ::= <explicit base> | <implicit base>

<explicit base> ::= <project #> ',' <programmer #>
                  |  '-'
                  |  '+'
                  |  '^'

<implicit base> ::= <name>


<project #> ::= {<octal disit>}
<programmer #> ::= {<octal disit>}
```

Either or both parts of the PPN may be left out. As usual, they will default to the corresponding part of your Job's PPN. E.g. if your PPN is 123,456 then "cd ,777" will be equivalent to "cd 123,777".

```
<sfd name> ::= <identifier>
<name> ::= <identifier>

<identifier> ::= {<letter> | <disit> | % | $ | <numeric>}
<numeric> ::= '#' {<octal disit>}
```

An identifier can consist of any number of characters, but will be truncated to six. You can include any sixbit character by giving its octal equivalent,

Eg: "#373240" is an identifier, while "?:@" is not. This conforms to DEC standards. In order to tell PPNs and path names apart, path names may not start with an octal digit.

```
<protection> ::= '<' {<octal digit>} '>'
               |  <empty>
```

The protection is a standard DEC 3-digit protection code. The angle brackets may NOT be left out. Note that you don't need to specify this if you are happy with what CD gives you. Since you are shown what your new path and protection are, you can say "cd - <xyz>" if you want something else.

```
<switches> ::= {'/'<switch>}
             |  <empty>

<switch> ::= 'help'
           |  'help:no'          - normal default
           |  'help:yes'
           |  'help:all'
           |  'dir'
           |  'dir:no'           - normal default
           |  'dir:yes'
           |  'scan'
           |  'scan:no'
           |  'scan:yes'         - normal default
           |  'scan:asis'
```

The short form of these switches implies :yes, e.g. /dir means /dir:yes. There is a flaw in the program which means that you have to use the long form if you have a setting in your SWITCH.INI which you want to over-ride.

The help switch asks for the file HLP:CD.HLP to be printed out. If /help:all is used the file DOC:CD.DOC is printed instead (which is this file).

The dir switch specifies that a fast directory listing is to be performed after moving to the new path. It will happen even if there was an error.

The scan switch specifies whether or not SCAN will be set (see the system manuals about this). /scan:asis specifies that SCAN should be left set to whatever it was previously. Note that the default is /scan:YES.

START
IF the <input> does not conform to this syntax, an error message explaining the symptom is written, often indicating the culprit. CD will then display your current path and protection, and exit leaving them unchanged.

IF the input is valid then the following occurs:

The actions specified by the switches are taken at some suitable point (either before or after the following).

```
IF <base and trail> is <empty>
  THEN  Change the Job's path to the user's UFD (cannot fail)

ELSEIF <base> is an <explicit base>
  THEN  Append the path specified by <base> to the <trail> and try
        to change the Job's path to this path.  If unsuccessful provide
        an error message and leave the path as it was originally.
        The <explicit bases> have the following interpretations:
```

<project #>, <programmer #> - stands for itself
'-' - stands for the current path
'+' - stands for the root (PPN part) of the current path
'^' - stands for the current path with the last SFD removed (if there is one)

ELSEIF the <base> is an <implicit base> (ie a <name>)
THEN Look in SWITCH.INI[,] for a definition of the <name>,
IF <name> is defined use the definition as an <explicit base> and proceed as above.

OTHERWISE
Append the current path, <name>, and the <trail> together and try to change the Job's path to this path.
IF this fails then reduce the current path by one SFD and try the previous step again.
Do this until no more SFD's can be taken from the current path.
IF still unsuccessful, and if the root (UFD) of the current path is different from the user's PPN then append the user's PPN, <name>, and the <trail> together and try to change the Job's path to this path (similar to original step).

OTHERWISE
Use the PATH UUO to see if the user has used <name> to define a "logical path name". (The names must be the same, the monitor level syntax of using colon is irrelevant here). If such a logical path name is defined then use the FIRST associated path as an <explicit base> and proceed as above. (If there is more than one associated path then a warning message is given but CD proceeds, using the first associated path).

OTHERWISE
Give up. Provide an error message and leave the Job's path and protection as they were originally.
CLOSE

OULD any appendings of paths result in a path with more SFD's than the allowed maximum (currently 5) this is an error - Provide an error message and leave the Job's path and protection as they were originally.

SHOULD the search be successful (ie Job's path is changed - even if this sets it to what it was originally)
THEN reset the Job's default file protection:
IF the command line had an explicit protection <prot>, set the Job's default protection to that.

OTHERWISE
Define the fields (SELF,GROUP,OTHERS) by scanning the user's SWITCH.INI file using the following defaults for any field not so defined:

SELF = xyz
GROUP = 00z
OTHERS = 000

where xyz are taken from the 'login/defprot:xyz' entry in SWITCH.INI.
If there is no login/defprot entry then xyz = 055.
An "asis" specification in SWITCH.INI will set all three fields to

the value of the Job's current default protection.
Use the final default path (as set or left, see above) to determine the applicable field. If the programmer part of the path is the same as the user's, use SELF (Note: it is NOT necessary for the project part to also agree in this case). Otherwise, if the project part of the path is the same as the user's, use GROUP. Otherwise use OTHERS.
Set the Job's default file protection to the value of the selected field.

END

FINALLY Output a message to the user showing the final path and default file protection (guarantee values by re-asking the monitor).
If the scan switch is not set then indicate this in the message.
If logical name processing was used then indicate this in the message.

FINISH

It should be noted that the <base and trail> system described here is more extensive than what is described in the user documentation (HPL:CD.HLP). In the HLP file only "cd foo" forms are mentioned. However, as can be seen, forms like "cd foo,baz" or "cd foo,abc,xyz" also have well defined meanings even when "foo" (the <base>) undersoes SWITCH.INI or logical path name processing.

Examples

```
.cd 123,456,pit

        Should set the path to [123,456,pit]

.cd -

        Should leave the default path as it is (however the
        full current path will be printed out)

.cd ^ <155>

        If the current path is [555,444,prolog,code,notes] it will
        be set to [555,444,prolog,code] and the protection to 155.

.cd foo

        If we assume that the user is [123,456] and that his
        current path is [555,444,prolog,code], and that he has a
        logical path name set up as if by:
                .path foo: = [111,246,feefie]
        then providing that foo is not defined in switch.ini[123,456]
        the following search would ensue:

                        [555,444,prolog,code,foo]
                        [555,444,prolog,foo]
                        [555,444,foo]
                        [123,456,foo]
                        [111,246,feefie]

.cd foo,one,two
```

This example exibits the <trail> mechanism. Usins the assumptions used above the followins search would ensue:

```
[555,444,prolos,code,foo,one,two]
[555,444,prolos,foo,one,two]
[555,444,foo,one,two]
[123,456,foo,one,two]
[111,246,feefie,one,two]
```

The SWITCH.INI file

The user's SWITCH.INI file may contain lines providins information to CD. This may consist of <name> definitions, default protection settinss, and default switch settinss. Note that the SWITCH.INI file read will be SWITCH.INI[,] not any file of the same same in the current path (or whatever); is is standard across TOPS10 prosrams which use SWITCH.INI.

SWITCH.INI entries can be as follows:

```
cd /protection:( <protdefs> )
cd /name:( <namedefs> )
cd /switches:( <switchdefs> )
```

where:

```
<protdefs> ::= <protdef>
             |  <protdef> ',' <protdefs>
             |  'as is',

<protdef> ::= 'self'   '='  <prot>
            |  'sroup'  '='  <prot>
            |  'others' '='  <prot>,

<prot> ::= {<octal disit>}

<namedefs> ::= <namedef>
             |  <namedef>  ','  <namedefs>,

<namedef> ::= <name>  '='  <pathspec2>,

<pathspec2> ::= ( As <pathspec> except that both the square
                    brackets must be present to avoid
                    ambisuity (commas separate <namedef>s) )


<switchdefs> ::= <switch> {',' <switch>}
```

Note that the (three disit) protection codes in a /protection entry must NOT have ansle brackets round them.

The SWITCH.INI file is read (if it exists) before anythins else is done, and all of it is read. Two scans are performed: first lookins for losin entries, and secondly lookins for cd entries. The losin entries are looked at in an attempt to pick up the 'losin/defprot' switch which, if present, is used

as a template in the default protection changing strategy (see above).
Note that this default may be then overridden by a proper cd/protection entry,
however we recommend the use of a login/defprot switch in your SWITCH.INI
(the default strategy based on this is maximally sensible).
[This method of looking at other programs entries (ie login) is a more recent
addition and is not an idea we are completely happy with. It does happen to
be very convenient in this case.]

If any SWITCH.INI line cannot be properly parsed
then an error message will be printed and the program will
exit. The simplest way of continuing is to temporarily rename the file.
The best way of continuing is to fix the file!
Note that it is not necessary for SWITCH.INI to exist for CD to work.

If there are repeated definitions for the same <name> or protection field then
only the first definition will be used, any others being ignored.

Here are some example entries taken from an imaginary SWITCH.INI:

```
cd/switches:(scan, dir:no)      ; these are the defaults anyway

cd/protection:(self=005, group=005, others=000)  ; a login/defprot:005
                                                 ; entry would do this

cd/name:(Justine=[777,248])
cd/name:(boadicea=[111,111])
cd/name:(util=[123,456,util])
cd/name:(plush=[123,456,bldns,hole,v2])
cd/name:(pros=[123,455,top,code])
cd/name:(fred=[,457])
```

END SPEC

SEE ALSO

HLP:CD.HLP - Help file. This provides user oriented documentation,
as well as other references.

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ERCC DEC10: [400,422]

NOTE

```
        Directory listing        9-Jul-81        14:33:35          Page  1
Name Extension Len  Prot     Access       ---Creation---    Mode      Version

DSKA:   [400,421,CD]
CD      HLP     15  <005>     9-Jul-81     18:50     8-Jul-81    0
CD      DOC     30  <005>    11-Jun-81      2:25    11-Jun-81    0
CD      BLI    100  <005>     1-Jul-81     19:56    18-Jun-81    0
CD      MSS     15  <005>     8-Jul-81     18:50     8-Jul-81    0
READ    ME       5  <005>     9-Jul-81     13:39     9-Jul-81    0
CD      CCL      5  <005>     9-Jul-81     13:50     9-Jul-81    0
  Total of 170 blocks in 6 files on DSKA: [400,421,CD]
```

```
;; CD.CCL : All the bits of the CD program etc.
;;
;; This is set up as a CCL file for use with BACKUP. Use by typing
;; "@cd[400,421,cd]" to BACKUP in order to copy stuff to tape.
;; [ NB Not yet tested!! (hope the comments are OK....)
;;
ssname "CD"
save    dska:cd.ccl[400,421,cd],-          ; This file
        dska:cd.bli[400,421,cd],-          ; The (BLIS10) source code
        sys:cd.exe,-                       ; The current EXE
        dska:cd.doc[400,421,cd],-          ; The specification
        dska:cd.mss[400,421,cd],-          ; The (SCRIBE) source for cd.hlp
        dska:cd.hlp[400,421,cd],-          ; The user help file
        dska:cd.new[400,444]               ; Latest CD news
```

```
!================================================================!
!                                                                !
!       Program  CD.BLI                                          !
!                                                                !
!       Author   R. A. O'Keefe                                   !
!                                                                !
!       Date     9-13 September 1980                             !
!       Updates  20 March 1981   - odd prunins                   !
!                14 May 1981     - losical names                 !
!                20 May 1981     - various rationalisations      !
!                25 May 1981     - read LOGIN/DEFPROT:           !
!                                                                !
!       Site     Department of Artificial Intellisence, Edinbursh.!
!                                                                !
!       Purpose  one-line SetSRC to simplify chansins default path!
!                NB this antedates PATH, and provides other features!
!                                                                !
!       See      CD.HLP - User documentation                     !
!                CD.DOC - Specification                          !
!                                                                !
!       Copyright R. A. O'Keefe 1981                             !
!                                                                !
!================================================================!
%
module cd(stack, fsave, timer=external(six12), debus) =
%
module cd(stack, lowseg) =
   begin
      bind ProgramName = sixbit 'CD';

      bind  No  = 0;      !  false logical value, /switch:NO or /NOswitch
      bind  Yes = 1;      !  true logical value, /switch:YES or /switch
      bind  EOS = "?@";   !  End Of String character
      bind  cr  = "?M";   !  Carriage Return
      bind  lf  = "?J";   !  Line Feed
      bind  tab = "?I";   !  like a space


      own   ch;           !  character which terminated previous token
      own   TextPtr;      !  points to next character of command/switch line
      own   LineBuf[30];  !  holds current command/switch line
      own   SixBuf[5];    !  holds sixbit identifiers
      own   ErrorCount;   !  errors detected in *this* run


!================================================================!
!                                                                !
!  All terminal I/O is done using TTCALLs, rather than opening a !
!  channel on TTY:.  The main reason for this is that I learned about!
!  TTCALLs first, and feel happier with them.  Also, I need to rescan!
!  the command line, so TTCALLs are needed for input anyway.     !
!                                                                !
!  putasc(ch) types a single right-justified ASCII character ch. !
!  putext(st) types the Ascii string literal st (use single quotes)!
!  putsix(id) types a sixbit identifier id without trailing blanks.!
!  putoct(nb) types the (unsigned) number nb in octal.           !
!  puterror(t,n) is rather kludgy, and relies on knowing the globals.!
!  GetTermLine(cmd,buf) reads a line, special handling for commands.!
!                                                                !
!================================================================!
```

```
      machop  ttcall = #051;
      machop  CallI  = #047;

macro   putasc(ch) =
   (vreg = ch; ttcall(1, vreg)) $;

macro   putext(st) =
   ttcall(3, uplit asciz st) $;

routine putsix(SixChars) =
   while .SixChars neq 0 do begin
      vreg = .SixChars<30,6>+32;
      if .vreg geq "A" and .vreg leq "Z" then vreg = .vreg+32;
      putasc(.vreg);
      SixChars = .SixChars ^ 6
   end;

routine putoct(oct) =
   begin
      register w, n;
      w = .oct^18;
      n = 0;
      do (n = .n+1; w = .w^(-3)) until .w<18,18> eql 0;
      do (putasc(.w<15,3>+"0"); w = .w^3) until (n = .n-1) eql 0;
   end;

routine PutError(ErrorType, ErrorNumber) =
   begin
      bind Messages = uplit(
% 0%       uplit asciz 'unknown switch',
% 1%       uplit asciz 'unknown attribute',
% 2%       uplit asciz 'unknown value',
% 3%       uplit asciz 'missing switch name',
% 4%       uplit asciz 'missing attribute name',
% 5%       uplit asciz 'missing ), ], or }',
% 6%       uplit asciz 'missing " or '' ',
% 7%       uplit asciz 'Nothing should precede [',
% 8%       uplit asciz 'Nothing should come between [ and -',
  9%       uplit asciz 'Protection or switches expected here',
%10%       uplit asciz 'missing sfd name',
%11%       uplit asciz 'meaningless after ]',
%12%       uplit asciz 'meaningless after <protection>',
%13%       uplit asciz 'Protection code should be followed by >',
%14%       uplit asciz 'unexpected text',
%15%       uplit asciz 'SWITCH.INI too long, stopping before?M?J',
%16%       uplit asciz 'Too many SFDs; the limit is 5',
%17%       uplit asciz 'no changes made',
%18%       uplit asciz '+ or - should be followed by , or ]',
%19%       uplit asciz 'Device has several paths; first taken',
%20%       uplit asciz 'Badly formed number',
%21%       uplit asciz 'Sorry, can''t read the directory',
%22%       uplit asciz 'Sorry, can''t find it',
%23%       uplit asciz 'Sorry, can''t change protection',
%24%       uplit asciz 'Brackets don''t match',
           0);

      putasc(if .ErrorType gtr 2 then "%" else "??");
      putasc(" ");
      if .ErrorType gtr 2 then ErrorCount = .ErrorCount-1;  !  warning only
```

```
      case .ErrorType mod 3 of set
      %0%   begin
               ttcall(3, .Messages[.ErrorNumber]);
            end;
      %1%   begin
               putsix(.SixBuf);
               putext(' - ');
               ttcall(3, .Messages[.ErrorNumber]);
            end;
      %2%   begin
               register Eptr;
               ttcall(3, .Messages[.ErrorNumber]);
               putext(' - ');
               Eptr = .TextPtr;
               putasc(scann(Eptr));
               while .vreg neq EOS do putasc(scani(Eptr));
            end;
      tes;
      putasc(cr); putasc(lf);
      ErrorCount = .ErrorCount+1;
   end;


routine GetTermLine(Command, Buffer) =
   begin
      register char, ptr, pts;

      if .Command then begin
         ifskip ttcall(8, 1) then begin
            putasc("*");  !  can't rescan command line, ask user for another
            Command = No; !  which won't need special command handling.
         end;             !  otherwise rescan done, special handling needed.
      end;

      ptr = (.Buffer)<36,7>;
      while 1 do begin
         ttcall(4, char); !  read a single character, but wait for a whole line
         if .char geq " " then begin
            replacei(ptr, .char);
         end else
         if #01400016200 ^ (-.char) then begin
            exitloop;     !  break char: bel,lf,vt,ff,^z,esc
         end else
         if .char neq cr and .char neq EOS then begin
            replacei(ptr, .char);
         end % if %;
      end % while %;
      replacei(ptr, EOS); !  AsciZ string terminator
      replacei(ptr, EOS); !  needed for empty command lines.
      replacei(ptr, EOS); !  just to be safe.

      ptr = (.Buffer)<36,7>;
      if .Command then begin
         do char = scani(ptr) until .char neq " " and .char neq tab;
         pts = SixBuf<36,6>;
         SixBuf[0] = sixbit '      ';  !  command name
         while 1 do begin
            vreg = if .char gtr "_" then .char-64 else .char-32;
            if .vreg lss sixbit "A" then exitloop;
            if .vreg gtr sixbit "Z" then exitloop;
```

```
            replacei(pts, .vreg);
            char = scani(ptr);
         end;
         if .SixBuf neq ProgramName then begin
            %  look for a comment character  %
            while .char neq ";" and .char neq "!"
              and .char neq "-" and .char neq EOS do char = scani(ptr);
         end;
      end;
      return .ptr
   end;


!=================================================================!
!                                                                 !
!  CD uses disc input for two purposes: to read the SWITCH.INI file  !
!  and to read a CD.HLP or CD.DOC file.  As the use of these two files !
!  doesn't overlap, a single fixed channel is adequate.  Also, CD is  !
!  quite capable of doing without either of them, so fancy error      !
!  detection and recovery isn't needed.  Furthermore, the file names  !
!  are fixed too, so passing the components to OpenFile as sixbit is  !
!  not too much of a burden.  The routine GetFileLine has a parameter !
!  "crlf" which is just to make GiveHelp prettier.                    !
!                                                                 !
!  GiveHelp is a fairly simple-minded routine which prints <pn>.DOC   !
!  (if level >= 2) or <pn>.HLP (if level =1 or <pn>.DOC unavailable)  !
!  or its third parameter (if level = 0 or <pn>.* unavailable) unless !
!  that is zero.  Now that the program has become a command, its .HLP !
!  file is HLP:CD.HLP and its .DOC file is DOC:CD.DOC.  It is easy to !
!  put them wherever you want by editing GiveHelp, but let users know. !
!                                                                 !
!  FastDirectory is given a path block (see later on in this program  !
!  for a description of path blocks) and lists all the files it can   !
!  find in that directory.  It searches all the devices in the Job's  !
!  search list, so it may miss some.  The output resembles DIR/FAST,  !
!  but it is in lower case.  It will not be enhanced further.         !
!                                                                 !
!=================================================================!


      own   FileNameBlock[4] = (4:0);  !  name,extn,0,ppn
      own   BufferBlock[3]   = (3:0);
      own   DeviceBlock[3]   = (0, sixbit 'DSK', BufferBlock[0]<0,0>);

      bind  BufferPtr = BufferBlock[1];  !  points to next character in buffer
      bind  BufferCnt = BufferBlock[2];  !  counts characters left
      bind  Channel = 1;  !  this channel is reserved for SWITCH.INI

macro CloseFile =
   begin
      machop close = #070;
      close(Channel, DeviceBlock);
   end $;

routine OpenFile(Device, Filnam, Ext, Ppn) =
   begin
      machop open = #050, close = #070, lookup = #076;

      DeviceBlock[1] = .Device;
      FileNameBlock[0] = .Filnam;
```

```
      FileNameBlock[1] = .Ext and (-1)^18;
      FileNameBlock[2] = 0;
      FileNameBlock[3] = .Ppn;
      ifskip open(Channel, DeviceBlock) then begin
         ifskip lookup(Channel, FileNameBlock) then return Yes;  %  success  %
         CloseFile;  %  there's a device but no file  %
      end;
      return No
   end;

routine GetFileLine(buffer, crlf) =
   begin
      machop in = #056;
      register nchars, char, ptr;

      nchars = 0;
      ptr = (.buffer)<36,7>;
      while 1 do begin
         if (BufferCnt = .BufferCnt-1) leq 0 then begin
            ifskip in(Channel, 0) then return -1;
         end;
         char = scani(BufferPtr);
         if .char neq " " then begin
            replacei(ptr, .char);
            nchars = .nchars+1
         end else
         if #01400016200 ^ (-.char) then begin
            exitloop % a break character %
         end else
         if .char neq cr and .char neq EOS then begin
            replacei(ptr, .char);
            nchars = .nchars+1
         end
      end % while 1 %;
      if .crlf then (replacei(ptr, cr); replacei(ptr, lf); nchars = .nchars+2);
      replacei(ptr, EOS);
      return .nchars
   end;

  utine GiveHelp(ProsName, Level, Extra) =
   begin
      bind HelpDev = sixbit 'HLP';    !  These two paths can be anywhere
      bind HelpPPN = 0;               !  but should be where people look
      bind DocuDev = sixbit 'DOC';    !  for them.  0 is just the proper
      bind DocuPPN = 0;               !  default for ersatz devices.
      local HelpLine[30];

      if .Level neq 2 then begin
         if OpenFile(DocuDev, .ProsName, sixbit'DOC', DocuPPN) then begin
            while GetFileLine(HelpLine, Yes) neq 0 do ttcall(3, HelpLine);
            CloseFile;
         end else begin
            Level = 1;
         end
      end % level 2 %;

      if .Level eql 1 then begin
         if OpenFile(HelpDev, .ProsName, sixbit'HLP', HelpPPN) then begin
            while GetFileLine(HelpLine, Yes) neq 0 do ttcall(3, HelpLine);
            CloseFile;
```

```
      end else begin
         Level = 0;
      end
   end % level 1 %;

   if .Level leq 0 then begin
      if .Extra neq 0 then begin
         ttcall(3, (.Extra)<0,36>);
      end else begin
         ttcall(3, uplit asciz 'Sorry, no help available.?M?J');
      end
   end % level 0 %;
end;


routine FastDirectory(PathBlock) =
   begin
      machop calli = #047, in = #056;
      bind  JobStr = #047;  ! calli to examine this Job's search list
      bind  binarymode = #14, asciimode = #00;
      bind  PB = .PathBlock;
      local SomeSeen, NextDevice[3];

      DeviceBlock[0] = binarymode;  !  HACK
      SomeSeen = 0;                 !  none of directory read yet
      NextDevice[0] = -1;           !  start from the beginning
      while 1 do begin
         vres = 3^18 + NextDevice<0,0>;
         ifskip calli(vres, JobStr) then (%ok%) else exitloop; ! error
         if .NextDevice eql 0 then exitloop;  !  _FENCE
         if .NextDevice eql-1 then exitloop;  !  end of search list
         !  try to open the directory on that device
         if begin
            if .PB[3] eql 0 then begin ! no SFDs
               OpenFile(.NextDevice, .PB[2], sixbit 'UFD', 1^18+1)
               !  DSKA:#000400 000422.UFD[1,1], for example
            end else
            if .PB[4] eql 0 then begin ! one SFD
               OpenFile(.NextDevice, .PB[3], sixbit 'SFD', .PB[2])
               !  DSKA:FILES.SFD[400,422], for example
            end else begin              ! many SFDs
               local LastSfd, LookupPath[10];
               LookupPath[0] = LookupPath[1] = 0;
               incr i from 2 to 9 do
                  if (LookupPath[.i] = .PB[.i]) eql 0 then begin
                     LastSfd = .LookupPath[.i-1];
                     LookupPath[.i-1] = 0;
                     exitloop;
                  end;
               OpenFile(.NextDevice, .LastSfd, sixbit 'SFD', LookupPath<0,0>)
               !  DSKA:ISNONE.SFD[400,422,FILES], for example
            end
         end then begin
            SomeSeen = .SomeSeen+1;
            putasc(tab);          putasc(tab);
            putsix(.NextDevice); putext(':?M?J');
            while 1 do begin
               if (BufferCnt = .BufferCnt-2) leq 0 then
                  ifskip in(Channel, 0) then exitloop;
               if scani(BufferPtr) eql 0 then exitloop;
```

```
            putsix(scann(BufferPtr));
            putasc(",");
            putsix(scani(BufferPtr) and (-1)^18);
            putasc(cr);       putasc(lf);
          end;
          CloseFile;
        end % if %;
      end % while %;
      if .SomeSeen eql 0 then PutError(0, 21);
      DeviceBlock[0] = asciimode;  !  undo HACK
   end;


!=================================================================!
!                                                                 !
!  The followins routines are token scanners, advancins their "P7" ars !
!  to after the token scanned, and returnins the followins Ascii char. !
!  GetSix scans identifiers, such as switch names, sfd names, Yes, No. !
!  GetInt scans numbers in any specified radix between 2 and 36.  !
!  GetPPN scans Dec PPNs, [project,programmer] where [ ] are optional. !
   Getext reads parenthesis balanced text, stoppins on ",/;!", and is  !
!  mainly used for readins switch values.  ! and ; start comments.  !
!  ToOctal converts a scanned "identifier" from octal to binary.  !
!                                                                 !
!=================================================================!

routine setsix(P7, %into% buffer) =
   begin
      register Pt6, Pt7, char;

      .buffer = 0;
      Pt7 = .,P7;
      Pt6 = (.buffer)<36,6>;
      while 1 do begin
         char = scani(Pt7);
         if .char geq "0" and .char leq "9" then begin
            replacei(Pt6, .char-32)
         end else
         if .char geq "A" and .char leq "Z"
         or .char eql "%" or  .char eql "$" then begin
            replacei(Pt6, .char-32)
         end else
         if .char geq "a" and .char leq "z" then begin
            replacei(Pt6, .char-64)
         end else
         if .char eql "#" then begin
            %  Pt6 points to 3-bit disits here %
            Pt6<24,6> = 3;  !  byte-size = octal
            Pt6<30,6> = .Pt6<30,6>+3;  !  same top bit as before
            while (char = scani(Pt7)) geq "0" and .char leq "7" do
               replacei(Pt6, .char-"0");
            if not .Pt6<30,6> then replacei(Pt6, 0);
            Pt6<24,6> = 6;  !  byte-size = sixbit
            Pt6<30,6> = .Pt6<30,6>-3;  !  same top bit as before
         end else
         if .char eql "`" then begin
            char = scani(Pt7);
            replacei(Pt6,  % sixbit value of char = %
               if .char leq " " then sixbit " " else
               if .char str "_" then .char-64 else .char-32);
```

```
            replacei(pt6, .char)
         end else
         if .char neq " " and .char neq tab then
            exitloop
      end % while 1 %;
      .p7 = .pt7;
      return if .char eql ";" or .char eql "!" then EOS else .char
   end;

routine setint(p7, radix, answer) =
   begin
      register pt7, char, number;
      local NumSign;

      pt7 = ..p7;
      NumSign = +1;
      number = 0;
      while 1 do begin
         char = scani(pt7);
         if .char geq "0" and .char leq "9" then begin
            if (char = .char-"0") gtr .radix then PutError(2, 20);
            number = .number*.radix + .char;
         end else
         if .char geq "A" and .char leq "Z" then begin
            if (char = .char-("A"-10)) gtr .radix then PutError(2, 20);
            number = .number*.radix - ("A"-10) + .char;
         end else
         if .char geq "a" and .char leq "z" then begin
            if (char = .char-("a"-10)) gtr .radix then PutError(2, 20);
            number = .number*.radix - ("a"-10) + .char;
         end else
         if .char eql "+" then begin
            NumSign = +1;
         end else
         if .char eql "-" then begin
            NumSign = -1;
         end else
         if .char neq " " and .char neq tab then
            exitloop;
      end % while %;
      .p7 = .pt7;  %  look at it with scanN not scanI %
      .answer =  .number*.NumSign;
      return if .char eql ";" or .char eql "!" then EOS else .char
   end;

%<<
routine setppn(p7, ppn) =
   begin
      local ps, pt, ch, pn;

      ps = pt = ..p7;
      do ch = scani(pt) until .ch neq " " and .ch neq tab;
      if .ch neq "[" then pt = .ps;
      ch = setint(pt, 8, pn);
      if .pn neq 0 then (.ppn)<18,18> = .pn;
      if .ch eql "," then begin
         ch = setint(pt, 8, pn);
         if .pn neq 0 then (.ppn)<0,18> = .pn;
      end;
      if .ch eql "]" then
```

```
        do ch = scani(pt) until .ch eqn " " and .ch neq tab;
      return .ch
    end;
>>%

routine setext(p7, buffer, nwords) =
!  move a text from p7 to buffer, and pad it out with at least one EOS.
!  nwords is set to the number of *words* moved.  The delimiter is returned.
    begin
       register char, pt7, ptb;
       local ps7, nchars, Quote, BracketCount, CloseBrackets[40];

       pt7 = .p7;
       ptb = (.buffer)<36,7>;
       nchars = 0;          !  no characters moved yet
       Quote = 0;           !  not inside a quoted string
       BracketCount = 0;    !  no open brackets seen
       while 1 do begin
          char = scani(pt7);
          if .char eql EOS then begin
             exitloop
          end else
          if .char eql .Quote then begin
             ps7 = .pt7;
             if scani(pt7) eql .char then begin
                replacei(ptb, .char);
                nchars = .nchars+1;
             end else begin
                pt7 = .ps7;
                Quote = 0;   !  string finished
             end
          end else
          if .Quote neq 0 then begin
             replacei(ptb, .char);
             nchars = .nchars+1;
          end else
          if .char eql ";" or .char eql "!" then begin
             exitloop;    ! comment
          end else
          if .char eql "," or .char eql "/" then begin
             if .BracketCount eql 0 then exitloop;
             replacei(ptb, .char);
             nchars = .nchars+1;
          end else
          if .char eql "(" or .char eql "[" or .char eql "{" then begin
             CloseBrackets[.BracketCount] =
                if .char eql "(" then ")" else
                if .char eql "[" then "]" else "}";
             BracketCount = .BracketCount+1;
             replacei(ptb, .char);
             nchars = .nchars+1;
          end else
          if .char eql ")" or .char eql "]" or .char eql "}" then begin
             if .BracketCount eql 0 then exitloop;
             BracketCount = .BracketCount-1;
             if .CloseBrackets[.BracketCount] neq .char then begin
                PutError(2, 24);   !  mis-matched brackets
                while .BracketCount neq 0 do
                   if .CloseBrackets[BracketCount = .BracketCount-1]
                      eql .char then exitloop;   !  this one, that is
```

```
            if .CloseBrackets[.BracketCount] neq .char then exitloop;
         end % if mis-matched %;
         replacei(ptb, .char);
         nchars = .nchars+1;
      end else
      if .char eql "'" or .char eql """ then begin
         Quote = .char;
      end else
      if .char eql "`" then begin
         replacei(ptb, .char);
         replacei(ptb, scani(pt7));
         nchars = .nchars+2;
      end else begin
         replacei(ptb, .char);
         nchars = .nchars+1;
      end % if %;
   end % while 1 %;
   if .BracketCount neq 0 then PutError(2, 5);
   if .Quote        neq 0 then PutError(2, 6);
   do replacei(ptb, EOS) until (nchars = .nchars+1) mod 5 eql 0;
   .nwords = .nchars div 5;
   .p7 = .pt7;
   return if .char eql ";" or .char eql "!" then EOS else .char;
end;

routine ToOctal(SixChars) =
   begin
      register n, w;
      n = 0;
      w = .SixChars;
      while .w neq 0 do begin
         if .w<30,6> lss sixbit "0" or .w<30,6> gtr sixbit "7" then begin
            SixBuf[0] = .SixChars;
            PutError(1, 20);
            return 0
         end;
         n = .n^3 + .w<30,3>;
         w = .w^6;
      end;
      return .n
   end;


!==================================================================!
!                                                                  !
!  To set switch settings from SWITCH.INI, you call ReadSwitches(Name) !
!  where Name is the program name in sixbit, which is used to select   !
!  the lines of SWITCH.INI which will be inspected.  These lines have  !
!  the form                                                        !
!     <progname>{/<assignment>}...                                 !
!  where                                                           !
!     <assignment> = <attribute>:(<bindings>{,<bindings>}...)      !
!                  ! <attribute>:<bindings>                        !
!                  ! <attribute> = <text>       -- login/name:"Fred"  !
!                  ! <attribute>                                   !
!     <attribute>  = <identifier>          (a valid SIXBIT identifier) !
!     <bindings>   = <identifier> = <text>                         !
!                  ! <identifier>                                  !
!                                                                  !
!  The syntax for identifiers is slightly non-standard, namely     !
```

```
!     <identifier> = <non-special>...                                          !
!     <non-special>= A .. Z ! a .. z ! 0 .. 9 ! $ ! % ! # octaldisits          !
!                  ! `<any ASCII printing character>                           !
!  Lower-case letters are equivalent to upper case.  "#" introduces one       !
!  or more octal characters which are combined in pairs to form sixbit.       !
!  A quoted character (`X) stands for itself, e.g. `< .  Identifiers          !
!  are converted to sixbit and truncated to six characters.                   !
!                                                                             !
!  A text must be parenthesis balanced, but may be enclosed in quotes         !
!  (either ' or ") in which case the contents may be unbalanced.  The         !
!  quotes are taken off before the text is stored as an ASCIZ string.         !
!                                                                             !
!  ReadSwitches puts the results of its scan in the arrays AttrInfo           !
!  and BindInfo.  An entry in AttrInfo looks like this:                       !
!                                                                             !
!                  +-------------------------+                                !
!                  |                         |                                !
!                  |        ATTRNAME         |                                !
!                  |-------------------------|                                !
!                  |            |            |                                !
!                  |   TAIL     |   HEAD     |                                !
!                  |____________|____________|                                !
!                                                                             !
!  where AttrName is a sixbit attribute name, Head points to its first       !
!  bindins (0 if there are none), and Tail points to its last bindins.        !
!  The bindinss themselves live in BindInfo and look like this:               !
!                                                                             !
!                  +-------------------------+                                !
!                  |                         |                                !
!                  |        BINDNAME         |                                !
!                  |-------------------------|                                !
!                  |            |            |                                !
!                  |   KIND     |   NEXT     |                                !
!                  |____________|____________|                                !
!                  |    |    |    |    |    |                                !
!                  :  TEXT (asciz string)  :      (omitted if Kind=0)        !
!                  |____|____|____|____|____|                                !
!                                                                             !
!  where BindName is the identifier of the bindins, Next points to the       !
!  next bindins for the attribute, and Kind says whether there was (=1)       !
!  or was not (=0) a text.  If there was, it follows as an AsciZ string       !
!  NOT in sixbit.  A string which will later be converted to sixbit           !
!  will be handled by a routine which understands the same conventions        !
!  as the one which converts identifiers.                                     !
!                                                                             !
!  I've had to add <attribute>=<text> to cope with login/ entries.  I         !
!  do this by hallucinating <attribute>;' VALUE=<text>, which can't be        !
!  mistaken for the ordinary case.  Drat that HT!                             !
!                                                                             !
!  A pointer to the next slot for an attribute is kept in NextAttrPtr,        !
!  and a pointer to the next slot for a bindins in NextBindPtr.  The          !
!  finished attribute table will end with two successive zeros.               !
!                                                                             !
!=============================================================================!
```

```
    own   MyJob, MyPPN;    !  set by GetSwitchIniProtections

    bind  AttrSize = 30;   !  suesstimate of number of distinct attributes

    own   AttrInfo[AttrSize*2];  !  see below
```

```
    own   NextAttrPtr;     !  points to next free word in AttrInfo
    own   ThisAttrPtr;     !  set by FindAttr, used by FindBind

    macro AttrName(Ptr) = (.Ptr)[0] $;
    macro head(Ptr)     = (.Ptr)[1]<18,18> $;
    macro tail(Ptr)     = (.Ptr)[1]< 0,18> $;


    bind  BindSize = 200; !  This allows about 40 "name:"s + all else

    own   BindInfo[BindSize*3];
    own   NextBindPtr;     !  points to next free word in BindInfo
    own   ThisBindPtr;     !  set by FindBind, used by SetXXX

    macro BindName(Ptr) = (.Ptr)[0] $;
    macro Kind(Ptr)     = (.Ptr)[1]<18,18> $;
    macro Next(Ptr)     = (.Ptr)[1]< 0,18> $;
    macro Text(Ptr)     = (.Ptr)[2]<36, 7> $;


    bind  Asis = 4;   !  (sometimes) absent switch or /SWITCH:AS IS
    bind  All  = 2;   !  /switch:HELP=ALL


routine FindAttr(ThisAttr, PutItIn) =
!  Point ThisAttrPtr to the entry for ThisAttr, and return Yes.
!  if there is none, put it in if PutItIn=Yes, otherwise return No.
   begin
      decr TempAttrPtr from .NextAttrPtr-2 to AttrInfo do
         if .AttrName(TempAttrPtr) eql .ThisAttr then begin
            ThisAttrPtr = .TempAttrPtr;
            return Yes
         end;
      if .PutItIn then begin
         ThisAttrPtr = .NextAttrPtr;
         NextAttrPtr = .NextAttrPtr+2;
         (.ThisAttrPtr)[0] = .ThisAttr;
         (.ThisAttrPtr)[1] = 0;
         return Yes
      end else begin
         return No
      end
   end;

routine FindBind(ThisBind) =
!  look through the bindings of ThisAttrPtr for one for .ThisBind.
!  if one is found, point .ThisBindPtr to it and return Yes, otherwise No.
   begin
      ThisBindPtr = .head(ThisAttrPtr);
      while .ThisBindPtr neq 0 do begin
         if .BindName(ThisBindPtr) eql .ThisBind then return Yes;
         ThisBindPtr = .next(ThisBindPtr)
      end;
      return No
   end;

routine FindBoth(ThisAttr, ThisBind) =
   return if FindAttr(.ThisAttr, No) then FindBind(.ThisBind) else No;

routine SetSwitch(Name, Variable) =
```

```
   if FindBind(.Name) then begin
      if .Kind(ThisBindPtr) then begin
         local ValuePtr, NextChar;
         ValuePtr = Text(ThisBindPtr);
         NextChar = getsix(ValuePtr, SixBuf);
         .Variable =
            if .SixBuf<30, 6> eql sixbit "Y"  then Yes  else
            if .SixBuf<30, 6> eql sixbit "N"  then No   else
            if .SixBuf<24,12> eql sixbit "AS" then AsIs else
            if .SixBuf<24,12> eql sixbit "AL" then All  else
               (PutError(1, 2); ..Variable);  %  don't change it, wrong  %
      end else begin
         .Variable = Yes;
      end;
      return Yes;
   end else
   if FindBind(sixbit "NO"^24 + .Name^(-12)) then begin
      .Variable = No;
      return Yes;
   end else begin
      return No;
   end;

routine SetNumber(Name, Variable, Radix, Default) =
   if FindBind(.Name) then begin
      if .Kind(ThisBindPtr) then begin
         local ValuePtr, NextChar;
         ValuePtr = Text(ThisBindPtr);
         NextChar = getint(ValuePtr, .Radix, .Variable);
      end else begin
         .Variable = .Default;
      end;
      return Yes;
   end else begin
      return No;
   end;

%<<
routine SetPPN(Name, Variable, Default) =
   if FindBind(.Name) then begin
      if .Kind(ThisBindPtr) then begin
         local ValuePtr, NextChar;
         register FirstChr;
         ValuePtr = Text(ThisBindPtr);
         NextChar = getsix(ValuePtr, SixBuf);
         FirstChr = .SixBuf<30,6>;
         if .FirstChr eql sixbit "N" then .Variable = 0 else
         if .FirstChr eql sixbit "Y" then .Variable = .Default else
         if .FirstChr eql sixbit "A" then (%% don't change %%) else
         begin ValuePtr = Text(ThisBindPtr);
               .Variable = .Default;
               NextChar = getppn(ValuePtr, .Variable);
         end;
      end else begin
         .Variable = .Default;
      end;
      return Yes;
   end else
   if FindBind(sixbit 'NO' + .Name^(-12)) then begin
      .Variable = 0;
```

```
        return Yes;
    end else begin
        return No;
    end;
>>%

routine SetStrins(Name, Variable, Default) =
    if FindBind(.Name) then begin
        if .Kind(ThisBindPtr) then begin
            .Variable = Text(ThisBindPtr);
        end else begin
            .Variable = .Default;
        end;
        return Yes;
    end else begin
        return No;
    end;

routine value(PutAtHead) =
    begin
        ThisBindPtr = .NextBindPtr;
        if .PutAtHead eql sixbit " VALUE" then begin        !  HACK
            SixBuf = .PutAtHead;
            PutAtHead = No;
            ch = "="
        end else % HACK over %
        ch = getsix(TextPtr, SixBuf);
        if .SixBuf eql 0 then begin
            PutError(2, 4);
            SixBuf = sixbit " ERROR";
        end;
        (.ThisBindPtr)[0] = .SixBuf;
        (.ThisBindPtr)[1] = if .ch eql "=" or .ch eql ":" then 1^18 else 0;
        NextBindPtr = .NextBindPtr+2;
        if .ch eql ":" or .ch eql "=" then begin
            local Nwords;
            ch = getext(TextPtr, .NextBindPtr, Nwords);
            NextBindPtr = .NextBindPtr+.Nwords;
        end % if .ch eql "=" %;

        if .head(ThisAttrPtr) eql 0 then begin
            head(ThisAttrPtr) = .ThisBindPtr;
            tail(ThisAttrPtr) = .ThisBindPtr;
        end else
        if .PutAtHead then begin
            next(ThisBindPtr) = .head(ThisAttrPtr);
            head(ThisAttrPtr) = .ThisBindPtr;
        end else begin
            next(tail(ThisAttrPtr)) = .ThisBindPtr;
            tail(ThisAttrPtr) = .ThisBindPtr;
        end;
    end;

routine assignment =
    begin
        local TempPtr;
        ch = getsix(TextPtr, SixBuf);
        if .SixBuf eql 0 then begin
            PutError(2, 3);
            SixBuf = sixbit " ERROR";
```

```
      end;
      FindAttr(.SixBuf, Yes);
      if .ch eql ":" or .ch eql "=" then begin
         TempPtr = .TextPtr;
         do ch = scani(TempPtr) until .ch neq " " and .ch neq tab;
         if .ch eql "(" then begin
            TextPtr = .TempPtr;
            do value(No) while .ch eql ",";
            if .ch neq ")" then PutError(2, 5);
            while .ch neq " " and .ch neq tab do ch = scani(TextPtr);
         end else
         if .ch geq "0" and .ch leq "9"
         or .ch geq "A" and .ch leq "Z"
         or .ch geq "a" and .ch leq "z" then begin
            value(No)            !  single bindins
         end else begin
            value(sixbit " VALUE")       !  HACK
         end
      end
   end;

routine ReadSwitches(ProsName) =
   begin
      NextAttrPtr = AttrInfo[0];
      NextBindPtr = BindInfo[0];
      if OpenFile(sixbit'DSK',sixbit'SWITCH',sixbit'INI',.MyPPN) then begin
         while GetFileLine(LineBuf, No) geq 0 do begin
            TextPtr = LineBuf<36,7>;
            ch = getsix(TextPtr, SixBuf);
            if .SixBuf eql .ProsName then
               if .NextAttrPtr geq NextAttrPtr-2
               or .NextBindPtr geq NextBindPtr-20 then begin
                  TextPtr = LineBuf<36,7>;
                  PutError(2, 15);
                  exitloop
               end else
               while .ch eql "/" or .ch eql "," do assignment();
         end % while %;
         CloseFile;
      end % if %;
      (.NextAttrPtr)[0] = 0;
      (.NextAttrPtr)[1] = 0;
   end;


!=================================================================!
!                                                                 !
!       the following routine is just a debugging aid             !
!                                                                 !
!=================================================================!
%<<
routine PrintSwitches(ProsName) =
   begin
      local AttrPtr, BindPtr;

      AttrPtr = AttrInfo[0];
      while .,AttrPtr neq 0 do begin
         BindPtr = .head(AttrPtr);
         if .BindPtr neq 0 then begin
            do begin
```

```
                putasc(";");
                putsix(.ProsName);
                putasc("/");
                putsix(.,AttrPtr);
                putasc(":");
                putsix(.(.BindPtr)<0,36>);
                if .Kind(BindPtr) then begin
                   putasc("=");
                   ttcall(3, (.BindPtr)[2]<0,36>);
                end;
                putasc(cr);
                putasc(lf);
                BindPtr = .Next(BindPtr)
             end until .BindPtr eql 0
          end %% if %% else begin
             putasc(";");
             putsix(.ProsName);
             putasc("/");
             putsix(.,AttrPtr);
             putasc(cr);
             putasc(lf);
          end %% if %%;
          AttrPtr = .AttrPtr+2;
       end %% while %%;
    end;
>>%


!================================================================!
!                                                                !
!  A file protection is a nine-bit field <Self Group Others> where !
!  each field is an access code from 0 (least) to 7 (most) protection. !
!  CD keeps track of three complete default protections,         !
!     Self , the protection when path's programmer number = yours !
!     Group, the protection when path's project number = yours   !
!     Other, the protection to be used in other cases.           !
!  Note that each of these is a full nine-bit protection field.  !
!  Only the first assignment for each in SWITCH.INI has any effect. !
   In addition, CD/PROTECTION:ASIS tells CD not to change your current !
   protection at all.  NB this is ONLY available in SWITCH.INI.  You !
!  can specify a protection 8:xyz by putting <xyz> in the command, but !
!  there is no /protection switch in commands, only in SWITCH.INI . !
!                                                                !
!  Henry Thompson wants CD to pick up its protection without any help !
!  from him.  The new scheme is that the default protection is taken !
!  from LOGIN/DEFPROT:xyz if it exists, or is set to 055.  Some code !
!  has been moved from ConsultMonitor into the new routine which does !
!  the new stuff, as it has to prepare for ReadSwitches.  SWITCH.INI !
!  is now read exactly twice, however often CD is continued.  I have !
!  taken advantage of this to look at login/scan or login/noscan as !
!  well, which is why it appears here and has no other business.  !
!                                                                !
!================================================================!

    own Scan  = Yes;  !  should the /scan flag be set/reset/left alone?
    own Self  = #055; !  the protection to use in your own area(s)
    own Group;        !  the protection to use in your group's areas
    own Other = #000; !  the protection to use elsewhere.
    own Protection;   !  the current/new default protection.
```

```
%<<
routine PrintProtection(NewOld, Protection) =
   begin
      putext(';Your ');
      putsix(.NewOld);
      putext(' default protection is <');
      putasc(.Protection<6,3>+"0");
      putasc(.Protection<3,3>+"0");
      putasc(.Protection<0,3>+"0");
      putext('>?M?J');
   end;
>>%

routine GetProtectionDefault =
   begin
      bind GetTab = #041, DefProt = #140;
      vres = .MyJob^18 + DefProt;
      return ifskip calli(vres, GetTab) then .vres<27,9> else 0
   end;

   tine SetProtectionDefault(Protection) =
   begin
      bind SetUUO = #075, SetDef = #033;
      local block[3];
      block[0] = 0^18 + 0;
      block[1] = .Protection and #777;
      block[2] = 0;  !  not mentioned in the monitor calls manual!
      vres = SetDef^18 + block<0,0>;
      return ifskip calli(vres, SetUUO) then Yes else No;
   end;

routine GetSwitchIniProtections =
   begin
      local Prot;
      bind GetPPN = #024;  !  MC 4.5.10 p 4-10
      bind PJob   = #030;  !  MC 4.5.22 p 4-14

      MyPPN = ifskip calli(vres, GetPPN) then .vres else .vres;
      MyJob = (calli(vres, PJob); .vres);

      ReadSwitches(sixbit 'LOGIN ');
      if FindAttr(sixbit 'DEFPRO', No) then begin
         Self = ToOctal(.BindName(head(ThisAttrPtr)))
      end else begin
         Self = #055
      end % if login/defprot:xyz %;
      Group = .Self and #007;    !  force self&group to all rights
      Other = #000;              !  everyone has all rights

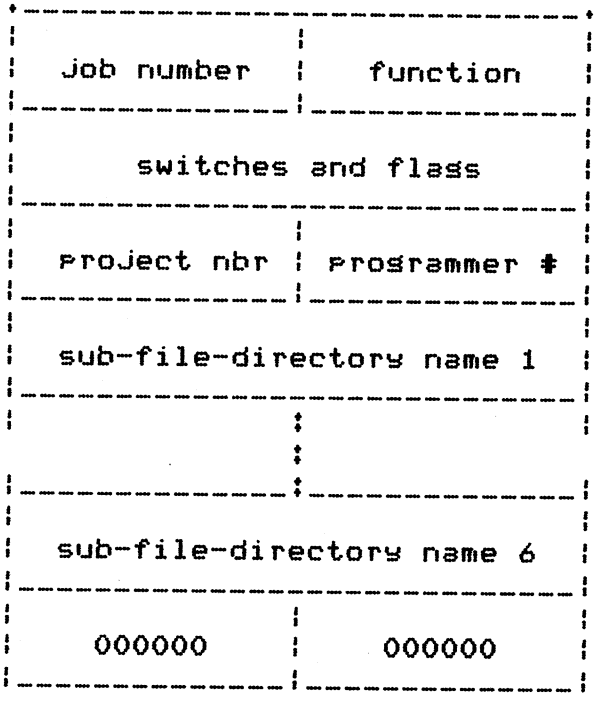
      Scan = if FindAttr(sixbit 'SCAN  ', No) then Yes
        else if FindAttr(sixbit 'NOSCAN', No) then No else Yes;

      ReadSwitches(ProgramName);
      if FindAttr(sixbit "PROTEC", No) then begin
         if FindBind(sixbit "ASIS  ") then begin
            Self = Group = Other = GetProtectionDefault();
            return
         end % as is %;
         SetNumber(sixbit "SELF  ", Self,  8, .Self );
         SetNumber(sixbit "GROUP ", Group, 8, .Group);
```

```
        SetNumber(sixbit 'OTHER ', Other, 8, .Other);  !  either
        SetNumber(sixbit 'OTHERS', Other, 8, .Other);  !  spellings
      end;
   end;

routine NewProtectionDefault(NewPPN) =
   if .NewPPN< 0,18> eql .MyPPN< 0,18> then .Self  else
   if .NewPPN<18,18> eql .MyPPN<18,18> then .Group else
   %  .NewPPN< 0,36> neq .MyPPN< 0,36> so % .Other;
```

A Path Block (MC 8.1.10.9) is a ten-word block of the form



CD maintains two path blocks: OldDefault (which is read), and NewDefault (which is written). There used to be two more blocks for tinkering with the library path, but they were removed as it was impossible to reconcile them with the complexity of /search logical names under TOPS10 version 7.01 (of which more below).

Each block has its opcode fixed, so DoPath only needs to be told which block to use. The old block is found by asking the monitor, and is copied into the new one. The new one is then modified in accordance with the command line and the user's SWITCH.INI file, and is then written back. This is CD's principal purpose. If the write-back fails (after strenuous attempts to find the new path), the original path is copied back into the new block and the initial path is restored. The report which tells the user where he is is always taken directly from the monitor in case of bugs.

The latest change to CD is to make it work in with PATH. In 7.01 you can define a logical name to stand for a sequence of paths, e.g. .PATH FRED:=DSKA:[,,JIM,FRED],DSKC:[77,1234,FRED]. The intention is that CD FRED should take you to that place. To start with, we have to make an arbitrary choice: CD will try the first path in the list and no other, not even a modified form as with ordinary search. Secondly, CD ignores the device; so it won't always work even when

```
!  the path exists.  CD **never** tinkers with the search list, which  !
!  it would have to in this case.  Finally, we have to use yet another !
!  form of path block and .PATH monitor call; see the new MC 27-227.   !
!  We still use DoPath to read the block, but it had to be bent.  CD   !
!  will never write a new-style block, only read it (that's bad enough)!
!                                                                      !
!======================================================================!

   macro
      JobNo(PathBlock)   = (PathBlock)[0]<18,18> $,
      OpVal(PathBlock)   = (PathBlock)[0]< 0,18> $,
      Flags(PathBlock)   = (PathBlock)[1] $,
         ScanSwitch      =  0,2 $,        !  values DoScan, DontScan
      PPNof(PathBlock)   = (PathBlock)[2] $,
         ProjectNbr      =  18,18 $,
         Programmer      =   0,18 $,
      SfdOf(PathBlock,N)= (PathBlock)[2+(N)] $;

   bind
      MaxSfds     =  5,  !  this MAY be different elsewhere
      DoScan      =  2,  !  scan switch setting
      DontScan    =  1,  !  scan switch setting
      GetDefault = -1,   !  Path opcode - read default path
      SetDefault = -2,   !  Path opcode - replace default path
      GetLogical = -6;   !  Path opcode - inspect logical name

   own
      OldDefault[10] = (GetDefault,  9;0),        !  original default path
      NewDefault[30] = (SetDefault, 29;0),        !  modified default path
      TryLogical[20] = (GetLogical, 1^33, 18;0); !  logical name expansion
   bind
      LogicalBlk     = TryLogical[5];             !  proper path part

   own
      LoseTop,    !  first Sfd which can't be squeezed out
      NextSfd,    !  place to put next sfd-name in NewDefault.
      DirWanted; !  /dir switch given; simulate .Direct/Fast.


 !<
routine PrintPath(NewOld, PathBlock) =
   begin
      putext(';Your ');
      putsix(.NewOld);
      putext(' default path is [');

      putoct(.PPNof(.PathBlock)<ProjectNbr>);
      putasc(",");
      putoct(.PPNof(.PathBlock)<Programmer>);
      incr i from 1 to 6 do begin
         if .SfdOf(.PathBlock, .i) eql 0 then exitloop;
         putasc(",");
         putsix(.SfdOf(.PathBlock, .i));
      end;
      putasc("]");

      select .Flags(.PathBlock)<ScanSwitch> of nset
         DoScan:    putext('/scan');
         DontScan:  putext('/noscan');
         otherwise: putext('/??scan');
```

```
      tesn;

      putasc(cr); putasc(lf);
   end;
>>%

routine DoPath(PathBlock) =
   begin
      bind PathUUO = #110;
   !  JobNo(.PathBlock) always eql -1, which is invalid so => this one
   !  OpVal(.PathBlock) always set to OpCode
      vres = (if .%OpVal%(.PathBlock) eql GetLogical then 20 else 10)^18
           + (.PathBlock)<0,0>;          !  [length,address]
      return ifskip calli(vres, PathUUO) then Yes else No
   end;

routine ConsultMonitor(NewOld) =
   begin
      Protection = GetProtectionDefault() or 1^35;
      DoPath(OldDefault);

      if .NewOld neq sixbit 'NEW' then return;

      putext('[ Now at [');
      putoct(.PPNof(OldDefault)<ProjectNbr>);
      putasc(",");
      putoct(.PPNof(OldDefault)<Programmer>);
      incr i from 1 to MaxSfds do begin
         if .SfdOf(OldDefault, .i) eql 0 then exitloop;
         putasc(",");
         putsix(.SfdOf(OldDefault, .i));
      end;
      putext('] <');
      putasc("0"+.Protection<6,3>);
      putasc("0"+.Protection<3,3>);
      putasc("0"+.Protection<0,3>);
      putasc(">");
      if .Flags(OldDefault)<ScanSwitch> neq Doscan then putext(' /noscan');
      if .TryLogical[4] neq 0 then putext(' (logical name)');
      putext(' ]?M?J');
   end;


!==================================================================!
!                                                                  !
!  The <base> of a path may take one of these forms:               !
!                                                                  !
!       <base> ::= <identifier>                          {a}       !
!                |   -                                   {b}       !
!                |   ^                                   {c}       !
!                |   +                                   {d}       !
!                |  <project> {, <programmer>}           {e}       !
!                                                                  !
!  where                                                           !
!                                                                  !
!       <project>     ::= <octal number> | <empty>                 !
!       <programmer>  ::= <octal number> | <empty>                 !
!                                                                  !
!  To take the simplest case first, {e} a project-programmer number!
!  pair stands for itself.  An empty project or programmer number is!
```

```
!  filled in from the corresponding field of your LOGIN PPN.  If the   !
!  programmer number is empty, and there are no SFDs following,  both  !
!  it and its comma may be omitted.  Thus if the current job has PPN   !
!  [123,456], then [123,456], [,456], [123,], [123], [,], and [] all  !
!  mean the same, while [777] means [777,456], and [,702] [123,702].   !
!                                                                      !
!  The next simplest case is {d}.   The plus sign means to use just    !
!  the PPN of the path.  Thus if you are currently in the directory    !
!  [1234,5670,Jim,fred] then the <base> [+ means "[1234,5670".         !
!                                                                      !
!  Case {b} specifies all of the current path.  If you don't want CD   !
!  to search, then e.g. to continue the example above, [-,harry stands !
!  for the path [1234,5670,Jim,fred,harry].  "CD -" is a good way of   !
!  checking what your current path is (like UNIX's "pwd"), and CD -/dir!
!  is an alternative to DIR/FAST.                                      !
!                                                                      !
!  Case {c} specifies the current path with the last sfd dropped, if   !
!  there is one.  The up arrow is meant to be suggestive of motion UP  !
!  the directory tree.  You may have SFDnames after this too, like all !
!  bases, but there isn't much point.  CD ^,FRED will take you to just !
   the same place as CD FRED unless there is a FRED in the current path!
!                                                                      !
!  Cases {b,.e} are explicit paths; if CD can't find the path you've   !
!  described it will give up at once.                                  !
!                                                                      !
!  The interpretation of case {a} depends on your SWITCH.INI file.  If !
!  it has a line CD/NAME:<identifier>=<path> the identifier means      !
!  whatever <path> means.  Thus if "CD/NAME:RUFUS=[,,SWORDS,GRAM]",    !
!  then RUFUS,HILT means [,,SWORDS,GRAM,HILT].  On the other hand, if  !
!  the <identifier> is not defined in your SWITCH.INI file, CD will go !
!  and look for it, starting in the current SFD, working up the tree,  !
!  and then finally dropping back into your UFD.  Thus if you are in   !
!  the directory [1234,5670,Jim,fred] and give the command .CD harry   !
!  CD will try [1234,5670,Jim,fred,harry], [1234,5670,Jim,harry],      !
!  [1234,5670,harry], then [,,harry] in that order, stopping when it   !
!  finds it.  If harry still can't be found, CD will check to see if   !
!  HARRY: is defined as a logical path name, and go there if it is.    !
!                                                                      !
   UNIX equivalences:                                                 !
        cd a/b/c          <=>     cd a,b,c                            !
!       cd                <=>     cd                                  !
!       cd .              <=>     cd -                                !
!       cd ..             <=>     cd ^                                !
!       cd $name          <=>     cd name          .profile vs switch.ini !
!       cd ***; ls        <=>     cd ***/dir                          !
!                                                                      !
!======================================================================!

                        forward ParsePath;

routine Base =
   begin
      ch = getsix(TextPtr, SixBuf);
      if .ch eql "[" then begin
         if .SixBuf neq 0 then PutError(1, 7);
         ch = getsix(TextPtr, SixBuf);
      end % if "[" %;

      LoseTop = SfdOf(NewDefault, 0);
      NextSfd = SfdOf(NewDefault, 1);
```

```
    if .ch eql "+" or .ch eql "-" or .ch eql "^" then begin
       decr i from MaxSfds+1 to 0 do
          SfdOf(NewDefault, .i) = .SfdOf(OldDefault, .i);
       while ..NextSfd neq 0 do NextSfd = .NextSfd+1;

       if .ch eql "+" then begin
          NextSfd = SfdOf(NewDefault, 1)
       end else
       if .ch eql "^" then begin
          if .NextSfd neq SfdOf(NewDefault, 1) then NextSfd = .NextSfd-1
       end % if + ^ or - %;

       if .SixBuf neq 0 then PutError(1, 8);
       ch = getsix(TextPtr, SixBuf);
       if .SixBuf neq 0 then PutError(1, 18);
    end % + - ^ % else

    if .SixBuf<30,6> geq sixbit "A" and .SixBuf<30,6> leq sixbit "Z" then begin
       if FindBoth(sixbit "NAME  ", .SixBuf) then begin
          local SaveCh, SaveTextPtr;
          bind  BadDef = uplit asciz '!!undefined!!';
          SaveCh = .ch; SaveTextPtr = .TextPtr;
          SetString(.SixBuf, TextPtr, BadDef<36,7>);
          ParsePath();
          ch = .SaveCh; TextPtr = .SaveTextPtr;
       end else begin
          decr i from MaxSfds+1 to 0 do
             Sfdof(NewDefault, .i) = .SfdOf(OldDefault, .i);
          while ..NextSfd neq 0 do NextSfd = .NextSfd+1;
          (LoseTop = .NextSfd) = .SixBuf;
          NextSfd = .NextSfd+1;
       end;
    end % name % else

    if .ch eql "," or .ch eql "]" or .ch eql EOS then begin
       local pn;
       PPNof(NewDefault) = .MyPPN;
       pn = ToOctal(.SixBuf);
       if .pn neq 0 then PPNof(NewDefault)<ProjectNbr> = .pn;
       if .ch eql "," then begin
          ch = getsix(TextPtr, SixBuf);
          pn = ToOctal(.SixBuf);
          if .pn neq 0 then PPNof(NewDefault)<Programmer> = .pn;
       end % "," %
    end % cases {a,b,c,d,e} %;

    if .ch neq "," and .ch neq "]" and .ch neq "<" and
       .ch neq "/" and .ch neq EOS then PutError(2, 9);
 end;


routine ParsePath =
 begin
    Base();
    while .ch eql "," do begin
       ch = getsix(TextPtr, SixBuf);
       if .SixBuf eql 0 then begin
          PutError(2, 10);
       end else begin
```

```
            if .NextSfd-.LoseTop gtr MaxSfds then begin
               PutError(1, 16);
               NextSfd = .LoseTop-1;
            end % overflow check %;
            .NextSfd = .SixBuf;
            NextSfd = .NextSfd+1;
         end;
      end % while %;
      if .ch eql "]" then begin
         ch = getsix(TextPtr, SixBuf);
         if .SixBuf neq 0 then PutError(1, 11);
      end;
      .NextSfd = 0;
      if .ch eql "<" then begin
         ch = getint(TextPtr, 8, Protection);
         if .ch eql ">" then begin
            ch = getsix(TextPtr, SixBuf);
            if .SixBuf neq 0 then PutError(1, 12);
         end else begin
            PutError(2, 13);
         end;
      end % protection %;
      if .ch eql "/" then begin
         FindAttr(sixbit "SWITCH", Yes);
         do value(Yes) until .ch neq "/";
      end;
      if .ch neq EOS then PutError(2, 14);
   end;

!  CheckPath makes sure that there aren't too many Sfds in the
!  NewDefault path.  If there are, something like CD A,B,C,D,E
!  must have happened in a deep directory, so it is enough to
!  squeeze out what we can, as if long things weren't "found".

routine CheckPath =
   begin
      local Size, Lose, Shft;
      Size = .NextSfd-SfdOf(NewDefault, 1);
      Lose = .LoseTop-SfdOf(NewDefault, 0);
      if .Size leq MaxSfds then return Yes;
      if .Size-.Lose gtr MaxSfds then begin
         SixBuf = .SfdOf(NewDefault, .Size);
         PutError(1, 16);
         return No;
      end % if %;
      Shft = .Size-MaxSfds;
      incr i from .LoseTop to .NextSfd do (.i-.Shft) = .,i;
      LoseTop = .LoseTop-.Shft;
      NextSfd = .NextSfd-.Shft;
      return Yes;
   end % CheckPath %;

routine SetPathFlags =
   begin
      bind LSCN = .scan;         ! quick hack
      local scan, help;
      scan  = LSCN; !  default to the login/scan setting
      help  =   No; !  don't be overly helpful unless asked
      DirWanted=No; !  don't display the new directory unless asked
      if FindAttr( sixbit "SWITCH", No) then begin
```

```
        SetSwitch(sixbit 'SCAN  ', scan);
        SetSwitch(sixbit 'HELP  ', help);
        SetSwitch(sixbit 'DIR   ', DirWanted);
      end;
      if .scan eql Yes then Flags(NewDefault)<ScanSwitch> = DoScan else
      if .scan eql  No then Flags(NewDefault)<ScanSwitch> = DontScan;
      if .help neq No then GiveHelp(ProgramName, .help, 0);
   end;

routine ReadCommand =
   begin
      decr i from 9 to 1 do begin
         NewDefault[.i] = .OldDefault[.i];
      end;
      TextPtr = GetTermLine(Yes, LineBuf);
      ParsePath();
      CheckPath();
      SetPathFlags();
%<<   PrintPath(sixbit 'TMP', NewDefault);
>>%
   end;

routine Check701LogicalName =
   begin
      if .TryLogical[1] eql 0 then return No;    !  already tried
      TryLogical[1] = 1^33;                      !  flag cleared by call, alas!
      TryLogical[2] = .SfdOf(NewDefault, 1);     !  The name
      TryLogical[3] = 0;
      if not DoPath(TryLogical) then return No;

      incr i from 1 to 6 do
         if .SfdOf(LogicalBlk, .i) eql 0 then begin
            %  check for single definition  %
            if .SfdOf(LogicalBlk, .i+2) neq 0 then PutError(3, 19);
            %  append rest of NewDefault  %
            incr j from 2 to 6 do
               if (SfdOf(LogicalBlk, .i+.j-2) = .SfdOf(NewDefault, .j)) eql 0
               then exitloop % j %;
            exitloop % i %
         end % if %;
   %  now move the new path to NewDefault and check it  %
      incr i from 0 to 6 do SfdOf(NewDefault, .i) = .SfdOf(LogicalBlk, .i);
      CheckPath();
      return .ErrorCount eql 0
   end;

routine ObeyCommand =
   begin
      TryLogical[4] = 0;
      if .ErrorCount eql 0 then begin
         until DoPath(NewDefault) do begin
            if .LoseTop eql SfdOf(NewDefault, 0) then begin
               if not Check701LogicalName() then begin
                  %  nothing else left to try, so go back  %
                  PutError(0, 22);  !  don't forget not to change protection
                  decr i from 9 to 1 do NewDefault[.i] = .OldDefault[.i];
               end % if %
            end else
            if .LoseTop eql SfdOf(NewDefault, 1) then begin
               %  try looking in job's ppn  %
```

```
            LoseTop = SfdOf(NewDefault, 0);
            PPNof(NewDefault) = .MyPPN;
         end else begin
            incr Sfd from .LoseTop-1 to .NextSfd do
               .Sfd = .(.Sfd+1);  !  move everything down one
            NextSfd = .NextSfd-1;
            LoseTop = .LoseTop-1;
         end % if %;
      end % until %;
   end % if %;
   if .ErrorCount % now % neq 0 then begin
      decr i from 9 to 1 do begin
         NewDefault[.i] = .OldDefault[.i];
      end;
      DoPath(NewDefault);
   end else begin
      if .Protection % still % lss 0 then
         Protection = NewProtectionDefault(.PPNof(NewDefault));
      if not SetProtectionDefault(.Protection) then PutError(0, 23);
   end;
end;


   bind Reset = #00, ExitI = #12;  !  calli codes

   GetSwitchIniProtections();

   while 1 do begin
      calli(0, Reset);
      ErrorCount = 0;
      ConsultMonitor(sixbit 'Old');
      ReadCommand();
      ObeyCommand();
      ConsultMonitor(sixbit 'New');
      if .DirWanted then FastDirectory(OldDefault);
      calli(1, ExitI);  !  don't type the message
   end % forever %;
end
udom
```

```
(*************************************************************************
    This program reads a Prolog source file and extracts the tokens.
    The tokens are written on the output or counted and sorted.

    <token> ::= <layout> <token>
              |  <comment 1> <token>
              |  <comment 2> <token>
              |  <integer>
              |  <word>
              |  <quoted>
              |  <variable>
              |  <string>
              |  <operator>
              |  <single>
              |  <funny 1>
              |  <funny 2>

    <layout> ::= <spacing>
               |  <new line>

    <spacing> ::= ' ' | '^I'
    <new line> ::= '^G' | '^J' | '^K' | '^K' | '^L' | '^M' | '^Z' | '^[' | '^_'

    <comment 1> ::= '%' {any}* <new line>

    <comment 2> ::= '/*' {any}* '*/'

    <integer> ::= <digit>+ [ '''' <digit>+ ]

    <digit> ::= '0'..'9'

    <word> ::= <lower case> <alpha>*

    <lower case> ::= 'a'..'z'

    <variable> ::= <upper case> <alpha>*

    <upper case> ::= 'A'..'Z' | '_'

    <alpha> ::= <lower case> | <upper case> | <digit>

    <quoted> ::= '''' <non ''>* ''''

    <string> ::= '"' <non "">* '"'

    <non X> ::= {any character but X} | {two Xs}

    <single> ::= ')' | '[' | ']' | '{' | '}' | '|' | ',' | ';'

    <funny 1> ::= '('

    <funny 2> ::= '.'

    <operator> ::= <sign>+

    <sign> ::= {any other character, indlucing sometimes / and *}

    The fact which make the character '(' a funny one is that if it is
```

```
590       preceded by a <word>, <quoted>, or <operator> it represents the
600       token ' (' otherwise it represents the token '('.
610       The fact which makes the character "." funny too is that if it is
620       followed by a <layout> character it represents the token '. ',
630       otherwise it represents the token '.'.
640
650   ************************************************************************)
660
670
680   program wlist;
690
700       label
710           9;                          {end of program}
720
730       const
740           MaxTok  = 1280;             {longest token that can be handled}
750           MaxHash = 2003;             {size of dictionary (prime)}
760
770       type
780           HtIndex = 1..MaxHash;
790
800           StIndex = 1..MaxTok;        {index into a string text buffer}
810           Slength = 0..MaxTok;
820           foobaz  = packed array [StIndex] of char;
830           String  = record
840                       tally:  integer;            {how often seen}
850                       length: Slength;            {number of characters}
860                       offset: 0..MaxTok;          {offset from start of buffer}
870                       buffer: ^foobaz;            {why does Pascal want a name?}
880                     end {string};
890           StringP = ^String;
900
910           toclass = (int  {integer constant}
920                     ,str  {string constant}
930                     ,vbl  {variable}
940                     ,wrd  {ordinary word}
950                     ,op   {operator: made of signs}
960                     ,qtd  {quoted atom}
970                     ,pct  {punctuation}
980                     ,frq);{display frequencies?}
990
1000          chclass = (digit, lower, upper, single, sign,
1010                     comment1, comment2, quote1, quote2,
1020                     funny1, funny2, spacing, newline);
1030
1040      var
1050          dictionary: array [HtIndex] of StringP;
1060          nwords: 0..MaxHash;
1070          heaptop: integer;
1080          infile, outfile, helpfile: text;
1090          MinTally, MaxTally, MinCount: integer;
1100          upcase: array [char] of char;
1110          notice : array [toclass] of boolean;
1120          chtype : array [char] of chclass;
1130          nulch, eofch: char;
1140          chhash: array [char] of integer;
1150          curbuf: String;
1160
1170
1180  function CommandLine: integer;
```

```
1190        label
1200            9;
1210
1220        const
1230            MaxSpec = 72;           {longest possible file specification}
1240
1250        type
1260            chcnt   = 0..maxspec;
1270            chnum   = 1..maxspec;
1280            filespec= record length: chcnt; text: packed array [chnum] of char end;
1290            charset = set of char;
1300
1310        var
1320            result: 0..2;
1330            inspec, outspec: filespec;
1340            ch: char;
1350
1360
1370    procedure readspec(var spec: filespec; delimiters: charset);
1380        label
1390            9;
1400        var
1410            i: chcnt;
1420        begin
1430            i := 0;
1440            while not eoln(tty) do begin
1450                read(tty, ch);
1460                if ch in delimiters then goto 9;
1470                if upcase[ch] <> ' ' then begin
1480                    i := i+1;
1490                    spec.text[i] := upcase[ch];
1500                end {if};
1510            end {while};
1520            ch := chr(10);  {^J = linefeed}
1530    9:      spec.length := i;
1540            while i < maxspec do begin
1550                i := i+1;
1560                spec.text[i] := ' ';
1570            end {while};
1580        end;
1590
1600    procedure GiveHelp;
1610        var c: char;
1620        begin
1630            reset(helpfile, 'MEC:WLIST.HLP');
1640            while not eof(helpfile) do begin
1650                read(helpfile, ch);
1660                write(tty, ch);
1670            end {copying Mec:Wlist.Hlp to Tty:};
1680            close(helpfile);
1690            result := 1;
1700        end;
1710
1720    procedure readswitch;
1730        var
1740            switch: filespec;       {the switch text following /}
1750            b: boolean;             {value for logical switches}
1760            n: integer;             {value for integer switches}
1770            c: char;
1780            j: chnum;
```

```
1790        begin
1800            readspec(switch, ['/']);
1810            for j := 1 to switch.length do begin
1820                c := switch.text[j];
1830                if (c >= '0') and (c <= '9') then
1840                    n := n*10 + (ord(c)-ord('0'));
1850            end {for};
1860            b := true;                  {default /foobaz = /foobaz:yes}
1870            c := switch.text[1];
1880            if c = 'N' then begin
1890                c := switch.text[3];
1900                b := false;             {/NOfoobaz = /foobaz:no}
1910            end;
1920            case c of
1930                'A':        MinTally := n;          {Above:N}
1940                'B':        MaxTally := n;          {Below:N}
1950                'C':        MinCount := n;          {Count:N}
1960                'E':        begin                   {Everything}
1970                                notice[int] := b;   notice[str] := b;
1980                                notice[vbl] := b;   notice[wrd] := b;
1990                                notice[op ] := b;   notice[qtd] := b;
2000                                notice[pct] := b;
2010                            end;
2020                'F':        notice[frq] := true;    {Frequencies}
2030                'H':        GiveHelp;               {Help}
2040                'I':        notice[int] := b;       {Integers}
2050                'L':        begin                   {LetterQuote}
2060                                chtype['"'] := single;      {no strings}
2070                                chtype[''''] := lower;      {no quoted atoms}
2080                            end {text hack};
2090                'O':        notice[op ] := b;       {Operators}
2100                'P':        notice[pct] := b;       {Punctuation}
2110                'Q':        notice[qtd] := b;       {Quoted}
2120                'S':        notice[str] := b;       {Strings}
2130                'T':        notice[frq] := false;   {Tokens}
2140                'V':        notice[vbl] := b;       {Variables}
2150                'W':        notice[wrd] := b;       {Words}
2160                others:     begin
2170                                writeln(tty, 'unknown switch "',
2180                                    switch.text:switch.length, '"');
2190                                result := 1;
2200                            end {others};
2210            end {case}
2220        end;
2230
2240        begin
2250            result := 0;
2260            MinTally := 1;
2270            MaxTally := 1000000000;
2280            MinCount := 1;
2290            notice[int] := false;   notice[str] := false;
2300            notice[vbl] := true;    notice[wrd] := true;
2310            notice[op ] := false;   notice[qtd] := true;
2320            notice[pct] := false;   notice[frq] := true;
2330
2340            write(tty, '*');
2350            readln(tty);            {seems to be needed}
2360            if eof(tty) then begin
2370                result := 2;
2380                goto 9
```

```
2390            end {if ^Z typed};
2400            readspec(outspec, ['=', '_']);
2410            if ch = chr(10) then begin
2420                writeln(tty, '"=" expected after output file spec "',
2430                    outspec.text:outspec.length, '"');
2440                result := 1;
2450                goto 9;
2460            end {if};
2470            readspec(inspec, ['/']);
2480            if inspec.length = 0 then begin
2490                writeln(tty, 'No input file specified');
2500                result := 1;
2510                goto 9;
2520            end;
2530            if outspec.length = 0 then begin
2540                outspec.length := 4;
2550                outspec.text[1] := 'T';     outspec.text[2] := 'T';
2560                outspec.text[3] := 'Y';     outspec.text[4] := '!';
2570            end;
2580            while ch = '/' do readswitch;
2590            reset(infile, inspec.text);
2600            rewrite(outfile, outspec.text);
2610    9:      CommandLine := result;
2620        end;
2630
2640
2650    procedure ReadInput;
2660        label
2670            1;                                  {used for setting to 'sign' from '/'}
2680
2690        var
2700            ch, heldch: char;                   {current, lookahead characters}
2710            quote: char;                        {' ' / or eofch if not in a string}
2720            functorseen: boolean;               {to disambiguate "(" -> '(' | ' ('}
2730            token: array [StIndex] of char;     {current token, not packed}
2740            toklen: integer;                    {allow for possible overflow}
2750            k: HtIndex;                         {just for clearing the dictionary}
2760
2770
2780        procedure LookUp;
2790            label
2800                1,                              {collision}
2810                9;                              {found}
2820            var
2830                j: StIndex;
2840                k: HtIndex;
2850                h: integer;
2860            begin
2870                h := 0;
2880                for j := 1 to toklen do
2890                    h := (h*59 + chhash[token[j]]) mod MaxHash;
2900                h := h+1;
2910                k := h;
2920                repeat
2930                    if dictionary[k] = NIL then begin
2940                        if curbuf.length < toklen then with curbuf do begin
2950                            new(buffer);    {allocate another page}
2960                            length := MaxTok;
2970                            offset := 0;
2980                        end {checking for buffer overflow};
```

```
2990                        new(dictionary[k]);
3000                        with dictionary[k]^ do begin
3010                            tally := 1;      {seen this token once}
3020                            length := toklen;
3030                            offset := curbuf.offset;
3040                            buffer := curbuf.buffer;
3050                        end {dictionary entry};
3060                        with curbuf do begin
3070                            for j := 1 to toklen do buffer^[offset+j] := token[j];
3080                            length := length-toklen;
3090                            offset := offset+toklen;
3100                        end {copying string};
3110                        goto 9;
3120                    end {entered};
3130                    with dictionary[k]^ do begin
3140                        if length <> toklen then goto 1;
3150                        for j := 1 to toklen do
3160                            if buffer^[offset+j] <> token[j] then goto 1;
3170                        tally := tally+1;
3180                        goto 9;
3190                    end {found};
3200    1:              if k = MaxHash then k := 1 else k := k+1;
3210                until k = h;
3220                writeln(tty, 'Dictionary overflow with', MaxHash, ' words');
3230                k := k-h;    {bomb out}
3240    9:      end {Look up};
3250
3260
3270        procedure nextch;
3280            begin
3290                if heldch <> nulch then begin
3300                    ch := heldch;
3310                    heldch := nulch
3320                end else
3330                if eof(infile) then begin
3340                    ch := chr(26)
3350                end else begin
3360                    read(infile, ch);
3370                end
3380            end {next character};
3390
3400        procedure savech;
3410            begin
3420                heldch := ch;
3430            end;
3440
3450        procedure nextat;
3460            begin
3470                nextch;
3480                if ch = eofch then begin
3490                    savech;
3500                    ch := nulch
3510                end else
3520                if ch = quote then begin
3530                    nextch;
3540                    if ch <> quote then begin
3550                        savech;
3560                        ch := nulch
3570                    end
3580                end
```

```
3590            end {next quoted character};
3600
3610
3620        procedure stash;
3630            var j: 1..60;           {on overflow, print just a prefix of the token}
3640            begin
3650                toklen := toklen+1;
3660                if toklen <= MaxTok then begin
3670                    token[toklen] := ch
3680                end else
3690                if toklen = MaxTok+1 then begin
3700                    write(tty, '** token too long - ');
3710                    for j := 1 to 60 do write(tty, token[j]);
3720                    writeln(tty, ' ...');
3730                end {overflow};
3740                nextat;                     {read the next character}
3750            end {stash};
3760
3770        procedure finished(sort: toclass);
3780            var j: StIndex;
3790            begin
3800                if notice[sort] then begin
3810                    if notice[frm] then begin
3820                        if toklen > MaxTok then toklen := MaxTok;
3830                        LookUp;
3840                    end else begin
3850                        for j := 1 to toklen do write(outfile, token[j]);
3860                        writeln(outfile)
3870                    end;
3880                end;
3890                functorseen := (sort = wrd) or (sort = op) or (sort = qtd);
3900                toklen := 0;
3910            end;
3920
3930
3940        begin
3950            for k := 1 to MaxHash do dictionary[k] := NIL;
3960            with curbuf do begin
3970                new(buffer);            {allocate a new page of characters}
3980                length := MaxTok;       {all of it is free}
3990                offset := 0;            {none of it has been used}
4000            end {with};
4010
4020            toklen := 0;                {haven't started a word yet}
4030            quote := eofch;             {not in a string or quoted atom}
4040            ch := ' ';                  {will cause functorseen to be cleared}
4050            while ch <> eofch do
4060                case chtype[ch] of
4070
4080    digit:          begin
4090                        repeat stash until chtype[ch] <> digit;
4100                        if ch = '''' then
4110                        repeat stash until chtype[ch] <> digit;
4120                        finished(int);
4130                    end {integer};
4140
4150    lower:          begin
4160                        repeat stash until chtype[ch] > upper;
4170                        finished(wrd);
4180                    end {word};
```

```
4190
4200    upper:          begin
4210                        repeat stash until chtype[ch] > upper;
4220                        finished(vbl);
4230                    end {variable};
4240
4250    quote1:         begin
4260                        quote := ch;    nextch;
4270                        while ch <> nulch do stash;
4280                        quote := eofch; nextch;
4290                        finished(qtd);
4300                    end {quoted};
4310
4320    quote2:         begin
4330                        quote := ch;    nextch;
4340                        while ch <> nulch do stash;
4350                        quote := eofch; nextch;
4360                        finished(str);
4370                    end {string};
4380
4390    comment1:       begin
4400                        repeat nextch until chtype[ch] = newline;
4410                        functorseen := false;
4420                    end {percent comment};
4430
4440    comment2:       begin
4450                        quote := ch; nextch;
4460                        if ch <> '*' then begin
4470                            savech; ch := quote;
4480                            goto 1
4490                        end {if not a comment after all};
4500                        repeat
4510                            if ch = '*' then begin
4520                                nextch;
4530                                if ch = quote then ch := nulch;
4540                            end else begin
4550                                nextch
4560                            end {looking at *X or Y}
4570                        until (ch = nulch) or (ch = eofch);
4580                        if ch = nulch then ch := ' ';
4590                        quote := eofch;
4600                        functorseen := false;
4610                    end {/ * ... * / comment};
4620
4630    sign:           begin
4640            1:          repeat stash until chtype[ch] <> sign;
4650                        finished(op);
4660                    end {operator};
4670
4680    single:         begin
4690                        stash;
4700                        finished(pct);
4710                    end {punctuation};
4720
4730    funny1:         begin
4740                        if functorseen then begin
4750                            savech; ch := ' '; stash;
4760                        end {if functor application};
4770                        stash;
4780                        finished(pct);
```

```
4790                    end;
4800
4810    funny2:         begin
4820                        stash;
4830                        if chtype[ch] >= spacing then begin
4840                            ch := ' '; stash;
4850                        end {terminal period};
4860                        finished(pct);
4870                    end {period};
4880
4890    spacing,
4900    newline:        begin
4910                        nextch;
4920                        functorseen := false;
4930                    end {layout};
4940
4950            end {case and while};
4960        end {Read Input};
4970
4980
4990    procedure Pack;
5000        var k: HtIndex;
5010        begin
5020            nwords := 0;
5030            for k := 1 to MaxHash do
5040                if dictionary[k] <> NIL then
5050                    if (dictionary[k]^.tally >= MinTally) and
5060                       (dictionary[k]^.tally <= MaxTally) then begin
5070                        nwords := nwords+1;
5080                        dictionary[nwords] := dictionary[k];
5090                    end {if keeping entry}
5100            {end for k};
5110        end {Packing the dictionary};
5120
5130
5140    procedure HeapSort;
5150        var
5160            k: HtIndex;
5170            entry: StringP;
5180
5190        function great1(var b1, b2: foobaz; o1, o2: Slength;
5200                    {const} l1, l2: Slength): boolean;
5210            label 9;
5220            var L: Slength;
5230            begin
5240                L := l1;
5250                if L > l2 then L := l2;
5260                while L > 0 do begin
5270                    o1 := o1+1; o2 := o2+1;
5280                    if b1[o1] <> b2[o2] then begin
5290                        great1 := b1[o1] > b2[o2];
5300                        goto 9;
5310                    end {different};
5320                    L := L-1;
5330                end {for L := L downto 1};
5340                great1 := l1 > l2;
5350    9:      end {great 1};
5360
5370        function greater(w1, w2: StringP): boolean;
5380            begin
```

```
5390                greater := great1(w1^.buffer^, w2^.buffer^,
5400                    w1^.offset, w2^.offset, w1^.length, w2^.length);
5410            end {w1 > w2?};
5420
5430
5440        procedure RestoreHeap(l, n: HtIndex);
5450            label 9;
5460            var k, m: HtIndex;
5470            begin
5480                entry := dictionary[l];
5490                k := l;
5500                while k*2 <= n do begin
5510                    m := 2*k;
5520                    if m < n then
5530                        if greater(dictionary[m+1], dictionary[m]) then
5540                            m := m+1;
5550                    if not greater(dictionary[m], entry) then goto 9;
5560                    dictionary[k] := dictionary[m];
5570                    k := m;
5580                end {while};
5590    9:          dictionary[k] := entry;
5600            end {restoring a heap};
5610
5620        begin { sorting the packed dictionary }
5630            { make the dictionary into a heap }
5640            for k := nwords div 2 downto 1 do RestoreHeap(k, nwords);
5650            { sort the heap }
5660            for k := nwords downto 2 do begin
5670                entry := dictionary[1];
5680                dictionary[1] := dictionary[k];
5690                dictionary[k] := entry;
5700                RestoreHeap(1, k-1);
5710            end {for k};
5720        end {Heap Sort};
5730
5740
5750    procedure PrintOut;
5760        var
5770            k: HtIndex;
5780            j: StIndex;
5790            t: integer;
5800            q: boolean;                 {for writeq effect}
5810        begin
5820            t := 0;
5830            for k := 1 to nwords do with dictionary[k]^ do begin
5840                t := t+tally;
5850                if tally > MinCount then begin
5860                    write(outfile, tally:4, ' ')
5870                end else begin
5880                    write(outfile, '     ')
5890                end {if showing count};
5900                q := false;
5910                if length <= 1 then begin
5920                end else
5930                if chtype[buffer^[offset+1]] <= upper then begin
5940                    for j := 2 to length do
5950                        if chtype[buffer^[offset+j]] > upper then q := true;
5960                end else begin
5970                    for j := 2 to length do
5980                        if chtype[buffer^[offset+j]] <> sign then q := true;
```

```
5990                end;
6000                if q then write(outfile, '''');
6010                for j := 1 to length do write(outfile, buffer^[offset+j]);
6020                if q then write(outfile, '''');
6030                writeln(outfile);
6040            end {for k};
6050            break(outfile); {in case it is tty}
6060            writeln(tty, nwords:4,'\',t:1, ' types\tokens');
6070        end {Print Out};
6080
6090
6100    procedure Initialise;
6110        var ch: char; k: integer;
6120        begin
6130            for ch := chr(0) to chr(127) do upcase[ch] := ' ';
6140            for ch := 'A' to 'Z' do upcase[ch] := ch;
6150            for ch := 'a' to 'z' do upcase[ch] := chr(ord(ch)-32);
6160            for ch := '0' to '9' do upcase[ch] := ch;
6170            upcase['['] := '[';     upcase[']'] := ']';
6180            upcase[':'] := ':';     upcase['.'] := '.';
6190            upcase[','] := ',';
6200            nulch := chr(0);
6210            eofch := chr(26);
6220            for ch := chr(0) to chr(127) do chtype[ch] := sign;
6230            for ch := '0' to '9' do chtype[ch] := digit;
6240            for ch := 'a' to 'z' do chtype[ch] := lower;
6250            for ch := 'A' to 'Z' do chtype[ch] := upper;
6260            chtype['_'] := upper;
6270            chtype['%'] := comment1;
6280            chtype['/'] := comment2;
6290            chtype['''']:= quote1;
6300            chtype['"'] := quote2;
6310            chtype['('] := funny1;
6320            chtype['.'] := funny2;
6330            chtype['!'] := single;  chtype[')'] := single;
6340            chtype['['] := single;  chtype[']'] := single;
6350            chtype['{'] := single;  chtype['}'] := single;
6360            chtype[','] := single;  chtype[';'] := single;
6370            chtype[chr( 7)] := newline;     chtype[chr( 9)] := spacing;
6380            chtype[chr(10)] := newline;     chtype[chr(11)] := newline;
6390            chtype[chr(12)] := newline;     chtype[chr(13)] := spacing;
6400            chtype[chr(26)] := newline;     chtype[chr(27)] := newline;
6410            chtype[chr(31)] := newline;     chtype[chr(32)] := spacing;
6420            for ch := chr(0) to chr(127) do chhash[ch] := 0;
6430            for ch := '0' to '9' do chhash[ch] := ord(ch)-ord('0')+1;
6440            for ch := 'a' to 'z' do chhash[ch] := ord(ch)-ord('a')+11;
6450            for ch := 'A' to 'Z' do chhash[ch] := ord(ch)-ord('A')+37;
6460            chhash['_'] := 63;
6470            k := 63;
6480            for ch := chr(127) downto chr(0) do if chhash[ch] = 0 then begin
6490                k := k+1;
6500                chhash[ch] := k
6510            end;
6520        end {initialisation};
6530
6540
6550        begin {program}
6560            Initialise;
6570            while true do begin
6580                case CommandLine of
```

```
6590                    0:  begin
6600                            mark(heaptop);
6610                            ReadInput;
6620                            if notice[fra] then begin
6630                                Pack;
6640                                if nwords = 0 then begin
6650                                    writeln(tty, '** no tokens');
6660                                end else begin
6670                                    HeapSort;
6680                                    PrintOut;
6690                                end {if needed by USELESS Pascal};
6700                            end {sort and print};
6710                            close(outfile);
6720                            close(infile);
6730                            release(heaptop);
6740                        end {normal case};
6750                    1:  begin
6760                        end {error in command line};
6770                    2:  goto 9;
6780                end {case};
6790            end {forever};
6800    9:  end {program}.
```

No error detected

Highses: 5K
Lowses : 3K