

FILE: PATCHES/PASCAL THURSDAY 10/26/78 03:59 PM

\$# PATCH 1 FOR PASCAL.XVI.0 CONTAINS 10 CARDS, CORRECT SPELLING & TABULATION
 \$: PATCH TO CORRECT SPELLING IN SOME ERROR MESSAGES, CORRECT TABULATION OF CODE
 \$: OR COMMENTS, AND TO CORRECT THE CALL ON THE PROCEDURE TO GIVE A NEW PAGE.
 \$: *** NOTE THAT ERROR(71) IS NOW NO LONGER USED - SEE PATCH 513.
 \$: IS WAS USED ONCE, BUT INCORRECTLY, ERROR(63) IS CALLED IN ITS PLACE.
 \$: *** NOTE THAT THE ALGOL CODE FILE "PASCAL"/"DISK" HAS BEEN RENAMED
 \$: "PASCAL"/"PRELUDE". IT IS NO LONGER REFERENCED DIRECTLY IN THIS COMPILER
 \$: NILS A OTTE, UNIVERSITY OF NATAL, DURBAN. AUG - NOV 1977.
 \$:

BEGIN ; % NULL	**** 4) REWRITE	50203000
GEN("PUT",3,5);	**** 5) PAGE	50204000
GEN("PPAGE",5,3); %		50208000
BLOCK;	**** COMPILE PROCEDURE BODY ***	80646000
COMPSTAT;	**** COMPILE STATEMENT PART ***	80691000
(" 41 ALFA CONSTANTS MAY NOT BE LONGER THAN 7 CHARACTERS.")		91045000
(" 55 PROCEDURE NESTING DEPTH + NO OF RECORDS IS TOO GREAT.")		91060000
(" 87 END-OF-INPUT ENCOUNTERED UNEXPECTEDLY.")		91094000
(" 97 TOO MANY FILES IN USE.")		91104000
END OF B5700 PASCAL COMPILER.....		99001000

\$# PATCH 2 FOR PASCAL CONTAINS 171 CARDS,
 \$: PATCH TO MERGE DAG LANGMYHRS PPP10 TO PPP11 COSY PATCHES
 \$: WITH NILS OTTES MODIFIED PPP10 SOURCE.
 \$: DAVID A COOPER , HERIOT-WATT UNIVERSITY, JANUARY 1978.
 \$:

FILE CARD "SOURCE" (1,10,30);	% SOURCE CODE FILE	10035000
FILE LINES 1 (1,17);	% PRINT FILE	10036000
FILE PASCALGOL DISK SERIAL [20;600] (1,10,30,SAVE 0); % CODE FILE		10037000
ARRAY PARAMTAB, FORWPARAM1, FORWPARAM2[0;MAXPARAMS];		10109000
FILE XREFFILE DISK SERIAL [20;3000] (1,3,30);		10137000
ALPHA ARRAY XBUFF[0;2];		10138500
BOOLEAN XINB;		10138550
INTEGER ARRAY SYMKIND[0;62];	%USED IN ERROR RECOVERY.	10149000
ERROR100MESS (// "100 ILLEGAL SAVE CONSTANT IN """"S"""" OPTION		10188500
. THE VALUE 07 IS SUBSTITUTED"/" SO THIS ERROR DOES NOT INCREMENT TH		10188600
E COMPILATION ERRORS COUNT."/),%		10188700
PACKEDSY=61#, ASSERTSY=62#;		10211000
%		20181500
%		20181550
IF ERRNUM=100		20181600
THEN NUMERRS:=NUMERRS-1;%	* ERROR NUMBER 100 ALONE SHOULD NOT	20181650
%	* PREVENT THE XALGOL COMPILATION BEING	20181700
%	* ZIPPED AS THE VALUE 7 IS SUBSTITUTED	20181750
%	* FOR A BAD SAVE CONSTANT IN AN "S"	20181800
%	* OPTION.	20181850
%		20181900
%		20181950
7(INITIAL),MIDDLE,INITIAL;		20308000
"400READ", "6READLN", "50RESET", "6UNPACK", "50WRITE",		20373000
"6QQJZXL" DO		20373500
IF DECL THEN AX := -AX;		20520000
ABS(A[2]) LEQ ABS(B[2]);		20539000
%		20541100
%		20541150

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%
BOOLEAN PROCEDURE XREFINPUT(A);
ARRAY A[0];
BEGIN
  LABEL EOF;
  INTEGER I;
%
  READ(XREFFILE,3,XBUFF[*])[EOF];
  FOR I:=0,1,2 DO
    A[I] := XBUFF[I];
  IF FALSE THEN EOF: BEGIN
    CLOSE(XREFFILE,RELEASE);
    XINB := TRUE;
  END;
  XREFINPUT := XINB;
%
END OF XREFINPUT;
A2 := -A2;
BOOLEAN LPARFOUND,SAVEXREFOPT;
SAVEXREFOPT := XREFOPTION; XREFOPTION := FALSE;
IF SAVEXREFOPT THEN NEWXREF(CURNAME1,CURNAME2,THISLEVEL,
  FALSE);
XREFOPTION := SAVEXREFOPT;
%
  ASSERT 62 ASSERTSY INITIAL
  IF CURNAME1="6ASSERT" THEN ASSERTSY ELSE
  END%
%
% THE FOLLOWING LINES DECODE ANY OCCURRENCE OF THE "S" OPTION AND
% SETS THE GLOBAL INTEGER VARIABLE "SAVEFACTOR" WHICH CONTROLS THE
% TYPE OF COMPILATION INITIATED BY THE ZIP. THERE ARE THREE LEGAL FORMS
% OF THE "S" OPTION AS FOLLOWS:-
%
% "S-" WILL GIVE NO ZIP IE. PASCAL SYNTAX CHECK ONLY
% "S+" WILL GIVE A ZIP FOR COMPILE AND GO
% "S??" WILL GIVE A ZIP FOR COMPILE TO LIBRARY
% WHERE ?? IS THE TWO DIGIT DECIMAL SAVE
% CONSTANT GIVEN THE OBJECT CODE FILE
% NB. IF THE SAVE CONSTANT IS TO BE
% LESS THAN 10 THE FIRST DIGIT
% MUST BE INCLUDED IE. A "0".
%
%
ELSE
IF CX="S" THEN
BEGIN
IF C="-" THEN SAVEFACTOR:=-1 ELSE
IF C="+" THEN SAVEFACTOR:= 0 ELSE
IF C LEQ 9 THEN
BEGIN
SAVEFACTOR := 10 * C; NEXTCHAR;
SAVEFACTOR := SAVEFACTOR + C;
IF C GTR 9 THEN ERROR (100);
END
ELSE
BEGIN
ERROR(100);

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20541200
20541250
20541300
20541350
20541400
20541450
20541500
20541550
20541600
20541650
20541700
20541750
20541800
20541850
20541900
20541950
20541960
20570000
20842000
20847500
20861500
20861550
20868500
30075500
30165500
30280000
30280025
30280050
30280075
30280100
30280125
30280150
30280175
30280200
30280225
30280250
30280275
30280300
30280325
30280350
30280375
30280400
30280425
30280450
30280475
30280500
30280525
30280550
30280575
30280600
30280625
30280650
30280675
30280700
30280720
30280735
30280750

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                SAVEFACTOR := 7;
            END;
        END;
%
%
%
INTEGER EXPRLEVEL, TX, EXPINVARCNT; %
BOOLEAN INBRACKET, INRECORD, SIMPLEVAR;
    SIMPLEVAR := FALSE;
    CURTYPE := THISID.TYPE;    SIMPLEVAR := TRUE;
    SIMPLEVAR := FALSE;
        EXPINVARCNT := EXPINVARCNT + 1; %
        EXPINVARCNT := EXPINVARCNT - 1; %
SIMPLEVARIABLE := SIMPLEVAR;
    IF EXPINVARCNT = 0 THEN WRITEEXPR; %
LABEL EFH;

                                %*** 6) OPEN & CLOSE (INPUT) FOR
                                % CUMULATIVE FREQUENCY COUNT
        BEGIN
            GEN("QQJZXL", 6, 2);
            INSYMBOL;
            GO TO EFH; %
        END;
EFH:
    EXPRLEVEL := 1;
        IF THISID.IDCLASS = VAR OR
            THISID.IDCLASS = CONST AND BOOLEAN(THISID.FORMAL) THEN %
            EXPRLEVEL := 0;
PROCEDURE ASSERTSTAT;
BEGIN
    GEN("IF NOT(", 7, 1);
    INSYMBOL;    BOOLEXP;
    GEN(") THEN", 7, 2);    GEN("RUNERR(", 7, 1);    GEN("7,", 2, 6);
    GENINT(CARDCNT);    GEN(")", 1, 7);
END OF ASSERTSTAT;
        IF CURNAME1 = "6QQJZXL" THEN FILEHANDLING(6) ELSE
        IF CURSY = ASSERTSY THEN ASSERTSTAT ELSE
            IF PARAM THEN GEN("0", 1, 7) ELSE BEGIN
                                GEN("0:", 2, 6);
                                GENINT(RECSIZE - 1);
                                END
                FORWPARAM1[NUMPARAMS] := CURNAME1;
                FORWPARAM2[NUMPARAMS] := CURNAME2;
INTEGER INDEX, CTYPE, NUMFORWARDS, T, TX, I;
ALPHA T3;
    LABEL LL1; %
    LABEL LL2; %
    LABEL LL3; %
    IF CURLEVEL GEQ MAXTABLES THEN ERROR(101) ELSE
        BLOCKTAB[CURLEVEL + 1] := NUMBLOCKS := NUMBLOCKS + 1;
        NAMETAB3[CURLEVEL, THISINDEX].FORWARDDEF := 0;
        T := NAMETAB3[CURLEVEL, THISINDEX].INFO;
        TX := T + PARAMTAB[T];
        FOR I := T + 1 STEP 1 UNTIL TX DO
            NEWNAME(FORWPARAM1[I], FORWPARAM2[I], CURLEVEL + 1);
        REPLACE POINTER(NAMETAB1[CURLEVEL + 1, *]) BY 0
            FOR MAXNAMES + 1 WORDS;

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30280765
30280780
30280800
30280825
30280850
30280875
40018000
40087000
40099000
40104000
40109000
40120500
40121500
40199500
40751000
50201500
50204500
50204550
50208100
50208200
50208300
50208400
50208500
50219500
60346500
60354000
60354500
60383500
60391100
60391200
60391400
60391500
60391600
60391700
60391800
60443500
60457500
80129000
80129100
80129200
80129300
80177500
80177600
80403000
80403500
80447010
80496010
80542010
80543500
80543600
80553000
80554500
80554600
80554700
80554800
80637500
80637600

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IF CURLEVEL GEQ LASTREC THEN ERROR(101); * 80643000
% 90014100
% 90014200
SAVEFACTOR:=0;% * DEFAULT ZIP IS COMPILE AND GO UNLESS 90014300
% * CHANGED BY THE USE OF THE "S" OPTION 90014400
% 90014500
% 90014600
% 90042100
% THE FOLLOWING LINES ADD A "0" ONTO THE FRONT OF THE PROGRAM NAME OR 90042200
% THE FIRST SIX CHARACTERS THEREOF IF IT IS LONGER THAN SIX CHARACTERS 90042300
% THUS GIVING THE NAME OF THE XALGOL OBJECT CODE FILE PRODUCED. 90042400
% 90042500
% PROGRAM := CURNAME1.[35:36]; PROGNAMLENGTH := MIN(6,CURLLENGTH)+1; 90042600
% 90042700
% 90042800
BEGIN% 90090400
WRITE(LINE ,NOERRORS);% 90090500
IF ERR[100]%; 90090600
THEN WRITE(LINE ,ERROR100MESS);% 90090700
IF SAVEFACTOR<=0 THEN% *A ZIP IS REQUIRED 90090800
$VOIDT 90111000
END% 90129500
(*100 ILLEGAL SAVE CONSTANT IN """"S"""" OPTION. THE VALUE 07 IS 91106500
SUBSTITUTED"/" SO THIS ERROR DOES NOT INCREMENT THE COMPILATION ERRO 91106600
RS COUNT.,"),% 91106700
(*101 PROCEDURES/FUNCTIONS NESTED TOO DEEP.,"), 91106800
REWIND(XREFFILE); 92003500
SORT(PRINTXREF,XREFINPUT,0,XREFMAX,XREFCOMPARE,3,1000,6000); 92005000
$# PATCH 500 FOR PASCAL.XVI.0 CONTAINS 5 CARDS. PRT CELLS 25 TO 30
$: THIS PATCH CORRECTS THE DOCUMENTATION FOR THE COMPILERS PRT CELLS 25 TO 27
$: (NOT 21 TO 23). FURTHERMORE, IT USES PRT CELL 30 FOR THE CARD COUNT (IN PLACE
$: OF 27) TO BE CONSISTANT WITH THE OTHER SYSTEM COMPILERS. PRT CELL 27 IS USED
$: FOR THE PAGE COUNT FORMERLY AT SEQUENCE 10134000.
$: NILS A OTTE, UNIVERSITY OF NATAL, DURBAN. AUG - NOV 1977.
$:
INTEGER NUMERRS, % @R+25: NUMBER OF ERRORS IN PROGRAM. 10029000
SAVEFACTOR, % @R+26: SAVEFACTOR FOR CODE FILE. 10030000
PAGECNT, % @R+27: NUMBER OF PAGES PRINTED. 10033800
CARDCNT; % @R+30: NUMBER OF CARDS READ. 10034000
INTEGER LINECNT, ERRINX; % PAGECNT @ PRT+27 10134000
$# PATCH 501 FOR PASCAL.XVI.0 CONTAINS 3 CARDS. "PRT25" FOR USER-S PASCAL PROG.
$: THIS PATCH INCORPORATES THE PRE-DEFINED IDENTIFIER "PRT25" LOCATED
$: AT PRT CELL 25 AS PER DOCUMENTATION. (THE DOCUMENTATION MUST BE
$: AMENDED TO DELETE PRT26 AND PRT27 FROM THE PRE-DEFINED IDENTIFIER LIST.)
$: ** NOTE THAT FILE PASCAL/PRELUDE MUST BE UPDATED FOR "PRT25".
$: THE VARIABLE "PRT25" MAY BE SET BY THE Q COMMON = N CONTROL CARD.
$: NILS A OTTE, UNIVERSITY OF NATAL, DURBAN. AUG - NOV 1977.
$:
NEWNAME("50PRT25",0,0); %*** "PRT25" *** 20369100
T3:=INTTYPE; T3.IDCLASS:=VAR; % GLOBAL INTEGER VARIABLE 20369200
NAMETAB3[0,THISINDEX] := T3; 20369300
$# PATCH 502 FOR PASCAL.XVI.0 CONTAINS 3 CARDS. LINE COUNT WHEN DEBUGGING
$: TO CORRECT THE LINE COUNT WHEN THE DEBUGGING OPTION TO LIST THE ALGOL
$: CODE GENERATED IS SET (*$D+ *), OTHERWISE LINES PER PAGE GOES WRONG.
$: NILS A OTTE, UNIVERSITY OF NATAL, DURBAN. AUG - NOV 1977.
$:
DEFINE LINESPERPAGE = 60 #, 10038000

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IF DUMPOPTION THEN BEGIN IF (LINECNT:=LINECNT+1)≥LINESPERPAGE      20149000
    THEN HEADING; WRITE(LINE,10,ALGOLCARD[*]) END;                    20149100
$# PATCH 503 FOR PASCAL.XVI.0 CONTAINS 9 CARDS. INTEGER TO REAL FOR TYPETAB1
$: WHEN MORE THAN 63 ENTRIES WERE ENTERED IN THE "TYPETAB*" ARRAYS, THE
$: PASCAL COMPILER WAS DISCONTINUED DUE TO INTEGER OVERFLOW, WHICH COULD OCCUR
$: IN A NUMBER OF PROCEDURES AS A RESULT OF ASSIGNING TO AN INTEGER AN ARRAY
$: ELEMENT WHOSE EXPONENT FIELD WAS NOT ZERO. THE FIELD "ARRTYPE" IS
$: [43:10] AND HAS THE 4 HIGH ORDER BITS IN THE EXPONENT FIELD. THIS PATCH
$: ALTERS THE DECLARATIONS OF ALL IDENTIFIERS TO WHICH "TYPETAB1" MAY BE
$: ASSIGNED FROM INTEGER TO REAL TO CORRECT THIS ERROR.
$: NILS A OTTE, UNIVERSITY OF NATAL, DURBAN. AUG - NOV 1977.
$:
INTEGER IT; REAL T; 50225000
INTEGER IT; REAL T; 50285000
INTEGER CASETYPE,ADDR,MAXADDR,INDEX,CTYPE,TX,SX, T3,LLIM,ULIM,I; 70244000
REAL T1, CVAL; 70246000
INTEGER LEVEL1000, TYP, NAM, NAMTAB, I, J, RECSIZE; 80020000
ALPHA T1, FNAME; 80022000
INTEGER FIRSTPARAM, CURKIND, P1, PX, I, T3; REAL T; 80148000
INTEGER INDEX, CTYPE, NUMFORWARDS, T3, TX, I; 80403000
REAL T, CVAL; 80404000
$# PATCH 504 FOR PASCAL.XVI.0 CONTAINS 23 CARDS. IMPLEMENT FORWARD DECLARATIONS
$: FORWARD DECLARATIONS OF PROCEDURES ENDED IN CHAOS DUE TO THE PARAMETERS AND
$: THEIR TYPES NOT BEING KEPT, RESULTING IN GLOBALS BEING REFERENCED WHERE
$: POSSIBLE, AND FORWARD DECLARATIONS OF FUNCTIONS DID NOT WORK AT ALL.
$: THE PROBLEM WAS THAT THE INFORMATION ON THE PARAMETERS WAS BEING STORED
$: IN THE "NAMETAB*" ROWS FOR THE CURRENT LEVEL, WHICH WERE BEING SET TO ZERO
$: ON EXIT FROM PROCEDURE BLOCKS AT THAT LEVEL THEREAFTER.
$: THIS PATCH CORRECTS THE ERROR BY MARKING THE ENTRIES FOR PARAMETERS OF
$: FORWARD PROCEDURES AND FUNCTIONS, SETTING TO ZERO ONLY THOSE ELEMENTS WHICH
$: ARE NOT SO MARKED ON EXIT FROM A BLOCK, AND UNMARKING THE RELEVANT PARAMETERS
$: WHEN THE PROCEDURE OR FUNCTION IS DEFINED. THE MARKING OF THE PARAMETERS
$: IS DONE IN SUCH A WAY THAT THE SAME IDENTIFIER NAME MAY BE USED AT THE SAME
$: LEVEL WITHOUT SYNTAX ERROR 2 TO REPORT THAT THE IDENTIFIER IS ALREADY DEFINED
$: THE UNMARKING REPLACES THE IDENTIFIER NAME IN "NAMETAB*" TO ALLOW FOR THE
$: SAME NAME OR ONE THAT HASHES TO THE SAME PLACE TO HAVE BEEN USED PREVIOUSLY
$: AND NOW DELETED.
$: NILS A OTTE, UNIVERSITY OF NATAL, DURBAN. AUG - NOV 1977.
$:
IF FOUND AND THISID.IDCLASS≥FUNC THEN 80548000
    NAMETAB3[CURLEVEL,THISINDEX].FORWARDDEF:=0; 80553000
    (THISID.IDCLASS=FUNC AND NOT FUN) THEN ERROR(43); 80555100
    TX:=(T:=THISID.INFO)+PARAMTAB[T]; % UNMARK FORWARD PARMS 80556000
    FOR I:=T+1 STEP 1 UNTIL TX DO % TO ALLOW REFERENCE 80557000
    BEGIN T3:=PARAMTAB[I].PARAMNAME; 80558000
        CURNAME1:=ABS(NAMETAB1[CURLEVEL+1,T3]); 80559000
        CURNAME2:= NAMETAB2[CURLEVEL+1,T3]; 80560000
        NAMETAB1[CURLEVEL+1,T3]:=0; 80561000
        NEWNAME(CURNAME1,CURNAME2,CURLEVEL+1); 80562000
        IF T3≠THISINDEX THEN BEGIN 80563000
            PARAMTAB[I].PARAMNAME:=THISINDEX; 80564000
            NAMETAB3[CURLEVEL+1,THISINDEX] := 80565000
            NAMETAB3[CURLEVEL+1,T3]; 80565010
        END END; % OF UNMARKING FORWARD PARAMETERS. 80566000
    TX:=(T:=NAMETAB3[CURLEVEL,INDEX].INFO)+PARAMTAB[T]; 80636100
    FOR I:=T+1 STEP 1 UNTIL TX DO % MARK FORWARD PARAMETERS 80636200
        NAMETAB1[CURLEVEL+1,PARAMTAB[I].PARAMNAME],[46:1] := 1; 80636210

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TX:=CURFUNC; CURFUNC:=IF FUN THEN INDEX ELSE -1; 80645000
FOR I:=0 STEP 1 UNTIL MAXNAMES DO % LEAVE FORWARD PARAMETERS 80647000
    IF NAMETAB1[CURLFVEL,I]>0 THEN NAMETAB1[CURLEVEL,I]:=0; 80648000
CURLEVEL:=CURLEVEL-1; CURFUNC:=TX; 80649000
FOR I:=LASTREC STEP 1 UNTIL TOPREC-1 DO % CLEAR RECORD DECS 80693000
$# PATCH 505 FOR PASCAL.XVI.0 CONTAINS 9 CARDS. CHECK FOR HASH TABLE FULL
$: WHEN THERE ARE "MAXNAMES" IDENTIFIERS AT ONE LEVEL, THE "NAMETAB*" ROWS
$: BECOME FULL AND THIS USED TO PUT THE COMPILER INTO AN INFINITE LOOP,
$: EITHER IN "NEWNAME" OR "SEARCHTAB". THIS PATCH INSERTS TEST FOR WRAP AROUND
$: LEADING BACK TO THE HASHED STARTING POINT, FOR WHICH IT GIVES SYNTAX ERROR
$: 40, TOO MANY IDENTIFIERS DECLARED.
$: NILS A OTTE, UNIVERSITY OF NATAL, DURBAN. AUG - NOV 1977.
$:
DEFINE HASH(HASH1) = ENTIER((HASH1) MOD MAXNAMES) #; 20202000
BEGIN ALPHA TNAME; INTEGER WRAPAROUND; 20209000
    WRAPAROUND:=THISINDEX:=HASH(CURNAME1); 20210000
    IF THISINDEX=WRAPAROUND THEN TNAME:=0; % TABLE IS FULL 20216100
ALPHA TNAME; INTEGER WRAPAROUND; 20237100
    WRAPAROUND:=THISINDEX:=HASH(NAME1); 20238000
    IF THISINDEX=WRAPAROUND THEN % TABLE AT THIS LEVEL IS FULL 20244100
        BEGIN ERROR(40); NAME1:=TNAME; NAME2:=NAMETAB2[TAB,THISINDEX] 20244200
        END; 20244300
$# PATCH 506 FOR PASCAL.XVI.0 CONTAINS 2 CARDS. RESERVED WORD ENDING AT CC 80
$: IF A RESERVED WORD ENDED AT CARD COLUMN 79 OR 80 AND IF THE "BOLDFACE" FOR
$: RESERVED WORDS OPTION IS SET (*$R+*), AN INVALID INDEX OCCURRED IN THE
$: SCANNER "INSYMBOL". THE PROBLEM IS CURED BY CORRECTLY COMPUTING THE STARTING
$: AND ENDING POINT OF THE RESERVED WORDS.
$: NILS A OTTE, UNIVERSITY OF NATAL, DURBAN. AUG - NOV 1977.
$:
    BEGIN T1 := CARLENGTH-CHARCNT-CURLENGTH-1; 30178000
        FOR CURLENGTH+REAL(CHARCNT=0); 30181000
$# PATCH 507 FOR PASCAL.XVI.0 CONTAINS 5 CARDS. "VARIABLE", "SIMPLEVARIABLE"
$: IN PROCEDURE "VARIABLE", "SIMPLEVARIABLE" IS SET TRUE IF A SUBSCRIPT IS
$: SIMPLE, RESULTING IN ALGOL CODE BEING WRITTEN PREMATURELY DURING RECURSIVE
$: CALLS ON PROCEDURE "EXPRESSION", WHICH IN SOME CASES LEAD TO ALGOL SYNTAX
$: ERRORS. SINCE WRITING THE ALGOL CODE IS DEPENDANT ON "EXPRLEVEL" BEING ZERO,
$: THIS PATCH BUMPS ITS VALUE PRIOR TO ANALYSING THE SUBSCRIPT, AND SETS
$: "SIMPLEVARIABLE" FALSE AFTERWARDS.
$: NILS A OTTE, UNIVERSITY OF NATAL, DURBAN. AUG - NOV 1977.
$:
    EXPRLEVEL := EXPRLEVEL+1; % DO NOT "WRITEEXPR" YET 40120900
    EXPRLEVEL := EXPRLEVEL-1; 40121100
    SIMPLEVARIABLE := FALSE; % RECURSION ON "VARIABLE" 40121200
    EXPRLEVEL := EXPRLEVEL+1; 60063900
    EXPRLEVEL := EXPRLEVEL-1; 60065100
$# PATCH 509 FOR PASCAL.XVI.0 CONTAINS 1 CARD. "CONCAT" A FUNCTION OF ANY TYPE
$: THE INTRINSIC FUNCTION "CONCAT" COULD ONLY BE ASSIGNED TO A VARIABLE DECLARED
$: "REAL" TO AVOID TYPE CONFLICT SYNTAX ERRORS. THIS PATCH MAKES "CONCAT"
$: TYPELESS.
$: NILS A OTTE, UNIVERSITY OF NATAL, DURBAN. AUG - NOV 1977.
$:
CURTYPE := 0; % ALFATYPE OR REALTYPE 50050000
$# PATCH 511 FOR PASCAL.XVI.0 CONTAINS 7 CARDS. ALLOW UP-LEVEL ADDRESSING
$: TO ALLOW UP-LEVEL IDENTIFIER REFERENCES. FORMERLY, REFERENCES TO GLOBAL
$: IDENTIFIERS WHICH WERE NOT IN THE OUTER BLOCK WERE FLAGGED BY SYNTAX ERROR
$: 5, UP-LEVEL ADDRESSING NOT IMPLEMENTED DUE TO HARDWARE RESTRICTION.
$: ALTHOUGH THE RESTRICTION EXISTS IN EXTENDED ALGOL, IT IS NOT TRUE THAT THE

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$# IE FOR POINTERS TO POINTERS. THE OFFSET FOR COMPONENTS WITHIN RECORDS
$# WAS INCORRECTLY BEING ADDED TO THE RECORD IN THE LEFTMOST REFERENCE, IE THE
$# INNERMOST, INSTEAD OF AT THE EXPECTED LEVEL.
$# FOR EXAMPLE, THE FOLLOWING TWO REFERENCES WOULD BOTH BE TRANSLATED TO
$# THE SAME ALGOL CODE EQUIVALENT TO HEAP[HEAP[ID+IPART+ICOMP]]:
$# ID.PART.COMP, ID.PART.COMP,
$# WHEN THE FIRST SHOULD HAVE BEEN: HEAP[HEAP[ID+IPART]+ICOMP].
$# IN ADDITION, THIS PATCH IMPROVES THE COMPILER'S CODE FOR GENERATING THE
$# "MEM" ARRAY SUBSCRIPT.
$# NILS A OTTE, UNIVERSITY OF NATAL, DURBAN. 1977-11-14
$#
IF NUMSYMS+6 ≤ MAXSYMS THEN 40175000
  NUMSYMS := NUMSYMS+2; 40180400
  IF NUMPOINTERS > 0 % POINTER VIA POINTER 40180500
  THEN BEGIN REPLACE POINTER(SYMTAB[NUMSYMS+1]) BY 40180600
    "00-1)DIV00 1022,00 T MOD00 1022)"; 40180700
    NUMSYMS := NUMSYMS+4; 40180800
  END 40180900
  ELSE NUMPOINTERS := 1; 40181000
% INBRACKET := FALSE; 40191100
BEGIN NUMPOINTERS := NUMPOINTERS-1; 40193000
  IF NUMSYMS+4 ≤ MAXSYMS 40194000
  THEN BEGIN REPLACE POINTER(SYMTAB[NUMSYMS+1]) BY 40194100
    "00-1)DIV00 1022,00 T MOD00 1022)"; 40194200
    NUMSYMS := NUMSYMS+4; 40194300
  END 40194400
  ELSE ERROR(63); % EXPRESSION IS TOO LONG FOR SYMTAB[*] 40195000
$# PATCH 514 FOR PASCAL.XVI.0 CONTAINS 2 CARDS. PROCESS TIME FUNCTION FOR RUN
$# PATCH TO CHANGE THE NAME OF THE FUNCTION ON THE B5700 VERSION WHICH SUPPLIES
$# THE PROCESS TIME USED BY THE PASCAL PROGRAM ON THE CURRENT RUN FROM "ELAPSED"
$# WHICH MEANS PLATFORM TIME, TO "CPUTIME" WHICH IS THE WIDELY ACCEPTED TERM
$# FOR THIS QUANTITY.
$# NILS A OTTE, UNIVERSITY OF NATAL, DURBAN. AUG - NOV 1977.
$#
NEWNAME("7CPUTIM","E",0); NAMETAB3[0,THISINDEX]:=T3; 20390000
IF CURNAME1="7CPUTIM" AND CURNAME2="E" THEN % "CPUTIME" 40452000
$# PATCH 516 FOR PASCAL.XVI.0. CONTAINS 2 CARDS. CORRECT "NO LISTING" ERROR
$# THIS PATCH CORRECTS AN ERROR WHEREBY IF LISTING WAS TURNED OFF
$# AND PAGE THROW WAS INVOKED, A HEADING WAS PRINTED REGARDLESS.
$# DAVID A COOPER, HERIOT-WATT UNIVERSITY.....JUNE, 1978.
$#
IF CX="L" THEN IF C=1 THEN 30264000
  IF LISTOPTION THEN HEADING ELSE 30264500
$# PATCH 517 FOR PASCAL.XVI.0. CONTAINS 2 CARD.
$# THIS PATCH CORRECTS AN ERROR THAT CAUSED A FILE DECLARATION
$# TO HAVE ITS NAME STRING SPLIT OVER TWO LINES IN THE GENERATED XALGOL.
$# ALSO CHANGES SYMTAB FORM TYPE REAL TO TYPE ALPHA.
$# DAVID A COOPER, HERIOT-WATT UNIVERSITY.....JUNE, 1978.
$#
ALPHA ARRAY SYMTAB[0:MAXSYMS]; % USED BY "EXPRESSION". 10144000
IF ALGOLCNT LSS 14 THEN WRITEALGOL; 80103000
$# PATCH 518 FOR PASCAL.XVI.0. CONTAINS 224 CARDS.
$# THIS PATCH CHANGES THE WAY THAT MULTI-DIMENSION ARRAYS
$# REPRESENTING RECORDS ARE DECLARED. PREVIOUSLY THEY WRE DECLARED
$# THE WRONG WAY ROUND FOR XALGOL. THIS PATCH SORTS THE DIMENSIONS
$# INTO ASCENDING ORDER FROM LEFT TO RIGHT AND GENERATES APPROPRIATE
$# DEFINES AND CODE FOR HANDLING THE ARRAYS.

```

```

$: STUART ANDERSON, COMPUTER SCIENCE, HERIOT-WATT UNIVERSITY, JUNE.....1978.
$:
  DEFINE
    PERMSUB = 0 #, MAXTOTALSUBSCRS = 100#,
    ARRNAM = 1 #;
  ARRAY ARRPERMTAB[0:1,0:MAXTOTALSUBSCRS];
  INTEGER PASSPERMTAB, MAXPERMTAB, REMEMBERPOSN;
  $
  BOOLEAN SIMPLEVARIABLE, INSIDEBRACKETS, INSIDEPARENS;
  $
  IF INSIDEPARENS AND TYPETAB1[CURTYPE].STRUCT > 0 AND
    TYPETAB1[CURTYPE].FORM < FILES THEN
    PUTID("H",1000*THISLEVEL+THISINDEX,5)
  ELSE
    PUTID("V",1000*THISLEVEL+THISINDEX,5);
  INSIDEPARENS := TRUE;
  INSIDEPARENS := FALSE;
  $
    GENID("H",1000*THISLEVEL+THISINDEX,5);
  $
    GENID("H",1000*THISLEVEL+THISINDEX,5);
  $$SET VOIDT
  $POP VOIDT
  DEFINE
    LOWSUBS = 0 #,
    HISUBS = 1 #,
    NEXTSUBS = 2 #,
    MAXNOOFSUBSCRIPTS = 20 #,
    STOPPERSUBTAB = 21 #;
  ARRAY ARRSUBSCRIPTRANGE[0:2,0:MAXNOOFSUBSCRIPTS];
  INTEGER FIRSTSTRANGE, NEXTFREEENTRY, PASSSUBRANGE, PREVPASS,
    MP, POSNO, SUBDIFF;
  IF ARRAYVAR THEN GEN(";",1,7) ELSE ARRAYVAR := TRUE;
  IF NOT PARAM THEN
  BEGIN
    GEN("DEFINE",7,2);
    GENID("V",LEVEL1000+NAM,5);
    GEN("[",1,7);
  END;
  FIRSTSTRANGE := STOPPERSUBTAB; NEXTFREEENTRY := 0;
  POSNO := 1;
  MP := 10; FIRSTDIM := TRUE;
  DO
  BEGIN
    IF FIRSTDIM THEN FIRSTDIM := FALSE ELSE
    BEGIN
      IF NOT PARAM THEN GEN(";",1,7);
    END;
    IF NOT PARAM THEN GENID("V",(LEVEL1000+NAM)*MP+POSNO,IF MP=10
      THEN 6 ELSE 7); POSNO := POSNO + 1;
    IF POSNO = MP THEN MP := MP*10;
    IF NEXTFREEENTRY = STOPPERSUBTAB THEN
    BEGIN
      ERROR(0);
    END
    ELSE
    BEGIN

```

```

10156200
10156300
10156400
10156500
10156600
40080000
40080100
40105000
40105100
40105200
40105300
40105400
40105500
40258100
40259100
50243000
50243100
50307000
50307100
80052000
80064000
80064005
80064010
80064015
80064020
80064025
80064030
80064035
80064040
80064045
80064050
80064055
80064060
80064065
80064070
80064075
80064080
80064085
80064090
80064095
80064100
80064105
80064110
80064111
80064112
80064113
80064115
80064120
80064125
80064130
80064135
80064140
80064145
80064150
80064155

```

```

ARRSUBSCRIPTRANGE[LOWSUBS,NEXTFREEENTRY]:=TYPETAB2[TYP]; 80064160
ARRSUBSCRIPTRANGE[HISUBS,NEXTFREEENTRY] := TYPETAB3[TYP]; 80064165
END; 80064170
SUBDIFF := TYPETAB3[TYP] - TYPETAB2[TYP]; 80064175
IF FIRSTRANGE = STOPPERSUBTAB THEN 80064180
BEGIN 80064185
    FIRSTRANGE := NEXTFREEENTRY; 80064190
    NEXTFREEENTRY := NEXTFREEENTRY + 1; 80064195
    ARRSUBSCRIPTRANGE[NEXTSUBS,FIRSTRANGE] := STOPPERSUBTAB; 80064200
END 80064205
ELSE 80064210
BEGIN 80064215
    PASSSUBRANGE := FIRSTRANGE; 80064220
    PREVPASS := STOPPERSUBTAB; NEXTFREEENTRY:=NEXTFREEENTRY+1; 80064225
    WHILE(SUBDIFF ≥ ARRSUBSCRIPTRANGE[HISUBS,PASSSUBRANGE] 80064230
        -ARRSUBSCRIPTRANGE[LOWSUBS,PASSSUBRANGE]) AND 80064235
        (ARRSUBSCRIPTRANGE[NEXTSUBS,PASSSUBRANGE] ≠ 80064240
        STOPPERSUBTAB) DO 80064245
        BEGIN 80064250
            PREVPASS := PASSSUBRANGE; 80064255
            PASSSUBRANGE := ARRSUBSCRIPTRANGE[NEXTSUBS, 8006426
                PASSSUBRANGE]; 80064265
        END; 80064270
    IF PREVPASS = STOPPERSUBTAB THEN 80064275
    BEGIN 80064280
        IF SUBDIFF ≥ ARRSUBSCRIPTRANGE[HISUBS, 80064285
            PASSSUBRANGE] - 80064290
            ARRSUBSCRIPTRANGE[LOWSUBS, 80064295
            PASSSUBRANGE] THEN 80064300
        BEGIN 80064305
            ARRSUBSCRIPTRANGE[NEXTSUBS,PASSSUBRANGE] := 80064310
                NEXTFREEENTRY - 1; 80064315
            ARRSUBSCRIPTRANGE[NEXTSUBS,NEXTFREEENTRY-1] := 80064320
                STOPPERSUBTAB; 80064325
        END 80064330
        ELSE 80064335
        BEGIN 80064340
            ARRSUBSCRIPTRANGE[NEXTSUBS,NEXTFREEENTRY-1] := 80064345
                FIRSTRANGE; 80064350
            FIRSTRANGE := NEXTFREEENTRY-1; 80064355
        END 80064360
    END 80064365
    ELSE 80064370
    BEGIN 80064375
        IF SUBDIFF ≥ ARRSUBSCRIPTRANGE[HISUBS,PASSSUBRANGE] - 80064380
            ARRSUBSCRIPTRANGE[LOWSUBS,PASSSUBRANGE] 80064385
            THEN 80064390
        BEGIN 80064395
            ARRSUBSCRIPTRANGE[NEXTSUBS,PASSSUBRANGE] := 80064400
                NEXTFREEENTRY - 1; 80064405
            ARRSUBSCRIPTRANGE[NEXTSUBS,NEXTFREEENTRY-1] := 80064410
                STOPPERSUBTAB; 80064415
        END 80064420
        ELSE 80064425
        BEGIN 80064430
            ARRSUBSCRIPTRANGE[NEXTSUBS,PREVPASS] := 80064435
                NEXTFREEENTRY - 1; 80064440
        END
    END

```

```

ARRSUBSCRIPTRANGE[NEXTSUBS,NEXTFREEENTRY-1] := 80064445
PASSSUBRANGE; 80064450
END 80064455
END 80064460
END;TYP:=IF T1.FORM = ARRAYS THEN T1.ARRTYPE ELSE REALTYPE; 80064465
T1 := TYPETAB1[TYP]; 80064470
END UNTIL T1.STRUCT = 0 ; 80064475
IF NOT PARAM THEN 80064480
BEGIN 80064485
GEN(", ",2,6); 80064490
GENID("H",LEVEL1000+NAM,5); 80064495
GEN("[",1,7); 80064500
PASSSUBRANGE:= FIRSTRANGE; FIRSTDIM := TRUE; 80064505
WHILE PASSSUBRANGE ≠ STOPPERSUBTAB DO 80064510
BEGIN 80064515
IF FIRSTDIM THEN FIRSTDIM := FALSE ELSE GEN(", ",1,7); 80064520
GENID("V", (LEVEL1000+NAM)×(IF PASSSUBRANGE>9 THEN 100 ELSE 8006453
10)+PASSSUBRANGE+1, IF PASSSUBRANGE>9 THEN 7 ELSE 6); 80064535
PASSSUBRANGE := ARRSUBSCRIPTRANGE[NEXTSUBS,PASSSUBRANGE]; 80064540
END; 80064545
GEN("#",3,5); 80064550
END; 80064555
PASSSUBRANGE := FIRSTRANGE; 80064560
FIRSTDIM := TRUE; GEN("ARRAY",6,3); GENID("H",LEVEL1000+NAM,5); 80064565
GEN("[",1,7); 80064570
WHILE PASSSUBRANGE ≠ STOPPERSUBTAB DO 80064575
BEGIN 80064580
IF MAXPERMTAB LEQ MAXTOTALSUBSCRS AND PARAM THEN 80064585
BEGIN 80064590
ARRSUBPERMTAB[ARRNAM,MAXPERMTAB] := 80064595
IF FIRSTDIM THEN NAM ELSE "1"; 80064600
ARRSUBPERMTAB[PERMSUB,MAXPERMTAB] := PASSSUBRANGE; 80064605
MAXPERMTAB := MAXPERMTAB + 1; 80064610
END 80064615
ELSE 80064620
BEGIN 80064625
IF MAXPERMTAB > MAXTOTALSUBSCRS THEN ERROR(0); 80064630
END; 80064640
IF FIRSTDIM THEN FIRSTDIM := FALSE ELSE GEN(", ",1,7); 80064645
GENINT(ARRSUBSCRIPTRANGE[LOWSUBS,PASSSUBRANGE]); 80064650
IF NOT PARAM THEN 80064655
BEGIN 80064660
GEN(":",1,7); 80064665
GENINT(ARRSUBSCRIPTRANGE[HISUBS,PASSSUBRANGE]); 80064670
END; 80064675
PASSSUBRANGE := ARRSUBSCRIPTRANGE[NEXTSUBS,PASSSUBRANGE]; 80064680
END; 80064685
GEN("]",1,7); 80064950
$ 80421000
IF CURLEVEL > 1 THEN 80421010
BEGIN 80421020
INTEGER NAMOFTHING,DIFF; 80421030
BOOLEAN FIRSTTIME; 80421040
GEN("BEGIN",6,3); 80421050
IF MAXPERMTAB > 0 THEN 80421060
BEGIN 80421070
PASSPERMTAB := 0; 80421080

```

```

DO
BEGIN
REMEMBERPOSN := PASSPERMTAB;
GEN("DEFINE",7,2);
NAMOFTHING := ARRSUBPERMTAB[ARRNAM,PASSPERMTAB];
GENID("V",1000×CURLEVEL+NAMOFTHING,5);
GEN("[",1,7);
FIRSTTIME := TRUE;
DO
BEGIN
IF FIRSTTIME THEN FIRSTTIME := FALSE ELSE GEN(",","180421190
,7);80421200
DIFF := PASSPERMTAB-REMEMBERPOSN+1;
GENID("V",(1000×CURLEVEL+NAMOFTHING)×(IF DIFF>9 THEN 100 ELSE
10)+DIFF,(IF DIFF > 9 THEN 7 ELSE 6));
PASSPERMTAB := PASSPERMTAB + 1; END
UNTIL PASSPERMTAB = MAXPERMTAB OR
ARRSUBPERMTAB[ARRNAM,PASSPERMTAB] ≠ -1;
GEN("]",1,7);
GEN("=",1,7);
GENID("H",1000×CURLEVEL+NAMOFTHING,5);
GEN("[",1,7);
PASSPERMTAB := REMEMBERPOSN; FIRSTTIME := TRUE;
DO
BEGIN
IF FIRSTTIME THEN FIRSTTIME := FALSE ELSE GEN(",","80421380
1,7);80421390
DIFF := ARRSUBPERMTAB[PERMSUB,PASSPERMTAB]+1;
GENID("V",(1000×CURLEVEL+NAMOFTHING)×(IF DIFF>9 THEN
100 ELSE 10)+DIFF,(IF DIFF>9 THEN 7 ELSE 6));
PASSPERMTAB := PASSPERMTAB + 1;
END
UNTIL PASSPERMTAB = MAXPERMTAB OR
ARRSUBPERMTAB[ARRNAM,PASSPERMTAB] ≠ -1;
GEN("#;",3,5);
END
UNTIL PASSPERMTAB = MAXPERMTAB;
MAXPERMTAB := 0;
END;
END;
$
BEGIN
BEGIN
INTEGER NAM,T1,SCRATCH;
NAM := PARAMTAB[I],[9:10];
SCRATCH := NAMETAB3[CURLEVEL+1,NAM];
SCRATCH := SCRATCH.TYPE;
T1 := TYPETAB1[SCRATCH];
IF T1.STRUCT ≠ 0 AND T1.FORM < FILES THEN
GENID("H",1000×(CURLEVEL+1)+NAM,5)
ELSE
GENID("V",1000×(CURLEVEL+1)+NAM,5);
END;
MAXPERMTAB := 0;
INSIDEPARENS := FALSE;
$# PATCH 519 FOR PASCAL XVI.0. CONTAINS 1 CARDS. INCREASE RUNTIME STACK.
$!

```

```

80421090
80421100
80421110
80421120
80421130
80421140
80421150
80421160
80421170
80421180
80421190
80421200
80421210
80421220
80421230
80421270
80421280
80421290
80421300
80421310
80421320
80421340
80421350
80421360
80421370
80421380
80421390
80421400
80421410
80421420
80421430
80421440
80421450
80421460
80421470
80421480
80421490
80421500
80421510
80421520
80608000
80608010
80608020
80608030
80608040
80608050
80608060
80608070
80608080
80608090
80608100
80608110
80608120
90070100
90070200

```

```

" XALGOL STACK = 2048; STACK = 1024; END."; %
$# PATCH 600 FOR PASCAL.XVI.0. CONTAINS 22 CARDS. DAPS DEC77 PATCHES.
$: PATCHES RECEIVED FROM D.LANGMYHR AND TRANSPOSED FROM COSY FORMAT BY
$: DAVID A COOPER. FEBRUARY 1978.
$:
    IF(F1 NEQ SET OR RT NEQ EMPTYSET) %
        AND %
        (F2 NEQ SET OR LT NEQ EMPTYSET) THEN %
            IF(F1 NEQ POINTERS OR RT NEQ NILTYPE) %
                AND %
                (F2 NEQ POINTERS OR LT NEQ NILTYPE) THEN %
                    BEGIN ERROR(63); %
$
        GEN("PREAD(",6,2); WRITEEXPR; GEN("",1,7); %
$
$
        GENID("F",FILEID,5); GEN("",1,7); %
        IF F=NUMERIC THEN %
            BEGIN %
                GEN("",1,7); GENINT(TYPETAB2[CURTYPE]); %
                GEN("",1,7); GENINT(TYPETAB3[CURTYPE]); %
            END ELSE GEN(",0,0",4,4); %
$
        SET VOIDT
$
        POP VOIDT
    IF NAMTAB.IDCLASS=FUNC THEN GEN("FUNCTN",7,2) %
        ELSE GEN("PROCEDU",8,1); %
    IF FOUND AND (THISID.IDCLASS=PROC OR THISID.IDCLASS=FUNC) THEN
$#PATCH 601 FOR PASCAL.XVI.0.CONTAINS 147 CARDS. EXTENDE SET MODS.
$: PATCHES RECEIVED FROM D.LANGMYHR AND TRANSPOSED FROM COSY FORMAT BY
$: DAVID A COOPER. FEBRUARY 1978.
$: THIS PATCH MODIFIES THE SET HANDLING ROUTINES TO ALLOW SETS OF 0..93
$: ELEMENTS.
$: NB. THE RUN TIME SYSTEM MUST BE CHANGED ACCORDINGLY.....
$:
$
%
%
PROCEDURE SPLIT(SPLITINX,WIDTH); %
VALUE SPLITINX, WIDTH; %
INTEGER SPLITINX, WIDTH ; %
BEGIN %
    INTEGER I; %
%
    IF NUMSYMS+WIDTH LEQ MAXSYMS THEN %
        BEGIN %
            FOR I:=NUMSYMS STEP -1 UNTIL SPLITINX DO %
                SYMTAB[I+WIDTH] := SYMTAB[I]; %
            FOR I:=1 STEP 1 UNTIL WIDTH DO %
                SYMTAB[SPLITINX+I-1] := "3000000"; %
            NUMSYMS := NUMSYMS + WIDTH; %
        END %
    ELSE
        BEGIN %
            ERROR(63); %
            NUMSYMS := 1; %
        END; %
END OF SPLIT; %
%

```

```

90120500
20813000
20813050
20813100
20814000
20814050
20814100
40023000
50059000
50079000
50080000
50081000
50082000
50086010
50086050
50086100
50086150
50086200
50088000
50093000
80037000
80038000
80548000
40052050
40052055
40052100
40052150
40052200
40052250
40052300
40052350
40052400
40052450
40052500
40052550
40052600
40052650
40052700
40052750
40052800
40052830
40052860
40052890
40052900
40052950
40052960

```



```

IF SPLITTED THEN PUTSYM(")"); % 40551500
IF CURSY=COMMA THEN % 40552000
BEGIN % 40552200
    SPLIT(STARTSYM,1); SYMTAB[STARTSYM] := "SUNIO("; % 40552400
    PUTSYM(","); % 40552600
    SPLITTED := TRUE; % 40552800
END; % 40552850
NEWTYP; T1 := SET; T1.SIZE := 2; T1.STRUCT := 0; % 40558000
CURMODE := NUMBER; % 40561000
IF CURTYPE=BOOLTYPE THEN % 40587000
IF CURSY NEQ ANDSY THEN ERROR(64); 40593000
END ELSE % 40593100
IF F=SET THEN % 40593200
BEGIN % 40593300
    IF CURSY=ASTERISK THEN % 40593400
    BEGIN % 40593500
        SPLIT(STARTSYM,1); SYMTAB[STARTSYM] := "SINTS("; % 40593600
        PUTSYM(","); % 40593700
    END ELSE ERROR(64); % 40593800
    MODE := NUMBER; % 40593900
    IF F=SET THEN PUTSYM(")"); % 40608500
    SPLIT(STARTSYM,1); % 40650000
    IF CURSY=PLUS THEN SYMTAB[STARTSYM] := "SUNIO(" ELSE % 40651000
    IF CURSY=MINUS THEN SYMTAB[STARTSYM] := "SDIFF(" ELSE % 40652000
    ERROR(64); % 40653000
    PUTSYM(","); MODE := NUMBER; % 40654000
$ 40655000
IF F=SET THEN PUTSYM(")"); % 40668500
$ 40688000
    IF CURSY=EQLSY THEN SYMTAB[STARTSYM] := "SEQUA(" % 40713000
    ELSE % 40713150
    IF CURSY=NEQSY THEN % 40713300
    BEGIN % 40714000
        SPLIT(STARTSYM,1); SYMTAB[STARTSYM] := " NOT "; % 40714150
        SYMTAB[STARTSYM+1] := "SEQUA("; % 40714300
    IF TYPETAB1[LEFTTYPE].FORM=SET THEN % 60080100
    BEGIN % 60080200
        SYMTAB[1] := "SSTOR("; NUMSYMS := NUMSYMS - 3; % 60080300
        EXPRESSION; % 60080400
        PUTSYM(")"); CHECKTYPES(LEFTTYPE,CURTYPE); % 60080500
        WRITEEXPR; % 60080600
    END ELSE % 60080700
    IF TYPETAB2[TX] LSS 0 OR TYPETAB3[TX] GTR 93 THEN ERROR(51); 70210000
    T1.SIZE := TSIZE := 2; TYPETAB1[TYPEINDEX] := T1; % 70214000
    IF T1.FORM=SET THEN % 80046200
    BEGIN % 80046400
        GEN(",",1,7); GENID("W",LEVEL1000+NAM,5); % 80046600
    END; % 80046800
    IF T1.FORM=SET THEN % 80064700
    BEGIN % 80064750
        GEN(",0",2,6); % 80064800
        IF NOT PARAM THEN GEN(":1",2,6); % 80064850
    END; % 80064900
    BEGIN % 80608105
    IF T1.FORM=SET THEN % 80608111
    BEGIN % 80608113
        GEN(",",1,7); % 80608115

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```

GENID("W",1000*(CURLEVEL+1)+NAM,5); % 80608117
END; 80608118
END; % 80608119
IF TYPETAB1[NAMETAB3[CURLEVEL+1,PARAMTAB[I],PARAMNAME],TYPE 80627200
] .FORM=SET 80627205
THEN BEGIN % 80627400
GEN(", ",1,7); % 80627600
GENID("W",1000*(CURLEVEL+1)+PARAMTAB[I],PARAMNAME 80627800
,5); % 80627801
END; 80627850
$#PATCH 602 FOR PASCAL XVI./ CONTAINS 5 CARDS. CORRECT REPRESENTATION OF "NIL".
$! RECEIVED FROM DAG LANGHYMR ON 6/07/78.
$! DAVID A COOPER , HERIOT-WATT UNIVERSITY... JULY 1978.
NILTYPE := 6; %*** TYPE OF "NIL" *** 20363000
T1.FORM := POINTERS; TYPETAB1[6] := T1; 20364000
EMPTYSET := 7; % 20364500
T1.FORM := SET; TYPETAB1[7] := T1; 20365000
NUMTYPES := 7; % 20365500
$# PATCH 603 FOR PASCAL.XVI.O. CONTAINS 6 CARDS. CORRECTION TO PATCH 601
$! DAVID A COOPER & S O ANDERSON, HERIOT-WATT UNIVERSITY. UST AUGUST 1978
$!
INTEGER STARTSYM,FIRSTSYM,MODE,TYPE1,F; 40618000
PUTDUMMY; STARTSYM := FIRSTSYM := NUMSYMS; 40621000
SPLIT(FIRSTSYM,1); 40650000
IF CURSY = PLUS THEN SYMTAB[FIRSTSYM] := "SUNIO(" ELSE 40651000
IF CURSY = MINUS THEN SYMTAB[FIRSTSYM] := "SDIFF(" ELSE 40652000
ERROR(64); 40653000
$# PATCH 613 FOR PASCAL.XVI.O. CONTAINS 7 CARDS.
$ 40105100
$ 40105200
$ 40105300
$ 40105400
IF INSIDEPARENS AND SIMPLEVAR AND TYPETAB1[CURTYPE].STRUCT > 0 AND 40198500
TYPETAB1[CURTYPE].FORM < FILES THEN SYMTAB[STARTSYM],[35:6] := 40198600
"H"; 40198700
$# PATCH 700 FOR PASCAL.XVI.O HAS 179 CARDS. REDUCE THRASHING BY CODE CHANGE
$! TO IMPROVE RUN TIME EFFICIENCY BY REARRANGING THE THE COMPILERS CODE.
$! THE COMPILER HAD A HIGH OVERLAY I/O TIME AND HIGH ELAPSED TIME IN RELATION
$! TO THE PROCESS TIME, AND OBSERVATION OF THE B5700 CONFIRMED THAT IT WAS
$! THRASHING IN 32K. THIS PATCH ATTEMPTS TO REDUCE THE CORE REQUIREMENT BY
$! REARRANGING THE SEGMENTATION OF THE CODE. LARGE SEGMENTS ARE ELIMINATED
$! SO AS TO AVOID PULLING CODE THAT WILL NOT BE EXECUTED INTO CORE AND TO
$! RELEASE CODE SEGMENTS AS SOON AS EXECUTION HAS PASSED. FOR EXAMPLE, THE
$! CROSS REFERENCE ROUTINES WERE ALL CONTAINED IN THE LARGE OUTER BLOCK CODE
$! SEGMENT WHICH INCLUDED VARIOUS UTILITY ROUTINES.
$! A FEATURE WHICH CONTRIBUTED SIGNIFICANTLY TO LARGE SEGMENTS WAS THE HIGH
$! NUMBER OF "DEFINES" WHICH RESULTED IN SIZEABLE SECTIONS OF CODE BEING
$! GENERATED IN-LINE, SOMETIMES MANY TIMES IN ONE SEGMENT. THESE "DEFINES"
$! WERE REABLY CHANGED INTO PROCEDURES. (A SIDE EFFECT OF VIRTUALLY ELIMINATING
$! DEFINES FOR CODE IS THAT THE "BEND" OPTION NO LONGER RESULTS IN NUMEROUS
$! BLANK LINES REPEATING THE SAME SEQUENCE NUMBER FOR EVERY "END" IN THE NESTED
$! DEFINES.)
$! NILS A OTTE, UNIVERSITY OF NATAL, DURBAN. AUG - NOV 1977.
$!
$ 10167000
$ 10168000
$ 10169000

```

VALUE	NAME1,NAME2, TABLE,DECL;	20016000
REAL	NAME1,NAME2;	20017000
INTEGER	TABLE; BOOLEAN DECL;	20018000
FORWARD;		20019000
PROCEDURE PRINTERRORS;	FORWARD;	20020000
PROCEDURE HEADING;	*** PRINTS A HEADING AT START OF NEW PAGE,	20026000
BEGIN	DEFINE NEWSEGMENT = HERE #;	20027000
END OF HEADING;		20033000
PROCEDURE PRINTLINE;	*** PRINTS A PASCAL SOURCE CODE LINE	20036000
BEGIN	DEFINE NEWSEGMENT = HERE #;	20037000
END OF PRINTLINE;		20047000
PROCEDURE NEWCARD;	*** READS A NEW PASCAL SOURCE CODE CARD	20050000
BEGIN	DEFINE RESULT = ICARD[+], ETC #;	20051000
	REPLACE XLINPNT BY " " FOR 16 WORDS;	20056000
	REPLACE LINEPNT BY CARDPNT FOR 10 WORDS, XLINPNT FOR 6 WORDS;	20057000
END OF NEWCARD;		20061000
DEFINE GEN(GEN1,GEN2,GEN3) = GENI(TRUE,GEN1,GEN3,GEN2) #;		20063100
GENID(GENID1,GENID2,GENID3) = GENI(FALSE,GENID1,GENID2,GENID3) #;		20063200
		20063300
PROCEDURE GENI(GENT, TXT, NUM, N);		20063400
VALUE GENT, TXT, NUM, N;		20063500
BOOLEAN GENT; ALPHA TXT; INTEGER NUM, N;		20063600
BEGIN	DEFINE START = NUM #, NDIG = N #;	20063700
		20063800
IF GENT THEN	*** GENERATE A TEXT "TXT", CONSISTING OF	20064000
TEXT[0] := TXT;		20067000
END		20070000
ELSE	*** GENERATE AN ALGOL IDENTIFIER.	20073000
CH[0] := TXT;		20076000
END END GENI;		20079000
PROCEDURE GENINT(N);		20082000
VALUE N; INTEGER N;		20083000
BEGIN	DEFINE RESULT = ALGOL CODE #;	20084000
INTEGER NABS, NSIZE;		20085000
END OF GENINT;		20097000
PROCEDURE WRITEALGOL;	*** WRITES A COMPLETED ALGOL CARD TO	20145000
DEFINE NEWSEGMENT = HERE #;		20146100
DEFINE NEWSEGMENT = HERE #;		20168100
DEFINE NEWSEGMENT = HERE #;		20180100
DEFINE NEWSEGMENT = HERE #;		20193100
ALPHA THISID, CURNAME1, CURNAME2;	% USED IN SCANNER	20205000
PROCEDURE SEARCHTAB(TAB);	*** SEARCH NAME TABLE "TAB" FOR THE	20208000
VALUE TAB; INTEGER TAB;	*** IDENTIFIER JUST READ.	20208100
END OF SEARCHTAB;		20221000
PROCEDURE SEARCH;	*** SEARCH ALL TABLES CURRENTLY IN USE.	20223000
BEGIN	DEFINE RESULT = THISID #;	20224000
END OF SEARCH;		20233000
PROCEDURE NEWNAME(NAME1,NAME2, TAB);		20236000
VALUE NAME1, NAME2, TAB;		20236100
ALPHA NAME1, NAME2; INTEGER TAB;		20236200
END OF NEWNAME;		20250000
DEFINE NEWSEGMENT = HERE #;		20515100
DEFINE NEWSEGMENT = HERE #;		20533100
DEFINE NEWSEGMENT = HERE #;		20546100
PROCEDURE CHECKTYPES(LEFTTYPE, RIGHTTYPE);		20802000
VALUE LEFTTYPE, RIGHTTYPE; INTEGER LEFTTYPE, RIGHTTYPE;		20803000
BEGIN		20804000

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REAL TT1, TT2; INTEGER F1, F2, LT, RT; 20805000
END OF CHECKTYPES; 20838000
PROCEDURE FILEPARAM( DEFAULTFILE );  *** CHECKS THE FIRST PARAMETER 20844000
VALUE DEFAULTFILE; INTEGER DEFAULTFILE; *** TO SEE IF IT IS A FILE. 20844100
BEGIN DEFINE RESULTS = FILENAME & LPARFOUND #; 20845000
END OF FILEPARAM; 20869000
REAL CURVAL; INTEGER CURLLENGTH; 20872000
PROCEDURE CONSTANT( CVAL, CTYPE ); 20873000
REAL CVAL; INTEGER CTYPE; 20874000
BEGIN 20875000
INTEGER TFORM; BOOLEAN SIGNED, NEGATIVE; 20876000
END OF CONSTANT; 20876100
$ 20921000
ALPHA C, CX;  *( CURNAME1 & CURNAME2 MOVED TO 20205000 ) 30082000
INTEGER LASTCHARPOS;  *( CURVAL, CURLLENGTH MOVED TO 20872000 ) 30083000
PROCEDURE INSYMBOL;  *** IDENTIFIES THE NEXT SYMBOL ***** 30084000
BEGIN 30087000
PROCEDURE NEXTCHAR;  *** GETS THE NEXT CHARACTER. 30087100
END OF NEXTCHAR; 30087200
$ 30088000
$ SET VOIDT 30093000
$ POP VOIDT 30095000
DEFINE T1 = EXP #;  * USED AT 30178000 30098000
BEGIN DEFINE NEWSEGMENT = HERE #; 30099100
END NEWSEGMENT; 30261100
$ 30282200
$ 40016000
$ 40017000
INTEGER EXPRLEVEL; 40018000
DEFINE PUTSYM(S) = PUTTEXT( (S)&1[41:5:6] ) #; 40029000
$ 40029900
$ SET VOIDT 40033000
$ POP VOIDT 40041000
DEFINE PUTDUMMY = PUTTEXT("3000000") #; 40042000
$ SET VOIDT 40044000
$ POP VOIDT 40053000
PROCEDURE WRITEEXPR;  *** WRITE GENERATED ALGOL EXPRESSION 40054100
REAL SX; INTEGER T1, TX; 40066000
END OF WRITEEXPR; 40069000
PROCEDURE CHECKEXPR( LLIM, ULIM );  *** WRITE CODE TO CHECK VALUE 40069100
VALUE LLIM, ULIM; INTEGER LLIM, ULIM; 40070000
BEGIN DEFINE CHECK = VALUE #; 40077000
END OF CHECKEXPR; 40086100
INTEGER T1, T5;  * USED ONCE EACH 40094000
T1:=T.FIRSTWITHSYM; T5:=T.LASTWITHSYM; 40095000
FOR T1:=T1 STEP 1 UNTIL T5 DO PUTTEXT(WITHTAB[T1]); 40298000
DEFINE T1 = T #;  * USED AT 40558000 40299000
$ SET VOIDT 40309000
$ POP VOIDT 40331000
PROCEDURE PARAMETER;  *** CHECK THAT THE FUNCTION HAS 1 PARAM. 40332000
BEGIN 40333000
INSYMBOL; 40334000
IF CURSY=LPAR 40335000
THEN BEGIN 40336000
PUTSYM("("); INSYMBOL; EXPRESSION; 40337000
IF TYPETAB1[CURTYPE].FORM=NUMERIC THEN CURTYPE:=INTTYPE; 40338000
IF CURSY≠RPAR THEN BEGIN ERROR(3); SKIP(RPAR) END; 40339000

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        PUTSYM(")"); IF CURSY=RPAR THEN INSYMBOL;          40340000
    END ELSE ERROR(3); % OR ERROR(58)                    40341000
    END OF PARAMETER;                                    40342000
$                                                       40350000
    BEGIN LABEL LABFOUND;                                60396000
        THISID.IDCLASS=CONST AND BOOLEAN(THISID.FORMAL) OR 60399000
        THISID.IDCLASS=FUNC                              60423000
    THEN ASSIGNMENT ELSE                                60423200
                                                       60424000
$                                                       70013000
$                                                       70016000
    VALUE RECTAB,FIRSTADDR; SET VOIDT                   70018000
    INTEGER RECTAB,FIRSTADDR, LASTADDR; POP VOIDT       70019000
$                                                       70022000
$                                                       70034000
    SET VOIDT                                           70035000
    POP VOIDT                                           70036000
PROCEDURE TYPEDECL( TTYPE, TSIZE ); %***** TYPE DECLARATION ***** 70037000
    INTEGER TTYPE, TSIZE; %*****
    BEGIN                                               70038000
        INTEGER RECINX, ARRSTRUCT, TX, SX, T, N; REAL T1, T2, T3; 70039000
        BOOLEAN FIRST, PACKED;                          70040000
                                                       70041000
$                                                       70042000
    END TYPERR;                                         70048000
    PROCEDURE SUBRANGE; %*** SUBRANGE DECLARATION *** 70050000
    BEGIN %*****
        REAL VALX1, VALX2, T1;                          70051000
        INTEGER TYPEX1, TYPEX2;                          70052000
                                                       70053000
        CONSTANT(VALX1,TYPEX1);                          70054000
        IF TYPETAB1[TYPEX1].FORM>CHAR THEN ERROR(11); 70055000
        IF CURSY≠DOUBLEDOT THEN ERROR(53);              70056000
        INSYMBOL;                                        70057000
        CONSTANT(VALX2,TYPEX2);                          70058000
        IF TYPEX1>0 AND TYPEX2>0 THEN                   70059000
            IF TYPEX1≠TYPEX2 THEN ERROR(11) ELSE        70060000
            IF VALX1>VALX2 THEN ERROR(54);              70061000
            IF (T1:=TYPETAB1[TYPEX1].FORM) = SYMBOLIC THEN T1:=SUBTYPE; 70062000
            NEWTYPE; TTYPE:=TYPEINDEX;                  70063000
            T1.SIZE:=TSIZE:=1; T1.STRUCT:=0; T1.MAINTYPE:=TYPEX1; 70064000
            TYPETAB1[TYPEINDEX]:=T1;                    70065000
            TYPETAB2[TYPEINDEX]:=VALX1; TYPETAB3[TYPEINDEX]:=VALX2; 70066000
        END OF SUBRANGE;                                70067000
                                                       70068000
        DEFINE DEC = POINTER #;                          70069000
        DEFINE DEC = ARRAY #;                            70117100
        DEFINE DEC = FILE #;                             70143100
        DEFINE DEC = SET #;                              70180100
        DEFINE DEC = RECORD #;                           70200100
        DEFINE DEC = VARIANT #;                          70220100
        DEFINE DEC = FILE #;                             70247000
        DEFINE DEC = LABEL #;                            70285100
        DEFINE DEC = CONST #;                            70285200
        LABEL CASEPART, EXIT;                            70349100
        BEGIN                                           80066100
        LABEL CASETYPEID;                                80107000
        END;                                             80424100
        GEN(""/",2,6);                                  80447100
        DEFINE DEC = LABEL #;
        DEFINE DEC = CONST #;

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DEFINE DEC = TYPE #;          80475100
DEFINE DEC = VAR #;          80496100
IF CURSY=FUNCSY OR CURSY=PROCSY % 80540900
THEN BEGIN                   DEFINE DEC = CODE #; 80540910
END OF SEGMENT FOR PROCEDURE DECLARATIONS; 80658100
$# PATCH 701 FOR PASCAL.XVI.0 CONTAINS 14 CARDS. REDUCE THRASHING BY ARRAY CUTS
$: TO IMPROVE RUN TIME EFFICIENCY BY REDUCING ARRAY SIZES. THE MOST SIGNIFICANT
$: CONTRIBUTION TO THE COMPILERS THRASHING BEHAVIOUR WAS THE EXCESSIVELY LARGE
$: DATA ARRAYS. THIS PATCH SUCCEEDS IN DRASTICALLY REDUCING THE CORE REQUIREMENT
$: OF THE COMPILER BY MAKING MOST OF THE LARGE ARRAYS MUCH SMALLER WITHOUT
$: IMPOSING UNREASONABLE RESTRICTIONS. IN PARTICULAR, THE THREE ARRAYS,
$: NAMETAB1, NAMETAB2, NAMETAB3 WERE EACH [0:50, 0:1022], AND HAVE BEEN REDUCED
$: TO [0:30, 0:307]. THESE REDUCTIONS HAVE NOT PREVENTED THE COMPILATION OF
$: A LARGE PASCAL PROGRAM OF ABOUT 4000 LINES, NAMELY THE P4 PASCAL COMPILER
$: FROM ZURICH. IN FACT, PRIOR TO THE CHANGES INTRODUCED BY PATCHES 700 & 701,
$: THE P4 PASCAL COMPILER TOOK 60 MINUTES ELAPSED TIME TO COMPILE, WHICH WAS
$: REDUCED TO 9 MINUTES BY THESE PATCHES, WHILE THE PROCESS TIME HAS REMAINED
$: CONSTANT AT 9 MINUTES.
$:*:*:* NOTE THAT IF "MAXNAMES" IS CHANGED THEN THERE ARE 7 DEFINES IN THE FILE
$: PASCAL/PRELUDE THAT MUST ALSO BE CHANGED.
$: "MAXNAMES" IS CHOSEN AS A PRIME NUMBER AS IT IS USED AS A MODULUS FOR A HASH
$: FUNCTION. THE PASCAL IDENTIFIERS ARE TRANSLATED TO ALGOL NAMES USING LEVEL
$: AND HASH INDEX. HENCE CHANGING "MAXNAMES" CHANGES THE ALGOL NAMES FOR
$: "INPUT", "OUTPUT", & "PRT25".
$: NILS A OTTE, UNIVERSITY OF NATAL, DURBAN. AUG - NOV 1977.
$:
DEFINE MAXTABLES = 30 #, %MAX NUMBER OF LEVELS IN IDENTIFIER TABLE.10042000
MAXNAMES =307 #, %MAX NAMES IN EACH ROW OF IDENTIFIER TABLE.10043000
% ONLY USED IN WITH STATEMENT TO TEST 10044001
MAXCASES =64 #, %MAX LABELS IN A CASE-STATEMENT. 10045000
MAXLABS =50 #, %MAX NUMBER OF LABELS IN PROGRAM. 10046000
MAXPARAMS =200 #, %MAX NUMBER OF PARAMETERS IN WHOLE PROGRAM.10047000
MAXTYPES =250 #, %MAX NUMBER OF DIFFERENT TYPES. 10048000
MAXCONSTS =100 #, %SIZE OF TABLE FOR CONSTANTS. 10049000
MAXWITHSYMS= 70 #, %MAX NUMBER OF SYMBOLS USED BY WITH-STATMS.10051000
MAXSYMS =200 #, %MAX NUMBER OF SYMBOLS IN ONE EXPRESSION. 10052000
LISTLENGTH =100 #, %MAX LENGTH OF VAR & PARAM LISTS. 10053000
MAXEXTFILES=10 #, %MAX NUMBER OF EXTERNAL FILES. 10054000
MAXFILES =10 #, %MAX NUMBER OF FILES DECLARED AT ONE TIME. 10055000
MAXPNTRS =10 #, %MAX NUMBER OF UNDECLARED POINTERS (FORWD).10056000
$# PATCH 702 FOR PASCAL.XVI.0 CONTAINS 4 CARDS. BOOLEAN ARRAY "ERR" 120 TO 4
$: TO EXTEND THE REDUCTIONS OF PATCH 701 TO THE BOOLEAN ARRAY "ERR" FOR NOTING
$: THE SYNTAX ERRORS THAT HAVE OCCURRED. THIS PATCH COMPRESSES THE ARRAY FROM
$: 120 WORDS TO 4 WORDS BY USING 32 BITS IN EACH WORD.
$: IN ADDITION, THIS PATCH INSERTS THE ERROR COUNT ON THE LEFT OF THE LINE
$: WHICH REPORTS THE SYNTAX ERRORS.
$: NILS A OTTE, UNIVERSITY OF NATAL, DURBAN. AUG - NOV 1977.
$:
ARRAY ERRP[0:3]; % HOLDS 128 BITS % RECORDS ERROR MESSAGES USED, 10156000
DEFINE ERR[ERR1] = BOOLEAN(O&ERRP[ERR1,[6:2]][0:ERR1,[4:5]:1]) #; 10156100
ERRP[ERRNUM,[6:2]]:=ERRP[ERRNUM,[6:2]] & 1[ERRNUM,[4:5]:0:1]; 20182000
REPLACE POINTER(ERRLINE[0])+4 BY NUMERRS FOR 4 DIGITS; 20194900
$# PATCH 703 FOR PASCAL.XVI.0 CONTAINS 6 CARDS. REDUCE THRASHING BY SAVE CORE
$: TO IMPROVE RUN-TIME EFFICIENCY BY REDUCING NON-OVERLAYABLE AREAS.
$: THIS PATCH REDUCES THE SAVE CORE REQUIREMENTS BY DECREASING THE FILE BLOCK
$: SIZES AND ALSO THE NUMBER OF BUFFERS WITHOUT UNDULY RETARDING THE COMPILATION
$: SPEED. THE SIZE OF THE DISK AREAS IS KEPT A MULTIPLE OF THE ORIGINAL BLOCK

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$: SIZE WHERE RELEVANT TO AVOID INCOMPATIBILITY PROBLEMS, COMPARABLE REDUCTIONS
$: IN BLOCK SIZES OF THE OBJECT PROGRAM ARE ALSO MADE.
$: NILS A OTTE, UNIVERSITY OF NATAL, DURBAN. AUG - NOV 1977.
$:
FILE CARD "SOURCE" (1,10,30); % PASCAL SOURCE CODE INPUT FILE 10035000
FILE PASCALGOL DISK SERIAL [20:300] (1,10,30,SAVE 0); % ALGOL CODE FILE10037000
FILE XREFFILE DISK SERIAL [20:3000] (1,3,30); % FOR CROSS REFERENCE 10137000
IF RECSIZE=1 OR RECSIZE=10 THEN GENINT(30) 80119000
GEN(",SAVE",6,3); 80122000
GEN("30");", 4,4); 80123000
$# PATCH 704 FOR PASCAL.XVI.0 HAS 8 CARDS. REDUCE OVERHEADS IN COPYING FILE
$: TO REDUCE THE COMPILER=S OVERHEADS, FIRSTLY, THE ALGOL CODE FILE
$: PASCAL/DISK IS RENAMED PASCAL/PRELUDE. ORIGINALLY, THE COMPILER COPIED
$: THE PASCAL/PRELUDE FILE INTO THE GENERATED CODE FILE BEFORE STARTING TO
$: TRANSLATE THE PASCAL PROGRAM. THIS PATCH SAVES THE 3 SECONDS OR SO REQUIRED
$: FOR THIS BY SETTING THE "TAPE" OPTION FOR THE ALGOL COMPILER AND LABEL
$: EQUATING THE TAPE FILE TO PASCAL/PRELUDE. THE OVERHEAD TO THE ALGOL COMPILER
$: IS NEGLIGIBLE. THE ADVANTAGE IS EVEN GREATER IF THE PROGRAM FAILS TO
$: COMPILE SYNTAX FREE. THE FILE PASCAL/PRELUDE IS NO LONGER REFERENCED
$: DIRECTLY IN THE PASCAL COMPILER.
$: SEE PATCH 711. THIS NEEDS PATCH 705.
$: NILS A OTTE, UNIVERSITY OF NATAL, DURBAN. AUG - NOV 1977.
$:
ERRORS (15," ERRORS DETECTED ",20("#") /), 10188000
ALIST ("S SET LIST "), 10189000
MERGE ("S SET TAPE RESET S" / 10190100
"$ RESET TAPE", T73,"99000000" ), 10190200
TERMMESS ("**** COMPILATION TERMINATED."); 10192000
WRITE(PASCALGOL,MERGE); % ALGOL MUST COMPILE PRELUDE FIRST 90022000
$ SET VOIDT 90023000
$ POP VOIDT 90032000
$: "; ALGOL FILE TAPE= PASCAL/PRELUDE SERIAL; ALGOL FILE CARD=", 90119000
$# PATCH 705 FOR PASCAL.XVI.0 CONTAINS 21 CARDS. GENERATE A BETTER ZIP
$: THIS PATCH TIDIES UP THE CODE THAT GENERATES THE ZIP TO PASS CONTROL TO THE
$: COMPATIBLE ALGOL COMPILER.
$: NILS A OTTE, UNIVERSITY OF NATAL, DURBAN. AUG - NOV 1977.
$:
$ 90013000
PROGRAMME := IF CURLLENGTH < 7 90042000
THEN " "&CURNAME1[41:6xCURLLENGTH-1:6xCURLLENGTH] 90042010
ELSE CURNAME2.[5:6]&CURNAME1[41:35:36]; 90042020
$: ARRAY ZIPARRAY[0:16]; 90092000
DEFINE PPROGRAMME = 13 #, PALGOLNAME = 14 #, 90095000
PLIBRARY = 15 #, PUSER = 16 #, 90096000
P(P1) = POINTER(ZIPARRAY[P1])+1 FOR 7 #; 90097000
$ SET VOIDT 90098000
$ POP VOIDT 90104000
$ 90109000
ZIPARRAY[PPROGRAMME]:=PROGRAMME; ZIPARRAY[PALGOLNAME]:=ALGOLNAME; 90112000
ZIPARRAY[PLIBRARY]:= IF SAVEFACTOR>0 THEN "LIBRARY" ELSE 90113000
IF SAVEFACTOR<0 THEN " SYNTAX" ELSE " & RUN "; 90114000
ZIPARRAY[PUSER]:=USER; 90115000
REPLACE POINTER(ZIPARRAY[*]) BY "CC COMPILE ", 90116000
P(PPROGRAMME), "/", P(PUSER), 90117000
" XALGOL ", P(PLIBRARY), 90118000
"; ALGOL FILE TAPE= PASCAL/PRELUDE SERIAL; ALGOL FILE CARD=", 90119000
P(PALGOLNAME), "/", P(PUSER), " SERIAL; END."; 90120000

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$ SET VOIDT 90121000
$ POP VOIDT 90128000
$# PATCH 708 FOR PASCAL.XVI.0 CONTAINS 25 CARDS. LINE PRINT FILE MAY BE DISK
$: TO ENABLE THE COMPILER-S PRINT FILE TO BE LABEL EQUATED TO DISK AS FOR OTHER
$: B5700 COMPILERS, IN PARTICULAR, THIS PATCH CHANGES THE NAME TO LINE TO BE
$: CONSISTENT WITH ALL THE SYSTEM COMPILERS. THE ABILITY TO LABEL EQUATE FILE
$: "LINE" TO DISK IS NECESSARY IF THE COMPILER IS TO BE USED FROM A TERMINAL.
$: NOTE THAT A BLOCKED FILE SHOULD NOT HAVE VARIABLE LENGTH RECORDS IF IT IS
$: TO BE LABEL EQUATED TO A PRINTER. IF LESS THAN THE MAX NUMBER OF WORDS PER
$: RECORD IS WRITTEN, THE BALANCE OF THE RECORD REMAINS UNCHANGED FROM WHAT WAS
$: LAST IN THE FILE BUFFER, SO THAT ON BEING PRINTED, "GARBAGE" APPEARS AT THE
$: END OF SUCH LINES.
$: NILS A OTTE, UNIVERSITY OF NATAL, DURBAN. AUG - NOV 1977.
$:
$: SAVE FILE OUT LINE DISK SERIAL [20:1200] (1,17,90,SAVE 1); % PRINT FILE 10036000
% AVOID BLOCKING RECORDS OF VARIABLE LENGTH 10036001
ARRAY ICARD, ALGOLGARD[0:9], LINES, XLINE[0:16]; 10130000
% AVOID BLOCKING VARIABLE LENGTH RECORDS 10130001
ARRAY HEADTEXT, ERRLINE[0:16]; 10133000
WRITE( LINE[NO],17,XLINE[*]); 20042000
WRITE( LINE[NO],17,XLINE[*]); 20043000
WRITE(LINE, 17,LINES[*]); 20045000
WRITE(LINE, 17,ERRLINE[*]); 20195000
LINEPNT :=POINTER(LINES[1]); 20315000
REPLACE LINEPNT-8 BY " " FOR 17 WORDS; 20317000
REPLACE XLINEPNT-8 BY LINEPNT-8 FOR 17 WORDS; 20318000
REPLACE POINTER(ERRLINE[*]) BY "**** ", LINEPNT FOR 16 WORDS; 20319000
REPLACE ALGOLPNT BY LINEPNT FOR 9 WORDS; 20321000
REPLACE POINTER(HEADTEXT[*]) BY LINEPNT FOR 10 WORDS, "PAGE 1 ", 20326000
LINEPNT FOR 6 WORDS; 20326100
WRITE(LINE, 17,XREFLINE[*]); 20549000
LOCK( LINE, * ); % & CRUNCH 20550000
WRITE(LINE, 17,XREFLINE[*]); LINECNT:=LINECNT+1; 20560000
WRITE(LINE, 17,XREFLINE[*]); LINECNT:=LINECNT+1; 20571000
WRITE(LINE, TERMMESS); 90084000
WRITE(LINE, NOERRORS); 90111000
WRITE(LINE, ERRORS,NUMERRS); 91110000
WRITE(LINE, ERRORMESS1[I]); 91112000
WRITE(LINE, ERRORMESS2[I-60]); 91114000
$# PATCH 709 FOR PASCAL.XVI.0 CONTAINS 17 CARDS. NO PRINT IF NO LIST & NO ERRORS
$: TO OPEN THE PRINT FILE ONLY IF THE LIST OPTION IS SET OR IF SYNTAX ERRORS
$: ARE DETECTED. IF THE FIRST CARD IN THE PASCAL SOURCE RESETS THE LIST OPTION
$: (*$L= *) AND NO SYNTAX ERRORS ARE DETECTED, THEN THE PRINT FILE WILL NOT BE
$: CREATED (EVEN FOR THE HEADING) AS FOR OTHER COMPILERS. IN PARTICULAR, THIS
$: IMPLEMENTATION DOES NOT REQUIRE A TEST PRIOR TO PRINTING EACH LINE TO
$: DETERMINE WHETHER A HEADING HAS BEEN PRINTED. IT ONLY DOES THIS TEST WHEN
$: THE LIST OPTION IS SET AFTER THE FIRST CARD OR EXPLICITLY THEREAFTER, OR
$: IN THE "PRINTERRORS" ROUTINE.
$: NILS A OTTE, UNIVERSITY OF NATAL, DURBAN. AUG - NOV 1977.
$:
$: IF PAGECNT=1 THEN WRITE(LINE[NO],17,HEADTEXT[*]) ELSE 20029900
WRITE( LINE[PAGE]); 20030000
WRITE( LINE[DBL],17,HEADTEXT[*]); 20031000
IF NOT LISTOPTION THEN 20194000
BEGIN IF PAGECNT=0 THEN HEADING; PRINTLINE END; 20194100
REPLACE POINTER(HEADTEXT[*])+45 BY TEXTPNT+5 FOR 2, "/"; 20329000
TEXTPNT+1 FOR 2, "/", TEXTPNT+3 FOR 2; 20330000

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NEWCARD; LISTOPTION:=CHECKOPTION:=TRUE; % DEFAULT 20402100
INSYMBOL; % ANALYSING FIRST CARD MAY CHANGE DEFAULT LIST OPTN 20402200
IF LISTOPTION AND PAGECNT=0 THEN HEADING; % ON FIRST PAGE. 20402300
IF LISTOPTION THEN IF PAGECNT=0 THEN HEADING; % ON FIRST PAGE 30282100
C := " "; % TO INITIALIZE "INSYMBOL" 90034000
INITIALIZE; % COMPILER TABLES, NEWCARD, INSYMBOL 90035000
$
IF PAGECNT > 0 % THERE HAS BEEN SOME LISTING 90036000
THEN BEGIN WRITE( LINE[DBL] ); WRITE( LINE[DBL] ) END; 90088000
IF PAGECNT>0 THEN % THERE HAS BEEN LISTING 90110000
$# PATCH 710 FOR PASCAL.XVI.0 CONTAINS 4 CARDS. NO OVERPRINTING WITH BLANK LINE
$: TO PREVENT OVERPRINTING WITH BLANK LINES. IF THE OPTION FOR "BOLDFACE"
$: PRINTING OF RESERVED WORDS IS SET (*$R+ *) THEN EACH LINE IS CONSTRUCTED BY
$: 2 OVERPRINTS FOR THE RESERVED WORDS ONLY, THEN ONE PRINT OF THE FULL TEXT.
$: THE AIM OF THIS PATCH IS TO SKIP THE OVERPRINTING FOR ALL THOSE LINES IN
$: WHICH NO RESERVED WORDS OCCUR.
$: NILS A OTTE, UNIVERSITY OF NATAL, DURBAN. AUG - NOV 1977.
$:
DEFINE RESWORDPRESENT = RESWORDOPTION.[1:1] #; 10159100
IF REAL(RESWORDOPTION) = 3 THEN % RESERVED WORD IS PRESENT 20040000
RESWORDOPTION := RESWORDOPTION AND TRUE; % RESET RESWORDPRESENT 20057100
RESWORDOPTION := BOOLEAN(3); % SET RESWORDPRESENT BIT 30179000
$# PATCH 711 FOR PASCAL.XVI.0 CONTAINS 10 CARDS. PASCOO1/USERCODE UNIQUE NAME
$: TO GENERATE A UNIQUE FILE NAME IN THE DISK DIRECTORY. THIS PATCH CHANGES THE
$: METHOD FOR GENERATING A UNIQUE FILE NAME FOR THE ALGOL SOURCE CODE OUTPUT OF
$: THE COMPILER. FORMERLY, THIS WAS DONE USING THE TIME FUNCTION TO OBTAIN
$: SOME RANDOM DIGITS. THE METHOD USED IN PATCH/MERGE IS ADOPTED HERE, NAMELY
$: STARTING WITH THE PREFIX (MFID) "PASCOO1", A SEARCH IS PERFORMED TO DETERMINE
$: WHETHER SUCH A FILE NAME IS ALREADY CATALOGUED. IF SO, 1 IS ADDED AND THE
$: SEARCH REPEATED. IN ADDITION, THE FILE IS CREATED WITH A SAVE FACTOR
$: (RETENTION PERIOD) OF ZERO DAYS SO THAT A HALT-LOAD WILL REMOVE THE FILE
$: AUTOMATICALLY.
$: SEE PATCH 704.
$: NILS A OTTE, UNIVERSITY OF NATAL, DURBAN. AUG - NOV 1977.
$:
PROCEDURE SEARCHDISKDIRECTORY( F, A ); FILE F; ARRAY A[0]; 20222100
SEARCH( F, A[*] ); % END OF SEARCHDISKDIRECTORY; 20222200
20222300
CHARPNT := POINTER(CH[0])+7; CH[0] := " "; 20322000
CH[0] := "PASCOO0"; CHARPNT := POINTER(CH[0])+5; 90016000
PASCALGOL.FID := USER := TIME(-1); 90017000
DO BEGIN C:=C+1; REPLACE CHARPNT BY C FOR 3 DIGITS; 90018000
PASCALGOL.MFID := ALGOLNAME := CH[0]; 90019000
SEARCHDISKDIRECTORY( PASCALGOL, LINES[*] ); 90020000
END UNTIL LINES[0]=-1; % FILE NOT ON DISK 90021000
$# PATCH 712 FOR PASCAL.XVI.0 CONTAINS 2 CARDS. MARK PROCEDURE LEVELS IN MARGIN
$: PATCH TO MARK THE START AND END OF PROCEDURES AND FUNCTIONS BY ANNOTATING THE
$: MARGIN WITH THE SYMBOLS "+P" & "-P" FOLLOWED BY THE LEVEL NUMBER.
$: NILS A OTTE, UNIVERSITY OF NATAL, DURBAN. AUG - NOV 1977.
$:
MARGIN("+P",CURLEVEL); % MARK PROCEDURE LEVEL 80420100
MARGIN("-P",CURLEVEL); % MARK END OF PROCEDURE 80702100
$# PATCH 713 FOR PASCAL.XVI.0. CONTAINS 14 CARDS.CORRECTS ERROR MESSAGE ETC.
$: CORRECTS THE DOUBLE "NO ERRORS" MESSAGE AND THE OUTPUT OF HEADINGS
$: WHEN L1 IS SET AFTER L-.
$: ALSO CORRECTS THE SCANNING PROBLEM WHEN COMPILER OPTIONS ARE INCORRECT.
$: DAVID A COOPER, HERIOT-WATT UNIVERSITY ..... AUGUST 1978

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$!
  ERROR102MESS(//"102 *** WARNING ONLY, ILLEGAL COMPILER OPTION.")10188750
  , % 10188751
  IF ERRNUM=100 OR ERRNUM=102 20181600
  THEN NUMERRS := NUMERRS + 1; %*ERROR NUMBER 102 IS ONLY AN ILLEGAL 20181610
% * DOLLAR OPTION WARNING & 20181620
% *ERROR NUMBER 100 ALONE SHOULD NOT 20181650
  ELSE LISTOPTION := C="+ " ELSE 30265000
  END 30280800
  ELSE ERROR(102); 30280810
  IF ERR(102) THEN 90090710
  WRITE(LINE,ERROR102MESS); 90090720
$ 90110000
$ 90111000
  ("102 ***WARNING ONLY, ILLEGAL DOLLAR OPTION."), 91106900
$# PATCH 800 FOR PASCAL.XVI.0.CONTAINS 10 CARDS.
$: TO REMOVE CONFLICTS BETWEEN HERIQT=WATT & NATAL EXISTING PATCHES.
$!
  MAXSYMS = 800#; %MAX NUMBER OF SYMBOLS IN ONE EXPRESSION. 10052000
  MAXPNTRS = 25#; %MAX NUMBER OF UNDECLARED POINTERS(FORWD). 10056000
  DEFINE ERR(ERR1) = BOOLEAN(O&ERRP[(ERR1).[6:2]][0:((ERR1).[4:5]):1])#; 10156100
  INTEGER EXPRLEVEL, EXPINVARCNT; % 40018000
  INTEGER INDEX, CTYPE, NUMFORWARDS, TX, I; % 80403000
  INTEGER PROGNAMELENGTH; % 90013900
  IF ERR(100) % 90090600
  "; ALGOL FILE TAPE=PASCAL/DISK SERIAL; ALGOL FILE CARD=", 90119000
  P(PALGOLNAME),"/",P(PUSER)," SERIAL;"; % 90120000
  " XALGOL STACK = 2048; END."; % 90120500
$# PATCH 998 FOR PASCAL.XVI.0 CONTAINS 10 CARDS. INSERT PAGE THROWS AT DESIRED
$: PATCH TO INSERT PAGE THROWS AT DESIRED POINTS IN THE SOURCE TO PRODUCE A
$: NICELY LAID OUT LISTING.
$!
$ PAGE 19000000
$ PAGE 20290000
$ PAGE 29000000
$ PAGE 39000000
$ PAGE 49000000
$ PAGE 59000000
$ PAGE 69000000
$ PAGE 79000000
$ PAGE 89000000
$ PAGE 90070999
$: NILS A OTTE, UNIVERSITY OF NATAL, DURBAN. AUG - NOV 1977.
$!
$# PATCH 999 FOR PASCAL.XVI.0. CONTAINS 1 CARDS. VERSION NUMBER.
$!
  DEFINE EDITION = "4.4"#;%AUGUST 1978...DAVID A COOPER... 10028000

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LABEL 00000000LINE 00178299CC EX 0/R;COMMON=1;FILE LINE=LINE PRINT;FILE S=PATCHES/PASCAL;END+

0 /R