PASCAL USERS GROUP

# Pascal News

**Communications about the Programming Language Pascal by Pascalers**

Number 24

- Pascal Standards: Progress Report
- Status Report on Version 3.0
- WRITENUM — A Routine to Output Real Numbers
- TREEPRINT — A Package to Print Trees on Character Printers
- Three Proposals for Extending Pascal
- Announcements

Number
24
JANUARY 83

## POLICY: PASCAL NEWS (Jan. 83)

- *Pascal News* is the official but *informal* publication of the User's Group.

Purpose: The Pascal User's Group (PUG) promotes the use of the programming language Pascal as well as the ideas behind Pascal through the vehicle of *Pascal News*. PUG is intentionally designed to be non political, and as such, it is not an "entity" which takes stands on issues or support causes or other efforts however well-intentioned. Informality is our guiding principle; there are no officers or meetings of PUG.

The increasing availability of Pascal makes it a viable alternative for software production and justifies its further use. We all strive to make using Pascal a respectable activity.

Membership: Anyone can join PUG, particularly the Pascal user, teacher, maintainer, implementor, distributor, or just plain fan. Memberships from libraries are also encouraged. See the ALL-PURPOSE COUPON for details.

- *Pascal News* is produced 3 or 4 times during a year; usually in March, June, September, and December.
- ALL THE NEWS THAT'S FIT, WE PRINT. Please send material (brevity is a virtue) for *Pascal News* single-spaced and camera-ready (use dark ribbon and 15.5 cm lines!)
- Remember: ALL LETTERS TO US WILL BE PRINTED UNLESS THEY CONTAIN A REQUEST TO THE CONTRARY.
- *Pascal News* is divided into flexible sections:

POLICY — explains the way we do things (ALL-PURPOSE COUPON, etc.)

EDITOR'S CONTRIBUTION — passes along the opinion and point of view of the editor together with changes in the mechanics of PUG operation, etc.

HERE AND THERE WITH PASCAL — presents news from people, conference announcements and reports, new books and articles (including reviews), notices of Pascal in the news, history, membership rosters, etc.

APPLICATIONS — presents and documents source programs written in Pascal for various algorithms, and software tools for a Pascal environment; news of significant applications programs. Also critiques regarding program/algorithm certification, performance, standards conformance, style, output convenience, and general design.

ARTICLES — contains formal, submitted contributions (such as Pascal philosophy, use of Pascal as a teaching tool, use of Pascal at different computer installations, how to promote Pascal, etc.).

OPEN FORUM FOR MEMBERS — contains short, informal correspondence among members which is of interest to the readership of *Pascal News.*

IMPLEMENTATION NOTES — reports news of Pascal implementations: contacts for maintainers, implementors, distributors, and documentors of various implementations as well as where to send bug reports. Qualitative and quantitative descriptions and comparisons of various implementations are publicized. Sections contain information about Portable Pascals, Pascal Variants, Feature-Implementation Notes, and Machine-Dependent Implementations.

# Pascal News

Communications about the Programming Language Pascal by Pascalers

**JANUARY 1983** **Number 24**

Hello

This is Pascal News and my name is Charlie Gaffney. Much has happened since I received my March #22-23 Issue. I am the publisher of USUS News. USUS is the UCSD p-System User Society. The p-system was developed to bring Pascal to micro computers. Our USUS News was modeled on Pascal News. We have a lot of information in USUS but it was a chore to read because of bad original and photo copy material used for printing.

I sought a typesetter and found we could typeset and print for only 10% increase in cost. This is a small premium cost to have a readable newsletter. We typeset in August and received many compliments so far.

I thought of our model Pascal News and called Rick Shaw to explain our (USUS) improvement and ask if he needed help.

But Rick had his own story to tell. The work at Pascal Users Group was not performed by a group but by one man, Rick Shaw. He was hard pressed to keep up with the business of PUG.

An offer had been made by the "Journal of Pascal & Ada" to take all pending articles and publish them.

I made a counter offer to maintain PUG as it is under new management. Rick thought that was a nice idea, but the problems would persist and PUG would fail either now or later. After three phone calls Rick decided to let me try.

The News will be typeset and I hope you approve of our new appearance. The articles you submit may be in any format because they will now be typeset. It is possible to enlarge the program listings if they are submitted in a narrow format of 15.5 cm wide.

**Business**

I have decided to pay a small business to update:

1. the member list
2. new and renew members
3. banking records

Membership costs have gone up but if you pay for two years the third year is free.

Back issues have tied up a great deal of money. We have articles and programs just waiting for you. Buy a set. Buy a complete set. Buy a set for your friends.

**A little about me**

I am an electrician, and I work for Chevrolet in Parma, Ohio. I have no college education and no formal computer training. My experience with computers involved the purchase of a Western Digital microengine, 16 bit computer. The computer uses p-code as defined by UCSD p-System and directly implements the code without an interpreter. Pascal News and USUS News, and 25 text books, have been my teachers. I thank them and each of you.

Charlie

# A Pascal Bibliography

**By Tony Heyes**
Blind Mobility Research Unit,
Department of Psychology,
University of Nottingham
England

**Introduction**

The Pascal Bibliography is a package of programs written in standard Pascal and should therefore be easily transported. It enables users to store references and to retrieve them either by AUTHOR name or by KEYWORD; or logical combinations of AUTHORS and KEYWORDS. The bibliography is designed for human use; it uses very explicit prompts.

**Design Philosophy**

The bibliography consists of a collection of ITEMS. Each ITEM takes the form of:-

One line devoted to AUTHOR or ADDRESSEE names.
Two lines devoted to TITLE or ADDRESS.
Two lines devoted to LOCATION.
DATE ITEM NUMBER.
Two lines devoted to KEYWORDS.

For example:-

HEYES A.D.,FERRIS A.J.,ORLOWSKI R.J.
COMPARISON BETWEEN TWO METHODS OF RESPONSE FOR
AUDITORY LOCALISATION IN THE AZIMUTH PLANE.
J. ACOST. SOC. AMER., 58; 1336-1339

1975 260
DEAFNESS,LOCALISATION,AUDITORY DISPLAYS
STEREOPHONIC SOUNDS,KINAESTHESIS

If ITEMS are addresses the convention is to store the address on the two lines of title.

For example:-

BLOGGS J.B.
Mr.J.B.Bloggs\13 Fishpond Rd.\ Beeston,
Nottingham\ NG7 2RD\ U.K.
Tel 0602-251234

1980 27
ADDRESS,CIRCULATION LIST,XMAS CARD

Note the use of the backslash [\] to indicate the start of a new line. Note also that additional information such as the telephone number can be stored on the location lines. Note, finally, the date has little meaning in this context.

Items may be located by running the program "bibout".

Items may be APPENDED or CHANGED by running the program "bibin".

Both programs are well supplied with prompts and are very simple to use.

Since additions and changes require that the current DICTIONARY be recompiled and this takes time, the actual changes take place during the night. The instructions to implement the changes reside in a PENDING TRAY until the night time run. The user will remain unaware of this slight restriction unless he tries to locate an ITEM during the day on which the ITEM was loaded.

**Method of Use**

The following assumed the use of the UNIX operating system. Login with your user name, give your password, respond to the first system prompt "%" with "cd bib", ie. change directory to "bib". In answer to the next system prompt, "%", you may select any one of the programs from within the package.

These are:-

a) "bibbin" to enter new items or to change an ITEM.
b) "bibout" to search the bibliography for an ITEM.
c) "outdict" to produce a hard copy of the current DICTIONARY.
d) "cat scratch lpr" to output a hard copy of the SCRATCH FILE.

NEW USERS SHOULD ASK IF THEY MAY HAVE ACCESS TO AN ESTABLISHED BIBLIOGRAPHY AND THEN TRY USING "bibout" TO LOCATE ITEMS OF INTEREST.

To logout respond to the system prompt "%" by typing "control Z".

**The Programs**

a) "bibin"
The opening prompt allows the selection of one of the following options:-
APPEND

The prompts should be sufficiently explicit, but note:-

(1) Authors and keywords should be separated by commas. Since they are used in the dictionary they should not spill over the end of a line. They can be any length but only the first 20 characters are significant.
(2) The terminal will probably be set to produce lower case letters. The program will automatically convert them to upper case. If you wish to override this, begin each line of text with a backslash [\].
(3) The date must be a single integer e.g. 1980.
(4) If addresses are to be stored use the two title lines, close pack but indicate new lines with a backslash [\].
(5) A personal local storage reference may be kept on the second location line. It should be enclosed in square brackets; e.g. [BM760] means that a copy of this ITEM is in the BM library, entry number 760.

**CHANGE**

Answer the prompts but please take note of the following:-

1) You must know in advance the ITEM number of the ITEMS you require to change.
2) You have to retrieve the ITEMS from the bibliography so CHANGE is relatively slow; be patient. It saves time, if you are changing more than one ITEM to make the changes in numerical order of ITEM number.
3) You retrieve the ITEM to be changed from the bibliography, the changed ITEM goes into the PENDING TRAY. If you change the same ITEM more than once in a single day only the last version will survive.

**SPECIAL FACILITY**

This option moves the contents of the SCRATCH file into the PENDING tray. It can be used for moving ITEMS from one bibliography to another. Since SCRATCH is a text file, ITEMS may be changed using an editor and then loaded back into the PENDING tray. (Clever stuff!!).

b) "bibout"

The computer will count the ITEMS in the bibliography and then offer the option of producing a HARD COPY of the dictionary or doing a SEARCH for ITEMS.

**SEARCH**

You may either search by NUMBER or, more usually by using the DICTIONARY.

You may opt to send the results either to the TERMINAL or to the SCRATCH FILE for subsequent printing.

**SEARCH by NUMBER**

The search is terminated by asking to search for item number zero [0].

A block of ITEMS may be searched for by asking to search for item number minus one [−1]. You will then be asked for the lowest and the highest item numbers of the block.

**SEARCH by DICTIONARY**

You will be asked for a word i.e. an AUTHOR name or a KEYWORD. The computer will look this up in the DICTIONARY and list the ITEM numbers of all ITEMS containing this word in their AUTHOR or KEYWORD string. If you are doing a single word search answer the next prompt will a full stop [.], and then the instruction to LOOK UP. If, however, it is a multiple word search give the next word. Once again the corresponding ITEM number list will be printed out.

The answer to the prompt "AND, OR or NOT" enables you to combine the current ITEM number list with the previous ITEM number list. For instance:-

AND Only numbers present in both lists are retained.
OR All numbers from both lists are retained.
NOT Numbers present in the current list are deleted from the previous list.

A new current list is printed out showing the results of the selection. The search sequence may be continued for any number of logical combinations of words. At any time a search for the ITEMS in the current list may be initiated by giving a full stop [.]. After which you may either LOOK UP the selected ITEMS or, if you have made a mistake in your list combinations simply RESTART. There is one special word, namely ***, this word will match all the dictionary.

c) "outdict"

No prompts and no option, simply type "outdict" in answer to the system prompt "%" to obtain a hard copy of the current DICTIONARY.

Note, you must have first prepared a copy of the DICTIONARY by running the appropriate HARD COPY option of "bibout".

d) "opr scratch"

This program is run to obtain the printed output from "bibout", provided the option had been chosen to send the output to the SCRATCH FILE.

No prompts and no options, simply type "opr scratch" in answer to the system prompt "%" to obtain a hard copy of the contents of the SCRATCH FILE.

N.B. If you would like to list the SCRATCH FILE to the terminal to check the contents then run "cat scratch".

**Acknowledgements**

I gratefully acknowledge the encouragement and support I have received from Roger Henry and Chris Blunsdon.

The bibliography was originally intended for use by the members of the BLIND MOBILITY RESEARCH UNIT it is however available to any members of the Pascal Users Group. Would anyone wishing to take up this offer please contact Tony Heyes to arrange medium of transportation.

**NOTES FOR IMPLEMENTORS**

The following notes outline the steps the imple-

menter should take in order to establish a new bibliography. After this groundwork, the user can use the shell commands *bibin, bibout,* and *outdict* to build and manipulate the bibliography.

1. The bibliography system requires 6 workfiles named b1 to b6. The recommended practice is for the user to devote a directory to the bibliography, say 'user/bib'. The workfiles can be created easily using the cat command. E.g

   cat > b1 Ẑ

   File b3 requires a link named scratch. This can be created by the command —

   ln b3 scratch

2. b6 is used as a temporary scratch file during the overnight run. It grows to be as large as b1. If there is insufficient room on the user's disc b6 may be coerced on to another disc.
3. The bib directory must contain the following shell commands:-

| | |
|---|---|
| bibin | Bibin.out b1 b2 b3 b4 b5 |
| bibout | Bibout.out b1 b2 b3 b4 b5 |
| bibupdate | Bibupdate.out b1 b2 b3 b4 b5 b6 |
| outdict | (lpr b4;rm b4; > b4)& |

4. Finally, an entry must be made in the UNIX table 'crontab' so that bibupdate will be executed during the night.

```
program Bibin(input,output,bank,dict,scratch,dlist,PendingTray);
(* To ADD, CHANGE or REMOVE items,
 instructions left in a PendingTray file 'pending',
actual changes made by running "Bibupdate.p"  *)
(*  written by Tony Heyes, Blind Mobility Research Unit,
Department of Psychology, The University,
Nottingham, U.K.  *)

label 10;

const    LineLn = 70;
      RowLn = 20;
      HiTag = 10000;
      NonDate = -1066;

type     string = packed array [1..LineLn] of char;
     item = record
               authors,titlel,title2,
               placel,place2 : string;
               date       : integer;
               keyl,key2  : string
            end;
     word = packed array [1..20] of char;
     row = array [1..RowLn] of integer;
     dic = record
              name      : word;
              numbers   : row;
              cont      : boolean
           end;
     TagItem = record
                  tag : integer;
                  entry : item
               end;

var   empty,entry : item;
    bank : file of item;
    PendingTray,TempPendingTray : file of TagItem;
    dlist,scratch  : text;
    dict : file of dic;
    TagEntry : TagItem;
    ch,AppendOption,ChangeOption,MainOption,HelpOption,
      SpecialOption : char; chge : boolean;
    a,n,nn,count : integer;

procedure InlChar (var ch : char);
(* to read the first character of a word typed into the terminal *)
begin
   ch := input^;
   while not (ch in ['A'..'Z','a'..'z']) do
   begin  (* skips along until first character found *)
      get(input);
      if eoln(input)
        then
          begin
            writeln;
            write('ERROR: character required ....  ')
          end;
      ch := input^
   end;
   while not eoln(input) do   (* skips over rest of line *)
      get(input)
end;  (* of InlChar *)

procedure InlInt (var int : integer);
(* to read an integer and not cause a fatal error if a
     character is given *)
var ch : char;
    a,OrdZero : integer;
    NegFound : boolean;
begin
   repeat  (* skips along until integer is found *)
      get(input);
      if eoln(input)
         then
            begin
               writeln;
               write('ERROR: digit required ....  ')
            end;
      ch := input^
   until ch in ['-','+','0'..'9'];
   if ch='-'
      then
         begin
            NegFound := true;
            get(input);
            ch := input^
         end
      else
         begin
            NegFound := false;
            if ch='+'
               then
                  begin
                     get(input);
                     ch := input^
                  end
         end;
   a := 0;
   OrdZero := ord('0');
   repeat
      a := 10*a+ord(ch)-OrdZero;
      get(input);
      ch := input^
   until not (ch in ['0'..'9']);
   while not eoln(input) do  (* skips over rest of line *)
     get(input);
   if NegFound
      then
         int := -a
         else
            int := a
end; (* of InlInt *)

procedure VDUinString(var str : string);
(*  to input from terminal  *)

var i,n : integer;
    ch : char;
    AllCaps : boolean;
begin
   n := 0;
   AllCaps := true;
   repeat
      n := n+1;
      read(ch);
      if (n=1) and (ch=' ')
         then
            n := 0;
      if (n=1) and (ch='\')
         then
            begin  (* defeat automatic shift with '\' *)
               AllCaps := false;
               n := 0
            end;
      if n<>0
         then
            begin
               if AllCaps
                  then
                     if ch in ['a'..'z']
```

```
                    then
                       ch := chr(ord(ch)-32);
              str[n] := ch
            end
   until eoln(input);
   for i:=n+1 to LineLn do
      str[i] := ' '
end; (* of VDUinString *)

procedure ScratchInStr(var str : string);
(* input from file scratch  *)
var n,i : integer;
    ch : char;
begin
   if not eof(scratch)
      then
         begin
            n := 0;
            repeat
               read(scratch,ch);
            until (ch=':') or (eof(scratch));
            while (not eoln(scratch)) do
               begin
                  read(scratch,ch);
                  n := n+1;
                  str[n] := ch;
               end;
             if n+1<=LineLn
               then
                  for i:=n+1 to LineLn do
                     str[i] := ' ';
         end
 end;   (* of ScratchInStr  *)

 function ScratHoldsItems : boolean;
 (* to inspect the SCRATCH FILE and check that ITEMS are complete *)
   var count,LineNo : integer;
       FaultFound,HeadingError,NegFound : boolean;
   procedure CheckLine;
     var CharCount : integer;
         LineTooLong,BadLine : boolean;
     begin
       LineNo := LineNo + 1;
       CharCount := 1;
       BadLine := false;
       LineTooLong := false;
       get(scratch);
       while (not eoln(scratch)) and (CharCount < LineLn + 9 ) do
         begin
           get(scratch);
           CharCount := CharCount + 1;
           if (CharCount = 9) and (scratch^ <> ':') then
               BadLine := true;
         end;
       if CharCount < 9 then BadLine := true;
       while not eoln(scratch) do
         begin
           get(scratch);
           if scratch^ <> ' ' then LineTooLong := true
         end;
       if BadLine then
         begin
           FaultFound := true;
           writeln('Line',LineNo : 4,'  bad line '':'' missing.')
         end;
       if LineTooLong then
         begin
           FaultFound := true;
           writeln('Line',LineNo : 4,'  overflow.')
         end
     end;  (* of CheckLine *)
   begin
     LineNo := 0;
     HeadingError := false;
     FaultFound := false;
     NegFound := false;
     writeln;
     writeln('SCRATCH FILE CHECK in progress.');

   writeln;
   while not eof(scratch) and not HeadingError do
     begin
       repeat
         get(scratch);
         if not eof(scratch) then
         if eoln(scratch) then LineNo := LineNo + 1
       until (eof(scratch)) or (scratch^ = '-');
       if scratch^ = '-' then NegFound := true;
       LineNo := LineNo + 1;
       if eof(scratch) then
         begin
           if not NegFound then  (* no ITEMS present *)
             begin
               HeadingError := true;
               writeln('SCRATCH does not contain ITEMS.')
             end
         end
         else
         begin
           while not eoln(scratch) do get(scratch);
           for count := 1 to 5 do CheckLine;
           LineNo := LineNo + 1;
           get(scratch);
           while (not eoln(scratch)) and
                 not (scratch^ in ['1'..'9']) do get(scratch);
           while (not eoln(scratch)) and
                 not (scratch^ = ' ') do get(scratch);
           while (not eoln(scratch)) and
                 not (scratch^ in ['1'..'9']) do get(scratch);
           if eoln(scratch) then
             begin (* two numbers not present *)
               FaultFound := true;
               writeln('Line',LineNo : 4,
                       '  two integers not found.')
             end
             else
             while not eoln(scratch) do get(scratch);
           for count := 1 to 2 do CheckLine;
         end;
       if FaultFound then
         begin
           writeln;
           writeln('Errors in SCRATCH use editor to correct,
                    then try again.');
           writeln;
           ScratHoldsItems := false
         end
         else if not HeadingError then ScratHoldsItems := true;
       reset(scratch)
   end; (* of ScratHoldsItems *)

procedure empt; (* to empty an ITEM *)
var NoChar : string;
    a  : integer;
    ch : char;
begin
   NoChar[1] := ' ';
   NoChar[2] := ' ';
   NoChar[3] := ' ';
   for a:=4 to LineLn do
      NoChar[a] := '.';
   with empty do
      begin
         authors := NoChar;
         title1 := NoChar;
         title2 := NoChar;
         place1 := NoChar;
         place2 := NoChar;
         date := NonDate;
         key1 := NoChar;
         key2 := NoChar
      end;
   for a:=2 to 9 do
      begin
         case a of
            2: ch := '.';
            3: ch := 'e';
            4: ch := 'm';
            5: ch := 'p';
            6: ch := 't';
            7: ch := 'y';
            8: ch := ' ';
            9: ch := ' '
         end;  (* of case *)
         empty.authors[a] := ch
      end
end; (* of empt *)

procedure OutRecord(entry : item; n : integer);
(*  to write to the terminal *)
var a : integer;
begin
   for a:=1 to 7 do
      write('---------I');
   writeln;
   with entry do
      begin
         writeln(authors);
         writeln(title1);
         writeln(title2);
```

```
        writeln(place1);
        writeln(place2);
        writeln(date:8,'      Item number :',n :5);
        writeln(key1);
        writeln(key2)
      end
end;  (* of OutRecord *)

procedure GetReference(n : integer);
(* to count through bank to find an ITEM *)
begin
   if n<count
      then
         begin
            reset(bank);
            count := 1
         end;
   while (count < n) and (not eof(bank)) do
      begin
         count := count+1;
         get(bank)
      end;
   if eof(bank)
      then
         begin
            writeln;
            writeln(' You have only got',count -1,' Items.');
            writeln;
            goto 10
         end
      else
         OutRecord(bank^,n)
end; (* of GetReference *)

procedure change(var entry : item; m : integer);
(* to change the mth. ITEM *)
var  line : integer;
    DMOption,LineOption  :  char;
    str : string;
begin
   writeln;
   writeln;
   repeat
      write('Do you wish to DELETE or MODIFY ....      ');
      InlChar(DMOption)
   until DMOption in ['D','d','M','m'];
   if DMOption in ['D','d']
      then
         begin
            empt;
            entry := empty
         end
      else
         begin
            writeln;
            writeln('You may REPLACE a line,');
            writeln('move to the NEXT line,');
            writeln('or SKIP to the end of the item. ');
            writeln;
            line := 0;
            repeat
               line := line+1;

with entry do
   case line of
      1: str := authors;
      2: str := title1;
      3: str := title2;
      4: str := place1;
      5: str := place2;
      6: ;
      7: str := key1;
      8: str := key2
   end;  (* of case *)
if line<>6
   then
      begin
         writeln;
         writeln(str);
         writeln(output);
         repeat
            write('REPLACE, NEXT line or SKIP to end ....  ');
            InlChar(LineOption)
         until LineOption in ['R','r','N','n','S','s'];
         writeln;
         if LineOption in ['R','r']
            then
               begin
                writeln('Type replacement line  :');
                writeln;
                VDUinString(str);
                with entry do
                case line of
                 1: authors := str;
                 2: title1 := str;
                 3: title2 := str;
                 4: place1 := str;
                 5: place2 := str;
                 7: key1 := str;
                 8: key2 := str
                end; (* of case *)
               end
      end
   else
      begin
         writeln('Date   ',entry.date :4);
         writeln;
         repeat
            write('REPLACE, NEXT line or SKIP to end ....  ');
            InlChar(LineOption)
         until LineOption in ['R','r','N','n','S','s'];
         if LineOption in ['R','r']
            then
               begin
                writeln('Type replacement date ');
                write(':  ');
                InlInt(entry.date)
                                end;
                        end
           until ((line=8) or (LineOption in ['S','s']));
         end;
   writeln;
   writeln('Modified item reads :    ');
   writeln;
   OutRecord(entry,m);
   writeln;
end; (* of change *)

begin (* MAIN PROGRAM *)
   count := HiTag;
   n := 1;
   reset(PendingTray);
   rewrite(TempPendingTray);
   while not eof(PendingTray) do
      begin  (* copy down existing contents of file
                'PendingTray' *)
         TempPendingTray^ := PendingTray^;
         put(TempPendingTray);
         get(PendingTray)
      end;
   rewrite(PendingTray);
   reset(TempPendingTray);
   while not eof(TempPendingTray) do
      begin  (* copy back 'PendingTray' and count contents *)
         PendingTray^ := TempPendingTray^;
         put(PendingTray);
         get(TempPendingTray);
         n := n+1
      end;
   rewrite(TempPendingTray);

   repeat
      writeln;
      repeat
         write('Do you wish to APPEND, to CHANGE, ');
         writeln('to use the SPECIAL facility, ');
         write('or to FINISH ....  ');
         InlChar(MainOption)
      until MainOption in ['A','a','C','c','S','s','F','f'];

(*  MainOption= S is a special facility,
used  for loading from 'scratch' to 'PendingTray' *)

      case MainOption of
         'A','a':    (* TO APPEND *)
                  begin
                     writeln;
                     repeat
                        write('Do you need help
                              [YES or NO] ....  ');
                        InlChar(HelpOption)
                     until HelpOption in ['Y','y','N','n'];
                     if HelpOption in ['Y','y']
                then
                   begin
writeln;
writeln('NOTES.');
write('(a) Authors and keywords separated');
writeln(' by a comma ",".');
write('(b) To remove the automatic conversion to ');
writeln('upper case letters');
write('    begin a line of text with');
writeln(' a backslash "\".');
```

```
write('(c) Date must be a single integer number');
writeln(' eg. 1980.');
write('(d) If addresses are to be entered use the two');
writeln(' title lines;');
write('    close pack but indicate new');
writeln(' lines with a backslash "\".');
write('(e) A personal local storage reference');
writeln(' may be kept on the 2nd. location line');
write('    but should be enclosed in square brackets;');
writeln(' for example: [EM360].')
                end;
            repeat
               writeln;
               writeln('New item:- ');
               writeln;
               for a:=1 to 7 do
                  write('---------I');
               writeln;
               with entry do
                  begin
      writeln( 'Line of author names, or name of addressee :' );
                     VDUinString(authors);
                     writeln('First line of title or address :');
                     VDUinString(title1);
                     writeln('Second line of title or address :');
                     VDUinString(title2);
                     writeln('First line of reference location :');
                     VDUinString(place1);
                     writeln('Second line of reference location :');
                     VDUinString(place2);
                     writeln('Date - just the year -    :');
                     InlInt(date);
                     writeln('First line of keywords :');
                     VDUinString(key1);
                     writeln('Second line of keywords :');
                     VDUinString(key2);
                  end;
               writeln;
               OutRecord(entry,n);
               repeat
                  writeln;
                  repeat
write( 'Do you wish to make a change [YES or NO] ....      ' );
                     InlChar(ChangeOption)
                       until ChangeOption in ['Y','y','N','n'];
                       if ChangeOption in ['Y','y']
                          then
                           change(entry,n)
                     until ChangeOption in ['N','n'];
                     if entry.date <> NonDate
                        then
                           begin
                            TagEntry.tag := HiTag;
                            TagEntry.entry := entry;
                            PendingTray^ := TagEntry;
                            put(PendingTray);
                            n := n+1
                           end
                        else
                           begin
                            writeln;
                            writeln('Item withdrawn.');
                            writeln
                           end;
                     writeln;
                     repeat
    write( 'Do you wish to append more items [YES or NO] ....  ' );
                        InlChar(AppendOption)
                      until AppendOption in ['Y','y','N','n'];
                   until AppendOption in ['N','n']
               end;  (* of Append option *)

     'C','c':   (* TO CHANGE *)
               begin;
                  writeln;
                  repeat
                     write('Do you need help [YES or NO] ....  ');
                     InlChar(HelpOption)
                  until HelpOption in ['Y','y','N','n'];
                  if HelpOption in ['Y','y']
                     then
                        begin
writeln;
writeln( 'You MUST know the ITEM NUMBERS of the ITEMS you wish to
        change.' );
writeln( 'If you do not, leave this program and run "bibout" to
        find them.' );
writeln( 'Changes do not take place immediately, they stay in the
        PENDING' );
writeln('tray until the "update" program is run.');
writeln( 'If an ITEM is changed more than once only the last
        version survives.'
                        end;
                  repeat
                     10: writeln;
                     chge := false;
               writeln('Type 0 if no ITEM needs changing, otherwise
                     type');
               write('the ITEM number...  ');
                     InlInt(nn);
                     if nn<0
                        then
                           begin
                  writeln;
                  writeln('No negative numbered ITEMS')
                end;
             if nn > 0
                then
                   begin
                    writeln;
                    GetReference(nn);
                    if not eof(bank)
                     then
                      begin
                       entry := bank^;
                       repeat
                        writeln;
                        repeat
 write('Do you wish to change this item [YES or NO] ....  ');
                          InlChar(ChangeOption)
                         until ChangeOption in ['Y','y','N','n'];
                         if ChangeOption in ['Y','y']
                          then
                           begin
                            change(entry,nn);
                            chge := true
                           end
                       until ChangeOption in ['N','n'];
                       TagEntry.tag := nn;
                       TagEntry.entry := entry;
                       if chge
                        then
                         begin
                          PendingTray^ := TagEntry;
                          put(PendingTray);
                          n := n+1
                         end
                      end
                   end;
                writeln;
             until nn = 0
          end; (* of Change option *)

'S','s':  (* To move from text file 'scratch' to 'PendingTray' *)
          begin
             writeln;
             write('This option moves the contents of the ');
             writeln('SCRATCH file into the PENDING tray.');
             write('It can be used to copy selected ITEMS from one');
             writeln(' bibliography to another.');
             write('OR, it can be used to reinstate ITEMS ');
             writeln('which have been changed by the editor.');
             writeln;
             repeat
               writeln;
  write('Do you wish these items to be APPENDED, REINSTATED or
          NO ACTION ....  ');
                     InlChar(SpecialOption)
            until SpecialOption in ['A','a','N','n','R','r'];
            if SpecialOption in ['A','a','R','r']
               then
                  begin
                     reset(scratch);
                     writeln;
                    (* now check that scratch holds ITEMS in
                       the correct form  *)
                     if (not eof(scratch)) and
                       ScratHoldsItems
                         then
                         begin
                           while not eof(scratch) do
                            begin
                             with entry do
                              begin
                               ScratchInStr(authors);
                               ScratchInStr(title1);
                               ScratchInStr(title2);
                               ScratchInStr(place1);
                               ScratchInStr(place2);
                               read(scratch,date);
```

```
                                repeat
                                  read(scratch,ch)
                                until ch = ':';
                                readln(scratch,TagEntry.tag);
        writeln(n,' Dated ',date,'  Item number ',TagEntry.tag);
                                ScratchInStr(key1);
                                ScratchInStr(key2);
                               end;
                              if SpecialOption in ['A','a'] then
                              TagEntry.tag := HiTag;
                              TagEntry.entry := entry;
                              PendingTray^ := TagEntry;
                              put(PendingTray);
                              n := n+1;
                              if not eof(scratch)
                               then
                                get(scratch)
                             end;
                            rewrite(scratch)
                          end
                     end
            end;  (* of Special option *)

    'F','f': begin
               writeln;
               writeln('Number of ITEMS now in Pending
                        Tray =',n-1 :5);
               writeln
             end
     end  (* of case "MainOption" *)
   until MainOption in ['F','f']
end.   (* end of program Bibin.p  *)
```

```
program Bibout(input,output,bank,dict,scratch,dlist,PendingTray);
(* To call down items from the bibliography *)
(*  written by Tony Heyes, Blind Mobility Research Unit,
Department of Psychology, The University,
Nottingham, U.K..  *)

label 10;

co       LineLn = 70;
      RowLn = 20;
      HiTag = 10000;
      LinesPerPage = 64 ;
      VDULinesPerPage = 24;

type     string = packed array [1..LineLn] of char;
     item = record
              authors,title1,title2,
              place1,place2 : string;
              date       : integer;
              key1,key2  : string
            end;
     word = packed array [1..20] of char;
     row = array [1..RowLn] of integer;
     dic = record
             name      : word;
             numbers   : row;
             cont      : boolean
           end;
     link = ^DicLine;
     DicLine = record
                 val  : integer;
                 next : link
               end;

var FileAssigned : boolean;
    bank,PendingTray : file of item;
    dlist,AddressFile,scratch  : text;
    dict : file of dic;
    FirstLink,SecondLink,ThirdLink,ptl,here : link;
    low,high,n,NumSoFar,
    LineNo,AddLineNo,count,TopItem,NFromDict,NumW : integer;
    device,FileStyle,MainOpt,NDOption,LogicAction : char;

procedure InlChar (var ch : char);
(* to read the first character of a word typed into the terminal *)
begin
    h := input^;
    ile not (ch in ['A'..'Z','a'..'z']) do
     begin
        (* skips along until first character found *)
      get(input);
      if eoln(input)
         then
            begin
               writeln;
               write('ERROR: character required ....  ')
            end;
        ch := input^
    end;
    while not eoln(input) do   (* skips over rest of line *)
       get(input)
end;  (* of InlChar *)

procedure InlInt (var f : text; var int : integer);
(* to read an integer and not cause a fatal error if a character
   is given *)

var ch : char;
    a,OrdZero : integer;
    NegFound : boolean;
begin
   repeat  (* skips along until integer is found *)
      get(f);
      if eoln(f)
         then
            begin
               writeln;
               write('ERROR: digit required ....  ')
            end;
      ch := f^
   until ch in ['-','+','0'..'9'];
   if ch='-'
      then
         begin
            NegFound := true;
            get(f);
            ch := f^
         end
      else
         begin
            NegFound := false;
            if ch='+'
               then
                  begin
                     get(f);
                     ch := f^
                  end
         end;
   a := 0;
   OrdZero := ord('0');
   repeat
      a := 10*a+ord(ch)-OrdZero;
      get(f);
      ch := f^
   until not (ch in ['0'..'9']);
   while not eoln(f) do  (* skips over rest of line *)
      get(f);
   if NegFound
      then
           int := -a
        else
           int := a
end; (* of InlInt *)

procedure SkipToEndOfPage(PageLines : integer;
                          var where : text);
begin
   while LineNo < PageLines do
      begin
         writeln(where);
         LineNo := LineNo+1
      end;
   LineNo := 0
end;  (* of SkipToEndOfPage *)

procedure GetRef(n : integer; destination : char);

var a,CharCount,LineInQuestion,NOfCommas,WordLength : integer;
    line : string;
    DoubleSpace,InBrackets,KeepNextCap,
    something,KeepAllCaps,woops : boolean;
    ch,LastCh : char;
begin
   if n<count
      then
         begin
            reset(bank);
            count := 1
         end;
   while (count < n) and (not eof(bank)) do
      begin
         count := count+1;
         get(bank)
      end;
   if eof(bank)
```

```
then
   begin
      writeln;
      writeln(' You have only got',count -1,' Items.');
      writeln;
      goto 10
   end
else
   with bank^ do
      begin
         case destination of
            'T','t': (* Output to terminal *)
         begin
            if (VDULinesPerPage-LineNo < 9)
             then
              SkipToEndOfPage(VDULinesPerPage,output);
            for a:=1 to 7 do
                write('---------I');
                writeln;
                writeln(authors);
                writeln(title1);
                writeln(title2);
                writeln(place1);
                writeln(place2);
                writeln(date:8,'      Item number :',n :5);
                writeln(key1);
                writeln(key2);
                LineNo := LineNo + 9
            end;  (* of 'T' *)
   'I','i': (* Output to scratch file *)
            begin
               if LinesPerPage-LineNo < 9
                then
                 SkipToEndOfPage(LinesPerPage,scratch);
               for a:=1 to 7 do
                write(scratch,'---------I');
               writeln(scratch,'---------');
               writeln(scratch,'Names   :',authors);
               writeln(scratch,'Details :',title1);
               writeln(scratch,'        :',title2);
               writeln(scratch,'        :',place1);
               writeln(scratch,'        :',place2);
               writeln(scratch,date:14,'     Item number:',n :5);
               writeln(scratch,'Keywords:',key1);
               writeln(scratch,'        :',key2);
               LineNo := LineNo + 9
            end;  (* of 'I' *)
   'E','e': (* Output to scratch file in envelope label format.
               Only for addresses. *)
            begin
               writeln(AddressFile);
               AddLineNo := AddLineNo +1;
               woops := true;
               for LineInQuestion:=1 to 2 do
                begin
                 DoubleSpace := false;
                 LastCh := ':'; (* initail value *)
                 CharCount := 0;
                 writeln(AddressFile);
                 AddLineNo := AddLineNo +1;
                 write(AddressFile,'       ');
                 if LineInQuestion=1
                  then
                   line := title1
                  else
                   line := title2;
                 while (CharCount<LineLn) and not DoubleSpace do
                  begin
                   CharCount := CharCount+1;
                   ch := line[CharCount];
                   if ch='\'
                    then
                        begin
                         woops := false;
                         writeln(AddressFile);
                         AddLineNo := AddLineNo +1;
                         write(AddressFile,'       ')
                        end
                       else
                        write(AddressFile,ch);
                      DoubleSpace := (ch=' ') and (LastCh=' ');
                      LastCh := ch
                    end
                  end;
                 while (AddLineNo mod 8) <> 0 do
                  begin
                   writeln(AddressFile);
                   AddLineNo := AddLineNo + 1
                  end;
                 if woops
                  then
                   begin
                        writeln;
                        writeln;
write('An attempt to output a reference');
                        writeln(' in address format.');
                        writeln;
                        writeln;
write( 'Addresses must be close-packed on the two' );
                        writeln(' title lines.');
writeln( 'Use the backslash "\" as line separator.' );
                        writeln;
                        rewrite(scratch);
                        FileAssigned := false;
                        goto 10
                       end
                  end;  (* of 'E' *)
          'R','r': (* Output in format for wordprocessor NROFF *)
                  begin  (* firstly the author line *)
                     writeln(scratch,'.nr');
                     (* this is an NROFF macro *)
                     write(scratch,'\:');
                                    (* bold lettering command *)
                    DoubleSpace := false;
                    KeepAllCaps := false;
                    woops := false;
                    LastCh := ':';       (* initial value *)
                    CharCount := 0;
                    NOfCommas := 0;
                    if authors[1]='\'
                     then
                      begin
                       KeepAllCaps := true;
                       CharCount := CharCount+1
                      end;
                    while (CharCount<LineLn)
                                          and not DoubleSpace do
                     begin
                   CharCount := CharCount+1;
                   ch := authors[CharCount];
                   if ch=','
                    then
                     NOfCommas := NOfCommas+1;
                   DoubleSpace := (ch=' ') and (LastCh=' ');
                   LastCh := ch
                  end;
                 DoubleSpace := false;
                 LastCh := ':';
                 CharCount := 0;
                 while (CharCount<LineLn) and not DoubleSpace do
                  begin
                   CharCount := CharCount+1;
                   ch := authors[CharCount];
                   if (ch in ['A'..'Z']) and (LastCh in ['A'..'Z'])
                      and not KeepAllCaps
                    then
                     write(scratch,chr((ord(ch)+32)))
                    else
                     if ch=','
                      then
                       begin
                        if NOfCommas=1
                         then
                          write(scratch,' & ')
                         else
                          write(scratch,', ');
                        NOfCommas := NOfCommas-1
                       end
                      else
                       write(scratch,ch);
                   DoubleSpace := (ch=' ') and (LastCh=' ');
                   LastCh := ch
                  end;
                 writeln(scratch,'(',date : 4,')\:');
                 for LineInQuestion :=1 to 4 do
                  begin       (* title and place lines *)
                   KeepNextCap := true;
                   KeepAllCaps := false;
                   case LineInQuestion of
                    1: line := title1;
                    2: begin
                        line := title2;
                        KeepNextCap := false
                       end;
                    3: line := place1;
                    4: begin
                        line := place2;
                        CharCount := 0;
                        InBrackets := false;
                        repeat
                         CharCount := CharCount+1;
                         if line[CharCount]='['
                          then
```

```
        InBrackets := true;
       if InBrackets
        then
         if line[CharCount]=']'
          then
           begin
            line[CharCount] := ' ';
            InBrackets := false
           end;
       if InBrackets
        then
         line[CharCount] := ' '
      until CharCount=LineLn
     end
end; (* of case LineInQuestion *)
CharCount := LineLn;
repeat
 CharCount := CharCount-1
until (CharCount=1) or (line[CharCount]<>' ');
if CharCount<LineLn
 then
  line[CharCount+1] := '!'; (* a silly character '
  (* placed at the end of the character stirng *)
WordLength := 0;
if CharCount>1
 then
  repeat
   CharCount := CharCount-1;
   if line[CharCount]<>' '
    then
     begin
      if line[CharCount] in ['A'..'Z']
       then
        WordLength := WordLength+1
     end
    else
     begin
      if not (WordLength in [2,3])
       then
        line[CharCount] := '~';
        (* another silly char fills up spaces
         before words which keep caps. *)
       WordLength := 0
     end
  until CharCount=1;
CharCount := 0;
something := false;
if line[1]='\'
 then
  begin
   KeepAllCaps := true;
   CharCount := CharCount+1
  end;
   ch := ':';  (* initial value *)
    while (CharCount < LineLn) and
          (line[CharCount+1] <> '!') do
    begin
     CharCount := CharCount+1;
     LastCh := ch;
     ch := line[CharCount];
     if not ((LastCh in ['~',' ']) and
        (ch in ['~',' ']))
      then
       begin
        if (ch in ['A'..'Z']) and not KeepNextCap
         then
          ch := chr((ord(ch)+32));
        if ch in ['A'..'Z']
         then
          KeepNextCap := false;
        if ch='\'
         then
          woops := true; (* its an address *)
        if ch='~'
         then
          begin
           ch := ' ';
           if (LineInQuestion in [3,4])
            then
             KeepNextCap := true
          end;
        if (ch in ['1'..'9'])
         then
          KeepNextCap := false;
        if (ch<>' ') and (ch<>'!')
         then
          something := true;
        if something
         then
          write(scratch,ch)
       end
      end;
     if something
      then
       writeln(scratch)
    end;
   if woops
    then
     begin
      writeln;
      writeln;
      write('An attempt to output addresses in');
      writeln(' reference format.');
      writeln;
      writeln;
      rewrite(AddressFile);
      FileAssigned := false;
                       goto 10
                      end
                end   (* of 'R' *)
      end   (* of case destination *)
    end
end; (* of GetRef *)

procedure ReWind(var ptr : link);

var  p,q,pt : link;
begin
   p := ptr;
   pt := nil;
   while p<>nil do
      begin
         new(q);
         q^.val := p^.val;
         q^.next := pt;
         pt := q;
         p := p^.next
      end;
   ptr := pt
end;  (* of ReWind  *)

procedure GetDict(m : integer; var ptr : link);

var       a : integer;
    p : link;
    OldEntry : dic;
    more : boolean;
begin
   if m < HiTag
      then
         begin
            reset(dict);
            a := 1;
            while a<m do
               begin
                  OldEntry := dict^;
                  get(dict);
                  if OldEntry.cont=false
                     then
                        a := a+1
               end;
            writeln;
            writeln(dict^.name);
            ptr := nil;
            repeat
               for a:=1 to RowLn do
                  if dict^.numbers[a]<>0
                     then
                        begin
                           new(p);
                           p^.val := dict^.numbers[a];
                           p^.next := ptr;
                           ptr := p
                        end;
               more := dict^.cont;
               get(dict);
            until not more;
            ReWind(ptr)
         end
      else
         begin
            ptr := nil;
            for a:=TopItem downto 1 do
               begin
                  new(p);
                  p^.val := a;
                  p^.next := ptr;
                  ptr := p
               end
         end
end;  (* of GetDict *)
```

```
procedure join(var p1 :link; p2 : link; which : char);

var       continue : boolean;
    q,qp,pt1,pt2,pt3 : link;
begin
   pt1 := p1;
   pt2 := p2;
   continue := (pt1<>nil) and (pt2<>nil);
   qp := nil;
   case which of
      'A','a':        (* AND *)
               begin
                  while continue do
                     begin
                        if pt1^.val>pt2^.val
                           then
                              begin
                               pt3 := pt1;
                               pt1 := pt2;
                               pt2 := pt3
                              end;
                        if pt2^.val>pt1^.val
                           then
                              begin
                               pt1 := pt1^.next;
                               continue := pt1<>nil
                              end
                           else
                              if pt1^.val=pt2^.val
                               then
                                begin
                                 new(q);
                                 q^.val := pt1^.val;
                                 q^.next := qp;
                                 qp := q;
                                 pt1 := pt1^.next;
                                 pt2 := pt2^.next;
                                 continue := (pt1<>nil) and
                                                    (pt2<>nil)
                                end
                     end
               end;  (* of AND *)
      'O','o':         (* OR *)
               begin
                  begin
                     while continue do
                        begin
                           if pt1^.val>pt2^.val
                              then
                               begin
                                pt3 := pt1;
                                pt1 := pt2;
                                pt2 := pt3
                               end;
                           if pt1^.val<pt2^.val
                              then
                               begin
                                new(q);
                                q^.val := pt1^.val;
                                q^.next := qp;
                                qp := q;
                                pt1 := pt1^.next;
                                continue := pt1<>nil
                               end
                              else
                               if pt1^.val=pt2^.val
                                then
                                 begin
                                  new(q);
                                  q^.val := pt1^.val;
                                  q^.next := qp;
                                  qp := q;
                                  pt1 := pt1^.next;
                                  pt2 := pt2^.next;
                                  continue := (pt1<>nil) and
                                                    (pt2<>nil)
                                 end
                        end;
                     if pt1=nil
                        then
                           pt1 := pt2;
                     while pt1<>nil do
                        begin
                           new(q);
                           q^.val := pt1^.val;
                           q^.next := qp;
                           qp := q;
                           pt1 := pt1^.next
                        end
                        end
                     end;  (* of OR *)
      'N','n':         (* NOT *)
               begin
                  while continue do
                     begin
                        if pt1^.val>pt2^.val
                           then
                              begin
                               pt2 := pt2^.next;
                               continue := pt2<>nil
                              end
                           else
                              if pt1^.val<pt2^.val
                               then
                                begin
                                 new(q);
                                 q^.val := pt1^.val;
                                 q^.next := qp;
                                 qp := q;
                                 pt1 := pt1^.next;
                                 continue := pt1<>nil
                                end
                               else
                                if pt1^.val=pt2^.val
                                 then
                                  begin
                                   pt1 := pt1^.next;
                                   pt2 := pt2^.next;
                                   continue := (pt1<>nil) and
                                                    (pt2<>nil)
                                  end
                     end;
                  while pt1<>nil do
                     begin
                        new(q);
                        q^.val := pt1^.val;
                        q^.next := qp;
                        qp := q;
                        pt1 := pt1^.next
                     end
               end  (* of NOT *)
   end;  (* of case *)
   ReWind(qp);
   p1 := qp
end;   (* of join *)

procedure OutList(ptr : link; var aa : integer);

var p : link;
begin
   p := ptr;
   aa := 0;
   writeln;
   while p<>nil do
     begin
        aa := aa+1;
        if aa mod 13 = 0
           then
              writeln(p^.val :5)
           else
              write(p^.val :5);
        p := p^.next
     end;
  writeln;
  writeln
end;  (* of OutList *)

procedure DictList(var where : text);
(* TO LIST DICTIONARY   *)

const NoOfLines = 64;
      WordsPerLine = 4; (* Change constants to suit page size *)
                        (* See also line 700 *)

type list = array[1..384] of word;

var      num,i : integer;
    OldEntry : dic;
    WordList : list;
begin
   reset(dict);
   rewrite(dlist);
   i := 0;
   while not eof(dict) do
      begin
         for num:=1 to NoOfLines*WordsPerLine do
            begin
               OldEntry := dict^;
               while (dict^.cont=true)and(not eof(dict)) do
                  get(dict);
               if not eof(dict)
                  then
```

```
                begin
                   WordList[num] := OldEntry.name;
                   get(dict)
                end
             else
                WordList[num] := '                    ';
          end;
       for num:=1 to NoOfLines do
          writeln(where,WordList[num],WordList[NoOfLines+num],
                  WordList[2*NoOfLines+num],
                                   WordList[3*NoOfLines+num]);
         (* Extent this list for more words per line *)
       i := i+NoOfLines*WordsPerLine
    end;
writeln;
write('Dictionary written to file.');
writeln(' To obtain a hard copy run "outdict".');
(* 'outdict' simply prints out the file 'dlist'. *)
   writeln
end;  (* of DictList  *)

procedure TwoCols (var F,G : text);

const rows = 8;
      TwiceRows = 16;
      cols = 40;

type   ChLink = ^chstack;
     chstack = record
                  ch : char;
                  next : ChLink
               end;
     lines = array[1..TwiceRows] of ChLink;

var    pt,here : ChLink;
    lin,StartLin : lines;
    LineNo,CharNo : integer;
    ch : char;

procedure reverse(var ptr : ChLink);

var p,q,pt : ChLink;
begin
   p := ptr;
   pt := nil;
   while p <> nil do
      begin
         new(q);
         q^.ch := p^.ch;
         q^.next := pt;
         pt := q;
         p := p^.next
      end;
   ptr := pt
end;  (* of reverse *)

begin
   reset(F);
   if not eof(F)
      then
         begin
            page(G);
            writeln;
            writeln('Output in two column ''Xerox'' label format.');
            writeln
         end;
   while not eof(F) do
      begin
         mark(here);
         for LineNo := 1 to 2*rows do
            begin
      StartLin[LineNo] := nil;
      if not eof(F) then
      while not eoln(F) do
         begin
            read(F,ch);
            new(lin[LineNo]);
            lin[LineNo]^.ch := ch;
            lin[LineNo]^.next := StartLin[LineNo];
            StartLin[LineNo] := lin[LineNo]
         end;
      if not eof(F)
         then
            readln(F);
      reverse(StartLin[LineNo]);
   end;

for LineNo := 1 to rows do
   begin
      CharNo := 0;
      pt := StartLin[LineNo];
      while (pt <> nil) and (CharNo < cols) do
         begin
            write(G,pt^.ch);
            pt := pt^.next;
            CharNo := CharNo + 1
         end;
      pt := StartLin[LineNo + rows];
      if pt <> nil
         then
            while CharNo < cols do
               begin
                  write(G,' ');
                  CharNo := CharNo +1
               end;
      while pt <> nil do
         begin
            ch := pt^.ch;
            write(G,ch);
            pt := pt^.next
         end;
      writeln(G)
   end;
release(here);
end
end; (* of TwoCols *)

procedure GetFromDict(var FirstWord,NumWords : integer);

var
    ch,action,option      : char;
    n,ChCount,PointerNum,NumberFound : integer;
    name,signame : word;
    AllCaps : boolean;
begin
writeln;
AllCaps := true;
ChCount := 0;
write('Enter word required or [.] ....   ');
repeat
   read(ch)
until ch<>' ';
if ch='\'
   then
      begin
         AllCaps := false;
         read(ch)
      end;
if ch='.'
   then
      begin    (*  "action"  *)
         while not eoln(input) do
            get(input);
         repeat
            writeln;
 writeln( 'Do you wish to LOOK UP the selected string,
           to RESTART the' );
            write('selection or to QUIT the dictionary ....  ');
            InlChar(action)
         until action in ['L','l','R','r','Q','q']
      end
   else
      begin    (* word *)
         action := 'W';
         repeat
            ChCount := ChCount + 1;
            if ChCount > 1
               then
                  read(ch);
            if AllCaps and (ch in ['a'..'z'])
               then
                  name[ChCount] := chr(ord(ch)-32)
               else
                  name[ChCount] := ch
         until eoln(input) or (ChCount = 20);
         if not eoln(input)
            then
               readln;
         for n:=ChCount+1 to 20 do
            name[n] := ' '
      end;
if action in ['L','l']
   then
      FirstWord := -1  (* look up *)
   else
      if action in ['R','r']
         then
            FirstWord := -2  (* restart *)
         else
           if action in ['Q','q']
         then
            FirstWord := 0  (* quit *)
         else
```

```
            if name='***
                (* special word *)
               then
                  begin
                     writeln;
                     writeln('***  ALL ITEMS  ***');
                     writeln;
                     repeat
                      write('Is this correct  [YES or NO] ....  ');
                      InlChar(option)
                     until option in ['Y','y','N','n'];
                     if option in ['Y','y']
                      then
                       FirstWord := HiTag
                      else
                       GetFromDict(FirstWord,NumWords)
                  end
               else
                  begin  (* a real word *)
                     reset(dict);
                     NumberFound := 0;
                     PointerNum := 0;
                     writeln;
                     signame := '                         ';
                     while (name >= signame) and not eof(dict) do
                      begin
                       if name=signame
                        then
                         begin
                          writeln(dict^.name);
                          NumberFound := NumberFound+1
                         end;
                       while (dict^.cont=true) do
                        get(dict);
                       if (PointerNum > 0) and not eof(dict)
                        then
                         get(dict);
                       PointerNum := PointerNum+1;
                       for n:=1 to ChCount do
                        signame[n] := dict^.name[n];
                       for n:=ChCount+1 to 20 do
                        signame[n] := ' ';
                      end;
                     writeln;
                     if NumberFound=0
                      then
                       begin
  writeln( 'Word not found in your dictionary; try again.' );
                        writeln;
                        GetFromDict(FirstWord,NumWords)
                       end
                             else
                              begin
                               repeat
                                if NumberFound = 1
                                 then
        write( 'Is this word correct  [YES or NO] ....  ' )
                                 else
        write( 'Are ALL these words required  [YES or NO] .... ' );
                                InlChar(option)
                               until option in ['Y','y','N','n'];
                               if option in ['Y','y']
                                then
                                 begin
                                  FirstWord := PointerNum -
                                               NumberFound;
                                  NumWords := NumberFound
                                 end
                                else
                                 GetFromDict(FirstWord,NumWords)
                              end
                       end
end;   (* of GetFromDict  *)

begin (* MAIN PROGRAM *)
   rewrite(scratch);
   rewrite(AddressFile);
   reset(bank);
   count := HiTag;
   LineNo := 0;
   AddLineNo := 0;
   FileAssigned := false;
   writeln;
   writeln('To retrieve ITEMS from the BIBLIOGRAPHY.');
(* TO SEARCH BY AUTHORS and KEYWORDS *)
   writeln;
   reset(dlist);
   if dlist^ = '~'
      then
         InlInt(dlist,TopItem)
      else
         begin
            TopItem := 0;
            writeln('Counting, please wait.');
            writeln;
            writeln;
            while not eof(bank) do
               begin
                  TopItem := TopItem +1;
                  get(bank)
               end;
            rewrite(dlist);
            writeln(dlist,'~',TopItem : 5);
            writeln(dlist);
            writeln(dlist);
     writeln(dlist,'Your DICTIONARY must first be compiled by running');
    writeln(dlist,' the HARD COPY option of ''bibout''.');
            writeln(dlist);
            writeln(dlist)
         end;
writeln('The BIBLIOGRAPHY currently holds ',TopItem,'  ITEMS.');
repeat
   writeln;
   10: repeat
 writeln( 'Do you wish to obtain a HARD COPY of the current dictionary,'
          write('to SEARCH for items or to FINISH ....  ');
          InlChar(MainOpt)
        until MainOpt in ['H','h','S','s','F','f'];
   writeln;
   if MainOpt in ['H','h']
      then
         begin
            DictList(dlist);
            MainOpt := 'F'
         end;
   if MainOpt in ['S','s']
      then
         begin
            repeat
               writeln;
               writeln('Do you wish to search by item NUMBER');
               write('or by use of the DICTIONARY ....  ');
               InlChar(NDOption)
            until NDOption in ['N','n','D','d'];
            writeln;
            repeat
               writeln;
               write('Output to TERMINAL or to scratch FILE ....  ');
               InlChar(device)
            until device in ['T','t','F','f','S','s'];
            writeln;
            if device in ['T','t']
               then
                  FileStyle := 'T';
            if (device in ['F','f','S','s']) and not FileAssigned
               then
                  repeat
                     writeln('Is the desired output');
                     write('an ITEM list,');
                     writeln('  ''the full item being given'' ');
                     write('a REFERENCE list,');
                     writeln('  ''only the reference part being given''
                     write('or an address list suitable');
                     write(' for ENVELOPE addressing .... ');
                     InlChar(FileStyle);
                     FileAssigned := true
                  until FileStyle in ['I','i','R','r','E','e'];
            if FileStyle in ['R','r']
               then
                  begin
                     writeln(scratch,'.hy 0'); (* NROFF commands *)
                     writeln(scratch,'.na');
                     writeln(scratch,'.sp 2');
                     writeln(scratch,'.de nr');
                     writeln(scratch,'.sp');
                     writeln(scratch,'.ne 6');
                     writeln(scratch,'.ti -5');
                     writeln(scratch,'..');
                     writeln(scratch,'.ne 10');
                     writeln(scratch,'\:References.\:');
                     writeln(scratch,'.sp 2');
                     writeln(scratch,'.in +5')
                  end;
            writeln;
            case NDOption of
               'D','d' : begin
  writeln('Words are looked up in ');
  writeln('the dictionary and a list of reference numbers' );
  writeln( 'containing the given word is shown on the terminal.' );
  writeln;
  write( 'The special "word", [***] will match with all the words' );
```

```
writeln(' in the dictionary.');
writeln;
write('Logical combination of ');
writeln( 'author and keywords continue until you wish' );
w   ln('to terminated the search.');
v    ln;
wr..eln( 'To terminate a search answer the prompt with a full
        stop [.].' );
writeln;
                          repeat
                           writeln;
                           writeln('New sequence.');
                           writeln;
                           NumSoFar := 0;
                           mark(here);
                           GetFromDict(NFromDict,NumW);
                           if NFromDict > 0  (* a real word *)
                            then
                             begin
                              GetDict(NFromDict,FirstLink);
                              if NumW > 1
                               then
                                repeat
                                 NFromDict := NFromDict + 1;
                                 GetDict(NFromDict,SecondLink);
                                 join(FirstLink,SecondLink,'O');
                                 NumW := NumW - 1
                                until NumW = 1;
                              OutList(FirstLink,NumSoFar);
                              while NFromDict > 0 do
                               begin
                                GetFromDict(NFromDict,NumW);
                                if NFromDict > 0 (* a real word *)
                                 then
                                 begin
                                  GetDict(NFromDict,SecondLink);
                                  if NumW > 1
                                   then
                                    repeat
                                     NFromDict := NFromDict + 1;
                                     GetDict(NFromDict,ThirdLink);
                                     join(SecondLink,ThirdLink,'O');
                                     NumW := NumW - 1
                                    until NumW = 1;
                                  OutList(SecondLink,NumSoFar);
                                  repeat
    write( 'AND, OR or NOT .....  ?            ' );
                                   InlChar(LogicAction)
                                  until LogicAction in ['A','a','O',
                                        'o','N','n'];
                                  join(FirstLink,SecondLink,
                                       LogicAction);
                                  OutList(FirstLink,NumSoFar)
                                 end
                               end;
                              if ((NumSoFar > 0) and (NFromDict = -1))
                               then  (* look up *)
                                begin
                                 writeln;
    writeln('Search in progress for',NumSoFar :8, ' Items');
                                 writeln;
                                 ptl := FirstLink;
                                 while ptl<>nil do
                                  begin
                                   GetRef(ptl^.val,FileStyle);
                                   ptl := ptl^.next
                                  end;
                                 if FileStyle in ['I','i','R','r',
                                        'E','e']
                                  then
                                   begin
                                    writeln;
     writeln( 'ITEMS written to SCRATCH FILE.' );
                                    writeln
                                   end;
                                  release(here)
                                 end;
                             end
                           until NFromDict=0  (* quit *)
                         end;
            'N','n' : begin  (* TO SEARCH BY NUMBER *)
writeln;
writeln('ITEMS may be called by number.');
w   ln('A whole block of ITEMS may be called;');
v    ('to do this answer this prompt with');
wr..eln(' minus one [-1].');
writeln;
writeln( 'To quit: answer prompt with a zero [0]. ' );
                          repeat
                           writeln;
      write('Number of ITEM to be referenced.....  ' );
                                        InlInt(input,n);
                                        writeln;
                                        if n = -1
                                         then
                                          begin
                                           writeln;
                                           writeln('To output a block of
                                                    ITEMS.');
      writeln( 'Give the LOW ITEM number ,then the HIGH number.' );
                                           write('LOW number  ....  ');
                                           InlInt(input,low);
                                           write('HIGH number ....  ');
                                           InlInt(input,high);
                                           if (low=0) or (high=0)
                                            then
                                             begin  (* an escape *)
                                              low := 1;
                                              high := 0;
                                              n := 0
                                             end;
                                           if low <= high
                                            then
                                             begin
                                              writeln;
                                              writeln('Search in progress');
                                              writeln;
                                              for n:=low to high do
                                               GetRef(n,FileStyle)
                                             end
                                          end
                                         else
                                          if n > 0
                                           then
                                            begin
                                             writeln;
                                             writeln('Search in progress.');
                                             writeln;
                                             GetRef(n,FileStyle)
                                            end
                                       until n=0
                                     end
                          end  (* of case MDOption *)
                        end
until MainOpt in ['F','f'];
if FileStyle in ['R','r']
   then
      begin
         writeln(scratch,'.in -5');
         writeln;
  writeln( 'The output file ''scratch'' contains the references and
            the' );
         writeln('instructions for the word processing program
                  ''nroff''.');
         writeln;
  writeln( 'An attempt has been made to reintroduce lower case
            letters.' );
         writeln('To obtain your output run   ''nroff scratch''  ');
         writeln;
    writeln( 'If all is not well edit scratch and run ''nroff
              scratch'' again.' )
         writeln;
         writeln('When all is correct get the hard copy output
                  by  ');
         writeln('running ''nroff scratch |lpr''. ');
         writeln
      end;
   if FileStyle in ['E','e']
      then
         TwoCols(AddressFile,scratch);
   writeln;
   writeln;
   writeln('FINISHED.');
   writeln
end.  (* of program Bibout.p *)
```

```
program Bibupdate(input,output,bank,dict,scratch,
                                dlist,PendingTray,TempBank);
(* A non-interactive program which moves the contents of
'PendingTray' to the bibliography. Clever systems run this program
at night.
TempBank is made external because it grows to be as large as bank.
Diagnostics are written to 'scratch'.
Written by Tony Heyes, Blind Mobility Research Unit,
Department of Psychology, The University,
Nottingham, U.K..   *)

const    LineLn = 70;
      RowLn = 20;
```

```
      heap = 200;
      HiTag = 10000;
      stack = 50;
      NonDate = -1066;

type     string = packed array [1..LineLn] of char;
     item = record
               authors,titlel,title2,
               placel,place2 : string;
               date       : integer;
               keyl,key2  : string
            end;
     word = packed array [1..20] of char;
     row = array [1..RowLn] of integer;
     TagItem = record
                  tag : integer;
                  entry : item
               end;
     point = ^CoreTagItem;
     CoreTagItem = record
                      TagEntry : TagItem;
                      next     : point
                   end;
     dic = record
              name      : word;
              numbers   : row;
              cont      : boolean
           end;
     link = ^dentry;
     dentry = record
                 dline  : dic;
                 next   : link
              end;

var    bank,TempBank,addition : file of item;
    LastOne : item;
    PendingTray,correction : file of TagItem;
    first,here,p,pt,newp : link;
    efirst,now,ept,e,enewp : point;
    dlist,scratch  : text;
    TempDict,dict : file of dic;
    GotFromCore,dlistOK,InitialBuild,continue,move,same : boolean;
      n,TopItem,m,corr,reps,add,OldTotal : integer;

  procedure FromCore;

  var p : link;
  begin
     writeln(scratch,'      Fromcore');
     rewrite(dict);
     GotFromCore := true;
     p := first;
     while p<>nil do
        begin
           dict^ := p^.dline;
           put(dict);
           p := p^.next
        end
  end;  (* of FromCore *)

  procedure build(entry : item;n : integer);
       (* TO BUILD THE DICTIONARY *)

  var         str : string;
      NewEntry,OldEntry : dic;
      l,let,line,i      : integer;
      same,space,AlreadyHad,WordFound,LastWord     : boolean;
  begin
     for line:=1 to 3 do
        begin
           case line of
              1: str := entry.authors;
              2: str := entry.keyl;
              3: str := entry.key2
           end;
           l := 0;
           let := 0;
           if not ((str[1]=' ')and(str[2]=' '))
              then
                 repeat  (* not empty line *)
                    let := let+1;
                    LastWord := (((str[let]=' ') and
                                                 (str[let+1]=' '))
                                 or (let=LineLn-1));
                    WordFound := ((str[let]=',') or LastWord);
                    if not WordFound
                       then
                          begin
                             l := l+1;
                             if (l=1) and (str[let]=' ') then
                                l := 0
                                else
                                begin
                                 if l<21 then
                                   NewEntry.name[l] := str[let]
                                end
                          end
           else
              begin
                 for i:=l+1 to 20 do
                    NewEntry.name[i] := ' ';
                    (* fill up with spaces *)
                 if InitialBuild
                    then
                     begin     (* first entry *)
                      NewEntry.numbers[1] := n;
                      for i:=2 to RowLn do
                       NewEntry.numbers[i] := 0;
                      NewEntry.cont := false;
                      new(p);
                      p^.dline := NewEntry;
                      p^.next := nil;
                      first := p;
                      l := 0;
                      InitialBuild := false
                     end
                    else
                     begin
                      OldEntry := first^.dline;
                      pt := first;
(* move pt past all words before the new entry *)
                      while (pt^.next<>nil) and
                      (NewEntry.name>=pt^.next^.dline.name) do
                       pt := pt^.next;
                      OldEntry := pt^.dline;
                      same := OldEntry.name=NewEntry.name;
                      space := OldEntry.numbers[RowLn]=0;
                      AlreadyHad := false;
                      if same then
                        begin
                          i := RowLn;
                          while OldEntry.numbers[i] = 0 do
                            i := i-1;
                          if OldEntry.numbers[i] = n then
                            AlreadyHad := true
                        end;
                      if not AlreadyHad then
                       begin (* if keyword has author name only
                       one dic|if (same and (not space))
                        then
                         begin
(* new entry already in dict but no space in the string *)
                           OldEntry.cont := true;
                           pt^.dline := OldEntry
                         end;
                        if same and space
                        then
                         begin
   (* new entry already in dict AND space in the number string *)
                           i := 0;
                           repeat
                                i := i+1
                              until OldEntry.numbers[i]=0;
                              OldEntry.numbers[i] := n;
                              pt^.dline := OldEntry
                             end
                           else
                            begin
  (* a new word for the dictionary OR a repeat of an old word *)
                              NewEntry.numbers[1] := n;
                              NewEntry.cont := false;
                              for i:=2 to RowLn do
                               NewEntry.numbers[i] := 0;
                              new(newp);
                              newp^.dline := NewEntry;
                              if NewEntry.name<first^.dline.name
                               then
                                begin   (* new head of the list *)
                                 newp^.next := first;
                                 first := newp;
                                end
                               else
                                begin   (* slot entry into list *)
                                 newp^.next := pt^.next;
                                 pt^.next := newp
                                end
                             end
                          end;  (* of AlreadyHad *)
                        l := 0
                       end
              end
     until LastWord
```

```
      end
end; (* of build *)

procedure merge;
     (* to merge dict in core with existing dict on file *)

var   continue : boolean;
    j,jj : integer;
    NewEntry : dic;
begin
   writeln(scratch,'      Merge');
   rewrite(TempDict);
   reset(dict);
     (* copy to scratch with additions *)
   pt := first;
   continue := (not eof(dict)) and (pt^.next<>nil);
   while continue do
      begin
         if dict^.name<pt^.dline.name
            then
               begin
                  TempDict^ := dict^;
                  put(TempDict);
                  get(dict);
                  continue := not eof(dict)
               end;
         if dict^.name>pt^.dline.name
            then
               begin
                  TempDict^ := pt^.dline;
                  put(TempDict);
                  pt := pt^.next;
                  continue := pt<>nil
               end;
         if dict^.name=pt^.dline.name
            then
               begin
                  dict^.cont := true;
                  TempDict^ := dict^;
                  put(TempDict);
                  get(dict);
                  continue := not eof(dict)
               end
      end;
    hile not eof(dict) do
      begin
         TempDict^ := dict^;
         put(TempDict);
         get(dict)
      end;
   while pt<>nil do
      begin
         TempDict^ := pt^.dline;
         put(TempDict);
         pt := pt^.next
      end;

   rewrite(dict);
   reset(TempDict);
     (* copy back to dict and squeeze *)
   while not eof(TempDict) do
      begin
         NewEntry := TempDict^;
         if (NewEntry.numbers[RowLn]>0) or (NewEntry.cont=false)
            then
               begin
                  dict^ := NewEntry;
                  put(dict);
                  get(TempDict)
               end
            else
               begin
                  get(TempDict);
                  if not eof(TempDict)
                     then
                        begin
                           for j:=2 to RowLn do
           if NewEntry.numbers[j]=0
            then
             begin
              NewEntry.numbers[j] := TempDict^.numbers[1];
              for jj:=1 to RowLn-1 do
               TempDict^.numbers[jj] := TempDict^.numbers[jj+1]
              TempDict^.numbers[RowLn] := 0
             end;
         if TempDict^.numbers[1]=0
            then
             begin
              NewEntry.cont := false;
              get(TempDict);
              dict^ := NewEntry;
                                                  put(dict)
                                                 end
                                                else
                                                 begin
                                                  dict^ := NewEntry;
                                                  put(dict)
                                                 end
                                          end
                                    end
                              end;
                     rewrite(TempDict)
end;    (* of merge *)

begin (* MAIN PROGRAM *)
   reset(PendingTray);
   reset(bank);
   dlistOK := false;
   rewrite(scratch);
   writeln(scratch);
   writeln(scratch,'No new additions.');
   writeln(scratch);
   GotFromCore := false;
   corr := 0;
   reps := 0;
   add := 0;
   TopItem := 0;
   reset(dlist);
   if dlist^ = '~' then dlistOK := true;
   if eof(PendingTray)
      then
         begin
          if not dlistOK then
            while not eof(bank) do
              begin
                TopItem := TopItem + 1;
                get(bank)
              end
         end
         else
         begin
(* divide PendingTray into corrections and additions *)
         rewrite(correction);
         rewrite(additions);
         rewrite(dict);
         rewrite(scratch);
         dlistOK := false;
         while not eof(PendingTray) do
            if PendingTray^.tag<HiTag
               then
                  begin
                     write(correction,PendingTray^);
                     corr := corr+1;
                     get(PendingTray)
                  end
               else
                  begin
                     write(addition,PendingTray^.entry);
                     add := add+1;
                     get(PendingTray)
                  end;
         reset(correction);
         writeln(scratch,'Corrections ',corr :5,'  Additions ',add:5);

         while not eof(correction) do
            begin
(* order correction into core in batches of 'stack'  *)
               writeln(scratch,'To deal with corrections');
               mark(now);
               n := 1;
               new(e);
               e^.TagEntry := correction^;
               e^.next := nil;
               efirst := e;
               get(correction);
               while (not eof(correction)) and (n<stack) do
                  begin
                     n := n+1;
                     new(enewp);
                     enewp^.TagEntry := correction^;
                     if correction^.tag<efirst^.TagEntry.tag
                        then
                           begin   (* new head of list *)
                            enewp^.next := efirst;
                            efirst := enewp
                           end
                        else
                           begin
(* move pointer ept to correct place, slot in new item *)
                            ept := efirst;
                            while (ept^.next<>nil) and
                            (correction^.tag>=ept^.next^.TagEntry.tag)
```

```
                    do
                    ept := ept^.next;
                   if correction^.tag=ept^.TagEntry.tag
                        then
                         ept^.TagEntry := correction^
(* replace with later correction, this is why items are sorted in
       this way *)
                       else
                        begin
                         enewp^.next := ept^.next;
                         ept^.next := enewp
                        end
                     end;
                  get(correction)
               end;  (*  n=stack or eof(correction)  *)
            write(scratch,'Corrections processed in ');
            writeln(scratch,'this batch  ',n :5);
(* first batch of items from 'correction' now in core and ordered  *)

  (*  now read bank to TempBank making changes from core.
    Items are labelled for later extraction by making the
          date = NonDate.
    Replacement items are passed to join additions.  *)
            write(scratch,'Copy bank to TempBank ....');
            rewrite(TempBank);
            reset(bank);
            OldTotal := 0;
            ept := efirst;
            while not eof(bank) do
               begin
                  OldTotal := OldTotal+1;
                  if (ept<>nil) and (ept^.TagEntry.tag=OldTotal)
                     then  (* we have found one to correct *)
                        begin
                         if ept^.TagEntry.entry.date<>NonDate
                          then  (* ie. it is not empty *)
                           begin
                (* Replacement item written to addition file *)
                            write(addition,ept^.TagEntry.entry);
                            reps := reps+1
                           end;
                        bank^.date := NonDate;
                        write(TempBank,bank^);
                        get(bank);
  (* Making the date = NonDate will remove the item when
    the last batch of corrections are processed  *)
                        ept := ept^.next;
                       end
                    else
                       begin
                        write(TempBank,bank^);
                        get(bank)
                       end
               end;
            release(now);
            writeln(scratch,' O.K.');

  (*  read TempBank back to bank  *)
            write(scratch,'Copy TempBank to bank ....');
          rewrite(bank);
          reset(TempBank);
          while not eof(TempBank) do
             if eof(correction) and (TempBank^.date=NonDate)
                then
                   get(TempBank)  (* removes corrected items *)
                else
                   begin
                      write(bank,TempBank^);
                      get(TempBank);
                   end;  (* of reading back to bank *)
          writeln(scratch,' O.K.');
          rewrite(TempBank)
       end;  (* return for more corrections  *)

     rewrite(correction);
     reset(addition);
     while not eof(addition) do
        begin
(* order additions alphabetically into core in batches of 'stack'  *)
          writeln(scratch,'To deal with additions.');
          if reps>0
             then
                writeln(scratch,'These include ',reps :5,
                      ' replacements.');
          mark(now);
          n := 1;
          new(e);
          e^.TagEntry.entry := addition^;
          e^.next := nil;
          efirst := e;
          get(addition);
          while not eof(addition) and (n<stack) do
             begin
                n := n+1;
                new(enewp);
                enewp^.TagEntry.entry := addition^;
                move := ((enewp^.TagEntry.entry.authors
                        > efirst^.TagEntry.entry.authors) or
                        ((enewp^.TagEntry.entry.authors
                        = efirst^.TagEntry.entry.authors) and
                        (enewp^.TagEntry.entry.date
                        > efirst^.TagEntry.entry.date)));
                if not move
                   then  (* new head of list *)
                      begin
                       enewp^.next := efirst;
                       efirst := enewp
                      end
                   else
                      begin
(* move pointer ept to correct place, slot in new item *)
                       ept := efirst;
                       while (ept^.next<>nil) and
                            ((addition^.authors
                            > ept^.next^.TagEntry.entry.authors) or
                            ((addition^.authors
                            = ept^.next^.TagEntry.entry.authors) and
                            (addition^.date
                            > ept^.next^.TagEntry.entry.date))) do
                        ept := ept^.next;
                       enewp^.next := ept^.next;
                       ept^.next := enewp
                      end;
                get(addition)
             end;  (* n=stack or eof(addition)  *)
          writeln(scratch,'Additions processed in this batch  ',n :5);

(* now read bank to TempBank making additions from core *)
          write(scratch,'Copy bank to TempBank ....');
          reset(bank);
          rewrite(TempBank);
          ept := efirst;
          continue := (not eof(bank)) and (ept<>nil);
          while continue do
           begin
              if ((bank^.authors < ept^.TagEntry.entry.autho    or
                 ((bank^.authors = ept^.TagEntry.entry.autho    and
                 (bank^.date     < ept^.TagEntry.entry.date)))
                 then
                    begin
                     write(TempBank,bank^);
                     get(bank);
                     continue := not eof(bank)
                    end
                 else
                    begin
                     write(TempBank,ept^.TagEntry.entry);
                     ept := ept^.next;
                     continue := ept<>nil
                    end
             end;  (* of the merging of the core and the file *)
          while not eof(bank) do
             begin
                write(TempBank,bank^);
                get(bank)
             end;
          while ept<>nil do
             begin
                write(TempBank,ept^.TagEntry.entry);
                ept := ept^.next
             end;
          LastOne := bank^;
(* assigned to give LastOne a starting value *)
          writeln(scratch,' O.K.');

       (* now copy back to bank *)
          write(scratch,'Copy TempBank to bank ....');
          reset(TempBank);
          rewrite(bank);
          release(now);
          while not eof(TempBank) do
             begin
                same := ((TempBank^.authors=LastOne.authors)
                        and (TempBank^.title1=LastOne.title1)
                        and (TempBank^.title2=LastOne.title2
                        and (TempBank^.date=LastOne.date));
                if not same
                   then
                     write(bank,TempBank^);  (* rejects duplicates *)
                LastOne := TempBank^;
                get(TempBank)
             end;
```