

```

/PAL III
/PART IV
/PAGE 28
/ASR 33 I/O ROUTINES
/CALLED BY JMS I AAA
/EXITS WITH LEGAL CHARACTER IN CHAR
/LENGTH: 14 REGISTERS
*1400

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```

LOREAD, 0

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```

      KSF
      JMP .-1
      KRB          /READ THE CHARACTER
      SNA          /BLANK TAPE?
      JMP LOREAD+1 /IGNORE
      TAD M200      /LEADER?
      SNA
      JMP LOREAD+1 /IGNORE
      TAD C200
      DCA CHAR      /SAVE CHAR
      JMS I CHEKT   /IS IT LEGAL?
      JMP LOREAD+1  /NO, TRY AGAIN
      JMP I LOREAD

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/ROUTINE TO SET SIGN FOR
/ADD OR SUBTRACT OR IOR
/LENGTH: 8 REGISTERS

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SUB,   TAD M2          /SIGN FOR SUBTRACT IS -1
ADD,   IAC            /SIGN FOR ADD IS +1
SPACE, DCA TEM2        /SIGN FOR IOR IS 0
      PUSHJ          /GO PROCESS THE INFORMATION
      SPAC          /ADDRESS
      TAD TEM2
      DCA SIGN        /SET SIGN
      JMP I FFF       /GO BACK TO CSYM

```

/PAGE 29
 /PAL 750 READ ROUTINE
 /CALLED BY JMS I AAA
 /EXITS WITH LEGAL CHARACTER IN CHAR
 /LENGTH: 48 REGISTERS

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HIREAD, 0
    ISZ RCNT                /IS BUFFER EMPTY?
    JMP GETCHR              /NO, FETCH A CHARACTER
    ISZ SWITCH              /DID TAPE END?
    SKP                     /NO
    JMP ENDBF               /YES, GO HALT
    DCA SWITCH              /SET SWITCH AGAIN
    TAD RBGN                /POINTER TO BEGINNING OF BUFFER
    DCA AUTOA               /IN AN AUTO-INDEX REGISTER
    TAD RKON                /CONSTANT FOR SIZE OF BUFFER
    DCA RCNT                /IN READ COUNTER
READIN, RFC                /FETCH A CHARACTER
    DCA TEM3                /START COUNTING
    ISZ TEM3                /OVERFLOW?
    JMS WAIT
    JMP FULL1               /YES, SET SWITCH, TAPE ENDED
    RSF                     /CHARACTER READY YET?
    JMP .-4                 /NO, TRY AGAIN
    RRB
    SNA                     /IS IT BLANK TAPE?
    JMP READIN              /IGNORE BLANK TAPE
    TAD M200                /IS IT LEADER-TRAILER?
    SNA
    JMP READIN              /IGNORE LEADER-TRAILER
    TAD C200                /RESTORE ORIGINAL CODE
    DCA I AUTOA             /SAVE IT
    ISZ RCNT                /BUFFER FULL YET?
    JMP READIN              /NO, GET SOME MORE
    JMP FULL                /FULL
FULL1, CLA CMA              /SET TAPE SWITCH TO 7777
    DCA SWITCH
    TAD RCNT                /GET ALTERED COUNT FOR BUFFER
    CMA IAC
FULL, TAD RKON
    SNA                     /WAS BUFFER COMPLETELY EMPTY?
    JMP ENDBF               /YES
    DCA RCNT                /NO, COUNT OF BUFFER SIZE
    TAD RBGN                /RESET BUFFER POINTER
    DCA AUTOA
GETCHR, TAD I AUTOA        /GET A CHARACTER FROM BUFFER
    DCA CHAR
    JMS I CHEKI             /IS IT LEGAL?
    JMP HIREAD+1            /NO
    JMP I HIREAD            /YES
ENDBF, CLA CMA              /SET COUNT TO EMPTY
    DCA RCNT
    HLT                     /HALT
    JMP HIREAD+1            /TRY AGAIN
  
```

/PAGE 30

/CHECK FOR SPECIAL CHARACTERS IN READ ROUTINES

/EXIT TO CALLING ADDRESS+1 IF CHAR IS TO BE IGNORED

/EXIT TO CALLING ADDRESS+2 IF CHAR IS LEGAL

/THE FOLLOWING CHARACTERS ARE IGNORED:

/ 0 BLANK TAPE
/200 LEADER-TRAILER
/212 LINE FEED
/214 FORM FEED
/377 RUBOUT

/LENGTH: 40 REGISTERS

CHEK, 0
TAD CHAR
AND SL7 /SET CHANNEL 8
TAD C200 /IN CASE OF PARITY
DCA CHAR /INPUT
TAD CHAR
TAD M377 /IGNORE RUBOUT
SNA CLA
JMP I CHEK
TAD PF /PASS 3?
SMA CLA
JMP .+3
TAD CHAR /GET CHARACTER
DCA I AUTOC /STORE IN PASS3 BUFFER
TAD CHAR /CHECK FOR A COMMENT
TAD M215 /CARRIAGE RETURN?
SNA CLA
JMP ECMN /YES, END OF COMMENT
TAD FLAG /NO, ARE WE PRESENTLY IN A COMENT?
SZA CLA
JMP I CHEK /YES, IGNORE THE CHARACTER
TAD CHAR
TAD M212 /LINE FEED?
SNA
JMP I CHEK /YES, IGNORE LINE FEED
TAD M2 /FORM FEED?
SNA
JMP I CHEK /YES, IGNORE FORM FEED

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TAD M43A	/IS IT A SLASH??
SNA CLA	
JMP COMMNT	/YES: START OF COMMENT
ISZ CHEK	/NO, LEGAL CHARACTER
JMP I CHEK	/EXIT

COMMNT, ISZ FLAG	/BEGINNING OF COMMENT
JMP I CHEK	/SET FLAG TO ZERO, EXIT
ECMN, DCA FLAG	/END OF COMMENT
ISZ CHEK	/GET CHARACTER
JMP I CHEK	/EXIT

M43A, -0043
M377, -0377

/THE EXPUNGE PSEUDO-OP
/LENGTH: 13 REGISTERS

EXPN, DCA INFO	/NO PUNCHING
TAD PF	/WHICH PASS IS THIS?
SZA CLA	/IGNORE IT ON PASS 2 OR 3
POPJ	/EXIT
CMA	/MOVE SYMBOL TABLE BACK
TAD MCRI	/TO PSEUDO-OPS
DCA IAM1	
TAD IAM1	
DCA SPNT	
DCA I MCRIP	
POPJ	/EXIT

MCRI, OPCD
MCRIP, MICRP

L14,

*1600

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/ERROR ROUTINES FOR PAL III

/LENGTH: 45 REGISTERS

/THE ERROR ROUTINES ARE OF TWO TYPES

/ TYPE 1 CONSISTS OF

/ UA UNDEFINED ADDRESS

/ DT DOUBLE TAG

/ ST SYMBOL TABLE OVERFLOW

/ RD REDEFINITION BY PARAMETER ASSIGN.

/ TYPE 1 ERRORS ARE CALLED BY

/ PUSHJ

/ ERROR1

/WITH THE ADDRESS OF THE OFFENDING SYMBOL ON THE PUSHDOWN LIST

/AND WITH THE CODE FOR THE ERROR IN C(AC)

/THE ERROR PRINTOUT IS

/ XX YYYYYY AT ZZZZ

/WHERE XX REPRESENTS THE PARTICULAR ERROR CODE INVOLVED

/YYYYYY REPRESENTS THE SYMBOL THAT CAUSED THE ERROR

/ZZZZ REPRESENTS THE LOCATION IN THE USER'S PROGRAM AT WHICH THE

/ERROR OCCURRED

/TYPE 2 ERRORS CONSIST OF

/ IC ILLEGAL CHARACTER

/ IR ILLEGAL REFERENCE

/ PO PUSHDOWN OVERFLOW

/ PU PUSHDOWN UNDERFLOW

/TYPE 2 ERRORS ARE CALLED BY

/ PUSHJ

/ ERROR2

/WITH THE VALUE OF THE ILLEGAL CHARACTER, LITERAL, OR ORIGIN ON THE

/PUSHDOWN LIST AND THE CODE FOR THE ERROR IN THE ACCUMULATOR

/THE ERROR PRINTOUT IS

/XX YYYY AT ZZZZ

/WHERE XX REPRESENTS THE PARTICULAR ERROR CODE INVOLVED

/YYYY REPRESENTS THE VALUE OF THE ILLEGAL CHARACTER OR REFERENCE

/ZZZZ REPRESENTS THE LOCATION IN THE USER'S PROGRAM AT WHICH THE ERROR

/ OCCURRED

/NUMBER CODE FOR ERRORS

/1 UA

/2 DT

/3 ST

/4 IC

/5 IR

/6 PO

/7 PU

/10 RD

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```
ERROR1, JMS ETYPO      /TYPE ERROR CODE
        DCA TEM2        /SAVE SYMBOL ADDRESS AS A POINTER
        TAD I TEM2      /GET FIRST WORD OF SYMBOL
        AND MASK        /GET RID OF UNDEFINED BIT
        DCA I TEM2      /SYMBOL IS DEFINED FOR FUTURE REFERENCE
        TAD I TEM2      /GET IT BACK IN THE AC
        JMS I EEE        /TYPE OUT THE FIRST WORD OF THE SYMBOL
        ISZ TEM2        /INCREMENT THE POINTER TO THE 2ND WORD
        TAD I TEM2      /PICK UP THE 2ND WORD
        JMS I EEE        /TYPE IT OUT
        ISZ TEM2        /MOVE THE POINTER TO THE THIRD WORD
        TAD I TEM2      /PICK UP THE THIRD WORD
        JMS I EEE        /TYPE IT OUT
ECOMON, JMS I EEE        /TYPE TWO SPACES
        TAD ATCODE      /GET "AT"
        JMS I EEE        /TYPE IT
        JMS I EEE        /TYPE TWO SPACES
        TAD AACT        /GET THE ABSOLUTE ADDRESS COUNTER
        JMS I OCTI      /TYPE IT OUT
        TAD C377        /TYPE A RUBOUT
        JMS I DDD
        JMP I TEM1      /EXIT
```

```
ERROR2, JMS ETYPO      /TYPE THE ERROR CODE
        JMS I OCTI      /TYPE THE VALUE OF IC, PO, OR PU
        JMP ECOMON      /TYPE "AT" AND AACT
```

```
ETYP0,  0              /SUBROUTINE TO TYPE ERROR CODE
        TAD TBLEAD      /ADD ERROR CODE TO TABLE POINTER
        DCA TEM2        /SAVE POINTER TO CODE IN TEMP
        POP             /GET EXIT ADDRESS FROM PDL
        DCA TEM1        /SAVE IT, ERROR ADDRESS NOW AVAILABLE
        TAD PF          /WHICH PASS IS THIS?
        SZA CLA         /ERROR PRINTOUTS ONLY ON PASS1
        JMP ERRQUT      /OTHERWISE, EXIT FROM ERROR ROUTINE
        TAD C377        /TYPE A RUBOUT IN CASE OF IR
        JMS I DDD
        TAD CRLF        /TYPE A CARRIAGE RETURN, LINE FEED
        JMS I EEE
        TAD I TEM2      /GET THE ERROR CODE LETTERS
        JMS I EEE        /TYPE THE ERROR CODE
        JMS I EEE        /TYPE TWO SPACES
        POP             /GET SYMBOL ADDRESS OR IC, IL, IO VALUE
        JMP I ETYPO      /EXIT WITH IT IN THE AC
```

```
ERRQUT, POP           /CLEAR JUNK OFF THE PUSHDOWN LIST
        CLA
        JMP I TEM1      /EXIT
```


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/PASS3 ROUTINE

/ASSEMBLY LISTING ON ASR33 IF SW11 DOWN, 75A IF UP

/LENGTH: 75 REGISTERS

POUT,	CLA DSR	/GET SWITCH REGISTER
	CLL RAR	/WAS BIT 11 SET?
	SNL CLA	
	JMP PART1	/NO
	TAD BBB	/YES, RESET PRINT POINTER
	DCA DDD	/FOR 75A PUNCH
PART1,	TAD CRLF	/TYPE CR, LF
	JMS I EEE	
	TAD INFO	/ANY INFORMATION ON THIS LINE?
	SZA CLA	
	JMP PART2	/YES
	TAD M6	/NO, TYPE 12 SPACES
	DCA TEM3	
	JMS I EEE	
	ISZ TEM3	
	JMP .-2	
	JMP .+7	/DON'T TYPE AACT
PART2,	TAD AACT	/VALID INFO, TYPE AACT
	JMS I OCTI	
	JMS I EEE	/TYPE 2 SPACES
	TAD BINW	/TYPE ASSEMBLED VALUE
	JMS I OCTI	
	JMS I EEE	/TYPE TWO SPACES
	TAD CHAR	/WAS IT A CR?
	TAD M215	
	SZA CLA	
	JMP I TABIT-1	/NO: RETURN
	CLA CMA	/YES: PUT STATEMENT
	DCA I AUTOC	/DELIMITER IN BUFFER
PART3,	TAD TBUF	/SET BUFFER
	DCA AUTOC	
PART4,	TAD I AUTOC	/GET CHARACTER
	TAD M211	/TAB?
	SNA	
	JMP TABIT	/YES, TYPE TAB, RUBOUT
	TAD M1	/LINE FEED?
	SNA	
	JMP PART4	/YES, IGNORE IT
	TAD M2	/FORM FEED?
	SNA	
	JMP FFEED	/YES, TYPE FORM FEED
	TAD M1	/CARRIAGE RETURN?
	SNA	
	JMP PART4	/YES, IGNORE IT
	TAD C215	/RESTORE ORIGINAL CHARACTER
	SPA	/RUBOUT?
	JMP PART5	/YES, ALL DONE
	SZA	/IGNORE CR
	JMS I DDD	/NO, TYPE OR PUNCH CHAR
	JMP PART4	/RETURN

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```
PARTS,  CLA          /ALL DONE
        TAD TBUF      /RESET BUFFER
        DCA AUTOC
        TAD LOPUNI    /RESET PUNCH POINTER
        DCA DDD
        JMP I ,+1
        MQUT          /RETURN TO MAIN
TABIT,  TAD C211      /TAB ROUTINE
        JMS I DDD
        TAD C377      /TYPE RUBOUT
        JMS I DDD
JMP PART4      /RETURN
```

```
FFEEEEED,      TAD M6          /TYPE SIX BLANK LINES
        DCA TEM3
        MS I DDD
        ISZ TEM3
        JMP ,=2
        TAD C214      /TYPE FORM FEED
        JMS I DDD
        TAD M6        /TYPE SIX MORE BLANK LINES
        DCA TEM3
        JMS I DDD
        ISZ TEM3
        JMP ,=2
        JMP PART4     /RETURN
```

```
TBLEAD, TABLE-1      /POINTER FOR ERROR CODES
ATCODE, 01244         /AT
```

```
/SET INDIRECT BIT
INDI,   TAD C400      /"I"= 0400
        DCA SYMVAL
        ISZ INFO      /I= VALID INFORMATION
        POPJ          /RETURN
```

L16,

PAUS