# Burroughs

# B 6700

## SYSTEM SOFTWARE IMPROVEMENTS
## D NOTE DOCUMENTATION

### (RELATIVE TO MARK 2.5 RELEASE)

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# NEW FEATURES AND DOCUMENTATION CHANGES

## ALGOL

### D0300 ALGOL - VERSION DOLLAR OPTION - 04-23-73

THIS PATCH IMPLEMENTS THE FOLLOWING ADDITIONAL SYNTAX FOR THE VERSION DOLLAR OPTION:

<OPTION CONTROL CARD>::=

$SET VERSION<VERSION INCREMENT>.<CYCLE INCREMENT><PATCH NUMBER>

WHERE

<VERSION INCREMENT>::= + <INTEGER>
<CYCLE INCREMENT>::= + <INTEGER>
<PATCH NUMBER>::= <EMPTY> / .<3 DIGIT INTEGER>

IF VERSION INCREMENT AND CYCLE INCREMENT APPEAR ON THE VERSION CARD THEN THOSE INCREMENTS WILL BE ADDED TO THE VERSION ON THE SYMBOLIC. IF NO VERSION CARD APPEARS IN THE SYMBOLIC THE INCREMENTS VALUES WILL BE USED TO APPEND TO THE CARD IMAGES.

IF THE PATCH NUMBER APPEARS ON THE VERSION CARD IT WILL UPDATE THE SYMBOLIC VERSION CARD. ALSO, THE PROGRAMMER CAN GAIN ACCESS TO THE PATCH NUMBER BY ACCESSING COMPILETIME (22).

### D0326 ALGOL - STATISTICS IN ALGOL - 04-23-73

A FEATURE FOR GATHERING TIMING STATISTICS HAS BEEN ADDED TO THE ALGOL LANGUAGE. IT PRODUCES OUTPUT SIMILAR TO THE STATISTICS PROCEDURES USED IN FORTRAN, BUT IS INVOKED BY A DOLLAR CARD OPTION CALLED STATISTICS. THE OPTION IS EXAMINED AT THE BEGINNING OF EACH

PROCEDURE OR BLOCK. IF IT IS SET AT THAT TIME, STATISTICS ARE GATHERED FOR THAT PROCEDURE OR BLOCK. ALTHOUGH THE OPTION MAY BE ALTERED AT ANY TIME, ONLY ITS STATUS AT THE BEGINNING OF PROCEDURES AND BLOCKS IS SIGNIFICANT FOR DETERMINING WHETHER TIMINGS WILL BE MADE.

IF STATISTICS ARE TAKEN FOR A PROCEDURE OR BLOCK, THEN THE FREQUENCY OF THAT PROCEDURE OR BLOCK IS MEASURED, ALONG WITH THE LENGTH OF TIME SPENT IN THAT PROCEDURE OR BLOCK. WHEN THE PROGRAM IS COMPLETED FOR ANY REASON (INCLUDING BOTH NORMAL EOJ AND DS-ING), THE STATISTICS GATHERED ARE PRINTED OUT ON THE DIAGNOSTIC FILE.

ON THE OUTPUT LISTING, AN ASTERISK (*) INDICATES THAT THERE IS SOME DOUBT ABOUT THE TIMINGS FOR THE SPECIFIC PROCEDURE NAME WHICH PRECEDES THE ASTERISK. IN ADDITION, TIMINGS ARE INVALID FOR ANY PROCEDURE OR BLOCK WHICH IS ENTERED BY A BAD GO TO.

FOR ANY PROCEDURE OR BLOCK WHICH HAS STATISTICS GATHERED , IT IS POSSIBLE TO BREAK DOWN THE TIMINGS TO THE LABEL LEVEL WITHIN THAT PROCEDURE BY SETTING THE OPTION LABELS. LABELS MUST APPEAR IN PARENTHESES IMMEDIATELY AFTER THE WORD STATISTICS ON THE DOLLAR CARD. IT MAY BE PRECEDED BY SET OR RESET. IF BOTH ARE OMITTED, SET IS ASSUMED. FOR EXAMPLE:

```
$ SET STATISTICS (LABELS)
```

WILL BEGIN TIMING LABEL BREAKPOINTS.

```
$ SET STATISTICS (RESET LABELS)
```

WILL END TIMING OF LABEL BREAKPOINTS. SET OR RESET INSIDE THE PARENTHESES ONLY HAS EFFECT FOR THE DURATION OF THE PARENTHESES.

ONLY THE FIRST SIX CHARACTERS OF ANY IDENTIFIER ARE PRINTED OUT IN STATISTICS LISTINGS. FOR FURTHER INFORMATION ABOUT THE FORM OF THE STATISTICS PRODUCED SEE FORTRAN NOTE D0109 IN THE 2.3. SYSTEM MISCELLANEA.

## D0327 ALGOL - DIRECT ARRAY PARAMETERS - 06-24-73

THIS CHANGE ALLOWS THE PASSING OF A DIRECT ARRAY TO A NON-DIRECT FORMAL ARRAY.

## D0359 ALGOL - LISTINCL $CARD OPTION - 06-24-73

THIS CHANGE IMPLEMENTS A NEW $CARD OPTION, LISTINCL, WHICH CONTROLS THE LISTING OF CARDS FROM INCLUDED FILES. THOSE CARDS ARE NOW LISTED ONLY IF BOTH LIST AND LISTINCL ARE SET. LISTINCL IS RESET BY DEFAULT.

THIS CHANGE ALSO NOW SUPPRESSES A PAGE EJECT IF THE PAGE OPTION IS SET IN AN INCLUDE FILE BUT LIST AND LISTINCL ARE NOT BOTH SET.

## D0362 ALGOL - POINTER PRIMARIES - 06-24-73

THIS CHANGE EXTENDS THE SYNTAX OF POINTER PRIMARIES AS FOLLOWS:

1. THE CHARACTER SIZE IN A POINTER DESIGNATOR MAY NOW BE ZERO. IN THIS CASE, THE DESCRIPTOR WILL NOT BE CHANGED INTO A STRING DESCRIPTOR: IT WILL REMAIN A WORD-ORIENTED ARRAY DESCRIPTOR.

2. A ONE-DIMENSIONAL ARRAY DESIGNATOR OR A FULLY SUBSCRIPTED VARIABLE MAY UNDER SOME CIRCUMSTANCES BE INTERPRETED AS A POINTER PRIMARY. THAT IS, THE "ARRAY PART" OF A POINTER DESIGNATOR MAY BE A POINTER PRIMARY WITHOUT BEING USED IN THE POINTER TRANSFER FUNCTION CONSTRUCT. THIS WILL HAPPEN WHENEVER CONTEXT DETERMINES THAT THERE IS NO CONFLICT WITH OTHER LEGAL CONSTRUCTS, SUCH AS WHEN A POINTER EXPRESSION IS REQUIRED. IN THIS CASE, THE DESCRIPTOR REMAINS A WORD-ORIENTED DESCRIPTOR, AND IS NOT NECESSARILY INDEXED. THIS SYNTAX IS USEFUL FOR SUCH CONSTRUCTS AS:

D0362 ALGOL - POINTER PRIMARIES - 06-24-73

REPLACE A BY B FOR 10 WORDS

WHERE A AND B ARE ONE-DIMENSIONAL ARRAYS.

D0364 ALGOL - ARRAY REFERENCE VARIABLE - 05-07-73

THIS CHANGE IMPLEMENTS THE "ARRAY REFERENCE VARIABLE". THE ARRAY REFERENCE VARIABLE IS USED AS A NORMAL ARRAY; HOWEVER, IT MAY REFER TO DIFFERENT ARRAYS AT DIFFERENT TIMES DURING EXECUTION OF A PROGRAM.

SYNTAX

THE ARRAY REFERENCE VARIABLE IS DECLARED AS FOLLOWS:

```
<ARRAY REFERENCE DECLARATION>::= <DIRECT SPEC> <TYPE> ARRAY
                                 REFERENCE <ARRAY REF LIST>
```

WHERE

```
<DIRECT SPEC>::= DIRECT / <EMPTY>
<TYPE>::= INTEGER / REAL / ALPHA / BOOLEAN / DOUBLE / HEX /
          BCL / EBCDIC / ASCII / <EMPTY>
<ARRAY REF LIST>::= <ARRAY REF> / <ARRAY REF LIST>,<ARRAY REF>
<ARRAY REF>::= <IDENTIFIER LIST>[<LOWER BOUND LIST>]
<IDENTIFIER LIST>::=  <IDENTIFIER> / <IDENTIFIER LIST>,
                      <IDENTIFIER>
<LOWER BOUND LIST>::= <LOWER BOUND> /
                      <LOWER BOUND LIST>,<LOWER BOUND>
<LOWER BOUND>::= <INTEGER>
```

THE ARRAY REFERENCE VARIABLE IS ASSIGNED A VALUE AS FOLLOWS:

```
<ARRAY REF VARIABLE ID> := <ARRAY DESIGNATOR>
```

SEMANTICS

1. AN ARRAY REFERENCE VARIABLE IS NOT ITSELF AN ARRAY BUT CONTAINS A COPY DESCRIPTOR TO AN ARRAY. ANY REFERENCE TO

D0364 ALGOL - ARRAY REFERENCE VARIABLE - 05-07-73

AN ARRAY REFERENCE VARIABLE BEHAVES LIKE A REFERENCE TO THE ARRAY MOST RECENTLY ASSIGNED TO THE ARRAY REFERENCE VARIABLE.

2. THE DIMENSION OF THE ARRAY REFERENCE VARIABLE IS DETERMINED BY THE NUMBER OF LOWER BOUNDS IN THE DECLARATION. THE ARRAY DESIGNATOR MUST HAVE THE SAME DIMENSION.

3. THE TYPE OF THE ARRAY REFERENCE VARIABLE IS SPECIFIED IN THE DECLARATION; IF NO TYPE IS SPECIFIED, REAL IS ASSUMED. THE ARRAY DESIGNATOR ASSIGNED TO THE ARRAY REFERENCE VARIABLE MAY BE ANY TYPE. IF NECESSARY, THE COPY DESCRIPTOR WILL BE MODIFIED SO THAT IT AGREES WITH THE TYPE OF THE ARRAY REFERENCE VARIABLE.

4. THE ARRAY REFERENCE VARIABLE MAY BE DECLARED DIRECT. IF SO, THEN ONLY DIRECT ARRAY DESIGNATORS MAY BE ASSIGNED TO IT. HOWVER, NON-DIRECT ARRAY REFERENCE VARIABLES MAY BE ASSIGNED EITHER DIRECT OR NON-DIRECT ARRAY DESIGNATORS.

5. THE LEX LEVEL OF THE ARRAY DESIGNATOR (I.E., THE LEVEL AT WHICH IT IS DECLARED) MAY NOT BE GREATER THAN THAT OF THE ARRAY REFERENCE VARIABLE; THAT IS, THE ARRAY REFERENCE VARIABLE MAY NOT BE GLOBAL TO THE ARRAY DESIGNATOR.

D0365 ALGOL - COMPILE-TIME FACILITIES - 07-08-73

THIS CHANGE IMPLEMENTS A COMPILE-TIME FACILITY WHICH MAY BE USED CONDITIONALLY AND/OR ITERATIVELY TO COMPILE ALGOL SOURCE CODE. THE FACILITY CONSISTS OF (1) THE DECLARATION AND USE OF COMPILE-TIME VARIABLES; (2) COMPILE-TIME IDENTIFIER; (3) SEVERAL COMPILE-TIME STATEMENTS; AND (4) SOME NEW DOLLAR CARD OPTIONS. THE ALGOL COMPILER MUST BE COMPILED WITH THE DOLLAR OPTION CTPROC SET IN ORDER TO INCLUDE THESE FEATURES IN COMPILATIONS.

## 1. COMPILE-TIME VARIABLES

### SYNTAX

<COMPILE-TIME VARIABLE DECLARATION>::= NUMBER <CT VAR LIST>
WHERE
<CT VAR LIST>::= <CT VAR> / <CT VAR LIST>,<CT VAR>
<CT VAR>::= <IDENTIFIER> / <IDENTIFIER>:=<INITIAL VALUE> /
<IDENTIFIER>[<VECTOR LENGTH>]
<INITIAL VALUE>::= <ARITHMETIC EXPRESSION>
<VECTOR LENGTH>::= <ARITHMETIC EXPRESSION>

### SEMANTICS

1. AN IDENTIFIER DECLARED TO BE A NUMBER IS A "NUMBER VARIABLE", OR AN ARITHMETIC COMPILE-TIME VARIABLE.

2. A NUMBER VARIABLE REPRESENTS A SINGLE-PRECISION ARITHMETIC VALUE. IT MAY BE USED WHEREVER AN ARITHMETIC VALUE IS ALLOWED; IT REPRESENTS THE VALUE MOST RECENTLY ASSIGNED TO IT.

3. THE VALUE OF A NUMBER VARIABLE MAY BE CHANGED AT ANY TIME DURING COMPILATION BY MEANS OF A COMPILE-TIME "LET" STATEMENT.

4. A NUMBER VARIABLE MAY BE DECLARED WITH AN INITIAL VALUE. BY DEFAULT, THE INITIAL VALUE IS ZERO. THE INITIAL VALUE MUST BE A CONSTANT ARITHMETIC EXPRESSION.

5. A VECTOR OF NUMBER VARIABLES MAY BE DECLARED BY SPECIFYING ITS LENGTH IN BRACKETS. THE MEMBERS OF A VECTOR OF NUMBER VARIABLES ARE REFERENCED LIKE SUBSCRIPTED VARIABLES. THE SUBSCRIPT MUST BE AN ARITHMETIC CONSTANT EXPRESSION, GREATER THAN OR EQUAL TO ZERO, AND LESS THAN THE DECLARED VECTOR LENGTH. THE VECTOR LENGTH MUST BE A CONSTANT ARITHMETIC EXPRESSION.

## 2. COMPILE TIME IDENTIFIERS

### SYNTAX

<COMPILE-TIME IDENTIFIER>::= <IDENTIFIER><APOSTROPHE><NUMBERID>

### SEMANTICS

1. A COMPILE-TIME IDENTIFIER IS FORMED BY COMBINING A COMPILE-TIME VARIABLE WITH AN IDENTIFIER.
2. THE COMPILE-TIME IDENTIFIER MAY APPEAR ANYWHERE A NORMAL IDENTIFIER MAY BE USED, INCLUDING DECLARATIONS.
3. NO BLANK CHARACTERS MAY APPEAR BETWEEN THE IDENTIFIER AND THE APOSTROPHE.
4. THE CREATED IDENTIFIER IS THE ORIGINAL IDENTIFIER FOLLOWED BY AN APSOTROPHE, FOLLOWED BY NUMERIC CHARACTERS CORRESPONDING TO THE VALUE OF THE COMPILE-TIME VARIABLE, WITH LEADING ZEROS SUPPRESSED.

## 3. COMPILE-TIME STATEMENTS

COMPILE-TIME STATEMENTS ARE INTRODUCED BY THE APOSTROPHE. THEY ARE RECOGNIZED AT A VERY PRIMITIVE LEVEL IN THE COMPILER AND MAY, THEREFORE, APPEAR "ALMOST ANYWHERE", SUCH AS BETWEEN ANY TWO NORMAL LANGUAGE ELEMENTS.

THE COMPILE-TIME STATEMENTS ARE INTENDED TO PROVIDE A CONVENIENT METHOD FOR ALTERING THE NORMAL CONTROL OF COMPILATION, PRIMARILY VIA CONDITIONAL AND ITERATIVE COMPILATION.

THE COMPILE-TIME STATEMENTS (ALL INTRODUCED BY AN APOSTROPHE) ARE:

1. BEGIN
2. IF
3. THRU

4. FOR
5. WHILE
6. DEFINE
7. INVOKE
8. LET

IN THE SYNTAX WHICH FOLLOWS, THE TERM "CTSTMT" REFERS TO ANY OF THESE STATEMENTS. THE TERM "TEXT" REFERS TO ANY ALGOL TEXT, INCLUDING COMPLETE COMPILE-TIME STATEMENTS. A QUOTE MARK (") IS USED TO INDICATE AN APSOTROPHE. THIS IS FOR PRINTING REQUIREMENTS ONLY, AND THE APOSTROPHE IS THE ONLY CORRECT SYNTAX.

COMPLETE COMPILE-TIME STATEMENTS ARE ALWAYS TERMINATED BY SEMICOLONS. HOWEVER, COMPILE-TIME STATEMENTS WHICH ARE COMPONENTS OF OTHER STATEMENTS MAY BE TERMINATED BY "END OR "ELSE. NOTE THAT THESE RULES ARE THE SAME AS FOR NORMAL ALGOL STATEMENTS.

## "BEGIN STATEMENT

### SYNTAX

<COMPILE-TIME BEGIN STMT>::= "BEGIN<TEXT>"END<COMMENTS>

### SEMANTICS

1. THIS STATEMENT DELIMITS A PORTION OF ALGOL TEXT. IT IS NORMALLY USED IN CONJUNCTION WITH THE "IF, "THRU AND "FOR STATEMENTS.
2. IF THE STATEMENT IS NOT SKIPPED, THE ALGOL COMPILER PROCESSES ALL THE DELIMITED TEXT; OTHERWISE, THE COMPILER IGNORES THE TEXT.
3. ANYTHING FOLLOWING THE "END UP TO THE FIRST SPECIAL CHARACTER, END, ELSE OR UNTIL IS CONSIDERED TO BE COMMENTS AND IS IGNORED.

## "IF STATEMENT

### SYNTAX

```
<COMPILE-TIME IF STMT>::= "IF <BOOLEAN EXPRESSION> THEN <CTSTMT>
                        / "IF <BOOLEAN EXPRESSION> THEN <CTSTMT>
                          "ELSE <CTSTMT>
```

### SEMANTICS

1. THIS STATEMENT PROVIDES FOR CONDITIONAL COMPILATION OF ALGOL TEXT.
2. THE <BOOLEAN EXPRESSION> MUST BE A CONSTANT EXPRESSION. IF TRUE, THE <CTSTMT> FOLLOWING THEN IS PROCESSED. IF FALSE, THE <CTSTMT> FOLLOWING "ELSE IS PROCESSED, IF PRESENT.

## "THRU STATEMENT

### SYNTAX

```
<COMPILE-TIME THRU STMT>::= "THRU <ARITHMETIC EXPRESSION> DO
                              <CTSTMT>
```

### SEMANTICS

1. THIS STATEMENT PROVIDES ITERATIVE COMPILATION OF ALGOL TEXT.
2. THE <ARITHMETIC EXPRESSION> MUST BE A CONSTANT EXPRESSION, GREATER THAN OR EQUAL TO ZERO.
3. THE <CTSTMT> FOLLOWING DO IS PROCESSED THE SPECIFIED NUMBER OF TIMES. IF ZERO, THE STATEMENT IS SKIPPED.

## "FOR STATEMENT

SYNTAX

<COMPILE-TIME FOR STMT>::= "FOR <NUMBERID>:=<AEXP-1> STEP
<AEXP-2>
UNTIL <AEXP-3> DO <CTSTMT>

SEMANTICS

1. THIS STATEMENT PROVIDES FOR ITERATIVE COMPILATION OF ALGOL TEXT.
2. EACH AEXP MUST BE A CONSTANT ARITHMETIC EXPRESSION. AEXP-2 MAY BE POSITIVE OR NEGATIVE, BUT MUST NOT BE ZERO.
3. THE ACTION OF THIS STATEMENT IS SIMILAR TO THE NORMAL ALGOL FOR STATEMENT. AN EXCEPTION IS THAT AEXP-2 AND AEXP-3 ARE EVALUATED ONLY ONCE, AT THE BEGINNING OF THE OPERATION. THEY ARE NOT REEVALUATED, EVEN THOUGH THEIR COMPONENTS MAY CHANGE VALUE.

"WHILE STATEMENT

SYNTAX

<COMPILE-TIME WHILE STMT>::= "WHILE <BOOLEAN EXPRESSION> DO
<CTSTMT>

SEMANTICS

1. THIS STATEMENTS PROVIDES FOR ITERATIVE COMPILATION OF ALGOL TEXT.
2. THE <BOOLEAN EXPRESSION> MUST BE A CONSTANT EXPRESSION.
3. PRIOR TO THE ITERATIONS, THE <BOOLEAN EXPRESSION> IS EVALUATED. IF IT IS TRUE, THE <CTSTMT> IS PROCESSED, IF IT IS FALSE, THE ENTIRE STATEMENT IS FINISHED.

"DEFINE STATEMENT

SYNTAX

<COMPILE-TIME DEFINE STMT>::= "DEFINE <IDENTIFIER> = <CTSTMT>

SEMANTICS

1. THIS STATEMENT DECLARES AN IDENTIFIER TO REPRESENT A <CTSTMT>.
2. THE <CTSTMT> IS STORED AWAY, TO BE PROCESSED WHEN REFERENCED IN A SUBSEQUENT "INVOKE STATEMENT.

"INVOKE STATEMENT

SYNTAX

<COMPILE-TIME INVOKE STMT>::= "INVOKE <IDENTIFIER>

SEMANTICS

1. THIS STATEMENT CAUSES THE <CTSTMT>, PREVIOUSLY ASSOCIATED WITH THE IDENTIFIER IN A "DEFINE STATEMENT, TO BE PROCESSED.

"LET STATEMENT

SYNTAX

<COMPILE-TIME LET STMT>::= "LET <NUMBER VARIABLE>:=<AEXP-2>
WHERE
<NUMBER VARIABLE>::= <NUMBERID> / <NUMBERID>[AEXP-2]

SEMANTICS

1. THIS STATEMENT IS USED TO MODIFY THE VALUE OF A COMPILE-TIME VARIABLE.

2. <AEXP-1> MUST BE A CONSTANT ARITHMETIC EXPRESSION.

3. IF THE SUBSCRIPTED FORM IS USED, THE <NUMBERID> MUST HAVE BEEN DECLARED AS A VECTOR OF NUMBER VARIABLES; <AEXP-2> MUST BE GREATER THAN OR EQUAL TO ZERO AND LESS THAN THE DECLARED <VECTOR LENGTH>.

## 4. NEW DOLLAR CARD OPTIONS

1. CTMON

   IF CTMON IS SET, ALL ASSIGNMENTS TO COMPILE-TIME VARIABLES ARE MONITORED ON THE LINE PRINTER LISTING.

2. CTLIST

   IF CTLIST IS SET, ALL CARD IMAGES PROCESSED ARE PRINTED ON THE LINE PRINTER LISTING. IN PARTICULAR, DURING ITERATIVE COMPILE-TIME STATEMENTS, CARD IMAGES WHICH ARE PROCESSED REPEATEDLY ARE PRINTED REPEATEDLY. THEY ARE IDENTIFIED BY AN ASTERISK (*) WHERE THE P OR C USUALLY APPEARS. IF CTLIST IS RESET (DEFAULT), CARD IMAGES ARE PRINTED ONLY THE FIRST TIME THEY ARE PROCESSED.

3. LISTSKIP

   IF LISTSKIP IS RESET, THE PRINTING OF SKIPPED CARD IMAGES IS SUPPRESSED. IF LISTSKIP IS SET (DEFAULT), CARD IMAGES ARE PRINTED WHETHER OR NOT THEY ARE SKIPPED (PROVIDED OTHER LISTING OPTIONS ARE SET APPROPRIATELY).

4. LISTINCL

   IF LISINCL IS SET, CARD IMAGES FROM INCLUDE FILE ARE PRINTED ON THE LINE PRINTER LISTING (PROVIDED OTHER LISTING OPTIONS ARE SET APPROPRIATELY). IF LISTINCL IS RESET (DEFAULT), INCLUDED CARDS ARE NOT PRINTED.

5. CTTRACE

   IF CTTRACE IS SET, VALUES OF ALL EXPRESSIONS WHICH ARE COMPONENTS OF COMPILE-TIME STATEMENTS ARE PRINTED ON THE

D0365 ALGOL - COMPILE-TIME FACILITIES - 07-08-73

LINE PRINTER LISTING.

D0366 ALGOL - CLOSE WITH CRUNCH - 07-14-73

THIS PATCH ALLOWS A DISK FILE TO BE LOCKED WITH CRUNCH. THE SYNTAX REQUIRED IS

```
CLOSE(FILENAME,CRUNCH)
```

OR

```
LOCK(FILENAME,CRUNCH)
```

OR

```
LOCK(FILENAME,*)
```

NOTE THAT THIS WILL ONLY HAVE AN EFFECT IF THE "CRUNCH" RUN-TIME SYSTEM OPTION IS SET.

D0367 ALGOL - DOLLAR OPTION "INCLSEQ" - 07-14-73

THIS PATCH ADDS THE DOLLAR OPTION INCLSEQ. $SET INCLSEQ WILL RESEQUENCE AN INCLUDED FILE IF SEQ IS ALSO SET. IT IS NO LONGER NECESSARY TO SET NEWINCL IN ORDER TO RESEQUENCE AN INCLUDED FILE, HOWEVER, NEWINCL MUST STILL BE SET FOR AN INCLUDED FILE TO HAVE ITS CARD IMAGES IN THE NEWTAPE.

D0380 ALGOL - TASKFILE HANDLING WITH CLOSE - 07-08-73

THIS PATCH ALLOWS THE TASK ATTRIBUTE TASKFILE TO BE CLOSED USING THE CLOSE STATEMENT. ALSO, ANY BOOLEAN VALUED FILE ATTRIBUTE MAY NOW BE APPLIED TO TASKFILE, E.G.,

```
TASKID.TASKFILE.OPEN
```

IS NOW A LEGAL BOOLEAN EXPRESSION.

## D0395 ALGOL - MULTIPLE VALUE ARRAYS - 07-17-73

THIS PATCH ALLOWS MULTIPLE VALUE ARRAY DECLARATIONS. PREVIOUSLY, ONLY ONE VALUE ARRAY COULD BE DECLARED IN A DECLARATION. NOW MORE THAN ONE VALUE ARRAY CAN BE DECLARED IN ONE DECLARATION.

## D0400 ALGOL - THRU STATEMENTS - 07-17-73

THE THRU STATEMENT HAS HAD ITS RANGE EXTENDED. IT MAY NOW BE EXECUTED FROM 0 TO 2*38 -1 TIMES.

## D0401 ALGOL - ADDRESS EQUATION - 07-31-73

THIS PATCH ALLOWS ADDRESS EQUATION AMONG INTEGER, REAL, AND BOOLEAN VARIABLES. SECTION 10.4 OF THE B6700/B7700 EXTENDED ALGOL LANGUAGE INFORMATION MANUAL SHOULD BE CHANGED TO THE FOLLOWING:

### 10.4 TYPE DECLARATION

SYNTAX:

```
<TYPE DECLARATION>::= <LOCAL OR OWN TYPE><IDENTIFIER LIST> /
                      <SIMPLE TYPE><EQUATION LIST>
<LOCAL OR OWN TYPE>::= <TYPE> / OWN<TYPE>
<TYPE>::=<SIMPLE TYPE> / DOUBLE / ALPHA
<SIMPLE TYPE>::=REAL/INTEGER/BOOLEAN
<EQUATION LIST>::= <IDENTIFIER>=<IDENTIFIER> / <IDENTIFIER LIST> /
                   <EQUATION LIST>,<IDENTIFIER>=<IDENTIFIER> /
                   <EQUATION LIST>,<IDENTIFIER>
<IDENTIFIER LIST>::= <IDENTIFIER> / <IDENTIFIER LIST>,<IDENTIFIER>
```

D0401 ALGOL - ADDRESS EQUATION - 07-31-73

SEMANTICS:

THIS PART REMAINS THE SAME AS IN THE MANUAL.

10.4.1 THE EQUATION LIST

THE <EQUATION LIST> ALLOWS ADDRESS EQUATION AMONG REAL, INTEGER, AND BOOLEAN VARIABLES ONLY. AN <IDENTIFIER> MAY ONLY BE ADDRESS EQUATED TO A PREVIOUSLY DECLARED LOCAL <IDENTIFIER> OR TO AN <IDENTIFIER> GLOBAL TO THE BLOCK IN WHICH IT IS DECLARED.

D0402 ALGOL - RELATIONAL OPERATORS - 07-31-73

THIS PATCH NOW ALLOWS THE FOLLOWING OPERATORS TO BE USED IN ALGOL:

```
>= FOR GEQ
<= FOR LEQ
¬= FOR NEQ
 | FOR  OR
```

D0403 ALGOL - CONTINUE STATEMENT SYNTAX - 07-27-73

THE SYNTAX FOR A <CONTINUE STATEMENT> IN SYSTEM MISCELLANEA, DATED 11 APRIL 1973, PAGES 6-12, 6-13, SHOULD BE CHANGED FROM

```
   CONTINUE [<TASK DESIGNATOR>]
```

TO

```
   CONTINUE (<TASK DESIGNATOR>)
```

ALSO THE EXAMPLE ON PAGE 9-39 OF THE 06-72 ALGOL LANGUAGE MANUAL SHOULD BE CHANGED FROM

```
   CONTINUE [T];
```

TO

```
   CONTINUE (T);
```

D0440 ALGOL - INITIALIZATION - 07-23-73

THE DEFAULT ERROR LIMIT ASSIGNED BY THE ALGOL COMPILER FOR USE UNDER CANDE WAS SET TO 10 BUT WAS THEN REASSIGNED TO 150 IN THE INITIALIZATION OF THE COMPILER. THIS PATCH SETS THE ERROR LIMIT FOR CANDE USE TO 10 AND DOES NOT OVERRIDE THIS ASSIGNMENT AS PREVIOUSLY DONE.

D0441 ALGOL - CASE STMT AND NUMBERED STMTS - 07-29-73

THE CASE STATEMENT SYNTAX AND SEMANTICS FOUND ON PAGE 9-5 OF THE ALGOL LANGUAGE MANUAL IS MODIFIED AS FOLLOWS:

SYNTAX:

```
<CASE STATEMENT>::= CASE <ARITHMETIC EXPRESSION> OF <CASE BODY>
<CASE BODY>::= <COMPOUND TAIL> /
               BEGIN <NUMBERED STATEMENT LIST> END
<NUMBERED STATEMENT LIST>::= <NUMBERED STATEMENT GROUP> /
                             <NUMBERED STATEMENT GROUP>;<NUMBERED
                             STATEMENT LIST>
<NUMBERED STATEMENT GROUP>::= <UNSIGNED INTEGER>:<STMT LIST>
<STMT LIST>::= <STATEMENT> / <STMT LIST>;<STATEMENT>
```

SEMANTICS:

CASE STATEMENTS PROVIDE A CONVENIENT MEANS OF DYNAMICALLY SELECTING ONE OF MANY ALTERNATIVE SECTIONS OF CODE FOR EXECUTION AT A PARTICULAR POINT IN THE PROCESSING OF A PROGRAM. THE CODE IS SELECTED DIFFERENTLY FOR THE TWO TYPES OF <CASE BODY>S.

<COMPOUND TAIL>:

A <COMPOUND TAIL> IS A LIST OF <STATEMENT>S SEPARATED BY SEMICOLONS, BRACKETED BY A BEGIN AND END. THESE <STATEMENT>S MAY BE NUMBERED ZERO THROUGH N. IF THE RESULT OF THE

<ARITHMETIC EXPRESSION> IS M, THEN M IS INTEGERIZED IF NECESSARY. IF M IS LESS THAN ZERO OR GREATER THAN N (THE NUMBER OF STATEMENTS LISTED IN THE <COMPOUND TAIL>, THEN AN INVALID INDEX INTERRUPT IS GENERATED. AFTER EXECUTION OF THE MTH STATEMENT, A BRANCH IS PERFORMED TO THE NEXT <STATEMENT> FOLLOWING THE <CASE STATEMENT>. NOTE THAT EVEN THOUGH SYNTACTICALLY THE <CASE BODY> APPEARS TO BE A <COMPOUND TAIL>, SEMANTICALLY IT IS ABOUT AS FAR REMOVED FROM A <COMPOUND TAIL> AS ONE COULD IMAGINE.

NUMBERED STATEMENTS:

THIS ALTERNATIVE FORM OF THE <CASE STATEMENT> FUNCTIONS SIMILARLY TO THE FORM DESCRIBED ABOVE. THE MAJOR DIFFERENCE IS THAT RATHER THAN IMPLICITLY NUMBER THE <STATEMENT>S IN THE <COMPOUND TAIL> AS THEY APPEAR, THE USER IS REQUIRED TO EXPLICITLY NUMBER THE STATEMENT GROUPS. LET A REPRESENT THE LOWEST NUMBER ASSIGNED TO A STATEMENT LIST, AND B THE HIGHEST VALUE ASSIGNED. A AND B MUST BE NON-NEGATIVE. THE INTEGERIZED VALUE OF THE <ARITHMETIC EXPRESSION> (CALL IT M) MUST FULFILL THE REQUIREMENTS A LEQ M LEQ B. IF THIS IS NOT SO, AN ERROR WILL BE SIGNALED. FURTHERMORE, M MAY NOT TAKE ON ANY VALUES THAT WERE NOT ASSOCIATED WITH SOME <STATEMENT LIST>. AT THE END OF EACH <NUMBERED STATEMENT GROUP> A BRANCH IS GENERATED TO THE <STATEMENT> FOLLOWING THE <CASE STATEMENT>.

EXAMPLES:

```
CASE I OF
BEGIN
   J:=1;
   J:=20;
   J:=3;
   J:=4;
END;

CASE X+1 OF
```

```
BEGIN
    10: J:=10;
    11: J:=11; I:=20;
        Q:=Q+1; X:=0;
        GO TO EXIT;
    12: J:=12;
        X:=X+1;
    13: X:=14;
    15: X:=20; Q:=Q+1;
END;
```

D0442 ALGOL - NORMALIZE - 08-19-73

THIS PATCH ADDS NORMALIZE TO THE LIST OF ARITHMETIC FUNCTIONS INTRINSIC TO ALGOL.

SYNTAX:

<NORMALIZE FUNCTION>::= NORMALIZE(<ARITHMETIC EXPRESSION>)

SEMANTICS:

THE NORMALIZE FUNCTION NORMALIZES ITS ARGUMENT, I.E., EMITS A SNGL OPERATOR, RETURNING A SINGLE PRECISION RESULT.

D0443 ALGOL - SINGLE SPACE DEFAULT - 08-19-73

THIS PATCH MAKES THE LINE PRINTER DEFAULT SPACING FOR ALGOL SINGLE SPACED RATHER THAN DOUBLE SPACED. A COMPILE TIME OPTION HAS BEEN ADDED FOR INSTALLATIONS WHICH PREFER DEFAULT DOUBLE SPACING. THIS COMPILE TIME OPTION IS DOUBLESPACE. DOUBLESPACE MUST BE SET DURING COMPILATION OF THE COMPILER IN ORDER TO GET DOUBLE SPACE DEFAULT, OTHERWISE, SINGLE SPACING WILL BE THE DEFAULT.

D0444 ALGOL - CRUNCH NEW SYMBOL FILES - 09-04-73

THIS PATCH CAUSES NEW SYMBOL FILES TO BE CRUNCHED WHEN THE "NEW" OPTION IS SET.

D0489 ALGOL - SEPCOMP - 05-19-73

AN AUTOMATIC SEPARATE COMPILATION AND BINDING FACILITY IS AVAILABLE IN THE 2.5 ALGOL (AND DCALGOL) COMPILER. THIS FACILITY IS PARTICULARLY HELPFUL FOR DEVELOPMENT WORK ON LARGE ALGOL PROGRAMS, SINCE THE AMOUNT OF CONTROL INFORMATION REQUIRED BY THE COMPILER TO REPLACE PROCEDURES IN HOST PROGRAMS HAS BEEN REDUCED TO A MINIMUM. THIS FACILITY IS INTENDED AS A SUPPLEMENT TO, NOT A REPLACEMENT FOR, OTHER METHODS OF COMPILING AND BINDING ALGOL PROCEDURES. GIVEN ONLY THE NAME OF THE HOST PROGRAM TO BE CHANGED, AND THE PATCHES TO CHANGE IT, THE COMPILER IS ABLE TO SEPARATELY COMPILE AND BIND TO THE HOST ONLY THOSE PROCEDURES WHICH ARE BEING CHANGED. THIS METHOD REQUIRES THAT CERTAIN INFORMATION BE ASSOCIATED WITH THE HOST PROGRAM, INFORMATION THAT IS NOT NORMALLY COLLECTED AND SAVED DURING THE COMPILATION OF A PROGRAM.

"MAKEHOST" IS THE DOLLAR OPTION THAT REQUESTS THAT THIS INFORMATION BE SAVED WHEN COMPILING A BLOCK PROGRAM OR PROCEDURE AT LEVEL TWO. THIS OPTION CANNOT BE EXPLICITLY REFERENCED AFTER THE APPEARENCE OF THE FIRST SYNTACTICAL ITEM.

IF MAKEHOST IS SET, INFORMATION IS SAVED IN THE CODE FILE OF THE PROGRAM ABOUT THE SYMBOLIC FILE USED OR CREATED BY THE COMPILATION, THE SEQUENCE RANGES OF ALL PROCEDURE BODIES DECLARED IN THE OUTER BLOCK OF THE PROGRAM, AND THE DECLARATIVE ENVIRONMENT OF THE OUTER BLOCK. THE ENVIRONMENT OF THE OUTER BLOCK IS SIMILAR TO THE INFORMATION OBTAINED BY THE "DUMPINFO" DOLLAR OPTION, AND ENABLES LEVEL THREE PROCEDURES TO BE COMPILED SEPARATELY WITHIN THIS ENVIRONMENT.

ADDITIONAL ENVIRONMENTS MAY BE SAVED, IF DESIRED, IN ORDER THAT

PROCEDURES AT LEVELS GREATER THAN THREE MAY BE REPLACED. ADDITIONAL ENVIRONMENTS CAN ONLY BE SPECIFIED IMMEDIATELY FOLLOWING THE SETTING OF THE MAKEHOST OPTION.

SYNTAX

```
<ADDITIONAL-ENVIRONMENT>::= <EMPTY> / (<ENVIRONMENT-LIST>)
<ENVIRONMENT-LIST>::= <ENVIRONMENT> / <ENVIRONMENT-LIST>,
                                      <ENVIRONMENT>
<ENVIRONMENT>::= <PROCEDURE-IDENTIFIER> / <PROCEDURE-IDENTIFIER> OF
                                          <ENVIRONMENT>
```

EXAMPLE

```
$ SET MAKEHOST
$ SET MAKEHOST (PASSONE, PASSTWO)
$ SET MAKEHOST (PASSONE, PASSTWO, WRAPUP OF PASSTWO)
```

IN THE EXAMPLE, THE LAST DOLLAR CARD OVERRIDES THE FIRST TWO, SAVING THE ENVIRONMENTS OF PASSONE, PASSTWO AND WRAPUP OF PASSTWO IN ADDITION TO THE ENVIRONMENT OF THE OUTER BLOCK. THE <ENVIRONMENT-LIST> MAY EXTEND ACROSS SEVERAL CARD IMAGES, A PRECEDENT ARISING MORE OUT OF NECESSITY THAN DESIRE. THE CURRENT IMPLEMENTATION, FOR REASONS OF SIMPLICITY, REQUIRES ENVIRONMENTS TO BE FULLY QUALIFIED THROUGH LEVEL THREE PROCEDURE IDENTIFIERS. IF AN ENVIRONMENT IS NEVER FOUND DURING THE COURSE OF COMPILATION, THE COMPILER LISTS THE UNKNOWN ENVIRONMENT, ALONG WITH A SYNTAX ERROR. ENVIRONMENTS MAY APPEAR IN ANY ORDER, WITHOUT REGARD TO THE ACTUAL BLOCK STRUCTURE OF THE HOST PROGRAM.

FINALLY, WHEN MAKING A HOST, DO NOT FORGET TO SET THE "NEW" DOLLAR OPTION IF THERE ARE ANY CHANGES TO THE HOST. THE DEFAULT SYMBOLIC FILE ASSOCIATED WITH THE HOST IS THE TITLE OF THE "NEWTAPE" FILE IF ONE HAS BEEN CREATED, OTHERWISE IT IS THE TITLE OF THE "TAPE" FILE.

"SEPCOMP" IS THE DOLLAR OPTION THAT INVOKES THE AUTOMATIC SEPARATE COMPILATION AND BINDING FACILITY. AS A DOLLAR OPTION, SEPCOMP HAS SOME PECULIAR DISTINCTIONS. IT CANNOT BE EXPLICITLY REFERENCED AFTER THE BEGINNING OF THE COMPILATION NOR ARE MULTIPLE SEPCOMP

OPTION SETTINGS ALLOWED SINCE, WHEN FIRST SET, IT INITIATES THE PREPROCESSING OF THE CARD FILE INPUT. THE TITLE OF THE HOST PROGRAM CAN BE SPECIFIED EITHER AS A STRING IMMEDIATELY FOLLOWING THE WORD SEPCOMP ON THE DOLLAR CARD OR BY LABEL EQUATING THE ALGOL COMPILERS FILE HOST. THE OPTIONAL STRING SPECIFICATION HAS PRECEDENCE OVER LABEL EQUATION. THESE TWO COMPILE DECKS BOTH SPECIFY A HOST FILE TITLED "A/HOST".

DECK 1:

```
?COMPILE A/B WITH ALGOL FOR LIBRARY
?DATA
$ SEPCOMP "A/HOST" LIST STACK
$ SET LINEINFO
   % PATCH CARD                <SEQ-NUMBER>
?END
```

DECK 2:

```
?COMPILE A/B WITH ALGOL FOR LIBRARY
?ALGOL FILE HOST=A/HOST
?DATA
$ SEPCOMP LIST STACK
$ SET LISTDELETED
   % PATCH CARD                <SEQ-NUMBER>
?END
```

ONCE THE HOST FILE TITLE IS KNOWN, THERE IS NOTHING ELSE TO DO EXCEPT PROVIDE THE PATCH CARDS. DOLLAR CARDS WITH BLANK SEQUENCE NUMBERS ARE ACCEPTED FOLLOWING THE DOLLAR CARD SETTING THE SEPCOMP OPTION AND PRIOR TO THE FIRST "PATCH CARD". A "PATCH CARD" IS A CARD HAVING A NON-BLANK SEQUENCE NUMBER AND AT LEAST ONE IS REQUIRED. AMONG PATCH CARDS HAVING NON-BLANK SEQUENCE NUMBERS, SEQUENCE ERRORS ARE NOT ALLOWED. SEPCOMP LOOKS AT THESE PATCH CARDS, DECIDES WHICH PROCEDURES CAN BE COMPILED, AND TAKES CARE OF GENERATING BINDER CONTROL INFORMATION FOR REPLACING THESE PROCEDURES IN THE HOST. SEPCOMP ALWAYS TRIES TO COMPILE PROCEDURES AT THE HIGHEST POSSIBLE LEX LEVEL. THEREFORE, THE NUMBER OF EXTRA ENVIRONMENTS SPECIFIED WHEN MAKING A HOST HAS AN EFFECT ON CHOICES

AVAILABLE TO SEPCOMP.

SEPCOMP SETS SEVERAL OTHER DOLLAR OPTIONS AUTOMATICALLY IN AN EFFORT TO SIMPLIFY OPERATION. THE MERGE OPTION IS UNAVAILABLE FOR USE DURING SEPCOMP CONTROL. REFERENCES TO THIS OPTION ARE IGNORED AFTER SEPCOMP HAS BEEN SET. SETTING MERGE PRIOR TO SETTING SEPCOMP IS ILLEGAL SINCE IT DESTROYS THE DEFAULT LABEL EQUATION OF THE SYMBOLIC FILE TO BE MERGED WITH THE PATCHES. THE TITLE OF THE DEFAULT SYMBOLIC FILE IS ASSOCIATED WITH THE HOST, BUT THIS TITLE CAN BE OVERRIDDEN BY LABEL EQUATION OF THE ALGOL FILE TAPE. SEPCOMP SETS BOTH THE "AUTOBIND" AND "LIBRARY" OPTIONS CAUSING ALL PROCEDURES TO BE COMPILED INTO ONE MULTI-PROGRAM CODE FILE, A TEMPORARY FILE LEFT OPEN FOR THE USE OF THE BINDER. EXPLICITLY RESETTING "AUTOBIND" WILL PREVENT THE BINDER FROM BEING CALLED AND RESULT IN THE CODE FILE BEING LOCKED ON DISK IF COMPILED FOR LIBRARY. EXPLICITLY RESETTING "LIBRARY" WILL CAUSE EACH PROCEDURE COMPILED TO BE PUT IN A SEPARATE AND PERMANENT CODE FILE. BINDING MAY STILL OCCUR, BUT AT A SOMEWHAT SLOWER RATE. IF PROCEDURES ARE PUT IN SEPARATE CODE FILES, THE TITLE OF THE CODE FILE IS DETERMINED IN THE STANDARD WAY, WITH THE PROCEDURE NAME REPLACING THE LAST IDENTIFIER FROM THE TITLE ON THE COMPILE CARD. PROCEDURES COMPILED AT LEX LEVEL FOUR AND HIGHER HAVE THE NAME OF THEIR ENVIRONMENT USED IN THE CODE FILE NAME ALSO. FOR EXAMPLE, IF WE COMPILED TWO LEVEL FOUR PROCEDURES HAVING THE SAME NAME BUT DIFFERENT ENVIRONMENTS AS:

```
? COMPILE A/HOST WITH ALGOL FOR LIBRARY
? DATA
$ SEPCOMP "A/HOST"
$ RESET LIBRARY
   % PATCH CARD TO Q OF PASSONE          <SEQ-NUMBER>
   % PATCH CARD TO Q OF PASSTWO          <SEQ-NUMBER>
?END
```

TWO CODE FILES WOULD BE PRODUCED, A/PASSONE/Q AND A/PASSTWO/Q, IN ADDITION TO THE NEW HOST FILE "A/HOST" ASSUMING PASSONE AND PASSTWO WERE SPECIFIED AS EXTRA ENVIRONMENTS WHEN "A/HOST" WAS MADE.

D0489 ALGOL - SEPCOMP - 05-19-73

THE SPECIAL INFORMATION ASSOCIATED WITH THE HOST PROGRAM IS ALWAYS COPIED OVER BY THE BINDER TO THE CODE FILE OF THE NEW PROGRAM SO IT ALSO MAY BE USED AS A HOST, AS IN THE PREVIOUS EXAMPLE. THIS INFORMATION IS NOT, HOWEVER, "UPDATED" EITHER BY THE BINDER OR THE COMPILER DURING THE SEPCOMP PROCESS AND IT IS POSSIBLE FOR THIS INFORMATION TO COME TO INACCURATELY REFLECT THE ACTUAL STRUCTURE AND CONTENT OF THE HOST PROGRAM WITH WHICH IT IS ASSOCIATED.

BECAUSE OF THE ORDER OF THE CODE FILE IT IS MUCH FASTER TO BIND TO A BOUND HOST THAN TO AN UNBOUND HOST. FOR THIS REASON, IT MAY BE ADVANTAGEOUS TO SET AUTOBIND WHEN COMPILING A HOST PROGRAM JUST TO GET THE BINDER TO REARRANGE THE CODE FILE.

D0524 ALGOL - MULTI-PROCEDURE CODE FILE - 07-14-73

WHEN COMPILING MULTIPLE PROCEDURES, SUCH AS THE ALGOL INTRINSICS, IT IS NOW MORE EFFICIENT TO SET THE DOLLAR OPTION "LIBRARY". THIS WILL CAUSE ALL OBJEPP->T:≤TAM CODE TO BE PUT IN ONE FILE AND MARKED AS A MULTI-PROCEDURE CODE FILE. BINDER CONTROL CARDS FOR BINDING THESE PROCEDURE, EITHER TO A HOST OR AN INTRINSIC FILE, WILL HAVE TO BE CHANGED, HOWEVER. IF, FOR EXAMPLE, SOME PROCEDURES WERE COMPILED AS "A/B", THEN THE BIND CARD WOULD HAVE TO BE CHANGED:

```
FROM:  BIND = FROM A/=;
TO:    BIND = FROM A/B;
```

THE LIBRARY OPTION IS INITIALIZED TO TRUE WHEN COMPILING FROM CANDE OR WHEN USING THE "SEPCOMP" FACILITY.

## BACKUP

### D0288 BACKUP - SPECIFIC FILE NAMES - 04-23-73

THIS CHANGE ALLOWS THE USER TO SPECIFY A FILE NAME TO BACKUP. THE SYNTAX IN THE II.4 SYSTEM MISCELLANEA ON PAGE 8-3 SHOULD READ:

```
<INPUT DESIGNATOR>::= MT<UNIT NO.> / D<MIX NO.> /
                      D<PB FILE ID> / "<FILE NAME>"
```

SPECIFYING THE FILE NAME IS USEFUL WHEN PRINTING A FILE WHICH WAS CREATED USING THE BDNAME AND BDBASE OPTIONS WHICH WILL HAVE A FILE NAME OF <NAME FROM BDNAME>/<MIX NO.>/<INTERNAL FILE NAME> AND CANNOT NORMALLY BE PRINTED BY BACKUP UNLESS THE NAME IS CHANGED.

EXAMPLES:

IF THE FOLLOWING JOB WERE RUN:

```
<I>COMPILE A/B ALGOL
<I>ALGOL OPTION=BDBASE
<I>BDNAME=LISTING
     .
     .
     .
<I>END JOB
```

AND HAD A MIX NUMBER OF 670, THE BACKUP FILE CONTAINING THE LISTING WOULD HAVE THE TITLE LISTING/0000670/000LINE, IT COULD BE PRINTED BY:

```
<I>PB "LISTING/0000670/000LINE"
```

OTHER OPTIONS, SUCH AS SAVE, KEY, RANGE, ETC COULD ALSO BE USED, IF DESIRED.

IF THE FOLLOWING JOB WERE RUN:

D0288 BACKUP - SPECIFIC FILE NAMES - 04-23-73

```
<I>RUN A/B
<I>OPTION=BDBASE
<I>BDNAME=MYNAME
<I>END JOB
```

AND A/B INTERNALLY USED A PRINTER FILE CALLED PRNT, AND WAS RUN WITH A MIX NUMBER OF 1234, THE BACKUP FILE WOULD HAVE THE TITLE MYNAME/0001234/000PRINT. IT COULD BE PRINTED BY:

```
<I>PB "MYNAME/0001234/000PRNT"
```

IF A DIRECTORY NAME IS SPECIFIED (E.G., <I>PB "MYNAME"), ALL BACKUP FILES UNDER THE DIRECTORY WILL BE PRINTED AND/OR PUNCHED.

D0333 BACKUP - PARITY ERROR HANDLING - 06-24-73

SYSTEM/BACKUP NOW GIVES THE OPERATOR THE OPTION TO CONTINUE AFTER AN IRRECOVERABLE PARITY ERROR. ON ENCOUNTERING AN ERROR, AN ACCEPT MESSAGE IS SENT TO THE OPERATOR GIVING HIM THE OPTION OF CONTINUING OR STOPPING. IF THE PRINTOUT IS RESUMED, ALL LINES READ WITH A PARITY ERROR ARE FLAGGED ON THE OUTPUT.

ALLOWABLE RESPONSES ARE DS AND OK. IF DS IS ENTERED, PROCESSING OF THE CURRENT BACKUP FILE IS DISCONTINUED. IF OK IS ENTERED, PROCESSING CONTINUES. IF ANYTING ELSE IS ENTERED, THE ACCEPT IS REPEATED.

D0334 BACKUP - SUPPRESS INCLUDED CARDS - 06-24-73

AN OPTION "NOINCL" HAS BEEN ADDED TO BACKUP. WHEN THIS OPTION IS SPECIFIED, THOSE CARDS WHICH WERE INCLUDED IN A PROGRAM BY A $ INCLUDE CARD WILL NOT BE PRINTED. THIS FEATURE IS USEFUL ONLY WHEN PRINTING PROGRAM LISTINGS. A KEY MUST BE SPECIFIED WHEN USING THIS OPTION, SINCE BACKUP LOOKS FOR A DIGIT TWO CHARACTERS IN FRONT OF THE SEQUENCE NUMBERS.

D0420 BACKUP - FILE TITLE PRINTED - 06-24-73

D0420 BACKUP - FILE TITLE PRINTED - 06-24-73

BACKUP NOW DISPLAYS THE NAME OF THE BACKUP FILE IT IS PRINTING. IF NO FILE EXISTS FOR THE REQUEST, THE MESSAGE "NO FILE FOUND" IS DISPLAYED.

D0445 BACKUP - NON-DIRECT OUTPUT FILE OPTION - 08-26-73

THIS PATCH IMPLEMENTS THE ABILITY TO SPECIFY THAT BACKUP IS TO USE A NON-DIRECT FILE FOR OUTPUT. THIS IS ACCOMPLISHED BY INCLUDING THE PARAMETER "ND" IN THE INPUT STRING, E.G., ?PB D 607 ND SAVE. THE FILE USED IS CALLED "BFILE", AND MAY BE LABEL EQUATED TO ANYTHING ALLOWABLE, SUCH AS DISK, PRINTER BACKUP TAPE, PRINTER, PUNCH, ETC. IF IT IS EQUATED TO A DISK FILE, THE FILE WILL BE LOCKED WHEN BACKUP IS DONE.

# BASIC

## D0335 BASIC - "DEF FN" FUNCTIONS IMPROVEMENT - 06-24-73

A BASIC PROGRAM MAY NOW HAVE A "FN" FUNCTION WHICH HAS THE SAME NAME AS A VARIABLE (I.E., THE FUNCTION "FNA" AND THE VARIABLE "A" MAY NOW APPEAR IN THE SAME BASIC PROGRAM).

## D0490 BASIC - EXTENDED INPUT AND OUTPUT - 08-26-73

THE B6700 BASIC LANGUAGE HAS BEEN EXPANDED TO ALLOW THE USER MORE CONTROL OVER INPUTTING, OUTPUTTING, AND STORING DATA. DETAILED INFORMATION CONCERNING THIS EXPANSION IS CONTAINED IN THE BASIC LANGUAGE INFORMATION MANUAL (FORM NO. 5000383), WHICH WILL BE AVAILABLE AT THE TIME OF THIS RELEASE.

## BINDER

### D0436 BINDER - HIGHER LEVEL COBOL BINDING - 08-19-73

THIS PATCH IMPLEMENTS HIGHER LEVEL COBOL BINDING. COBOL ROUTINES RUNNING AT HIGHER LEXICAL LEVELS CAN REFERENCE INTERMEDIATE LEVEL DECLARED ITEMS BY DECLARING THEM TO BE GLOBAL. ALSO, A COBOL ROUTINE AT ANY LEVEL MAY BE REPLACED.

### D0446 BINDER - FORMAL LABELS - 07-23-73

BINDING 2.4 CODE FILES (ALGOL OR FORTRAN) CONTAINING FORMAL LABELS TO CODE FILES COMPILED WITH A 2.3 OR EARLIER RELEASE COMPILERS IS NOT ALLOWED.

### D0449 BINDER - INTRINSIC BINDING - 08-26-73

THE NUMBER OF INTRINSICS THAT THE BINDER IS CAPABLE OF BINDING TOGETHER HAS BEEN INCREASED. PREVIOUSLY AN INVALID INDEX WOULD OCCUR IF MORE THAN 256 INTRINSICS WERE BOUND INTO A FILE. THE BINDER NOW RESIZES ARRAYS WHEN APPROPRIATE IN ORDER TO ACCOMODATE LARGER NUMBERS OF INTRINSICS.

### D0450 BINDER - SINGLE SPACED LISTING - 08-26-73

THE BINDER NOW SETS THE DOLLAR OPTION "SINGLE" BY DEFAULT. DOUBLE SPACED LISTINGS MAY BE OBTAINED ONLY BY SPECIFICALLY RESETTING THE OPTION. THIS FEATURE MAY BE COMPILED OUT OF THE BINDER BY SETTING A COMPILE TIME OPTION "DOUBLESPACE" AND RECOMPILING THE BINDER.

## CANDE

### D0295 CANDE - IMPROVE PAPERTAPE I-O HANDLING - 04-23-73

SEVERAL CHANGES HAVE BEEN MADE IN CANDE AND SOURCENDL AFFECTING THE HANDLING OF PAPER-TAPE INPUT/OUTPUT USING TELETYPE TERMINALS.

THE CANDE CHANGES INCLUDE:

1. CANDE NOW RESPONDS CORRECTLY TO BREAK ON OUTPUT, TERMINATING THE OUTPUT.
2. THE INITIAL-LINE PROTOCOL (DELAY AND NULLS) IS NOW INITIATED EXPLICITLY BY CANDE (SETTING TOGGLE 7), SO ERROR OR BREAK RECOVERY CAN BE HANDLED CORRECTLY.
3. THE LIMITING OF OUTPUT MESSAGE QUEUING HAS BEEN CORRECTED FOR ALL UNBUFFERED TERMINAL OUTPUT (NOT JUST PAPER TAPE).
4. CANDE WILL NO LONGER LOSE THE LAST RECORD OF SOME INPUT TAPES.
5. A PAPER-TAPE INPUT RECORD CONTAINING ONLY A SEQUENCE NUMBER NOW CORRECTLY CAUSES A BLANK LINE IN THE FILE, NOT A LINE-DELETION.
6. CANDE NOW HANDLES ERROR TERMINATIONS FROM PAPER-TAPE INPUT.

THE SOURCENDL CHANGES INCLUDE:

1. THE SPECIAL TREATEMENT OF THE HEADING LINE IN PAPER-TAPE PUNCHING IS NOW CAUSED BY THE MCS SETTING TOGGLE 7. FORMERLY, IT WAS NECESSARY TO ACHIEVE NORMAL COMPLETION OF THE FILE IN ORDER TO RE-ARM THE INITIAL LOGIC FOR ANOTHER FILE.
2. CR (CARRIAGE RETURN) HAS BEEN DEFINED AS THE ONLY CHARACTER INDICATING THE END OF A RECORD. ADJACENT CARRIAGE RETURNS CAUSE AN EMPTY RECORD. THE FOLLOWING CONTROL CHARACTERS ARE NOW IGNORED, NO MATTER WHERE IN THE RECORD THEY APPEAR:

LF (LINE FEED), NUL, DEL (RUBOUT), DC1 (XON), DC3 (XOFF),

3. A 15-SECOND TIMEOUT ON THE FIRST INPUT CHARACTER NOW CAUSES "TERMINATE ERROR" RATHER THAN "TERMINATE NOINPUT" ACTION.

4. BREAK-ON-INPUT, END-OF-BUFFER AND NO-SPACE CONDITIONS NOW CAUSE "TERMINATE NOINPUT" (TO FREE THE STATION) FOLLOWED BY "TERMINATE ERROR" ACTION.

5. LEADER AND TRAILER ARE NOW NUL (BLANK TAPE) RATHER THAN DEL (RUBOUT) CHARACTERS. THE RUBOUT FOLLOWING EACH LINE HAS BEEN OMITTED.

THE FORMAT OF B6700 CANDE PAPER TAPE IS SPECIFIED BELOW. ALTHOUGH THIS FORMAT DIFFERS FROM THE B5500 CANDE USAGE, B6700 PAPER TAPE FUNCTIONS REMAIN COMPATIBLE WITH THE B5500: EITHER SYSTEM CAN READ TAPE PUNCHED BY THE OTHER. THE DESCRIPTION USES ANSCII-67 CONTROL CODES, WITH TELETYPE SYNONYMS SHOWN IN PARENTHESES.

OUTPUT:

PRIOR TO PUNCHING THE HEADING FOR A PAPER TAPE, THE DCP DELAYS FIVE SECONDS FOR THE USER TO TURN ON HIS PUNCH. THEN IT SENDS NINE NUL CHARACTERS (BLANK LEADER), THE HEADING (FILE NAME), AND 40 MORE NULS.

EACH LINE OF THE FILE IS TRANSMITTED AS THE SEQUENCE NUMBER (UNLESS SUPPRESSED BY THE "UNSEQUENCED" FORMAT OPTION), FOLLOWED WITHOUT SPACE BY THE TEXT, FOLLOWED BY

CR (CARRIAGE RETURN)
LF (LINE FEED)
DC1 (XON).

(THE DC1 PROVIDES B5500 COMPATIBILITY, AS WELL AS CARRIAGE-RETURN DELAY.) IF THE SEQUENCE NUMBER IS PRESENT, IT IS FILLED WITH LEADING ZEROS TO MAXIMUM WIDTH (E.G. 8 DIGITS).

AFTER THE LAST LINE, A DC3 (XOFF) CHARACTER IS PUNCHED, FOLLOWED BY 40 NULS FOR TRAILER. (THE XOFF IN THE TAPE WILL STOP SOME PAPER-TAPE READERS.) THE DCP THEN DELAYS FIVE SECONDS FOR THE USER TO

TURN OFF HIS PUNCH, BEFORE TRANSMITTING THE FINAL "#".

INPUT:

AFTER THE USER ENTERS A "TAPE" COMMAND, CANDE SENDS "#OK" FOLLOWED BY CR, LF AND DC1 (XON). THE XON WILL AUTOMATICALLY START THE PAPER-TAPE READER ON SOME TERMINALS; OTHERWISE THE USER MUST START IT MANUALLY WITHIN 15 SECONDS. IF FIFTEEN SECONDS ELAPSES WITH NO INPUT, THE DCP SIGNALS AN ERROR TERMINATION AND CANDE SENDS A MESSAGE TO THE TERMINAL. ONCE INPUT HAS BEGUN, IT CONTINUES UNTIL THE PAPER-TAPE READER STOPS (AS NOTED BY 500 MILLISECONDS WITH NO NEW CHARACTER). DURING INPUT, A CR (CARRIAGE RETURN) DELIMITS A LINE. THE FOLLOWING CHARACTER CODES ARE IGNORED (DISCARDED BY THE DCP):

LF (LINE FEED)
NUL
DEL (RUBOUT)
DC1 (XON)
DC3 (XOFF)

INPUT TAPES MAY CONTAIN SEQUENCE NUMBERS OR NOT; THE "SEQ" OPTION MUST BE SPECIFIED ON THE "TAPE" COMMAND IF CANDE IS TO SUPPLY SEQUENCE NUMBERS. LEADING ZEROS IN SEQUENCE NUMBERS MUST BE SUPPLIED ONLY IF THE FIRST CHARACTER OF TEXT IS A DIGIT, SINCE THE TEXT FIELD BEGINS WITH THE FIRST NON-DIGIT OR AFTER THE MAXIMUM NUMBER OF DIGITS FOR A SEQUENCE NUMBER.

ERRORS:

THE PAPER TAPE INPUT WILL BE TERMINATED IF NO INPUT APPEARS FOR 15 SECONDS, IF BREAK IS DETECTED ON THE LINE, IF A RECORD EXCEEDS MAXIMUM INPUT LENGTH, OR IF THE DCP FAILS TO ACQUIRE MESSAGE SPACE WHEN NEEDED. INPUT FOLLOWING THE ERROR IS DISCARDED. AN INVALID-STOPBIT ERROR IS TREATED BY SUBSTITUTING "?" FOR THE GARBLED CHARACTER; INPUT IS NOT ABORTED.

D0295 CANDE - IMPROVE PAPERTAPE I-O HANDLING - 04-23-73

OFF-LINE PREPARATION:

THE MINIMUM REQUIREMENT FOR CANDE INPUT IS THAT EACH LINE BE TERMINATED BY CR. IN ORDER THAT THE OUTPUT BE READABLE ON THE TELETYPE AS THE TAPE IS BEING READ, IT IS RECOMMENDED THAT EACH LINE BE TERMINATED BY CR, LF AND DEL (RUBOUT) OR NUL. THE LF ADVANCES THE PAPER, AND THE RUBOUT OR NUL GIVES THE CARRIAGE TIME TO RETURN. LEADER OR TRAILER TAPE MAY BE PUNCHED USING THE REPEAT KEY WITH DEL (RUBOUT) OR NUL. (NUL MAY BE PUNCHED ON MANY TELETYPEWRITERS USING SHIFT, CONTROL, AND "P".) ERRORS COMMITTED IN PUNCHING THE TAPE MAY BE REPAIRED BY BACKSPACING THE PAPER TAPE AT THE PUNCH, TYPING RUBOUT, AND THEN TYPING THE CORRECT CHARACTER. (THERE IS USUALLY A BACKSPACE ON THE PAPER-TAPE PUNCH FOR THIS PURPOSE.)

D0301 CANDE - EXECUTE WITH PARAMETER - 04-23-73

IN AN EXECUTE COMMAND WITH FILENAME SPECIFIED, A SINGLE PARAMETER MAY BE OPTIONALLY PROVIDED. THE PARAMETER MUST BE A QUOTED EBCDIC STRING; IT APPEARS IN PARENTHESES AFTER THE FILENAME. (THE STRING LENGTH IS LIMITED ONLY BY INPUT RECORD SIZE.) THE CORRESPONDING ACTUAL PARAMETER MUST BE A REAL ARRAY. EXAMPLE:

```
EXECUTE UTILITY ("CONTROLTEXT")
```

THE TEXT BETWEEN THE QUOTES IS FOLLOWED BY AT LEAST ONE NUL CHARACTER AND THEN PADDED WITH MORE NUL CHARACTERS (AT THE RIGHT END) TO A WORD BOUNDARY, AND INSERTED IN A MINIMUM-LENGTH ARRAY.

D0302 CANDE - ALLOW WORKFILE RECOMPILE - 04-23-73

IF AN EXPLICIT COMPILE COMMAND FOR THE WORKFILE IS ENTERED WHEN A VALID OBJECT FILE EXISTS, CANDE WILL NOW INFER A "REMOVE OBJECT" AND DO THE COMPILATION. (CANDE USED TO REJECT THE COMPILE.)

## D0303 CANDE - REVERSION TO NO CHARGECODE - 04-23-73

IF THE "CHARGE" COMMAND IS NULL (CONTAINS NO CHARGECODE), THE SESSION REVERTS TO THE CONDITION OF NO CHARGECODE SPECIFICATION. (IN II.3 CANDE, A CHARGE RECORD WAS LOGGED WITH THE USERCODE IN PLACE OF THE CHARGECODE. IN II.4 CANDE AS RELEASED, A "CHAOS" MEMORY DUMP IS PRODUCED. HENCEFORTH, AN MCS-TIMES RECORD WILL "LOG OFF" THE CHARGECODE, AND A NEW LOG-ON WILL BE RECORDED WITHOUT CHARGECODE.)

## D0304 CANDE - NOTE OBJECT FILE ONLY IF CODE - 04-23-73

THE "OBJECT-FILE PRESENT" INDICATION WILL BE SET BY A "GET" COMMAND ONLY IF THE FILE IS AN EXECUTABLE CODEFILE. IF YOU "GET X" AND THE FILE "OBJECT/X" EXISTS BUT IS NOT CODE, THE OBJECT FILE WILL BE IGNORED. (PREVIOUSLY, THE "OBJECT FILE PRESENT" INDICATION WAS SET, BUT AN ATTEMPT TO EXECUTE THE WORKFILE GAVE "DS-ED NO CODEFILE".)

## D0305 CANDE - FIX COL RANGE IN FIND-REPLACE - 04-23-73

THE COLUMN-RANGE CHECKING IN FIND/REPLACE COMMANDS HAS BEEN CORRECTED SO THAT THE LAST COLUMN IN THE USABLE RECORD IS NOW ACCESSIBLE. THE FOLLOWING RESTRICTIONS SHOULD BE NOTED:

THE COLUMN-RANGE SPECIFICATION

@<COL> - <COL2>

MAY REFER TO ANY PART OF THE USABLE RECORD EXCEPT THE SEQUENCE-NUMBER FIELD. (FOR EXAMPLE, AN ALGOLSYMBOL FILE PRODUCED BY THE COMPILER HAS 90-CHARACTER RECORDS; THE RANGE MAY INCLUDE ANY OF COLUMNS 1-72 OR 81-90.) THE DEFAULT COLUMN RANGE IS THE TEXT FIELD (1-72, FOR EXAMPLE).

D0305 CANDE - FIX COL RANGE IN FIND-REPLACE - 04-23-73

THE TARGET SPECIFICATION FORM

COLUMN <COL1> - <COL2>

IS LIMITED TO THE (DEFAULT OR EXPLICIT) COLUMN RANGE FOR THE REPLACE COMMAND. THUS

REPLACE COL 83-87 /013/ @81-90

IS VALID, BUT

REPLACE COL 83-87 /013/

CONTAINS INVALID COLUMN SPECIFICATIONS (FOR THE ALGOLSYMBOL EXAMPLE).

D0306 CANDE - LIST CHANGES OPTIONS - 05-19-73

THREE NEW OUTPUT FORMAT OPTIONS HAVE BEEN IMPLEMENTED FOR THE LIST COMMAND, TO SHOW ALTERATIONS WHICH HAVE BEEN MADE IN A WORKFILE SINCE THE LAST UPDATE. THE NEW OPTIONS ARE:

FLAG (MINIMUM ABBREVIATION "F"):

THE FILE IS LISTED IN FULL, WITH TWO EXTRA SPACES BEFORE EACH LINE. THE SPACES ARE BOTH BLANK IF THE LINE IS UNALTERED. THE FIRST SPACE BECOMES "I", "R", OR "F" FOR A LINE WHICH WAS INSERTED, REPLACED, OR FIXED, RESPECTIVELY. DELETED LINES ARE NOTED BY A "-" FOLLOWED BY THE SEQUENCE NUMBER (FOR SINGLE-LINE DELETION) OR SEQUENCE-NUMBER RANGE.

CHANGES (MINIMUM ABBREVIATION "CH"):

THE FILE IS LISTED WITH FLAGGING, AS DESCRIBED ABOVE, BUT UNALTERED LINES ARE SUPPRESSED.

COMPARE (MINIMUM ABBREVIATION "CO"):

THE FILE IS LISTED WITH FLAGGING, WITH UNALTERED LINES SUPPRESSED. ANY LINES DELETED, REPLACED OR FIXED ARE

LISTED IN FULL IN UNMODIFIED FORM, FLAGGED BY "-". BLANK LINES ARE INSERTED TO SEPARATE THE LISTING INTO GROUPS, WHERE A GROUP CONTAINS A SINGLE REPLACE OR FIX (LISTED BEFORE AND AFTER) OR AN INSERTION OR A DELETION. CONSECUTIVE INSERTED OR DELETED LINES ARE SHOWN AS A SINGLE GROUP.

THE SEVERAL OPTIONS ARE ILLUSTRATED IN THE FOLLOWING EXCERPT FROM A CANDE SESSION (REPRODUCED HERE IN THREE COLUMNS):

```
GET T;L
#WORKFILE T: SEQ,
  9 RECORDS, SAVED
10 A
20 B
30 C
40 D
50 E
60 F
70 G
80 H
90 I
#
20
35CD
37DC
40D2
DEL 60-80
#
F90//X
#
```

```
L
10 A
30 C
35 CD
37 DC
40 D2
50 E
90 XI
#
L:F
  10 A
- 20
  30 C
I 35 CD
I 37 DC
R 40 D2
  50 E
- 60-80
F 90 XI
#
```

```
L:CH
- 20
I 35 CD
I 37 DC
R 40 D2
- 60-80
F 90 XI
#
L:CO

- 20 B

I 35 CD
I 37 DC

- 40 D
R 40 D2

- 60 F
- 70 G
- 80 H

- 90 I
F 90 XI
#
```

THE ALTERATIONS WHICH CAN BE SHOWN ARE ANY DELETIONS, FIXES OR SINGLE-LINE ENTRIES WHICH HAVE BEEN ENTERED SINCE THE LAST TIME THE

D0306 CANDE - LIST CHANGES OPTIONS - 05-19-73

WORKFILE WAS UPDATED. AN UPDATE IS PERFORMED WHEN AN "UPDATE" COMMAND IS ENTERED, OR AUTOMATICALLY WHEN NEEDED: UPDATE IS FORCED BY MERGE, RMERGE, EXCLUDE, INSERT, MOVE OR RESEQ. WHEN THE WORKFILE HAS ANY ALTERATIONS, UPDATE IS FORCED PRIOR TO PERFORMING MANY OTHER COMMANDS, SUCH AS COMPILE, EXECUTE, TYPE, FIND OR SAVE. A LIST DOES NOT FORCE UPDATE, SO THE SAME ALTERATIONS MAY BE SHOWN ON SEVERAL SUCCESSIVE LIST COMMANDS.

SEVERAL LIST OPTIONS ARE INDEPENDENT: ONE MAY SELECT UNSEQUENCED, TRUNCATED, OR SQUASHED INDEPENDENTLY OF EACH OTHER OR THE OTHER OPTIONS. HOWEVER, THE FOLLOWING OPTIONS ARE MUTUALLY EXCLUSIVE, AND HAVE A PRECEDENCE IN THE ORDER LISTED (FROM HIGH TO LOW): PUNCH, COMPARE, CHANGE, FLAG. IF MORE THAN ONE OF THESE OPTIONS APPEARS, IN WHATEVER ORDER, THE ONE HAVING HIGHEST PRECEDENCE IS OPERATIVE.

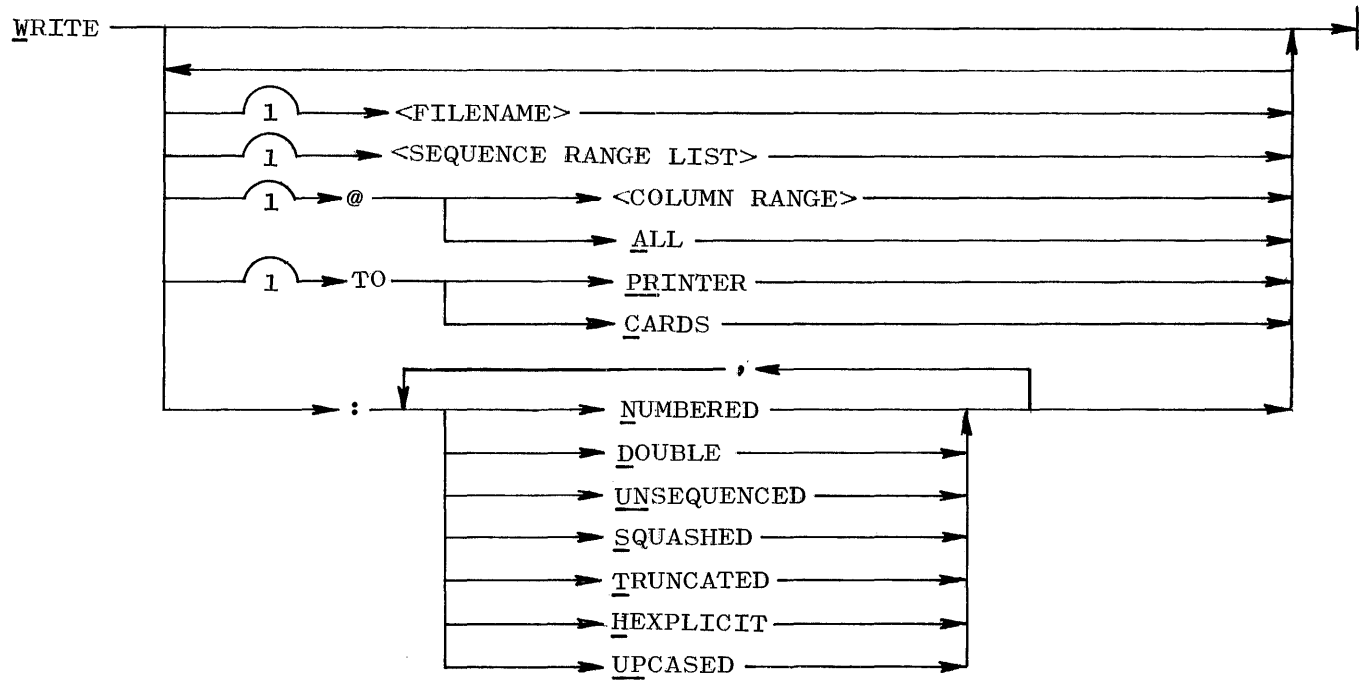
D0360 CANDE - TERMINAL CAPACITY LIMITS - 04-23-73

THE DEFAULT VALUES FOR THE TERMINAL SPECIFICATIONS ARE DERIVED FROM NDL PARAMETERS; THEY MAY BE ALTERED BY "TERM". THE DEFAULTS FOR LINE, PAGE AND BUFFER ARE NOW LIMITED TO 255, 255, AND 4095, RESPECTIVELY. LARGER SPECIFICATIONS WILL BE CUT BACK TO THESE LIMITS. (FORMERLY, THEY WERE TAKEN MODULO 256, 256, OR 4096, BY FIELD TRUNCATION.) IT ADDITION TO THESE UPPER BOUNDS, A LOWER BOUND OF 25 IS APPLIED TO LINE.

D0361 CANDE - WRITE COMMAND - 06-24-73

A NEW CANDE INPUT/OUTPUT COMMAND, WRITE, HAS BEEN IMPLEMENTED TO ALLOW THE USER TO HAVE FILES (OR PORTIONS THEREOF) LISTED ON THE LINE PRINTER OR PUNCHED ON CARDS. THE SYNTAX RESEMBLES THAT FOR LIST: THE KEYWORD "WRITE" (MINIMUM ABBREVIATION "W") FOLLOWED OPTIONALLY BY A FILENAME, SEQUENCE RANGE LIST, COLUMN RANGE, OUTPUT DEVICE, AND/OR OUTPUT FORMAT OPTIONS.

SYNTAX:




BY DEFAULT, THE CONTENTS OF THE WORKFILE ARE PRINTED ON THE LINE PRINTER. THE USER MAY SPECIFY THE OUTPUT DEVICE AS EITHER LINE PRINTER OR CARDS. IF A FILENAME IS SPECIFIED IT IS PRINTED (PUNCHED) IF THE USER HAS ACCESS PRIVILEGES. ONE OR MORE SEQUENCE RANGES IN ASCENDING ORDER MAY BE SELECTED; OTHERWISE, THE WHOLE FILE IS WRITTEN.

A COLUMN RANGE, IF PROVIDED, INDICATES THAT ONLY THE SPECIFIED PART OF EACH LINE IS TO BE OUTPUT (BEGINNING IN COLUMN 1 FOR CARDS AND COLUMN 13 FOR PRINTERS). THE KEYWORD "ALL" IS MEANINGFUL FOR PRINTERS ONLY AND CAUSES THE ENTIRE CONTENTS OF EACH RECORD TO BE PRINTED UNEDITED.

SEVERAL OUTPUT FORMAT OPTIONS ARE AVAILABLE FOR THE LINE PRINTER; THEY ARE IGNORED FOR CARDS. THE OPTIONS AND THEIR EFFECTS ARE:

1. NUMBERED THE RECORD NUMBER OF EACH RECORD IS PRINTED IN COLUMNS 115-120.

2. DOUBLE — LISTINGS ARE DOUBLE SPACED.

3. UNSEQUENCED — THE SEQUENCE NUMBER LISTED AT THE BEGINNING OF EACH LINE IS SUPPRESSED.

4. SQUASHED — ANY GROUP OF MULTIPLE BLANKS IS REDUCED TO A SINGLE BLANK.

5. TRUNCATED — IF THE TEXT PORTION OF A RECORD WILL NOT FIT IN THE AVAILABLE SPACE ON A LINE, IT IS TRUNCATED TO ONE LINE (AND TERMINATED BY A "/").

6. HEXPLICIT — IF A RECORD CONTAINS NON-GRAPHIC CHARACTERS, THE RECORD WILL BE PRINTED ON TWO LINES: THE TWO CHARACTERS REPRESENTING THE HEXADECIMAL NOTATION OF THE NON-GRAPHIC CHARACTER WILL APPEAR VERTICALLY, THE FIRST HEX-CHARACTER ON THE FIRST LINE, THE SECOND HEX-CHARACTER (IMMEDIATELY BELOW THE FIRST) ON THE SECOND LINE. LOWER-CASE LETTERS ARE PRINTED IN UPPER CASE WITH A HYPHEN UNDERSCORE. A BLANK LINE SEPARATES EACH RECORD; THE "DOUBLE" OPTION IS IGNORED.

7. UPCASED — ANY LOWER CASE LETTERS IN THE RECORD WILL BE TRANSLATED TO THEIR UPPER CASE EQUIVALENT.

PRINTER LINES ARE FORMATTED AS FOLLOWS: THE SEQUENCE NUMBER OF THE LINE APPEARS RIGHT JUSTIFIED IN COLUMNS 1-8 (PSEUDO SEQUENCE NUMBERS FOR TYPE DATA OR CDATA FILES) WITH LEADING ZEROS OMITTED, FOLLOWED BY FOUR BLANKS AND THE TEXT OF THE LINE. THE SEQUENCE FIELD OF THE RECORD IS PRINTED BEYOND THE TEXT FIELD (STARTING IN COLUMN 93), EXCEPT FOR UNSEQUENCED FILES. IF PATCH MARKS OR COMMENTARY ARE PRESENT IN COLUMNS 81-90 OF ALGOL, ESPOL, OR DCALGOL FILES, THEY ARE PRINTED FOUR SPACES BEYOND THE SEQUENCE FIELD. IF THE SEQUENCE FIELD OF A RECORD CONTAINS NON-NUMERIC CHARACTERS OR THE SEQUENCE NUMBER IS LESS THAN OR EQUAL TO THE PRECEDING SEQUENCE NUMBER, THE NUMBER IS FLAGGED AS HAVING A SEQUENCE ERROR. THE

## D0361 CANDE - WRITE COMMAND - 06-24-73

COMMENT PORTION OF TYPE COBOL FILES (COLUMNS 72-80) IS OFFSET FROM THE REST OF THE TEXT BY TWO BLANKS. (ALL LINE FORMATTING BEYOND THE TEXT FIELD IS SUPPRESSED WHEN A COLUMN RANGE IS SPECIFIED.)

IF THE TEXT PORTION OF A RECORD WILL NOT FIT IN THE SPACE AVAILABLE ON A PRINT LINE, IT IS SPLIT; LONG RECORDS ON CARDS ARE TRUNCATED.

NON-EBCDIC FILES ARE TRANSLATED TO EBCDIC FOR WRITING.

AS WITH ANY OUTPUT GENERATED BY A USER, BACKUP FILES CREATED BY USING THE WRITE VERB ARE NOT ACTUALLY PRINTED OR PUNCHED UNTIL THE USER EITHER LOGS OFF OR USES THE SPLIT COMMAND.

## D0368 CANDE - DEBUG SELECTIVELY BY STATION - 07-14-73

THE DIAGNOSTIC FACILITIES IN CANDE, ENABLED BY COMPILING WITH THE "DEBUG" OPTION SET, HAVE BEEN EXTENDED TO PERMIT SELECTIVE DEBUGGING BY STATION. A DIFFERENT SET OF OPTIONS MAY BE SPECIFIED FOR EACH STATION, IF DESIRED. THE SYNTAX OF THE ?BUG CONTROL STATEMENT HAS BEEN EXTENDED TO ACCEPT AN OPTIONAL STATION LIST TO FOLLOW THE DEBUG SPECIFICATIONS. THE STATION LIST, IF IT APPEARS, IS ENCLOSED IN BRACKETS; ITEMS ARE SEPARATED BY COMMAS. EACH ITEM MAY BE A LOGICAL-STATION NUMBER, STATION NAME, D:L:S, OR AN ASTERISK. THE DEBUG SPECIFICATIONS ARE APPLIED TO EACH STATION IN THE LIST; ASTERISK DENOTES THE STATION FROM WHICH THE ?BUG COMMAND IS ENTERED. IF NO LIST APPEARS, THE SPECIFICATIONS ARE APPLIED TO ALL STATIONS. THE FOLLOWING EXAMPLE SHOWS INPUT COMMANDS FOLLOWED BY THE RESPONSES.

```
?BUG 1 2 4
#BUGWORDS=000000000016

?BUG A 46 [TTY7,17,0:21]
#BUGWORD[9]=BFFFFFFFFFFF
#BUGWORD[17]=BFFFFFFFFFFF
#BUGWORD[34]=BFFFFFFFFFFF

?BUG -4
```

D0368 CANDE - DEBUG SELECTIVELY BY STATION - 07-14-73

```
#BUGWORDS=000000000006

?BUG [*]
#BUGWORD[17]=BFFFFFFFFFEF
```

NOTE THAT WHEN NO STATION LIST APPEARS, THE RESPONSE SHOWS THE SETTINGS FOR ALL STATIONS FOR WHICH NO INDIVIDUAL SPECIFICATIONS APPLY. WHEN THE NEW OVERALL SPECIFICATION IS A MODIFICATION (SUCH AS -4), IT APPLIES TO ALL STATIONS, BUT THE PRIOR SETTINGS OF OTHER BITS FOR SPECIFIC STATIONS REMAIN UNCHANGED (SO STATION 17 CHANGED FROM BFFFFFFFFFFF TO BFFFFFFFFFEF, IN THIS EXAMPLE).

THE SPECIFIED DEBUG SETTINGS APPLY WHENEVER CANDE ACTIVITY IS ATTRIBUTABLE TO SERVING THAT STATION IN PARTICULAR. AT TIMES WHEN IT IS IMPOSSIBLE TO ATTRIBUTE ACTIVITY TO ANY ONE STATION, THE DEBUG SETTINGS ARE TAKEN AS THE LOGICAL OR OF ALL SETTINGS SELECTED FOR ANY STATION. SUCH CASES ARISE DURING CERTAIN ADMINISTRATIVE ACTIVITY, WHEN PROCESSING SM AND OTHER NON-STATION MESSAGES, AND WHEN PROCESSING CONTROL MESSAGES.

A COMMA IS NOW AN ACCEPTABLE DELIMITER BETWEEN DUBUG SPECIFICATIONS.

D0369 CANDE - PAGED OUTPUT FROM FILES-LFILES - 07-14-73

OUTPUT FROM THE FILES AND LFILES COMMANDS WILL NOW BE PAGED IN SIMILAR FASHION TO OUTPUT FROM LIST, FIND AND REPLACE. THE OUTPUT IS CONTROLLED BY THE SAME TERMINAL SPECIFICATION (DEFAULT OR SPECIFIED BY THE TERMINAL COMMAND): IF PAGE EXCEEDS ONE AND WAIT IS TRUE, THE APPROPRIATE NUMBER OF LINES ARE SENT AND THE USER MUST RESPOND WITH ANY NON-CONTROL RECORD TO RECEIVE MORE OUTPUT. (A #? INDICATION APPEARS, BECAUSE SYSTEM/LISTFILES OPENS AN INPUT/OUTPUT FILE TO RECEIVE THE RESPONSE.) NOTE THAT SYSTEM/LISTFILES IGNORES THE BUFFER SPECIFICATION IN SENDING ITS OUTPUT; IT SENDS ONE LINE AT A TIME. ON TERMINALS WHERE THE BUFFER IS SMALLER THAN THE SCREEN, THIS MAY RESULT IN SOME LINES BEING LOST BEFORE THE ENTIRE PAGE HAS BEEN SENT; IT MAY BE NECESSARY TO SPECIFY AN ARTIFICIALLY SMALL PAGE SIZE, ESPECIALLY FOR LFILES (WHICH TENDS TO FILL THE

D0369 CANDE - PAGED OUTPUT FROM FILES-LFILES - 07-14-73

OUTPUT LINES).

D0451 CANDE - CHAR FILES: CDATA,CSEQDATA - 08-26-73

CANDE CAN NOW READ CHARACTER FILES (UNITS=CHARACTERS, INTMODE = EBCDIC, BCL OR ASCII); IT CAN WRITE SUCH FILES PROVIDING MAXRECSIZE IS EVEN AND THE MODE IS NOT BCL.

CANDE NOW CREATES AND RECOGNIZES TWO NEW TYPES (FILEKINDS): CDATA AND CSEQDATA (MINIMUM ABBREVIATIONS CD AND CS). WHEN CREATED BY CANDE, BOTH ARE 80-CHARACTER RECORDS IN BLOCKS OF 2160 EBCDIC CHARACTERS. CDATA FILES ARE UNSEQUENCED; CSEQDATA FILES HAVE SEQUENCE NUMBERS IN COLUMNS ONE THROUGH FIVE, WITH COLUMN SIX BLANK. THESE TYPES ARE COMPATIBLE WITH BASIC INPUT/PRINT AND READ/WRITE STATEMENTS, RESPECTIVELY.

CANDE NOW DISALLOWS ANY FILE WITH MODE NOT EBCDIC, BCL OR ASCII.

D0452 CANDE - LOGON W-OUT PASSWORD; ESCAPE - 08-19-73

USERS AUTHORIZED TO RUN WITHOUT PASSWORDS MAY NOW LOG ONTO CANDE. THE USER MAY ENTER HIS USERCODE FOLLOWED BY A PERIOD (".") TO INDICATE HE WILL NOT PROVIDE A PASSWORD. A PERIOD MAY ALSO BE USED AS A RESPONSE TO THE "ENTER PASSWORD" REQUEST.

THE USER MAY ABORT THE LOGON OR PASSWORD-CHANGE SEQUENCE BY ENTERING A NULL INPUT WHEREVER A PASSWORD IS REQUESTED. THIS ESCAPE MECHANISM SPARES A USER FROM HAVING TO ENTER A PASSWORD AND RECEIVE A SECURITY ERROR WHEN HE KNOWS THE USERCODE WAS INCORRECT.

D0453 CANDE - DISALLOW CERTAIN SM COMMANDS - 08-19-73

CANDE WILL NOW DISALLOW CERTAIN CONTROL COMMANDS AS SM INPUT FROM THE SYSTEM CONSOLE. THESE COMMANDS HAD NO MEANING IF ENTERED FROM THE CONSOLE AND COULD CAUSE CANDE FAULTS OR MEANINGLESS RESPONSES.

THE EXCLUDED COMMANDS ARE: END, DENY, MCS, DS, SPO, AND WRU.

## D0454 CANDE - MARGIN, SEQUENCE - 08-19-73

CANDE PROCESSING OF THE MARGIN (@) COMMAND HAS BEEN REWRITTEN, ALONG WITH SEVERAL ASPECTS OF HANDLING SEQUENCE MODE. A NUMBER OF PROBLEMS WERE ELIMINATED, AND BETTER CHECKING IS BEING PERFORMED.

TWO NEW SYNTACTIC CONSTRUCTS ARE AVAILABLE:

```
   @?
```

OR

```
   MARGIN?
```

CAUSES CANDE TO DISPLAY THE CURRENT MARGIN SETTING.

```
   <SEQUENCE>@<COLUMN>:<NEW LINE TEXT>
```

NOW HAS THE SAME EFFECT AS

```
   @<COLUMN>:<SEQUENCE><NEW LINE TEXT>
```

WHEN CANDE IS NOT RUNNING IN AUTOMATIC SEQUENCE MODE.

NOTE THAT AN "@" MUST APPEAR TWICE ("@@") IF IT IS TO BE ENTERED AS THE FIRST CHARACTER FOR A LINE; THIS RULE NOW APPLIES WHETHER OR NOT SEQUENCE MODE IS ACTIVE.

## D0455 CANDE - FAULT AND ERROR HANDLING - 08-19-73

CANDE NOW INCORPORATES A NEW MECHANISM FOR HANDLING FAULTS AND ERRORS. WHEN A FAULT OR ERROR IS DETECTED, CANDE ATTEMPTS TO MINIMIZE ITS EFFECT: IF THE PROBLEM CAN BE ASCRIBED TO A PARTICULAR USER, THAT USER WILL BE NOTIFIED AND HIS CURRENT OPERATION TERMINATED, WHILE SERVICE TO OTHER USERS CONTINUES. (THERE REMAIN SOME CASES WHERE IT IS IMPOSSIBLE OR UNSAFE TO CONTINUE PROCESSING, WHEN CANDE MUST BE TERMINATED.) IN THE CURRENT CONTEXT, A "FAULT" IS DEFINED AS AN ILLEGAL SITUATION DETECTED BY THE B6700 HARDWARE,

SUCH AS INDEXING OUTSIDE THE BOUNDS OF AN ARRAY; AN "ERROR" IS DEFINED AS AN ILLEGAL SITUATION DETECTED BY THE CANDE PROGRAM, SUCH AS A VIOLATION OF ITS BUFFER-ALLOCATION PROTOCOL. FAULTS AND ERRORS ARE HANDLED ALIKE, EXCEPT FOR THE MESSAGES REPORTING THEM:

```
FAULT MESSAGE:   #CANDE FAULT FF @LLLLLLLL
ERROR MESSAGE:   #CANDE ER:EEEEEE@LLLLLLLL
```

FF REPRESENTS A TWO-DIGIT FAULT CODE, EEEEEE AN ERROR LITERAL, AND LLLLLLLL A LINE NUMBER IN CANDE. NOTE THAT THESE CRYPTIC MESSAGES REFER TO PROBLEMS IN CANDE ITSELF, NOT A USER PROGRAM. (IF LINEINFO IS UNAVAILABLE, THE LLLLLLLL IS REPLACED BY AN ADDRESS, AA:AAA:A.)

RECOVERY FROM A FAULT OR ERROR CONDITION PROCEEDS GENERALLY AS FOLLOWS. THE MESSAGE IS DISPLAYED ON THE CENTRAL OPERATOR CONSOLE. A PROGRAMDUMP AND OTHER DIAGNOSTIC INFORMATION IS WRITTEN FROM THE CANDE STACK ENCOUNTERING TROUBLE (OCCASIONALLY BOTH STACKS); THIS MAY BE SEEN AS A PAUSE IN CANDE RESPONSE. IF THE PROBLEM CAN BE ASSOCIATED WITH A USER STATION, THE MESSAGE IS SENT THERE; THE MESSAGE IS ALSO SENT TO THE CANDE LOG STATION, IF ACTIVE. THE INTERRUPTED OPERATION IS TERMINATED AND APPROPRIATE HOUSEKEEPING FUNCTIONS PERFORMED TO RETURN TO A NEUTRAL STATE. USERS WHO NOTICE PARTICULAR OPERATIONS OR DATA CAUSING REPEATED PROBLEMS ARE URGED TO COMMUNICATE WITH THEIR INSTALLATION MANAGEMENT OR BURROUGHS TECHNICAL REPRESENTATIVE, SO THAT THE UNDERLYING PROBLEM MAY BE ISOLATED AND CORRECTED.

THE FOLLOWING TECHNICAL INFORMATION IS OFFERED FOR INSTALLATION AND FIELD PERSONNEL.

FAULTS ARE TRAPPED BY "ON ANYFAULT" STATEMENTS IN THE OUTER BLOCKS OF EACH CANDE STACK, AS WELL AS IN CERTAIN SPECIAL ENVIRONMENTS. (SOME PROCEDURES CONTAIN "ON" STATEMENTS FOR SELECTED FAULTS WHICH MAY ARISE DUE TO EXCESSIVE INPUT DATA; THESE ARE TREATED AS NORMAL USER ERRORS RATHER THAN CANDE PROBLEMS.) BOTH STACKS HAVE BOOLEAN VARIABLES USED TO PREVENT RECURSIVE FAULT SITUATIONS OR INHIBIT RECOVERY ACTION AT CRITICAL POINTS (NOTABLY THE WAITANDGO PROCEDURE). FAULTS AT SUCH TIMES CAUSE NORMAL OR ABNORMAL

TERMINATION OF THE SECOND STACK, AND (HOPEFULLY) NORMAL TERMINATION OF THE PRIMARY STACK SO THAT DATACOM ACTIVITY WILL RESTART CANDE.

THE PROCEDURE MUDDLE IS USED TO FORMAT AND SEND THE FAULT/ERROR MESSAGE, AND PROGRAMDUMP THE TROUBLED STACK. IF THERE ARE MESSAGES IN THE HOLDQ FOR THE STATION BEING PROCESSED, THEY ARE PRINTED FOLLOWING THE PROGRAM DUMP. WHEN RUNNING IN STACK2, MUDDLE COPIES COMPILEPARAMS, STA AND WBUFINF INTO ITS LOCAL STACK, SO THAT THESE KEY GLOBAL DATA ARE VISIBLE IN THE PROGRAMDUMP. A STACK2 PROGRAMDUMP IS USUALLY FOLLOWED BY LISTINGS OF THE KEY TANKFILE RECORDS PERTAINING TO THAT STATION AND WORKER. THUS IN MOST CASES, A PROGRAM DUMP OF ONLY ONE STACK SUFFICES. FOR THOSE "CHAOS" ERRORS WHERE ONE STACK ATTEMPTS TO ACQUIRE A BUFFER IN USE BY THE OTHER, A SOFTWARE INTERRUPT CAUSES THE OTHER STACK TO PROGRAMDUMP ITSELF. (CANDE NO LONGER DIRECTLY INVOKES A FULL-MEMORY DUMP.) NOTE THAT ALL THIS DIAGNOSTIC INFORMATION IS WRITTEN TO THE TASKFILES FOR THE RESPECTIVE TASKS, AND MAY NOT BE PRINTED IN CHRONOLOGICAL ORDER.

THE PROGRAMDUMPS AND OTHER DIAGNOSTIC DATA FROM RECOVERABLE FAULTS AND ERRORS MAY BE SUPPRESSED BY USING THE ?R047 CONTROL COMMAND; THEY MAY BE REINSTATED WITH THE ?S047 COMMAND. INSTALLATIONS ARE URGED TO RUN WITH THE OPTION SET (AS IT IS BY DEFAULT), SINCE THE REMAINING CANDE PROBLEMS ARE LIKELY TO BE ELUSIVE AND DIFFICULT TO REPRODUCE. A POTENTIAL PROBLEM WITH FAULT RECOVERY IS THAT TROUBLE SPOTS WILL BECOME TOLERATED ANNOYANCES AND GO UNREPORTED (AND HENCE UNCORRECTED).

CANDE ERRORS ARE TRANSFORMED INTO FAULTS BY THE DEFINES "PUNT", "PUNT1" OR "PUNX"; THE EBCDIC STRING REPRESENTING THE ERROR LITERAL IS DIVIDED BY ZERO. THUS THE LITERAL SHOWS UP JUST BELOW THE DIVIDE-BY-ZERO INTERRUPT IN THE PROGRAM DUMP. IN SOME CASES A SECOND PARAMETER APPEARS JUST BELOW THE LITERAL. THE ERRORS DEFINED IN 2.5 CANDE ARE LISTED BELOW WITH BRIEF DESCRIPTIONS OF THE PROBLEMS.

BUFCNT THE BUFFER COUNTER FOR THE PRIMARY STACK IS NON-ZERO AFTER ALL BUFFERS HAVE BEEN DEALLOCATED.

CHAOS AN ATTEMPT WAS MADE TO ACCESS A TANKFILE BLOCK THAT IS ALREADY IN USE.

CTF=0 THE CONTROL INFORMATION DESCRIBING CHANGES TO THE WORKFILE APPEARS TO HAVE A NULL ENTRY. THE SECOND PARAMETER IS AN INDEX INTO THE CONTROL BLOCK.

DIOERR AN UNEXPECTED DIRECT-I/O ERROR WAS REPORTED. THE SECOND PARAMETER IS THE VALUE OF THE IOERRORTYPE ATTRIBUTE.

NOBUF THE TANK BUFFER POOL IS EXHAUSTED (IN SPITE OF A DISCIPLINE THAT ASSURES THIS CANNOT OCCUR).

ORPHAN UPON COMPLETION OF AN OPERATION, NOT ALL BUFFERS WERE RETURNED TO THE POOL.

QEMPTY A REMOVE FAILED TO FIND A MESSAGE IN A QUEUE WITH NON-ZERO QMESSAGECOUNT. THE SECOND PARAMETER IS THE QUEUE IDENTIFIER.

STATE A SWITCHED GO TO STATEMENT ON THE STATION STATE FAILED.

SWAPPR STACKSWAPPER REPORTED AN ERROR; THE SECOND PARAMETER IS THE ERROR CODE.

TANK THE TANKFILE DATA FOR RECOVERY IS UNUSABLE.

USURP A REFERENCE WAS MADE TO A BUFFER NOT ACQUIRED BY THAT STACK OR WORKER. (MOST OF THE CHECKING FOR THIS TRAP IS ENABLED BY THE "PEDANTIC" COMPILE TIME OPTION.)

XSBUF A GIVEN STACK OR WORKER ACQUIRED MORE THAN TWO BUFFERS.

## D0456 CANDE - "END" AS SEQRANGE OR BASE - 08-19-73

"END" MAY NOW BE USED AS A VALID SEQUENCE RANGE OR BASE.

"END" MAY APPEAR ANYWHERE IN THE SYNTAX THAT A <SEQUENCE RANGE> IS ACCEPTED, EXCEPT IN MERGE, RMERGE OR EXCLUDE (WHERE IT WOULD BE AMBIGUOUS, EXPENSIVE, AND OF NEGLIGIBLE UTILITY); IT REFERS TO THE LAST LINE IN THE FILE.

"END" MAY APPEAR ANYWHERE IN THE SYNTAX THAT A <BASE> IS ACCEPTED, EXCEPT RESEQ; IT REFERS TO THE LAST LINE IN THE FILE PLUS THE (SPECIFIED OR DEFAULT) INCREMENT.

FOR EXAMPLE, ASSUME A FILE WHOSE LAST LINE IS AT 14700.

D0456 CANDE - "END" AS SEQRANGE OR BASE - 08-19-73

```
L END              LISTS 14700
S END+50           SETS SEQUENCE BASE TO 14750
INS XYZ AT END     INSERTS CONTENTS OF FILE "XYZ" AT
                   14700+INC, WHERE INC IS THE LAST
                   INCREMENT SPECIFIED (DEFAULT 100).
```

IN THOSE COMMANDS WHERE A FILENAME AND/OR SEQUENCE RANGE MAY APPEAR IN EITHER ORDER, THE WORD "END" MUST APPEAR IN QUOTES WHEN USED AS A FILENAME. THE FOLLOWING ARE UNAMBIGUOUS AND CORRECT:

```
LIST "END"
LIST END
LIST END/GAME
```

D0514 CANDE - SEPARATELY COMPILED PROCEDURES - 09-04-73

COMPILATION OF SEPARATE PROCEDURES WITH CANDE IS NOW GREATLY SIMPLIFIED BY CHANGES IN THE COMPILERS. THE NEW "LIBRARY" DOLLARCARD OPTION IN ALGOL, DCALGOL, ESPOL AND FORTRAN PERMIT ONE OR MORE PROGRAM UNITS (PROCEDURES, OUTER BLOCKS, SUBROUTINES, FUNCTIONS) TO BE COMPILED INTO A SINGLE CODEFILE, USING THE FILE NAME SPECIFIED BY THE USER (OR BY CANDE FOR A WORKFILE). THESE COMPILERS SET LIBRARY BY DEFAULT FOR CANDE COMPILATIONS. A LIBRARY FILE MAY BE USED AS A SOURCE BY THE BINDER. A LIBRARY FILE CONTAINING A SINGLE PROCEDURE CAN BE EXECUTED WITH A PARAMETER.

EXAMPLE:

```
MAKE X A
100 PROCEDURE P(A); ARRAY A[*];
200 BEGIN
.
.
.
900 END.
C; SA
```

```
E X("...")
```

IN THE FOLLOWING EXAMPLE, ASSUME THAT FILE A/B CONTAINS SEVERAL PROCEDURES TO BE COMPILED AND BOUND TO HOST A/H WITH THE RESULT BEING EXECUTED.

```
C A/B
MAKE X BI
100 HOST IS A/H
200 BIND=FROM OBJECT/A/B;
R
```

THIS EXAMPLE DIFFERS FROM A 2.4 CASE ONLY IN THAT THE BIND STATEMENT WOULD HAVE BEEN

```
200 BIND=FROM OBJECT/A/=;
```

## D0515 CANDE - DEBUG: LABEL "WRITE" DCWRITES - 09-09-73

IF THE "DEBUG" COMPILE TIME OPTION IS SET, CANDE WILL MARK EACH "WRITE" MESSAGE WITH A MESSAGE COUNT IN MSG[4].[35:12], SO RESULTS CAN BE UNAMBIGUOUSLY ASSOCIATED WITH WRITES. SEPARATE COUNTERS ARE USED IN THE TWO STACKS; THE PRIMARY STACK USES ODD VALUES AND THE SECOND STACK EVEN VALUES.

## D0516 CANDE - AUTOMATIC RECOVERY - 09-09-73

IF A CANDE FAULT OR ERROR OCCURS IN A WORKFILE EDITING OR OUTPUT OPERATION (A CANDE "WORKER"), THE FOLLOWING ACTIONS ARE TAKEN TO INVOKE THE CONSISTENCY CHECKING OF CANDE WORKFILE RECOVERY:

1. THE TANKFILE DATA ARE SAVED IN A RECOVERY FILE, AS THOUGH THE STATION HAD DISCONNECTED.
2. CANDE DISPLAYS "#AUTORECOVERY INITIATED".
3. THE ACTION OF A "RECOVER" COMMAND IS TAKEN USING THE APPROPRIATE RECOVERY FILE.

D0516 CANDE - AUTOMATIC RECOVERY - 09-09-73

IF THE CONSISTENCY CHECKING FAILS, NORMAL "INVALID RECOVERY FILE" ACTION FOLLOWS; SEE CANDE NOTE D0517.

D0517 CANDE - REVISED RECOVERY MECHANISM - 09-04-73

THE CANDE RECOVERY MECHANISM HAS BEEN SUBSTANTIALLY REVISED; THE FUNDAMENTAL APPROACH AND THE USER INTERFACE ARE LITTLE CHANGED.

FILE NUMBERING AND LIMITS

THE NUMBERING SCHEMES FOR RECOVERY FILES AND WORKFILES HAVE BEEN REVISED AND CONSOLIDATED, IMPROVING RELIABILITY AND GREATLY REDUCING . OVERHEAD. THE RECOVERY NUMBER TO BE USED AT ANY SESSION IS NOW DETERMINED AT THE BEGINNING OF THE SESSION, AND THIS NUMBER IS SUFFIXED TO THE "TEXT" AND "CODE" FILES CREATED BY UPDATING AND COMPILING THE WORKFILE. IF A RECOVERY FILE MUST BE CREATED, THE SAME NUMBER IS SUFFIXED TO THE "RECV" FILE; THE TEXT AND CODE FILES NEED NOT BE RENAMED. THE RECOVERY NUMBER CONSISTS OF THE LOGICAL STATION NUMBER (IN DECIMAL) FOLLOWED BY ONE DIGIT TO DISTINGUISH MULTIPLE RECOVERY FILES FROM THE SAME STATION.

THE NEW SCHEME IMPOSES A LIMIT OF 10 RECOVERY FILES FROM THE SAME STATION, AND A TOTAL OF 25 RECOVERY FILES UNDER ANY ONE USERCODE. (THE SECOND LIMIT IS AN ARBITRARY DEFINE, MAXRECFILES, WHICH THE INSTALLATION MAY MODIFY BY COMPILING CANDE; ITS UPPER BOUND IS 149.) IF 25 OR MORE RECOVERY FILES EXIST, ONLY THE FIRST 25 ARE LISTED AT LOG-ON TIME OR BY THE RECOVER COMMAND, AND ANY ATTEMPT TO GET OR MAKE ANOTHER WORFILE IS REJECTED WITH THE MESSAGE

#RECOVER OR DISCARD A WORKFILE.

IF 10 RECOVERY FILES EXIST FOR THE CURRENT STATION, ANY GET OR MAKE, OR AN ATTEMPT TO RECOVER A FILE CREATED FROM ANOTHER STATION, WILL BE REJECTED WITH A MESSAGE LIKE

#RECOVER OR DISCARD A WORKFILE IN THE RANGE 230-239

## QUEUING

THE PROCEDURE THAT LISTS THE AVAILABLE RECOVERY FILES IS NOW RUN WITH THE QUEUE USED FOR SUCH OPERATION AS REMOVE, TITLE, GET OR MAKE, RATHER THAN WITH THE QUEUE FOR LIST, UPDATE AND THE LIKE. THUS THERE WILL NEVER BE A "#WAITING FOR WORKER" SITUATION GENERATED AT LOG-ON TIME.

## VALIDITY

A SUBSTANTIALLY HIGHER LEVEL OF CONSISTENCY CHECKING IS NOW APPLIED TO RECOVERY FILES, TO SCREEN OUT FILES HARMFUL TO CANDE. WHEN AN INVALID RECOVERY FILE IS DETECTED, THE FOLLOWING ACTIONS ARE TAKEN: THE CONTENTS OF THE "RECV" FILE ARE LISTED IN THE TASKFILE OF STACK2/CANDE, TO PERMIT DIAGNOSIS OF THE FAILURE. (PLEASE FORWARD ALL SUCH OUTPUT THROUGH TIO.) THE FILE IS THEN PURGED. IF A "TEXT" WORKFILE EXISTS (THAT IS, IF THE FILE WAS UPDATED SINCE GET OR MAKE), THEN THAT FILE IS RECOVERED. THE RESULTS OF SUCH RECOVERY LOOK LIKE:

```
#WORKFILE IS NOT NAMED: ALGOL, 347 RECORDS
#INVALID RECOVERY FILE; NAME AND ANY CHANGES WERE LOST
```

IF THERE WAS NO TEXT, OR IF ITS RECOVERY FAILED, THE MESSAGE IS

```
#INVALID RECOVERY FILE
```

## COMPATIBILITY

WHEN A WORKFILE HAS BEEN UPDATED, ITS DATA RESIDE IN A "TEXT" FILE; A COMPILED WORKFILE OBJECT EXISTS AS A "CODE" FILE. ALL OTHER INFORMATION ABOUT AN ACTIVE WORKFILE, INCLUDING ANY CHANGES SINCE THE LAST UPDATE, ARE KEPT IN THE "TANKFILE". A RECOVERY FILE IS CREATED BY TRANSCRIBING FROM THE TANKFILE THAT INFORMATION WHICH PERTAINS TO THE STATION WHOSE SESSION WAS ABORTED. THIS TRANSCRIPTION IS PERFORMED IMMEDIATELY IF CANDE WAS FUNCTIONING AT THE TIME OF THE ABORT (STATION DISCONNECT, OPERATOR ?QUIT, ETC.); IN A CATASTROPHE (EXTERNAL DS OF CANDE, SYSTEM HALT/LOAD), THE TANKFILE DATA ARE TRANSCRIBED WHEN CANDE IS NEXT INITIATED.

## D0517 CANDE - REVISED RECOVERY MECHANISM - 09-04-73

THE 2.5 CANDE TANKFILE IS NOT COMPATIBLE WITH PRIOR RELEASES; ITS NAME HAS BEEN CHANGED [FROM TANKFILE/CANDE TO TANKFILE/"(CANDE)"] SO 2.5 CANDE WILL IGNORE A 2.4 TANKFILE, AND VICE VERSA. CANDE CAN RECOVER TANKFILE DATA ONLY WHEN THE RECOVEROR HAS THE SAME MAXSTATIONS DEFINED AS THE LATE CREATOR; 2.5 CANDE WILL DISPLAY WARNING MESSAGES AND TERMINATE IF THE TANKFILE IS NOT COMPATIBLE. THUS IT IS IMPORTANT TO TERMINATE CANDE NORMALLY BEFORE CHANGING VERSIONS OR MAXSTATIONS. (UPON NORMAL TERMINATION, 2.5 CANDE PURGES THE TANKFILE.)

ONCE THE RECOVERY DATA HAVE BEEN RECORDED IN A SEPARATE FILE, THEY ARE UPWARD COMPATIBLE: 2.5 CANDE WILL RECOGNIZE AND ACCOMMODATE 2.4 RECOVERY FILES; 2.4 CANDE WILL NOT RECOGNIZE 2.5 RECOVERY FILES.

## D0518 CANDE - FURTHER BRUTALITY - 09-04-73

THE "BRUTAL" COMPILE TIME OPTION HAS BEEN EXTENDED AND MODIFIED: BY DEFAULT, IF BRUTAL IS SET, ANY CALL ON WAITANDGO WILL NOW CALL STACKSWAPPER, TO INCREASE THE PROBABILITY OF DETECTING ANY VIOLATIONS OF THE STACKSWAPPER RESTRICTIONS. TWO RUN TIME CONTROLS NOW PROVIDE FLEXIBILITY, USING THE ?RO AND ?SO CONTROL COMMANDS. ?RO46 WILL STOP FORCING WAITANDGO TO CALL STACKSWAPPER; ?RO45 WILL STOP FORCING GETBLK TO CALL WAITANDGO.

## D0519 CANDE - IMPLEMENT DISCARD COMMAND - 09-04-73

A NEW CANDE COMMAND, DISCARD, HAS BEEN IMPLEMENTED TO ALLOW USERS TO REMOVE RECOVERY FILES THEY DO NOT WANT TO KEEP. THE KEYWORD "DISCARD" (MINIMUM ABBREVIATION DIS) MUST BE FOLLOWED BY THE RECOVERY FILE NUMBER (OR A LIST OF NUMBERS SEPARATED BY COMMAS) TO BE REMOVED. THIS COMMAND SPARES A USER FROM HAVING TO RECOVER A FILE AND THEN REMOVE HIS WORKFILE IN ORDER TO DISCARD AN UNWANTED RECOVERY FILE.

EXAMPLE

```
DISCARD 900,880,20
DIS700
```

## COBOL

### D0289 COBOL - STATISTICS - 04-23-73

IT IS NOW POSSIBLE TO OBTAIN STATISTICS WHICH REVEAL THE CHARACTERISTICS OF A COBOL OBJECT JOB. STATISTICS ARE ACCUMULATED FOR A PROGRAM WHEN THE STATISTICS DOLLAR OPTION IS SET. THIS OPTION MAY NOT BE CHANGED AFTER THE COMPILER HAS ENCOUNTERED THE BEGINNING OF THE IDENTIFICATION DIVISION. WHEN THIS OPTION IS SET, THE COMPILER WILL INCLUDE CODE TO DETERMINE HOW MANY TIMES EACH PARAGRAPH IS ENTERED AND HOW MUCH TIME IS SPENT EXECUTING THE INSTRUCTIONS COMPRISING EACH PARAGRAPH.

EACH PARAGRAPH HAS A UNIQUE NUMBER. THIS NUMBER IS PRINTED ON THE RIGHT-HAND SIDE OF THE COMPILER LISTING AND CORRESPONDS TO ONE LINE OF OUTPUT ON THE SYSTEM SUMMARY OF THE STATISTICS. THIS SUMMARY IS WRITTEN ON THE JOBS DIAGNOSTIC FILE (THE FILE ON WHICH PROGRAM DUMPS APPEAR). A SIMPLE EXAMPLE FOLLOWS:

```
   PROCEDURE DIVISION.
   P1.
                                                ACTIVE CLOCK IS #0001
      OPEN INPUT CARD-FILE.
   P2.
                                                ACTIVE CLOCK IS #0002
      READ CRD AT END GO TO DONE.
      IF FLD=0 THEN PERFORM ZERO-RECORD.
   P3.
                                                ACTIVE CLOCK IS #0003
      MOVE 5 TO R-CLASS.
```

THE OUTPUT OF THE STATISTICS SUMMARY WOULD LOOK LIKE THE FOLLOWING EXAMPLE:

```
   BLOCK          FREQ          TOTAL TIME      AVG TIME
```

D0289 COBOL - STATISTICS - 04-23-73

| BLOCK | FREQ | TOTAL TIME | AVG TIME |
|---|---|---|---|
| MAIN | 1 | 0.132267 | 0.132267 |
| 1 | 1 | 600 | 600 |
| 2 | 1000 | 0.500000 | 500 |
| 3 | 366 | 36600 | 100 |
| . | . | . | . |
| . | . | . | . |
| . | . | . | . |

THE COLUMN LABELED BLOCK SPECIFIES THE PARAGRAPH, AS NUMBERED ON THE SOURCE LISTING, FOR WHICH THE LINE OF OUTPUT APPLIES. THE LINE LABELED MAIN IS PART OF THE TIME NECESSARY TO INITIALIZE USER DATA AREAS AND CONSTRUCT PART OF THE STACK.

THE DATA LISTED UNDER THE HEADING FREQ REFLECTS THE NUMBER OF TIMES THE PARAGRAPH WAS ENTERED. PARAGRAPHS NEVER ENTERED ARE NOT LISTED.

THE DATE UNDER TOTAL TIME IS THE TOTAL ELAPSED TIME SPENT PROCESSING THE PARAGRAPH. THE COLUMN AVG TIME IS EQUAL TO THE VALUE OF TOTAL TIME DIVIDED BY FREQ. ONE SHOULD NOTE THAT TIMES PRINTED IN BOTH OF THESE COLUMNS WITHOUT A DECIMAL POINT ARE TIMES IN MICROSECONDS. THUS THE TOTAL TIME SPENT IN P1 WOULD BE 600 MICROSECONDS; BUT, FOR P2 IT WOULD BE ONE HALF OF A SECOND.

A STATISTICS SUMMARY IS PRODUCED AT END OF JOB, WHEN THE PROGRAM IS DS-ED, OR WHEN THE EXCEPTION EVENT FOR THE JOB IS CAUSED. IF A SUMMARY IS DESIRED PART OF THE WAY THROUGH EXECUTION THE EXCEPTION EVENT CAN BE CAUSED BY ENTERING A HI MESSAGE AT THE CONSOLE.

ONE MUST OBSERVE A FEW FACTS ABOUT THE METHOD USED TO COLLECT STATISTICS TO AVOID MISINTERPRETATION OF THE DATA. FIRSTLY, THE TIMES ACCUMULATED ARE ELAPSED TIMES. THEREFORE, THEY REFLECT THE TIME NEEDED TO HANDLE PRESENCE BIT INTERRUPTS, I/O INTERRUPTS, AND POSSIBLY, TIME SPENT IN OTHER PROCESSES. ALSO, THE TIMING DOES NOT CEASE UPON ENTERING THE MCP (READ, WRITE, ETC) OR USING IPC (CALL, PROCESS, CONTINUE, ETC). THE PERFORM STATEMENT, HOWEVER, DOES STOP TIMING AND BEGIN TIMING THE PERFORMED PARAGRAPH, RESUMING THE TIMING OF THE PERFORMING PARAGRAPH UPON EXIT FROM THE PERFORM RANGE.

D0349 COBOL - ERROR PROCEDURES - 06-24-73

THIS CHANGE ALLOWS THE APPLICATION OF STANDARD ERROR PROCEDURES ON REMOTE FILES. WHEN THE TIMELIMIT FOR A READ IS EXCEEDED, THE USE PROCEDURE WILL BE EXECUTED.

D0370 COBOL - COBOL SORT OR MERGE STATEMENT - 06-24-73

THIS CHANGE IMPLEMENTS THE ABILITY TO GENERATE OPTIMIZED COMPARE PROCEDURES USED BY COBOL SORT AND MERGE VERBS. NORMALLY, THE AMOUNT OF CODE PRODUCED FOR THIS PURPOSE IS REDUCED AND IN SOME CASES, ELIMINATED ENTIRELY BY PASSING INFORMATION TO THE SORT INTRINSIC TO ALLOW THE COMPARISONS TO BE DONE WITHIN THE INTRINSIC. THIS CHANGE CAN RESULT IN SUBSTANTIALLY DECREASED SORT TIMINGS. THE COMPILER WILL SCAN ALL SORT KEYS BEFORE EMITTING CODE FOR THE COMPARE PROCEDURE. WHEN POSSIBLE, ADJACENT KEYS WILL BE CONCATENATED AND OVERLAPPING KEYS WILL BE TRUNCATED OR ELIMINATED. TO USE THIS NEW ABILITY TO GREATEST ADVANTAGE THE FOLLOWING ARE SUGGESTED (IN ORDER OF IMPORTANCE).

1. USE ONLY ONE KEY WHICH IS A WORD ALIGNED COMPUTATIONAL DATA ITEM.
2. WHEN SIGNED NUMERIC KEYS ARE USED, MAKE THEM COMPUTATIONAL AND PREFERABLY WORD ALIGNED.
3. WHEN MULTIPLE KEYS ARE USED, MAKE THEM ADJACENT IN THE RECORD AND ALL ASCENDING OR ALL DESCENDING.
4. DISPLAY-1 NUMERIC CAN BE PROCESSED AS WELL AS EBCDIC NUMERIC BUT DISPLAY-1 NON-NUMERIC SHOULD BE TRANSLATED TO EBCDIC.

THE QUICKEST SORTS WILL OCCUR WHEN THE COMPARISONS ARE DONE WITHIN THE SORT AND THIS CAN ONLY HAPPEN WHEN THE SORT KEY MAY BE COMPARED BY A SINGLE COMPARE. PROCESSOR AND ELAPSED TIME REDUCTIONS OF 50%

OR GREATER CAN RESULT FROM TAKING ADVANTAGE OF THIS IMPROVEMENT. TO UTILIZE THIS NEW FEATURE, IT IS NECESSARY TO COMPILE THE PROGRAM (S) CONAINING SORT OR MERGE STATEMENTS WITH OPTIMIZE SET. WHEN OPTIMIZE IS RESET THE PREVIOUS COMPARE PROCEDURE CODE WILL BE EMITTED EXACTLY AS THE MARK 2.4 LEVEL CODE. NO PROBLEMS ARE ANTICIPATED FOR THE IMPROVED COMPARE PROCEDURE, HOWEVER, IF YOU BELIEVE THE NEW METHOD DOES NOT RESULT IN CORRECTLY SEQUENCED OUTPUT YOU CAN RECOMPILE WITH OPTIMIZE RESET AND OBTAIN THE OLD COMPARISON METHOD.

PLEASE REFER TO SYSTEM NOTES FOR THE SORT FOR ADDITIONAL INFORMATION.

NOTE: IT WILL BE NECESSARY TO UTILIZE A 2.5 LEVEL MCP TO TAKE ADVANTAGE OF THE SORT IMPROVEMENTS.

## D0457 COBOL - FLOATING POINT IMPLEMENTATION - 09-04-73

FLOATING POINT ARITHMETIC HAS BEEN IMPLEMENTED. A DATA ITEM MAY BE DESIGNATED AS FLOATING POINT BY THE "USAGE" CLAUSE. FOR SINGLE PRECISION FLOATING POINT, "USAGE IS COMP-4" SHOULD BE WRITTEN, AND FOR DOUBLE PRECISION, "USAGE IS COMP-5". NO PICTURE CLAUSE MAY BE SPECIFIED. A FLOATING POINT ITEM MAY BE USED LEGALLY ANYWHERE A "COMP" ITEM CAN BE USED. IN ORDER TO FACILITATE THE USE OF THIS NEW COMPUTATIONAL USAGE, THE COMPILER ALSO WILL ACCEPT NUMERIC LITERALS OF THE FORM:

<NUMBER>E<EXPONENT>

THE <EXPONENT> MUST BE AN INTEGER AND MAY BE SIGNED. NO SPACE MAY BE IMBEDDED IN THE LITERAL. A DECIMAL POINT MUST APPEAR IN THE MANTISSA.

EXAMPLES:

```
-12.347E3
3.13E-14
1247.E-4
```

D0458 COBOL - CLOSE WITH CRUNCH - 07-29-73

THIS PATCH IMPLEMENTS THE CLOSE CRUNCH ACTION. "CRUNCH" SHOULD BE ADDED TO THE LIST OF OPTIONS AVAILABLE TO A FORMAT ONE CLOSE STATEMENT.

CRUNCH IS NOW A RESERVED WORD.

D0459 COBOL - CODE FILE - 08-19-73

THIS CHANGE DECLARES THE COMPILER CODE FILE TO HAVE A ROW SIZE OF 180 SEGMENTS. IT ALSO PROVIDES FOR A CLOSE WITH CRUNCH TO RETURN TO THE SYSTEM ANY DISK SPACE NOT ACTUALLY USED FOR OBJECT CODE.

D0460 COBOL - REPORT WRITER SUM COUNTERS - 08-19-73

THIS CHANGE WILL ALLOW COBOL REPORT WRITER PROGRAMS TO CONTAIN MORE THAN 128 SUM COUNTERS.

D0461 COBOL - SELECT STATEMENT - 08-19-73

THIS CHANGE ELIMINATES THE "ACCESS IS DIRECTED" AND "ASSIGN TO PACKED" OPTIONS FROM THE SELECT STATEMENT. THE WORDS DIRECTED AND PACKED ARE NO LONGER RESERVED WORDS. THESE OPTIONS WERE NEVER IMPLEMENTED.

D0462 COBOL - SINGLE SPACE LISTING - 08-26-73

THIS CHANGE CAUSES THE SINGLE OPTION TO BE SET BY DEFAULT. RESETTING SINGLE WILL PROVIDE A DOUBLE SPACED LISTING. IF DEFAULT DOUBLE SPACE LISTING IS DESIRED THE COMPILER SHOULD BE RECOMPILED

D0462 COBOL - SINGLE SPACE LISTING - 08-26-73

WITH THE USER OPTION LISTDOUBLE SET.

D0463 COBOL - MODEL I - 08-26-73

THIS CHANGE ELIMINATES THE MODEL I - MODEL II DISTINCTION. MODEL II CODE IS GENERATED IN ALL CASES NOW.

D0464 COBOL - COBOL REPORT WRITER - 08-26-73

THIS CHANGE IMPLEMENTS THE USE OF TODAYS-DATE AS A SOURCE FIELD IN REPORT WRITER.

D0525 COBOL - IMBEDDED QUOTES - 09-23-73

BEGINNING ON THE 2.6 RELEASE, THE HANDLING OF IMBEDDED QUOTES WITHIN LITERAL STRINGS WILL CHANGE TO CONFORM WITH THE NATIONAL STANDARD, WHICH STATES:

> "EACH EMBEDDED PAIR OF CONTIGUOUS QUOTATION MARKS REPRESENTS A SINGLE QUOTATION MARK CHARACTER".
>
> FOR EXAMPLE: THE LITERAL STRING """A""B""" WILL BE CONSIDERED TO BE "A"B" IN AN OUTPUT FORM, AND WILL HAVE A LENGTH OF FIVE CHARACTERS.

D0526 COBOL - ENHANCED DMS - 05-19-73

IN ORDER TO ACCESS ENHANCED DATA MANAGEMENT FUNCTIONS IN COBOL THE COMPILER MUST BE COMPILED WITH A

> $ SET BDMS

D0527 COBOL - COBOL INSTALLATION INTRINSICS - 08-26-73

COBOL PROGRAMS COMPILED AT LEVEL TWO MAY BE BOUND INTO THE INTRINSIC FILE IF THEY ARE COMPILED WITH "INTRINSICS" SET. AT PRESENT THE USE OF SUCH INTRINSICS IS RESTRICTED TO NON-COBOL PROGRAMS, SINCE THEY ARE ANALOGOUS TO ALGOL UNTYPED PROCEDURES. THE GLOBAL PHRASE IS NOT ALLOWED IF INTRINSICS IS SET.

D0528 COBOL - SYNCHRONIZE CLAUSE - 09-16-73

IN A RECORD DESCRIPTION, WHEN AN ITEM IS NOT SUBORDINATE TO AN ITEM HAVING AN OCCURS CLAUSE, THE SYNCRONIZED CLAUSE CAUSES THE ITEM TO BE ALIGNED TO A WORD BOUNDARY, REGARDLESS OF ITS USAGE OR THE USAGE OF AN 01 ITEM. WHEN AN ITEM IS SUBORDINATE TO AN ITEM HAVING AN OCCURS CLAUSE, THE SYNCHRONIZED CLAUSE IS EFFECTIVELY IGNORED, AND THE ITEM IS ALIGNED TO THE NEXT CHARACTER BOUNDARY CONSISTENT WITH ITS USAGE. A WARNING MESSAGE IS NOW PRINTED IN THIS CASE.

D0542 COBOL - OPTIMIZE RESET WITH DM & MONIT - 09-23-73

ON 2.5 COBOL THE DOLLAR OPTION "OPTIMIZE" IS INITIALIZED TO TRUE. PROGRAMS USING MONITOR OR TWO-DIMENSIONAL DIRECT RECORD AREAS WILL HAVE TO EXPLICITLY RESET THIS OPTION. PROGRAMS USING DATA MANAGEMENT WILL BE GIVEN A WARNING MESSAGE STATING THAT THE OPTIMIZE OPTION HAS BEEN RESET IMPLICITLY.

## CONTROLLER

### D0293 CONTROLLER - DM - DEFAULT MONITOR TITLE - 05-07-73

THE "DM" INPUT MESSAGE TO THE CONSOLE IS A METHOD OF HANDLING DEFAULT TITLES TO DESIGNATE WHICH DATA-MANAGEMENT MONITOR IS TO BE EXECUTED AT DATA-BASE OPEN TIME. THE SYNTAX IS:

| | |
|---|---|
| DM<ETX> | INTERROGATE CURRENT DEFAULT MONITOR TITLE. |
| DM-<ETX> | CHANGE DEFAULT MONITOR TITLE BACK TO THE COLD START VALUE OF SYSTEM/DM6700. |
| DM<MONITOR TITLE><ETX> | CHANGE DEFAULT TITLE TO <MONITOR TITLE> E.G., SYSTEM/FM6700ALL. |

THE RESPONSE TO ANY OF THESE INPUTS WILL BE EITHER:

REQUIRED LOCK IN USE

OR

DM MONITOR: <CURRENT MONITOR TITLE>

### D0296 CONTROLLER - INPUT MESSAGES BREAK AND WHY - 05-07-73

THIS PATCH IMPLEMENTS TWO NEW FEATURES:

1. <MIX> WHY (SYNONYMS WY, Y)

   THIS WILL RETURN NAME, PRIORITY, RSVP, DISPLAY, STACK STATE, LEGAL RESPONSES TO RSVP, JOB CLASS, ETC.

2. BREAK (SYNONYM BRK)

   THIS WILL FLUSH THE QUEUE CONTAINING MESSAGES TO BE DISPLAYED.

D0298 CONTROLLER - "EI" CHANGES - 05-07-73

EI WILL WORK AS IT DID PREVIOUSLY BUT NOW ALLOWS THE FOLLOWING SYNTAX:

1. EI? THIS WILL INDICATE THE CURRENT SETTING
2. EI+ THIS WILL SET THE INTERRUPT
3. EI- THIS WILL RESET THE INTERRUPT

D0308 CONTROLLER - CHANGE DISPLAY FORMAT OF OT - 05-07-73

WHEN THE OT MESSAGE IS ENTERED, THE SYSTEM DISPLAYS THE FOLLOWING MESSAGE ON THE CONSOLE:

<STACK#> STACK CELL <CELL#> = <TAG><CONTENT OF THAT CELL IN HEX><MESSAGE>

<MESSAGE> HAS ONE OF THE FOLLOWING THREE FORMATS:

1. "NOT A SINGLE OPERAND" IF TAG > ZERO
2. "THIS DECIMAL NUMBER > 549755813887" IF CONTENT > MAXINTEGER
3. "<CONTENT OF THAT CELL IN DECIMAL> -- DECIMAL"

D0318 CONTROLLER - ERRORS IN GET-SET STATUS - 06-03-73

CERTAIN ERROR CONDITIONS RETURNED BY GETSTATUS AND SETSTATUS INDICATE THAT ONE OF THE PARAMETERS WAS WRONG, THAT IS, THAT THE FORMAT OF THE CALL WAS INCORRECT. SOME OF THE CALLS ON GETSTATUS AND SETSTATUS WERE NOT CHECKING FOR THESE ERROR CONDITIONS. IF ONE IS DETECTED ITS NUMBER WILL NOW BE DISPLAYED.

EXAMPLE:

INVALID CASE #

D0336 CONTROLLER - CONSOLE MSG FOR Q-DS-ED JOBS - 06-24-73

## CONSOLE MESSAGES

IF A JOB IS NOT RUN BECAUSE IT DID NOT FIT IN A QUEUE, THE MESSAGE "JOB FAILED QUEUE INSERTION" WILL BE DISPLAYED AND THE JOB WILL SHOW AS "Q-DS" IN THE COMPLETED TABLE. NOTE THAT THIS CAN OCCUR A) WHEN A JOB FIRST COMES INTO THE SYSTEM, B) AFTER A HALT/LOAD, OR C) AFTER AN EQ.

IF A JOB IS NOT RUN BECAUSE IT IS EXPLICITLY DS-ED FROM ITS QUEUE BY THE OPERATOR, THE MESSAGE "OPERATOR DS-ED" WILL BE DISPLAYED AND THE JOB WILL SHOW AS "O-DS" IN THE COMPLETED TABLE.

IF A JOB HAS AN ERROR WHEN IT IS STARTED UP, SUCH AS AN INVALID USER CODE NOT DETECTED AT WORK FLOW LANGUAGE COMPILE TIME, THE MESSAGE "JOB ATTRIBUTE ERROR" WILL BE DISPLAYED AND THE COMPLETED TABLE WILL SHOW "A-DS".

JOBS FLUSHED BY PQ WILL STILL NOT BE SHOWN SINCE IT IS ASSUMED THAT COMMAND IS ONLY USED TO REMEDY SOME GROSS OPERATIONAL ERROR.

## LOG FORMAT OF JOB ABORT RECORDS

WHEN A JOB IS DS-ED FOR ANY OF THE REASONS DESCRIBED ABOVE, IT WILL GET A LOG RECORD. THIS RECORD HAS THE FOLLOWING FORMAT:

```
MAJOR TYPE = 1
MINOR TYPE = 7  "LOGJOBABORT"
WORDS 0-3 AS USUAL
WORD   4  [31:8]     WHY DS-ED:
                     1. QUEUE INSERTION ERROR
                     2. JOB ATTRIBUTE ERROR
          [23:16]    USED, IF ATTRIBUTE ERROR,
                     TO GIVE ATTRIBUTE NUMBER
```

D0337 CONTROLLER - CONSOLE MESSGE FOR NEW JOBDESC - 06-24-73

D0337 CONTROLLER - CONSOLE MESSGE FOR NEW JOBDESC - 06-24-73

IF A NEW JOBDESC IS CREATED, "A NEW JOBDESC CREATED" MESSAGE WILL BE DISPLAYED ON THE CONSOLE.

D0338 CONTROLLER - TRUNCATE PD INPUT MESSAGE - 06-24-73

WHEN REQUESTING A PD, THE IDENTIFIERS (EACH) MUST BE 17 CHARACTERS OR LESS, OTHERWISE THE SYSTEM WILL UNCONDITIONALLY TRUNCATE TO 17 CHARACTERS AND DISPLAY THE MESSAGE, "NAME TOO LONG - TRUNCATED TO 17 CHRS".

D0339 CONTROLLER - RESTRICT LOGICAL QUEUE NUMBER - 06-24-73

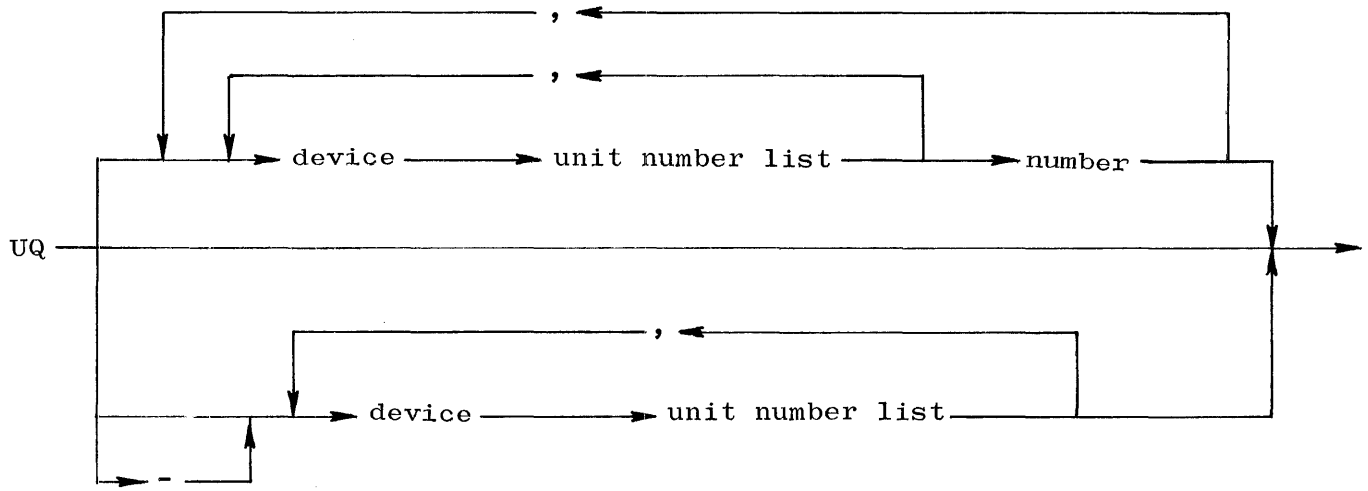
THE MAXIMUM QUEUE NUMBER WHICH CAN BE USED IN AN MQ COMMAND IS 1023.

D0371 CONTROLLER - UNIT QUEUE - 06-24-73

THE FUNCTION "CLASS ASSIGNMENT BY ORIGINATING UNIT" IS NOW IMPLEMENTED.

1. THE UQ MESSAGE PROVIDES (A) ASSIGNMENT, (B) INTERROGATING AND (C) DELETING FUNCTIONS.
2. ALL JOBS INITIATED THROUGH A UNIT WHICH HAS UNIT QUEUE ASSIGNMENT WILL GO THROUGH THAT PARTICULAR QUEUE. IF THE JOB HAS CLASS ASSIGNMENT IN ITS CONTROL CARD, THE SYSTEM WILL CHECK THE CLASS OF THE JOB AGAINST THE CLASS OF THE UNIT (IF THAT UNIT HAS CLASS ASSIGNMENT). IF CLASS IS NOT COINCIDENT, THE JOB WILL BE THROWN AWAY.
3. IF THE QUEUE FOR A UNIT WHICH HAS CLASS ASSIGNMENT WAS EQ-ED, ALL JOBS THROUGH THAT UNIT WILL BE THROWN AWAY.

SYNTAX




CONSOLE RESPONSE

1. ASSIGNMENT (INPUT UQ <DEVICE><UNIT NUMBER><NUMBER>)
   A. QUEUE X EXISTS
      DISPLAY: QUEUE FOR UUNNN IS X
         NOTE: UU = UNIT TYPE
               NNN = UNIT NUMBER
                 X = QUEUE NUMBER
      EXP. QUEUE FOR CR012 IS 3.
   B. QUEUE X DOES NOT EXIST
      1) UNIT HAS QUEUE ASSIGNMENT
         DISPLAY: QUEUE X DOES NOT EXIST
                  QUEUE FOR UUNNN IS X1
      2) UNIT DOES NOT HAVE QUEUE ASSIGNMENT
         DISPLAY: QUEUE X DOES NOT EXIST

2. INTERROGATION (INPUT UQ <DEVICE><UNIT NUMBER>)
   A. UNIT DOES NOT HAVE QUEUE ASSIGNMENT
      NO DEFAULT FOR UUNNN
   B. UNIT HAS QUEUE ASSIGNMENT
      QUEUE FOR UUNNN IS X

3. DELETING (INPUT UQ <DEVICE><UNIT NUMBER>)

D0371 CONTROLLER - UNIT QUEUE - 06-24-73

DISPLAY: NO DEFAULT FOR UUNNN

4. GENERAL REQUEST (INPUT UQ)
   A. NO UNIT QUEUE ASSIGNMENT AT ALL
      DISPLAY: NO UNIT QUEUE ASSIGNMENTS
   B. AT LEAST ONE UNIT QUEUE ASSIGNMENT
      DISPLAY: QUEUE FOR UUNNN IS X

D0373 CONTROLLER - QF MESSAGE DISPLAY ACTIVE MIX - 07-08-73

WHEN AN QF MESSAGE IS ENTERED, THE ACTIVE MIX COUNT WILL ALSO BE DISPLAYED IF THE ACTIVE COUNT IS NOT ZERO.

D0374 CONTROLLER - EQ WITH ACTIVE JOBS - 07-14-73

A JOB QUEUE WHICH HAS ACTIVE JOBS ASSOCIATED WITH IT MAY NOT BE ELIMINATED. AN ATTEMPT TO DO SO WILL PRODUCE THE ERROR MESSAGE:

"QUEUE HAS ACTIVE JOBS"

D0399 CONTROLLER - DISK PACK CONTROLLER CHANGES - 06-24-73

THIS DNOTE DISCUSSES THE CHANGES THAT HAVE BEEN MADE IN CONTROLLER, SETSTATUS, AND GETSTATUS TO IMPROVE THE DISK PACK OPERATOR INTERFACE.

THE OPERATORS CONTROL OVER THE DISK PACK SUBSYSTEM HAS BEEN ENHANCED BY PUTTING MORE INFORMATION IN THE PER PK AND OL PKUUU DISPLAYS, PROVIDING A COMMAND TO RELABEL A PACK WITHOUT DESTROYING THE FILES ON IT, IMPLEMENTING DISK PACK VOLUME PROTECTION VIA THE OWNERS-NAME VOLUME LABEL FIELD, AND GIVING THE OPERATOR CONTROL OVER THE WRITE LOCKOUT STATUS FOR EACH PACK.

OPERATOR DISPLAYS

TWO OPERATOR DISPLAYS WILL BE PROVIDED:

1. THE PER PK DISPLAY, WHERE EACH PACK IS LIMITED TO ONE LINE. SINCE, IN CERTAIN CASES, THERE IS NOT ROOM FOR ALL OF THE INFORMATION ON ONE LINE, ONLY THE MOST IMPORTANT ITEMS WILL BE DISPLAYED.
2. THE OL PKNN DISPLAY, WHERE THE ENTIRE SCREEN IS AVAILABLE FOR THE PACK IN QUESTION. IN THIS CASE THE COMPLETE STATUS OF THE UNIT CAN BE DISPLAYED.

BELOW ARE DESCRIBED THE DISPLAYS AS THEY WILL APPEAR ON THE SCREEN (FROM LEFT TO RIGHT).

1. THE UNIT NUMBER.
2. CODE FOR TYPE OF PACK (B = NATIVE MODE BASEPACK, C = NATIVE MODE CONTINUATION PACK, I = INTERCHANGE MODE PACK).
3. ASTERISK IF UNIT IS NOT WRITE LOCKED OUT.
4. VOLUME SERIAL NUMBER ENCLOSED IN BRACKETS.
5. IF PACK IS NATIVE CONTINUATION PACK, THE SERIAL NUMBER OF THE BASEPACK IS PRECEDED BY A COLON.
6. IF PACK IS A CONTINUATION PACK AND THE BASEPACK IS MOUNTED, THE UNIT NUMBER OF THE BASEPACK IS PRECEDED BY ANOTHER COLON.
7. IF A UNIT IS ASSIGNED TO AN MCP FUNCTION, THE STACK NUMBER OF THE INDEPENDENT RUNNER IS ENCLOSED IN PARENTHESES.

THIS COMPLETES ALL OF THE STANDARD INFORMATION THAT IS ALWAYS DISPLAYED IF AVAILABLE. EXCEPT FOR POINT SEVEN, WHICH NORMALLY ONLY APPLIES FOR A FEW SECONDS (E.G., DURING READPACKLBL), 27 SPACES HAVE BEEN USED. FOR THE FOLLOWING ITEMS, ONLY THE FIRST APPLICABLE ITEM IS DISPLAYED FOR THE PER PK LINE (FOR THE OL PKNN CASE, ALL APPLICABLE ITEMS ARE DISPLAYED).

8. IF THE UNIT WAS CLEARED (CL PKNN) OR THE OPERATOR REPLIED DS TO A WRONG PK MESSAGE, THE UNIT IS IN THE "BLASTED" STATE AND "BLASTED" IS DISPLAYED.

9. IF THE UNIT IS NOT READY AND IT IS STILL IN USE BY A PROGRAM, "NOT READY" IS DISPLAYED.

10. IF THE UNIT HAS THE SAME SERIAL NUMBER OF ANOTHER PACK THAT IS ALREADY MOUNTED, "DUP SERIAL" IS DISPLAYED.

11. IF THE UNIT IS SAVED, "SAVED" IS DISPLAYED.

12. IF THE UNIT HAS BEEN CLOSED BUT IT IS STILL READY, "CLOSED" IS DISPLAYED.

13. IF THE PACK DOES NOT HAVE A VALID VOLUME LABEL (E.G., NO PACKNAME), "UNLABELLED" IS DISPLAYED.

14. IF THE PACK HAS NOT BEEN IV-ED, "UNINITIALIZED" IS DISPLAYED.

15. IF THE PACK HAS BEEN PURGED (PG COMMAND), "SCRATCH" IS DISPLAYED.

16. IF THE PACK IS LABELLED AND HAS A VALID PACKNAME, THE PACKNAME IS DISPLAYED.

RELABEL VERB:

THE NEW VERB LB IS USED TO CHANGE THE PACKNAME, VOLUME SERIAL NUMBER, AND/OR THE NAME OF THE OWNER WITHOUT DESTROYING OR DAMAGING ANY FILES ON THE PACK. (USEFUL FOR CREATING BACKUP PACKS, ETC.) THE LB VERB TAKES THE SAME OPERAND STRING AS THE RC AND IV VERBS.

PACK PROTECTION:

THE OPERAND OWNER = NAME MAY NOW BE USED (WHERE THE NAME HAS FROM ONE TO 14 CHARACTERS) FOR THE RC, IV AND LB VERBS. THIS INFORMATION WILL BE INSERTED INTO THE APPROPRIATE VOL1 LABEL FIELD WHENEVER SPECIFIED. SUBSEQUENTLY, IF ANY ATTEMPT IS MADE TO IV, RC, LB OR PG A PACK WITH A NON-BLANK OWNERS NAME, THE OPERATOR WILL BE NOTIFIED AND WILL BE REQUIRED TO AUTHORIZE THE REQUEST. THIS

D0399 CONTROLLER - DISK PACK CONTROLLER CHANGES - 06-24-73

WILL HELP PREVENT OPERATOR MISTAKES (E.G., WRONG UNIT NUMBER FOR AN RC COMMAND) AND WILL ALSO PROTECT AGAINST MALICIOUS SETSTATUS CALLS FROM DCALGOL PROGRAMS. TO OK SUCH AN RL THE OPERATOR MUST ENTER <MIX NUMBER>OK. IF HE DS-ES THE RC, THE PACK MUST BE CLOSED AND READIED BEFORE FURTHER USE. IF IT IS DESIRED TO REMOVE THE OWNER ATTRIBUTE OF THE $PACK, THE $PACK SHOULD BE RC-ED WITH OWNER="
"

WRITE LOCKOUT:

THE OPERATOR WILL NOW BE ABLE TO SPECIFY THE INTERNAL WRITE ENABLE/ DISABLE STATE OF DISK PACKS. GETUSERDISK WILL GIVE A SECT REQ MESSAGE IF A REQUEST IS MADE FOR A SPACE ON A WRITE LOCKED OUT PACK. THE OPERATOR WILL BE ABLE TO CHANGE THE WRITE LOCKOUT STATUS OF THE UNIT (AS REFLECTED BY THE ASTERISK IN THE PER PK DISPLAY) WITH THE COMMAND:

```
MODE PKNN IN
          OUT
```

D0424 CONTROLLER - EP WILL NOT WORK IF AP IS SET - 08-12-73

EP IS NOT ALLOWED WHILE AP IS RUNNING. THE CONSOLE WILL DISPLAY "AP IS SET" INSTEAD OF ELIMINATING THE PRINT QUEUE.

D0425 CONTROLLER - EXPANDED DIR SYNTAX - 08-12-73

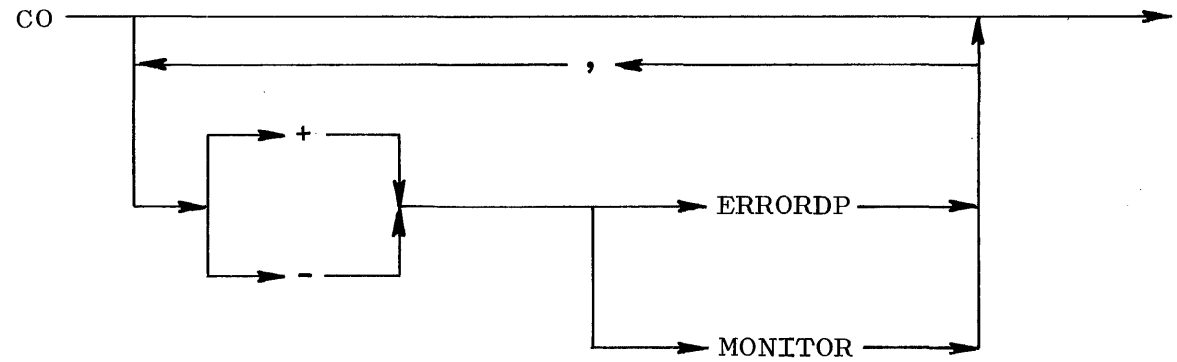
THE DIR SYNTAX HAS BEEN EXPANDED TO ALLOW A USERCODE AND PASSWORD TO BE ASSOCIATED WITH THE EXECUTION.

NEW SYNTAX:

```
DIR [(<USERCODE>/<PASSWORD>)] [- / <INTEGER>]
```

## D0465 CONTROLLER - IMPROVED DIAGNOSTIC FACILITIES - 07-08-73

SYNTAX



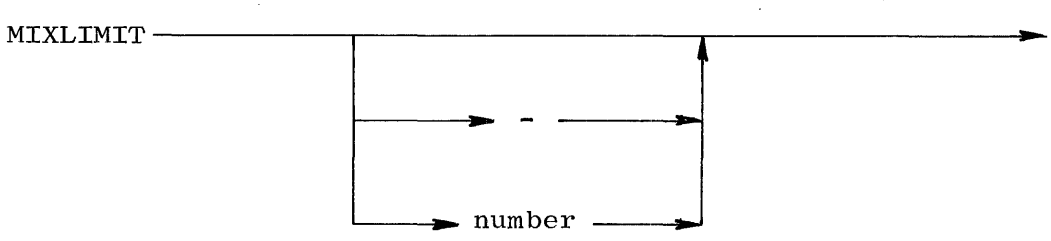

THE CO (CONTROLLER OPTIONS) MESSAGE ALLOWS OPTIONS WHICH ARE MEANINGFUL ONLY TO THE CONTROLLER TO BE EXPLICITLY SET OR RESET. THE CONTROLLER OPTIONS ARE:

ERRORDP WHEN SET ANY ERROR WILL RESULT IN A PROGRAM DUMP. ANY CONDITION WHICH WOULD RESULT IN A MEMORY DUMP BY THE CONTROLLER WILL ALSO RESULT IN A PROGRAM DUMP. RESETTING THIS OPTION WILL CLOSE THE PRINTER BACKUP FILE FOR SUBSEQUENT PRINTING.

MONITOR WHEN SET STATEMENTS WITHIN THE CONTROLLER MAY BE CONDITIONALLY EXECUTED. THE OPTION IS USED FOR DEBUGGING AND IN THE STANDARD RELEASE THIS OPTION WILL HAVE NO EFFECT.

## D0466 CONTROLLER - OVERALL MIX LIMITS - 07-08-73

SYNTAX



## D0466 CONTROLLER - OVERALL MIX LIMITS - 07-08-73

THIS WILL SET OR DISPLAY THE OVERALL MIX LIMIT. WHEN A MIXLIMIT IS SET THIS IS THE LIMIT USED WHEN INTRODUCING NEW JOBS INTO THE SYSTEM. THIS IS THE TOTAL NUMBER OF JOBS WHICH MAY BE INTRODUCED REGARDLESS OF THE MIXLIMIT AS SET ON EACH QUEUE. SETTING MIXLIMIT EQUAL TO ZERO WILL ALLOW NO JOBS TO BE RUN. THE LIMITS SET ON EACH JOB QUEUE NEED NOT BE CHANGED. THE RESPONSE TO THIS MESSAGE WILL SHOW THE QUEUE CLASS, THE ACTIVE COUNT, THE MIXLIMIT, AND THE NUMBER OF JOBS QUEUED FOR EVERY JOB QUEUE. IF A DEFAULT QUEUE HAS BEEN SET THE LETTER "D" WILL APPEAR IN THE LEFT MARGIN BESIDE THAT QUEUE. MIXLIMIT MAY BE USED IN THE ADM TIME MODE.

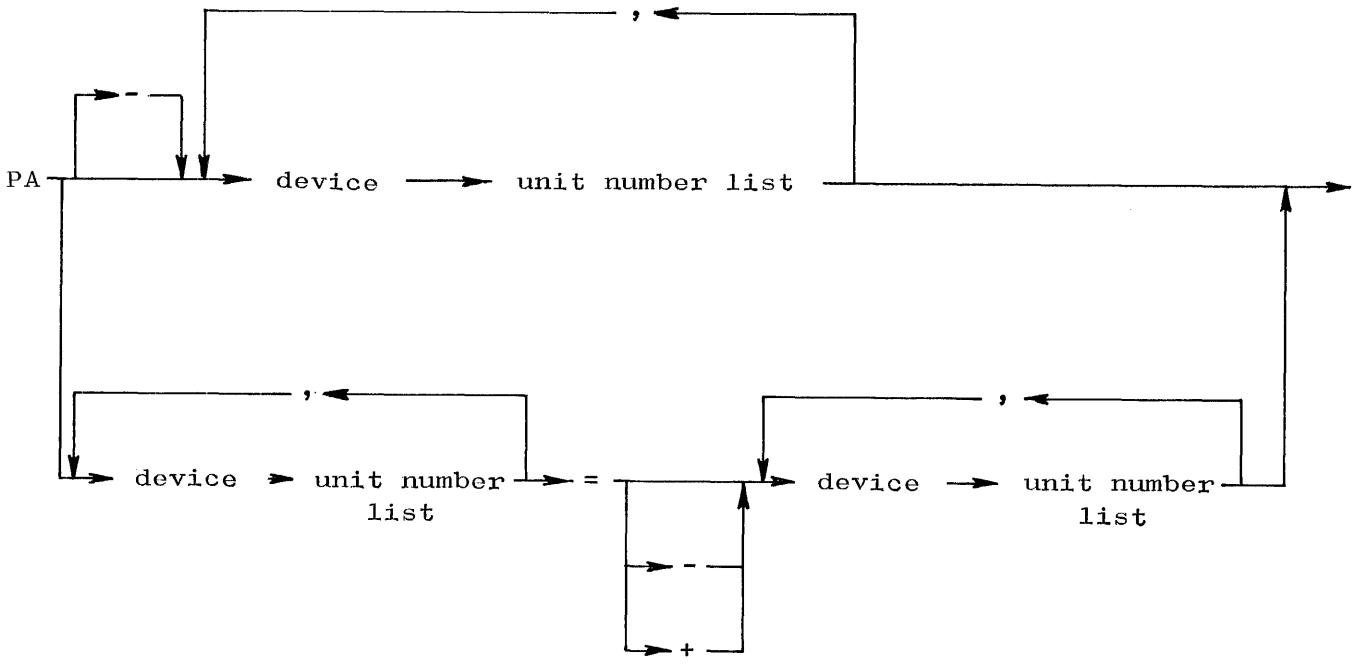
THE COMMAND "MIXLIMIT" IS ALSO A VALID ADM OPTION FOR TIME (BUT NOT EVENT) DISPLAYS.

## D0467 CONTROLLER - PERIPHERAL ASSOCIATION - 07-23-73

THE PA (PERIPHERAL ASSOCIATION) COMMAND IS USED TO ASSOCIATE INPUT DEVICES AND OUTPUT DEVICES. THE UNITS HAVE TO BE SEEN BY THE SYSTEM AT RUN TIME. HOWEVER, CURRENT IMPLEMENTATION ONLY HAS CONTROL OVER LINE-PRINTER AND CARD-PUNCH AS OUTPUT. THE INPUT UNIT HAS TO BE SEEN BY THE SYSTEM AS THE ORIGINATING UNIT. IF THERE IS NO PA ASSOCIATED FOR A CERTAIN UNIT, BY DEFAULT THE OUTPUT (OF THE JOB THROUGH THAT UNIT) WILL GO TO ANY LINE-PRINTER OR CARD-PUNCH.

IF THE UNIT HAS PA ASSOCIATED, THE OUTPUT OF THE JOB THROUGH THAT UNIT CAN ONLY GO TO THE SPECIFIED LINE-PRINTER OR CARD-PUNCH. NOTE THAT IF AN INPUT UNIT HAS BEEN PA-ED BUT HAS NO APPROPRIATE OUTPUT DEVICES ASSOCIATED, THEN BACKUP FILES FOR JOBS INITIATED FROM THAT UNIT MAY ACCUMULATE ON DISK WITHOUT BEING PRINTED OR PUNCHED.

SYNTAX:




EXAMPLE ONE:

PA CR10 = LP12, LP13, CP20

ALL THE JOBS THROUGH CARD READER 10 CAN ONLY BE PRINTED OUT ON LINE-PRINTER 12 OR 13 OR PUNCHED OUT ON CARD-PUNCH 20, EVEN IF THE SYSTEM HAS LP15, LP16, OR CP18, CP21, CP22.

EXAMPLE TWO:

AFTER THE FIRST EXAMPLE HAS BEEN DONE, THE NEW MESSAGE

PA CR10 = -LP13

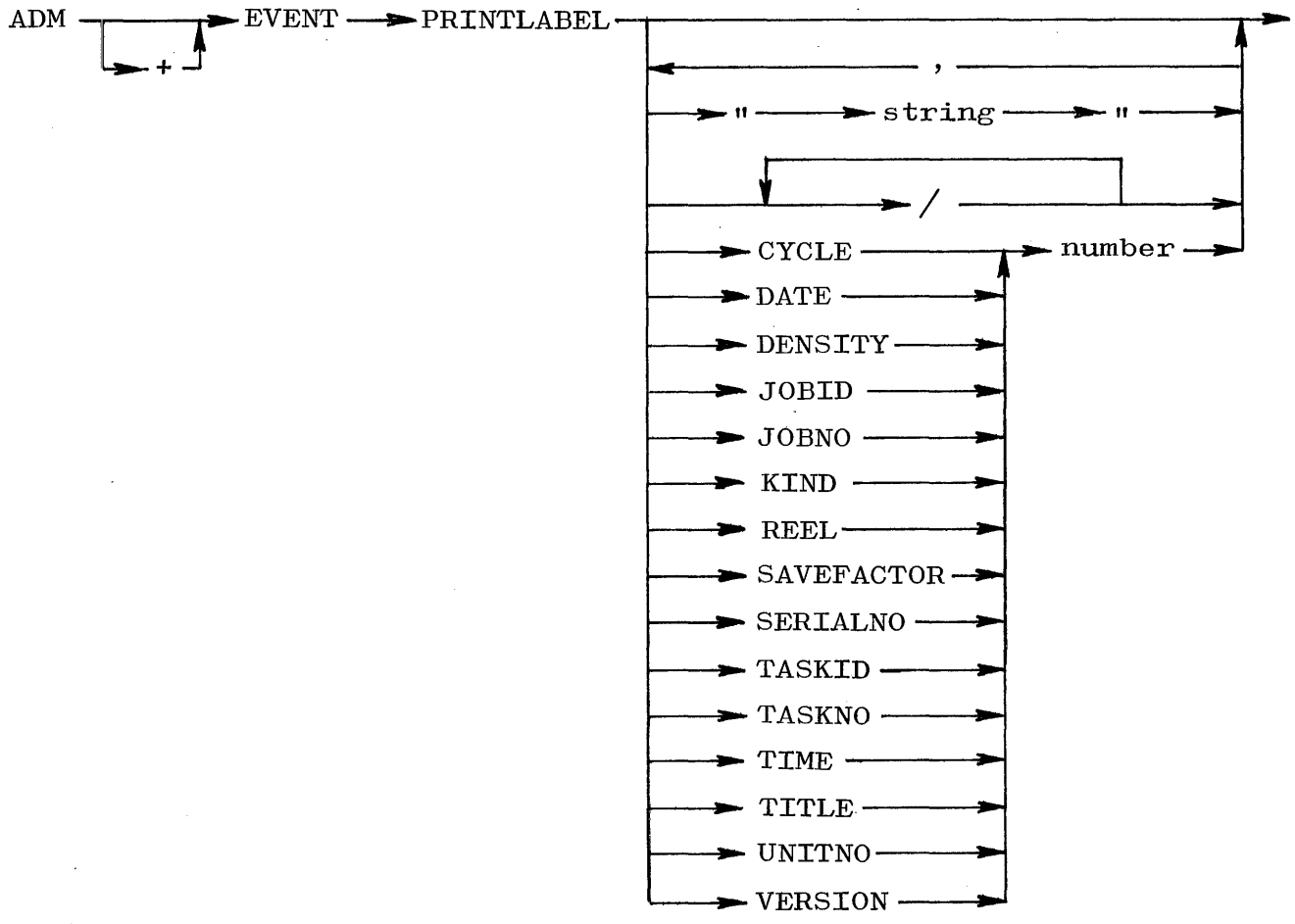
IS ENTERED. THIS WILL LIMIT THE OUTPUT DEVICES FOR CR10 TO BE LP12 AND CP20 ONLY. NO JOB THROUGH CR10 CAN BE PRINTED OUT ON LP12.

EXAMPLE THREE:

IF AFTER EXAMPLE ONE HAS BEEN DONE THE MESSAGE PA-CR10 IS ENTERED, THE SYSTEM WILL FROM NOW ON ASSUME THE JOBS THROUGH CR10 CAN BE PRINTED OUT ON ANY EXISTING LINE-PRINTER OR PUNCHED OUT ON ANY EXISTING CARD-PUNCH.

D0475 CONTROLLER - ADM EVENT PRINTLABEL - 08-12-83

NEW ADM EVENT TYPE:




THIS ADM EVENT TYPE IS USED TO PRODUCE TAPE LABELS IN ANY DESIRED FORMAT. THESE LABELS MAY BE PRINTED DIRECTLY ON THE GUMMED LABELS TO AVOID OPERATIONAL MISTAKES. THE QUOTED STRING IS USED TO INSERT

A LITERAL TO IDENTIFY THE VARIOUS DATA ITEMS. THE / WILL CAUSE A CARRAGE RETURN. THE NUMBER FOLLOWING THE NAMED DATA ITEMS SPECIFIES THE MAXIMUM SIZE WHICH MAY BE USED TO CONTAIN THAT DATA. IF THE DATA OF AN ALPHA TYPE ITEM EXCEEDS THE FIELD WIDTH THEN THE RIGHT MOST CHARACTERS WILL BE TRUNCATED. IF THE DATA OF A NUMERIC TYPE ITEM EXCEEDS THE FIELD WIDTH THEN THE FIELD WILL BE FILLED WITH "*".

THE FORMATTING SPECIFICATION MAY BE EXTENDED BY USING THE "+" FOLLOWING THE WORD ADM. AFTER THIS ADM TYPE HAS BEEN SET UP THE STATE OF THE AUTOMATIC DISPLAY IS MARKED AS "STOPPED". THIS ALLOWS THE PROPER FORMS TO BE INSERTED PRIOR TO RECEIVING ACTUAL DATA. TO TEST THE FORMATTING SPECIFICATION "PRINTLABEL" MAY BE ENTERED. THIS WILL PRODUCE THE TAPE LABEL FILLING ALL NUMERIC ITEMS WITH "N" AND ALL ALPHA ITEMS WITH "A". ONCE THE FORMATTING HAS BEEN CORRECTLY ESTABLISHED ADM GO WILL ACTIVATE THE PRINTING OF TAPE LABELS EACH TIME A TAPE FILE IS CLOSED.

IF NOTHING FOLLOWS THE WORD PRINTLABEL THEN A DEFAULT SETTING WILL BE SET UP AS DEFINED IN THE CONTROLLER. THIS DEFAULT MAY BE CHANGED BY THE INSTALLATION.

## DATACOM

### D0312 MCP-DATACM - NEW QUEUE ATTRIBUTES - 05-19-73

TWO NEW QUEUE ATTRIBUTES HAVE BEEN IMPLEMENTED WHICH MAY BE USED TO TAILOR DISK TANKING PARAMETERS. THESE ATTRIBUTES ARE:

1. QBLOCKSIZE SPECIFIES THE NUMBER OF WORDS PER BLOCK IN THE TANKING FILE. THE DEFAULT VALUE IS 300. THIS ATTRIBUTE WILL BE ROUNDED UP TO A MULTIPLE OF 30 IF NECESSARY.

2. QROWSIZE SPECIFIES THE NUMBER OF BLOCKS TO BE ALLOCATED FOR EACH DISK ROW OF THE TANKING FILE. THE DEFAULT VALUE IS 10.

PRAGMATICS:

BOTH ATTRIBUTES ARE INTEGER VALUED. THEY MAY BE READ AT ANY TIME, BUT MAY NOT BE SET WHILE THE QUEUE IS TANKED.

INCREASING THE VALUE OF QBLOCKSIZE REDUCES THE AMOUNT OF DISK I/O TIME FOR A QUEUE WHILE INCREASING THE MEMORY REQUIREMENTS. TWO BUFFERS ARE ALLOCATED QBLOCKSIZE WORDS LONG FOR EACH QUEUE. THEREFORE, BY DEFAULT, 600 WORDS ARE REQUIRED FOR BUFFER SPACE.

INCREASING QROWSIZE REDUCES THE OVERHEAD INVOLVED IN ALLOCATING TANKING DISK SPACE WHILE INCREASING THE DISK SPACE REQUIREMENTS. BY DEFAULT, 100 SEGMENTS ARE REQUIRED FOR EACH ROW OF THE TANKING FILE.

INITIALLY, TWO ROWS ARE ALLOCATED WHEN TANKING IS INVOKED. ROWS ARE ALLOCATED AND DEALLOCATED AS THE SIZE OF THE QUEUE INCREASES AND DECREASES. ALL DISK SPACE IS RETURNED WHEN THE QUEUE IS NO LONGER TANKED. THE TANK FILE MAY CONTAIN A VIRTUALLY UNLIMITED NUMBER OF ROWS.

D0312 MCP-DATACM - NEW QUEUE ATTRIBUTES - 05-19-73

USING THE COMBINE FUNCTION TO COMBINE TWO QUEUES WHOSE QROWSIZE AND/OR QBLOCKSIZE DIFFER CAN RESULT IN THESE VALUES BEING UNDEFINED IN THE <RESULT QUEUE> IF EITHER QUEUE IS TANKED AND <PRIORITY> = TRUE (COMBINE TO HEAD OF <RESULT QUEUE>.)

D0313 MCP-DATACM - QUEUE DISK TANKING - 05-19-73

DATACOM QUEUE DISK TANKING HAS BEEN REDESIGNED WITH THE FOLLOWING FEATURES.

1. IMPROVED RELIABILITY. ALL KNOWN PROBLEMS HAVE BEEN SOLVED.
2. INCREASED EFFICIENCY. TANKING IS NOW PERFORMED OUT OF THE REQUESTING STACK, RATHER THAN INVOLVING THE OVERHEAD REQUIRED, AND THE DELAYS INHERENT, IN USING A SEPARATE INDEPENDENT RUNNER.
3. COMPLETE IMPLEMENTATION. THE FOLLOWING FEATURES NOW EXIST:
   A. TANKING INVOKED BY INSERTING A MESSAGE TO THE HEAD OF A QUEUE NOW MAINTAINS THE ORDER OF ALL MESSAGES IN THAT QUEUE.
   B. COMBINING QUEUES WHICH ARE TANKED NOW RESULTS IN THE TANKED PORTIONS BEING COMBINED, ALSO.
   C. DECREASING THE MEMORY LIMIT OF A QUEUE (QMEMORYLIMIT ATTRIBUTE) WILL CAUSE EXCESS MESSAGES TO BE TANKED. INCREASING MEMORYLIMIT WILL HAVE NO IMMEDIATE EFFECT.
4. FLEXIBILITY. THE USER MAY NOW DEFINE SEVERAL TANKING PARAMETERS VIA QUEUE ATTRIBUTES. SEE DNOTE D0312.
5. IMPROVED DISK ALLOCATION. POTENTIAL DEADLOCK SITUATIONS INVOLVING SEGMENTS REQUIRED FOR TANKING HAVE BEEN RESOLVED IN THE FOLLOWING MANNER:
   A. WHEN THE TANKING HANDLER BEGINS TO WORK ON THE LAST ROW OF A TANK FILE, IT WILL ATTEMPT TO ALLOCATE

D0313 MCP-DATACM - QUEUE DISK TANKING - 05-19-73

ANOTHER ROW IN ANTICIPATION OF ITS NEEDS. IF INSUFFICIENT DISK SPACE EXISTS TO SATISFY THE REQUEST, A WARNING MESSAGE OF THE FORM

"<MIXNO> DISK TANK NEEDS <SEGMENTS> SEGS"

IS DISPLAYED. THE JOB WILL BE ALLOWED TO PROCEED.

B. IF ANOTHER DISK ROW IS IMMEDIATELY REQUIRED, THE USUAL

"<MIXNO><SEGMENTS> SEGMENTS REQD"

MESSAGE IS DISPLAYED. THE STACK REQUIRING THE SPACE IS SUSPENDED. HOWEVER, THE QUEUE INVOLVED IS UNLOCKED SUCH THAT OTHER STACKS MAY REMOVE MESSAGES FROM THE QUEUE (AND THEREFORE RETURN DISK SPACE).

C. A STACK WHICH HAS BEEN SUSPENDED FOR LACK OF DISK TANK SPACE MAY BE DS-ED.

D0317 MCP-DATACM - SET LINE TOGS-TALLIES DCWRITE - 07-14-73

A NEW DCWRITE FUNCTION (TYPE=103) HAS BEEN IMPLEMENTED WHICH ALLOWS AN MCS TO DYNAMICALLY SET OR RESET ANY OR ALL LINE TOGS AND/OR LINE TALLIES FOR A GIVEN LINE. THE FORMAT OF THIS MESSAGE IS:

```
MSG[0].[47:8]  = 103
       .[23:1]  =   1
       .[22:23] =  DL
MSG[6].[23.1]  =   1 => ENABLE SETTING OF LINE(TOG[1])
       .[22:1]  =   1 => ENABLE SETTING OF LINE(TOG[0])
       .[21:1]  =   1 => ENABLE SETTING OF LINE(TALLY[1])
       .[20:1]  =   1 => ENABLE SETTING OF LINE(TALLY[0])
       .[17:1]  =   SETTING OF LINE(TOG[1])
       .[16:1]  =   SETTING OF LINE(TOG[0])
       .[15:8]  =   SETTING OF LINE(TALLY[1])
       .[7:8]   =   SETTING OF LINE(TALLY[0])
```

THE MINIMUM MESSAGE SIZE FOR THIS DCWRITE IS EIGHT WORDS.

D0317 MCP-DATACM - SET LINE TOGS-TALLIES DCWRITE - 07-14-73

EXAMPLE:

TO SET LINE(TOG[0]) = 0 AND LINE(TALLY[1]) = 100:

```
ALLOCATE(MSG,8);
MSG[0]:= DL & (1)[23:1] & (103)[47:3];
MSG[6]:= 0 & (1)[22:1] & (1)[21:1]
         & (0)[16:1] & (100)[15:8];
         RESULT:= DCWRITE(MSG);
```

D0375 MCP-DATACM - STATION INTERROGATE - 07-14-73

THE STATION INTERROGATE DCWRITE (TYPE = FOUR) WILL NOW RETURN THE FIRST DCP LINE WORD IF LINE INFORMATION IS REQUESTED (MSG[0].[27:1] =1). THE LINE WORD WILL BE THE SECOND WORD IN THE LINE INFORMATION SECTION. IF INX:=MSG[6].[7:8], THEN THE DCP LINE WORD IS AT MSG [MSG[INX].[31:8]+1]. THE BITS OF INTEREST IN THIS WORD ARE:

```
[47:1] = LINE NOT READY
[46:1] = LINE BUSY
[45:1] = WRITE READY
[44:1] = ACKNOWLEDGE READY
[43:1] = LINE NOT CONNECTED
[42:1] = LINE QUEUED
[41:1] = LINE(TOG[1])
[40:1] = LINE(TOG[0])
[39:8] = STATION
[31:8] = MAX STATIONS
[23:8] = LINE(TALLY[1])
[15:8] = LINE(TALLY[0])
[07:8] = COLINE NUMBER
```

D0376 MCP-DATACM - RECONFIGURATION IMPROVEMENTS - 07-14-73

D0376 MCP-DATACM - RECONFIGURATION IMPROVEMENTS - 07-14-73

SEVERAL IMPROVEMENTS TO DATACOM RECONFIGURATION HAVE BEEN MADE TO EXTEND ITS UTILITY IN DEALING WITH HARDWARE MALFUNCTIONS IN A DATACOM NETWORK. ONE SERIOUS PROBLEM WHICH HAS BEEN RESOLVED IS IN USING RECONFIGURATION AGAINST LINES WITH BAD ADAPTORS. SUCH LINES CAN PERMANENTLY ENTER A BUSY STATE. SINCE RECONFIGURATION REQUIRES LINES TO BE NOT READY BEFORE IT CAN COMPLETE A REQUEST, BAD LINES COULD PREVENT THE DCP FROM COMPLETING A "MAKE LINE NOT READY" REQUEST, THEREBY PREVENTING THE TERMINATION OF A RECONFIGURATION REQUEST. A NEW DCP REQUEST, "BLAST LINE", ALLOWS THE DCP TO IGNORE THE BUSY STATE OF A LINE AND FORCE THE LINE NOT READY.

SINCE UNCONDITIONAL USE OF THIS REQUEST COULD CAUSE ABNORMAL TERMINATION OF CURRENT REQUESTS ON GOOD LINES, RECONFIGURATION WILL RESORT TO ITS USE ONLY IF THE NORMAL "MAKE LINE NOT READY" REQUEST IS NOT COMPLETED BY THE DCP WITHIN 10 SECONDS AFTER IT IS ISSUED. SINCE SOME REQUESTS MAY TAKE LONGER THAN 10 SECONDS, THE FOLLOWING GUIDELINES SHOULD BE CONSIDERED WHEN USING RECONFIGURATION:

1. IF THE LINE(S)/STATION(S) INVOLVED IN THE REQUEST IS(ARE) BEING RECONFIGURED FOR HARDWARE PURPOSES (BAD LINE ADAPTER, BAD CLUSTER, FAIL-SOFT RECONFIGURTION, ETC.) THEN IF IT IS ASSUMED THAT NO MEANINGFUL REQUESTS ARE IN PROGRESS ON THE AFFECTED LINES, RECONFIGURATION CAN BE PERMITTED TO FORCE THE NECESSARY LINES NOT READY TO COMPLETE THE REQUEST.

2. IF RECONFIGURATION IS BEING INVOKED TO PERFORM A DYNAMIC MODIFICATION TO AN ACTIVE SUBSET OF THE DATACOM NETWORK, SUCH AS ADDING NEW STATIONS, LOAD LEVELING BETWEEN DCPS, CHANGING LINE ATTRIBUTE, ETC., AND USEFUL REQUESTS MAY BE IN PROGRESS ON THE LINE(S)/STATION(S) INVOLVED, THEN IT WOULD BE UNDESIRABLE TO FORCE LINES NOT READY. THIS CAN BE AVOIDED BY HAVING THE MCS PERFORM "MAKE LINE NOT READY" (TYPE=97) REQUESTS TO THE AFFECTED LINES AND WAITING FOR DCP ACKNOWLEDGEMENT OF THE NOT READY STATE OF THESE LINES

D0376 MCP-DATACM - RECONFIGURATION IMPROVEMENTS - 07-14-73

BEFORE MAKING THE RECONFIGURATION REQUEST. THIS PRACTICE WILL INSURE THAT THE LINES WILL NOT BE BUSY WHEN RECONFIGURATION EXECUTES THE REQUEST, THEREBY ELIMINATING THE NECESSITY FOR FORCING THE LINES NOT READY.

RECONFIGURATION NOW ALLOWS REQUESTS WHICH INVOLVE OFF LINE OR UNINITIALIZED DCPS, WHICH PERMITS SYSTEMS TO RECONFIGURE THEIR NETWORK AFTER A DCP FAILURE.

RECONFIGURATION WILL NOW RECOVER FROM A HALT/LOAD OCCURRING DURING EXECUTION OF A REQUEST. IF THE DATACOM FILES ARE NOT CHANGED BEFORE DATACOM IS REINITIALIZED, RECONFIGURATION WILL BE INVOKED AUTOMATICALLY TO CONTINUE THE REQUEST IN PROGRESS AT THE TIME OF THE HALT/LOAD. ONLY THE REQUEST IN PROGRESS WILL BE RECOVERED.

D0469 MCP-DATACM - DCP INITIALIZATION LOOP - 09-04-73

IF DURING INITIALIZATION OF A DCP, THE DCP RESPONDS PROPERLY WITH A "HEYU" INTERRUPT, BUT, DUE TO A HARDWARE MALFUNCTION, FAILS TO RETURN THE "ADD CLUSTERS" REQUEST VIA ITS RESULT QUEUE, THE DCC STACK WILL NOW DISPLAY "DCP NOT READY" AND ABORT THE INITIALIZATION REQUEST. PREVIOUS TO THIS CHANGE, THE DCC WOULD LOOP INDEFINITELY UNDER THESE CIRCUMSTANCES.

## DATA MANAGEMENT

### D0354 AUDITDEFIN - ADD JOB NUM TO MON UP REC - 07-19-73

THIS PATCH DOCUMENTS A CHANGE TO THE AUDIT TRAIL -- THE JOB NUMBER OF THE MONITOR IS NOW INCLUDED IN THE AUDIT RECORD, AND FIXES A PROBLEM IN MONITOR.

### D0356 AUDITDEFIN - DOCUMENT AUDIT REC TYPE ZERO - 07-29-73

THIS PATCH DOCUMENTS THE FORMAT OF AUDIT RECORD TYPE ZERO. THIS TYPE OF RECORD IS USED AS A FILLER WHEN AUDITING TO TAPE, IN ORDER TO MAKE ALL TAPE BLOCKS THE SAME SIZE. MAKING ALL TAPE BLOCKS THE SAME SIZE INCREASES THE LIKELIHOOD THAT TAPE PARITY RETRY WILL BE SUCCESSFUL.

### D0357 COPYAUDIT - DM INITIAL COPYAUDITTAPE - 07-19-73

SYSTEM/COPYAUDITAPE IS A UTILITY PROGRAM THAT WILL COPY A DM6700 AUDIT TAPE UP TO THE FIRST BAD SPOT. THIS WILL BE USEFUL IN CASE AN I/O ERROR IS ENCOUNTERED DURING A CLOSE OF THE AUDIT TAPE. IN THIS CASE, DMRECOVER WILL NOT RUN PROPERLY BECAUSE IT WILL GET AN I/O ERROR ON THE TAPE. TO GET AROUND THIS PROBLEM SYSTEM/ COPYAUDITTAPE SHOULD BE RUN TO GET A GOOD COPY OF THE TAPE AND RUN DMRECOVER AGAIN.

IT SHOULD BE RUN WITH FILE TAPE LABEL EQUATED TO THE BAD AUDIT TAPE. THE TITLE, CYCLE AND THE KIND ATTRIBUTES SHOULD BE SET. THE PROGRAM WILL PRODUCE A NEW AUDIT TAPE OF THE SAME KIND AS THE OLD TAPE.

THE PROGRAM DIVIDES BY ZERO ON ANY ABNORMALITY, INCLUDING I/O

D0357 COPYAUDIT - DM INITIAL COPYAUDITTAPE - 07-19-73

ERRORS, AND AUDIT RECORDS WHICH HAVE BAD CONTROL WORDS. THIS IS DONE TO GET A PROGRAM DUMP SO THE RECORD IN ERROR MAY BE OBSERVED.

NOTE: THIS PROGRAM DOES NOT SOLVE THE PROBLEM OF HAVING A BAD SPOT IN THE MIDDLE OR BEGINNING OF AN AUDIT TAPE. AN ATTEMPT IS MADE BY DM6700 TO AVOID THIS BY CLOSING AN AUDIT TAPE IF A WRITE ERROR OCCURS, SO ANY BAD SPOTS SHOULD BE AT THE END. IT IS ALWAYS BEST TO USE CLEAN TAPES OF HIGH QUALITY FOR AUDIT TAPES.

D0314 DMPRINTIT - DOCUMENTATION AND ESTHETICS - 05-17-73

COMMENTS CONCERNING COARSE TABLE PROCEDURE PARAMETERS ARE PROVIDED. A ROW OF BLANKS BETWEEN LAST SDL STRUCTURE INFORMATION AND LAST ROW OF ASTERISKS IS ADDED.

D0404 DMRECOVER - PGM DUMPEXCEPT FOR WRITE EOF - 07-19-73

IN ADDITION TO LOGGING I/O ERRORS IN A DUPLICATED DISK FILE, DMRECOVER WILL ALSO NOW GIVE A PROGRAM DUMP.

D0529 DMROWRECOV - ADDITIONAL ERROR MESSAGE - 09-23-73

IF THE DM MONITOR (SYSTEM/DM6700) DOES NOT HAVE THE DOLLAR OPTION "AUDIT" COMPILED IN THEN, WHEN DMROWRECOVERY IS TOLD THIS BY THE MONITOR, DMROWRECOVERY WILL RETURN THE ERROR MESSAGE

"AUDIT CAPABLE MONITOR REQD"

D0297 DM6700 - DM - NEW STATUS CORRECTION - 04-11-73

DNOTE D0290 IN THE II.4 SYSTEM MISCELLANEA INCORRECTLY DOCUMENTS THE NEW DATA MANAGEMENT STATUS VALUE AS EIGHT (WHICH IS REALLY "POPULATION EXCEEDED"), RATHER THAN 22, WHICH IS ITS CORRECT VALUE.

PRIOR TO II.4, A VALUE OF SIX WAS RETURNED FOR THE CASE WHERE THERE WAS NO MASTER FOR THE SLAVE BEING OPERATED UPON. WITH II.4, 22 IS RETURNED FOR THIS CASE.

D0353 DM6700 - AUDIT AND RECONSTRUCTION IMPRV - 08-12-73

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# AUDIT AND RECONSTRUCTION IMPROVEMENTS

## 1. AUDIT

### 1.1. AUDIT BY RECORD

THE 2.4 RELEASE OF DATA MANAGEMENT INCORPORATED AUDITING BY BLOCK. NOW, AUDIT IS BY RECORD. THIS RESULTS IN A SAVINGS OF TIME AND SPACE. LESS DATA HAS TO BE MOVED TO THE AUDIT

BUFFERS AND WRITTEN TO THE AUDIT TRAIL. THE NEW RELEASE WILL HANDLE AUDIT FILES MADE UNDER THE 2.4 RELEASE AS WELL AS THE NEW AUDIT BY RECORD FORMAT.

## 1.2. AUDIT BUFFERSIZE

THE SIZE OF THE BUFFERS FOR THE AUDIT MAY NOW BE SPECIFIED IN SDL/INITIALIZE IN THE AUDIT STATEMENT. FOR EXAMPLE,

```
AUDIT
   BUFFERSIZE = 2000
```

DEFAULT SIZE IS 900 WORDS, MAX IS 4080. WHEN AUDITING TO DISK, THREE BUFFERS ARE USED. WHEN AUDITING TO TAPE, TWO ARE USED (BUT IF AN I/O ERROR OCCURS, THERE WILL BE A TEMPORARY THIRD BUFFER).

THE SIZE OF THE AUDIT BUFFERS IS CRITICAL. THEY SHOULD BE MADE LARGE ENOUGH TO HOLD ALL THE INFORMATION FOR AN AVERAGE SIZED TRANSACTION. THEN ONLY ONE WRITE WILL BE PERFORMED FOR THE AVERAGE TRANSACTION. IF THE AUDIT BUFFER SIZE IS TOO SMALL, MORE THAN ONE WRITE WILL BE NEEDED FOR THE TRANSACTION, BECAUSE THE BUFFER WILL OVERFLOW AT LEAST ONCE DURING TRANSACTION.

A DOUBLE BUFFERING SCHEME IS NOW USED BY THE MONITOR. REQUEST HANDLERS MAY NOW MOVE INFORMATION INTO ONE BUFFER WHILE AN I/O IS IN PROGRESS ON THE OTHER. IN THE 2.4 RELEASE, THE MONITOR WAITED FOR COMPLETION OF ALL WRITES TO THE AUDIT TRAIL WITH NO OVERLAP OF I/O AND PROCESSING.

## 1.3. TAPE AUDIT

PROBLEMS WITH AUDIT AND RECOVERY TO TAPE HAVE BEEN NOTED. THEY WERE DUE TO TAPE PARITY RETRY BY THE MCP. THE WORST CASE FOR THE TAPE PARITY RETRY ALGORITHM WAS A LONG BLOCK FOLLOWED BY A SHORT ONE FOLLOWED BY A LONG ONE, ETC. (THIS WAS THE USUAL SITUATION IN THE AUDIT TRAIL.) IN THIS CASE, TAPE PARITY RETRY OFTEN INCORRECTLY POSITIONED THE TAPE,

RESULTING IN LOST INFORMATION.

TO ALLEVIATE THIS PROBLEM, A DUMMY AUDIT RECORD OF ZEROES IS NOW USED TO PAD OUT THE BLOCK. AUDIT TAPE BLOCKS ARE ALL THE SAME LENGTH, WITH THE FOLLOWING RARE EXCEPTIONS:

IF THE AUDIT BUFFER SIZE IS LESS THAN THE SIZE OF ANY INDEX TABLE OR DATA RECORD, IT WILL BE DYNAMICALLY RESIZED UPWARDS WHEN IT IS NECESSARY TO AUDIT AN AFTER IMAGE OF SUCH A RECORD. THIS WILL RESULT IN A JUMP OF THE TAPE BLOCK SIZE. THIS CASE SHOULD BE VERY RARE, AS THE AUDIT BUFFER SIZE MUST BE MUCH LARGER THAN THIS FOR EFFICIENT OPERATION OF THE AUDIT.

THE SERIAL NUMBER (RECORD NUMBER) OF EACH TAPE BLOCK IS NOW INCLUDED IN THE AUDIT PHYSICAL CONTROL WORDS. THE SERIAL NUMBER IS CHECKED BY DMRECOVER, ETC., SO THAT MISSING TAPE BLOCKS ARE EXPLICITLY DETECTED. MISSING TAPE BLOCKS WILL RESULT IN UNSUCCESSFUL RECOVERY.

THE SERAIL NUMBER IS ALSO USED BY THE MONITOR WHEN IT TRIES TO REPOSITION AN AUDIT TAPE SO THAT IT CAN CLOSE IT AFTER AN IRRECOVERABLE I/O ERROR HAS OCCURRED.

## 1.4. DISPLAY MESSAGES

THE MONITOR NOW DISPLAYS THE DATA BASE NAME AND THE AUDIT PACK NAME WHEN AUDITING (EVEN IF THE AUDIT DOES NOT GO TO PACK, BUT TO TAPE OR DISK). IN ADDITION, WHENEVER A NEW AUDIT FILE IS CREATED, THE REQUEST HANDLER DISPLAYS ITS SERIAL NUMBER AND THE RECORD NUMBER OF THE CORRESPONDING AUDIT ARCHIVE ENTRY. THUS, THE SYSTEM LOG CAN BE USED TO REBUILD THE AUDIT ARCHIVE BY HAND, IF NECESSARY.

NOTE: TO PREVENT THE AUDIT ARCHIVE FROM EVENTUALLY OVERFLOWING, IT MAY BE REMOVED AFTER A COMPLETE DUMP OF THE DATA BASE HAS BEEN DONE. THIS IS BECAUSE THE MONITOR CREATES THE AUDIT ARCHIVE IF IT IS NOT RESIDENT WHEN IT FIRST BEGINS OPERATION, AND BECAUSE THE AUDIT FILES CREATED

BEFORE THE DUMP WILL NOT BE NEEDED (ASSUMING THE DUMP WAS SUCCESSFUL).

## 1.5. AUDIT TAPE COPY

THE MONITOR ATTEMPTS TO CLOSE AN AUDIT TAPE IF IT ENCOUNTERS AN ERROR IN WRITING IT. HOWEVER, IT IS POSSIBLE FOR CLOSE TO FAIL. IF THE TAPE IS NOT CLOSED PROPERLY OR IF THERE IS AN I/O ERROR ON IT, THEN RECOVERY WILL NOT BE SUCCESSFUL. TO ALLEVIATE THIS PROBLEM, SYSTEM/COPYAUDITTPAPE HAS BEEN IMPLEMENTED. WHEN IT IS RUN, FILE TAPE SHOULD BE LABEL EQUATED TO THE AUDIT TAPE TO BE COPIED AND THE TITLE AND KIND ATTRIBUTES SHOULD BE SET. COPYAUDITTAPE WILL CREATE A NEW AUDIT TAPE OF THE SAME KIND AS THE OLD ONE AND WILL DIVIDE BY ZERO ON ANY I/O ERRORS OR IF THE AUDIT TRAIL FAILS CERTAIN VALIDITY CHECKS. THE NEW AUDIT TAPE CAN BE USED BY DMRECOVER.

NOTE THAT COPYAUDITTAPE IS A LAST RESORT AND WILL NOT BE ABLE TO PRODUCE A COMPLETE AUDIT TAPE FROM ONE WHICH HAS AN I/O ERROR BEFORE THE LAST BLOCK.

# 2. RECONSTRUCTION

## 2.1. REWRITE

RECONSTRUCTION HAS BEEN REWRITTEN AND THOROUGHLY TESTED. THE NEW VERSION IS MORE EFFICIENT AND MANY PROBLEMS HAVE BEEN FIXED.

## 2.2. DOUBLE BUFFERING

DOUBLE BUFFERING HAS BEEN ADDED TO RECONSTRUCTION IN ORDER TO OVERLAP I/O WITH PROCESSING. A FEWER TOTAL NUMBER OF I/OS IS DONE THAN UNDER THE 2.4 RELEASE.

## 2.3. I/O ERRORS

INSTEAD OF DIVIDING BY ZERO ON I/O ERRORS, RECONSTRUCTION RETURNS A STATUS OF 24. ALSO, IF AN INSUFFICIENT NUMBER OF BUFFERS IS AVAILABLE TO RECONSTRUCTION, IT RETURNS AN ERROR STATUS OF 24.

RECONSTRUCTION HAS THE SAME NUMBER OF BUFFERS AS THE MONITOR WHEN AUDIT IS COMPILED IN, NAMELY TWO TIMES MAXBUFFERS. THUS, IF COBOL PROGRAMS ARE UPDATING THE DATA BASE DURING RECONSTRUCTION, THERE ARE 4*MAXBUFFERS BUFFERS PRESENT IN CORE. IF TWO STRUCURES ARE BEING RECONSTRUCTED AT THE SAME TIME WHILE COBOL PROGRAMS ARE RUNNING AGAINST THE DATA BASE (THREE REQUEST HANDLERS), THERE ARE 6* MAXBUFFERS BUFFERS.

IF NO COBOL PROGRAMS ARE AROUND AND THE MONITOR IS INITIATED BY SYSTEM/DMROWRECOVERY FOR RECONSTRUCTION, ONLY 2*MAXBUFFERS WILL BE PRESENT.

## 2.4. DMROWRECOVERY SYNCHRONOUS

DMROWRECOVERY NOW WAITS FOR A REPLY FROM THE MONITOR AND DISPLAYS THE STATUS OF ITS REQUEST. FORMERLY, DMROWRECOVERY MERELY SENT THE REQUESTS TO THE MONITOR AND WENT TO END OF JOB.

## 2.5. NOTES ON RECONSTRUCTION

### 2.5.1. SDL RECORD ZERO

THE MONITOR READS SDL RECORD ZERO BEFORE PROCESSING ANY REQUESTS. THUS, THIS RECORD MUST BE RE-ESTABLISHED BY THE USER, IF THE ONLY COPY OR BOTH COPIES ARE DESTROYED. AMONG THE THINGS IN RECORD ZERO ARE:

DATA BASE IN USE BIT
AUDIT INFORMATION

CURRENT AUDIT SERIAL NUMBER
AUDIT PACK NAME
AUDIT FILE SIZE, ETC.
MONITOR LIMITS
MAX NUMBER OF REQUEST HANDLERS
MAX NUMBER OF BUFFERS, ETC.
DUPLICATED FILE BIT FOR SDL FILE
ERROR FLAG AND COPY LOCKS FOR SDL FILE

## 2.5.2. SDL FILE

IF THE SDL FILE IS DAMAGED, IT MUST BE RECONSTRUCTED OR RESTORED BEFORE THE CORRESPONDING DATA BASE STRUCTURES CAN BE USED. THUS, IT IS A GOOD IDEA TO HAVE A SMALL AREASIZE (E.G., ONE) FOR THE SDL FILE.

THERE ARE UNUSED WORDS IN MOST OF THE SDL RECORDS. THE MONITOR WRITES RANDOM BIT PATTERNS IN THESE WORDS UNLESS AUDIT AND DIAGNOSTICS ARE COMPILED IN. THEN THESE WORDS ARE ZEROES. RECONSTRUCTION WILL RESTORE THESE UNUSED WORDS FROM THE BACKUP. THIS SHOULD BE BORNE IN MIND WHEN TESTING RECONSTRUCTION: A BIT-BY-BIT COMPARE MAY FAIL ON A PROPERLY RECONSTRUCTED SDL RECORD, BECAUSE THE UNUSED WORDS WILL NOT MATCH UNLESS THE MONITOR HAD DIAGNOSTICS AND AUDIT COMPILED IN.

A REQUEST HANDLER ONLY RECONSTRUCTS OR RESTORES ONE DATA BASE FILE AT A TIME, AS SPECIFIED BY THE REQUEST FROM DMROWRECOVERY.

D0405 DM6700 - IMPLEMENT ROW RECOV IOERR STAT - 07-29-73

A STATUS OF 24 FROM SYSTEM/DMROWRECOVERY INDICATES THAT AN I/O ERROR OCCURRED DURING RECONSTRUCTION OR RESTORATION IN THE MONITOR, OR THAT INSUFFICIENT BUFFERS WERE AVAILABLE DURING RECONSTRUCTION (MAXBUFFERS WILL HAVE TO BE INCREASED).

D0406 DM6700 - AUDIT DISPLAY PATCH - 07-29-73

WHEN AUDITING, THE MONITOR DISPLAYS THE DATA BASE NAME, THE AUDIT TAPE NAME, AND THE SERIAL NUMBER AND AUDIT ARCHIVE RECORD NUMBER OF EACH NEW AUDIT FILE AS IT IS CREATED. IF THE AUDIT ARCHIVE IS LOST, IT MAY BE POSSIBLE TO REBUILD IT BY HAND USING THE INFORMATION NOW INCLUDED IN THE LOG. WHEN RUNNING RECONSTRUCTION, THE AUDIT FILE DESIRED IS DISPLAYED TO AID IN RESOLVING DUPLICATE FILE CONDITIONS.

D0418 DM6700 - DUMMY FILLER FOR TAPE AUDIT - 07-29-73

WHEN AUDITING TO TAPE, A DUMMY AUDIT RECORD IS ADDED SO THAT ALL BLOCKS WILL BE OF EQUAL SIZE. THIS IS NECESSARY BECAUSE THE MCP TAPE PARITY RETRY ALGORITHM ASSUMES THIS TO BE TRUE. CONSEQUENTLY, RECORDS SOMETIMES GET LOST WHEN THE TAPE BLOCK SIZE DIFFERENCE IS SIGNIFICANT.

D0419 GETDMRSF - ALLOW LAST TAPE BLOCK PARTIAL - 07-19-73

THIS PATCH TAKES INTO ACCOUNT THE FACT THAT THE LAST BLOCK ON AN AUDIT TAPE MAY BE A PARTIAL BLOCK.

D0315 SDLS - AUDIT BUFFERSIZE - 05-09-73

THIS CHANGE GIVES THE USER THE ABILITY TO SPECIFY IN THE AUDIT STATEMENT IN SDL/INITIALIZE:

BUFFERSIZE = <INTEGER>

THIS SPECIFIES THE SIZE OF THE AUDIT BUFFERS.

THE AUDIT BUFFERSIZE CONTROLS AN IMPORTANT TRADEOFF IN THE OPERATION OF THE AUDIT: THE LARGER THE AUDIT BUFFER SIZE THE FEWER

D0315 SDLS - AUDIT BUFFERSIZE - 05-09-73

THE WRITES THAT WILL BE INITIATED TO THE AUDIT TRAIL BECAUSE THE BUFFER OVERFLOWED, BUT THE GREATER THE CORE THAT WILL BE TIED UP. (THERE ARE SEVERAL AUDIT BUFFERS.) THE DEFAULT IS 900 WORDS.

D0316 SDLS - SDL AND TABLE AREASIZE - 05-09-73

THIS CHANGE ALLOWS THE USER THE ABILITY TO SPECIFY THE AREASIZE OF OTHER THAN FILES IN SYSTEM/SDL/INITIALIZE: AREASIZE FOR INDEX SEQUENTIAL (FINE TABLES ONLY), INDEX RANDOM, TAG, BIT. SDL CAN NOW BE SPECIFIED VIA THE SYNTAX FOR SET OR STRUCTURE, I.E.,

```
SET SDL AREASIZE = 1;
SET 5 AREASIZE = 100;
```

D0324 SDLS - CHNGE DEFAULT AUDIT CYCLE TIME - 05-31-73

THIS CHANGE ALTERS THE DEFAULT AUDIT CONTROL CYCLE TIME FROM 10 TO 40 CYCLETIMES, THAT IS FROM EVERY 30 SECONDS TO EVERY TWO MINUTES (IF CYCLETIME IS DEFAULT). THIS MEANS THAT THERE WILL BE FEWER CONTROL RECORDS IN THE AUDIT TRAIL; ERGO, RECOVERY WILL TAKE A LITTLE LONGER.

## DCALGOL

### D0309 DCALGOL - QUEUE ATTRIBUTES - 05-19-73

THIS CHANGE IMPLEMENTS TWO NEW QUEUE ATTRIBUTES "QBLOCKSIZE" AND "QROWSIZE". BOTH ATTRIBUTES ARE INTEGER-VALUED AND CAN BE READ OR WRITTEN.

### D0470 DCALGOL - HOLD STATEMENT WARNING - 07-29-73

THIS CHANGE CAUSES A WARNING MESSAGE TO BE EMITTED IF THE VARIABLE DECLARED TO RECEIVE THE RESULT OF A HOLD STATEMENT IS NOT DECLARED DOUBLE.

### D0471 DCALGOL - DISKHEADER ARRAYS - 08-26-73

THIS CHANGE FORCES ALL <DISKHEADER ARRAY>S TO BE LONG. THE DECLARATION

```
DISKHEADER ARRAY DA[0:19];
```

IS NOW EQUIVALENT TO THE DECLARATION

```
LONG DISKHEADER ARRAY DA[0:19];
```

## DCPPROGEN

D0292 DCPPROGEN - USER DEFINED TRANSLATETABLES - 05-07-73

THIS PATCH ADDS USER DEFINED TRANSLATETABLES TO DCPPROGEN.

D0319 DCPPROGEN - CLEAR LINE TOGS AND TALLYS - 06-03-73

THIS PATCH ADDS A FEATURE IN WHICH THE LINE TOGGLES ARE SET TO FALSE AND THE LINE TALLYS ARE SET TO ZERO WHENEVER A SWITCHED LINE IS CONNECTED. NOTE: THIS MAY AFFECT EXISTING REQUEST SETS.

## DCSTATUS

### D0397 DCSTATUS - RUNNING DCSTATUS THROUGH CANDE - 07-08-73

THIS PATCH IMPROVES THE PERFORMANCE OF DCSTATUS WHEN EXECUTED FROM A REMOTE TERMINAL. A PERIOD IS NOW RECOGNIZED AS A VALID SUBSTITUTE FOR THE SEMICOLON IN THE DCSTATUS INPUT COMMAND AVOIDING THE ERRONEOUS RECOGNITION OF THE SEMICOLON AS A CANDE STATEMENT DELIMITER. FOR EXAMPLE:

```
DC DCP 1. LINE 0:12
```

A COLON IS ALSO NOW SYNONYMOUS WITH A COMMA. DCSTATUS WILL ALSO NOW GRACEFULLY TERMINATE WHEN IT ENCOUNTERS A BREAK ON OUTPUT.

## ESPOL

### D0300 ESPOL - VERSION DOLLAR OPTION - 05-07-73

THIS PATCH IMPLEMENTS THE FOLLOWING ADDITIONAL SYNTAX FOR THE VERSION DOLLAR OPTION:

<OPTION CONTROL CARD>::=

$SET VERSION<VERSION INCREMENT>.<CYCLE INCREMENT><PATCH NUMBER>

WHERE

<VERSION INCREMENT>::= + <INTEGER>
<CYCLE INCREMENT>::= + <INTEGER>
<PATCH NUMBER>::= <EMPTY> / .<3 DIGIT INTEGER>

IF VERSION INCREMENT AND CYCLE INCREMENT APPEAR ON THE VERSION CARD THEN THOSE INCREMENTS WILL BE ADDED TO THE VERSION ON THE SYMBOLIC. IF NO VERSION CARD APPEARS IN THE SYMBOLIC THE INCREMENTS VALUES WILL BE USED TO APPEND TO THE CARD IMAGES.

IF THE PATCH NUMBER APPEARS ON THE VERSION CARD IT WILL UPDATE THE SYMBOLIC VERSION CARD. ALSO, THE PROGRAMMER CAN GAIN ACCESS TO THE PATCH NUMBER BY ACCESSING COMPILETIME (22).

### D0340 ESPOL - LISTDELETED DOLLAR CARD OPTN - 06-24-73

AN INDICATION OF CARD IMAGES THAT ARE BEING REPLACED, DELETED, OR VOIDED IS NOW AVAILABLE IF "LISTDELETED" IS SET.

D0341 ESPOL - NAME DECLARATIONS - 06-24-73

D0341 ESPOL - NAME DECLARATIONS - 06-24-73

THE WORD "NAME" IN ESPOL HAS BEEN MADE RESERVED IN ORDER TO SPEED UP COMPILATION.

D0342 ESPOL - VALUE ARRAYS - 06-24-73

THIS CHANGE INCREASES THE SIZE ALLOWABLE FOR INITIALIZED VALUE ARRAYS FROM 511 WORDS TO 8192 WORDS (OR CHARACTERS FOR STRING ARRAYS).

D0363 ESPOL - FILES AT LEX LEVEL ZERO - 06-24-73

ESPOL NOW PERMITS ADDRESS-EQUATED FILES (AND NO FILES IN ANY OTHER FORM) AT LEX LEVEL ZERO. SYNTAX EXAMPLE:

```
FILE F=W;
```

THE FORMS

```
FILE F(ATTRIBUTES); OR
FILE F;
```

WILL STILL BE GIVEN A SYNTAX ERROR AT LEX LEVEL ZERO.

D0407 ESPOL - SEGMENT 5 SIZE LIMIT - 07-18-73

THE DOLLAR PARAMETER "SIZECHECK" ALLOWS THE COMPILER TO LIMIT THE SIZE OF SEGMENT 5 FOR MCP COMPILATIONS. THE SYNTAX IS:

```
SIZECHECK <INTEGER>.
```

THE COMPILER WILL SYNTAX ANY MCP HAVING A SEGMENT 5 LARGER THAN THE <INTEGER>.

## D0472 ESPOL - ESPOL BINDINFO - 08-19-73

INFORMATION FOR ESPOL BINDING HAS BEEN REVISED TO BE CONSISTENT WITH OVERALL IMPLEMENTATION. IN ORDER TO INCLUDE ALL BINDINFO WHEN COMPILING ESPOL THE DOLLAR CARD

```
$SET MAKEHOST *
```

IS REQUIRED. WHEN SET, THE MCP PROCEDURES COMPILED AT LEVELS HIGHER THAN GLOBAL CAN BE BOUND. WHEN THE OPTION IS RESET A SOMEWHAT MORE LIMITED FORM OF BINDINFO IS PRODUCED THAT WILL PERMIT BINDING GLOBAL AND EXTERNAL PROCEDURES ONLY. THIS LATTER FORM HAS A SMALLER CODE FILE WHICH MAY FACILITATE CHANGING MCPS.

## D0530 ESPOL - IMPROVED THREE-CARD LOADER - 07-23-73

THIS CHANGE IMPLEMENTS AN IMPROVED THREE-CARD LOADER, ADDING THE CAPABILITIES OF RECOVERING FROM CARD-READER ERRORS, AND OF LOADING LARGER DECKS.

## D0531 ESPOL - MULTI-PROCEDURE FILES - 08-19-73

WHEN COMPILING MULTIPLE PROCEDURES, SUCH AS THE ESPOL INTRINSICS, IT IS NOW MORE EFFICIENT TO SET THE DOLLAR OPTION "LIBRARY". THIS WILL CAUSE ALL OBJECT PROGRAM CODE TO BE PUT IN ONE FILE AND MARKED AS A MULTI-PROCEDURE CODE FILE. BINDER CONTROL CARDS FOR BINDING THESE PROCEDURES, EITHER TO AN MCP OR TO AN INTRINSIC FILE, WILL HAVE TO BE CHANGED HOWEVER. IF, FOR EXAMPLE, SOME PROCEDURES WERE COMPILED AS "A/B", THEN THE BIND CARD WOULD HAVE TO BE CHANGED

```
FROM:  BIND = FROM A/=;
  TO:  BIND = FROM A/B;
```

WHEN COMPILING FROM CANDE, THE LIBRARY OPTION IS INITIALIZED TO TRUE.

## ESPOLINTRINSICS

### D0421 ESPOLINTRN - NEW FREEFIELD OUTPUT FEATURES - 09-04-73

THE FORTRAN USER NOW HAS A WIDER VARIETY OF FREEFIELD OUTPUT OPTIONS AVAILABLE TO HIM. INSTEAD OF JUST THE "/" FORM, E.G., AS USED IN THE STATEMENT PRINT /,A,B,C THE FOLLOWING 16 FORMS ARE AVAILABLE:

1. THE / FORM, AS USED IN PRINT /,LIST ETC. THIS FORM INSTRUCTS THE I/O SUBSYSTEM TO OUTPUT THE LIST ITEMS IN WHATEVER FORMAT BEST DISPLAYS THEM, WITH THE FORMAT VARYING FROM LIST ELEMENT TO LIST ELEMENT (HEREAFTER ABBREVIATED L.E.). THE L.E.S MAY BE ANY VARIABLE, EXPRESSION, OR STRING (SEE THE DOCUMENTATION IN THE FORTRAN SYSTEM NOTES FOR AN INTRODUCTION TO STRINGS IN FREEFIELD OUTPUT LISTS).

   INTEGER VARIABLES AND EXPRESSIONS ARE OUTPUT IN AN INTEGER-TYPE FORMAT (UNLESS FOR SOME REASON THEY EXCEED IN MAGNITUDE THE LARGEST INTEGER -- 549755813887 -- E.G., AN INTEGER VARIABLE IS EQUIVALENCED TO A REAL VARIABLE OF MAGNITUDE E+50; IN THIS CASE, IT WOULD BE TREATED AS TYPE REAL).

   REAL VARIABLES AND EXPRESSIONS ARE OUTPUT IN AN F-TYPE OR E-TYPE FORMAT, WHICHEVER ALLOWS THE MAXIMUM AMOUNT OF NUMERICAL SIGNIFICANCE IN THE LEAST WIDTH. COMPLEX VARIABLES AND EXPRESSIONS ARE TREATED AS TWO SUCCESSIVE REALS, FIRST THE REAL PART AND THEN THE IMAGINARY PART.

   DOUBLE PRECISION VARIABLES AND EXPRESSIONS ARE OUTPUT IN AN F-TYPE OR D-TYPE FORMAT, WHICHEVER ALLOWS THE MAXIMUM AMOUNT OF NUMERICAL SIGNIFICANCE IN THE LEAST WIDTH.

   LOGICAL VARIABLES AND EXPRESSIONS ARE OUTPUT AS T FOR TRUE

VALUES AND AS F FOR FALSE VALUES.

STRINGS ARE OUTPUT EXACTLY AS THEY APPEAR IN THE LIST.

EACH EDITED LIST ITEM IS FOLLOWED BY A COMMA (,) AND A BLANK CHARACTER. THE EDITED LIST ITEM IS NEVER SPLIT ACROSS A RECORD BOUNDARY. IF THE RECORD LENGTH IS TOO SHORT TO ACCOMODATE THE EDITED LIST ITEM, THE L.E. IS RE-EDITED IN A FORMAT TO FIT WITHIN THE RESTRICTIVE RECORD LENGTH. IF THIS RECORD LENGTH IS TOO SHORT TO ACCOMODATE ANY REPRESENTATION OF THE L.E., A STRING OF POUND SIGNS (#...#) IS OUTPUT IN PLACE OF THE EDITED LIST ITEM.

EXAMPLES

```
PRINT /,123.456000,-.00123.1234,1.234D-1234,3.12E50
```

PRODUCING:

```
123.456, -0.00123, 1234, 1.234D-1234, 3.12E+50,
```

AND,

```
PRINT /,"THIS IS A STRING",.TRUE.,.NOT..TRUE.,
            9.87654321987D87
```

PRODUCING:

```
THIS IS A STRING, T, F, 9.87654321987D+87,
```

2. THE (R)/ FORM, AS USED IN PRINT (6)/,LIST ETC. THIS FORM INSTRUCTS THE I/O SUBSYSTEM TO OUTPUT THE LIST ITEMS IN A MANNER SIMILAR TO THE ONE DESCRIBED ABOVE, BUT WITH THE FEATURE OF OUTPUTTING ONLY R L.E.S PER RECORD; THE EDITED L.E. IS MADE TO FIT WITHIN C CHARACTERS, WHERE C IS THE MAXIMUM INTEGER NOT EXCEEDING (RECORDLENGTHINCHARACTERS/ABS(R))-2, AND GREATER THAN 0. THIS CONSTRAINT PRODUCES COLUMNAR OUTPUT, R COLUMNS TO A RECORD, EACH COLUMN C+2 CHARACTERS WIDE (THE 2 REPRESENTS THE TWO DELIMITING CHARACTERS: THE COMMA AND THE BLANK). IF AN EDITED L.E. REQUIRES LESS THAN C CHARACTERS,

LEADING BLANKS ARE INSERTED TO FILL OUT TO C CHARACTERS. IF THE L.E. CANNOT BE EDITED TO FIT WITHIN C CHARACTERS, A STRING OF C POUND SIGNS (#...#) IS OUTPUT IN PLACE OF THE EDITED L.E.

EXAMPLES:

```
PRINT (2)/,122334.567,-.2,45,-1.543267E-47
```

PRODUCING:

```
          122334.567,                  -0.2,
                  45,       -1.543267E-47,
```

IN THE ABOVE EXAMPLE, EACH FIELD WIDTH IS 18 CHARACTERS. THIS IS BECAUSE THE MAXIMUM FIELD WIDTH REQUIRED TO EDIT ANY INTEGER OR REAL IS 18 CHARACTERS. IN GENERAL, THE COMPILER ASSIGNS A MAXIMUM FIELD WIDTH VALUE OF 1 TO LOGICALS, 18 TO INTEGERS AND REALS (REMEMBER THAT COMPLEX IS 2 REALS), 33 TO DOUBLES, AND THE STRING LENGTH TO STRINGS. THE COMPILER THEN COMPUTES THE MAXIMUM MAXIMUM VALUE OVER THE ENTIRE LIST, AND THIS IS THE DEFAULT FIELD WIDTH FOR THE OUTPUT STATEMENT. FOR EXAMPLE, SUPPOSE THE LIST CONSISTS OF A LOGICAL AND A DOUBLE; THEN THE DEFAULT FIELD WIDTH WOULD BE 33, SINCE 33=MAX(1,33). THE DEFAULT FIELD WIDTH IS OF COURSE ADJUSTED TO ALLOW R COLUMNS TO FIT WITHIN THE RECORD.

EXAMPLE:

```
PRINT (2)/,0,"STRING","ANOTHER STRING",0.0
```

PRODUCING:

```
                  0,          STRING,
ANOTHER STRING,                0.0,
```

3. THE /(W) FORM, AS USED IN PRINT /(15),LIST ETC. THIS FORM INSTRUCTS THE I/O SUBSYSTEM TO OUTPUT THE LIST ITEMS IN A MANNER SIMILAR TO (2) ABOVE, BUT WITH THE FIELD WIDTH OF THE COLUMNS SPECIFIED BY W+2 RATHER THAT THE NUMBER OF

COLUMNS SPECIFIED BY R. THE MAXIMUM FIELD WIDTH AVAILABLE FOR EDITING IS W, AND THE NUMBER OF COLUMNS, N, EQUALS THE LARGEST INTEGER NOT EXCEEDING RECORDLENGTHINCHARACTERS/(ABS(W)+2), AND NOT LESS THAN ONE.

(NOTE: IN THE TERMINOLOGY USED HERE, "COLUMN WIDTH" REFERS TO THE TOTAL WIDTH OF THE COLUMN -- HERE, W+2, AND IN (2) ABOVE C+2 -- AND "MAXIMUM FIELD WIDTH" OR "FIELD WIDTH" OR "AVAILABLE FIELD WIDTH" REFERS TO THE WIDTH OF THE COLUMN SANS THE 2 CHARACTER DELIMETER -- HERE, W CHARACTERS, AND IN (2) ABOVE, C CHARACTERS.)

EXAMPLE:

```
PRINT /(10),-4.31567243E-14,5.3214567893210D12345,.TRUE.
```

PRODUCING:

```
-4.3157-14, 5.32+12345,          T,
```

4. THE (R)/(W) FORM, AS USED IN PRINT (3)/(20),LIST ETC. THIS FORM INSTRUCTS THE I/O SUBSYSTEM TO OUTPUT THE LIST ITEMS IN A MANNER SIMILAR TO THE COMBINED EFFECTS OF (2) AND (3) ABOVE. THE OUTPUT IS COLUMNAR, R COLUMNS W+2 CHARACTERS WIDE, WITH AN AVAILABLE EDITING FIELD WIDTH OF W CHARACTERS. IF (ABS(W)+2)*ABS(R) IS GREATER THAN RECORDLENGTHINCHARACTERS, THE VALUE OF W IS DECREASED TO THE LARGEST INTEGER GREATER THAN 0 SUCH THAT (W+2)*ABS(R) LEQ RECORDLENGTHINCHARACTERS.

EXAMPLE:

```
PRINT (3)/(6),-17.216,4.273E+50,8.21467D+17898,.FALSE.,
            "TOO LONG",0,184,CMPLX(.3,-4.2)
```

PRODUCING:

```
-17.22, 4.2+50, D17899,
     F, ######,      0,
  184,    0.3,   -4.2,
```

(NOTE: THE VALUES FOR R AND W ARE IN GENERAL ROUNDED TO INTEGERS. A ROUNDED VALUE OF 0 IS EQUIVALENT TO NO VALUE SPECIFIED, E.G., (3)/(.2) => (3)/. THE ABS OF R AND W IS USED).

5, 6, 7, AND 8.

THE * FORM OF (1), (2), (3), AND (4) ABOVE: */ *(R)/ */(W) *(R)/(W) AS USED, RESPECTIVELY, IN PRINT */,LIST PRINT *(4)/,LIST PRINT */(20),LIST
AND PRINT *(3)/(15),LIST ETC. THESE FOUR VARIATIONS OF FORMS (1)-(4) INSTRUCT THE I/O SUBSYSTEM TO PREFIX EACH EDITED LIST ITEM WITH THE SOURCE TEXT OF THE LIST ITEM, FOLLOWED BY AN EQUAL SIGN ("=").

FOR EXAMPLE, LET A=-72.6; THEN PRINT */,A PRODUCES: A=-172.6, ; AND PRINT */(5),A PRODUCES: A=-73, . THE TEXT TO THE LEFT OF THE EQUAL SIGN (IN THE OUTPUT RECORD) IS REFERRED TO AS THE "NAME" OF THE EDITED L.E. IF THE L.E. IS A SIMPLE VARIABLE, AS IN THE ABOVE EXAMPLE, THE VARIABLE IDENTIFIER IS USED AS THE NAME. IF THE L.E. IS A SUBSCRIPTED VARIABLE, THE VARIABLE IDENTIFIER ALONG WITH THE NAME, E.G., RUN-TIME SUBSCRIPT VALUES IS USED AS THE LET A(I,J)=7.8 AND I=3, J=121; THEN PRINT */(11),A(I,J) PRODUCES: A(3,121)=8., [NOTE: FOR THE 2.5 RELEASE, SUBSCRIPTED VARIABLES WILL BY TREATED AS EXPRESSIONS (SEE BELOW), AND WILL BE TREATED IN THE MANNER DESCRIBED ABOVE CONCURRENT WITH THE II.6 RELEASE]. IF THE L.E. IS AN ARRAY NAME, THE IMPLICIT OR IMPLIED SUBSCRIPTS ARE DISPLAYED ALONG WITH THE ARRAY IDENTIFIER,
E.G., FOR REAL A(3)/-1,-2,-3.4/, PRINT */,A PRODUCES: A(1)=-1.0, A(2)=-2.0, A(3)=-3.4, .

IF THE L.E. IS A COMPLEX SIMPLE OR SUBSCRIPTED VARIABLE OR A COMPLEX ARRAY NAME, A ":R" OR ":I" IS IS APPENDED TO THE NAME, DENOTING RESPECTIVELY THE REAL AND IMAGINARY PARTS. FOR EXAMPLE, LET C=CMPLX(2.7,1.4E-20), CA(I)=-C, AND I=4; THEN PRINT *(2)/,C,CA(2+I/2) PRODUCES:

```
                    C:R=2.7,                    C:I=1.4E-20,
                CA(4):R=-2.7,               CA(4):I=-1.4E-20,
```

IN THIS EXAMPLE, EACH FIELD WIDTH IS 30 CHARACTERS. THIS IS BECAUSE THE MAXIMUM WIDTH REQUIRED TO EDIT A NAMED L.E. IS EQUAL TO THE SUM OF THE MAXIMUM WIDTH REQUIRED TO EDIT THE VALUE (SEE ABOVE) PLUS THE MAXIMUM WIDTH REQUIRED TO EDIT THE NAME (FIVE CHARACTERS IS CONSIDERED THE MAXIMUM WIDTH REQUIRED TO EDIT AN INDEX).

IF THE L.E. IS AN EXPRESSION, THE GENERAL TERM "<EXPR>" IS USED AS THE NAME, E.G., LET A=2; THEN PRINT */,A+4 PRODUCES: <EXPR>=6.0, . COMPLEX EXPRESSIONS HAVE A ":R" OR ":I" SIMILAR TO THE HANDLING OF COMPLEX VARIABLES. (NOTE: IT IS HOPED THAT IN THE FUTURE THE ACTUAL EXPRESSION TEXT WILL BE USED INSTEAD OF <EXPR>).

THE * AS APPLIED TO A SPECIFIC LIST ELEMENT: INSTEAD OF USING THE * FORMS DESCRIBED ABOVE, WHICH CAUSE A NAME TO BE DISPLAYED FOR EACH EDITED LIST ITEM, THE USER CAN INSTRUCT THE I/O SUBSYSTEM TO DISPLAY ONLY THE NAMES OF SELECTED LIST ELEMENTS BY PREFIXING THESE L.E.S WITH AN *. FOR EXAMPLE, LET A=2, B=-3, AND C=1.4; THEN PRINT /,A,*B, C,*A**B PRODUCES: 2, B=-3, 1.4, <EXPR>=0.125, . NOTE THAT THE * AS APPLIED TO A STRING IS MEANINGLESS.

9, 10, 11, 12,
13, 14, 15, 16.

THE // FORMS OF (1)-(8) ABOVE: // (R)// //(W) (R)//(W) *// *(R)// *//(W) *(R)//(W) AS USED, RESPECTIVELY, IN PRINT //,LIST ... PRINT *(5)//(15),LIST ETC. THESE EIGHT VARIATIONS PERFORM IDENTICALLY TO THE FORMS (1)-(8), WITH THE SINGLE EXCEPTION THAT THE 2-CHARACTER DELIMITER IS NOT THE ", ", BUT RATHER IS TWO BLANKS. FOR EXAMPLE, PRINT //,1,2,3 PRODUCES: 1 2 3 ; WHEREAS PRINT /,1,2,3 PRODUCES: 1, 2, 3, . SINCE THERE ARE NO COMMAS SEPARATING THE EDITED LIST ITEMS, THIS FORM OF FREEFIELD OUTPUT CANNOT BE READ BY THE / FORM OF FREEFIELD INPUT (A

// FORM OF FREEFIELD INPUT WILL BE PROVIDED WITH THE II.6 RELEASE).

A NOTE ABOUT STRINGS: SINCE STRINGS MAY BE INPUT UNDER FREEFIELD ONLY IF THEY ARE ENCLOSED IN QUOTES, THE USER OUTPUTTING STRINGS UNDER FREEFIELD AND INTENDING TO INPUT THEM UNDER FREEFIELD MUST INCLUDE THE QUOTES IN THE OUTPUT STRINGS, E.G., THE OUTPUT FROM PRINT /,"STRING" CANNOT BE INPUT BY READ /,A; BUT PRINT /,""""STRING"""" CAN BE INPUT BY READ /,A SINCE THE OUTPUT STRING IS "STRING", AND THE VALUE OF A IN THIS CASE WOULD BE 6HSTRING. WHEN NOT WORKING IN BCL, THE APOSTROPHE CHARACTER MAY BE SUBSTITUTED FOR THE QUOTE. OF COURSE, THE HOLLERHTH REPRESENTATION MAY BE USED IN EITHER BCL OR EBCDIC, E.G., PRINT /,8H"STRING" PRODUCES THE OUTPUT STRING "STRING".

## FORTRAN

### D0310 FORTRAN - LABEL EQUATN OF COMPILER FILES - 05-07-73

"MERGE" OR "NEW" MAY BE FOLLOWED BY A FILE NAME ENCLOSED IN PARENTHESES. IF THIS IS DONE, THE FILE (TAPE OR NEWTAPE RESPECTIVELY) WILL BE LOCKED, AND THE TITLE WILL BE CHANGED.

EXAMPLE:

```
$SET MERGE(A/B) NEW((USER)X/Y.)
```

THE TITLE IS LIKE THE TITLE ON LABEL EQUATION CONTROL CARDS.

### D0325 FORTRAN - NEW INTRINSICS - 06-03-73

THE FOLLOWING NEW INTRINSICS MAY NOW BE REFERENCED IN FORTRAN:

| | |
|---|---|
| ATANH | ERFC (COMPLEMENTED ERROR FUNCTION 1/ERF) |
| DACOS | DGAMMA |
| DASIN | DLGAMA |
| DCOSH | DSINH |
| DERF | DTAN |
| DERFC | DTANH |

### D0343 FORTRAN - SYNTAX ERROR #92 MESSAGE - 06-24-73

THIS PATCH ALTERS THE DIAGNOSTIC MESSAGE FOR SYNTAX ERROR #92 TO READ:

"VARIABLE BOUND MUST BE FORMAL OR COMMON ELEMENT"

D0426 FORTRAN - SPACING FOR PROGRAM LISTING - 08-12-73

THIS PATCH CAUSES THE COMPILER OPTION SINGLE TO BE SET BY DEFAULT RESULTING IN SINGLE SPACED LISTINGS.

THE USER OPTION SINGLEBYDEFAULT CAN BE RESET UPON COMPILATION OF FORTRAN TO ALLOW DOUBLE SPACING TO BE THE DEFAULT SETTING.

D0435 FORTRAN - MISSING SUBROUTINE ERROR MSG - 08-19-73

THIS PATCH CHANGES THE SYNTAX ERROR MESSAGE "MISSING SUBROUTINE OR FUNCTION" TO READ "MISSING SUBROUTINE OR FUNCTION OR END CARD" SINCE A MISSING END CARD MIGHT RESULT IN A MISSING SUBPROGRAM INDICATION.

D0473 FORTRAN - ENTRIES FOR OPTIMIZATION - 08-19-73

THIS CHANGE IMPLEMENTS THE HANDLING OF MULTIPLE SUBPROGRAM ENTRY POINTS FOR OPTIMIZATION LEVELS GREATER THAN ZERO. NO CODE IS SHARED BETWEEN ENTRY POINTS. EACH ENTRY IS ANALYZED AND TREATED AS IF IT WERE A SEPARATE SUBPROGRAM.

D0474 FORTRAN - LIBRARY OPTION - 09-04-73

A NEW DOLLAR OPTION "LIBRARY" HAS BEEN IMPLEMENTED IN FORTRAN. IT IS SIMILAR TO THE OPTION "SEPARATE" EXCEPT ALL OF THE SUBROUTINES ARE COMPILED INTO ONE CODE FILE (UNDER "SEPARATE" EACH SUBROUTINE AND/OR .MAIN. GOES INTO A SEPARATE CODE FILE). THE TITLE OF THE RESULTING CODE FILE WILL BE THE TITLE GIVEN THE CODE FILE ON THE COMPILE CARD. THE BINDER HAS BEEN UPDATED SO THAT IT WILL BIND SUBROUTINES FROM A LIBRARY FILE. THIS OPTION OFFERS TWO ADVANTAGES OVER "SEPARATE":

1. ONLY ONE FILE OVERHEAD.

2. CANDE CANNOT HANDLE THE CASE WHERE THE COMPILER CHANGES THE RESULTING CODE FILE TITLE ACCORDING TO THE SUBROUTINE NAME.

## INPUT/OUTPUT

### D0377 MCP-I-O - QT TAPE SEARCH - 07-14-73

PREVIOUS TO THIS PATCH, THE ONLY WAY TO STOP THE SYSTEM FROM NEEDLESSLY SEARCHING A TAPE FOR A FILE WAS TO DS THE PROGRAM. NOW IT IS POSSIBLE TO QT THE PROGRAM AND TAPESEARCH WILL REWIND THE UNIT WITH LOCK AND GO LOOK ELSEWHERE.

### D0398 MCP-I-O - FILE ATTRIBUTES - 07-14-73

THE FOLLOWING FILE ATTRIBUTES HAVE BEEN ELIMINATED ON THIS RELEASE:

1. CODEFILE (56)

   THE 2.1 SYSTEM NOTE MCP #1075 ANNOUNCED THAT THE FILEKIND ATTRIBUTE WITH ITS RICHER AND MORE MEANINGFUL SET OF VALUES WOULD SUPERSEDE THE FUNCTION OF THE CODEFILE ATTRIBUTE. THIS IS NOW BEING ENFORCED BY THE ELIMINATION OF THE CODEFILE ATTRIBUTE.

2. MAXGENNO (68)

   SINCE 2.0 ACCESSING THIS ATTRIBUTE HAS CAUSED A RUN-TIME ATTRIBUTE ERROR. NOW, THE ERROR WILL COME AT COMPILE TIME WITH A SYNTAX ERROR.

3. ACCESS (19)

   THE NEED FOR THIS ATTRIBUTE WAS ELIMINATED WITH THE REWRITE OF LOGICALRECORD AT 2.0 AND IT HAS GENERATED RUN TIME ERRORS ON THE LAST TWO RELEASES. IT WILL NOW GENERATE A COMPILE TIME SYNTAX ERROR.

4. NEXTRECORD (48)

THIS ATTRIBUTE HAS NEVER BEEN IMPLEMENTED BECAUSE ADDING ONE (1) TO THE VALUE OF THE RECORD ATTRIBUTE PERFECTLY SIMULATES IT. INSTEAD OF THE USUAL RUN TIME ATTRIBUTE ERROR, THE SYSTEM NOW GIVES A COMPILE TIME SYNTAX ERROR.

THE FOLLOWING FILE ATTRIBUTES HAVE BEEN IMPLEMENTED ON THIS RELEASE:

1. UPDATEFILE (47)

   BOOLEAN VALUED, SET WHEN FILE IS CLOSED, READ AT ANYTIME, MEANINGFUL ONLY FOR DISK FILES.

   THE UPDATEFILE ATTRIBUTE ALLOWS THE USER TO EXPLICITLY INDICATE WHEN A DISK FILE IS TO HAVE THE UPDATE I/O ACCESSING METHOD.

   WHEN A DISK FILE IS OPEN AND UPDATEFILE IS TRUE, THE UPDATE I/O METHOD IMPLIES THAT A SERIAL (NON-KEYED) WRITE FOLLOWING A SERIAL READ WILL WRITE UPON THE RECORD JUST READ (THE NORMAL SERIAL MODE WRITES UPON THE NEXT RECORD OF THE FILE).

   TESTING THE ATTRIBUTE WHEN THE FILE IS CLOSED WILL INDICATE WHETHER OR NOT THE ATTRIBUTE HAS BEEN SET. WHEN THE FILE IS OPENED UPDATEFILE INDICATES WHETHER OR NOT UPDATE I/O ACTION WILL BE PERFORMED UPON THE FILE. IRREGUARDLESS OF THE SETTING OF THE ATTRIBUTE, IF THE FILE IS ASSIGNED TO A NON-DISK PERIPHERAL UNIT THE VALUE OF THE ATTRIBUTE WILL BE FALSE.

   THE UPDATEFILE ATTRIBUTE WILL RETURN TRUE, EVEN IF THE ATTRIBUTE WAS SET TO FALSE, IF A DISK FILE IS OPENED WITH THE ATTRIBUTE MYUSE SET TO IO. THIS IS AN UNFORTUNATE SIDE EFFECT OF THE MYUSE ATTRIBUTE WHICH HAS NOT BEEN CORRECTABLE PREVIOUS TO THIS RELEASE, BECAUSE THERE HAS BEEN NO EXPLICITE WAY TO INDICATE THE DESIRE FOR UPDATE I/O ACTION. THE COBOL COMPILER NOW SETS THE UPDATEFILE ATTRIBUTE WHENEVER A FILE IS OPENED INPUT-OUTPUT AND RESETS IT OTHERWISE, SO THAT ALL COBOL PROGRAMS THAT ARE

NOW BEING COMPILED WILL NO LONGER BE DEPENDENT UPON THE MYUSE SIDE EFFECT. ALGOL PROGRAMS CAN SET THE UPDATEFILE ATTRIBUTE EXPLICITLY IF UPDATE I/O ACTION IS DESIRED, BUT SHOULD BE WARNED ABOUT THE COMBINATION OF MYUSE=IO AND KIND=DISK.

2. STATIONSDENIED (103)

   INTEGER VALUED, READ ONLY AND ONLY WHILE THE FILE IS OPENED, MEANINGFUL FOR DATACOM (KIND=REMOTE) FILES ONLY.

   THE STATIONSDENIED ATTRIBUTE RETURNS THE NUMBER OF THE STATIONS IN A FAMILY WHICH HAVE BEEN DENIED ASSIGNMENT TO THE FILE BY THEIR CONTROLLING MCS(S).

   BECAUSE FILE ASSIGNMENT IS AN ASYNCHRONOUS PROCESS REQUIRING THE COOPERATION OF MESSAGE CONTROL SYSTEMS (MCS) THERE IS A POINT IN TIME WHEN THE POPULATION ATTRIBUTE CAN RETURN A VALUE OF ZERO (0) BECAUSE THE MCS HAS NOT YET REACTED TO THE FILE OPEN REQUESTS. WITH THE HELP OF THE STATIONSDENIED ATTRIBUTE A PROGRAM CAN NOW MEANINGFULLY INTERPRET THE STATUS OF THE FILE WHEN IT IS USED IN CONJUNCTION WITH THE POPULATION AND FAMILYSIZE ATTRIBUTES.

3. CRUNCHED (59)

   BOOLEAN VALUED, READ ONLY AND ONLY WHILE THE FILE IS ASSIGNED, MEANINGFUL ONLY FOR DISK FILES.

   THE CRUNCHED ATTRIBUTE INDICATES WHETHER OR NOT A DISK FILE HAS RETURNED THE UNUSED PORTION OF THE LAST AREA OF THE FILE TO THE SYSTEM.

   THE FOLLOWING CONDITIONS APPLY TO CRUNCHED FILES:

   1. FILES WILL BE CRUNCHED TO A BLOCK BOUNDARY WHERE THE BLOCK BOUNDARY IS IN TERMS OF THE BLOCKING FACTORS USED TO CREATE THE FILE.

   2. END OF FILE CAN BE EXTENDED ON A CRUNCHED FILE UP

TO THE BLOCK BOUNDARY USED WHEN CRUNCHING.

3. CRUNCHED FILES CAN BE WRITTEN ON, USING NORMAL LOGICAL I/O ONLY WHEN THE BLOCKSIZE OF THE LOGICAL FILE IS EQUAL TO THE BLOCKSIZE USED TO CREATE THE PHYSICAL FILE.

A DISK FILE IS CRUNCHED VIA A CALL ON CLOSE E.G. IN ALGOL

"CLOSE(FILEID,CRUNCH);"

CODE FILES AND PRINTER BACKUP DISK FILE WILL BE AUTOMATICALLY CRUNCHED WHEN THEY ARE CLOSED.

4. EXCLUSIVE (90)

BOOLEAN VALUED, SETTABLE WHILE THE FILE IS CLOSED, READABLE AT ANYTIME, MEANINGFUL ONLY FOR DISK FILES.

THE EXCLUSIVE ATTRIBUTE ALLOWS A PROGRAM TO OPEN A PERMANENT DISK FILE AND LOCK OUT ALL OTHER PROGRAMS WHILE THE FILE IS OPEN.

WHEN EXCLUSIVE IS TRUE, A PROGRAM OPENING A PERMANENT DISK FILE IMPLICITELY OR THROUGH THE ATTRIBUTES OPEN OR PRESENT OR BY A DIRECT CALL ON THE PROCEDURE OPEN (AS DONE IN COBOL PROGRAMS) WILL:

A. GET THE USUAL NO FILE ACTION, IF THE FILE DOES NOT EXIST.

B. GO TO SLEEP, IF THE FILE EXISTS BUT IS ALREADY OPENED.

C. OPEN THE FILE EXCLUSIVELY, LOCKING OUT ALL OTHER PROGRAMS UNTIL THE FILE IS CLOSED.

WHETHER OR NOT EXCLUSIVE IS TRUE, THE RESIDENT ATTRIBUTE WILL RETURN:

TRUE IF THE FILE EXISTS (LOCKED OUT IS CONSIDERED IRRELEVENT).

FALSE IF THE FILE DOES NOT EXIST.

5. AVAILABLE (48)

REAL VALUED, READ ONLY, READABLE AT ANY TIME.

THE ATTRIBUTE AVAILABLE IS AN EXTENSION OF THE PRESENT ATTRIBUTE WHICH MAKES IT POSSIBLE TO DISTINGUISH BETWEEN A NO FILE AND A LOCKED OUT FILE CONDITION AND PREVENTS THE PROGRAM FROM BEING SUSPENDED IN AN ENVIRONMENT WHERE FILES ARE BEING OPENED EXCLUSIVELY.

WHEN TESTED AVAILABLE RETURNS:

0 THE FILE IS LOCKED AND NOT AVAILABLE (I.E., THE PROGRAM IS LOCKED OUT) OR IF EXCLUSIVE IS TRUE, THE FILE WAS ALREADY OPENED AND ASSIGNED TO ANOTHER PROGRAM.

1 THE FILE IS OPENED AND ASSIGNED TO THE PROGRAM (IF THE FILE PREVIOUSLY WAS NOT OPEN, IT WAS OPENED) AND IF EXCLUSIVE IS TRUE THE FILE IS NOW LOCKED.

2 THE FILE DOES NOT EXIST.

THE FOLLOWING ATTRIBUTES HAVE BEEN CORRECTED ON THIS RELEASE:

1. DIRECTION (27)

INTEGER VALUED, SET WHEN FILE IS CLOSED (IT MAY BE SET AT ANYTIME WITH DIRECT I/O), READ AT ANYTIME, MEANINGFUL FOR TAPE FILES (OR PAPERTAPE WHEN THE MCP IS COMPILED WITH REVERSEPAPERTAPE SET).

THE ATTRIBUTE DIRECTION INDICATES THE DIRECTION IN WHICH RECORDS WILL BE ACCESSED FROM A FILE. THE DEFAULT VALUE IS FORWARD (0). TO READ A TAPE FILE WHEN DIRECTION IS REVERSE (1) WITH NORMAL I/O, THE TAPE MUST BE PROPERLY POSITIONED AT THE END OF THE FILE BEFORE IT IS OPENED. DIRECT I/O CAN CHANGE DIRECTION AT ANYTIME, AS LONG AS THE FILE HAS NOT SEEN A TAPE MARK. DIRECT I/O MUST CLOSE THE

FILE TO MOVE PAST A TAPE MARK.

2. EOF (36)

GENERAL, READ ONLY, OPENED, BOOLEAN

THE ATTRIBUTE EOF INDICATES WHETHER OR NOT (TRUE OR FALSE) END OF FILE HAS BEEN REACHED. DEPENDING ON THE ASSIGNED PERIPHERAL UNIT (KIND) IT MAY BE POSSIBLE TO "RESET" EOF BY ACCESSING A VALID RECORD. THIS MAY BE DONE BY USING A RANDOM READ OR WRITE OR BY "BACKSPACING".

3. BLOCK (44)

DISK/TAPE, READ ONLY, ANYTIME, INTEGER

THE ATTRIBUTE BLOCK RETURNS THE NUMBER OF THE BLOCK IN THE FILE REFERENCED IN THE LAST I/O STATEMENT. WHEN THE FILE IS CLOSED, OR IF THE FILE IS OPEN BUT NO I/O HAS BEEN PERFORMED, BLOCK WILL RETURN MINUS ONE (-1). BLOCK WILL ALSO RETURN MINUS ONE (-1) AFTER AN ATTEMPTED I/O BEYOND THE END OF THE FILE. THE COUNTING OF BLOCKS IS ZERO RELATIVE, THAT IS TO SAY, THE FIRST BLOCK IN A FILE IS BLOCK ZERO (0).

THE OPERATION OF THE FOLLOWING ATTRIBUTES HAS BEEN CHANGED.

1. OTHERUSE (21)

THE OTHERUSE ATTRIBUTE HAS NEVER BEEN IMPLEMENTED. HOWEVER, IT HAS BEEN POSSIBLE TO SET AND READ THE VALUE OF THE ATTRIBUTE EVEN THOUGH THE SYSTEM MADE NO USE OF IT. TO ELIMINATE THE CONFUSION (SEE TAR 10034 AND 10229) CAUSED BY THIS SITUATION, THE ATTRIBUTE TABLE HAS BEEN MODIFIED SO THAT EITHER SETTING OR ACCESSING THE OTHERUSE ATTRIBUTE WILL GENERATE A NON-FATAL ATTRIBUTE ERROR.

2. USEDATE (61)

THE ATTRIBUTE USEDATE WILL NOW ONLY BE CHANGED IF A FILE IS ACTUALLY OPENED, OR EXECUTED IN THE CASE OF CODE FILES. LIBRARY MAINTENANCE FUNCTIONS WILL NO LONGER ALTER ACCESS

D0398 MCP-I-O - FILE ATTRIBUTES - 07-14-73

DATES.

D0427 MCP-I-O - DIRECT I-O CHARACTR DISK FILES - 08-12-73

THIS PATCH IMPLEMENTS DIRECT I/O CHARACTER ORIENTED DISK FILES. THE USER SHOULD NOTE THAT THE SIZE PARAMTER IN A DIRECT I/O READ OR WRITE STATEMENT IS ALWAYS IN THE FORM WORDS AND CHARACTERS IN THE LAST WORD. THE FIELDS ARE WORDCOUNT = [16:17] AND CHARACTERS = [19:03].

D0476 MCP-I-O - PUNCH-UNLABLD FILES DISALLOWED - 08-19-73

THE TESTS IN OPEN TO PREVENT THE CREATION OF UNLABELED PUNCH FILES WAS INCORRECTLY PREVENTING LABELTYPE=STANDARD FILES FROM BEING CREATED. THIS PATCH UNIFORMLY PREVENTS THE CREATION OF PUNCH OR PUNCH BACKUP FILES WHEN LABELTYPE=OMITTED OR OMITTEDEOF (UNLESS IT IS A DIRECT I/O FILE).

## JOBFORMATTER

### D0479 JOBFORMAT - NAME AND USERCODE IN EOT-EOJ - 08-26-73

THIS CHANGE ADDS THE JOB OR TASK NAME AND THE USERCODE TO THE INFORMATION PRINTED IN THE END OF JOB AND END OF TASK PRINTOUTS.

## LISTDIRECTORY

D0344 LISTDIR - DIRECTORY LISTING REPORTS - 06-24-73

MAJOR CHANGES HAVE BEEN MADE IN THE PRODUCTION OF THE "HIERARCHICAL DIRECTORY STRUCTURE". PRE-2.2 DIRECTORIES ARE NO LONGER HANDLED AND THE HANDLING OF NEWER ONES HAS BEEN REWRITTEN.

THERE IS A NEW REPORT, THE SORTED HIERARCHICAL DIRECTORY REPORT, WHICH PUTS SEGMENT SIZES (TOTAL CONTROLLED BY A DIRECTORY) ON THE LEFT AND ORDERS THIS INFORMATION BY SIZE. DIRECTORIES ARE SORTED ON THE NUMBER OF SEGMENTS THEY CONTROL AND ALL OTHER FILES ON SEGMENTS USED. THE BASIC TREE STRUCTURE IS RETAINED, WITH THE LARGEST BRANCH APPEARING FIRST, THEN THE LARGEST LIMB DESCENDING FROM IT, ETC.

TASK VALUES (VALUE = N OR DIR N) ARE DEFINED AS FOLLOWS:

0 DEFAULT CASE. GIVES ALL REPORTS AND TAKES THE LONGEST TIME. REPORTS PRODUCED ARE:

1. HIERARCHICAL DIRECTORY
2. SORTED HIERARCHICAL DIRECTORY
3. DISK MAP BY FILE
4. FILE MAP BY AREA ADDRESS
5. DISK CHECKERBOARD
6. FILE CONFLICTS (IF ANY)
7. STATUS OF DISK SWITCHES

1 PRODUCES ONLY REPORT NUMBER ONE. FASTEST AND TAKES LEAST PAPER.

2 PRODUCES REPORTS NUMBER ONE AND NUMBER TWO ONLY.

RESETTING "LINE8" RESULTS IN OUTPUT AT SIX LINES PER INCH.

THE DEFAULT PAGE SIZE FOR OUTPUT IS 81 LINES INCLUDING HEADINGS, IF

D0344 LISTDIR - DIRECTORY LISTING REPORTS - 06-24-73

AT EIGHT LINES PER INCH AND 58 LINES IF AT SIX LINES PER INCH. THE SIZE IS NOW CONTROLLED BY THE "PAGESIZE" ATTRIBUTE OF THE PRINTER FILE "LINE" AND MAY BE CHANGED AT RUN TIME BY A FILE CARD. A "PAGESIZE" OF ZERO SETS THE LOGICAL PAGE TO 65,534.

THE VERSION AND CYCLE NUMBERS HAVE BEEN ADDED TO THE HEADING LINE.

D0379 LISTDIR - INCREASED SPEED OF LISTDIR - 07-08-73

A NEW TECHNIQUE OF PRODUCING THE HIERARCHICAL DIRECTORY HAS RESULTED IN A SPEED UP OF APPROXIMATELY SIX TO ONE. THIS IS ACCOMPLISHED BY HAVING THE MCP PRODUCE A FILE CONTAINING THE SYSTEMDIRECTORY FILE AND ALL ASSOCIATED HEADERS WITHOUT OPENING AND CLOSING THE FILES INVOLVED. THIS FILE IS THEN PROCESSED BY SYSTEM/LISTDIRECTORY USING DIRECT I/O. THE MCP COPY REQUEST (A CALL UPON GETSTATUS) WILL TERMINATE THE JOB IF IT ATTEMPTS TO VIOLATE SECURITY. HENCE, SYSTEM/LISTDIRECTORY MUST BE RUN UNDER A PRIVILEGED USERCODE. SEE D0425 FOR THE NEW SYNTAX OF DIR WHICH ALLOWS INTRODUCTION OF THE PRIVILEGED USERCODE. FINALLY, NO FILES MAY BE ADDED OR REMOVED FROM THE SYSTEM WHILE THE COPY IS TAKING PLACE (APPROXIMATELY 200 FILES/SECOND).

D0381 LISTDIR - CRUNCHED FILE REPORTING - 07-14-73

LISTDIRECTORY NOW REPORTS THE CORRECT SIZE OF CRUNCHED DISK FILES. PLEASE REFER TO MCP D0410 FOR A MORE DETAILED EXPLANATION OF CRUNCHED FILES.

D0480 LISTDIR - CLEAN UP FILE CONFLICT REPORT - 09-04-73

AN END OF FILE NUMBER LABEL NO LONGER OCCURS ON THE LINE-PRINTER IF THERE IS MORE THAN ONE PAGE OF CONFLICTS.

CONFLICTING ROW NUMBERS ARE NOW GIVEN IN ADDITION TO THE FILE

D0480 LISTDIR - CLEAN UP FILE CONFLICT REPORT - 09-04-73

NUMBER.

D0483 LISTDIR - NEW APL AND BASIC FILETYPES - 08-26-73

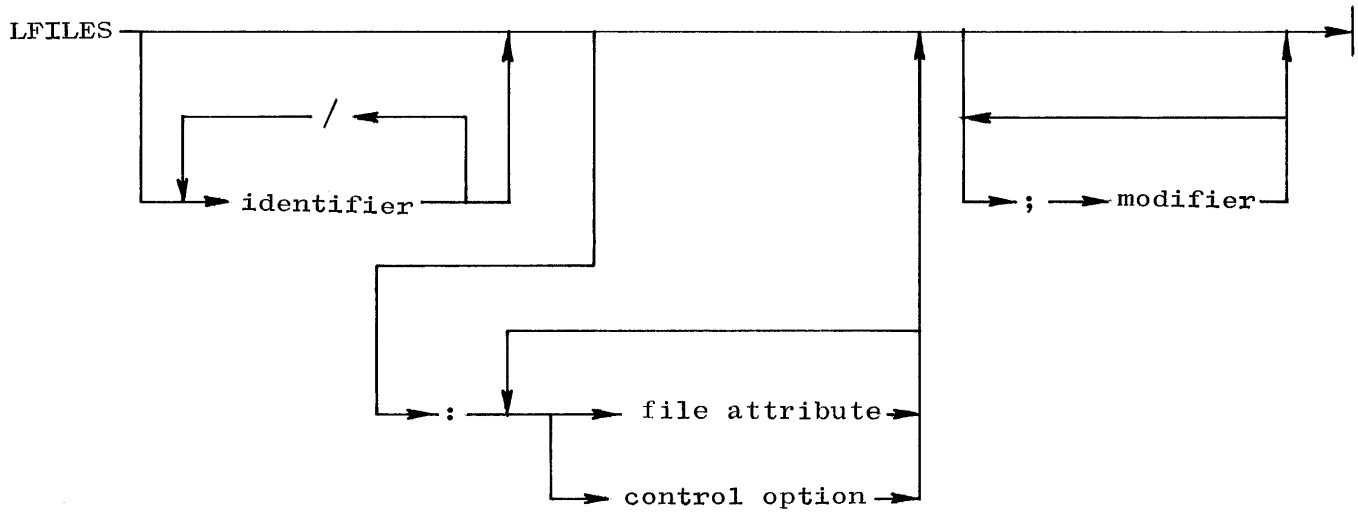
THIS CHANGE ADDS THE FILE TYPES APLDATA (195), APLWORKSPACE (196), CDATA (192), AND CSEQDATA (198) TO THE LIST OF KNOWN FILE TYPES.

D0491 LISTDIR - IDENTIFICATN OF CRUNCHED FILE - 10-16-73

CRUNCHED FILES ARE NOW IDENTIFIED AS SUCH FOLLOWING THE NUMBER OF SEGMENTS IN THE FILE.

# LISTFILES

D0481 LISTFILES - USER OPTIONS IN LISTFILES - 08-26-73




SYNTAX FOR MODIFIED LFILES

WHEN A ":" APPEARS IN THE INPUT PARAMETER LIST, WHAT FOLLOWS IS TAKEN AS USER-SUPPLIED OPTIONS UNTIL THE END OF INPUT. IF THE COLON APPEARS, ALL OPTION REPORTING IS PRESET TO FALSE. ONLY SUFFICIENT CHARACTERS TO UNSURE UNIQUENESS NEED BE SUPPLIED FOR EACH OPTION. UNRECOGNIZED SPELLING OR INSUFFICIENT CHARACTERS RESULT IN A WARNING MESSAGE.

IN ADDITION TO THE DATA FILE ATTRIBUTES SHOWN ARE THE FOLLOWING CONTROL OPTIONS:

| | |
|---|---|
| ABBREVIATED | SHORTENS ALL FILE OPTION IDENTIFICATION. |
| ALL | SETS ALL DATA FILE ATTRIBUTE REPORTING TO TRUE. |
| DOUBLE | DOUBLE SPACES THE OUTPUT. |

EXAMPLES:

LFILES X: AREAS AREASIZE U MAX MIN BL ABBREVIATED

LFILES : ALL DOUBLE ABB

LFILES (NOTME): FILETYPE DATE DO

LFILES A/B: CREATIONDATE, LASTA, LASTR, AB, D

NOTE: "D" HAS NOT SUFFICIENT CHARACTERS FOR UNIQUENESS AND HENCE RESULTS IN A WARNING MESSAGE.

## LOADER

### D0382 LOADER - DAMAGED DIRECTORY-FILE RECOVRY - 07-08-73

THIS CHANGE IMPLEMENTS RECOVERY FROM DAMAGED DIRECTORY AND FILES.

SYNTAX

1. THE LOADER DATA CARD "COOLSTART" INVOKES DIRECTORY COMPLEMENT.
2. THE LOADER DATA CARD "REMOVE" REMOVES THE INDICATED FILE.

   REMOVE<MULTI-FILE ID>
   <MULTI-FILE ID>::= <FILE ID> / <MULTI-FILE ID>/<FILE ID>
   <FILE ID>::= <IDENTIFIERS OF 17 OR LESS CHARACTERS>

SEMANTICS

1. COOLSTART

   THIS OPTION WILL SIMULATE THE MCP"S PROCEDURE "DIRECTORYCOMPLEMENT" IN THE LOADER. IT WILL CATCH ANY I/O THAT RESULTS IN DISK I/O ERRORS (PARITY, TIMEOUT, ETC.). IT WILL CHECK ROW ADDRESSES OF ALL HEADERS FOR VALID EU AND ADDRESS FIELDS. (THE EU MUST BE ON THE LINE, THE ADDRESS MUST BE WITHIN RANGE FOR THIS TYPE EU, IAD FILES POINTING TO NON-EXISTING DISK WILL CAUSE PROBLEMS). IT WILL NOT CHECK FOR OVERLAPPING FILES ("DIRECTORY DAMAGED" WILL NOT CAUSE THE HALT/LOAD TO FAIL AND DAMAGED FILES CAN BE REMOVED AFTER A LISTDIRECTORY). IF AN ERROR OCCURS WHILE LOOKING THROUGH THE DIRECTORY, THE CURRENT FILE OR DIRECTORY THAT IS BEING LOOKED AT WILL BE DISPLAYED ON THE CONSOLE AND AN "OK" MUST BE ENTERED TO REMOVE THE FILE OR DIRECTORY. AFTER THE DIRECTORY OR FILE IS REMOVED, THE LOADER WILL TRY AGAIN STARTING AT THE BASE OF THE DIRECTORY. IF A RESPONSE IS NOT SEEN INDICATING THE FILE HAS BEEN REMOVED (LOADER STARTS DUMPING), THIS MEANS

D0382 LOADER - DAMAGED DIRECTORY-FILE RECOVRY - 07-08-73

THE HEADER OR DIRECTORY CANNOT BE REMOVED AND THE PREVIOUS DIRECTORY MUST BE REMOVED USING THE "REMOVE" CARD. ANOTHER POSSIBLE RESPONSE WHILE TRYING TO REMOVE THE HEADER IS:

"DISK ERROR WHILE TRYING TO REMOVE HEADER OR DIRECTORY... USE REMOVE CARD TO REMOVE PREVIOUS DIRECTORY".

2. REMOVE

THE REMOVE OPTION ALLOWS A HEADER OR DIRECTORY TO BE REMOVED FROM THE SYSTEM. IF THE HEADER OR DIRECTORY CANNOT BE FOUND, THIS FACT WILL BE DISPLAYED. A MESSAGE IS DISPLAYED FOR SUCESSFUL REMOVAL.

NOTE:

THE LOADER REQUIRES TWO MEMORY MODS, MOD ZERO AND ANY OTHER MOD TO BE ON-LINE.

D0383 LOADER - DIRECTORY COMPLEMENT TIMINGS - 07-14-73

IN ADDITION TO INDICATING WHEN THE DIRECTORY COMPLEMENT IS STARTED AND ENDED, THE SYSTEM/LOADER WILL ALSO GIVE THE TIME IN MINUTES AND SECONDS AS TO DURATION OF DIRECTORY COMPLEMENT AND ALSO A DIRECTORY FILE COUNT WILL BE DISPLAYED ON THE CONSOLE.

D0408 LOADER - UPDATED SOFTWARE LEVEL - 07-29-73

THIS PATCH ADDS CERTAIN FEATURES TO THE SYSTEM/LOADER.

1. UPDATES SOFTWARE LEVEL SO THAT IT IDLES WITH "2.5" IN A, X, B AND Y PROCESSOR REGISTERS AND SPO MESSAGE LEVEL IS UPDATED FROM "2.4" TO "2.5".
2. LOCATIONS OF SYSTEMDIRECTORY AND MCPINFO ARE DISPLAYED ON THE CONSOLE WHEN THE LOADER READS A PARAMETER CARD WHICH HAS THE WORD "LOCATIONS" ON IT.

3. AS THE LOADER FINDS THE PROPER FILE TO LOAD, IT WILL DISPLAY THE MESSAGE "***LOAD <FILE ID>***".

D0428 LOADER - DIRECTORYLOC AND DIRECTORYROW - 08-12-73

THIS PATCH REMOVES THE ABILITY TO SPECIFY DIRECTORY LOCATION AND DIRECTORY ROW SIZE IN LOADER AT COLD START TIME.

D0532 LOADER - RESERVE SU OR SWITCHES - 09-23-73

THE LOADER "RESERVE" PROCEDURE HAS BEEN CHANGED TO ASSUME THAT UNIT (SU) AND SWITCH NUMBERS (SWITCH) ORIGINATE AT "1" FOR TYPE I DISK. THIS MAKES THE LOADER "RESERVE" CONFORM TO THE CONSOLE "RES" AND "RET".

## LOGANALYZER

### D0331 LOGANALY - COPY AND COMPARE ERRORS - 06-03-73

THIS CHANGE IMPLEMENTS THE ABILITY FOR LOGANALYZER TO PRINT OUT LIBRARY MAINTENANCE COPY AND COMPARE ERRORS, WHICH THE MCP NOW PUTS IN THE SYSTEM LOG. THE RECORDS WILL BE PRINTED OUT ON ANY LOG MAINTENANCE COMMAND. SEE MCP D0348.

### D0345 LOGANALY - DUMP AND UNKNOWN OPTIONS - 06-24-73

TWO NEW OPTIONS HAVE BEEN ADDED TO LOGANALYZER - DUMP AND UNKNOWN. "DUMP" RESULTS IN A DUMP OF ALL SELECTED RECORDS IN THE LOG (AS OPPOSED TO "RAW", WHICH DUMPS THE WHOLE LOG). "UNKNOWN" RESULTS IN A DUMP OF ALL RECORDS IN THE LOG WHICH LOGANALYZER DOES NOT RECOGNIZE.

### D0346 LOGANALY - UNSORTED OPTION - 06-24-73

A NEW OPTION HAS BEEN ADDED TO SYSTEM/LOGANALYZER WHICH ALLOWS PRINTING THE LOG ENTRY IN SEQUENTIAL ORDER INSTEAD OF SORTED BY RECORD TYPE AS IS DONE NORMALLY. THE PARAMETER "UNSORTED" MAY BE SPECIFIED IN ADDITION TO OTHER PARAMETERS IN ORDER TO OBTAIN AN UNSORTED LOG PRINTOUT.

### D0347 LOGANALY - MIX OPTION - 07-08-73

THE DESCRIPTION OF THE "MIX" OPTION IN THE WFM REFERENCE MANUAL (P. 5-3) IS INCORRECT. IT SHOULD STATE THAT "LOG MIX <MIX NUMBER>" GIVES ALL RECORDS ASSOCITED WITH THE <MIX NUMBER>. (ADDITIONAL

D0347 LOGANALY - MIX OPTION - 07-08-73

CRITERIA (BOJ, EOJ, IOERROR, ETC.) MAY BE USED IN ADDITION TO PRINT ONLY THE DESIRED ENTRIES FOR THE <MIX NUMBER>.)

D0429 LOGANALY - IOERROR LOG HEADING - 08-12-73

THE COLUMN LABELED "TIME" ON THE IO ERROR LOG PRINTOUT HAS BEEN CHANGED TO "SCNO TIME" IN ORDER TO POINT OUT THE FACT THAT THIS IS THE ACTUAL TIME THAT THE IO OPERATION WAS INITIATED RATHER THAN THE TIME THAT THE ERROR RECORD WAS LOGGED.

D0484 LOGANALY - LOG TASKS WITH ERRORS - 08-26-73

A NEW SPECIFICATION, "ERRORS", HAS BEEN ADDED TO LOGANALYZER. WHEN THIS OPTION IS SET, ONLY THOSE TASKS WHICH WERE DS-ED OR WERE COMPILATIONS WITH SYNTAX ERRORS WILL BE PRINTED OUT.

D0533 LOGANALY - LOG PROCESSOR ERRORS - 07-23-73

THE CAPABILITY TO ANALYZE LOG RECORDS CREATED BY THE PROCESSOR VERIFICATION ROUTINES TO REPORT ANY PROCESSOR FAILURES HAS BEEN ADDED TO LOGANALYZER. THESE RECORDS MAY BE PRINTED BY "LOG MAINT" OR "LOG CPUERROR".

## MCP

### D0291 MCP - RESERVE SYNTAX EXAMPLES - 04-23-73

RESERVE SYNTAX EXAMPLES AS NOTED IN THE MARK II.3 SYSTEM MISCELLANEA ON PAGE 191, EXAMPLES THREE AND FIVE, SHOULD NOT INCLUDE THE WORDS "AS BADDISK".

### D0299 MCP - DISK PACK INITIALIZE & VERIFY - 04-23-73

THIS SYSTEM NOTE DESCRIBES THE NEW VERSION OF DISKPACKINITIALIZE (CALLED DPI FOR BREVITY), THE BASIC PURPOSE OF DPI AND THE IMPROVEMENTS MADE IN THE NEW ROUTINE. FOLLOWING THIS WILL BE A DETAILED DISCUSSION OF THE I/O ERROR ANALYSIS DONE BY DPI.

#### PURPOSE

DPI IS CALLED BY DISKPACKER WHEN THE OPERATOR INPUTS A IV COMMAND. IT IS PASSED A SINGLE PARAMETER, THE UNIT NUMBER OF THE SPINDLE CONTAINING THE PACK TO BE INITIALIZED. DPI FORMATS THE PACK WITH 30-WORD RECORDS, ANALYZES THE SURFACE FOR BAD SPOTS, CONSTRUCTS THE MASTER AVAILABLE TABLE, AND MARKS THE PACK AS INITIALIZED.

DPI MAKES TWO PASSES OVER THE GIVEN PACK. DURING THE FIRST PASS AN INITIALIZE COMMAND IS USED TO PREFORMAT EACH TRACK WITH 30-WORD RECORDS. DURING THE SECOND PASS A VERIFY COMMAND IS USED TO TEST EACH RECORD WRITTEN DURING THE FIRST PASS. DPI ATTEMPTS TO RELOCATE BAD SECTORS TO THE SPARES PROVIDED ON TRACK ZERO OF EACH CYLINDER. IF THIS CANNOT BE DONE, THE TRACK IS AUTOMATICALLY XD-ED. DPI PRODUCES A REPORT INDICATING I/O ERRORS ENCOUNTERED, WHAT SECTORS WERE RELOCATED, AND WHAT TRACKS AND CYLINDERS WERE XD-ED.

## IMPROVEMENTS

DPI WAS COMPLETELY REWRITTEN. SEVERL IMPROVEMENTS WERE MADE IN THE ROUTINE, THE MOST IMPORTANT ONE BEING THAT THE NEW ROUTINE PERFORMS A CAREFUL ANALYSIS OF DISKPACK I/O ERRORS. SPECIFIC IMPROVEMENTS ARE AS FOLLOWS:

1. THE INITIALIZE AND VERIFY COMMANDS ARE ISSUED IN THE CYLINDER MODE RATHER THAN THE FULL PACK MODE. THIS BREAKS THE PROCESS DOWN INTO 812 HALF-SECOND OPERATIONS RATHER THAN TWO FOUR-MINUTE OPERATIONS.

2. A PRINTED REPORT IS PRODUCED THAT SERVES AS A PERMANENT RECORD OF THE PHYSICAL CONDITION OF THE PACK. THIS LIST COULD PROVE USEFUL WHEN TRYING TO ANALYZE I/O ERRORS LATER ON THE PACK (E.G., RELOCATED SECTORS COULD BE IDENTIFIED).

3. A DETAILED ANALYSIS IS MADE OF ALL I/O ERRORS ENCOUNTERED. THIS ANALYSIS IS DISCUSSED MORE FULLY BELOW.

4. PROVISION WAS MADE FOR THE 225 DISK PACKS. SEVERAL GLOBAL DEFINES WERE ADDED TO THE MCP TO EXTRACT THE VARIOUS SIZE PARAMETERS FOR THE DEVICE. THESE PARAMETERS INCLUDE: SPARES PER CYLINDER, CYLINDERS PER PACK, SECTORS PER CYLINDER, AND SECTORS PER TRACK.

## DEFINITIONS

THIS DESCRIPTION SUPERSEDES THE DISK PACK MANUAL REGARDING THE ADDRESSING OF PHYSICAL DISK-PACK RECORDS. THE FOLLOWING STANDARD IS PROPOSED AND WILL BE FOLLOWED CONSISTENTLY.

SECTOR NUMBER — THE RELATIVE POSITION (STARTING FROM ZERO) OF THE GIVEN SECTOR WITH RESPECT TO THE INDEX POINT ON THE TRACK. FOR EXAMPLE, THE SECTOR NUMBERS OF A 215 PACK FORMATTED WITH STANDARD 30-WORD RECORDS RANGE FROM ZERO TO 32.

SEGMENT ADDRESS — THE DISK ADDRESS USED IN READ AND WRITE COMMANDS

FOR THE GIVEN SECTOR. FOR EXAMPLE, THE SEGMENT ADDRESSES OF A 215 PACK FORMATTED WITH STANDARD 30-WORD RECORDS RANGE FROM ZERO TO 265929. NOTICE, IN THIS CASE, THAT:

1. THE FIRST SECTOR ON CYLINDER ZERO TRACK ZERO IS ZERO.
2. THE FIRST SECTOR ON CYLINDER ZERO TRACK ONE IS 28.
3. THE FIRST SECTOR ON CYLINDER ZERO TRACK TWO IS 61.
4. THE FIRST SECTOR ON CYLINDER ONE TRACK ZERO IS 655.

## I/O ERROR PROCESSING

I/O ERRORS ARE DETECTED AND PROCESSED BY DPI AS FOLLOWS:

1. DISKWAIT OR WAITIO IS CALLED TO ISSUE THE PRIMARY I/O REQUEST.
2. IF THE RESULT DESCRIPTOR FROM EITHER OF THESE ROUTINES INDICATES AN ERROR (BIT ZERO IS A ONE), THE NEW GLOBAL MCP PROCEDURE, PACKERRMSG, IS CALLED TO CONSTRUCT AN ERROR MESSAGE AND CLASSIFY THE ERROR.
3. THE ERROR MESSAGE IS PRINTED. IF WAITIO WAS CALLED, THE ERROR MAY BE RETRIED UP TO FIVE TIMES AT THIS POINT.
4. IF THE ERROR PERSISTS, DPI MAY MARK THE TRACK AS BAD (XD IT), ETC. THE COURSE OF ACTION DEPENDS ON THE CLASS OF ERROR AND WHERE IT OCCURS. SINCE THE PROCESSING OF THE ERROR CONDITION DEPENDS ON WHAT ITS CLASS IS, PACKERRMSG WILL BE DESCRIBED FIRST.

## PACKERRMSG

PACKERRMSG IS A NEW GLOBAL MCP PROCEDURE THAT CONSTRUCTS DISK-PACK

I/O ERROR MESSAGES AND CLASSIFIES THE ERROR CONDITION. IT IS CURRENTLY INTENDED FOR THE USE OF DISKPACKINITIALIZE, DISKPACKPWROFF, DISKPACKCONFIGURE, AND READPACKLBL. THE ROUTINE IS PASSED SEVERAL PARAMETERS:

1. AN 8-BIT POINTER TO THE 100-BYTE BUFFER THAT IS TO RECEIVE THE ERROR MESSAGE.
2. THE RESULT DESCRIPTOR FROM WAITIO OR DISKWAIT.
3. THE STARTING SEGMENT ADDRESS, INCLUDING THE UNIT NUMBER.
4. THE ORIGINAL I/O COMMAND.
4. A CODE INDICATING THE NAME OF THE CALLER.

THE MESSAGE CONSTRUCTED IN THE BUFFER INCLUDES THE NAME OF THE CALLER, THE PACK UNIT NUMBER, THE RESULT DESCRIPTOR AND COMMAND IN HEX, THE STARTING SEGMENT ADDRESS, THE STARTING CYLINDER AND TRACK, AND A TEXT DESCRIPTION OF THE ERROR CONDITION (E.G., SEEK TIME OUT). PACKERRMSG RETURNS A VALUE INDICATING THE CLASS OF ERROR DETECTED. THIS IS INTENDED PRIMARILY FOR DISKPACKINITIALIZE AND ATTEMPTS TO DISTINGUISH BETWEEN ERRORS CAUSED BY THE I/O EQUIPMENT (I.E., DRIVE, CONTROLLER, AND CHANNEL), THE PROGRAM OR OPERATOR, AND THE PACK ITSELF. THE ERRORS HAVE BEEN CLASSIFIED AS FOLLOWS:

1. PROGRAM OR OPERATOR ERROR -- VALUE ONE

   MEMORY PROTECT, MEMORY ADDRESS, NOT READY OR SELECT LOCK, CONTROLLER IN LOCAL, WRITE LOCK OUT.

2. SOLID EQUIPMENT ERROR (CONTROLLER OR CHANNEL) -- VALUE TWO

   MEMORY PARITY, DESCRIPTOR ERROR, CONTROLLER BUSY, CONTROLLER MALFUNCTIONING, MEMORY ACCESS, TRANSMISSION PARITY, INTERFACE PARITY, FIRST ACTION, DRIVE SEEKING, SEEK INITIATED, SEEK TIME OUT, DRIVE BUSY, UNKNOWN (UNLISTED RESULT DESCRIPTOR BIT COMBINATION).

3. PROBABLE DISK DRIVE ERROR -- VALUE THREE

   SPEED ERROR, SECTOR TIME OUT, SEEK ERROR.

4. PROBABLE PACK ERROR -- VALUE FOUR

ADDRESS PARITY, ADDRESS POSITION, DATA ERROR RETRY, DATA ERROR CORRECTION.

## DISKPACKINITIALIZE I/O ERROR PROCESSING

THE ACTION TAKEN BY DPI AFTER AN ERROR DEPENDS ON THE CLASS OF ERROR AND THE COMMAND BEING PERFORMED. IN GENERAL, A CLASS ONE OR TWO ERROR CAUSES AN IMMEDIATE ABORT, CLASS THREE ERRORS CAUSE THE TRACK IN QUESTION TO BE XD-ED, AND CLASS FOUR ERRORS CAUSE THE SECTOR TO BE RELOCATED TO A SPARE. THE EXACT ACTIONS ARE AS FOLLOWS:

| ERROR CONDITION | ACTION TAKEN |
|---|---|
| CLASS ONE OR TWO, OR THREE ERROR DURING INITIALIZE PASS. | ABORT IV WITH RETURN CODE OF 42. |
| CLASS FOUR ERROR DURING INITIALIZE PASS. | CAUSE ENTIRE CYLINDER TO BE REMOVED FROM MASTER AVAILABLE TABLE (MAT), IF ERROR IS ON CYLINDER ZERO, ABORT RUN. |
| CLASS ONE OR TWO ERROR DURING VERIFY PASS. | ABORT IV WITH RETURN CODE OF 44. |
| CLASS THREE OR FOUR ERROR DURING VERIFY PASS AND NO SEGMENT ADDRESS REPORTED BY CONTROLLER. | REPEAT VERIFY PASS OVER CYLINDER A SINGLE TRACK AT A TIME. WHEN ERROR REOCCURS. REMOVE TRACK FROM MAT. |
| CLASS THREE OR FOUR ERROR DURING VERIFY PASS AND SEGMENT NUMBER REPORTED BY CONTROLLER. | IF SEGMENT IN ERROR IS A SPARE, INDICATE THERE ARE NO SPARES AVAILABLE ON CYLINDER AND CONTINUE. IF ERROR IS ON TRACK ZERO OF THE CYLINDER, VERIFY THE REST LOCATED AT THE END OF THE TRACK). IF THAT FAILS FOR ANY REASON. REMOVE TRACK ZERO FROM THE MAT AND INDICATE THAT THERE ARE NO |

| ERROR CONDITION | ACTION TAKEN |
|---|---|
| | SPARES AVAILABLE ON THE CYLINDER. OTHERWISE, OR IF ERROR WAS NOT TRACK ZERO, RELOCATE THE SECTOR TO A SPARE AND REVERIFY THE TRACK (TO MAKE SURE THE RELOCATE WORKED). IF THERE ARE NO MORE SPARES AVAILABLE ON THE CYLINDER, REMOVE THE TRACK FROM THE MAT. • |
| ANY ERROR DURING RELOCATE. | REMOVE TRACK CONTAINING SEGMENT BEING RELOCATED FROM MAT. |
| ANY ERROR WRITING MAT OR LABEL ON PACK. | ABORT RUN. |

THE GOAL OF THIS ERROR PROCEDURE IS TO ONLY ALLOW TRACKS THAT COULD BE COMPLETELY VERIFIED FROM START TO FINISH IN THE MAT. IF A TRACK CONTAINS RELOCATED SECTORS, THAT IS FINE, AS LONG AS THE ENTIRE TRACK COULD BE REVERIFIED AFTER RELOCATION. THERE ARE TWO EXCEPTIONS TO THIS:

1. IF TRACK ZERO CONTAINS A RELOCATED SECTOR, A VERIFY FOR TRACK ZERO WILL ALWAYS RETURN AN ADDRESS POSITION ERROR WHEN IT REACHES THE SPARE THAT WAS ASSIGNED. THIS ERROR IS IGNORED.

2. IF A RELOCATE COMMAND FAILS, THE TRACK CONTAINING THE SEGMENT TO BE RELOCATED IS XD-ED. HOWEVER, IT IS STILL POSSIBLE THAT A SPARE ON TRACK ZERO WAS IN ERROR AND MIGHT HURT FUTURE TRACK ZERO I/O. (AT LEAST TRACK ZERO WAS COMPLETELY VERIFIED ONCE, SO LATER DAMAGE COULD BE CLASSIFIED AS BAD LUCK, SO TO SPEAK.)

NO ATTEMPT IS MADE TO XD INDIVIDUAL SEGMENTS (AS THE ORIGINAL ROUTINE DID WHEN IT RAN OUT OF SPARES) BECAUSE THERE IS NO GUARANTEE THAT A READ OR WRITE FOR ANOTHER SEGMENT ON THAT TRACK MIGHT NOT BE CONFUSED BY NOISE IN THE BAD SECTOR (E.G., NOISE MIGHT LOOK LIKE AN ADDRESS MARK).

## D0311 MCP - PARTNER ATTRIBUTE - 05-07-73

IF A TASK DOES NOT HAVE A PARTNER THEN THE TASK ITSELF IS RETURNED AS A PARTNER.

## D0320 MCP - MPX LOAD LEVEL INPUT MESSAGE - 06-03-73

THE KEYBOARD COMMAND LL IS NOW AVAILABLE FOR INTERROGATION, AND SETTING THE MODEL II MULTIPLEXOR LOAD LEVEL FUNCTION. THE SYNTAX IS AS FOLLOWS:

LL MCP <N>, ...<ETX>

THIS SETS THE LOAD LEVEL OF MPX <N> TO <L>. THE SAME KIND OF LIST IS ALLOWED AS FOR SN:

LL <ETX>

WILL DISPLAY THE LOAD LEVELS FOR ALL PRESENT MULTIPLEXORS.

## D0321 MCP - DISK-PACK TURN-OFF - 06-03-73

THIS PATCH PROTECTS THE SYSTEM FROM HAVING AN IN-USE DISK PACK TURNED OFF. IF AN IN-USE DISK PACK (ONE WITH OPEN FILES ON IT) IS TURNED OFF, THE SYSTEM WILL DEMAND THAT IT BE TURNED ON WITH THE SAME PACK MOUNTED. THE PREVIOUS LACK OF THIS REQUIREMENT COULD CAUSE SYSTEM FAILURE.

THIS CHANGE IMPLEMENTS VOLUME PROTECTION BY OWNERS NAME. PLEASE REFER TO CONTROLLER D0399 FOR FURTHER INFORMATION.

THIS CHANGE ALSO CORRECTS SEVERAL PROBLEMS IN LIBRARY MAINTENANCE FOR DISK PACKS.

D0322 MCP - LOGGING-INCLUDE UNIT NUMBER - 06-03-73

A NEW FIELD IS ADDED TO WORD SEVEN OF LOG OPEN AND CLOSE RECORDS. THIS IS THE UNIT NUMBER FIELD, [39:8]. THIS FIELD IS NOT VALID FOR HEAD-PER-TRACK DISK OR REMOTE FILES.

D0323 MCP - EOJ LOGGING - 06-03-73

THIS PATCH CAUSES THE VALUE FOR ACTIVETIME (ZERO IF THE ACTIVETIME OPTION IS RESET) TO BE PLACED IN WORD 20 OF THE EOJ LOG RECORD. VARIABLE INFORMATION NOW STARTS IN WORD 21. IN ADDITION, LOGGING PROBLEMS WHICH COULD RESULT IN A DEADLOCK IN NOUSERDISK SITUATIONS AND DIFFERENT TIME VALUES IN THE LOG AND THE TASK HAVE BEEN CORRECTED.

D0328 MCP - DUP FILE ON CHANGE - 06-19-73

IF A FILE NAMED A/B IS CHANGED TO A FILE C/D AND GETS A "DUP FILE" MESSAGE (FOR EXAMPLE, IF AUTORM IS RESET OR C/D IS A DIRECTORY), THEN A HALT-LOAD WILL REMOVE A/B FROM THE DIRECTORY AND C/D WILL BE UNCHANGED.

D0329 MCP - USER PROGRAM SAVE CORE - 06-19-73

A PROGRAM WHICH LOOPS GETTING SAVE CORE (E.G. DIRECT ARRAYS) CAN HANG THE SYSTEM BY EXHAUSTING ALL CORE.

D0330 MCP - ALGOL TIME (14) - 06-19-73

THE TIME (14) FUNCTION DOES NOT RETURN THE TIME SINCE HALT-LOAD BUT RATHER THE CONTENTS OF THE SIX-BIT MACHINE CLOCK IN MULTIPLES OF

2.4 MICROSECONDS. IT BEARS THE SAME RELATION TO TIME (4) THAT TIME (11) DOES TO TIME (1).

D0348 MCP - LOG COMPARE ERRORS IN LIBMAINT - 06-24-73

LIBRARY MAINTENANCE COMPARE ERRORS WILL BE LOGGED IF THE COMPILE-TIME DIAGNOSTICS OPTION IS SET.

LOG FORMAT FOR COPY ERRORS:

```
LOG MAJOR TYPE  = 2
LOG MINOR TYPE  = 11  "MLLIBERR"
    WORDS 0 - 3     AS USUAL
    WORD  4         SOURCE INFORMATION WORD
                    [40:1]  TAPE FLAG (1=> TAPE)
                    [39:8]  UNIT NUMBER
                    [31:12] FIRST WORD IN SOURCE ON WHICH
                            COMPARE FAILED
                    [19:20] ADDRESS IF DISK
    WORD  5         CONTENTS OF FIRST SOURCE WORD ON WHICH
                    COMPARE FAILED
    WORD  6         DESTINATION INFORMATION WORD (SAME
                    AS WORD FOUR)
    WORD  7         CONTENTS OF FIRST DESTINATION WORD ON
                    COMPARE FAILED
```

D0372 MCP - B5500 LIBRARY MAINT TAPES - 10-16-73

DUE TO HARDWARE PROBLEMS, BACKSPACING A B5500 LIBRARY MAINTENANCE TAPE TO BEGINNING OF FILE IS NOT ALWAYS SUCCESSFUL ON THE B6700. THE TAPE MAY BE BACKSPACED THROUGH AN INDETERMINATE NUMBER OF FILES.

THE B6700 LIBRARY MAINTENANCE ROUTINE DEPENDS ON BACKSPACING IN THE COMPARE PHASE OF LIBRARY MAINTENANCE COPY. DURING THE COMPARE PHASE, THE ROUTINE BACKSPACES TO BEGINNING OF FILE TO REREAD THE FILE DISK DIRECTORY HEADER. IF THE BACKSPACE IS UNSUCCESSFUL, AN

INCORRECT HEADER IS READ. MINIMAL CHECKING FOR THIS CONDIDTION IS DONE. IF THE FILE LABEL IS READ, A TAPE POSITIONING ERROR MESSAGE IS OUTPUT AND LIBRARY MAINTENANCE IS TERMINATED.

USERS EXPERIENCING THIS PROBLEM SHOULD USE SIMPLE COPY TO INPUT B5500 LIBRARY MAINTENANCE TAPES.

D0384 MCP - FASTER LIST DIRECTORY - 06-24-73

THIS CHANGE IMPLEMENTS A NEW VERSION OF LIST/DIRECTORY WHICH PRODUCES A DIRECTORY ANALYSIS COMPARABLE TO THE OUTPUT OF SYSTEM/ LISTDIRECTORY. A SIGNIFICANT SPEED INCREASE WILL BE OBSERVED WHEN PROCESSING LARGE NUMBERS OF FILES.

THE NEW PROGRAM USES A GETSTATUS DIRECTORY COPY CALL WHICH IS INVOKED WITH A MAJOR TYPE OF THREE AND A MINOR TYPE OF THREE.

A LOGICALLY LINKED DIRECTORY COPY IS PRODUCED, ASSUMING A MAXRECSIZE AND BLOCKSIZE OF 30 WORDS.

THE FILE IS STRUCTURED SUCH THAT THE FIRST 90 WORD DIRECTORY NAME BLOCK PHYSICALLY FOLLOWS EACH DIRECTORY HEADER. ADDITIONAL NAME BLOCKS ARE POINTED TO BY WORD ONE (PREDECESSOR LINK). A ZERO VALUE INDICATES END OF CHAIN). THE FILE HEADER AND FIRST NAME BLOCK OF SYSTEM DIRECTORY ARE LOCATED IN LOGICAL ADDRESSES 0-3 OF THE FILE.

LOWER LEVEL DIRECTORY HEADERS AND FILE HEADERS ARE LINKED VIA WORD ZERO OF A FILE NAME ENTRY. FORMAT OF WORD ZERO IS:

```
LOGICAL LINK  = [47:20]
FILE KIND     = [27:8]
HEADER SIZE   = [19:16]
```

GETSTATUS MUST ALSO BE PASSED A FILE NAME FOR THE COPY FILE. THE NAME MUST BE IN MCP STANDARD FORM.

IF SECURED FILES ARE PRESENT THE CALLING PROGRAM MUST BE RUNNING UNDER A PRIVILEGED USER CODE. THE CALLING PROGRAM DOES NOT HAVE TO BE RUN UNDER A PRIVILIGED USER CODE IF NO SECURED FILES ARE PRESENT.

D0385 MCP - TASK AND QUEUE PRIORITY LIMIT - 07-08-73

THE PRIORITY OF A SUBTASK IS NOT ALLOWED TO EXCEED THE JOB QUEUE PRIORITY LIMIT.

D0387 MCP - REDUCE SAVE CORE - 07-08-73

THIS CHANGE IMPLEMENTS A "NODUMP" COMPILE TIME OPTION WHICH WILL, WHEN SET, REDUCE SEGMENTS OF SAVE CORE BY APPROXIMATELY 650 WORDS. WITH "NODUMP" SET NO MEMORY DUMPS WILL BE TAKEN. NON-FATAL HANGS CALLING MEMDUMP CAUSE A MESSAGE TO BE DISPLAYED (IDENTICAL TO NODUMP RUN TIME OPTION MESSAGES). FATAL DUMPS CAUSE THE SYSTEM TO DO A DEFUNCT OF "FATAL DUMP HALT/LOAD" REQUIRING A MANUAL HALT/LOAD. THE OPTION IS RELEASED RESET.

D0388 MCP - NEW SUBTYPES - SET-GET STATUS - 07-14-73

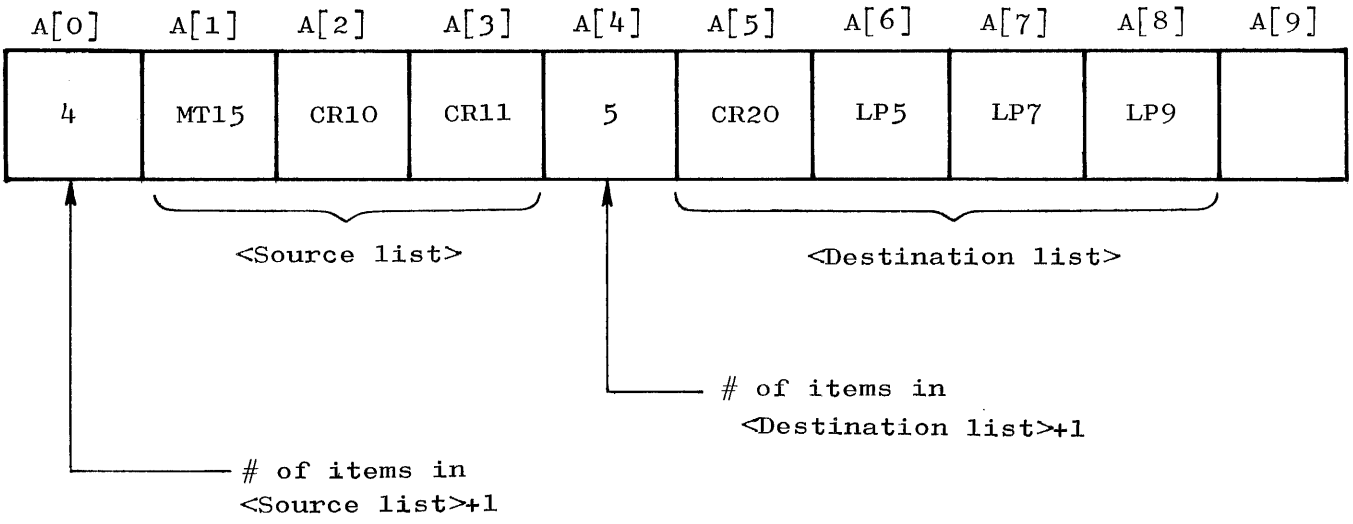
I. SETSTATUS

THIS PATCH ADDS THREE CASES TO SETSTATUS UNITS PORTION. THESE ARE AS FOLLOWS:

1. SUBTYPE #8 - WHICH ALLOWS CHANGING THE MODE OF A GIVEN UNIT: E.G., TO MAKE IT WRITE ENABLED. A <UNIT NUMBER LIST> IS REQUIRED ON THE SETSTATUS CALL. THIS CASE IS ONLY APPLICABLE TO DISK PACKS AND MAGNETIC TAPE UNITS. THE UNIT MAY NOT BE ASSIGNED OR RESERVED AT THE TIME OF THIS CALL. THE UNITS WRITE RING STATUS IS SET TO ONE IF "V" IS GREATER THAN ONE OR ELSE IT IS SET TO ZERO. THE "MODE" (I.E., "V") IS RETAINED ACROSS A HALT/LOAD.
2. SUBTYPE #11 - ALLOWS A DISK PACK TO BE LABELED. A SETSTATUS <UNIT NUMBER LIST> IS REQUIRED. A STRING LIST IS REQUIRED THAT MATCHES THAT OF A SETSTATUS UNIT REQUEST

TYPE TWO, V EQUALING ONE OR TWO. WHEN THIS CALL IS PERFORMED. A VISIBLE INDEPENDENT RUNNER TITLED "LB PK <NUMBER>" WILL BE STARTED.

3. SUBTYPE #12 - THIS CASE ALLOWS "ASSOCIATING" A SERIES OF <DESTINATION UNITS> WITH A <SOURCE LIST>. THE SETSTATUS ARRAY FORMAT IS AS FOLLOWS:




THE <SOURCE LIST> AND <DESTINATION LIST> ARE A <UNIT NUMBER LIST>.

IF V EQUALS ZERO THEN THE DESTINATION LIST IS NOT USED, AND ALL "PERIPHERAL ASSOCIATIONS" ASSOCIATED WITH THE <SOURCE LIST> ARE DISASSOCIATED FROM THE UNITS OF THE <SOURCE LIST>.

IF V EQUALS ONE THE ASSOCIATION ATTACHED TO THE FIRST UNIT OF THE <SOURCE LIST> BECOMES THE <DESTINATION LIST> USED BY ALL OTHER MEMBERS OF THE <SOURCE LIST>. THIS <DESTINATION LIST> MAY BE AMMENDED BY INFORMATION FROM THE SETSTATUS ARRAY "A" <DESTINATION LIST>. THIS IS ACCOMPLISHED THROUGH THE USE OF THE "ERRORVALUEF" OF EACH ITEM IN THE <DESTINATION LIST>. IF THE ERROR FIELD EQUALS ZERO THE UNIT IS DELETED FROM THE ORIGINAL ASSOCIATION

OTHERWISE IF IT EQUALS ONE IT IS ADDED TO THE ORIGINAL ASSOCIATION LIST. THE <DESTINATION LIST> MAY BE <EMPTY>.

IF V EQUALS TWO, THE <DESTINATION LIST> BECOMES THE NEW ASSOCIATION FOR ALL UNIT OF THE SOURCE LIST>. WITH THIS TYPE OF CALL, THE <DESTINATION LIST> MAY NOT BE EMPTY AND ALL ITEMS OF THE <DESTINATION LIST> ARE UNCONDITIONALLY ADDED TO THE ASSOCIATION.

THE "ASSOCIATIONS" ARE MAINTAINED OVER A HALT/LOAD VIA LOGIC ADDED TO THE CONTROLLER.

THIS PATCH ALSO ADDS A NEW SUBTYPE FOR SPECIFYING AND INTERROGATING THE DATA MANAGEMENT MONITOR TITLE (DM MESSAGE) TO THE MISCELLANEOUS REQUESTS:

SUBTYPE #24 - TO CHANGE DM MONITOR NAME. THE EXTENSION LENGTH IS ZERO. IF THE VALUE IS EQUAL TO ZERO THE DEFAULT DM MONITOR NAME IS TO BE SET TO SYSTEM/DM6700. IF THE VALUE IS EQUAL TO ONE THE DM MONITOR NAME MUST BE SET. IN THAT CASE, ARRAYROW CONTAINS POINTER TO STANDARD FORM NAME.

TWO NEW ERROR MESSAGES HAVE BEEN ADDED TO SETSTATUS AS FOLLOWS:

1. ERROR MESSAGE #92 - PRODUCES THE FOLLOWING MESSAGE: "A REQUIRED LOCK IS IN USE"
2. ERROR MESSAGE #93 - INDICATES A REQUEST WAS MADE AGAINST A GROUP (FROM SOURCE LIST, V=0,1) AND THE <SOURCE ITEM> DID NOT HAVE A PERIPHERIAL ASSOCIATION.

## II. GETSTATUS

TWO NEW BITS HAVE BEEN ADDED TO THE GETSTATUS UNIT REQUEST SECTION. THESE ARE MASK BITS #25 AND #26. MASK BIT #25 RETURNS ALL UNITS ASSOCIATED WITH A DESIGNATED UNIT. "LINKF" FOR MASK BIT #25 POINTS TO THE FOLLOWING:

WORD 0 NUMBER OF ENTRIES FOLLOWING THIS WORD (IN WORDS).

WORD 1-N ONE WORD FOR EACH UNIT IN THIS ASSOCIATION. THE

D0388 MCP - NEW SUBTYPES - SET-GET STATUS - 07-14-73

WORD CONTAINS THE UNIT NUMBER IN "UNITNUMF" AND THE UNIT TYPE IN UTYPEF.

MASK BIT #26 RETURNS THE NUMBER OF UNITS ASSOCIATED WITH THE REQUESTED UNIT.

A NEW SUBCLASS IS ALSO ALLOWED FOR PERPHERIAL ASSOCIATIONS. SUBTYPE ONE WILL ALLOW THE USE OF SUBCLASS = Z. UNDER THIS REQUEST ALL UNITS THAT HAVE A PERIPHERIAL ASSOCIATION WILL BE RETURNED BY GETSTATUS. MASK BIT #25 AND #26 MAY ALSO BE USED WITH THIS REQUEST.

ANOTHER BIT TO THE MISCELLANEOUS REQUEST SECTION, SUBTYPE ONE, HAS ALSO BEEN ADDED TO RETRIEVE THE NAME OF THE DM MONITOR. MASK PARAMETER BIT 23 TRUE MEANS TO GET THE CURRENT DM MONITOR TITLE. THE REPLY TYPE IS STANDARD FORM INDEX TO A DM MONITOR TITLE OR AN INDICATION THAT NONE HAS BEEN SPECIFIED (THE VALIDITY BIT IS RETURNED FALSE) OR AN ERROR MESSAGE VALUE #92 MEANING "A REQUIRED LOCK IS IN USE".

D0389 MCP - REDUCE EXECUTION STACK SIZE - 07-14-73

THIS IMPLEMENTATION REDUCES THE AMOUNT OF STACK OVERHEAD PROVIDED BY THE SYSTEM FOR EXECUTION STACKS BY 200 WORDS IF THE DIAGNOSTIC OPTION IS RESET AND 130 WORDS IF THE DIAGNOSTIC OPTION IS SET.

D0390 MCP - PROCESSOR VERIFICATION TESTS - 07-14-73

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IV. RESOURCES USED

## I. INTRODUCTION

THE PROCESSOR CONFIDENCE TESTS ESTABLISH A BASIC LEVEL OF CONFIDENCE IN THE CORRECT OPERATION OF PROCESSOR REGISTERS AND INTER-REGISTER BUSES. THEY ARE NOT EXPLICIT TESTS OF HARDWARE FLOW-OF-CONTROL (J-COUNT) LOGIC OR OF SPECIAL DECODERS OR DATA-TRANSFER PATHS WHICH ARE USED ONLY BY CERTAIN SPECIFIC J-COUNTS OF SOME OPERATORS.

THE ORDER OF THE TESTS IS DETERMINED BY THE FUNCTION PERFORMED BY THE OPERATOR-UNDER-TEST AND THE RESTRICTION THAT A FUNCTION BE SUBJECTED TO A TEST BEFORE IT IS USED IN THE CHECKING OF SOME OTHER FUNCTION, WHEREVER SUCH PREVIOUS TESTING IS FEASIBLE.

WE ASSUME THAT THE TEST SEQUENCE MAY BE EXECUTED BY ANY ON-LINE PROCESSOR, THAT A REQUEST FOR EXECUTION OF THE TESTS MAY SPECIFY WHICH PROCESSOR(S) SHOULD BE USED, AND THAT NO TEST SEQUENCE LOSES CONTROL OF ITS PROCESSOR (I.E., THE ENTIRE SEQUENCE IS EXECUTED WITH EXTERNAL INTERRUPTS DISABLED).

AN ON-LINE VERSION OF THESE TESTS WILL BE INCORPORATED IN THE MCP; IT WILL BE ACTIVATED FOR EACH ON-LINE PROCESSOR WHEN THERE IS NO OTHER USEFUL WORK FOR THE PROCESSOR TO DO (I.E., THE PROCESSOR WOULD BE DISPLAYING THE "B" IN ITS REGISTERS) AND A REASONABLE PERIOD OF TIME HAS PASSED SINCE THIS PROCESSOR WAS LAST TESTED AND KEYBOARD OPTION 15 ("TESTCPU") IS SET. THE "REASONABLE PERIOD OF TIME" IS SET TO ONE HOUR AT HALT/LOAD, BUT WILL BE DECREASED TO ONE HALF OF ITS PREVIOUS VALUE FOR EACH EXECUTION WHICH DISCOVERS AN ERROR.

AN OFF-LINE STAND-ALONE VERSION WILL ALSO BE AVAILABLE. THIS VERSION WILL CONSIST OF A SKELETON MCP TO HANDLE INTERRUPTS, INITIATE THE PROCESSORS EXECUTION OF THE TESTS, ETC., AND A SET OF $INCLUDE CARDS WHICH CAUSE THE TESTS THEMSELVES TO BE COMPILED FROM THE APPROPRIATED SECTIONS OF THE MCP SYMBOLIC.

## II. TEST PARAMETERS AND ERROR REPORTING

THE DATA USED IN ALL OF THE REGISTER AND BUS VERIFICATION TESTS CONSISTS EITHER OF LITERAL VALUES RESULTING FROM SOME FORM OF LITERAL CALL OPERATOR (E.G., LTI, LT48) OR OF A KNOWN DATA PATTERN RETRIEVED FROM A READ-ONLY ARRAY. THE RESULT OF APPLYING THE OPERATOR-UNDER-TEST TO THIS KNOWN DATA IS "FLOATED" ON THE TOP OF THE STACK, AND THE VERIFICATION TESTS ARE PERFORMED ON A COPY OF THIS TEST RESULT CREATED BY MEANS OF A DUPL OPERATOR. THUS, IF THE OPERATOR-UNDER-TEST HAS PRODUCED AN INCORRECT RESULT, THIS RESULT IS "FLOATING" ON TOP OF THE STACK, AND THE OPERATOR SEQUENCE AND

TEST DATA MAY BE DETERMINED FROM THE COMBINATION OF SDI, PIR, PSR AND A PROGRAM LISTING.

THE ON-LINE VERSION OF THESE TESTS WILL ATTEMPT TO ENTER THE EVIDENCE OF FAILURE IN THE SYSTEM SUMLOG FOR SUBSEQUENT FORMATTING AND PRINTOUT BY THE SYSTEM/LOGANALYZER PROGRAM.

THE OFF-LINE VERSION WILL HALT WHEN AN ERROR IS DETECTED. THE TEST SEQUENCE MAY BE DETERMINED BY MANUALLY READING SDI, PIR, SPR AND S VIA THE MDL DISPLAY AND EXAMINING THE TOP-OF-STACK OPERAND VIA THE MEMORY TESTER TO DETERMINE THE INCORRECT RESULT RETURNED BY THE SUSPECTED FAILING OPERATOR. THE PROGRAM CODE MAY THEN BE DETERMINED EITHER BY FINDING THE CODE IN MEMORY VIA THE MEMORY TESTER OR BY REFERRING TO A PROGRAM LISTING.

## III. TEST SEQUENCES

A DESCRIPTION OF THE HARDWARE FUNCTION UNDER TEST, THE TEST PARAMETERS AND THE EXPECTED (CORRECT) RESULT IS PROVIDED IN THE FOLLOWING PARAGRAPHS.

THE ASSOCIATION OF A TEST NUMBER WITH A GIVEN REGISTER-BUS COMBINATION IS A TWO-STEP PROCESS:

1. FIRST DETERMINE THE OPERATOR BY LOCATING THE DESIRED TRANSFER FUNCTION IN THE HEADING OF TABLE ONE. A "1" INDICATES THAT THE DESIGNATED OPERATOR USES THIS REGISTER-BUS COMBINATION FOR SINGLE-PRECISION OPERANDS AND A "2" INDICATES THAT THIS OPERATOR ALSO VERIFIES THIS PATH FOR DOUBLE-PRECISION TEST ARGUMENTS. AN "*" INDICATES THOSE FUNCTIONS WHICH ARE USED BY THE DESIGNATED OPERATOR BUT ARE NOT EXPLICITLY CHECKED BY THE CORRESPONDING OPERATOR TEST.

2. HAVING DETERMINED THE TEST OPERATOR, TABLE TWO IDENTIFIES THE TEST NUMBER WHICH USES THIS OPERATOR.

   FOR EXAMPLE, BTZ6 IS USED BY BOTH THE DUPL AND RSUP OPERATORS (TABLE ONE). THE VERIFICATION TEST FOR DUPL IS TEST THREE FOR SINGLE-PRECISION OPERANDS AND TEST 17 FOR

DOUBLE-PRECISION OPERANDS; THE RSUP VERIFICATION IS PERFORMED BY TEST 16 (TABLE TWO).

TABLE 1

TABLE 1
OPERATOR(S) USING DESIGNATED INTER-REGISTER BUSES

| | ATZ4 | BTZ4 | CTZ4 | PTZ4 | XTZ4 | YTZ4 | ATZ5 | BTZ5 | XTZ5 | YTZ5 | ATZ6 | BTZ6 | CTZ6 | XTZ6 | YTZ6 | DISS | Z11TA | Z11TB | Z11TC | Z11TX | Z11TY | Z22TA | Z22TB | Z22TX | Z22TY | Z33TA | Z33TB | Z33TC | Z33TP | Z33TX | Z33TY | Z10C | Z6T8 | Z8T11 | Z9T11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BRUN | | | | | | | | | | | | 1 | | | | 1 | | | | | | | | | | | | | | | 1 | | | | |
| BSET B17 | | | | | | | | | | | 1 | | | | | 1 | 1 | | | | | | | | | | | | | | 1 | | | | |
| CBDN D21 | | | 1 | | | | | | 2 | | 1 | | | | | | 1 | | | | | 2 | | | | | | | | | | | | | |
| DUPL D 3 | | | | | | | | | | 2 | | 1 | | | | | 1 | | | | | | | 2 | | | | | | | | | | | |
| EXCH D 7 | | | | | | | | 1 | 2 | | 1 | | | | 2 | | | | | 2 | | 1 | | | 2 | | | | | | | | | | |
| INSR B 9 | | | | | | | | | | 2 | 1 | | | | | 1 | | 1 | | | | | | 2 | 2 | | | | | | | * | | | |
| JOIN C53 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1 | | | | |
| LAND B 1 | 1 | | | | 2 | | | | | | | | | | | | | | | | | | 1 | | | | | | | | 2 | | | | |
| LEQV B 1 | 1 | | | | 2 | | | | | | | | | | | | | | | | | | 1 | | | | | | | | 2 | | | | |
| LT16 D14 | | | | | | | | | | | | | 1 | | | 1 | 1 | | 1 | | | | | | | | | | | | | 1 | | | |
| LT8 D13 | | | | | | | | | | | | | 1 | | | | 1 | | | | | | | | | | | | | | | 1 | | | |
| LNOT B 3 | 1 | | | | 2 | | | | | | | | | | | | | | | | | | 1 | | | | | | 2 | | | | | | |
| LOR B 1 | 1 | | | | 2 | | | | | | | | | | | | | | | | | | 1 | | | | | | | | 2 | | | | |
| LT48 D15 | | | | 1 | | | | | | | | | | | | | | | | | | | | | | 1 | | | | | | | | | |
| NTGR A42 | | | | | | | | | | | | 2 | | 2 | * | 2 | | 2 | | | | | | | | | | | | | | | | | |
| PROF/ | | | | 1 | | | | | | | | | | | | | | | | | | | | | | | | | 1 | | | | | | |
| PUSH D 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RPRR D19 | | | | | | | | | | | 1 | | 1 | | | * | 1 | | 1 | | | | | | | | | | | | | | | 1 | 1 |
| RSDN D 4 | | | | | | | 1 | | 2 | | | 1 | | | 2 | | 1 | 1 | | 2 | | | 1 | | 2 | | | | | | | | | | |
| RSUP D 5 | | | | | | | 1 | | | | 1 | 1 | 1 | | | | 1 | 1 | 1 | | | | 1 | | | | | | | | | | | | |
| SAME B 2 | 1 | 1 | | | 2 | 2 | | | | | | | | | | | | | | | | | | | | | 1 | | | | 2 | | | | |
| SPLT C53 | | | | | | 2 | | | | | | | | | | | | | | | | | | | | 2 | | | | | | | | | |
| SPRR D20 | | 1 | | | | | | | | | 1 | | | | | | | | | | | | | | | | | 1 | | | | 1 | | | |

| | ATZ4 | BTZ4 | CTZ4 | PTZ4 | XTZ4 | YTZ4 | ATZ5 | BTZ5 | XTZ5 | YTZ5 | ATZ6 | BTZ6 | CTZ6 | XTZ6 | YTZ6 | DISS | Z11TA | Z11TB | Z11TC | Z11TX | Z11TY | Z22TA | Z22TB | Z22TX | Z22TY | Z33TA | Z33TB | Z33TC | Z33TP | Z33TX | Z33TY | Z10C | Z6T8 | Z8T11 | Z9T11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

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TABLE 2
NUMBER OF TEST USING THE DESIGNATED OPERATOR FOR SINGLE/DOUBLE PRECISION TEST DATA.

| | SINGLE PRECISION TEST | DOUBLE PRECISION TEST |
|---|---|---|
| BRUN | 2 | |
| BSET B17 | | |
| CBDN D21 | | |
| DUPL D 3 | 3 | 17 |
| EXCH D 7 | 10 | 20 |
| INSR B 9 | 13&14 | |
| JOIN C53 | | 6 |
| LAND B 1 | | |
| LEQV B 1 | | |
| LT16 D14 | 4 | |
| LT8 D13 | 4 | |
| LNOT B 3 | 9 | 19 |
| LOR B 1 | 8 | 18 |
| LT48 D15 | 1 | |
| NTGR A42 | | 21 |
| PROF/ | | |
| PUSH D 1 | | |
| RPRR D19 | 7 | |
| RSDN D 4 | | |
| RSUP D 5 | 16 | |
| SAME B 2 | 3 | 17 |
| SPLT C53 | 6 | |
| SPRR D20 | 7 | |

3.1. HARDWARE FUNCTIONS: Z3TP, PTZ4, PARITY-CHECK CIRCUITRY ON Z4 BUS

OPERATOR: LT48

TEST ONE IS INTENDED TO CHECK FOR SINGLE DROPPED AND PICKED UP BITS IN PERFORMING THE LT48 OPERATOR.

THE FIRST TEST SEQUENCE CONSISTS OF EXECUTING LT48 OPERATORS WITH NUMERIC ARGUMENTS CONSISTING OF A WORD OF ZEROES WITH A SINGLE ONE-BIT IN EACH OF THE 48 DATA-BIT POSITIONS.

THE SECOND SEQUENCE PERFORMS LT48S OF VALUES CONSISTING OF A WORD OF ALL ONES WITH A SINGLE ZERO IN BIT POSTIONS ZERO THROUGH 47.

THE RESULTS OF THESE LT48 OPERATORS ARE LEFT "FLOATING" ON THE TOP-OF-STACK UNTIL TEST 15 IS COMPLETED. AT THAT TIME, THE VALUES INITIALLY LOADED INTO THE STACK ARE CREATED USING OPERATORS ZERO, DBST AND LNOT AND COMPARED WITH THE TEST1 VALUES. AN UNEQUAL COMPARISON COULD BE DUE EITHER TO AN INCORRECT RESULT FROM THE ORIGINAL LT48 OR (MORE LIKELY) FROM A FAILURE IN THE DBST OR LNOT OPERATORS.

AN ERROR IN THE FIRST PART OF TEST1 CAUSED BY THE ALTERATION OF THE VALUE LOADED BY THE LT48 RESULT MAY CAUSE A PROCESSOR MEMORY PARITY ERROR.

3.2. HARDWARE FUNCTION: CTZ6, DIS SHIFTOR LOGIC, Z10C, AR00-AR001 SENSING

OPERATORS: BRTR, BRUN, BRFL

THE INDICATION OF UNSUCCESSFUL OPERATION OF SUBSEQUENT TESTS WILL TYPICALLY INVOLVE A CONDITIONAL BRANCH AROUND THE ERROR-REPORTING CODE. THE PURPOSE OF THIS TEST IS TO ESTABLISH A MINIMAL LEVEL OF CONFIDENCE IN THE ABILITY TO PERFORM THE BRTR, BRUN AND BRFL FUNCTIONS.

THE TEST ALGORITHM CONSISTS OF EXECUTING A SEQUENCE OF TOPOFSTACK := TRUE, TOPOFSTACK := FALSE, IF BOOLEAN (TOPOFSTACK) THEN GO TO, AND IF NOT BOOLEAN (TOPOFSTACK)

THEN GO TO STATEMENTS WHICH ARE DIFFICULT TO DESCRIBE IN PROSE; THE COMBINATION OF VALUES PLACED IN THE STACK AND CONDITIONAL BRANCHES EXECUTED WILL RESULT IN A CALL ON THE ERROR-LOGGING PROCEDURE FOR EACH TEST WHICH DOES NOT PERFORM THE CORRECT BRANCH OPERATIONS. THE "MAZE" OF CONDITIONAL BRANCHES IS CONSTRUCTED SUCH THAT IT IS NOT POSSIBLE TO TRAVERSE THE MAZE WITHOUT MISHAP UNLESS ALL BRANCHES ARE EXECUTED CORRECTLY.

3.3. HARDWARE FUNCTIONS: LOTJ, LOTJ L1TK (=SAME), WBML, WSML, BU03; (Z6T1)

OPERATORS: DAME, DUPL

SUBSEQUENT TEST ALGORITHMS WILL TYPICALLY PLACE ONE OR MORE TEST OPERANDS IN THE STACK, PERFORM THE TEST ALGORITHM, DUPLICATE THE RESULT OF THE TEST AND CHECK THIS DUPLICATE FOR CORRECTNESS.

THE DUPLICATION IS NECESSARY IN ORDER TO PRESERVE THE ACTUAL RESULT OF THE TEST SO THAT IMMEDIATE DIAGNOSIS OR LOGGING CAN BE PERFORMED IF THE RESULT IS INCORRECT.

THE "CHECK FOR CORRECTNESS" WILL USUALLY CONSIST OF PLACING THE EXPECTED CORRECT RESULT IN THE STACK AND EXECUTING A SAME OPERATOR FOLLOWED BY A BRTR OR BRFL AROUND THE ERROR-REPORTING CODE.

AT THIS EARLY STAGE OF THE TEST SEQUENCE, THERE IS NO KNOWN RELIABLE METHOD OF COMPARING TWO OPERAND VALUES WHICH CONTAIN NON-ZERO BITS IN THE MOST SIGNIFICANT NINE BITS OF AN OPERAND VALUE ([47:9]). THE PURPOSE OF TEST THREE IS TO ESTABLISH CONFIDENCE OR DETECT ERRORS IN THE OPERATION OF THIS DUPL/SAME CHECKING CODE.

THE FIRST SEQUENCE OF TESTS LOADS TWO VALUES CONSISTING OF ZEROES WITH A SINGLE ONE BIT IN BIT POSITONS I AND J FOR 0 LEQ I, J LEQ 47, EXECUTING SAME, DUPL AND PERFORMING THE APPROPRIATE BRTR OR BRFL AROUND THE ERROR-REPORTING CODE, DEPENDING UPON WHETHER I = J OR I ≠ J.

THE SECOND TEST SEQUENCE PERFORMS THE SAME FUNCTIONS ON VALUES CONSISTING OF WORDS OF ALL-ONES WITH SINGLE ZERO BITS IN BIT POSITIONS I AND J.

3.4. HARDWARE FUNCTIONS: OPERATOR SYLLABLE SELECTION FROM ALL SIX POSITIONS OF P-REGISTER, Z10C DATA TRANSFER FROM ALL P-REGISTER POSITIONS, PROF SYNCHRONIZATION FOR MULTI-SYLLABLE OPERATORS

OPERATORS: LT8, LT16

THE Z10 BUS IS AN EIGHT-BIT-WIDE PATH BETWEEN THE PSR-SELECTED SYLLABLE IN THE P REGISTER AND THE LEAST SIGNIFICANT EIGHT BITS IN THE C-REGISTER. IT IS USED BY MULTI-SYLLABLE OPERATORS (E.G., VALC, NAME, LT8, LT16) TO ACQUIRE THE SECOND THROUGH NTH OPERATOR SYLLABLES.

THE PURPOSE OF TEST FOUR IS TO VERIFY THAT AN OPERATOR CAN BE SELECTED FROM ANY SYLLABLE OF THE P-REGISTER AND THAT MULTI-SYLLABLE OPERATORS ARE ABLE TO OBTAIN OPERATOR SYLLABLES TWO THROUGH N BY MEANS OF THIS Z10C DATA PATH.

THE TEST CONSISTS OF EIGHT DATA-DEPENDENT SECTIONS. FOR EACH OF THESE SECTIONS, THE CODE CONSISTS OF EIGHT PAIRS OF LT8 <NUMBER1>, LT16 <NUMBER2><NUMBER3> OPERATORS FOLLOWED BY 16 COMPARISONS OF THE CURRENT TOP-OF-STACK VALUE WITH THE CORRECT RESULT GENERATED BY MEANS OF A LT48 OPERATOR.

THE EIGHT SECTIONS USE NUMERIC VALUES CONSISTING OF CONCATENATED EIGHT-BIT BYTES CONTAINING CYCLICALLY SHIFTED GROUPS OF ONE TO EIGHT ADJACENT ONE-BITS; EACH SUCH EIGHT-BIT VALUE IS UNIQUE (NO TWO OPERATORS GENERATE THE SAME NUMERIC VALUE), AND EACH OF THE VALUES OCCURS AS THE ARGUMENT FOR A LT8 AND IN BOTH ARGUMENT POSITIONS FOR LT16.

THE OPERATORS ARE EXECUTED AS LT8-LT16 PAIRS SO THAT EACH SYLLABLE POSITION OF BOTH THE LT8 AND LT16 OPERATOR OCCURS IN ALL OF THE SIX POSSIBLE POSITIONS OF THE P-REGISTER IN EACH OF THE EIGHT TEST SECTIONS.

THE FIVE-SYLLABLE LENGTH OF THE LT8-LT16 TEST SEQUENCE IS NOT A SUBMULTIBLE OF THE SIX-SYLLABLE LENGTH OF THE P-REGISTER, SO THAAT EACH TEST SECTION CONTAINS LT8/LT16 OPERATORS WHICH BEGIN IN EACH OF THE SIX POSSIBLE P-REGISTER POSITIONS; EACH SECTION ALSO CONTAINS LT8 AND LT16 OPERATORS WHICH ARE SPLIT ACROSS A WORD BOUNDARY.

3.5. HARDWARE FUNCTIONS: ADDRESS ADDER, MEMORY ADDRESSING
OPERATORS: INDX, LODT

SUBSEQUENT TESTS WILL USE NXLV OR INDX-LODT OPERATORS TO REFERENCE TEST INPUT DATA AND EXPECTED RESULTS.

TEST TWO PERFORMS A PRELIMINARY CHECK ON THESE SEQUENCES FOR REFERENCING ARRAY DATA BY LOADING THE WORDS AT INDEX VALUES 2**I-1 AND 2**I FROM THE READ-ONLY ARRAY OF TEST PARAMETERS, FOR 1 LEQ I LEQ 8. THESE INDEX VALUES ARE CHOSEN TO PRODUCE THE MAXIMUM-LENGTH AND MINIMUM-LENGTH CARRIES IN THE ADDRESS ADDER WHEN THE LODT OPERATOR IS EXECUTED.

THE VALUES THUS RETRIEVED FROM THE READ-ONLY ARRAY ARE COMPARED WITH CORRECT VALUES GENERATED BY MEANS OF LT48 OPERATORS. AN UNEQUAL (NON-SAME) COMPARISON CONSTITUTES AN ERROR.

3.6. HARDWARE FUNCTION: Z4T3
OPERATORS: SPLT, JOIN

THE PRIMARY PURPOSE SERVED BY TEST SIX IS TO VERIFY THE CORRECT OPERATION OF THE Z4T3 DATA TRANSFER PATH, WHICH IS USED FOR PUSH-DOWN AND POP-UP OPERATIONS BY THE STACK CONTROLLER.

THE ALGORITHM CONSISTS OF PLACING A WORD OF ALL-ONES IN THE B-REGISTER, A WORD OF ZEROES IN THE A-REGISTER AND EXECUTING A SEQUENCE OF JOIN, SPLT PAIRS OF OPERATORS. FOLLOWING THE LAST SPLT, DUPLICATES OF THE TWO TOP-OF-STACK OPERANDS ARE CHECKED FOR EQUALITY WITH THE ORIGINAL VALUES, USING THE SAME OPERATOR.

THE PUSH-DOWN AND POP-UP OPERATION WHICH IS IMPLICITLY TESTED BY THIS SEQUENCE WILL BE USED IN SAVING AND RESTORING THE CONTENTS OF SOME PROCESSOR IC REGISTERS IN TEST SEVEN.

3.7. HARDWARE FUNCTIONS: ABILITY TO SET AND READ MOST ADDRESSABLE IC REGISTERS

OPERATORS: SPRR, RPRR

TEST SEVEN INITIALIZES ALL IC REGISTERS EXCEPT S, PIR, PBR AND F TO THE VALUE OF THE REGISTER-NUMBER; EACH OF THESE REGISTERS IS THEN SET TO ALL-ONES AND THE VALUE IS READ BACK AND CHECKED FOR EQUALITY. THE TEST IS THEN REPEATED WITH AN ALL-ZEROES VALUE. AN INCORRECT VALUE RETURNED BY THE RPRR INSTRUCTION COULD BE EITHER AN ALL-ONES VALUE WITH ONE OR MORE DROPPED BITS OR AN ALL-ZEROES VALUE WITH PICKED-UP BITS OR THE REGISTER NUMBER OF THE MISADDRESSED REGISTER IF REGISTER SELECTION IS FAILING. AT THE CONCLUSION OF EACH ALL-ONES/ALL-ZEROES TEST, THE REGISTER CONTENTS ARE RESTRORED TO THE IC REGISTER NUMBER BEFORE PROCEEDING TO TEST THE NEXT REGISTER.

F, D0, D1, LOSR, BOSR, SNR AND PDR VALUES ARE "FLOATED" ON THE TOP-OF-STACK BEFORE INITIATING TEST SEVEN AND RESTORED TO THEIR INITIAL VALUES ON SUCCESSFUL COMPLETION.

PIR, PSR, S AND ALL-ONES VALUE FOR F CANNOT BE TESTED.

3.8. HARDWARE FUNCTIONS: LOGICAL TRANSFER PATH (L1TJ)

OPERATOR: LOR

THE PRELIMINARY CHECKOUT OF THE SAME OPERATOR IN TEST THREE HAS ALREADY VERIFIED THE (LOTJ, LOTK) = LEQV AND (LOTJ, L1TK) = LNOT LOGICAL TRANSFER FUNCTIONS. TEST EIGHT VERIFIES THE REMAINING L1TJ FUNCTION (LOR) BY OR-ING A WORD OF ZEROES WITH A SINGLE ONE-BIT IN EACH OF THE 48 DATA POSITIONS WITH A WORD OF ALL-ZEROES AND CHECKING THE RESULT USING THE PREVIOUSLY VERIFIED SAME OPERATOR.

3.9. HARDWARE FUNCTIONS: LOGICAL TRANSFER NETWORK (LOTJ, L1TK)

OPERATOR: LNOT

THE LNOT FUNCTION WAS IMPLICITLY CHECKED BY ITS USE IN EXECUTING THE SAME OPERATORS IN TEST THREE; HOWEVER, THE DUTY CYCLE FOR THE REGISTER-TO-BUS AND BUS-TO-REGISTER CONNECTIONS IN TEST THREE WAS SOMEWHAT LESS THAN THE MAXIMIM RATE. THE PURPOSE OF TEST NINE IS TO EXERCISE THE LOGICAL TRANSFER NETWORK AND ITS INPUT AND OUTPUT STACK WITH A OPERAND CONSISTING OF ALTERNATE ZERO-ONE BITS, PERFORMING A SEQUENCE OF 24 LNOT OPERATORS ON THIS VALUE AND VERIFIYING THAT THE ORIGINAL VALUE WAS PRESERVED.

THE OTHER PAIR OF Z4 TO Z3 TRANSFER FUNCTIONS, LOTK + L1TJ = Z4T3, WAS VERIFIED IN TEST SIX.

3.10. HARDWARE FUNCTIONS: Z5T2, "Z6T1"
OPERATOR: EXCH

THE Z5T2 DIRECT TRANSFER PATH IS CHECKED BY LOADING THE A- AND B-REGISTERS WITH VALUES OF ZERO AND ALL-ONES; A SEQUENCE OF 24 EXCH OPERATORS IS THEN APPLIED TO THESE OPERANDS AND THE RESULTING TOP TWO STACK WORDS ARE COMPARED WITH THE ORIGINAL VALUES.

THE "Z6T1" ZERO-DISPLACEMENT PATH THROUGH THE STEERING MATRIX BETWEEN THE Z6 AND Z1 BUSES WAS PREVIOUSLY VERIFIED IN TEST THREE; IT IS ALSO USED HERE, BUT AT A HIGHER DUTY CYCLE, SINCE THE STACK-ADJUST WHICH WAS NECESSARY IN TEST THREE IS NOT NEEDED IN THIS TEST.

3.11. HARDWARE FUNCTIONS: B.[50:3]←A.[2:3]; C.[2:3]←A.[50:3], "Z6T1"; A.[50:3] = B.[S50:3]≠B.[50:3]
STAG, RTAG, SAME

THE FIRST SEQUENCE OF TESTS CONSITS OF LOADING A WORD OF ZEROES INTO THE STACK, SETTING THE TAG TO VALUES SEVEN, SIX, FIVE, FOUR, THREE, TWO, ONE, ZERO, READING THE TAG AND CHECKING FOR THE CORRECT VALUE. AFTER THE FINAL STAG/RTAG USING A TAG OF ZERO, THE OPERAND BITS ARE CHECKED FOR EQUALITY WITH THE ORIGINAL ALL-ZEROES VALUE. THE TEST IS THEN REPEATED USING AN OPERAND OF 48 ONE-BITS.

UPON SUCCESSFUL COMPLETION OF THIS FIRST SEQUENCE, EACH VALUE OF ZERO & (I) TAG IS COMPARED WITH ZERO & (J) TAG FOR I AND J = SEVEN, SIX, FIVE, FOUR, THREE, TWO, ONE, ZERO USING THE SAME OPERATOR TO PERFORM THE COMPARISON. A TRUE RESULT FOR THE SAME OPERATOR SHOULD BE PRODUCED FOR THE SEVEN CASES FOR WHICH THE A- AND B-REGISTER TAGS ARE EQUAL (I = J) AND SHOULD BE FALSE FOR THE REMAINING 42 COMBINATIONS OF TAG VALUES.

3.12. HARDWARE FUNCTIONS: C.[13:6]←Z10.[5:6] BY PROGRAM CONTROLLER

OPERATOR: NAMC

THE LOW ORDER SIX BITS OF THE FIRST SYLLABLE OF A NAMC OPERATOR ARE TRANSFERRED TO C.[13:6] BY MEANS OF SPECIAL GATING ON THE Z10 BUS USED BY THE PROGRAM CONTROLLER. TEST 12 CHECKS THIS GATING BY EXECUTING A SEQUENCE OF NAMC OPERATORS WHOSE LOWER SIX BITS OF THE MOST SIGNIFICANT OPERATOR BYTE CONTAIN AN INDIVIDUAL ONE BIT IN EACH POSITION; THE SAME TEST IS THEN PERFORMED USING AN ADDRESS COUPLE OF ALL ONES WITH AN INDIVIDUAL ZERO IN EACH BIT PSOITION OF THE FIRST BYTE.

THE HEX AND EQUIVALENT BINARY REPRESENTATION FOR THESE NAMC OPERATORS IS:

6000 = 01100000 00000000
5000 = 01010000 00000000
4800 = 01001000 00000000
4400 = 01000100 00000000
4200 = 01000010 00000000
4100 = 01000001 00000000
4300 = 01000011 00000000
4700 = 01000111 00000000
4F00 = 01001111 00000000
5F00 = 01011111 00000000
7F00 = 01111111 00000000
7E00 = 01111110 00000000

7D00 = 01111101 00000000
7B00 = 01111011 00000000
7700 = 01110111 00000000
6F00 = 01101111 00000000

THE RESULTING INDIRECT REFERENCE WORDS ARE CHECKED BY EXECUTING AN APPROPRIATE LT16 FOLLOWED BY ONE, STAG, SAME AND A CONDITIONAL BRANCH AROUND THE ERROR-REPORTING CODE.

3.13. HARDWARE FUNCTION: STEERING NETWORK BETWEEN Z6 AND Z1 BUSES

OPERATOR: INSR

THE Z6T1 INTER-BUS DATA TRANSFER OPERATION REQUIRES SPECIFICATION OF BOTH THE AMOUNT OF DISPLACEMENT (DIS) AND THE DESTINATION BITS TO BE "PROTECTED" FORM MODIFICATION (TOA, TOM). TEST 13 CHECKS THE DISPLACEMENT USING A "WIDE OPEN" MASK (TOA = 47, TOM = 0).

THE DISPLACEMENT NETWORK CONSISTS OF THREE CASCADED END-AROUND SHIFT STAGES WHICH ARE CONTROLLED BY ADJACENT PAIRS OF BITS IN THE SIX-BIT DIS REGISTER.

FOR AN INSR K:L OPERATOR, THE DISPLACEMENT IS L-K-1 AND FOR L = 48 THE FOLLOWING PARAMETERS CHECK ALL PATHS BETWEEN THE THREE INTERNAL SHIFTER STAGES BY TRANSFERRING BOTH A ZERO AND A ONE BIT FROM EACH Z6 INPUT BIT POSITION TO THE CORRESPONDING Z1 OUTPUT BUS POSITION. THE TWO "CORRECT RESULT" COLUMNS CORRESPOND TO THE RESULT OF INSERTING THE DIS = 0 VALUES INTO A DESTINATION WORD OF ALL-ZEROES.

TABLE

| DIS (DECIMAL) | DIS (BINARY) | OPERATOR | CORRECT RESULT | CORRECT RESULT |
|---|---|---|---|---|
| 0 | 00 00 00 | INSR 47:48 | 0123456789AB | FEDCBA987654 |
| 1 | 00 00 01 | INSR 46:48 | 8091A2B3C4D5 | 7F6E5D4C3B2A |
| 2 | 00 00 10 | INSR 45:48 | C048D159E26A | 3FB72EA61D95 |
| 3 | 00 00 11 | INSR 44:48 | 602468ACF135 | 9FDB97530ECA |
| 4 | 00 01 00 | INSR 43:48 | B0123456789A | 4FEDCBA98765 |
| 5 | 00 01 01 | INSR 42:48 | 58091A2B3C4D | A7F6E5D4C3B2 |
| 6 | 00 01 10 | INSR 41:48 | AC048D159E26 | 53FB72EA61D9 |
| 7 | 00 01 11 | INSR 40:48 | 5602468ACF13 | A9FDB97530EC |
| 8 | 00 10 00 | INSR 39:48 | AB0123456789 | 54FEDCBA9876 |
| 9 | 00 10 01 | INSR 38:48 | D58091A2B3C4 | 2A7F6E5D4C3B |
| 10 | 00 10 10 | INSR 37:48 | 6AC048D159E2 | 953FB72EA61D |
| 11 | 00 10 11 | INSR 36:48 | 35602468ACF1 | CA9FDB97530E |
| 12 | 00 11 00 | INSR 35:48 | 9AB012345678 | 654FEDCBA987 |
| 13 | 00 11 01 | INSR 34:48 | 4D58091A2B3C | B2A7F6E5D4C3 |
| 14 | 00 11 10 | INSR 33:48 | 26AC048D159E | D953FB72EA61 |
| 15 | 00 11 11 | INSR 32:48 | 135602468ACF | ECA9FDB97530 |
| 16 | 01 00 00 | INSR 31:48 | 89AB01234567 | 7654FEDCBA98 |
| 17 | 01 00 01 | INSR 30:48 | C4D58091A2B3 | 3B2A7F6E5D4C |
| 18 | 01 00 10 | INSR 29:48 | E26AC048D159 | 1D953FB72EA6 |
| 19 | 01 00 11 | INSR 28:48 | F135602468AC | 0ECA9FDB9753 |
| 20 | 01 01 00 | INSR 27:48 | 789AB0123456 | 87654FEDCBA9 |
| 21 | 01 01 01 | INSR 26:48 | 3C4D58091A2B | C3B2A7F6E5D4 |
| 22 | 01 01 10 | INSR 25:48 | 9E26AC048D15 | 61D953FB72EA |
| 23 | 01 01 11 | INSR 24:48 | CF135602468A | 30ECA9FDB975 |
| 24 | 01 10 00 | INSR 23:48 | 6789AB012345 | 987654FEDCBA |
| 25 | 01 10 01 | INSR 22:48 | B3C4D58091A2 | 4C3B2A7F6E5D |
| 26 | 01 10 10 | INSR 21:48 | 59E26AC048D1 | A61D953FB72E |
| 27 | 01 10 11 | INSR 20:48 | ACF135602468 | 530ECA9FDB97 |
| 28 | 01 11 00 | INSR 19:48 | 56789AB01234 | A987654FEDCB |
| 29 | 01 11 01 | INSR 18:48 | 2B3C4D58091A | D4C3B2A7F6E5 |
| 30 | 01 11 10 | INSR 17:48 | 159E26AC048D | EA61D953FB72 |
| 31 | 01 11 11 | INSR 16:48 | 8ACF13560246 | 7530ECA9FDB9 |
| 32 | 10 00 00 | INSR 15:48 | 456789AB0123 | BA987654FEDC |
| 33 | 10 00 01 | INSR 14:48 | A2B3C4D58091 | 5D4C3B2A7F6E |
| 34 | 10 00 10 | INSR 13:48 | D159E26AC048 | 2EA61D953FB7 |
| 35 | 10 00 11 | INSR 12:48 | 68ACF1356024 | 97530ECA9FDB |
| 36 | 10 01 00 | INSR 11:48 | 3456789AB012 | CBA987654FED |
| 37 | 10 01 01 | INSR 10:48 | 1A2B3C4D5809 | E5D4C3B2A7F6 |
| 38 | 10 01 10 | INSR 9:48 | 8D159E26AC04 | 72EA61D953FB |
| 39 | 10 01 11 | INSR 8:48 | 468ACF135602 | B97530ECA9FD |
| 40 | 10 10 00 | INSR 7:48 | 23456789AB01 | DCBA987654FE |
| 41 | 10 10 01 | INSR 6:48 | 91A2B3C4D580 | 6E5D4C3B2A7F |
| 42 | 10 10 10 | INSR 5:48 | 48D159E26AC0 | B72EA61D953F |
| 43 | 10 10 11 | INSR 4:48 | 2468ACF13560 | DB97530ECA9F |
| 44 | 10 11 00 | INSR 3:48 | 123456789AB0 | EDCBA987654F |
| 45 | 10 11 01 | INSR 2:48 | 091A2B3C4D58 | F6E5D4C3B2A7 |
| 46 | 10 11 10 | INSR 1:48 | 048D159E26AC | FB72EA61D953 |
| 47 | 10 11 11 | INSR 0:48 | 02468ACF1356 | FDB97530ECA9 |

3.14. HARDWARE FUNCTIONS: MASKING NETWORK BETWEEN Z6 AND Z1 BUSES

OPERATOR: INSR

THE SINGLE-ENDED OUTPUTS FROM THE STEERING NETWORK (TEST 13) ARE FED INTO ANOTHER COMBINATIONAL NETWORK CONTROLLED BY THE TOP OF APERTURE (TOA) AND TOP OF MASK (TOM) REGISTERS. THIS NETWORK GENERATES LOGIC LEVELS PT00 THROUGH BT47, WHICH ARE TRUE IF BIT TRANSFER ONTO THE Z1 BUS SHOULD OCCUR.

THE LOGIC EQUATION FOR TYPICAL BIT POSITION, NN, BEING TRANSFERRED ONTO THE Z1 BUS IS:

```
BTNN = (TOA GEQ NN AND TOM LSS NN) OR
       (TOM GEQ TOA AND TOA GEQ NN) OR
       (TOM GEQ TOA AND TOM LSS NN).
```

TEST 14 PERFORMS INSR K:L OPERATORS WHICH TRANSFER BITS FROM AN ALL-ONES SOURCE INTO ALL-ZEROES DESTINATION AND VICE-VERSA WITH K:L VALUES SELECTED TO EXCITE EACH OF THE THREE OR TERMS IN BTNN.

TABLES 14.1 THROUGH 14.4 SHOW THE VALUES OF K, L, TOM, TOA, THE CONTENTS OF THE Y REGISTER AT JB = 109 (IN BINARY) AND A BIT REPRESENTATION OF THE Z1 BUS IN WHICH:

"-" = NO DATA TRANSFER (B-REGISTER BIT NOT CHANGED AT JB=113),
"X" = TOA GEQ NN AND TOM LSS NN
"Y" = TOM GEQ TOA AND TOA GEQ NN
"Z" = TOM GEQ TOA AND TOM LSS NN.

FOR THE "Y" AND "Z" CASES, THE TOM GEQ TOA IS GENERATED BY A SPECIAL SIX-BIT COMPARATOR WHOSE OUTPUT IS DESIGNATED "MGEA" ("MASK GREATER THAN OR EQUAL TO APERTURE") IN THE LOGIC BOOK. TABLE 14.5 SHOWS THE COMBINATIONS OF SOME ("MM") AND TOA ("AA") VALUES WHICH SHOULD CAUSE MGEA TO BE TRUE; THE "PIN" COLUMN REPRESENTS THE LOGIC PIN ON WHICH THE RESULT OF THIS BIT COMPARISON APPEARS.

TABLE 14.6 SHOWS THE OR TERMS WHICH ARE USED TO DETERMINE THE TOA GEQ NN AND TOM LSS NN CONDITIONS FOR THE 48 POSSIBLE VALUES OF NN IN THE BTNN EQUATION.

TABLE 14.1

INSR N:L HARDWARE PARAMETERS

| K L | TOM | TOA | Y | BT |
|---|---|---|---|---|
| 47:47 | 0 | 47 | 100 000 000 | XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXX- |
| 46:46 | 0 | 46 | 100 000 000 | -XXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXX- |
| 45:45 | 0 | 45 | 100 000 000 | --XXXXXX XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXX- |
| 44:44 | 0 | 44 | 100 000 000 | ---XXXXX XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXX- |
| 43:43 | 0 | 43 | 100 000 000 | ----XXXX XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXX- |
| 42:42 | 0 | 42 | 100 000 000 | -----XXX XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXX- |
| 41:41 | 0 | 41 | 100 000 000 | ------XX XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXX- |
| 40:40 | 0 | 40 | 100 000 000 | -------X XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXX- |
| 39:39 | 0 | 39 | 100 000 000 | -------- XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXX- |
| 38:38 | 0 | 38 | 100 000 000 | -------- -XXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXX- |
| 37:37 | 0 | 37 | 100 000 000 | -------- --XXXXXX XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXX- |
| 36:36 | 0 | 36 | 100 000 000 | -------- ---XXXXX XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXX- |
| 35:35 | 0 | 35 | 100 000 000 | -------- ----XXXX XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXX- |
| 34:34 | 0 | 34 | 100 000 000 | -------- -----XXX XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXX- |
| 33:33 | 0 | 33 | 100 000 000 | -------- ------XX XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXX- |
| 32:32 | 0 | 32 | 100 000 000 | -------- -------X XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXX- |
| 31:31 | 0 | 31 | 100 000 000 | -------- -------- XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXX- |
| 30:30 | 0 | 30 | 100 000 000 | -------- -------- -XXXXXXX XXXXXXXX XXXXXXXX XXXXXXX- |
| 29:29 | 0 | 29 | 100 000 000 | -------- -------- --XXXXXX XXXXXXXX XXXXXXXX XXXXXXX- |
| 28:28 | 0 | 28 | 100 000 000 | -------- -------- ---XXXXX XXXXXXXX XXXXXXXX XXXXXXX- |
| 27:27 | 0 | 27 | 100 000 000 | -------- -------- ----XXXX XXXXXXXX XXXXXXXX XXXXXXX- |
| 26:26 | 0 | 26 | 100 000 000 | -------- -------- -----XXX XXXXXXXX XXXXXXXX XXXXXXX- |
| 25:25 | 0 | 25 | 100 000 000 | -------- -------- ------XX XXXXXXXX XXXXXXXX XXXXXXX- |
| 24:24 | 0 | 24 | 100 000 000 | -------- -------- -------X XXXXXXXX XXXXXXXX XXXXXXX- |
| 23:23 | 0 | 23 | 100 000 000 | -------- -------- -------- XXXXXXXX XXXXXXXX XXXXXXX- |
| 22:22 | 0 | 22 | 100 000 000 | -------- -------- -------- -XXXXXXX XXXXXXXX XXXXXXX- |
| 21:21 | 0 | 21 | 100 000 000 | -------- -------- -------- --XXXXXX XXXXXXXX XXXXXXX- |
| 20:20 | 0 | 20 | 100 000 000 | -------- -------- -------- ---XXXXX XXXXXXXX XXXXXXX- |
| 19:19 | 0 | 19 | 100 000 000 | -------- -------- -------- ----XXXX XXXXXXXX XXXXXXX- |
| 18:18 | 0 | 18 | 100 000 000 | -------- -------- -------- -----XXX XXXXXXXX XXXXXXX- |
| 17:17 | 0 | 17 | 100 000 000 | -------- -------- -------- ------XX XXXXXXXX XXXXXXX- |
| 16:16 | 0 | 16 | 100 000 000 | -------- -------- -------- -------X XXXXXXXX XXXXXXX- |
| 15:15 | 0 | 15 | 100 000 000 | -------- -------- -------- -------- XXXXXXXX XXXXXXX- |
| 14:14 | 0 | 14 | 100 000 000 | -------- -------- -------- -------- -XXXXXXX XXXXXXX- |
| 13:13 | 0 | 13 | 100 000 000 | -------- -------- -------- -------- --XXXXXX XXXXXXX- |
| 12:12 | 0 | 12 | 100 000 000 | -------- -------- -------- -------- ---XXXXX XXXXXXX- |
| 11:11 | 0 | 11 | 100 000 000 | -------- -------- -------- -------- ----XXXX XXXXXXX- |
| 10:10 | 0 | 10 | 100 000 000 | -------- -------- -------- -------- -----XXX XXXXXXX- |
| 9: 9 | 0 | 9 | 100 000 000 | -------- -------- -------- -------- ------XX XXXXXXX- |
| 8: 8 | 0 | 8 | 100 000 000 | -------- -------- -------- -------- -------X XXXXXXX- |
| 7: 7 | 0 | 7 | 100 000 000 | -------- -------- -------- -------- -------- XXXXXXX- |
| 6: 6 | 0 | 6 | 100 000 000 | -------- -------- -------- -------- -------- -XXXXXX- |
| 5: 5 | 0 | 5 | 100 000 000 | -------- -------- -------- -------- -------- --XXXXX- |
| 4: 4 | 0 | 4 | 100 000 000 | -------- -------- -------- -------- -------- ---XXXX- |
| 3: 3 | 0 | 3 | 100 000 000 | -------- -------- -------- -------- -------- ----XXX- |
| 2: 2 | 0 | 2 | 100 000 000 | -------- -------- -------- -------- -------- -----XX- |
| 1: 1 | 0 | 1 | 100 000 000 | -------- -------- -------- -------- -------- ------X- |
| 0: 0 | 0 | 0 | 100 000 000 | -------- -------- -------- -------- -------- -------- |
| K L | TOM | TOA | Y | BT |

-=BIT NOT TRANSFERRED TO Z1
X=TOA GEQ NN AND TOM LSS NN
Y=TOM GEQ TOA AND TOA GEQ NN
Z=TOM GEQ TOA AND TOM LSS NN

INSR K:L HARDWARE PARAMETERS

| K L | TOM | TOA | Y | BT |
|---|---|---|---|---|
| 47:48 | 47 | 47 | 011 111 111 | YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 46:47 | 47 | 46 | 011 111 111 | -YYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 45:46 | 47 | 45 | 011 111 111 | --YYYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 44:45 | 47 | 44 | 011 111 111 | ---YYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 43:44 | 47 | 43 | 011 111 111 | ----YYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 42:43 | 47 | 42 | 011 111 111 | -----YYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 41:42 | 47 | 41 | 011 111 111 | ------YY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 40:41 | 47 | 40 | 011 111 111 | -------Y YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 39:40 | 47 | 39 | 011 111 111 | -------- YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 38:39 | 47 | 38 | 011 111 111 | -------- -YYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 37:38 | 47 | 37 | 011 111 111 | -------- --YYYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 36:37 | 47 | 36 | 011 111 111 | -------- ---YYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 35:36 | 47 | 35 | 011 111 111 | -------- ----YYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 34:35 | 47 | 34 | 011 111 111 | -------- -----YYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 33:34 | 47 | 33 | 011 111 111 | -------- ------YY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 32:33 | 47 | 32 | 011 111 111 | -------- -------Y YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 31:32 | 47 | 31 | 011 111 111 | -------- -------- YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 30:31 | 47 | 30 | 011 111 111 | -------- -------- -YYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 29:30 | 47 | 29 | 011 111 111 | -------- -------- --YYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 28:29 | 47 | 28 | 011 111 111 | -------- -------- ---YYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 27:28 | 47 | 27 | 011 111 111 | -------- -------- ----YYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 26:27 | 47 | 26 | 011 111 111 | -------- -------- -----YYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 25:26 | 47 | 25 | 011 111 111 | -------- -------- ------YY YYYYYYYY YYYYYYYY YYYYYYYY |
| 24:25 | 47 | 24 | 011 111 111 | -------- -------- -------Y YYYYYYYY YYYYYYYY YYYYYYYY |
| 23:24 | 47 | 23 | 011 111 111 | -------- -------- -------- YYYYYYYY YYYYYYYY YYYYYYYY |
| 22:23 | 47 | 22 | 011 111 111 | -------- -------- -------- -YYYYYYY YYYYYYYY YYYYYYYY |
| 21:22 | 47 | 21 | 011 111 111 | -------- -------- -------- --YYYYYY YYYYYYYY YYYYYYYY |
| 20:21 | 47 | 20 | 011 111 111 | -------- -------- -------- ---YYYYY YYYYYYYY YYYYYYYY |
| 19:20 | 47 | 19 | 011 111 111 | -------- -------- -------- ----YYYY YYYYYYYY YYYYYYYY |
| 18:19 | 47 | 18 | 011 111 111 | -------- -------- -------- -----YYY YYYYYYYY YYYYYYYY |
| 17:18 | 47 | 17 | 011 111 111 | -------- -------- -------- ------YY YYYYYYYY YYYYYYYY |
| 16:17 | 47 | 16 | 011 111 111 | -------- -------- -------- -------Y YYYYYYYY YYYYYYYY |
| 15:16 | 47 | 15 | 011 111 111 | -------- -------- -------- -------- YYYYYYYY YYYYYYYY |
| 14:15 | 47 | 14 | 011 111 111 | -------- -------- -------- -------- -YYYYYYY YYYYYYYY |
| 13:14 | 47 | 13 | 011 111 111 | -------- -------- -------- -------- --YYYYYY YYYYYYYY |
| 12:13 | 47 | 12 | 011 111 111 | -------- -------- -------- -------- ---YYYYY YYYYYYYY |
| 11:12 | 47 | 11 | 011 111 111 | -------- -------- -------- -------- ----YYYY YYYYYYYY |
| 10:11 | 47 | 10 | 011 111 111 | -------- -------- -------- -------- -----YYY YYYYYYYY |
| 9:10 | 47 | 9 | 011 111 111 | -------- -------- -------- -------- ------YY YYYYYYYY |
| 8: 9 | 47 | 8 | 011 111 111 | -------- -------- -------- -------- -------Y YYYYYYYY |
| 7: 8 | 47 | 7 | 011 111 111 | -------- -------- -------- -------- -------- YYYYYYYY |
| 6: 7 | 47 | 6 | 011 111 111 | -------- -------- -------- -------- -------- -YYYYYYY |
| 5: 6 | 47 | 5 | 011 111 111 | -------- -------- -------- -------- -------- --YYYYYY |
| 4: 5 | 47 | 4 | 011 111 111 | -------- -------- -------- -------- -------- ---YYYYY |
| 3: 4 | 47 | 3 | 011 111 111 | -------- -------- -------- -------- -------- ----YYYY |
| 2: 3 | 47 | 2 | 011 111 111 | -------- -------- -------- -------- -------- -----YYY |
| 1: 2 | 47 | 1 | 011 111 111 | -------- -------- -------- -------- -------- ------YY |
| 0: 1 | 47 | 0 | 011 111 111 | -------- -------- -------- -------- -------- -------Y |
| K L | TOM | TOA | Y | BT |

-=BIT NOT TRANSFERRED TO Z1
X=TOA GEQ NN AND TOM LSS NN
Y=TOM GEQ TOA AND TOA GEQ NN
Z=TOM GEQ TOA AND TOM LSS NN

TABLE 14.3

INSR K:L HARDWARE PARAMETERS

| K | L | TOM | TOA | Y | BT |
|---|---|---|---|---|---|
| 0:48 | | 0 | 0 | 011 010 000 | ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZY |
| 0:47 | | 1 | 0 | 011 010 001 | ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZ-Y |
| 0:46 | | 2 | 0 | 011 010 010 | ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZZ---Y |
| 0:45 | | 3 | 0 | 011 010 011 | ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZ----Y |
| 0:44 | | 4 | 0 | 011 010 100 | ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZ-----Y |
| 0:43 | | 5 | 0 | 011 010 101 | ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZ------Y |
| 0:42 | | 6 | 0 | 011 010 110 | ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ Z-------Y |
| 0:41 | | 7 | 0 | 011 010 111 | ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ --------Y |
| 0:40 | | 8 | 0 | 011 011 000 | ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZ- --------Y |
| 0:39 | | 9 | 0 | 011 011 001 | ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZ-- --------Y |
| 0:38 | | 10 | 0 | 011 011 010 | ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZZ--- --------Y |
| 0:37 | | 11 | 0 | 011 011 011 | ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZ---- --------Y |
| 0:36 | | 12 | 0 | 011 011 100 | ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZ----- --------Y |
| 0:35 | | 13 | 0 | 011 011 101 | ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZ------ --------Y |
| 0:34 | | 14 | 0 | 011 011 110 | ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ Z------- --------Y |
| 0:33 | | 15 | 0 | 011 011 111 | ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ -------- --------Y |
| 0:32 | | 16 | 0 | 011 100 000 | ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZ- -------- --------Y |
| 0:31 | | 17 | 0 | 011 100 001 | ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZ-- -------- --------Y |
| 0:30 | | 18 | 0 | 011 100 010 | ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZZ--- -------- --------Y |
| 0:29 | | 19 | 0 | 011 100 011 | ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZZ---- -------- --------Y |
| 0:28 | | 20 | 0 | 011 100 100 | ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZZ----- -------- --------Y |
| 0:27 | | 21 | 0 | 011 100 101 | ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ ZZ------ -------- --------Y |
| 0:26 | | 22 | 0 | 011 100 110 | ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ Z------- -------- --------Y |
| 0:25 | | 23 | 0 | 011 100 111 | ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZZ -------- -------- --------Y |
| 0:24 | | 24 | 0 | 011 101 000 | ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZZ- -------- -------- --------Y |
| 0:23 | | 25 | 0 | 011 101 001 | ZZZZZZZZZ ZZZZZZZZZ ZZZZZZZ-- -------- -------- --------Y |
| 0:22 | | 26 | 0 | 011 101 010 | ZZZZZZZZZ ZZZZZZZZZ ZZZZZ--- -------- -------- --------Y |
| 0:21 | | 27 | 0 | 011 101 011 | ZZZZZZZZZ ZZZZZZZZZ ZZZZ---- -------- -------- --------Y |
| 0:20 | | 28 | 0 | 011 101 100 | ZZZZZZZZZ ZZZZZZZZZ ZZZ----- -------- -------- --------Y |
| 0:19 | | 29 | 0 | 011 101 101 | ZZZZZZZZZ ZZZZZZZZZ ZZ------ -------- -------- --------Y |
| 0:18 | | 30 | 0 | 011 101 110 | ZZZZZZZZZ ZZZZZZZZZ Z------- -------- -------- --------Y |
| 0:17 | | 31 | 0 | 011 101 111 | ZZZZZZZZZ ZZZZZZZZZ -------- -------- -------- --------Y |
| 0:16 | | 32 | 0 | 011 110 000 | ZZZZZZZZZ ZZZZZZZZ- -------- -------- -------- --------Y |
| 0:15 | | 33 | 0 | 011 110 001 | ZZZZZZZZZ ZZZZZZZ-- -------- -------- -------- --------Y |
| 0:14 | | 34 | 0 | 011 110 010 | ZZZZZZZZZ ZZZZZ--- -------- -------- -------- --------Y |
| 0:13 | | 35 | 0 | 011 110 011 | ZZZZZZZZZ ZZZZ---- -------- -------- -------- --------Y |
| 0:12 | | 36 | 0 | 011 110 100 | ZZZZZZZZZ ZZZ----- -------- -------- -------- --------Y |
| 0:11 | | 37 | 0 | 011 110 101 | ZZZZZZZZZ ZZ------ -------- -------- -------- --------Y |
| 0:10 | | 38 | 0 | 011 110 110 | ZZZZZZZZZ Z------- -------- -------- -------- --------Y |
| 0: | 9 | 39 | 0 | 011 110 111 | ZZZZZZZZZ -------- -------- -------- -------- --------Y |
| 0: | 8 | 40 | 0 | 011 111 000 | ZZZZZZZZ- -------- -------- -------- -------- --------Y |
| 0: | 7 | 41 | 0 | 011 111 001 | ZZZZZZZ-- -------- -------- -------- -------- --------Y |
| 0: | 6 | 42 | 0 | 011 111 010 | ZZZZZ---- -------- -------- -------- -------- --------Y |
| 0: | 5 | 43 | 0 | 011 111 011 | ZZZZ----- -------- -------- -------- -------- --------Y |
| 0: | 4 | 44 | 0 | 011 111 100 | ZZZ------ -------- -------- -------- -------- --------Y |
| 0: | 3 | 45 | 0 | 011 111 101 | ZZ------- -------- -------- -------- -------- --------Y |
| 0: | 2 | 46 | 0 | 011 111 110 | Z-------- -------- -------- -------- -------- --------Y |
| 0: | 1 | 47 | 0 | 011 111 111 | -------- -------- -------- -------- -------- --------Y |
| 0: | 0 | 0 | 0 | 100 000 000 | -------- -------- -------- -------- -------- -------- |
| K | L | TOM | TOA | Y | BT |

-=BIT NOT TRANSFERRED TO Z1
X=TOA GEQ NN AND TOM LSS NN
Y=TOM GEQ TOA AND TOA GEQ NN
Z=TOM GEQ TOA AND TOM LSS NN

TABLE 14.4

INSR K:L HARDWARE PARAMETERS

| K L | TOM | TOA | Y | BT |
|---|---|---|---|---|
| 47:48 | 47 | 47 | 011 111 111 | YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 46:48 | 46 | 46 | 011 111 110 | ZYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 45:48 | 45 | 45 | 011 111 101 | ZZYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 44:48 | 44 | 44 | 011 111 100 | ZZZYYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 43:48 | 43 | 43 | 011 111 011 | ZZZZYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 42:48 | 42 | 42 | 011 111 010 | ZZZZZYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 41:48 | 41 | 41 | 011 111 001 | ZZZZZZYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 40:48 | 40 | 40 | 011 111 000 | ZZZZZZZY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 39:48 | 39 | 39 | 011 110 111 | ZZZZZZZZ YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 38:48 | 38 | 38 | 011 110 110 | ZZZZZZZZ ZYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 37:48 | 37 | 37 | 011 110 101 | ZZZZZZZZ ZZYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 36:48 | 36 | 36 | 011 110 100 | ZZZZZZZZ ZZZYYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 35:48 | 35 | 35 | 011 110 011 | ZZZZZZZZ ZZZZYYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 34:48 | 34 | 34 | 011 110 010 | ZZZZZZZZ ZZZZZYYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 33:48 | 33 | 33 | 011 110 001 | ZZZZZZZZ ZZZZZZYY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 32:48 | 32 | 32 | 011 110 000 | ZZZZZZZZ ZZZZZZZY YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 31:48 | 31 | 31 | 011 101 111 | ZZZZZZZZ ZZZZZZZZ YYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 30:48 | 30 | 30 | 011 101 110 | ZZZZZZZZ ZZZZZZZZ ZYYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 29:48 | 29 | 29 | 011 101 101 | ZZZZZZZZ ZZZZZZZZ ZZYYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 28:48 | 28 | 28 | 011 101 100 | ZZZZZZZZ ZZZZZZZZ ZZZYYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 27:48 | 27 | 27 | 011 101 011 | ZZZZZZZZ ZZZZZZZZ ZZZZYYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 26:48 | 26 | 26 | 011 101 010 | ZZZZZZZZ ZZZZZZZZ ZZZZZYYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 25:48 | 25 | 25 | 011 101 001 | ZZZZZZZZ ZZZZZZZZ ZZZZZZYY YYYYYYYY YYYYYYYY YYYYYYYY |
| 24:48 | 24 | 24 | 011 101 000 | ZZZZZZZZ ZZZZZZZZ ZZZZZZZY YYYYYYYY YYYYYYYY YYYYYYYY |
| 23:48 | 23 | 23 | 011 100 111 | ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ YYYYYYYY YYYYYYYY YYYYYYYY |
| 22:48 | 22 | 22 | 011 100 110 | ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZYYYYYYY YYYYYYYY YYYYYYYY |
| 21:48 | 21 | 21 | 011 100 101 | ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZYYYYYY YYYYYYYY YYYYYYYY |
| 20:48 | 20 | 20 | 011 100 100 | ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZYYYYY YYYYYYYY YYYYYYYY |
| 19:48 | 19 | 19 | 011 100 011 | ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZYYYY YYYYYYYY YYYYYYYY |
| 18:48 | 18 | 18 | 011 100 010 | ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZZYYY YYYYYYYY YYYYYYYY |
| 17:48 | 17 | 17 | 011 100 001 | ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZZZYY YYYYYYYY YYYYYYYY |
| 16:48 | 16 | 16 | 011 100 000 | ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZZZZY YYYYYYYY YYYYYYYY |
| 15:48 | 15 | 15 | 011 011 111 | ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ YYYYYYYY YYYYYYYY |
| 14:48 | 14 | 14 | 011 011 110 | ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZYYYYYYY YYYYYYYY |
| 13:48 | 13 | 13 | 011 011 101 | ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZYYYYYY YYYYYYYY |
| 12:48 | 12 | 12 | 011 011 100 | ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZYYYYY YYYYYYYY |
| 11:48 | 11 | 11 | 011 011 011 | ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZYYYY YYYYYYYY |
| 10:48 | 10 | 10 | 011 011 010 | ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZZYYY YYYYYYYY |
| 9:48 | 9 | 9 | 011 011 001 | ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZZZYY YYYYYYYY |
| 8:48 | 8 | 8 | 011 011 000 | ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZZZZY YYYYYYYY |
| 7:48 | 7 | 7 | 011 010 111 | ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ YYYYYYYY |
| 6:48 | 6 | 6 | 011 010 110 | ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZYYYYYYY |
| 5:48 | 5 | 5 | 011 010 101 | ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZYYYYYY |
| 4:48 | 4 | 4 | 011 010 100 | ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZYYYYY |
| 3:48 | 3 | 3 | 011 010 011 | ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZYYYY |
| 2:48 | 2 | 2 | 011 010 010 | ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZZYYY |
| 1:48 | 1 | 1 | 011 010 001 | ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZZZYY |
| 0:48 | 0 | 0 | 011 010 000 | ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZZZZZ ZZZZZZZY |
| K L | TOM | TOA | Y | BT |

-=BIT NOT TRANSFERRED TO Z1
X=TOA GEQ NN AND TOM LSS NN
Y=TOM GEQ TOA AND TOA GEQ NN
Z=TOM GEQ TOA AND TOM LSS NN

TABLE 14.5

```
     MGEA DECODING
     (.=DONT CARE)
   DRAWING D23307812
   UNIT     23033780
   CARD     ABJC4

PIN          MM          AA
H3K       ....1.      ....0.
H3K       ......      ....00
H3P       .....1      ....0.
H3N       ....1.      .....0
E3P       ....11      ......
   M.[1:2]'A.[1:2]

PIN          MM          AA
E3N       ..1...      ..0...
E3K       ...1..      ..00..
G3P       ....MM      ..00AA
G3K       ...1MM      ..0.AA     MM'AA FROM M.[1:2]'A.[1:2]
A3P       ..11..      ...0..
A3K       ..1.MM      ...0AA
B3P       ..11MM      ....AA
   M.[3:4]'A.[3:4]

PIN          MM          AA
A2P       1.....      0.....
B3K       .1....      00....
B2P       ..MMMM      00AAAA
B2K       .1MMMM      0.AAAA     MMMM'AAAA FROM M.[3:4]'A.[3:4]
D2P       11....      .0....
D2K       1.MMMM      .0AAAA
A2K       11MMMM      ..AAAA
   M.[5:6]'A.[5:6]

EXAMPLES:

PIN H3N = TOM.[1:1]=1 AND TOA.[0:1]=0.
    G3K = TOM.[2:1]=1 AND TOA.[3:1]=0 AND TOM[1:2]'TOA.[1:2].
    B2P = TOA.[5:2]=0 AND TOM.[3:4]'TOA.[3:4].

TOM.[1:2]'TOA.[1:2] = H3K "OR" H3P "OR" H3N "OR" E3P.
```

TABLE 14.6

PIN LOCATIONS FOR "OR" TERMS IN TOM/TOA DECODING.

DRAWING D23307754
UNIT 23033723
CARD ABJB2

| | | | |
|---|---|---|---|
| A' 1 | D1B+D1N+D1F+D1J | M< 1 | A2N |
| A' 2 | C2P+C2K | M< 2 | D2K |
| A' 3 | D2P+C2N+E1B | M< 3 | C2P+C2K |
| A' 4 | F3J | M< 4 | B2N |
| A' 5 | C1N+C1P+F1N | M< 5 | B2P+B2K |
| A' 6 | F1B+E2N | M< 6 | C1K+C1K |
| A' 7 | F2J+E2J | M< 7 | C3P+C3N+E2P |
| A' 8 | F2U | M< 8 | F2F |

DRAWING D23307762
UNIT 23033731
CARD ABJB4

| | | | |
|---|---|---|---|
| A' 9 | H0F+F1N+F2K+F2K | M< 9 | E2K+E2P |
| A'10 | H0N+H1P+H1N | M<10 | F1P+F1K |
| A'11 | H0B+G1P+G2K | M<11 | G1N+G1K+H1K |
| A'12 | B0J+C1N | M<12 | G2P+G2N |
| A'13 | B0F+E1K+D1K | M<13 | D1N+C1P+C1K |
| A'14 | B0N+E0K | M<14 | E1P+E1N+D1P |
| A'15 | B0B+E2N | M<15 | G0K+G0K+E0P+E0N |
| A'16 | D0F | M<16 | D0J |

DRAWING D23307770
UNIT 23033749
CARD ABJB6

| | | | |
|---|---|---|---|
| A'17 | B0J+A2K+A2K+A2P+A2N | M<17 | G2P+C1K |
| A'18 | B0F+C2P+C2N+D2P | M<18 | D2N+D2K |
| A'19 | B0N+B2N+E2P+B2K | M<19 | E2N+E2K+C2K |
| A'20 | B0B+E1K+E1K | M<20 | E1N+B2P |
| A'21 | A1N+D1P+A1P+A1K | M<21 | D1N+E1P+D1K |
| A'22 | F0J+F1P+B1K | M<22 | F1K+F1K+F1N |
| A'23 | F0F+G1N+C1N | M<23 | B1N+B1P+G1K+G1K |
| A'24 | H1K+F0B | M<24 | G1P+F0N |

DRAWING D23307788
UNIT 23033756
CARD ABJB8

| | | | |
|---|---|---|---|
| A'25 | D1N+C1K+C1K | M<25 | C1N+D1F+E3K |
| A'26 | E2J+B2K+B2K | M<26 | B2P+D1B+B2N |
| A'27 | E2N+A2P+C2K | M<27 | A2K+E2F+A2K+A2N |
| A'28 | E1F+C2P | M<28 | C2N+E1J+E2B |
| A'29 | D2N+D2P+D2K | M<29 | A1N+E1B+E1N+A1K |
| A'30 | F1N+B1K | M<30 | B1N+F1F+F1J+A1P |
| A'31 | F2F+C3N | M<31 | B3K+F2J+F1B+B3K+B1P |
| A'32 | F2B | M<32 | F2N |

DRAWING D23307796
UNIT 23033764
CARD ABJC0

| | | | |
|---|---|---|---|
| A'33 | C2N+C3K+A2F+A2J+C3K | M<33 | C0B+C3P |
| A'34 | C2K+C2K+B2F+B2J | M<34 | A2B+A2N |
| A'35 | C1P+C1N+G2J+C2P | M<35 | B2B+B2N+C1K |
| A'36 | E1K+E1K+G2N | M<36 | G2F+E1N |
| A'37 | D1P+D1N+F2P+F2N | M<37 | G2B+E1P+F2K |
| A'38 | D2K+D2K+D2N | M<38 | F1J+D1K+D1K |
| A'39 | D0P+D0N+E2K | M<39 | F1F+E2P+E2N+D2P |
| A'40 | D0K+D0K | M<40 | F1B+F1N |

DRAWING D23307804
UNIT 23033772
CARD ABJC2

| | | | |
|---|---|---|---|
| A'41 | F0B+C1P+C1N+E1P | M<41 | F0N+E1N+E1K |
| A'42 | C0F+B1P+B1N | M<42 | C0J+C1K+C1K |
| A'43 | C0B+A1P+A1K | M<43 | C0N+A1N+B1K+B1K |
| A'44 | G1N+D1P | M<44 | G1F+D1N+G1J |
| A'45 | H1F+C2K+D2K | M<45 | H1J+D2N+G1B+D1K |
| A'46 | F1J+B2K | M<46 | H1B+C2N+H1N+D2P |
| A'47 | F1B+A2N | M<47 | F1N+B2P+F1F+B2N+C2P |

BIT TRANSFER (FROM Z6=>Z1) FOR BIT NN=
BI[NN]=((M<NN).(A'NN)) + MGEA.((M<NN)+(A'NN))

3.15. HARDWARE FUNCTIONS: ATAA, BTBB, CCTB
OPERATORS: ADD, SUBT

TEST 15 CHECKS THE DATA TRANSFER TO AND FROM THE ARITHMETIC ADDER AND THE ADDER CARRY/BORROW LOGIC.

THE CARRY TEST CONSISTS OF ADDING 38 VALUES CONSISTING OF A WORD OF ZEROES WITH A SINGLE ONE-BIT IN BIT POSITIONS ZERO THROUGH 37 TO AN OCTAL VALUE OF 3777777777777.

OPERANDS OF ZERO WITH A SINGLE ONE BIT IN BIT POSITIONS ZERO THROUGH 38 FROM AN OCTAL VALUE OF 4000000000000.

THE RESULT OF THE ADD AND SUBTRACT OPERATIONS ARE COMPARED WITH THE CORRECT RESULTS USING THE SAVE OPERATOR.

3.16. HARDWARE FUNCTIONS: ATZ5, Z2TB, CTZ6, Z1TB, Z1TC, Z2TB
OPERATOR; RSUP

THE TOP THREE STACK WORDS ARE INITIALIZED TO BIT PATTERNS OF ALTERNATE ZERO AND ONE BITS, ALL-ONES AND ALL-ZEROES. THE RSUP OPERATOR IS THEN EXECUTED THIRTY TIMES AND THE TOP THREE WORDS ARE CHECKED FOR EQUALITY WITH THEIR ORIGINAL VALUES USING THE SAME OPERATOR.

THE HARDWARE FUNCTIONS VERIFIED BY TEST 16 INCLUDE THE CTZ6 AND Z1TA LEVELS WHICH WERE PREVIOUSLY CHECKED BY LT8 AND LT16 OPERATION IN TEST FOUR. HOWEVER, THE TEST FOUR LT16 CHECK USED ONLY THE LEAST SIGNIFICANT 16 BIT OF THE C-REGISTER SO THAT TEST 16 IS THE FIRST VERIFICATION THAT ALL 48 BITS ARE TRANSFERRED CORRECTLY TO THE Z6 BUS BY THE CTZ6 OPERATION.

OTHER INTER-BUS AND INTER-REGISTER CONTROLS USED BY TEST 16 WHICH HAVE BEEN VERIFIED BY PRECEDING TEST INCLUDE ATZ6 (EXCH), BTZ6(DUPL), CTC6(LT8, LT16), AND Z1TA(DPL).

3.17. HARDWARE FUNCTIONS: XTZ4, YTZ4, Z3TY; LOTK, LOTJ; LOTJ, L1TK; WSML, BU03
OPERATORS: SAME, DUPL

TEST 17 IS THE BEGINNING TEST IN THE SEQUENCE OF HARDWARE VERIFICATIONS WHICH USE DOUBLE-PRECISION DATA. THE PURPOSE OF THIS TEST IS TO ESTABLISH CONFIDENCE IN THE ABILITY TO DISTINGUISH BETWEEN EQUAL AND UNEQUAL BIT PATTERNS IN THE SECOND WORD OF A DOUBLE-PRECISION OPERAND.

THE TEST ALGORITHM CONSISTS OF PERFORMING THE SAME OPERATIONS AS THOSE USED IN TEST THREE ON OPERANDS WHOSE FIRST WORD IS ZERO AND SECOND WORD IS THE BIT PATTERNS USED IN TEST THREE.

3.18. HARDWARE FUNCTIONS: XTZ4, L1TJ, Z3TY
OPERATOR: LOR

TEST 18 PERFORMS THE SAME TEST ALGORITHM AS TEST EIGHT, USING DOUBLE-PRECISION OPERANDS CONSITING OF A FIRST WORD OF ZEROES AND A SECOND WORD IDENTICAL TO THAT USED BY TEST EIGHT.

THE RESULT OF THE OR OPERATION IS CHECKED BY COMPARING IT WITH THE EXPECTED RESULT USING THE SAME OPERATOR.

3.19. HARDWARE FUNCTIONS: XTZ4, LOTJ, L1TK, Z3TX
OPERATOR: LNOT

TEST 19 APPLIES THE ALGORITHM OF TEST NINE TO A DOUBLE-PRECISION OPERAND CONSISTING OF A FIRST WORD OF ZERO AND A SECOND WORD CONSISTING OF 24 CONSECUTIVE PAIRS OF 01 BIT.

3.20. HARDWARE FUNCTION: XTZ5, Z2TY, TYZ6, Z1TX
OPERATOR: EXCH

TEST 20 VERIFIES THE INDICATED DATA TRNASFERS OF THE SECOND WORD OF DOUBLE-PRECISION OPERANDS BY LOADING THE STACK WITH TWO OPERANDS CONSISTING OF A FIRST WORD OF ZEROES AND SECOND WORDS OF HEX AAAAAAAAAAAA AND 555555555555 AND THEN PERFORMING 24 EXCH OPERATORS. THE TOP TWO STACK WORDS ARE THEN COMPARED WITH THE ORIGINAL VALUES USING THE SAME OPERATOR.

3.21. HARDWARE FUNCTIONS: XTZ6, Z1MB

OPERATOR: NTGR

THE COMBINATION OF XTZ6, TOA = 47, TOM = 0 AND Z1T <ANYWHERE> IS NOT PRESENT IN THE LOGIC FOR ANY EXISTING OPERATOR. THE APPROXIMATION TO THIS DESIRED SEQUENCE WHICH WE USE TO CHECK THE XTZ6 REGISTER-BUS GATING THEREFORE WILL NOT DETECT ERRORS FOR ALL BIT POSITIONS IN THE X VALUE.

THE TEST ALGORITHM CONSISTS OF PERFORMING AN NTGR OPERATION ON THE VALUE DOUBLE(3"0140000000000007",3"0007777777777770"). THE HARDWARE COMPUTES THE CORRECT ANSWER IN TWO DISTINGUISHABLE STEPS CONSISTING OF SHIFTING THE MOST SIGNIFICANT MANTISSA WORD LEFT BY TWELVE OCTADES (USING THE DAM1 OPERATION AT JA = 2 * NTGR) FOLLOWED BY SHIFTING THE SECOND WORD MANTISSA OCTADES INTO THE "EMPTY" POSTIONS OF THE B-REGISTER (USING THE DAM2 OPERATION AT JA = 05 * NTGR). THE RESULT OF THE OPERATION IS CHECKED FOR EQUALITY WITH 3" 00077777777777" USING THE SAME OPERATOR.

THE SAME TEST SEQUENCE IS THEN PERFOMRED ON AN OPERAND VALUE OF DOUBLE (3"0140000000000004",0) IN ORDER TO CHECK THE TRANSFER OF ZERO BITS F X TO B. THE EXPECTED (CORRECT) RESULT IS 3"0004000000000000".

3.22. HARDWARE FUNCTIONS: CHARACTER COMPARISON NETWORK
OPERATORS: CLSD, CEQD, CGTD

THE STOPPING CONDITION FOR STRING SCAN OPERATORS AND THE DETERMINATION OF THE VALUE OF THE TFFF FLIP-FLOP FOR STRING COMPARISON OPERATORS ARE CONTROLLED BY A COMBINATIONAL NETWORK WHICH COMPARES TWO-BIT FIELDS IN THE SOURCE AND DESTINATION CHARACTERS. THE THREE OUTPUTS FROM THIS COMPARATOR ARE LEVELS SEQD/ ("SOURCE EQUALS DESTINATION NOT"), SERR ("SCAN ERROR") AND SERR/ (WHICH IS NOT THE COMPLEMENT OF SERR) WHICH ARE USED AT JG = 3 IN THE HARDWARE FLOW DIAGRAMS.

TEST 22 CHECKS THIS CHARACTER COMPARATOR BY EXECUTING CLSD, CEQD AND CGTD OPERATORS USING FOUR, SIX AND EIGHT-BIT STRING

DESCRIPTORS WHICH POINT OUT CHARACTERS OF ALL-ZEROES AND ALL-ONES WITH TWO-BIT SUBFIELD OF BINARY 01, 10 AND 11. FOR EACH OF THESE TEST CASES, AN ENTIRE 48-BIT WORD IS FILLED WITH THE CHARACTERS UNDER TEST SO THAT IMPROPER OPERATION OF THE CHARACTER-SELECTION LOGIC WILL NOT INFLUENCE THE OUTCOME OF THE COMPARISON.

EACH SUCH TEST CHARACTER IS COMPARED WITH ALL TEST CHARACTERS FOR THE CORRESPONDING CHARACTER SIZE.

THE RESULTS OF THE TWO-BIT FIELD COMPARISONS WHICH ARE UNDER APPEAR AT THE FOLLOWING LOCATIONS ON SCHEMATIC D-2330 8745

| | | | |
|---|---|---|---|
| SOURCE.[1:2] | > | DESTINATION.[1:2] | ABJI6 @ H1J |
| | = | | H1P |
| [3:2] | > | [3:2] | G1J |
| | = | | H1F |
| [5:2] | > | [5:2] | E1F |
| | = | | H1B |
| [7:2] | > | [7:2] | G1F |
| | = | | H1C |
| [7:8] | > | [7:8] | H1K |
| | = | | H1N |

3.23. HARDWARE FUNCTIONS: SOURCE AND DESTINATION CHARACTER SELECTION NETWORKS FOR STRING COMPARE OPERATORS: CEQD, CNED

THE STRING COMPARISON OPERATORS USE THE CHARACTER SIZE AND CHARACTER INDEX FIELDS OF THE SOURCE AND DESTINATION POINTERS TO SELECT INDIVIDUAL CHARACTERS FOR COMPARISON. TEST 22 VERIFIES THAT THE CHARACTER SELECTION NETWORKS WORK CORRECTLY FOR FOUR, SIX AND EIGHT-BIT STRING DESCRIPTORS.

FOR EACH CHARACTER SIZE, A STRING DESCRIPTOR IS CONSTRUCTED WHICH POINTS TO AN ALL-ZEROES CHARACTER IN A WORD WHOSE OTHER BITS ARE ALL ONE; THIS "DESTINATION" CHARACTER IS COMPARED WITH AN OPERAND OF ALL ZEROES USING BOTH THE CEQD AND CNED OPERATORS. AN UNEQUAL COMPARE CONSTITUTES AN ERROR.

THIS TEST IS REPEATED WITH THE STRING DESCRIPTOR POINTING AT EACH OF POSSIBLE CHARACTER POSITIONS FOR THE CURRENT CHARACTER-SIZE.

AFTER COMPLETING THE DESTINATION-CHARACTER-SELECTION TEST DESCRIBED ABOVE, EACH OF THESE DESTINATION CHARACTERS IS COMPARED WITH SOURCE CHARACTERS OF ALL-ZEROES SIMILARLY SELECTED FROM A WORD OF ONES USING A SOURCE STRING DESCRIPTOR.

3.24. HARDWARE FUNCTIONS: ISRT ("INSERT MATRIX") NETWORK
OPERATOR: SEQU

THE CONDITIONAL STRING TRANSFER AND STRING SCAN OPERATORS CONSTRUCT A 48-BIT WORD OF DUPLICATIONS OF THE COMPARISON CHARACTER AND USE THE NORMAL CHARACTER-SELECTION AND CHARACTER-COMPARISON NETWORKS VERIFIED IN TESTS 22 AND 23 TO DETERMINE WHETHER THE SCAN/TRANSFER OPERATION SHOULD TERMINATE WITH THE CURRENT SOURCE CHARACTER.

THE CONSTRUCTION OF THIS WORD OF DUPLICATIONS OF THE COMPARISON CHARACTER IS PERFORMED AT JG = 2, PX2 OF THE HARDWARE FLOW DIAGRAMS; THE ISRT = 1 AT KG = 0 ACTIVATES A COMBINATIONAL NETWORK WHICH ACCEPTS A 4-, 6-, OR 8-BIT CHARACTER FROM THE Z5 BUS AND PRODUCES SIX, FOUR OR THREE DUPLICATES OF IT ON THE Z2 BUS. THE Z6:Z1 SHIFT NETWORK IS THEN USED TO FILL THE MOST SIGNIFICANT HALF OF THE COMPARISON WORD WITH A DUPLICATE OF THE LEAST SIGNIFICANT HALF, USING THE TOA/TOM VALUES SET AT JG = 1 * KG1F AND THE DIS ← 24 SETTING AT JG = 2.

TEST 24 CHECKS THE OPERATION OF THIS ISRT DUPLICATION NETWORK BY PERFOMRING A SEQU OPERATOR USING A CHARACTER COUNT WHICH CORRESPONDS TO ONE FULL WORD OF CHARACTERS IN FOUR, SIX AND EIGHT-BIT CHARACTER SIZES AND

1. A STRING DESCRIPTOR POINTING AT A WORD OF ALL ZEROES WITH A COMPARION CHARACTER OF ALL ZEROES, AND

2. A STRING DESCRIPTOR POINTING TO A WORD OF ALL ONES WITH A COMPARISON CHARACTER OF ALL ONES.

CORRECT OPERATION OF THE SEQU CORRESPONDS TO HAVING AN UPDATE CHARACTER COUNT OF ZERO AND THE TFFF FLIP-FLOP EQUAL TO TRUE; BOTH CONDITIONS ARE CHECKED.

3.25. HARDWARE FUNCTIONS: SCAN-BUS DATA VALIDITY AND PARITY-CHECKING

OPERATOR: SCNI

TEST 25 PERFORMS TEN EXECUTIONS OF THE FOLLOWING CODE:

```
LT8 20      INTERROGATE PERIPHERAL STATUS
SCNI
DLET
LT8 60      READ TIME-OF-DAY CLOCK
SCNI
DLET
```

THE OBJECT IS TO EXERCISE THE SCAN BUS AT A RELATIVELY HIGH DUTY CYCLE IN ORDER TO DETECT BOTH SCAN PARITY ERRORS AND A "DROPPED BOUNCING BALL" IN THE SCIL SCAN-CONTROL LOGIC.

## IV. RESOURCES USED

THE 2.5 RELEASE OF THE MCP PROCESSOR TEST USES APPROXIMATELY 3800 WORDS OF MEMORY FOR STACK, CODE AND READ-ONLY DATA. EXECUTION TIME FOR AN ERROR-FREE RUN REQUIRES APPROXIMATELY 950 MILLISECONDS ON A MACHINE WITH 1.2 MICROSECOND MEMORY, AFTER THE CODE SEGMENT AND READ-ONLY ARRAY OF TEST DATA HAVE BEEN MADE PRESENT.

## D0391 MCP - LIBRARY MAINT IMPROVEMENTS - 07-14-73

LIBRARY MAINTENANCE FILE HANDLING HAS BEEN EXTENDED TO INCREASE THE NUMBER OF FILES WHICH MAY BE COPIED BY A SINGLE OPERATION FROM 999 TO A MAXIMUM OF 8191.

CORRECTIONS HAVE BEEN MADE TO INPUT REEL SWITCH HANDLING TO

D0391 MCP - LIBRARY MAINT IMPROVEMENTS - 07-14-73

ELIMINATE SUCH PROBLEMS AS INCORRECT FILE NAME WHEN REQUESTING THE NEXT REEL AND "UNEXPECTED TAPE DIRECTORY" ERRORS AT REEL SWITCH TIME. THESE PROBLEMS COULD OCCUR ON ANY MULTI-REEL TAPE BUT WERE MOST PREVALENT WHEN VERY SMALL FILES WERE INVOLVED.

THE EXTRA ARRAYS, CREATED WHEN STATEMENTS OF THE FORM "COPY <DIRECTORY>/=" ARE USED, ARE NOW OVERLAYABLE; THUS REDUCING SAVE CORE REQUIREMENTS.

D0409 MCP - PROGRAMMATIC DS OF MCS - 07-23-73

THE MCP WILL NOW IGNORE ANY ATTEMPT BY A USER PROGRAM TO PROGRAMMATICALLY DS OR ST A STACK HAVING PRIVILEGED STATUS (I.E. AN MCS OR AN INDEPENDENT RUNNER) UNLESS THE STACK ATTEMPTING THE ACTION IS ALSO PRIVILEGED.

D0410 MCP - CRUNCHED FILES - 07-29-73

A NEW RUN-TIME OPTION, "CRUNCH" (OPTION 16) HAS BEEN IMPLEMENTED TO ALLOW FILES TO BE CRUNCHED. A CRUNCHED FILE IS ONE ON HEAD-PER-TRACK DISK OR DISK PACK IN WHICH UNUSED SPACE IN THE LAST ROW OF THE FILE IS RETURNED TO THE SYSTEM. WITHOUT THIS OPTION SET, NO CRUNCHED FILES WILL BE CREATED. NOTE, HOWEVER, THAT PREVIOUSLY CREATED CRUNCHED LIBRARY FILES COPIED TO DISK WILL BE COPIED AS CRUNCHED. WITH THE CRUNCH OPTION SET, FILES WILL BE CRUNCHED IF THEY ARE EXPLICITLY CLOSED WITH CRUNCH; AND CODE FILES ARE AUTOMATICALLY CRUNCHED.

PLEASE REFER TO MCP-I-O D0398 AND ALGOL D0366 FOR INFORMATION ABOUT CREATING CRUNCHED FILES.

D0430 MCP - SWAP OF DIRECT ARRAYS - 08-12-73

IT IS NOT LEGAL TO SWAP DIRECT ARRAYS.

D0432 MCP - PROGRAMDUMP AND STACK OVERFLOW - 08-12-73

PROGRAM DUMP WOULD QUIT ANALYZING A STACK WHEN IT GOT A STACK OVERFLOW. NO INDICATION OF THIS CONDITION WAS GIVEN TO THE USER. THIS PATCH CAUSES NOTIFICATION TO BE GIVEN.

D0434 MCP - MISSING INTRINSICS - 08-12-73

IF AN INTRINSIC USED BY A CERTAIN PROGRAM IS MISSING, THE PROGRAM WILL BE DS-ED RATHER THAN GET A PROGRAM DUMP.

D0437 MCP - D1 RELATIVE CODE BIT 43 ON - 08-12-73

THIS FEATURE TREATS D1 RELATIVE CODE WHICH HAS BIT 43 ON IN ITS SEGMENT DESCRIPTOR AS IF IT WERE D0 RELATIVE CODE FOR THE PURPOSE OF KANGAROO MANIPULATION.

D0447 MCP - EVEN PARITY LABEL RECOGNITION - 05-19-73

B5700 TAPES WITH EVEN PARITY LABELS WHOSE MFID IS 000000 WILL BE TREATED AS IF THEY HAD NO MFID. THIS IS FOR COMPATIBILITY WITH B3700 TAPES WHERE THAT LABEL IS INDICATIVE OF NO MFID.

D0448 MCP - RECONSTRUCTION MESSAGE - 09-23-73

THIS PATCH CAUSES THE "RECONSTRUCTION IN PROCESS" MESSAGE TO BE DISPLAYED WHEN RECONSTRUCTING.

D0468 MCP - ADD FILETYPES 197,198 - 08-26-73

THIS CHANGE ADDS TWO FILETYPES 197 (CHARACTER DATA), 198 (SEQUENCE CHARACTER DATA).

D0477 MCP - MEMORY DUMP IMPROVEMENTS - 08-19-73

A MEMORY DUMP MAY NOW BE RESTARTED TO A NEW UNIT IF "CL" OR "RESTART" IS ENTERED WHILE THE DUMP IS RUNNING.

D0485 MCP - CREATE USERCODE - 09-04-73

FILE SECURITY AND SYSTEMS OPERATION CHARACTERISTICS IMPOSE SOME RESTRICTIONS ON HOW THE CREATE VERB CAN BE USED TO CREATE A SCRAMBLED USERCODE DIRECTORY.

1. USERCODE DIRECTORY MUST BE CREATED USING A PRIVILEGED USERCODE.
2. IF USERCODE FILES WERE IN USE, A HALT/LOAD WILL BE REQUIRED TO CLEAR THE SYSTEM STORED POINTERS TO THE OLD USERCODE DIRECTORY BEFORE THE NEW WILL BE USED.

THE RECOMMENDED PROCEDURE FOR CREATING A SCRAMBLED DIRECTORY FOR USERCODE IS

1. REMOVE PREVIOUS USERCODE IF NECESSARY AND HALT/LOAD.
2. RUN CONTROL CARD AS FOLLOWS:

D0485 MCP - CREATE USERCODE - 09-04-73

USER PRIVILEGE; CREATE * USERCODE WITH 125

PRIVILEGE IS ANY PRIVILEGED USERCODE. 125 IS ANY NUMERIC SCRAMBLE MODULUS.

D0486 MCP - ADM EVENT SYNTAX - 09-04-73

THE SYNTAX CHART FOR ADM INDICATES THAT, ON THE LOWEST PATH, THE WORD "EVENT" IS NOT REQUIRED. THIS IS INCORRECT; IT IS REQUIRED.

D0487 MCP - LABEL ERROR ON DUMP TAPES - 09-09-73

IF A MEMORY DUMP IS TAKEN ON A TAPE WITH A LABEL ERROR, THE TAPE IS SHOWN BY THE SYSTEM AS STILL HAVING THE LABEL ERROR WHEN THE DUMP IS COMPLETED. THIS IS DUE TO THE FACT THAT WHEN THE MCP RECORDS THE STATUS OF THE TAPE WHEN IT IS FIRST BROUGHT ON-LINE, IT LOCKS THE UNIT ENTRY. THIS IN TURN IS DUE TO THE FACT THAT A LARGE AMOUNT OF TIME WOULD BE SPENT RETRYING THE TAPE EVERY TIME IT IS NECESSARY TO CHECK THE STATUS OF THE TAPE (E.G., AFTER A DUMP). THEREFORE, THE TAPE LABEL "MEMORY/DUMP" WILL NOT BE FOUND WHEN THE MCP CHECKS TAPE STATUS AFTER THE DUMP. THE SOLUTION IS SIMPLY TO READY THE UNIT (EITHER WITH THE RY COMMAND OR SWITCHING THE DRIVE FROM REMOTE TO LOCAL AND BACK) WHEN THE DUMP IS TO BE ANALYZED.

D0488 MCP - WORKSET IMPROVEMENT - 05-19-73

THIS PATCH INCLUDES THE FOLLOWING:

1. REDUCTION OF OVERHEAD OF WORKING SETS.
2. CORRECTION OF A PROBLEM WHEREIN THE SYSTEM OVERLAYED AT LESS THAN THE SPECIFIED RATE.
3. A CHANGE IN WHICH THE SYSTEM WILL ONLY WAKE UP THE HIGHEST SUSPENDED JOB.

D0494 MCP - SHOW ACTIVE JOBS - 09-04-73

D0494 MCP - SHOW ACTIVE JOBS - 09-04-73

A JOB WILL BE DISPLAYED IN THE "ACTIVE" SECTION IF IT DOES NOT HAVE ANY TASKS ASSOCIATED WITH IT. THUS WHILE A JOB IS EXECUTING ITS WFL INSTRUCTIONS IT WILL BE LISTED AS ACTIVE.

D0520 MCP - "NODUMP" SET IN MEMORY DUMP - 09-09-73

THE COMMAND NODUMP MAY NOW BE TYPED AT THE CONSOLE WHILE MEMDUMP IS ACTIVE. THE EFFECT OF THIS COMMAND WILL BE TO SET OPTION 13 (NODUMP) AFTER THE DUMP IS COMPLETE. THIS WILL PREVENT CERTAIN LOOPS WHEREIN AN ERROR IS DETECTED, A DUMP OCCURS AND THE ERROR IS DETECTED AGAIN WHEN THE DUMP FINISHES OR IS DS-ED.

D0522 MCP - ENABLE SWAPDISK ON PACK - 08-19-73

THIS CHANGE MODIFIES THE INFORMATION IN D0029 IN THE 2.3 SYSTEM MISCELLANEA.

IN THE PAST SWAPPER HAS LOOKED ON HEAD-PER-TRACK DISK FOR A FILE CALLED SYSTEM/SWAPDISK. NOW SWAPPER WILL ALSO LOOK ON SYSTEMRESOURCE DISK PACK IF IT DID NOT FIND IT ON HEAD-PER-TRACK. THE FILE FORMAT IS THE SAME, REGARDLESS OF LOCATION.

## MCSII

### D0523 MCSII - DELETION OF MCSII - 09-04-73

MCSII IS A SUBSET OF DIAGNOSTICMCS AND THEREFORE HAS BEEN DELETED FROM SYSTEM RELEASES. DIAGNOSTICMCS COMPILED WITH THE $OPTION NOANALYZER IS IDENTICAL TO MCSII. USERS WISHING TO RETAIN MCSII CAN CONTINUE TO USE THE SYMBOL AND OBJECT FROM THE 2.4 RELEASE AS NO CHANGES HAVE BEEN OR WILL BE MADE TO MCSII SINCE OR AFTER THE 2.4 RELEASE.

## NDL (NETWORK DEFINITION LANGUAGE)

### D0294 NDL - INITIAL MESSAGE ALLOCATION - 05-07-73

THIS PATCH CHANGES THE CALCULATION WHICH IS USED TO DETERMINE THE INITIAL AMOUNT OF MESSAGE SPACE ALLOCATED FOR THE DCP. THIS NOW IS DONE AS FOLLOWS:

1. THE SIZE OF MESSAGES ALLOCATED IS BASED ONLY UPON THE TERMINAL BUFFER AND TERMINAL MAXINPUT SIZES. EACH ALLOCATION IS MADE IN MULTIPLES OF 16 WORDS ONLY. THIS HELPS TO PREVENT CHECKER BOARDING. ONE OF THESE WORDS IS A LINK SO THE USABLE MESSAGE IS ONE WORD LESS THAN A MULTIPLE OF 16.

2. A COUNT IS MAINTAINED FOR EACH REQUIRED SIZE. IT IS INCREMENTED ONCE FOR EACH TERMINAL WHICH REQUIRES THAT SIZE AND ONCE FOR EACH LINE WHOSE LARGEST REQUIREMENT BASED UPON ITS TERMINALS IS THAT SIZE.

3. THIS COUNT IS ADJUSTED BY THE FOLLOWING FORMULA:

   ```
   COUNT:=SQRT(COUNT*2)
   ```

   THE INITIAL MESSAGE ALLOCATION FOR EACH SIZE MESSAGE IS THIS ADJUSTED COUNT.

4. AN ADDITIONAL MESSAGE OF THE LARGEST SIZE IS ALLOCATED TO HELP PREVENT GETSPACE ABORTS.

5. A TABLE OF THESE ALLOCATIONS WILL BE PRINTED BY THE NDL COMPILER IF THE DOLLAR OPTION SUMMARY IS SET.

## D0350 NDL - MCS DECLARATION - 06-24-73

THE MCS DECLARATION HAS BEEN ADDED TO NDL. THE DECLARATION SHOULD APPEAR BEFORE THE STATION SECTION. THE SYNTAX IS:

```
MCS <MCSID>:
     CONTROL = <LOGICAL VALUE>.
```

THIS ADDS THE <MCSID> TO THE LIST OF USABLE MCS"S. CONTROL = TRUE SPECIFIES EXTENDED RECONFIGURATION CAPABILITIES WHILE CONTROL = FALSE SPECIFIES NORMAL RECONFIGURATION ABILITIES.

## D0412 NDL - INITIALIZE STATION VARIABLES - 07-26-73

THIS PATCH ALLOWS USERS TO INDICATE INITIAL VALUES FOR STATION TOGGLES AND TALLYS. THE SYNTAX FOR THIS STATION SECTION STATEMENT IS:

```
<TOGGLE/TALLY INITIAL VALUE STATEMENT>::=
   INITIALIZE <TOGGLE/TALLY ASSIGNMENT LIST>

<TOGGLE/TALLY ASSIGNMENT LIST>::=
   TALLY[<TALLY NUMBER>]=<INTEGER>/TOG[<TOGGLE NUMBER>]=
   <BOOLEAN PRIMARY>/<TOGGLE/TALLY ASSIGNMENT LIST>,
   TALLY[<TALLY NUMBER>]=<INTEGER>/<TOGGLE/TALLY ASSIGNMENT LIST>,
   TOG[<TOGGLE NUMBER>]=<BOOLEAN PRIMARY>
```

THE INITIALIZATION VALUE WILL BE ASSIGNED WHEN DCP INITIALIZATION OCCURS.

## D0478 NDL - STATION ADDRESS PAIRS - 09-16-73

IN SOURCENDL, WHEN DEFINING THE ADDRESS AS (DIFFERENT) IN THE TERMINAL SECTION, THE STATION ADDRESS COULD BE SPECIFIED AS A SINGLE ADDRESS AND BE DUPLICATED AUTOMATICALLY. THIS FEATURE DOES NOT WORK PROPERLY IN ALL CASES AND ALSO CAUSES CONFUSION. NDL NOW

GIVES AN ERROR.

D0495 NDL - SOFTWARE TRANSLATION - 05-07-73

NDL NOW ALLOWS THE USER TO SPECIFY TRANSLATION TABLES IN SOURCENDL.

THIS CONSTANT SECTION CONSTRUCT HAS THE FOLLOWING SYNTAX:

```
<STRING TRANSLATION>::= <STRING> TO <STRING>
<STRING TRANS GROUP>::= <STRING TRANSLATION>,<STRING TRANS GROUP>
<STANDARD CODE>::= EBCDIC / ASC67 / BCL
<TRANSID>::= <IDENTIFIER>
<STRINGSIZE>::= 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8
<STANDARD CODE GROUP>::= <STANDARD CODE>TO<STANDARD CODE>
<STRING TRANS TYPE>::= <STRING TRANS GROUP> / <STANDARD CODE
                       GROUP> / <TRANSID>
<TRANSLATE STATEMENT>::= <TRANSID><STRINGSIZE>(<STRING TRANS TYPE>)
<TRANSLATE STATEMENT GROUP>::= <TRANSLATE STATEMENT> / <TRANSLATE
                               STATEMENT>,<TRANSLATE STATEMENT
                                          GROUP>
<TRANSLATE STATEMENT SECTION>::= TRANSLATETABLE <TRANSLATE
                                 STATEMENT GROUP>
```

INVOCATION IS ACCOMPLISHED IN THE REQUEST SECTION BY:

```
<TRANSLATION INVOCATION>::= <BYTE VARIABLE>=<TRANSID>(<BYTE
                            VARIABLE>)
```

TRANSLATION MUST BE FROM OR TO EBCDIC AND WHEN DEFINING ONE <TRANSID> IN TERMS OF ANOTHER, STRING SIZE MUST BE COMPATIBLE. FOR AN EXAMPLE SEE SYMBOL/SOURCENDL.

D0496 NDL - BACKSPACE STATEMENT - 08-26-73

THIS PATCH ALLOWS USERS TO BACKSPACE A TEXT BUFFER WHEN IN A RECEIVE REQUEST. THE SYNTAX FOR THE STATEMENT IS:

D0496 NDL - BACKSPACE STATEMENT - 08-26-73

<BACKSPACE STATEMENT>::= BACKSPACE

D0497 NDL - NDL ERROR DISPLAY - 05-07-73

NDL NOW DISPLAYS AN "E" NEXT TO THE MIX NUMBER ON THE SYSTEM CONSOLE WHEN THE COMPILED JOB CONTAINS ERRORS.

## OLDLISTDIRECTORY

D0541 OLDLISTDIR - OLDLISTDIRECTORY - 09-23-73

A TEMPORARY PROGRAM, SYSTEM/OLDLISTDIRECTORY HAS BEEN RELEASED FOR 2.5. THIS PROGRAM MAY BE USED FOR CHECKING AND CONTRASTING WITH THE NEW LISTDIRECTORY.

OLDLISTDIRECTORY IS BASICALLY THE 2.3 RELEASE OF LISTDIRECTORY WITH THE FOLLOWING UPDATES: IT NO LONGER HANDLES PRE-2.2 DIRECTORY FORMATS, USER CONTROLLED PAGING IS IMPLEMENTED. IT PRODUCES TWO NEW REPORTS, THE CONDENSED DIRECTORY, WHICH CONSISTS OF ONLY THE DIRECTORY FILES IN HIERARCHICAL ORDER, AND A LIST OF FILE NUMBERS SORTED ON THE NUMBER OF SEGMENTS CONTROLLED BY THEM.

OLDLISTDIRECTORY DOES NOT HANDLE CRUNCHED FILES AND HENCE FALSE CONFLICT MESSAGES WILL PROBABLY OCCUR FOR CRUNCHED FILES. THE OLD METHOD OF OPENING DIRECTORIES IS USED AND HENCE THE PROGRAM IS MUCH SLOWER THAN LISTDIRECTORY. ALSO, OUTPUT FORMATS MAY DIFFER IN THE VARIOUS REPORTS.

OLDLISTDIRECTORY WILL NOT BE MAINTAINED.

## PACKDIR

### D0351 PACKDIR - PACK INDEX # AND HEADINGS - 06-24-73

PACK INDEX NUMBERS FOR ALL ROWS ARE NOW CORRECT RATHER THAN ALWAYS BEING THE BASE PACK. HEADINGS HAVE BEEN REFORMATTED TO REFLECT HEAD-PER-TRACK DISK OR DISK PACK OUTPUT. THE "CARRIAGE RETURN" CHARACTER (4 "0D") IS NOW ALLOWED IN THE INPUT PARAMETER STRING BUT IS DELETED DURING PROCESSING. HENCE, IT IS NEITHER A DELIMITER NOR A VISIBLE CHARACTER AND MAY BE USED IF THE INPUT STRING IS TOO LONG FOR ONE LINE.

THE DEFAULT PAGE SIZE FOR OUTPUT IS 81 LINES INCLUDING HEADINGS (AT EIGHT LINES PER INCH) OR 58 LINES (AT SIX LINES PER INCH). THIS SIZE IS NOW CONTROLLED BY THE "PAGESIZE" ATTRIBUTE OF THE PRINTER FILE "LINE" AND MAY BE ALTERED AT RUN TIME BY A FILE CARD. A "PAGESIZE" OF ZERO SETS THE LOGICAL PAGE TO 65,634.

### D0431 PACKDIR - PACKDIR DOCUMENTATION CHANGE - 09-23-73

ON PAGE 1-12 OF THE B6700 WORK FLOW MANAGEMENT USERS GUIDE (5000714), THE LINE, "FOR HPT, THE FIRST LEVEL IS IGNORED BUT MUST BE PRESENT" SHOULD BE DELETED.

### D0492 PACKDIR - CRUNCHED FILE IDENTIFICATION - 10-16-73

CRUNCHED FILES ARE NOW IDENTIFIED AS SUCH FOLLOWING THE FILE TYPE.

D0498 PACKDIR - NEW APL AND BASIC FILETYPES - 08-26-73

THIS PATCH ADDS THE FILETYPES APLDATA (195), APLWORKSPACE (196), CDATA (197) AND CSEQDATA (198) TO THE LIST OF KNOWN FILETYPES.

D0534 PACKDIR - INPUT HANDLING CHANGES - 09-23-73

THIS PATCH CORRECTS INPUT HANDLING SUCH THAT LACK OF ANY FILE NAME DOES NOT CAUSE A SEGMENTED ARRAY ERROR TERMINATION. FOR USE WITH HEAD-PER-TRACK DISK, THE ABOVE CONDITION WILL RESULT IN REPORTING THE ENTIRE SYSTEM DISK. FOR DISK PACK, AN ERROR MESSAGE WILL RESULT. ALSO, THE ENTIRE FILE IDENTIFIER FOR HEAD-PER-TRACK DISK IS NOW USED. PREVIOUSLY THE FIRST NAME WAS IGNORED.

## PATCH

D0438 PATCH - USE FROM CANDE TERMINAL - 07-14-73

PATCH MAY NOW BE RUN FROM A TERMINAL USING CANDE. TWO NEW FEATURES HAVE BEEN ADDED TO MAKE USE FROM A TERMINAL FEASIBLE, THE $.DISK $ <FILENAME> STATEMENT AND THE $.FILE STATEMENT.

WHEN PATCH ENCOUNTERS A $.DISK CARD, IT INCLUDES THE CARDS FROM THE SPECIFIED FILE IN THE CURRENT PATCH, HOWEVER, IT IS ASSUMED THAT THE CARDS ALREADY CONTAIN MARK NUMBERS. THE NEW FEATURE ALLOWS A $ BEFORE THE FILE NAME, IN WHICH CASE PATCH WILL ADD THE MARK NUMBERS TO THE CARDS.

WHEN A $.FILE CARD IS ENCOUNTERED, ALL SUBSEQUENT CONTROL STATEMENTS WILL BE TAKEN FROM THE SPECIFIED FILE. THIS FEATURE OVERCOMES THE PROBLEM OF HAVING TO RE-ENTER THE CONTROL STATEMENTS EACH TIME PATCH IS RUN.

EXAMPLE:

```
RUN SYTEM/PATCH; FILE TAPE = SYMBOL/BACKUP
ENTER INPUTS
$.RESET LIST SET COMPARE
$.FILE CTRL

FILE CTRL:

$.MARK COMPILE
$#PATCH 001
$.DISK $PATCH1
$#PATCH 002
$.DISK $PATCH2
$#
$SET NEW MERGE
```

THE $.DISK $<FILENAME> CARD MAY ALSO BE USED WHEN RUNNING PATCH THROUGH THE CARD READER; HOWEVER, NO SEQUENCE CHECKING, $ CARD OR CONTROL CARD PROCESSING WILL BE DONE ON THE CARDS FROM THE FILE.

# PLI

## D0433 PLI - ONCODES FOR CONDITIONS - 09-23-73

THE ONCODE BUILTIN FUNCTION MAY BE USED BY THE PROGRAMMER WITHIN AN ON-UNIT TO DETERMINE THE NATURE OF HIS ERROR WHEN A CONDITION IS RAISED. THE INITIAL LIST OF THESE ONCODES FOLLOWS UNDER THE ON CONDITION TO WHICH IT APPLIES:

IMPLEMENT

| | |
|---|---|
| 601 | EXCLUSIVE FILE OPTIONS ARE NOT IMPLEMENTED. |
| 602 | THIS RECORD I/O OPTION IS NOT IMPLEMENTED. |
| 603 | COMPLEX OPERATIONS ARE NOT IMPLEMENTED. |
| 604 | UNIMPLEMENTED CONVERSION. |

ENDFILE

| | |
|---|---|
| 801 | END-OF-FILE OCCURRED WHILE PROCESSING GET STATEMENT. |
| 802 | END-OF-FILE OCCURRED WHILE PROCESSING PUT STATEMENT. |
| 807 | END-OF-FILE OCCURRED WHILE PROCESSING GET STRING STATEMENT. |
| 808 | END-OF-FILE ODDURRED WHILE PROCESSING PUT STRING STATEMENT. |
| 809 | END-OF-FILE OCCURRED ON A KEYED FILE I/O. |

ENDPAGE

| | |
|---|---|
| 902 | END-OF-PAGE OCCURRED WHILE PROCESSING PUT STATEMENT. |

TRANSMIT

| | |
|---|---|
| 1301 | UNDEFINED I/O RESULT WORD ERROR ON OUTPUT. |
| 1302 | UNDEFINED I/O RESULT WORD ERROR ON INPUT. |
| 1303 | RESULT DESCRIPTOR ERROR ON KEYED I/O. |

1304 RESULT DESCRIPTOR ERROR ON KEYED READ.
1305 RESULT DESCRIPTOR ERROR ON KEYED WRITE.
1306 RESULT DESCRIPTOR ERROR ON KEYED TABLE READ.
1307 RESULT DESCRIPTOR ERROR ON KEYED TABLE WRITE.

NAME

1401 UNRECOGNIZED IDENTIFIER IN THE INPUT OR AN IDENTIFIER NOT IN THE ASSOCIATED INPUT LIST ON A GET DATA STATEMENT.

RECORD

1501 PHYSICAL RECORD SIZE DIFFERS FROM FILE RECORD SIZE SPECIFICATION ON RECORD I/O INTO OR FROM FIXED STRING.
1502 FILE RECORD SIZE EXCEEDS LENGTH OF VARYING STRING ON RECORD READ INTO VARYING STRING.
1503 LENGTH OF VARYING STRING EXCEEDS FILE RECORD SIZE ON RECORD WRITE FROM VARYING STRING.

SIZE

1601 ERROR IN PROCESSING F FORMAT ITEM FOR A GET EDIT STATEMENT. NUMBER OF DECIMAL DIGITS SPECIFIED IS GREATER THAN THE FORMAT FIELD WIDTH.
1602 ERROR IN PROCESSING F FORMAT ITEM FOR A PUT EDIT STATEMENT. THE WIDTH OF THE NUMBER IS GREATER THAN FORMAT FIELD WIDTH.
1603 ERROR IN PROCESSING F FORMAT ITEM FOR A PUT EDIT STATEMENT. MORE DECIMAL DIGITS ARE SPECIFIED THAN SIGNIFICANT DIGITS.
1604 ERROR IN PROCESSING E FORMAT ITEM FOR A PUT EDIT STATEMENT. MORE DECIMAL DIGITS ARE SPECIFIED THEN SIGNIFICANT DIGITS.
1605 SIZE CONDITION ERROR IN ASSIGNING REAL TO REAL.
1606 SIZE ERROR OCCURRED WHEN ASSIGNING TO A BINARY FIXED OPERAND.
1607 SIZE ERROR OCCURRED WHEN ASSIGNING TO A DECIMAL FIXED

OPERAND.

1608 THE SOURCE BITSTRING IN A STRING TO ARITHMETIC CONVERSION IS LONGER THAN 39 BITS.

1609 THE SOURCE BITSTRING IN A STRING TO ARITHMETIC CONVERSION IS LONGER THAN 78 BITS.

AREA

1701 ALLOCATE ERROR - ALLOCATE OF NEGATIVE SIZE REQUESTED.

1702 FREE ERROR - CHUNK IS ALREADY FREE.

1703 TANK AREA FOR LOCAL ARRAYS IS EXHAUSTED.

1704 ALLOCATE ERROR - AREA IS EXHAUSTED.

1705 FREE ERROR - NO SUCH CHUNK EXISTS.

1708 FREE ERROR - INVALID FREE STACKED.

1709 ALLOCATE ERROR - INVALID AREA HEADER.

1710 FREE ERROR - INVALID AREA HEADER.

1711 FREE ERROR - INVALID CHUNK WORD.

STRINGSIZE

1801 SOURCE STRING IS LONGER THAN TARGET STRING IN BIT STRING TO CHARACTER STRING CONVERSION.

1802 SOURCE STRING IS LONGER THAN TARGET STRING IN CHARACTER STRING TO BIT STRING CONVERSION.

1803 SOURCE STRING IS LONGER THAN TARGET STRING IN BIT STRING TO BIT STRING CONVERSION.

1804 SOURCE STRING IS LONGER THAN TARGET STRING IN CHARACTER STRING TO CHARACTER STRING CONVERION.

1805 SOURCE CHARACTER STRING IS LONGER THAN DESTINATION CHARACTER STRING.

1806 SOURCE BIT STRING IS LONGER THAN DESTINATION BIT STRING.

STRINGRANGE

1901 STRINGRANGE ERROR IN EVALUATION OF SUBSTR BUILT IN FUNCTION.

CONVERSION

2101 ILLEGAL BINARY CHARACTER ENCOUNTERED IN CHARACTER STRING TO BIT STRING CONVERSION.

2102 ILLEGAL BINARY CHARACTER ENCOUNTERED IN BIT STRING TO ARITHMETIC CONVERSION.

2107 A "+" OR "-" SIGN APPEARS AFTER A COMPLEX NUMBER.

2108 ILLEGAL BINARY CHARACTER ENCOUNTERED IN CONVERSION TO ARITHMETIC IN A GET STATEMENT.

2109 ILLEGAL CHARACTER ENCOUNTERED IN CONVERSION TO ARITHMETIC IN A GET STATEMENT.

2110 ERROR IN STRING TO ARITHMETIC CONVERSION.

2111 MISSING OR ILLEGAL CONSTANT IN CHARACTER STRING TO ARITHMETIC CONVERSION.

2112 MISSING EXPONENT FOLLOWING "E" IN FLOATING POINT NUMBER.

2113 MISSING "I" FOLLOWING COMPLEX NUMBER.

2114 ILLEGAL ALPHANUMERIC CHARACTER IN PICTURE VARIABLE TO CHARACTER STRING CONVERSION.

2115 ILLEGAL NUMERIC CHARACTER IN PICTURE VARIABLE TO CHARACTER STRING CONVERSION.

2116 MISSING "+" OR "-" SIGN ON PICTURE VARIABLE TO CHARACTER STRING CONVERSION.

2117 MISSING "$" SYMBOL OR INSERTION CHARACTER IN PICTURE VARIABLE TO CHARACTER STRING CONVERSION.

2118 MISSING INSERTION CHARACTER IN PICTURE VARIABLE TO CHARACTER STRING CONVERSION.

2119 ILLEGAL FLOAT CHARACTER FOUND IN PICTURE VARIABLE TO CHARACTER STRING CONVERSION.

2120 MISSING FLOAT CHARACTER IN PICTURE VARIABLE TO CHARACTER STRING CONVERSION.

2121 ILLEGAL NUMERIC CHARACTER IN CHARACTER STRING TO PICTURE VARIABLE CONVERSION.

2122 ILLEGAL ALPHANUMERIC CHARACTER IN CHARACTER STRING TO PICTURE VARIABLE CONVERSION.

KEY

2401 NO RECORD WAS FOUND WITH THIS KEY.
2402 NO SPACE IS AVAILABLE FOR ADDITIONAL KEYED RECORDS.
2403 ATTEMPTED TO WRITE A DUPLICATE KEYED RECORD WITH THE "NO DUPLICATE" OPTION SET.
2404 A DUPLICATE KEYED RECORD WAS ADDED WITH "RETAIN DUPLICATES" OPTION SET.
2405 A DIFFERENCE IN KEY EXISTS ON A REWRITE STATEMENT.
2406 A KEY ERROR EXISTS ON A "CREATE" WRITE. E.G., THE KEYS ARE OUT OF ORDER.
2407 TABLE OVERFLOW ON A KEYED "CREATE" WRITE.
2408 A REWRITE WAS ATTEMPTED BEFORE A READ WAS EXECUTED.
2409 INVALID USAGE OF KEYED FILE OR KEYED OPTION.

UNDEFINEDFILE

2501 ATTRIBUTE CONFLICT ON THIS FILE.
2502 ILLEGAL FILE ACCESS METHOD.
2503 IMPLICIT OPEN FAILURE.
2504 ATTEMPTED TO CLOSE AN UNOPENED FILE.
2505 PARAMETER ERROR ON KEYED FILE OPEN.
2506 KEYED FILE OPENED INCORRECTLY.
2507 ERROR OCCURRED WHILE OPENING A KEYED FILE.
2508 CANNOT HANDLE A BCL FILE.

ERROR

2601 AN ATTEMPT WAS MADE TO ACCESS AN UNINITIALIZED VARIABLE.
2602 UNIMPLEMENTED OR UNSUPPORTED FORMAT PHRASE.
2603 FORMAT ERROR, MISSING LEFT PARENTHESIS.
2604 SQRT ERROR.
2605 PICTURE CONVERSION ERROR WAS NOT CORRECTED.
2606 DOUBLE SQRT ERROR.
2607 STRING TO ARITHMETIC CONVERSION ERROR WAS NOT CORRECTED.

D0433 PLI - ONCODES FOR CONDITIONS - 09-23-73

2608 STRING TO STRING CONVERSION ERROR WAS NOT CORRECTED.

D0493 PLI - BINDING DOUBLES - 10-16-73

THIS PATCH IMPLEMENTS BINDING DOUBLES.

D0499 PLI - FILE DECLARATION - 05-07-73

THE SYSTEM FILE ATTRIBUTE MYUSE WILL BE SET TO "OUT" IF THE LANGUAGE FILE ATTRIBUTE OUTPUT OR PRINT IS SPECIFIED OR IF IT IS THE SYSPRINT FILE.

THE SYSTEM FILE ATTRIBUTE MYUSE WILL BE SET TO "IN" IF THE LANGUAGE FILE ATTRIBUTE INPUT IS SPECIFIED OR IF IT IS THE SYSIN FILE.

IF THE LANGUAGE FILE ATTRIBUTE PRINT IS SET OR KIND IS SET TO PRINTER OR THE FILE IS A SYSPRINT FILE PAGESIZE WILL HAVE A DEFAULT SIZE OF 58.

THE DEFAULT SAVE FACTOR FOR A FILE HAS BEEN CHANGED FROM ONE TO 30.

D0500 PLI - FILE VARIABLE - 05-07-73

FILE VARIABLES, FILE PARAMETERS, AND INTERNAL FILES ARE NOW IMPLEMENTED.

PLEASE REFER TO PL/I DOCUMENT (5000201) FOR FULL EXPLANATION OF FILE VARIABLES.

D0501 PLI - OPTIONS IN OPEN STATEMENT - 05-07-73

BITSTREAM AND BLINESIZE ARE NO LONGER RECOGNIZED AS VALID OPTIONS IN THE OPEN STATEMENT.

D0502 PLI - OPEN STATEMENT - 05-19-73

GENERAL FORMAT:

```
<OPEN-STATEMENT>::= OPEN<OPTIONS-GROUP>[,<OPTIONS GROUP>]...;
<OPTIONS-GROUP>::=
   FILE(<FILE DESIGNATOR>)
   [TITLE (FILE-TITLE)]
   [ENVIRONMENT (<SYSTEM-FILE-ATTRIBUTE-SPECIFICATION-LIST>)]
   [OPTIONS (<SYSTEM-FILE-ATTRIBUTE-SPECIFICATION-LIST>)]
   [PRINT]
   [INPUT / OUTPUT / UPDATE]
   [STREAM / RECORD]
   [LINESIZE(<SCALAR-EXPRESSION>)]
   [PAGESIZE(<SCALAR-EXPRESSION>)]
   [INDENT (<SCALAR-EXPRESION>)]
   [VOLUME]
   [EXCLUSIVE]
   [BACKWARDS]
   [TRANSIENT]
   [SEQUENTIAL / DIRECT]
   [TAB(<SCALAR-EXPRESSION LIST>)]

<SYSTEM-FILE-ATTRIBUTE-SPECIFICATION-LIST>::=
      <SYSTEM-FILE-ATTRIBUTE-SPECIFICATION> /
      <SYSTEM-FILE-ATTRIBUTE-SPECIFICATION-LIST>,
         <SYSTEM-FILE-ATTRIBUTE-SPECIFICATION>

<SYSTEM-FILE-ATTRIBUTE-SPECIFICATION>::=
      <SYSTEM-FILE-ATTRIBUTE>=<SCALAR-EXPRESSION> /
      <BOOLEAN-VALUED-SYSTEM-FILE-ATTRIBUTE>
```

FUNCTION:

THE OPEN STATEMENT COMPLETES THE SPECIFICATION OF ATTRIBUTES FOR THE FILE AND EXPLICITLY OPENS THE FILE, IF THE FILE HAS NOT PREVIOUSLY BEEN OPENED. IF THE FILE HAS ALREADY BEEN OPENED THE STATEMENT IS IGNORED. ATTRIBUTE SPECIFICATIONS IN THE OPEN

STATEMENT TAKE PRECEDENCE OVER ATTRIBUTE SPECIFICATIONS IN THE FILE DECLARATION.

GENERAL RULES:

1. THE FOLLOWING LANGUAGE FILE ATTRIBUTES ARE NOT IMPLEMENTED AND ATTEMPTING TO SPECIFY THEM IN AN OPEN STATEMENT WILL GENERATE AN ERROR OF LEVEL SIX AND THE SPECIFICATION WILL BE IGNORED.

   INDENT VOLUME EXCLUSIVE BACKWARDS TRANSIENT

2. IF THE FILE HAS ALREADY BEEN OPENED THE OPEN STATEMENT WILL BE IGNORED.

3. ATTEMPTING TO SET CONFLICTING LANGUAGE FILE ATTRIBUTES WILL GENERATE A SYNTAX ERROR OF LEVEL THREE. FOR A LIST OF COMPATIBLE LANGUAGE FILE ATTRIBUTES SEE SYSTEM NOTE D0225.

4. ATTEMPTING TO SET A SYSTEM FILE ATTRIBUTE INSIDE THE ENVIRONMENT OR OPTIONS CLAUSE THAT CONFLICTS WITH A LANGUAGE FILE ATTRIBUTE WILL GENERATE A LEVEL THREE SYNTAX ERROR AND THE SPECIFICATION INSIDE THE ENVIRONMENT OR OPTIONS CLAUSE WILL BE IGNORED. PL/I LANGUAGE FILE ATTRIBUTES AND SYSTEM FILE ATTRIBUTES THAT CONFLICT ARE:

| LANGUAGE FILE ATTRIBUTE | SYSTEM FILE ATTRIBUTE |
|---|---|
| PRINT | KIND |
| TITLE | TITLE |
| PAGESIZE | PAGESIZE |
| INPUT,OUTPUT,UPDATE | MYUSE |

5. CURRENT SYNTAX FOR KIND WILL STILL BE RECOGNIZED.

6. SYNTAX FOR SETTING SYSTEM FILE ATTRIBUTES INSIDE THE OPTIONS OR ENVIRONMENT CLAUSE IN AN OPEN STATEMENT IS THE SAME AS FOR A FILE DECLARATION EXCEPT THAT THE SPECIFICATIONS NEED NOT BE CONSTANT. IN THE CASE OF SYSTEM FILE ATTRIBUTES THAT REQUIRE MNEMONICS THEY MUST BE

USED. THIS CAN BE DONE BY SPECIFYING A STRING CONSTANT OR A STRING VARIABLE WHICH HAS BEEN ASSIGNED THE CORRECT VALUE. IF A CONSTANT IS USED A COMPILE TIME CHECK IS MADE TO SEE IF IT IS A VALID MNEMONIC FOR THE SPECIFIED FILE ATTRIBUTE. IF NOT AN ERROR OF LEVEL THREE IS GIVEN. IF A VARIABLE IS USED IT IS CHECKED AT RUN TIME AND IF IT IS AN INVALID MNEMONIC A NON-FATAL RUN TIME ERROR IS GIVEN. FOR A LIST OF SYSTEM FILE ATTRIBUTES AND SYSTEM FILE ATTRIBUTE MNEMONICS SEE PL/I FILE DECLARATIONS D0225.

6. ATTEMPTING TO SET INTMODE INSIDE THE ENVIRONMENT OR OPTIONS CLAUSE WILL CAUSE AN ERROR OF LEVEL ZERO TO BE GENERATED AND THE SPECIFICATION WILL BE IGNORED.

7. ATTEMPTING TO SET A READ-ONLY ATTRIBUTE INSIDE THE ENVIRONMENT OR OPTIONS CLAUSE WILL CAUSE AN ERROR OF LEVEL THREE TO BE GENERATED AND THE SPECIFICATION WILL BE IGNORED.

## D0503 PLI - RECORD CONDITION - 05-19-73

THE RAISING AND HANDLING OF THE RECORD CONDITION IS NOW IMPLEMENTED. PLEASE REFER TO THE PL/I DOCUMENT (5000201) FOR DETAILED DESCRIPTION.

## D0504 PLI - FILE ATTRIBUTE ASSIGN AND REF - 06-24-73

### SYSTEM FILE ATTRIBUTE ASSIGNMENT STATEMENT

FUNCTION:

THE SYSTEM FILE ATTRIBUTE ASSIGNMENT STATEMENT IS USED TO SET THE VALUE OF A SYSTEM FILE ATTRIBUTE FOR A FILE OUTSIDE OF A FILE DECLARATION OR AN OPEN STATEMENT.

GENERAL FORMAT:

<SYSTEM FILE ATTRIBUTE>(<FILE DESIGNATOR>) = <SCALAR EXPRESSION>

GENERAL RULES:

1. A WARNING OF LEVEL ZERO WILL BE GENERATED IF AN ATTEMPT IS MADE TO SET INTMODE AND THE STATEMENT WILL BE IGNORED.
2. AN ERROR OF LEVEL THREE WILL BE GENERATED IF AN ATTEMPT IS MADE TO SET A READ-ONLY ATTRIBUTE AND THE STATEMENT WILL BE IGNORED.
3. MULTIPLE ASSIGNMENTS ARE NOT ALLOWED.
4. IF THE SYSTEM FILE ATTRIBUTE TITLE OR INTNAME IS SPECIFIED A PERIOD WILL BE INSERTED AT THE END OF THE STRING.
5. IF A FILE ATTRIBUTE HAS MNEMONICS THEY MUST BE USED. THIS CAN BE DONE BY SPECIFYING A STRING CONSTANT OR A STRING VARIABLE WHICH HAS BEEN ASSIGNED THE CORRECT VALUE. IF A CONSTANT IS USED A COMPILE TIME CHECK IS MADE TO SEE IF IT IS A VALID MNEMONIC FOR THE SPECIFIED FILE ATTRIBUTE. IF NOT AN ERROR OF LEVEL THREE IS GIVEN. IF A VARIABLE IS USED IT IS CHECKED AT RUN TIME AND IF IT IS AN INVALID MNEMONIC A NON-FATAL RUN TIME ERROR IS GIVEN.

## SYSTEM FILE ATTRIBUTE REFERENCE STATEMENT

FUNCTION:

THE SYSTEM FILE ATTRIBUTE REFERENCE STATEMENT IS USED TO REFERENCE THE VALUE OF A SYSTEM FILE ATTRIBUTE.

GENERAL FORMAT:

<SCALAR VARIABLE> = <SYSTEM FILE ATTRIBUTE>(<FILE DESIGNATOR>)
<PSEUDO VARIABLE> = <SYSTEM FILE ATTRIBUTE>(<FILE DESIGNATOR>)

GENERAL RULES:

1. A CHECK IS MADE FOR A SYSTEM FILE ATTRIBUTE BEFORE CHECKING FOR A USER INTRINSIC I.E. A USER INTRINSIC OF THE SAME NAME AS A SYSTEM FILE ATTRIBUTE WILL NO LONGER BE

D0504 PLI - FILE ATTRIBUTE ASSIGN AND REF - 06-24-73

RECOGNIZED.

2. AN ERROR OF LEVEL THREE WILL BE GIVEN IF AN ATTEMPT IS MADE TO REFERENCE A WRITE-ONLY SYSTEM FILE ATTRIBUTE.

D0505 PLI - PRE-PROCESSOR DO-STATEMENT - 06-24-73

THE PRE-PROCESSOR DO STATEMENTS ARE IMPLEMENTED. PLEASE REFER TO THE PL/I DOCUMENT (5000201) FOR DETAILED DESCRIPTION OF THIS FEATURE.

D0506 PLI - AUTOBIND - 07-14-73

THIS PATCH SETS THE "AUTOBIND" OPTION ON PL/I COMPILATIONS TO FACILITATE FASTER SEPCOMP COMPILATIONS.

D0507 PLI - LINECNT OPTION - 07-14-73

THIS PATCH IMPLEMENTS A NEW COMPILER CONTROL OPTION: "SET LINECNT = N", WHERE N IS THE NUMBER OF LINES PER PAGE ON COMPILATION LISTINGS. FOR EXAMPLE, ON SIX LPI PRINTERS, THE OPTION MIGHT BE "SET LINECNT = 58".

D0508 PLI - PRE-PROCESSOR PROCEDURES & BIF - 07-14-73

PRE-PROCESSOR PROCEDURES ARE NOW IMPLEMENTED. A "%DCL P ENTRY;" STATEMENT IS SUFFICIENT TO DECLARE PROCEDURES WITH ANY NUMBER OF PARAMETERS AND ANY RETURN. PROCEDURES MAY BE CALLED RECURSIVELY. THEY MAY NOT BE NESTED MORE THAN 48 DEEP. ALL PRE-PROCESSOR VARIABLES MUST NOW BE DECLARED BEFORE BEING RECOGNIZED AS PRE-PROCESSOR VARIABLES.

THIS PATCH ALSO IMPLEMENTS SUBSTR, LENGTH AND INDEX IN PRE-

D0508 PLI - PRE-PROCESSOR PROCEDURES & BIF - 07-14-73

PROCESSOR. PLEASE REFER TO PL/I DOCUMENT (5000201) FOR A DETAILED DESCRIPTION OF THESE LANGUAGE FEATURES.

D0509 PLI - DUMP STATEMENT - 07-23-73

THE DUMP STATEMENT IS NOW IMPLEMENTED IN PL/I.

FUNCTION:

THE DUMP STATEMENT ACTIVATES AN INTRINSIC WHICH PRODUCES A PROGRAM STACK DUMP. WHEN THE PROGRAM STACK DUMP HAS BEEN COMPLETED, CONTROL PASSES TO THE NEXT EXECUTABLE STATEMENT.

GENERAL FORMAT:

<DUMP-STATEMENT>::= DUMP / DUMP(<DUMP-OPTION-LIST>)
<DUMP-OPTION-LIST>::= <DUMP-OPTION> / <DUMP-OPTION-LIST>
<DUMP-OPTION>::= CODE / BASE / FILE / FILES / ARRAY / ARRAYS / ALL

GENERAL RULES:

1. IF NO DUMP OPTIONS ARE SPECIFIED IN THE DUMP STATEMENT, THE DUMP OPTIONS SPECIFIED IN THE OPTIONS SYSTEM CONTROL CARD WILL BE USED. IF THERE IS NO OPTIONS SYSTEM CONTROL CARD THE DEFAULT WILL APPLY.

D0510 PLI - STRING COMPARE IN PRE-PROCESS - 08-26-73

THIS PATCH IMPLEMENTS STRING COMPARES IN PRE-PROCESSOR.

D0535 PLI - KEYED I-O - 07-14-73

THE KEYED I/O, UPDATE I/O AND INDEXED SEQUENTIAL I/O FEATURES OF PL/I HAVE BEEN IMPLEMENTED.

THESE FEATURES ALLOW:

1. DIRECT KEYED READS
2. ADDING OF KEYED RECORDS
3. READING OF NEXT KEYED RECORD IN SEQUENCE (ISAM READ)
4. REWRITING KEYED RECORD JUST READ
5. OVERWRITING A KEYED RECORD
6. DELETING KEYED RECORDS

KEYED FILES MAY BE ORDERED IN ASCENDING OR DESCENDING SEQUENCE. RECORDS MAY BE PHYSICALLY OR LOGICALLY DELETED. DUPLICATE KEYS MAY BE OPTIONALLY ALLOWED. A VARIETY OF KEY TYPES ARE ALLOWED.

A USER DECLARES A KEYED FILE BY:

1. DECLARING THE FILE TO HAVE THE "KEYED" AND/OR "DIRECT" ATTRIBUTE.
2. SPECIFYING THE FILE ATTRIBUTES AREAS AND AREASIZE, WHICH WILL DEFINE THE PRIME DATA AREA.
3. SPECIFYING THE DESIRED KEYED OPTIONS IN TABLE ONE.

TABLE 1

| KEYED OPTION | FUNCTION | SYNTAX |
|---|---|---|
| KEYLENGTH | LENGTH OF KEY IN 8-BIT BYTES | KEYLENGTH = <CONST.ARITH.EXP> |
| KEYSTART | STARTING BYTE NUMBER (1-RELATIVE OF THE KEY EMBEDDED IN THE RECORD); IF ZERO, THE KEY IS NOT PART OF THE RECORD | KEYSTART = <CONST.ARITH.EXP> |
| KEYORDER | SEQUENCE OF KEYS: ASCENDING OR DESCENDING; DEFAULT IS ASCENDING | KEYORDER = <-ASCENDING-> OR <-DESCENDING-> NOTE: DASH (-) IS USED AS SINGLE QUOTE. |

| KEYED OPTION | FUNCTION | SYNTAX |
|---|---|---|
| FILEOVERFLOW | THE NUMBER OF AREAS ALLOCATED FOR THE RECORDS FOR AREA ALLOCATED FOR OVERFLOW SPACE; DEFAULT IS ZERO | FILEOVERFLOW = <CONST.ARITH.EXP> |
| KEYSPERENTRY | THE "FINENESS" OF THE FINE TABLE, I.E., THE NUMBER OF RECORDS REPRESENTED BY ONE FINE TABLE ENTRY; DEFAULT IS ONE | KEYSPERENTRY = <CONST.ARITH.EXP> |
| NODUPLICATES | IF SPECIFIED, DUPLICATE KEYED RECORDS ARE ERRORS, OTHERWISE THEY ARE ALLOWED IN A "FIRST-IN-FIRST-OUT" BASIS; | NODUPLICATES |
| SAVEDELETIONS | IF SPECIFIED, DELETED RECORDS ARE "LOGICALLY DELETED", BUT ARE AVAILABLE ON SEQUENTIAL READS. THE FIRST BYTE OF THE RECORD WILL BE FLAGGED WITH A 4"FF", INDICATING DELETION. THE TABLE ENTRY IS REMOVED AND THE RECORD IS "SEEN" ONLY ON SEQUENTIAL READS. | SAVEDELETIONS |
| KEYTYPE | MODE OF THE KEY.<br>0=BINARY<br>1=8-BIT CHARACTERS<br>2=8-BIT UNSIGNED NUMERIC<br>3=8-BIT MSD SIGNED NUMERIC (SIGN IN ZONE OF MOST SIGNIFICANT BYTE)<br>4=8-BIT LSD SIGNED NUMERIC | KEYTYPE=0 |

KEYED OPTION | FUNCTION | SYNTAX

5=4-BIT CHARACTERS
6=4-BIT UNSIGNED NUMERIC
7=4-BIT MSD SIGNED NUMERIC
8=4-BIT LSD SIGNED NUMERIC
(DEFAULT IS ONE (8-BIT CHARACTERS)

KEYLENGTH AND KEYSTART ARE THE ONLY REQUIRED KEYED OPTIONS.

A USER MAY "REWIND" THE KEYED FILE AND READ THE FIRST RECORD BY PERFORMING A READ-KEY, WITH A KEY OF ALL ZEROES. THE LOW BUILTIN FUNCTION MAY BE USED FOR THIS SPECIAL KEY.

KEYED OPTIONS MAY NOT APPEAR AS OPEN STATEMENT OPTIONS, FILE ATTRIBUTE ASSIGNMENTS OR BE LABEL EQUATED.

EXAMPLES:

```
DECLARE K FILE KEYED ENVIRONMENT (KEYLENGTH=4,KEYSTART=1,AREAS=2,
                                  AREASIZE=10);
DECLARE KY FILE DIRECT KEYED
   ENVIRONMENT(AREAS=10,AREASIZE=15,
               KEYORDER=-DESCENDING-,KEYSPERENTRY=4,
               FILEOVERFLOW=4,AREAOVERFLOW=2,
               NODUPLICATES,SAVEDELETIONS,
               KEYLENGTH=10,KEYSTART=0);
```

NOTE: THE DASH (-) HAS BEEN USED AS THE SINGLE QUOTE.

THE FOLLOWING I/O STATEMENTS ARE NOW IMPLEMENTED AND BE USED TO MANIPULATE A KEYED FILE:

```
READ FILE(<FILE-EXP>)INTO(VARIABLE);
READ FILE(<FILE-EXP>)INTO(VARIABLE) KEY(<SCALAR-EXP>);
READ FILE(<FILE-EXP>)INTO(VARIABLE) KEYTO(<SCALAR-REF>);
READ FILE(<FILE-EXP>)SET(SCALAR-PTR-VAR)
READ FILE(<FILE-EXP>)SET(<SCALAR-PTR-VAR>)KEY(<SCALAR-EXP>);
READ FILE(<FILE-EXP>)SET(<SCALAR-PTR-VAR>)KEYTO(<SCALAR-EXP>);
```

D0535 PLI - KEYED I-O - 07-14-73

```
WRITE FILE(<FILE-EXP>)FROM(VARIABLE)KEYFROM(<SCALAR-EXP>);
DELETE FILE(<FILE-EXP>) [KEY(<SCALAR-EXP>)];
REWRITE FILE(<FILE-EXP>) [KEY<SCALAR-EXP>]FROM(VARIABLE);

LOCATE FILE(<FILE-EXP>)[SET(<SCALAR-PTR-VAR>)]KEYFROM
                                        (<SCALAR-EXP>);
```

BY USING THE WRITE-KEYFROM STATEMENT, A KEYED FILE MAY BE CREATED, IN ASCENDING OR DESCENDING SEQUENCE.

THE FILE MAY BE READ DIRECTLY (READ-KEY STATEMENT) OR SEQUENTIALLY (READ-INTO, READ-SET).

BY OPENING THE FILE UPDATE, RECORDS MAY BE ADDED (WRITE-KEYFROM), DELETED (DELETE STATEMENT) OR OVERWRITTEN (REWRITE-KEY STATEMENT). ADDITIONALLY, LOCATE-MODE I/O MAY BE PERFORMED ON A KEYED FILE (LOCATE-KEYFROM, READ-SET).

ALL KEYS ARE PASSED TO THE KEYED INTRINSICS AS B6700 HARDWARE POINTERS WITH AN ASSOCIATED 8-BIT CHARACTER LENGTH. HENCE, A BINARY KEY IS PASSED WITH A LENGTH OF SIX (ONE WORD), A PIC "HHHHHS" IS PASSED WITH A LENGTH OF THREE AND CHARACTER(50) IS PASSED AS 50.

IF ABNORMAL ERRORS ARISE DURING FILE CREATION OR ACCESS, THE KEY CONDITION WILL BE RAISED, AND THE BUILT-IN ONCODE WILL PROVIDE THE ERROR CODE.

VARIABLE LENGTH RECORDS ARE NOT ALLOWED FOR KEYED FILES.

---

A DOCUMENT DESCRIBING THE DESIGN AND DETAILED USE OF THE KEYED I/O INTRINSICS, IS AVAILABLE ON REQUEST FROM THE LARGE SYSTEMS PLANT, CITY OF INDUSTRY, CALIFORNIA.

---

D0536 PLI - FORMAT VARIABLES - 08-12-73

THE FORMAT ATTRIBUTE AND FORMAT VARIABLES ARE NOW IMPLEMENTED.

THE FORMAT ATTRIBUTE IS A PROGRAM CONTROL ATTRIBUTE WHICH SPECIFIES THAT THE IDENTIFIER WILL HAVE FORMAT-CONSTANTS AS VALUES.

THE FORMAT VARIABLE MAY HAVE OTHER FORMAT VARIABLES OR FORMAT CONSTANTS ASSIGNED TO IT. WHEN THE ASSIGNMENT IS MADE, THE ENVIRONMENT OF THE SOURCE FORMAT IS ASSIGNED TO THE TARGET.

FORMAT VARIABLES MAY BE COMPARED, BUT ONLY THE COMPARISON OPERATIONS EQUAL (=) AND NOT EQUAL (¬=) ARE PERMITTED.

FORMAT VARIABLES AND CONSTANTS MAY BE PASSED AS PARAMETERS.

THE FORMAT STATEMENT SPECIFIES A FORMAT LIST THAT CAN BE USED BY EDIT-DIRECTED STATEMENTS TO CONTROL THE FORM OF DATA BEING TRANSMITTED

```
FORMAT-CONSTANT:[FORMAT-CONSTANT:..]FORMAT(<FORMAT LIST>);
```

FORMAT CONSTANTS MAY BE SUBSCRIPTED.

THE R-FORMAT ITEM ALLOWS FORMAT ITEMS IN THE FORMAT STATEMENT TO REPLACE THE REMOTE (R) FORMAT ITEM.

```
R(FORMAT-DESIGNATOR)
```

THE FORMAT DESIGNATOR IS A FORMAT CONSTANT (SUBSCRIPTED OR UNSUBSCRIPTED), AN ELEMENT FORMAT VARIABLE OR A FUNCTION REFERENCE THAT RETURNS A FORMAT.

EXAMPLE:

```
DECLARE (FV,FVA(10))FORMAT VARIABLE, X FIXED;
FC:  FORMAT(F(10));
FCA(1):  FORMAT(X(2),F(10,2));
FCA(2):  FORMAT(X(5),F(10,5));
   FV=FC;
   FVA(2)=FCA(1);

   PUT EDIT(X) (R(FVA(2)));
   PUT EDIT(X,X)(X(1),R(FC),R(FCA(1)));
```

D0537 PLI - PRE-PROCESSOR PRECISN DEFAULT - 08-26-73

PRECISION OF PREPROCESSOR DECIMAL FIXED HAS BEEN CHANGED TO (5,0).

D0538 PLI - KEYED FILE INTRINSICS - 09-09-73

THE B6700 2.5 RELEASE WILL INCLUDE THE ISAM INTRINSICS COMPILED AS SYSTEM INTRINSICS. THESE INTRINSICS WILL BE USED BY THE NEWLY IMPLEMENTED PL/I KEYED I/O FEATURES, AND COINCIDENTALLY MAY BE CALLED DIRECTLY AS INSTALLATION INTRINSICS IN PL/I ALGOL AND COBOL. THE INTRINSICS WILL APPEAR IN THE NEW ESPOL SYMBOLIC "SYMBOL/PLINTRINSICS" AT SEQUENCE # 67549100 - 67643900. THESE INTRINSICS (ISOPEN, ISDELETE, ISWRITE, ISKEYWRITE, ISREADNEXT, ISREADREC, ISREAD, ISREWRITE, ISCLOSE AND ISLOCATE) WILL BE BOUND INTO SYSTEM/INTRINSICS, AS INSTALLATION ONE INTRINSICS, AND WILL REQUIRE NO SOFTWARE CHANGES.

ADDITIONALLY THE SPECIAL PL/I INTERFACE INTRINSICS (PLCLOSE, PLOPEN, PLDELETE, PLKEYWRITE, PLREADNEXT, PLREWRITE, PLREAD, PLWRITE) ARE INCLUDED IN THE SYMBOLIC AT SEQUENCE # 67700000 - 67704200. THESE INTRINSICS ALLOW PROPER PARAMETER MATCHING IF THE ISAM INTRINSICS ARE TO BE REFERENCED AS BUILT-IN FUNCTIONS. THE INTERFACE INTRINSICS MUST BE COMPILED AND BOUND TO SYSTEM/INTRINSICS SPECIFICALLY BY THE USER:

```
BIND
   PLCLOSE=3,1     (PL/I),
   PLOPEN=3,2      (PL/I),
      .
      .
      .
FROM PL/=;
```

IF THE BUILT-IN APPROACH IS USED, THE USER MUST MODIFY HIS FILE DECLARATION TO SET THE DIRECT ATTRIBUTE (WHICH WAS PREVIOUSLY SET BY THE INTRINSIC AND REQUIRED AN MCP PATCH). THE FILE SHOULD BE

DECLARED AS:

PL/I:
DECLARE <NAME> FILE...ENVIRONMENT (DIRECTIO=-TRUE-...);

(NOTE: THE DASH (-) HAS BEEN USED FOR THE SINGLE QUOTE.)

THE FILE ATTRIBUTE "DIRECTIO" WILL SET THE B6700 DIRECT I/O ATTRIBUTE AT FILE BUILDING TIME. "DIRECTIO" MAY NOT BE SET BY LABEL EQUATION OR IN AN OPEN STATEMENT.

THE "DIRECTIO" ATTRIBUTE IS NOT REQUIRED FOR THE NEW PL/I KEYED I/O SYNTAX:

DECLARE <NAME> FILE KEYED ENVIRONMENT(KIND=-DISK-);

(NOTE: THE DASH (-) HAS BEEN USED FOR THE SINGLE QUOTE.)

IF THE ISAM INTRINSICS ARE TO BE USED BY OTHER LANGUAGES, THE DIRECT ATTRIBUTE MUST BE INDICATED IN THE FILE DECLARATION:

COBOL:
SELECT NAME ASSIGN TO DIRECT DISK

ALGOL:
DIRECT FILE NAME (KIND=DISK)

## PLINTRINSICS

D0413 PLINTRN - PLINTRINSIC SYMBOLIC - 07-20-73

THIS PATCH COMBINES ALL ESPOLINTRINSICS AND ALGOLINTRINSICS WHICH APPLY ONLY TO PL/I AND FORMS A NEW INTRINSIC SYMBOLIC CALLED SYMBOL/PLINTRINSICS. THESE INTRINSICS HAVE BEEN DELETED FROM SYMBOL/ESPOLINTRINSICS AND SYMBOL/ALGOLINTRINSICS.

## RJE

### D0392 RJE - INPUT MESSAGES - 07-08-73

THIS PATCH IMPLEMENTS THE "WM" SM MESSAGE AND THE "DL" RSC MESSAGE. WHEN "<RJE MIX NUMBER>SM:WM" IS ENTERED AT THE SITE CONSOLE, RJE RESPONDS BY DISPLAYING ITS LEVEL AND COMPILE TIME DEBUG OPTION STATE AT THE CONSOLE. WHEN "DL" IS ENTERED AT AN RSC, THE DCP AND LINE NUMBER OF THAT TERMINAL ARE DISPLAYED ON THE RSC IF RJE IS COMPILED WITH "DEBUG" SET.

### D0393 RJE - NOLOGON COMPILETIME OPTION - 07-08-73

THIS PATCH IMPLEMENTS A NEW COMPILE TIME OPTION, "NOLOGON". WHEN THIS OPTION IS SET, ALL RJE STATIONS MAY BY DEFAULT LOG ON WITHOUT USERCODE AND PASSWORD. WHEN THE OPTION IS RESET (THE DEFAULT CONDITION), ALL STATIONS MUST BY DEFAULT PERFORM A COMPLETE LOG-ON SEQUENCE.

### D0394 RJE - NEW LINE DISCIPLINE - 07-14-73

THIS PATCH IMPLEMENTS A NEW COMPILE TIME OPTION, "NEWLINE". WHEN NEWLINE IS SET, AN RJE MCS IS GENERATED INCORPORATING A REVISED LINE DISCIPLINE. THIS OPTION IS RESET BY DEFAULT; THUS, THE RELEASED VERSION OF SYSTEM/RJE IS COMPATIBLE WITH 2.4 DC1000 LOADER DECKS.

D0414 RJE - LC RSC INPUT MESSAGE - 07-29-73

D0414 RJE - LC RSC INPUT MESSAGE - 07-29-73

THIS PATCH IMPLEMENTS THE LC (LOG COMMENT) REMOTE CONSOLE INPUT MESSAGE. WHEN THE USER TYPES IN

LC <TEXT>

THAT TEXT IS ENTERED IN THE LOG FOR THAT SESSION AS AN "MCS MESSAGE".

D0415 RJE - RJE LEVEL IN RJELINKED FILE - 07-20-73

THIS PATCH CAUSES THE LEVEL OF AN ACTIVE RJE MCS TO BE RECORDED IN THE RJELINKED FILE IT GENERATES. THIS INFORMATION IS RECORDED IN WORD 52 OF BLOCK ZERO AS A STRING OF EBCDIC CHARACTERS. THE FIRST CHARACTER YIELDS THE MARK NUMBER, THE NEXT TWO CHARACTERS THE LEVEL NUMBER, AND THE FINAL THREE CHARACTERS THE CYCLE NUMBER. FOR EXAMPLE: "204090".

D0416 RJE - IMPROVED CALLBACK HANDLING - 07-29-73

THIS PATCH CORRECTS THE HANDLING OF PRINTER BACKUP FILES GENERATED BY TWO OR MORE DIALIN TERMINALS CALLING INTO THE SAME MODEM SERIALLY AND EMPLOYING THE "CALLBACK" RUN-TIME UNIT OPTION. THE PREVIOUS IMPLEMENTATION OF RJE RECOGNIZED ALL SUCH TERMINALS AS HAVING THE SAME LSN; THEREFORE, THE LAST PHONE NUMBER PROVIDED TO RJE BY A STATION LOGGED-IN ON THIS LINE WAS USED WHEN A DIALOUT WAS PERFORMED. THE TERMINAL CALLED THUS RECEIVED ALL OUTPUT FROM ALL TASKS INITIATED BY TERMINALS BEFORE THEY LOGGED-OFF ON THAT LINE.

THE SOLUTION IMPLEMENTED BY THIS PATCH INVOLVES THE INCORPORATION OF A NEW "STATIONID" RUN-TIME OPTION INTO RJE. THIS OPTION MAY BE SET AND RESET IN THE SAME MANNER AS THE "LOGON" AND "USER" OPTIONS. WHEN "STATIONID" IS SET FOR A TERMINAL, A USER MAY NOT LOG-ON AT THAT TERMINAL UNTIL HE HAS TYPED IN A VALID RJE DC1000 STATION NAME

AT HIS RSC. THE DEFAULT STATE OF THIS OPTION IS RESET. SINCE THE USE OF THIS OPTION INVOLVES POSSIBLE DATACOM RECONFIGURATION, IT SHOULD BE EMPLOYED AS SPARINGLY AS POSSIBLE.

WHEN "STATIONID" AND "LOGON" ARE SET, A NEW REQUEST IS ADDED TO THE LOG-ON SEQUENCE AS FOLLOWS:

#AND YOUR STATION NAME.

WHEN "STATIONID" IS SET AND "LOGON" IS RESET, THE USER MUST SATISFY THE REQUEST:

#ENTER STATION NAME PLEASE

BEFORE BEING LOGGED-ON BY RJE.

## SYSTEM REQUIREMENTS

EACH TERMINAL WHICH MAY CALL-UP RJE ON A LINE MUST BE ASSIGNED A UNIQUE STATION NAME. TO FACILITATE THIS, EACH SUCH STATION MUST BE DESCRIBED AS A COMPLETE RJE TERMINAL IN THE NDL DESCRIPTION OF THE NETWORK. ALL LINES BEARING THESE TERMINALS MUST BE OF DIALIN-DIALOUT TYPE WITH APPRORPRIATE ACU-S. THIS HARDWARE NEED NOT BE ACTUALLY PRESENT.

THE COMPILETIME RJE DEFINES, MAXTERMINALS AND MAXTERMINALSLOG2, MUST BE LARGE ENOUGH TO ENCOMPASS AS MANY TERMINALS AS ARE PLACED UNDER THE CONTROL OF THIS MCS. FOR PROPER OPERATION OF THIS PATCH, "STATIONID" MUST BE SET FOR EACH OF THESE STATIONS; THESE MUST BE THE ONLY STATION NAMES ENTERED IN RESPONSE TO A REQUEST DURING THE LOG-ON SEQUENCE.

## OPERATING PROCEDURES

WHEN CHANGING TO A VERSION OF THE RJE MCS INCORPORATING THIS PATCH FROM AN EARLIER VERSION, THE RJELINKED FILE GENERATED BY THE PREVIOUS RJE MUST BE REMOVED AS THIS PATCH INVOLVES AN ALTERATION OF THE FORMAT OF THIS FILE.

NEXT, THE "STATIONID" OPTION MUST BE SET FOR EACH APPROPRIATE DIALIN-DIALOUT DC1000 LSN. THIS MAY BE ACCOMPLISHED THROUGH SM

SYSTEM INPUT MESSAGES OF THE FOLLOWING FORM:

<RJE MIX NUMBER> SM: <DC1000 LSN> SO STATIONID

IF ANY OF THE TERMINALS THUS REFERENCED ARE ACTIVE WHEN "STATIONID" IS NEWLY SET, THEY WILL NOT BE LOGGED-OFF AS IS THE CASE WITH THE "LOGON" OPTION.

THE FORMAT OF BACKUP FILES GENERATED BY TASKS INITIATED BY THESE TERMINALS WILL CONFORM TO PREVIOUS FORMATS; THE TITLES OF THESE FILES WILL CONTINUE TO CONTAIN THE LSN OF THE INITIATING DC1000 STATION AND THE SESSION NUMBER OF THE INITIATING SESSION.

WHEN A USER ATTEMPTS TO LOG-ON AT A TERMINAL FOR WHICH "STATIONID" IS SET, HE WILL KNOW THAT RJE IS SATISFIED WITH THE STATION NAME HE HAS TYPED-IN WHEN THE FOLLOWING MESSAGE IS TYPED ON HIS RSC:

#RECONFIGURATION COMPLETED.

OR WHEN HE RECEIVES THE STANDARD LOG-ON MESSAGE. THE ABOVE MESSAGE WILL BE TYPED IF ANY DATACOM RECONFIGURATION WAS REQUIRED. ANY ABORTED RECONFIGURATION ATTEMPTS FROM WHICH RJE WAS ABLE TO RECOVER WILL BE NOTED BY APPROPRIATE MESSAGES AT THE RSC. (COMPILING WITH DEBUG SET PROVIDES ADDITIONAL AIDS.)

THE RECONFIGURED RJE NETWORK MAY BE EXAMINED VIA THE "US" RSC INPUT MESSAGE.

IF FOR ANY REASON A DC1000 STATION IS ERRONEOUSLY LEFT WITH NO LINE ASSIGNMENT, THE FOLLOWING MESSAGE WILL BE DISPLAYED AT THE SYSTEM SPO:

<DC1000 LSN> : NOT ATTACHED.

SUCH A CONDITION WILL REQUIRE REINITIALIZATION OF THE DCP.

DUE TO THE PITFALLS INVOLVED IN RECONFIGURATION, IT IS AGAIN URGED THAT THE STATIONID OPTION BE USED SPARINGLY; IT IS ALSO RECOMMENDED THAT THE RJE MCS BE COMPILED WITH THE DEBUG COMPILETIME OPTION SET FOR INITIAL OPERATION.

## D0439 RJE - USERCODE IN PD MESSAGE - 08-12-73

THIS PATCH CAUSES RJE TO ACCEPT THE PARENTHESIZED FORM OF A USERCODE IN THE "PD" RSC MESSAGE. FOR EXAMPLE:

```
PD (MYCODE)A/B
```

## D0511 RJE - HANDLING OF INCOMPAT LINK FILE - 08-19-73

THIS PATCH CAUSES RJE TO DISCARD INCOMPATIBLE RJELINKED FILES DURING INITIATION.

## D0512 RJE - IMPLEMENTATION OF ?PB STMT - 09-04-73

THIS PATCH REPRESENTS A TEMPORARY IMPLEMENTATION OF A FORM OF THE "PB" MCP CONTROL STATEMENT (DISTINCT FROM THE "PB" RSC INPUT MESSAGE). THE SYNTAX OF THE NEW CONTROL STATEMENT IS:

```
<PB CS>::= <I>PB<MIX NUMBER><FILE ID><PB OPTIONS>
<I>::= ≤INVALID CHARACTER (? FOR RSC)≥
<FILE ID>::= <EMPTY> / <SLASH><FILE NAME>
<SLASH>::= /
```

WHERE <MIX NUMBER> REFERS TO THE TASK WHICH GENERATED THE BACKUP FILE, <PB OPTIONS> INCLUDE THE ASSOCIATIVE AND GENERAL OPTIONS RECOGNIZED BY THE WORK FLOW LANGUAGE PB STATEMENT (E.G., SAVE, KEY, RANGE, RECORD, ETC.) AND THEIR PARAMETERS, AND <FILE NAME> IS THE TITLE PART OF THE BACKUP FILE ENTRY. AT LEAST ONE <PB OPTION> MUST BE PRESENT.

THE FOLLOWING ARE VALID EXAMPLES OF THE PB RJE CONTROL STATEMENT:

```
?PB 1939 KEY ALGOL RANGE 10046000 10059000 SAVE
?PB 73/000LINE KEY 2 3 RANGE 60 80
```

THE FUNCTION OF THE STATEMENT IS TO INITIATE AN EXECUTION OF

D0512 RJE - IMPLEMENTATION OF ?PB STMT - 09-04-73

SYSTEM/BACKUP, USING AN ENTRY IN THE RJESAVEBD DIRECTORY OF BACKUP FILES AS INPUT. BACKUP GENERATES A COPY OF THE SPECIFIED PORTION OF THE INPUT FILE ON DISK IN THE RJEBD DIRECTORY WHICH IS THEN PRINTED BY THE AUTOPRINT ROUTINE OF RJE.

IF THE SESSION IS RUNNING UNDER A USERCODE OR IF THE "SAVE" PB OPTION IS SPECIFIED, THE ORIGINAL RJESAVEBD FILE IS RETAINED ON DISK AFTER THIS OPERATION, OTHERWISE THE FILE IS DISCARDED.

INDISCRIMINANT USE OF THIS CONTROL STATEMENT SHOULD BE AVOIDED AS IT CAN LEAD TO HEAVY DISK USAGE.

D0521 RJE - REMOTE PUNCH HANDLING - 09-09-73

THIS PATCH ENABLES RJE TO PUNCH BACKUP FILES AT A REMOTE TERMINAL. THE PATCH IS ENABLED BY SETTING THE "REMOTEPUNCH" COMPILE TIME OPTION WHEN COMPILING RJE. A NEW RUN TIME OPTION, ALSO CALLED "REMOTEPUNCH", IS IMPLEMENTED AND MAY BE SET BY A USER EMPLOYING A TERMINAL POSSESSING A PUNCH. THE REMOTE COMPUTER MUST BE LOADED IN SUCH A MANNER AS TO BE ABLE TO DRIVE A CARD PUNCH.

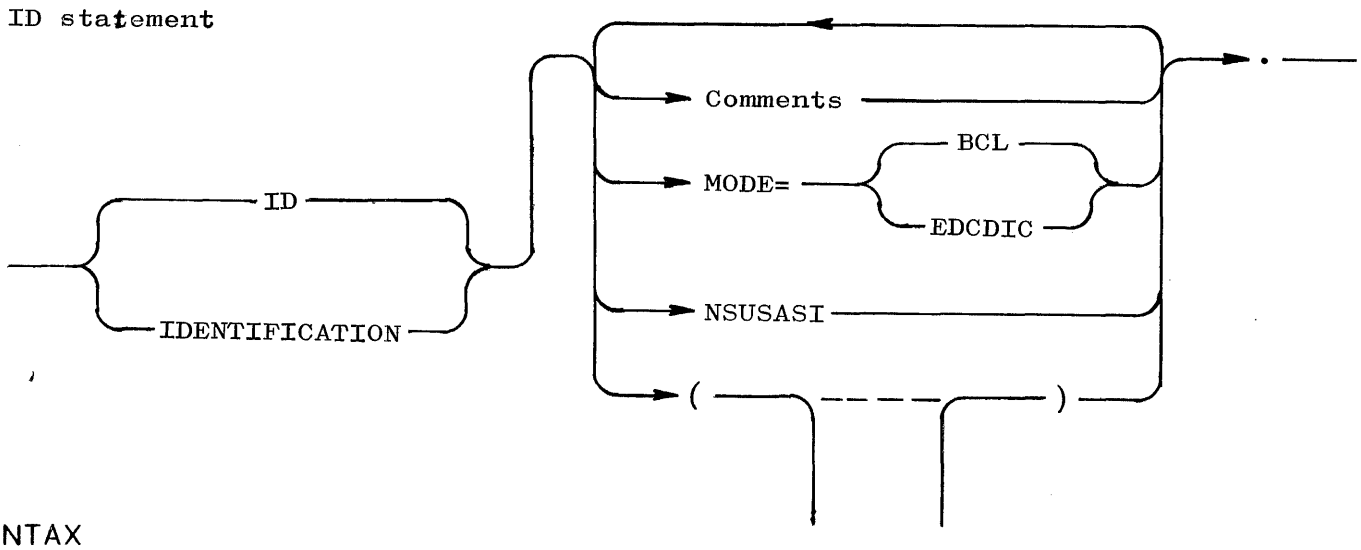
RJE MUST BOTH BE COMPILED WITH "REMOTEPUNCH" SET AND THE "REMOTEPUNCH" OPTION MUST BE SET BY THE USER (VIA THE "SO" RSC INPUT MESSAGE) BEFORE PUNCHING WILL OCCUR AT HIS TERMINAL. OTHERWISE, PUNCHING OF PUNCH BACKUP FILES WILL BE ATTEMPTED AT THE CENTRAL SITE. BOTH THE COMPILE TIME AND RUN TIME OPTIONS ARE RESET BY DEFAULT.

## RLTABLEGEN

D0358 RLTABLEGEN - NON-STANDARD USASI TAPES - 06-24-73

THIS PATCH MODIFIES THE SYNTAX OF THE ID STATEMENT AND ALLOWS THE USER TO SPECIFY THE PARAMETER NSUSASI.

ID STATEMENT:




SYNTAX

## SCR

### D0352 SCR - NEW MAT DOCUMENTATION - 06-24-73

THIS SYSTEM NOTE IS THE REFERENCE POINT FOR ALL THE PATCHES WHICH INFLUENCE DOCUMENTATION FOR THE MAINTENANCE AND TEST (MAT) LANGUAGE INFORMATION MANUAL. THE ACTUAL DOCUMENTATION WILL BE FOUND IN THE NEW MANUAL.

### D0539 SCR - DELETION OF THE "TESTS" TAPE - 09-23-73

THE "SYSTESTS" TAPE WITH THE 2.5 SYSTEM RELEASE IS PRIMARILY A FIELD ENGINEERING DOCUMENT. IN ADDITON TO ALL THE "MASTER TESTS" BEING INCLUDED ON THE "SYSTESTS" TAPE ALL PREVIOUSLY RELEASED MAINTENANCE PROGRAMS ARE ALSO CONTAINED THEREON ALONG WITH NEW MAINTENANCE PROGRAMS DESCRIBED IN ADVANCE TECHNICAL INFORMATION 11B.

THE FOLLOWING NAME CHANGES HAVE BEEN MADE TO THE "TESTS" TAPE AND "IOINTERACT" HAS BEEN REMOVED FROM THE "SYSTEM" AND "SYMBOL" TAPES.

| 2.4<br>"TESTS" | 2.5<br>"SYSTESTS" |
|---|---|
| TEST/XALGOL | SYSTEST/LANG/XALGOL |
| TEST/ALGOL | SYSTEST/LANG/ALGOL |
| TEST/COBOL | SYSTEST/LANG/COBOL |
| TEST/FORTRAN | SYSTEST/LANG/FORTRAN |
| TEST/XFORTRAN | SYSTEST/LANG/XFORTRAN |
| TEST/ALGOLSORT | SYSTEST/LANG/ALGOLSORT |
| TEST/BASIC | SYSTEST/LANG/BASIC |
| TEST/COBOLSORT | SYSTEST/LANG/COBOLSORT |
| TEST/PLI | SYSTEST/LANG/PLI |
| SOURCE/TEST/XALGOL | SYMTEST/LANG/XALGOL |
| SOURCE/TEST/ALGOL | SYMTEST/LANG/ALGOL |

| 2.4<br>"TESTS" | 2.5<br>"SYSTESTS" |
|---|---|
| SOURCE/TEST/COBOL | SYMTEST/LANG/COBOL |
| SOURCE/TEST/FORTRAN | SYMTEST/LANG/FORTRAN |
| SOURCE/TEST/ALGOLSORT | SYMTEST/LANG/ALGOLSORT |
| SOURCE/TEST/XFORTRAN | SYMTEST/LANG/XFORTRAN |
| SOURCE/TEST/BASIC | SYMTEST/LANG/BASIC |
| SOURCE/TEST/PLI | SYMTEST/LANG/PLI |
| DATA/TEST/PLI | SYMTEST/LANG/DATAPLI |
| TEST/AE3 | SYSTEST/PROC/AE3 |
| TEST/AE4 | SYSTEST/PROC/AE4 |
| SOURCE/TEST/AE3 | SYMTEST/PROC/AE3 |
| SOURCE/TEST/AE4 | SYMTEST/PROC/AE4 |
| SYSTEM/IOINTERACT | SYSTEST/IO/IOINTERACT |
| SYMBOL/IOINTERACT | SYMTEST/IO/IOINTERACT |

## SOURCENDL

### D0307 SOURCENDL - IMPLEMENTN OF TD700 TERMINALS - 05-07-73

TD700 TERMINALS DESIGN LEVEL ONE REQUEST SETS HAVE BEEN IMPLEMENTED. IN THESE REQUEST SETS NO CARRIAGE CONTROL CONSTRUCTS ARE IMPLEMENTED, SINCE THE TERMINAL IS NOT CAPABLE OF USING THEM CORRECTLY. THE SAME IS TRUE FOR SEQUENCE MODE; IF AN MCS SETS TOG [0] IN ORDER TO INDUCE SEQUENCE MODE, THE MESSAGE "SEQ MOD NOT IMPLEMENTED" IS SENT TO THE TERMINAL BY THE DCP AND AN EMPTY INPUT MESSAGE GENERATED TO INDICATE THE END OF SEQUENCE MODE TO THE MCS.

### D0417 SOURCENDL - 2741 TYPE TERMINALS - 07-29-73

2741 TYPE TERMINAL REQUEST SETS HAVE BEEN IMPLEMENTED FOR THE CORRESPONDENCE CODE SET (SELECTRIC TYPEWRITER KEYBOARD), USING THE REVERSE BREAK OPTION.

THE FOLLOWING NON-EBCDIC DEFINED CHARACTERS ARE TRANSLATED AS FOLLOWS:

UPPER CASE 1 AS <
EXCLAMATION MARK AS >
UPPER CASE SIX AS LEFT BRACKET
UPPER CASE EXCLAMATION MARK AS RIGHT BRACKET

AN OPTIONAL TRANSLATION TABLE HAS BEEN PROVIDED FOR USERS WHO WISH TO HAVE LOWER CASE ALPHA CHARACTERS ON INPUT TRANSLATED TO UPPER CASE ALPHA CHARACTERS (THIS FACILITATES THE MANIPULATION OF ALGOL TYPE FILES THROUGH CANDE BECAUSE THE ALGOL COMPILER DOES NOT ACCEPT LOWER CASE CHARACTERS). IF THIS IS DESIRED, SOURCENDL HAS TO BE RECOMPILED WITH THE OPTIONAL TRANSLATE TABLE REFERENCED, I.E., THE FOLLOWING PATCH MAY BE USED:

D0417 SOURCENDL - 2741 TYPE TERMINALS - 07-29-73

```
CHAR = CORTOEBCUP (CHAR).                    24467000
```

IN ESTABLISHING CONNECTION WITH THE TERMINAL, THE USER IS REQUIRED NOT TO ENTER INPUT UNTIL EITHER AN OUTPUT MESSAGE OR A CARRIAGE RETURN INDICATES THE PROPER COMPLETION OF THE INITIAL DIALUP SEQUENCE.

D0422 SOURCENDL - APL REQUEST SETS FOR 2741 TERM - 09-09-73

REQUEST SETS HAVE BEEN IMPLEMENTED FOR THE USE OF A 2741 TERMINAL AS AN APL TERMINAL. THE TERMINAL HAS TO USE APL CORRESPONDENCE CODE AND HAS TO BE EQUIPPED WITH THE PROPER TYPE SPHERE. THE REQUEST SETS REQUIRE THE USE OF APL AS THE CONTROLLING MCS.

D0482 SOURCENDL - PRELIM IMPLEM OF TD800 TERM - 09-16-73

THE IMPLEMENTATION OF TD800 TERMINALS IS PRELIMINARY AND DOES NOT REFLECT A QUALIFICATION OF THIS DATACOM TERMINAL AS OF THIS DATE. THE FOLLOWING FUNCTIONS ARE NOT IMPLEMENTED AS OF NOW BY THE SOFTWARE OR ARE NOT AVAILABLE IN THE HARDWARE:

1. FORMS MODE (AS USED BY CANDE FOR SEQUENCE MODE)
2. MULTIPLE RECORD INPUT (THE TERMINAL IS NOT CAPABLE OF TRANSMITTING CR)
3. SPECIAL FUNCTION CHARACTERS, SUCH AS LINE ERASE AND TABULATION.

D0513 SOURCENDL - DYNAMIC TRANSLATION FOR 2741 - 07-14-73

IT IS NOW POSSIBLE TO HAVE ALL LOWER CASE ALPHA CHARACTERS ON A 2741 TRANSLATED TO UPPER CASE BY ENTERING QUESTION MARK MINUS (?-) FROM THE TERMINAL. ALL LOWER CASE CHARACTERS WILL BE TRANSLATED UNTIL A QUESTION MARK PLUS (?+) IS ENTERED.

## XREFANALYZER

### D0396 XREFANALY - SPACING OPTION - 07-08-73

A COMPILE TIME OPTION "FAST" HAS BEEN ADDED TO XREFANALYZER. WHEN "FAST" IS SET, ALL BLANK LINES ARE ELIMINATED FROM THE XREF, THE = SIGNS ARE REPLACED WITH E-S, THE ::-S ARE CHANGED TO -- S, AND THE @ SIGNS ARE REPLACED WITH "AT". THE EFFECT OF THE CHARACTER SUBSTITUTIONS IS TO INCREASE THE PRINTING SPEED FROM TO 800 TO 1100 LINES PER MINUTE. WITH "FAST" RESET, THE XREF APPEARS AS BEFORE, EXCEPT SOME OF THE BLANK LINES ARE ELIMINATED. ("FAST" WILL BE SET ON THE RELEASE VERSION.)

### D0540 XREFANALY - INSTALLATION INTRINSICS - 09-23-73

INSTALLATION INTRINSICS APPEAR IN AN XREF PRINTOUT AS IF THEY WERE DECLARED AT THE LINE CONTAINING THE FIRST BEGIN STATEMENT (I.E., AT THE BEGINNING OF THE OUTER BLOCK).

# DOCUMENTS AFFECTED

| DOCUMENT | SYSTEM NOTE | MARKETING NO. | MARKETING DATE |
|---|---|---|---|
| ALGOL COMPILER | D0359 | 5000136 | 06-72 |
| ALGOL COMPILER | D0367 | 5000136 | 06-72 |
| ALGOL COMPILER | D0440 | 5000136 | 06-72 |
| ALGOL LANGUAGE | D0300 | 5000128 | 06-72 |
| ALGOL LANGUAGE | D0326 | 5000128 | 06-73 |
| ALGOL LANGUAGE | D0327 | 5000128 | 06-72 |
| ALGOL LANGUAGE | D0330 | 5000128 | 06-72 |
| ALGOL LANGUAGE | D0362 | 5000128 | 06-72 |
| ALGOL LANGUAGE | D0364 | 5000128 | 06-72 |
| ALGOL LANGUAGE | D0365 | 5000128 | 06-72 |
| ALGOL LANGUAGE | D0366 | 5000128 | 06-72 |
| ALGOL LANGUAGE | D0380 | 5000128 | 06-72 |
| ALGOL LANGUAGE | D0395 | 5000128 | 06-72 |
| ALGOL LANGUAGE | D0400 | 5000128 | 06-72 |
| ALGOL LANGUAGE | D0401 | 5000128 | 06-72 |
| ALGOL LANGUAGE | D0402 | 5000128 | 06-72 |
| ALGOL LANGUAGE | D0427 | 5000128 | 06-72 |
| ALGOL LANGUAGE | D0430 | 5000128 | 06-72 |
| ALGOL LANGUAGE | D0441 | 5000128 | 06-72 |
| ALGOL LANGUAGE | D0442 | 5000128 | 06-62 |
| ALGOL LANGUAGE | D0443 | 5000128 | 06-72 |
| ALGOL LANGUAGE | D0444 | 5000128 | 06-72 |
| ALGOL LANGUAGE | D0489 | 5000128 | 06-72 |
| BASIC LANGUAGE | D0335 | 5000383 | 07-71 |
| BASIC LANGUAGE | D0490 | 5000383 | 07-71 |
| BINDER | D0436 | 5000045 | 11-71 |
| BINDER | D0446 | 5000045 | 11-71 |
| BINDER | D0449 | 5000045 | 11-71 |
| BINDER | D0450 | 5000045 | 11-71 |
| CANDE LANGUAGE | D0295 | 5000318 | 10-72 |

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| DOCUMENT | SYSTEM NOTE | MARKETING NO. | MARKETING DATE |
|---|---|---|---|
| CANDE LANGUAGE | D0301 | 5000318 | 10-72 |
| CANDE LANGUAGE | D0302 | 5000318 | 10-72 |
| CANDE LANGUAGE | D0303 | 5000318 | 10-72 |
| CANDE LANGUAGE | D0304 | 5000318 | 10-72 |
| CANDE LANGUAGE | D0305 | 5000318 | 10-72 |
| CANDE LANGUAGE | D0306 | 5000318 | 10-72 |
| CANDE LANGUAGE | D0360 | 5000318 | 10-72 |
| CANDE LANGUAGE | D0369 | 5000318 | 10-72 |
| CANDE LANGUAGE | D0451 | 5000318 | 10-72 |
| CANDE LANGUAGE | D0452 | 5000318 | 10-72 |
| CANDE LANGUAGE | D0454 | 5000318 | 10-72 |
| CANDE LANGUAGE | D0455 | 5000318 | 10-72 |
| CANDE LANGUAGE | D0456 | 5000318 | 10-72 |
| CANDE LANGUAGE | D0481 | 5000318 | 10-72 |
| CANDE LANGUAGE | D0514 | 5000318 | 10-72 |
| CANDE LANGUAGE | D0516 | 5000318 | 10-72 |
| CANDE LANGUAGE | D0517 | 5000318 | 10-72 |
| CANDE LANGUAGE | D0519 | 5000318 | 10-72 |
| CANDE OPERATION | D0361 | 5000615 | 10-72 |
| CANDE OPERATION | D0368 | 5000615 | 10-72 |
| CANDE OPERATION | D0453 | 5000615 | 10-72 |
| CANDE OPERATION | D0455 | 5000615 | 10-72 |
| CANDE OPERATION | D0515 | 5000615 | 10-72 |
| CANDE OPERATION | D0517 | 5000615 | 10-72 |
| CANDE OPERATION | D0518 | 5000615 | 10-72 |
| COBOL REFERENCE | D0289 | 5000656 | 02-73 |
| COBOL REFERENCE | D0349 | 5000656 | 02-73 |
| COBOL REFERENCE | D0370 | 5000656 | 02-73 |
| COBOL REFERENCE | D0427 | 5000658 | 02-73 |
| COBOL REFERENCE | D0436 | 5000656 | 02-73 |
| COBOL REFERENCE | D0457 | 5000656 | 02-73 |
| COBOL REFERENCE | D0458 | 5000656 | 02-73 |
| COBOL REFERENCE | D0459 | 5000656 | 02-73 |

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| DOCUMENT | SYSTEM NOTE | MARKETING NO. | MARKETING DATE |
|---|---|---|---|
| COBOL REFERENCE | D0460 | 5000656 | 02-73 |
| COBOL REFERENCE | D0461 | 5000656 | 02-73 |
| COBOL REFERENCE | D0462 | 5000656 | 02-73 |
| COBOL REFERENCE | D0463 | 5000656 | 02-73 |
| COBOL REFERENCE | D0464 | 5000656 | 02-73 |
| COBOL REFERENCE | D0525 | 5000656 | 02-73 |
| COBOL REFERENCE | D0527 | 5000235 | 01-73 |
| COBOL REFERENCE | D0528 | 5000235 | 01-73 |
| DATA MANAGEMENT | D0314 | 5000235 | 01-73 |
| DATA MANAGEMENT | D0315 | 5000235 | 01-73 |
| DATA MANAGEMENT | D0316 | 500235 | 01-73 |
| DATA MANAGEMENT | D0353 | 5000235 | 01-73 |
| DATA MANAGEMENT | D0354 | 5000235 | 04-73 |
| DATA MANAGEMENT | D0356 | 5000235 | 01-73 |
| DATA MANAGEMENT | D0357 | 5000235 | 04-73 |
| DATA MANAGEMENT | D0404 | 5000235 | 04-73 |
| DATA MANAGEMENT | D0405 | 5000235 | 04-73 |
| DATA MANAGEMENT | D0406 | 5000235 | 04-73 |
| DATA MANAGEMENT | D0418 | 5000235 | 04-73 |
| DATA MANAGEMENT | D0419 | 5000235 | 04-73 |
| DATA MANAGEMENT | D0526 | 5000235 | 01-73 |
| DATACOM FUNCTIONAL | D0292 | 5000060 | 03-73 |
| DCALGOL LANGUAGE | D0309 | 5000052 | 06-73 |
| DCALGOL LANGUAGE | D0312 | 5000052 | 06-73 |
| DCALGOL LANGUAGE | D0317 | 5000052 | 06-73 |
| DCALGOL LANGUAGE | D0375 | 5000052 | 06-73 |
| DCALGOL LANGUAGE | D0376 | 5000052 | 06-73 |
| DCALGOL LANGUAGE | D0388 | 5000052 | 06-73 |
| DCALGOL LANGUAGE | D0470 | 5000052 | 06-73 |
| DCALGOL LANGUAGE | D0471 | 5000052 | 06-73 |
| DCALGOL LANGUAGE | D0489 | 5000052 | 06-73 |
| DUMP ANALYZER | D0487 | 5000334 | 11-71 |
| ESPOL LANGUAGE | D0300 | 5000094 | 06-72 |

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| DOCUMENT | SYSTEM NOTE | MARKETING NO. | MARKETING DATE |
|---|---|---|---|
| ESPOL LANGUAGE | D0340 | 5000094 | 06-72 |
| ESPOL LANGUAGE | D0341 | 5000094 | 06-72 |
| ESPOL LANGUAGE | D0342 | 5000094 | 06-72 |
| ESPOL LANGUAGE | D0363 | 5000094 | 06-72 |
| ESPOL LANGUAGE | D0472 | 5000095 | 06-72 |
| ESPOL LANGUAGE | D0531 | 5000095 | 06-72 |
| FORTRAN REFERENCE | D0325 | 5000458 | 06-72 |
| FORTRAN REFERENCE | D0343 | 5000458 | 06-72 |
| FORTRAN REFERENCE | D0421 | 5000458 | 06-72 |
| FORTRAN REFERENCE | D0426 | 5000458 | 06-72 |
| FORTRAN REFERENCE | D0473 | 5000458 | 06-72 |
| FORTRAN REFERENCE | D0474 | 5000458 | 06-72 |
| I-O SUBSYSTEM | D0398 | 5000185 | 07-71 |
| I-O SUBSYSTEM | D0476 | 5000185 | 07-71 |
| MCP | D0409 | 5000086 | 12-71 |
| MCP | D0434 | 5000086 | 12-71 |
| MCP | P2625 | 5000086 | 12-71 |
| MCSII USERS GUIDE | D0523 | 5000219 | 09-71 |
| NDL | D0294 | 5000078 | 08-71 |
| NDL | D0319 | 5000078 | 08-71 |
| NDL | D0350 | 5000078 | 08-71 |
| NDL | D0412 | 5000078 | 08-71 |
| NDL | D0422 | 5000078 | 08-71 |
| NDL | D0478 | 5000078 | 08-71 |
| NDL | D0495 | 5000078 | 08-71 |
| NDL | D0496 | 5000078 | 08-71 |
| NDL | D0513 | 5000078 | 08-71 |
| PLI LANGUAGE | D0433 | 5000201 | 10-72 |
| PLI LANGUAGE | D0493 | 5000201 | 10-72 |
| PLI LANGUAGE | D0499 | 5000201 | 10-72 |
| PLI LANGUAGE | D0500 | 5000201 | 10-72 |
| PLI LANGUAGE | D0501 | 5000201 | 10-72 |
| PLI LANGUAGE | D0502 | 5000201 | 10-72 |

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| DOCUMENT | SYSTEM NOTE | MARKETING NO. | MARKETING DATE |
|---|---|---|---|
| PL I LANGUAGE | D0503 | 5000201 | 10-72 |
| PL I LANGUAGE | D0504 | 5000201 | 10-72 |
| PL I LANGUAGE | D0505 | 5000201 | 10-72 |
| PL I LANGUAGE | D0506 | 5000201 | 10-72 |
| PL I LANGUAGE | D0507 | 5000201 | 10-73 |
| PL I LANGUAGE | D0508 | 5000201 | 10-72 |
| PL I LANGUAGE | D0509 | 5000201 | 10-72 |
| PL I LANGUAGE | D0510 | 5000201 | 10-72 |
| PL I LANGUAGE | D0535 | 5000201 | 10-72 |
| PL I LANGUAGE | D0536 | 5000201 | 10-72 |
| PL I LANGUAGE | D0537 | 5000201 | 10-72 |
| PL I LANGUAGE | D0538 | 5000201 | 10-72 |
| PROGRAM-DECK LOADER | D0530 | 5000755 | 10-73 |
| RJE | D0392 | 5000300 | 06-72 |
| RJE | D0393 | 5000300 | 06-72 |
| RJE | D0394 | 5000300 | 06-72 |
| RJE | D0414 | 5000300 | 06-72 |
| RJE | D0415 | 5000300 | 06-72 |
| RJE | D0416 | 5000300 | 06-72 |
| RJE | D0439 | 5000300 | 06-72 |
| RJE | D0511 | 5000300 | 06-72 |
| RJE | D0512 | 5000300 | 06-72 |
| RJE | D0521 | 5000300 | 06-72 |
| SOFTWARE HANDBOOK | D0288 | 5000722 | 01-72 |
| SOFTWARE HANDBOOK | D0293 | 5000722 | 01-71 |
| SOFTWARE HANDBOOK | D0308 | 5000722 | 01-72 |
| SOFTWARE HANDBOOK | D0310 | 5000722 | 01-72 |
| SOFTWARE HANDBOOK | D0311 | 5000722 | 01-72 |
| SOFTWARE HANDBOOK | D0313 | 5000722 | 01-72 |
| SOFTWARE HANDBOOK | D0318 | 5000722 | 01-72 |
| SOFTWARE HANDBOOK | D0321 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0326 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0331 | 5000722 | 07-73 |

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| DOCUMENT | SYSTEM NOTE | MARKETING NO. | MARKETING DATE |
|---|---|---|---|
| SOFTWARE HANDBOOK | D0333 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0334 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0336 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0337 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0338 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0344 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0345 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0346 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0351 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0371 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0373 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0374 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0377 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0379 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0381 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0382 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0383 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0387 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0388 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0391 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0396 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0398 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0407 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0408 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0410 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0420 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0424 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0428 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0429 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0435 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0445 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0448 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0465 | 5000722 | 07-73 |

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| DOCUMENT | SYSTEM NOTE | MARKETING NO. | MARKETING DATE |
|---|---|---|---|
| SOFTWARE HANDBOOK | D0466 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0467 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0468 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0469 | 5000714 | 07-73 |
| SOFTWARE HANDBOOK | D0474 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0475 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0477 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0480 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0481 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0483 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0484 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0486 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0489 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0497 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0498 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0507 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0516 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0520 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0524 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0527 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0529 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0532 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0533 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0534 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0539 | 5000722 | 07-73 |
| SOFTWARE HANDBOOK | D0540 | 5000722 | 07-73 |
| SORT PROGRAM | D0370 | 5000144 | 12-71 |
| SYSTEM MISCELLANEA | D0288 | 5000367 | 04-73 |
| SYSTEM MISCELLANEA | D0291 | 5000367 | 10-72 |
| SYSTEM MISCELLANEA | D0297 | 5000367 | 04-73 |
| SYSTEM MISCELLANEA | D0299 | 5000367 | 04-73 |
| SYSTEM MISCELLANEA | D0307 | 5000367 | 04-73 |
| SYSTEM MISCELLANEA | D0311 | 5000367 | 04-73 |

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| DOCUMENT | SYSTEM NOTE | MARKETING NO. | MARKETING DATE |
|---|---|---|---|
| SYSTEM MISCELLANEA | D0321 | 5000367 | 04-73 |
| SYSTEM MISCELLANEA | D0333 | 5000367 | 04-73 |
| SYSTEM MISCELLANEA | D0334 | 5000367 | 04-73 |
| SYSTEM MISCELLANEA | D0358 | 5000367 | 04-73 |
| SYSTEM MISCELLANEA | D0372 | 500367 | 04-73 |
| SYSTEM MISCELLANEA | D0384 | 5000367 | 04-73 |
| SYSTEM MISCELLANEA | D0389 | 5000367 | 04-73 |
| SYSTEM MISCELLANEA | D0390 | 5000367 | 04-73 |
| SYSTEM MISCELLANEA | D0397 | 5000367 | 04-73 |
| SYSTEM MISCELLANEA | D0399 | 5000367 | 04-73 |
| SYSTEM MISCELLANEA | D0403 | 5000367 | 04-72 |
| SYSTEM MISCELLANEA | D0413 | 5000367 | 04-73 |
| SYSTEM MISCELLANEA | D0417 | 5000367 | 04-73 |
| SYSTEM MISCELLANEA | D0432 | 5000367 | 04-73 |
| SYSTEM MISCELLANEA | D0437 | 5000367 | 04-73 |
| SYSTEM MISCELLANEA | D0438 | 5000367 | 04-73 |
| SYSTEM MISCELLANEA | D0447 | 5000367 | 04-73 |
| SYSTEM MISCELLANEA | D0468 | 5000367 | 04-73 |
| SYSTEM MISCELLANEA | D0477 | 5000367 | 04-73 |
| SYSTEM MISCELLANEA | D0480 | 5000367 | 04-73 |
| SYSTEM MISCELLANEA | D0482 | 5000367 | 04-73 |
| SYSTEM MISCELLANEA | D0483 | 5000367 | 04-73 |
| SYSTEM MISCELLANEA | D0485 | 5000367 | 04-73 |
| SYSTEM MISCELLANEA | D0488 | 5000367 | 04-73 |
| SYSTEM MISCELLANEA | D0491 | 5000367 | 04-73 |
| SYSTEM MISCELLANEA | D0492 | 5000367 | 04-73 |
| SYSTEM MISCELLANEA | D0498 | 5000367 | 04-73 |
| SYSTEM MISCELLANEA | D0522 | 5000367 | 04-73 |
| SYSTEM MISCELLANEA | D0523 | 5000367 | 04-73 |
| SYSTEM MISCELLANEA | D0532 | 5000367 | 04-73 |
| SYSTEM MISCELLANEA | D0534 | 5000367 | 04-73 |
| SYSTEM MISCELLANEA | D0541 | 5000367 | 04-73 |
| SYSTEMSTATUS INTRN | D0388 | 5000425 | 04-72 |

# DOCUMENTS AFFECTED

| DOCUMENT | SYSTEM NOTE | MARKETING NO. | MARKETING DATE |
|---|---|---|---|
| WFM REFERENCE | D0336 | 5000706 | 04-73 |
| WFM REFERENCE | D0339 | 5000706 | 04-73 |
| WFM REFERENCE | D0347 | 5000706 | 04-73 |
| WFM REFERENCE | D0385 | 5000706 | 04-73 |
| WFM REFERENCE | D0484 | 5000706 | 04-73 |
| WFM REFERENCE | D0533 | 5000706 | 04-73 |
| WFM USERS GUIDE | D0296 | 5000714 | 04-73 |
| WFM USERS GUIDE | D0320 | 5000714 | 04-73 |
| WFM USERS GUIDE | D0322 | 5000714 | 04-73 |
| WFM USERS GUIDE | D0323 | 5000714 | 04-73 |
| WFM USERS GUIDE | D0336 | 5000714 | 04-73 |
| WFM USERS GUIDE | D0338 | 5000714 | 04-73 |
| WFM USERS GUIDE | D0345 | 5000714 | 04-73 |
| WFM USERS GUIDE | D0346 | 5000714 | 04-73 |
| WFM USERS GUIDE | D0348 | 5000714 | 04-73 |
| WFM USERS GUIDE | D0371 | 5000714 | 04-73 |
| WFM USERS GUIDE | D0373 | 5000714 | 04-73 |
| WFM USERS GUIDE | D0374 | 5000714 | 04-73 |
| WFM USERS GUIDE | D0377 | 5000714 | 04-73 |
| WFM USERS GUIDE | D0399 | 5000714 | 04-73 |
| WFM USERS GUIDE | D0410 | 5000714 | 04-73 |
| WFM USERS GUIDE | D0425 | 5000714 | 04-73 |
| WFM USERS GUIDE | D0431 | 5000714 | 04-73 |
| WFM USERS GUIDE | D0435 | 5000714 | 04-73 |
| WFM USERS GUIDE | D0448 | 5000714 | 04-73 |
| WFM USERS GUIDE | D0465 | 5000714 | 04-73 |
| WFM USERS GUIDE | D0466 | 5000714 | 04-73 |
| WFM USERS GUIDE | D0467 | 5000714 | 04-73 |
| WFM USERS GUIDE | D0469 | 5000714 | 04-73 |
| WFM USERS GUIDE | D0475 | 5000714 | 04-73 |
| WFM USERS GUIDE | D0479 | 5000714 | 04-73 |
| WFM USERS GUIDE | D0486 | 5000714 | 04-73 |
| WFM USERS GUIDE | D0494 | 5000714 | 04-73 |

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| DOCUMENT | SYSTEM NOTE | MARKETING NO. | MARKETING DATE |
|---|---|---|---|
| WFM USERS GUIDE | D0497 | 5000714 | 04-73 |
| WFM USERS GUIDE | D0520 | 5000714 | 04-73 |
| WFM USERS GUIDE | D0529 | 5000714 | 04-73 |

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| KWIC | SYSTEM NOTE | FUNCTION |
|---|---|---|
| AREASIZE SDL AND TABLE | D0316 | SDLS |
| ARRAY PARAMETERS DIRECT | D0327 | ALGOL |
| ARRAY REFERENCE VARIABLE | D0364 | ALGOL |
| ARRAYS VALUE | D0342 | ESPOL |
| ARRAYS DISKHEADER | D0471 | DCALGOL |
| ARRAYS MULTIPLE VALUE | D0395 | ALGOL |
| ARRAYS SWAP OF DIRECT | D0430 | MCP |
| ASSIGN AND REF FILE ATTRIBUTE | D0504 | PLI |
| ASSOCIATION PERIPHERAL | D0467 | CONTROLLER |
| ATTRIBUTE PARTNER | D0311 | MCP |
| ATTRIBUTE ASSIGN AND REF FILE | D0504 | PLI |
| ATTRIBUTES FILE | D0398 | MCP-I-O |
| ATTRIBUTES QUEUE | D0309 | DCALGOL |
| ATTRIBUTES NEW QUEUE | D0312 | MCP-DATACM |
| AUDIT DUMMY FILLER FOR TAPE | D0418 | DM6700 |
| AUDIT AND RECONSTRUCTION IMPRV | D0353 | DM6700 |
| AUDIT BUFFERSIZE | D0315 | SDLS |
| AUDIT CYCLE TIME CHNGE DEFAULT | D0324 | SDLS |
| AUDIT DISPLAY PATCH | D0406 | DM6700 |
| AUDIT REC TYPE ZERO DOCUMENT | D0356 | AUDITDEFIN |
| AUTOBIND | D0506 | PLI |
| AUTOMATIC RECOVERY | D0516 | CANDE |
| BACKSPACE STATEMENT | D0496 | NDL |
| BASE "END" AS SEQRANGE OR | D0456 | CANDE |
| BASIC FILETYPES NEW APL AND | D0483 | LISTDIR |
| BASIC FILETYPES NEW APL AND | D0498 | PACKDIR |
| BIF PRE-PROCESSOR PROCEDURES & | D0508 | PLI |
| BINDINFO ESPOL | D0472 | ESPOL |
| BINDING INTRINSIC | D0449 | BINDER |
| BINDING HIGHER LEVEL COBOL | D0436 | BINDER |
| BINDING DOUBLES | D0493 | PLI |
| BIT 43 ON D1 RELATIVE CODE | D0437 | MCP |
| BLOCK PARTIAL ALLOW LAST TAPE | D0419 | GETDMRSF |

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# KWIC SUBJECT INDEX

| KWIC | SYSTEM NOTE | FUNCTION |
|---|---|---|
| COBOL SORT OR MERGE STATEMENT | D0370 | COBOL |
| CODE NOTE OBJECT FILE ONLY IF | D0304 | CANDE |
| CODE BIT 43 ON D1 RELATIVE | D0437 | MCP |
| CODE FILE | D0459 | COBOL |
| CODE FILE MULTI-PROCEDURE | D0524 | ALGOL |
| COL RANGE IN FIND-REPLACE FIX | D0305 | CANDE |
| COMMAND WRITE | D0361 | CANDE |
| COMMAND IMPLEMENT DISCARD | D0519 | CANDE |
| COMMANDS DISALLOW CERTAIN SM | D0453 | CANDE |
| COMPARE ERRORS COPY AND | D0331 | LOGANALY |
| COMPARE ERRORS IN LIBMAINT LOG | D0348 | MCP |
| COMPARE IN PRE-PROCESS STRING | D0510 | PLI |
| COMPILE-TIME FACILITIES | D0365 | ALGOL |
| COMPILED PROCEDURES SEPARATELY | D0514 | CANDE |
| COMPILER FILES LABEL EQUATN OF | D0310 | FORTRAN |
| COMPILETIME OPTION NOLOGON | D0393 | RJE |
| COMPLEMENT TIMINGS DIRECTORY | D0383 | LOADER |
| CONDITION RECORD | D0503 | PLI |
| CONDITIONS ONCODES FOR | D0433 | PLI |
| CONFLICT REPORT CLEAN UP FILE | D0480 | LISTDIR |
| CONSOLE MESSGE FOR NEW JOBDESC | D0337 | CONTROLLER |
| CONSOLE MSG FOR Q-DS-ED JOBS | D0336 | CONTROLLER |
| CONTINUE STATEMENT SYNTAX | D0403 | ALGOL |
| CONTROLLER CHANGES DISK PACK | D0399 | CONTROLLER |
| COPY AND COMPARE ERRORS | D0331 | LOGANALY |
| COPYAUDITTAPE DM INITIAL | D0357 | COPYAUDIT |
| CORE REDUCE SAVE | D0387 | MCP |
| CORE USER PROGRAM SAVE | D0329 | MCP |
| CORRECTION DM - NEW STATUS | D0297 | DM6700 |
| COUNTERS REPORT WRITER SUM | D0460 | COBOL |
| CREATE USERCODE | D0485 | MCP |
| CRUNCH CLOSE WITH | D0366 | ALGOL |
| CRUNCH CLOSE WITH | D0458 | COBOL |

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| KWIC | SYSTEM NOTE | FUNCTION |
|---|---|---|
| CRUNCH NEW SYMBOL FILES | D0444 | ALGOL |
| CRUNCHED FILE IDENTIFICATN OF | D0491 | LISTDIR |
| CRUNCHED FILE IDENTIFICATION | D0492 | PACKDIR |
| CRUNCHED FILE REPORTING | D0381 | LISTDIR |
| CRUNCHED FILES | D0410 | MCP |
| CYCLE TIME CHNGE DEFAULT AUDIT | D0324 | SDLS |
| DAMAGED DIRECTORY-FILE RECOVRY | D0382 | LOADER |
| DCP INITIALIZATION LOOP | D0469 | MCP-DATACM |
| DCSTATUS THROUGH CANDE RUNNING | D0397 | DCSTATUS |
| DCWRITE SET LINE TOGS-TALLIES | D0317 | MCP-DATACM |
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