

DECUS

PROGRAM LIBRARY

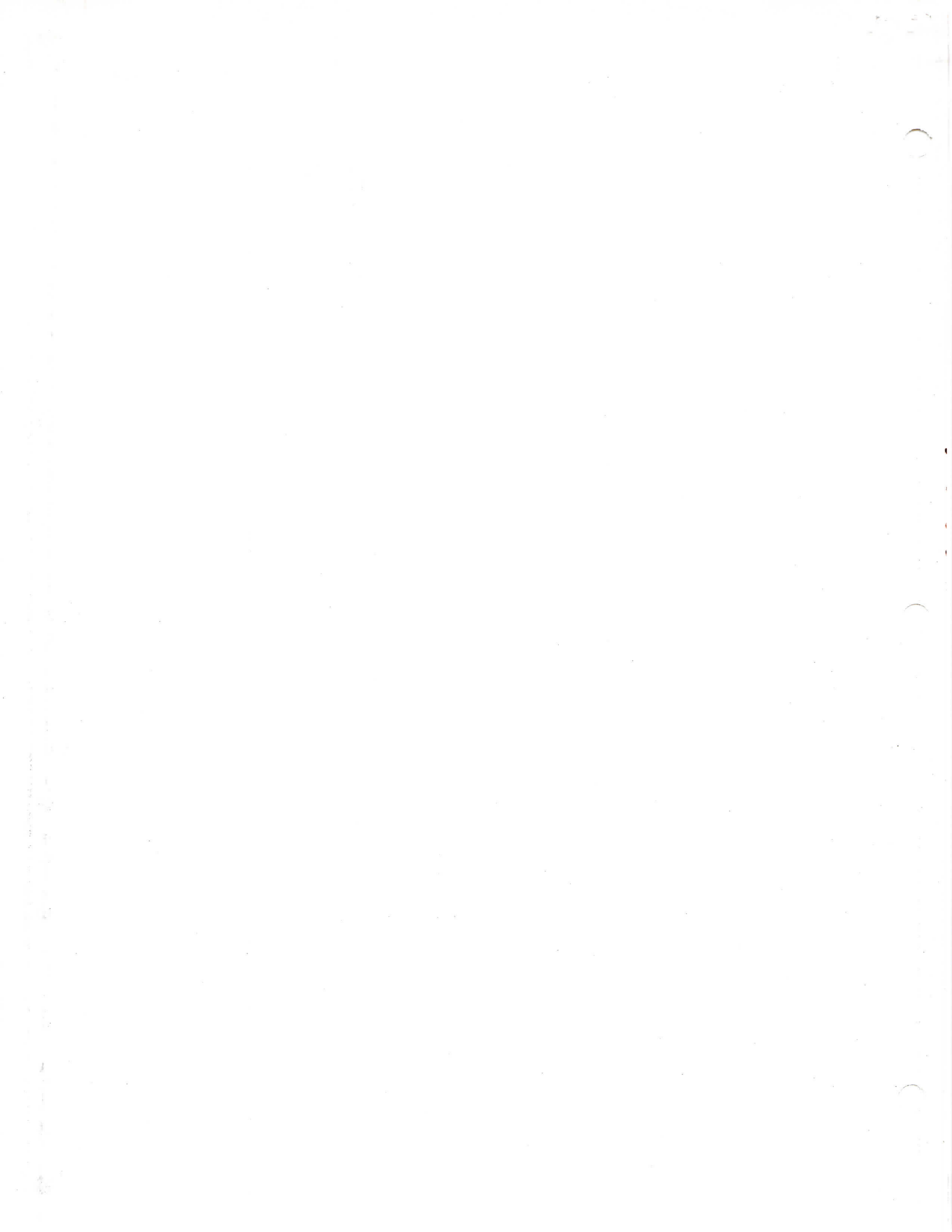
DECUS NO. 8-628 LISTING

TITLE LISP 1.5 INTERPRETER FOR PDP-8 WITH OS/8 (PS/8)

ATTENTION

This is a USER program. Other than requiring that it conform to submittal and review standards, no quality control has been imposed upon this program by DECUS.

The DECUS Program Library is a clearing house only; it does not generate or test programs. No warranty, express or implied, is made by the contributor, Digital Equipment Computer Users Society or Digital Equipment Corporation as to the accuracy or functioning of the program or related material, and no responsibility is assumed by these parties in connection therewith.



/LISP FOR PS/8
 /RELEASE 3
 /THIS IS A MODIFICATION OF DECUS 8-102A.

 /THE CCITT2 CODE SECTION HAS BEEN DELETED.
 /THE FOLLOWING ROUTINES HAVE BEEN ADDED:
 /
 /A TIMES ROUTINE
 /A CLEAR ROUTINE
 /AN EXIT ROUTINE
 /A LINEPRINTER ROUTINE
 /A BUFFERED TELETYPE INPUT ROUTINE WITH
 /LINE-EDITING CAPABILITIES;
 /ROUTINES TO CHANGE THE INPUT AND OUTPUT
 /TO PS/8 ASCII FILES ON ANY DEVICE.

/THE SYSTEM WAS MOVED TO FIELD 1 IN
 /ORDER TO LEAVE ROOM FOR DEVICE HANDLERS
 /IN FIELD 0.

/MODIFIED BY LARRY DAVIS
 /WASHINGTON UNIVERSITY
 /ST. LOUIS, MISSOURI

/JANUARY 28, 1972.

/MODIFIED SLIGHTLY ON MARCH 9, 1972
 /FUNCTION ZEXPR WAS ADDED.

/CORRECTED AND MODIFIED ON MAY 15, 1973
 /BY TORBJORN ALM
 /AUTOCODE AB
 /SOLNA, SWEDEN
 /A NUMBER OF ARITHMETIC AND LOGICAL ZEXPR
 /FUNCTIONS HAVE BEEN ADDED, SOME OF WHICH
 /USE EAF, MODE A (POP-8/I AND -8/E).
 /

/THE FOLLOWING DEFINITIONS HAD TO BE MADE
 /FOR THE ASSEMBLER

6011 RSF=6011
 6012 RRB=6012
 6014 RFC=6014
 6351 KLSF=6351
 6356 KLLS=6356

7577 LEND=7577 /LAST LIST LOCATION.
 /LP08 - LS8E

6661 PSKF=6661
 6662 PCLF=6662
 6664 PSTR=6664

/EAE-MODE A
 7621 CAM=7621

7501	MQA=7501
7421	MQL=7421
7521	SWP=7521
7441	SCA=7441
7641	SCL=7641
7405	MUY=7405
7407	DVI=7407
7411	NMI=7411
7413	SHL=7413
7415	ASR=7415
7417	LSR=7417

```

0000          FIELD 0
0034          *34
00034 0015  PQUOTI, QUOTIENT /POINTER TO QUOTIENT CELL IN FIELD 1
00035 0000  ZA1P, 0 /POINTER TO 1ST ARGUMENT.
00036 0000  TEMPAD, 0 /TEMPORARY STORAGE USED BY
                                /SEVERAL ROUTINES.
00037 0000  ZA2P, 0 /POINTER TO 2ND ARGUMENT.
00040 0171  PLRET2, LRET2 /POINTER TO LISP RETURN ADDRESS.
00041 0000  ZA3P, 0 /POINTER TO 3RD ARGUMENT.

00042 6213  /RETURN TO LISP SYSTEM WITH NO ARGUMENT.
00043 5440  ZRET2, CDF CIF 10
                                JMP I PLRET2

                                /RETURN TO LISP SYSTEM WITH A NUMERICAL VALUE
                                /WHICH IS IN THE ACCUMULATOR.
00044 6213  ZVRET2, CDF CIF 10
00045 5446  JMP I .+1
00046 3175  RMASK+2
                                *100
00100 0035  PA1P, A1P
00101 0037  PA2P, A2P
00102 0041  PA3P, A3P
00103 0000  NUMB, 0 /IF FIRST ARGUMENT TO IOPEN OR
                                /OOPEN WAS A NUMBER, STORE HERE.
00104 0000  NUMB1, 0 /NUMBER FOR OUTPUT OPENING.
                                /INPUT FILE NAME.
00105 0000  INDEV1, 0
00106 0000  INDEV2, 0
00107 0000  INFIL1, 0
00110 0000  0
00111 0000  0
00112 0000  0
                                /OUTPUT FILE NAME.
00113 0000  OUDEV1, 0
00114 0000  OUDEV2, 0
00115 0000  OUFIL1, 0
00116 0000  0
00117 0000  0
00120 0000  0
00121 0105  PPINNAME, INDEV1
00122 0113  PPOUTNAM, OUDEV1
00123 0000  PNAME, 0 /POINTER TO NEXT WORD FOR
                                /STORING FILE NAME.
00124 3134  PIERR, ERR /POINTER TO THE ERROR ROUTINE.
00125 1000  PGETNAM, GETNAM
00126 0000  IHNDLR, 0 /POINTER TO INPUT HANDLER
00127 0000  OHNDLR, 0 /POINTER TO OUTPUT HANDLER.
00130 0000  FINPTR, 0
00131 0107  PFILN1, INFIL1
00132 0115  PFILN2, OUFIL1

00133 1147  /RETURN FROM SUBROUTINE IN FIELD 0.
                                FIRET, TAD KN3

```

```

00134 3142      DCA      RLOCA  /SAVE RETURN ADDRESS
00135 6213      CIF CDF  10
00136 1542      TAD I   RLOCA  /RETURN ADDRESS
00137 3142      DCA      RLOCA
00140 1143      TAD      RVAL   /VALUE TO RETURN WITH
00141 5542      JMP I   RLOCA

00142 0000      RLOCA,  0
00143 0000      RVAL,   0
00144 0000      KOUTCHAR,0      /REPLACED BY A POINTER TO OUTPUT ROUTINE
00145 0600      P1LPTOUT,LPTOUT
00146 1475      P1FOCHAR,FOCHAR
00147 7775      KN3,    -3
00150 7700      K7700A, 7700      /LOCATION OF USR
00151 7400      FI7400, 7400

/ THE FOLLOWING WOULD NOT FIT ON GETNAM PAGE.
00152 0077      KP77,    77
00153 3600      KP3600, 3600
00154 7772      KM6,    -6
00155 0036      K36,    36
00156 0000      TMNAM,  0
00157 0000      NCTR,   0
00160 0000      PNAME1, 0
/ERROR IN OPENING OR CLOSING A FILE.
00161 7200      ERROR1,  CLA
00162 6213      CDF CIF  10
00163 4524      JMS I   PIERR  /PRINT ERROR MESSAGE
/AND RESTART.
/ERROR IN OUTPUTTING A CHARACTER
00164 7200      OIERR1,  CLA
00165 1171      TAD      P1OUTSUB /RESET OUTPUT TO TTY
00166 6213      CDF CIF  10
00167 3572      DCA I   PPOUTCH
00170 4524      JMS I   PIERR
00171 3217      P1OUTSUB,OUTSUB
00172 2124      PPOUTCH,POUTCH
00173 0000      PTARG1, 0
00174 0000      PTARG2, 0
/DEFAULT DEVICE NAME.
00175 6546      K6546,  6546  /"DS"
00176 0055      K55,    55    /"K"

```

0200

*200

/THIS ROUTINE IS THE BUFFERED TELETYPE
 /INPUT ROUTINE. IT WILL BUFFER UP TO A
 /CARRIAGE RETURN.
 /ON A LINE, THE FOLLOWING CHARACTERS
 /HAVE SPECIAL MEANING.
 /A RUBOUT DELETES THE PREVIOUS CHARACTER
 /A FU DELETES THE WHOLE CURRENT LINE.
 /A FR DOES A JMP 3001
 /A FC DOES A JMP 3000
 /A CARRIAGE RETURN ECHOES A CARRIAGE RETURN
 /LINE FEED PAIR.
 /AN ALTMODE IS THE SAME AS A CARRIAGE
 /RETURN, AND INSERTS A CARRIAGE RETURN
 /IN THE CODE. HOWEVER, IT DOES NOT ECHO.
 /NOTE: CHARACTERS ARE NOT TRANSMITTED
 /UNTIL A CARRIAGE RETURN OR ALTMODE OCCURS.

00200	0000	BTTY,	0		
00201	2200		ISZ	BTTY	/SKIP OVER ADDRESS.
00202	7200		CLA		
00203	1264		TAD	TFLAG	
00204	7700		SMA	CLA	
00205	5214		JMP	TREAD	/BUFFER EMPTY. READ IN.
00206	2264		ISZ	TFLAG	
00207	7000		NOP		
00210	1667	CRRET,	TAD	I CPOINT	/GET NEXT CHARACTER IN /BUFFER.
00211	2267		ISZ	CPOINT	
00212	6213	BRET,	CDF	CIF 10	
00213	5400		JMP	I BTTY	/RETURN WITH CHAR IN AC.
					/BUFFER EMPTY-READ IN A NEW BUFFER.
00214	7200	TREAD,	CLA		
00215	1270		TAD	BPOINT	
00216	3267		DCA	CPOINT	/INITIALIZE BUFFER POINTER.
00217	3264		DCA	TFLAG	/SAY NO CHARACTERS TYPED YET.
00220	6031	RLLOOP,	KSF		
00221	5220		JMP	.-1	/WAIT TILL SOMETHING TYPED.
00222	6036		KRB		/READ CHARACTER
00223	3363		DCA	TMCHAR	/SAVE CHARACTER
00224	1363		TAD	TMCHAR	
00225	1370		TAD	KM377	
00226	7450		SNA		
00227	5326		JMP	RUBOUT	/HAD RUBOUT.
00230	7001		IAC		
00231	7001		IAC		
00232	7450		SNA		
00233	5316		JMP	ALTM	/HAD ALTMODE.SAME AS C.R.
00234	1372		TAD	K150	
00235	7450		SNA		
00236	5323		JMP	CNTRU	/HAD FU
00237	1367		TAD	KP3	
00240	7450		SNA		

00241	5376		JMP	CNTRR	/HAD R
00242	1366		TAD	KP17	
00243	7450		SNA		
00244	5665		JMP I	PCNTRC	/HAD C
00245	1365		TAD	KM12	
00246	7650		SNA	CLA	
00247	5314		JMP	CRET	/HAD CARRIAGE RETURN.
00250	1266		TAD	KMLASTL	/NEGATIVE OF LAST
					/BUFFER LOCATION + 1.
00251	1267		TAD	CPOINT	/SEE IF BUFFER IS FULL.
00252	7700		SMA	CLA	
00253	5220		JMP	RLOOP	/BUFFER IS FULL. IGNORE
					/ANYTHING BUT CONTROL
					/CHARACTERS.
00254	7240		CLA	CMA	/-1 IN AC.
00255	1264		TAD	TFLAG	/SAY ONE MORE CHAR. IN
					/BUFFER.
00256	3264		DCA	TFLAG	
00257	1363		TAD	TMCHAR	/NOW PUT CHAR IN BUFFER.
00260	4271		JMS	ECHO	/ECHO IF SPECIFIED.
00261	3667		DCA I	CPOINT	
00262	2267		ISZ	CPOINT	/POINT TO NEXT BUFFER LOCATION
00263	5220		JMP	RLOOP	/GET NEXT CHARACTER.
00264	0000	TFLAG,	0		/CONTAINS THE NEGATIVE OF THE
					/NUMBER OF CHARACTERS REMAINING
					/IN THE BUFFER.
00265	0407	PCNTRC,	CNTRC		
00266	2177	KMLASTL,	-LASTL-2		
00267	0000	CPOINT,	0		/POINTER TO THE NEXT BUFFER
					/LOCATION.
00270	5400	BPOINT,	TBUF		/POINTER TO THE FIRST LOCATION
					/IN THE BUFFER.
					/ECHO TTY CHAR IF MODE SPECIFIES THIS.
00271	0000	ECHO,	0		
00272	3364		DCA	TEMP	/SAVE AC TEMPORARILY
00273	6211		CDF	10	
00274	1762		TAD I	Pmode	/GET MODE
00275	6201		CDF	0	
00276	0373		AND	KP45	
00277	7640		SZA	CLA	
00300	5306		JMP	ECHO1	
00301	1364		TAD	TEMP	
00302	6041		TSF		
00303	5302		JMP	.-1	/WAIT TILL TTY FREE
00304	6046		TLS		
00305	5671		JMP I	ECHO	
00306	1364	ECHO1,	TAD	TEMP	/NO ECHO
00307	5671		JMP I	ECHO	
00310	0336	CNTU,	336		
00311	0325		325		/STRING FOR CONTROL U
00312	0215	K215,	215		


```

00313 0212 KP212, 212
00314 4344 CRET, JMS TSTRING
00315 0312 K215
00316 1312 ALTM, TAD K215 /TYPE C.R. AND L.F.
00317 3667 DCA I CPOINT /NOW PUT C.R. IN BUFFER
00320 1270 TAD BPOINT /NOW RESET BUFFER POINTER
00321 3267 DCA CPOINT
00322 5210 JMP CRRET /NOW RETURN WITH 1ST CHAR.

```

```

00323 4344 CNTRU, JMS TSTRING
00324 0310 CNTU
00325 5214 JMP TREAD /REINITIALIZE BUFFER.

00326 1270 RUBOUT, TAD BPOINT /SEE IF ANY CHARS IN BUFFER
00327 7041 CIA
00330 1267 TAD CPOINT
00331 7650 SNA CLA
00332 5220 JMP RLOOP /NO CHARS IN BUFFER. IGNORE
00333 7240 CLA CMA
00334 1267 TAD CPOINT /RESET BUFFER POINTER
00335 3267 DCA CPOINT
00336 2264 ISZ TFLAG /RESET CHARACTER COUNTER
00337 7000 NOP
00340 1371 TAD K334
00341 4271 JMS ECHO /ECHO BACKSLASH
00342 7200 CLA
00343 5220 JMP RLOOP /RETURN

```

/TSTRING WILL TYPE A CHARACTER STRING WHICH
/IS ENDED BY A NEGATIVE NUMBER.

```

00344 0000 TSTRING, 0
00345 7200 CLA
00346 1744 TAD I TSTRING /GET ADDRESS OF STRING
00347 3361 DCA TMSTR
00350 2344 ISZ TSTRING
00351 7200 TSLOOP, CLA
00352 1761 TAD I TMSTR /GET NEXT CHARACTER IN STRING
00353 7710 SPA CLA
00354 5744 JMP I TSTRING /RETURN. HAD DELIMITER.
00355 1761 TAD I TMSTR
00356 4271 JMS ECHO /TYPE CHARACTER
00357 2361 ISZ TMSTR /INCREMENT POINTER
00360 5351 JMP TSLOOP

```

```

00361 0000 TMSTR, 0 /POINTER TO STRING.
00362 3154 PMODE, MODE
00363 0000 TMCHAR, 0
00364 0000 TEMP, 0 /STORE CHARACTER TEMPORARILY
00365 7766 KM12, -12
00366 0017 KP17, 17
00367 0003 KP3, 3
00370 7401 KM377, -377
00371 0334 K334, 334

```

```

00372 0150 K150, 150
00373 0045 KP45, 45 /MASK FOR CHECKING ECHO.
00374 0336 CNTR, 336 /STRING FOR CONTROL R
00375 0322 322
00376 4344 CNTRR, JMS TSTRING /TYPE R.
00377 0374 CNTR
00400 7200 CLA
00401 3617 DCA I PTFLAG /CLEAR BUFFER
00402 6213 CDF CIF 10 /BACK TO FIELD 10
00403 5604 JMP I .+1
00404 3001 INIT1 /RESTART, BUT DON'T CLEAR.

00405 0336 CNTC, 336 /STRING FOR CONTROL C
00406 0303 303

00407 4616 CNTRC, JMS I PTSTRING
00410 0405 CNTC
00411 7200 CLA
00412 3617 DCA I PTFLAG /CLEAR BUFFER.
00413 6213 CDF CIF 10
00414 5615 JMP I .+1
00415 3000 INIT /RESTART AND CLEAR.
00416 0344 PTSTRING, TSTRING
00417 0264 PTFLAG, TFLAG

```

```

00372 0150 K150, 150
00373 0045 KP45, 45
00374 0336 CNTR, 336 /MASK FOR CHECKING ECHO.
00375 0322 322 /STRING FOR CONTROL R
00376 4344 CNTRR, JMS TSTRING /TYPE =R.
00377 0374 CNTR
00400 7200 CLA
00401 3617 DCA I PTFLAG /CLEAR BUFFER
00402 6213 CDF CIF 10 /BACK TO FIELD 10
00403 5604 JMP I .+1
00404 3001 INIT /RESTART, BUT DON'T CLEAR.

00405 0336 CNTC, 336
00406 0303 303 /STRING FOR CONTROL C

00407 4616 CNTRC, JMS I PTSTRING
00410 0405 CNTC
00411 7200 CLA
00412 3617 DCA I PTFLAG /CLEAR BUFFER.
00413 6213 CDF CIF 10
00414 5615 JMP I .+1
00415 3000 INIT /RESTART AND CLEAR.
00416 0344 PTSTRING, TSTRING
00417 0264 PTFLAG, TFLAG

```

0600

PAGE

/LINEPRINTER SUBROUTINE.
 /THIS SUBROUTINE IS CURRENTLY FOR THE
 /KLEINSCHMIDT LINE PRINTER.
 /IT CONTAINS THE CHARACTER TO PRINT ON
 /THE KLEINSCHMIDT IN THE ACCUMULATOR ON
 /ENTRY.

00600	0000	LPTOUT, 0		
00601	5226	JMP	LPTLS8	/STANDARD LPT
00602	3221	DCA	TCHAR	
00603	1221	TAD	TCHAR	
00604	1223	TAD	KM215	/SEE IF C.R.
00605	7450	SNA		
00606	1224	TAD	K22	/HAD CARRIAGE RETURN /CONVERT THE CODE.
00607	1222	TAD	KPL3	/SEE IF LINE FEED.
00610	7450	SNA		
00611	1224	TAD	K22	/HAD LINE FEED. CONVERT /THE CODE.
00612	1225	TAD	K212	
00613	6356	KLLS		/PRINT ON KLEINSCHMIDT
00614	6351	KLSF		/SKIP IF KLEINSCHMIDT DONE
00615	5214	JMP	.-1	
00616	7200	CLA		
00617	1221	TAD	TCHAR	
00620	5600	JMP I	LPTOUT	/RETURN.
00621	0000	TCHAR, 0		
00622	0003	KPL3, 3		
00623	7563	KM215, -215		
00624	0022	K22, 22		
00625	0212	K212, 212		
00626	6666	LPTLS8, PCLF PSTB		/NORMAL LS8/LE8 PRINTER CODE
00627	6661	PSKF		/FOR USE OF KLEINSCHMIDT PRINTER
00630	5227	JMP	.-1	/INSERT 7000 INTO 601
00631	5600	JMP I	LPTOUT	/EXIT

```

1000          PAGE
/GET FILE NAME SUBROUTINE.

01000 0000 GETNAM, 0
01001 6211          CDF      10      /CHANGE TO FIELD OF CELLS.
01002 7200          CLA
01003 1123          TAD      PNAME
01004 3160          DCA      PNAME1  /SAVE POINTER TO NAME.
01005 3103          DCA      NUMB    /ZERO FLAG WHICH TELLS
                                          /IF FIRST ARGUMENT WAS A
                                          /NUMBER OR NOT.
01006 1500          TAD I    PA1P    /GET FIRST ARGUMENT POINTER
01007 3173          DCA      PTARG1 /POINTER TO CDR PART OF 1ST
                                          /ARGUMENT.
01010 1173          TAD      PTARG1
01011 7001          IAC
01012 3174          DCA      PTARG2 /POINTER TO CAR PART OF 1ST
                                          /ARGUMENT.
01013 7240          CLA CMA
01014 1574          TAD I    PTARG2 /SEE IF IT IS A NUMBER.
01015 7450          SNA
01016 5361          JMP      ARG1N  /FIRST ARGUMENT WAS A NUMBER.
01017 7001          IAC      /RESTORE ARGUMENT
/SEE IF IT IS AN ATOM
01020 7110          CLL RAR
01021 7420          SNL
01022 5161          JMP      ERROR1 /FIRST ARGUMENT WAS NOT AN
                                          /ATOM.
01023 7004          RAL      /RESTORE ADDRESS
/PICK UP DEVICE NAME
01024 3174          DCA      PTARG2
01025 1574          TAD I    PTARG2
01026 4372          JMS      SAVNAM /SAVE THIS NAME.
/GET NEXT TWO CHARACTERS
01027 7240          CLA CMA
01030 1174          TAD      PTARG2
01031 3174          DCA      PTARG2 /POINT TO CDR PART
01032 1574          TAD I    PTARG2
01033 7450          SNA
01034 5240          JMP      GETFLN /NO MORE OF NAME.
01035 7001          IAC      /POINT TO NAME PART.
01036 3174          DCA      PTARG2
01037 1574          TAD I    PTARG2
01040 4372 GETFLN, JMS SAVNAM /SAVE 2ND WORD OF
                                          /DEVICE NAME.
/NOW GET FILE NAME.
01041 1501          TAD I    PA2P
01042 3173          DCA      PTARG1 /SAVE ADDRESS OF CDR PART
                                          /OF 2ND ARGUMENT.
01043 1173          TAD      PTARG1
01044 7001          IAC
01045 3174          DCA      PTARG2 /SAVE CAR PART OF 2ND ARG
01046 7240          CLA CMA
01047 1574          TAD I    PTARG2 /SEE IF NUMBER
01050 7450          SNA

```

```

01051 5367      JMP      ARG2N  /IT WAS A NUMBER, SO ZERO
                                     /FILE NAME.
01052 7001      IAC
/SEE IF IT IS AN ATOM
01053 7110      CLL RAR
01054 7420      SNL
01055 5161      JMP      ERROR1  /ERROR-SECOND ARGUMENT WAS
                                     /NOT AN ATOM.
01056 7004      RAL
01057 3174      DCA      PTARG2  /SAVE POINTER TO CAR PART.
01060 7240      CLA CMA
01061 1174      TAD      PTARG2
01062 3173      DCA      PTARG1  /SAVE POINTER TO CDR PART.
01063 1574      TAD I    PTARG2  /GET 1ST 2 CHARS OF NAME
01064 4372      JMS      SAVNAM
01065 1573      TAD I    PTARG1  /GET POINTER TO NEXT CELL
01266 7452      SNA
01267 5372      JMP      ADDR2   /NIL. ZERO REST OF NAME.
01070 3173      DCA      PTARG1
01271 1173      TAD      PTARG1
01272 7221      IAC
01273 3174      DCA      PTARG2  /POINTED TO CAR PART
01074 1574      TAD I    PTARG2  /GET SECOND PAIR OF
                                     /CHARACTERS OF NAME.
01075 4372      JMS      SAVNAM
01076 1573      TAD I    PTARG1  /GET POINTER TO CDR PART
01077 7450      SNA
01100 5304      JMP      GETEXT  /NIL. ZERO REST OF NAME.
01101 7001      IAC
01102 3174      DCA      PTARG2
01103 1574      TAD I    PTARG2  /GET 3RD PAIR OF
                                     /CHARACTERS OF NAME.
01104 4372      GETEXT, JMS      SAVNAM

/NOW PICK UP EXTENSION.
01105 1502      TAD I    PA3P
01106 3173      DCA      PTARG1  /ADDRESS OF CDR PART OF
                                     /THIRD ARGUMENT.
01107 1173      TAD      PTARG1
01110 7001      IAC
01111 3174      DCA      PTARG2  /SAVE ADDRESS OF CAR PART
01112 7240      CLA CMA
01113 1574      TAD I    PTARG2  /SEE IF NUMBER.
01114 7450      SNA
01115 5325      JMP      SAVEXT
01116 7001      IAC
/SEE IF IT IS AN ATOM.
01117 7110      CLL RAR
01120 7420      SNL
01121 5161      JMP      ERROR1  /3RD ARGUMENT WAS NOT ATOMIC
01122 7004      RAL
01123 3174      DCA      PTARG2  /SAVE POINTER TO ATOM NAME.
01124 1574      TAD I    PTARG2  /GET EXTENSION.
01125 4372      SAVEXT, JMS      SAVNAM
/CONVERT INTERNAL CHARACTERS TO 6-BIT ASCII.

```

/IF 0, LEAVE 0. OTHERWISE, ADD 36 AND MASK.

```

01126 6201 CDF 0
01127 7200 CLA
01130 1154 TAD KM6 /GO THROUGH LOOP 6 TIMES.
01131 3157 DCA NCTR /LOOP COUNTER.
01132 1560 NMLoop, TAD I PNAME1 /GET NEXT WORD OF NAME.
01133 0150 AND K7700A
01134 7440 SZA
01135 1153 TAD KP3600
01136 7112 CLL RTR
01137 7012 RTR
01140 7012 RTR /SWAP CHARACTERS.
01141 3156 DCA TMNAM /HAVE ASCII FOR HIGH-ORDER CHAR
01142 1560 TAD I PNAME1
01143 0152 AND KP77
01144 7440 SZA
01145 1155 TAD K36
01146 0152 AND KP77 /HAVE ASCII FOR LOW CHAR.
01147 7106 CLL RTL
01150 7006 RTL
01151 7006 RTL
01152 1156 TAD TMNAM /HAVE BOTH IN ASCII.
01153 3560 DCA I PNAME1
01154 2160 ISZ PNAME1 /POINT TO NEXT WORD OF NAME
01155 2157 ISZ NCTR /INCREMENT LOOP COUNTER
01156 5332 JMP NMLoop
01157 6211 CDF 10
01160 5600 JMP I GETNAM /RETURN.

```

/FIRST ARGUMENT WAS A NUMBER.

```

01161 1573 ARG1N, TAD I PTARG1 /GET THE NUMBER.
01162 3103 DCA NUMB
01163 1175 TAD K6546 /"DS"
01164 4372 JMS SAVNAM /DSK IS DEFAULT DEVICE NAME.
01165 1176 TAD K55
01166 5240 JMP GETFLN

```

/SECOND ARGUMENT WAS A NUMBER-ZERO THE FILE NAME.

```

01167 4372 ARG2N, JMS SAVNAM
01170 4372 ARG22, JMS SAVNAM
01171 5304 JMP GETEXT

```

/STORE AC IN FIELD 0 LOCATION POINTED TO /BY PNAME, AND INCREMENT PNAME.

```

01172 0000 SAVNAM, 0
01173 6201 CDF 0
01174 3523 DCA I PNAME
01175 2123 ISZ PNAME
01176 6211 CDF 10
01177 5772 JMP I SAVNAM

```

```

1200          PAGE
              /OPEN AN INPUT FILE.

01200  0000  IOPENR, 0
01201  7200          CLA
01202  1121          TAD          PPINAME
01203  3123          DCA          PNAME          /SET POINTER TO INPUT NAME
01204  4525          JMS I      PGETNAM        /GET THE FILE'S DEVICE,
                                              /NAME, AND EXTENSION.

              /MOVE THE DEVICE NAME.
01205  1105          TAD          INDEV1
01206  3217          DCA          ASDEV1
01207  1106          TAD          INDEV2
01210  3220          DCA          ASDEV2

              /SET LOCATION FOR DEVICE HANDLER TO BE
              /LOADED INTO.
01211  1254          TAD          PINDBUF
01212  3221          DCA          ASPAG        /ALLOW 2 PAGE HANDLERS.

              /LOAD THE DEVICE HANDLER
01213  6201          CDF          0
01214  6212          CIF          10
01215  4550          JMS I      K7700A        /CALL USR
01216  0001          1
01217  0000  ASDEV1, 0
01220  0000  ASDEV2, 0
                                              /FETCH DEVICE HANDLER.
                                              /DEVICE NAME.
                                              /THIS IS CHANGED TO THE
                                              /DEVICE NUMBER.
01221  0000  ASPAG, 0
01222  5255          JMP          ASERR        /LOCATION OF HANDLER.
                                              /ERROR-COULD NOT FIND THE
                                              /DEVICE NAME.

              /NOW LOOK UP THE FILE.
01223  7200          CLA
01224  1131          TAD          PFILN1
01225  3232          DCA          FLUNAM
01226  1220          TAD          ASDEV2        /LOAD DEVICE NUMBER.
01227  6212          CIF          10
01230  4550          JMS I      K7700A        /CALL USR
01231  0002          2
01232  0000  FLUNAM, 0
                                              /LOOKUP FILE.
                                              /POINTER TO THE FILE
01233  0000  FLUCNT, 0
                                              /NAME. REPLACED BY BLOCK #.
                                              /REPLACED BY LENGTH AS A
                                              /NEGATIVE NUMBER.
01234  5255          JMP          ASERR        /ERROR IN LOOKUP.
01235  7240          CLA          CMA
01236  3335          DCA          F1CHCT        /SET INPUT CHARACTER COUNT
                                              /FOR A READ ON FIRST CALL.
01237  1232          TAD          FLUNAM        /GET FILE STARTING
                                              /BLOCK NUMBER.

01240  3273          DCA          FINREC
01241  1221          TAD          ASPAG        /GET HANDLER ENTRY POINT.
01242  3126          DCA          IHNDLR
01243  1337          TAD          FIN10
01244  3336          DCA          FINTMP        /SAY ON PROPER PART OF WORD.
              /MOVE INPUT POINTER TO GCHAR SUBROUTINE.
01245  1342          TAD          KGCHAR

```


01246	6211		CDF	10	
01247	3740		DCA I	PIPINSUR	
01250	6201		CDF	0	
01251	3143		DCA	RVAL	/ZERO RETURN VALUE.
01252	1200		TAD	IOPENR	/I.E. RETURN NIL.
01253	5133		JMP	FIRET	/RETURN.
01254	7201	PINDBUF, INDRUF+1			/LOCATION TO LOAD DEVICE /HANDLER, WITH BIT 1 SET. /TO ALLOW 2-PAGE HANDLERS.
01255	7200	/ERROR IN OPENING INPUT FILE.			
01256	6213	ASERR, CLA			
01257	4524	CDF CIF 10			
		JMS I PIERR			
01260	0000	/GET A CHARACTER ROUTINE			
01261	7200	GTCHAR, 0			
01262	2335	CLA			
01263	5305	FNXTCH, ISZ	FICHCT	/BUMP CHARACTER COUNT.	
		JMP	FIGET		
01264	1233	/SEE IF OUT OF DATA			
01265	7500	TAD	FLUCNT		
01266	5330	SMA			
01267	7200	JMP	ERROR2	/OUT OF DATA.	
01270	4526	CLA			
		JMS I IHNDLR		/BUFFER EMPTY. READ IN /A NEW BUFFER.	
01271	0200	FI200, 200		/READ IN 2 PAGES.	
01272	6200	FINBUF, INBUFL		/BUFFER LOCATION.	
01273	0000	FINREC, 0		/REPLACED BY BLOCK #.	
01274	5330	JMP	ERROR2	/ERROR IN READING.	
01275	2233	ISZ	FLUCNT	/INCREMENT BLOCK COUNT.	
01276	7000	NOP			
01277	2273	ISZ	FINREC	/INCREMENT BLOCK NUMBER.	
01300	7240	CLA CMA			
01301	1272	TAD	FINBUF		
01302	3130	DCA	FINPTR	/POINTER TO NEXT BUFFER /CHARACTER.	
01303	1310	TAD	FI7200	/SAVE CHARACTER COUNT.	
01304	3335	DCA	FICHCT		
01305	1336	FIGET, TAD	FINTMP	/GET HIGH-ORDER BIT BUFFER. /ON THIRD CHAR?	
01306	7510	SPA		/YES-OUTPUT COMBINED HIGH- /ORDER BITS.	
01307	5325	JMP	FITHRD		
01310	7200	FI7200, CLA			
01311	2130	ISZ	FINPTR		
01312	1530	TAD I	FINPTR		
01313	0151	AND	FI7400		
01314	7104	RAL CLL			
01315	1336	TAD	FINTMP	/PUT THE HIGH-ORDER BITS ONTO /THE HOB BUFFER.	
01316	7006	FINXX, RTL			
01317	7006	RTL			

020	3336	DCA	FINTMP	
021	1530	TAD I	FINPTR	/GET CHARACTER.
022	0343	AND	KP377	
03	6213	ODF CIF	10	
03	5660	JMP I	GTCHAR	/RETURN.
025	3530	FITHRD, DCA I	FINPTR	/FUDGE 3RD CHARACTER INTO BUFFER
026	7120	CLL CML		
027	5316	JMP	FINXX	/RESET FINTMP TO 10.

/ERROR IN READING INPUT FILE.

01330	7200	ERROR2, CLA		
01331	6213	ODF CIF	10	
01332	1341	TAD	KIINSUB	/RESET INPUT TO TTY
01333	3740	DCA I	PIINSUB	
01334	4524	JMS I	PIERR	/GIVE ERROR MESSAGE

/INPUT CHARACTER COUNT.
/HIGH-ORDER BITS BUFFER.

01335	0000	FICHCT, 0		
01336	0000	FINTMP, 0		
01337	0010	FIN10, 10		
01340	0100	PIINSUB, PINSUB		
01341	3155	KIINSUB, INSUB		
01342	2400	KGCHAR, GCHAR		
01343	0377	KP377, 377		

```

1400          PAGE
/OPEN AN OUTPUT FILE

01400 0000 0OPENR, 0
01401 7200          CLA
/MOVE POINTER FROM BASIC OUTPUT ROUTINE.

01402 6211          CDF          10
01403 1266          TAD          KPCHAR
01404 3667          DCA I        KPOUTCH
01405 6201          CDF          0
01406 1122          TAD          PPOUTNAME
01407 3123          DCA          PNAME /SET POINTER TO OUTPUT NAME.
01410 4525          JMS I        PGETNAM /GET THE FILE'S DEVICE, NAME,
/AND EXTENSION

01411 1103          TAD          NUMB
01412 3104          DCA          NUMB1 /MOVE TO NUMB1
01413 1104          TAD          NUMB1
01414 7440          SZA
01415 5261          JMP          OSPEC /SPECIAL OUTPUT DEVICE SPECIFIED.
/MOVE THE DEVICE NAME.

01416 1113          TAD          OUDEV1
01417 3230          DCA          OSDEV1
01420 1114          TAD          OUDEV2
01421 3231          DCA          OSDEV2
01422 1270          TAD          POUDBUF /LOCATION FOR OUTPUT
/DEVICE HANDLER.

01423 3232          DCA          OSPAG
/LOAD THE DEVICE HANDLER.

01424 6201          CDF          0
01425 6212          CIF          10
01426 4550          JMS I        K7700A /CALL USR
01427 0001          1 /FETCH DEVICE HANDLER
01430 0000 OSDEV1, 0 /DEVICE NAME.
01431 0000 OSDEV2, 0 /THIS IS REPLACED BY DEVICE #
01432 0000 OSPAG, 0 /PAGE TO LOAD HANDLER INTO.
01433 4264          JMS          OUERR /ERROR-COULD NOT FIND THE
/DEVICE NAME.

/NOW ENTER THE FILE

01434 7200          CLA
01435 3772          DCA I        KFOCNT /ZERO COUNT OF # OF BLOCKS WRITTEN
01436 1132          TAD          PFILN2
01437 3244          DCA          FOOANM /POINTER TO FILE NAME
01440 1231          TAD          OSDEV2 /DEVICE NUMBER
01441 6212          CIF          10
01442 4550          JMS I        K7700A /CALL USR
01443 0003          3 /ENTER.
01444 0000 FOOANM, 0 /POINTER TO FILE NAME.
01445 0000 FOCNT, 0 /LENGTH OF FILE.
01446 5264          JMP          OUERR /ERROR RETURN
01447 1244          TAD          FOOANM /GET STARTING BLOCK NUMBER
01450 3307          DCA          FOUPEC
01451 4354          JMS          FOSETP /SET UP POINTERS.
01452 1232          TAD          OSPAG /HANDLER LOCATION
01453 3127          DCA          OHNDR
/SET POINTER TO PROPER VALUE ROUTINE

```

```

1400 PAGE
/OPEN AN OUTPUT FILE

01400 0000 OOPENR, 0
01401 7200 CLA
/MOVE POINTER FROM BASIC OUTPUT ROUTINE.
01402 6211 CDF 10
01403 1266 TAD KPCHAR
01404 3667 DCA I KPOUTCH
01405 6201 CDF 0
01406 1122 TAD PPOUTNAME
01407 3123 DCA PNAME /SET POINTER TO OUTPUT NAME.
01410 4525 JMS I PGETNAM /GET THE FILE'S DEVICE, NAME,
/AND EXTENSION
01411 1103 TAD NUMB
01412 3104 DCA NUMB1 /MOVE TO NUMB1
01413 1104 TAD NUMB1
01414 7440 SZA
01415 5261 JMP OSPEC /SPECIAL OUTPUT DEVICE SPECIFIED.
/MOVE THE DEVICE NAME.
01416 1113 TAD OUDEV1
01417 3230 DCA OSDEV1
01420 1114 TAD OUDEV2
01421 3231 DCA OSDEV2
01422 1270 TAD POUDBUF /LOCATION FOR OUTPUT
/DEVICE HANDLER.
01423 3232 DCA OSPAG
/LOAD THE DEVICE HANDLER.
01424 6201 CDF 0
01425 6212 CIF 10
01426 4550 JMS I K7700A /CALL USR
01427 0001 1 /FETCH DEVICE HANDLER
01430 0000 OSDEV1, 0 /DEVICE NAME.
01431 0000 OSDEV2, 0 /THIS IS REPLACED BY DEVICE #
01432 0000 OSPAG, 0 /PAGE TO LOAD HANDLER INTO.
01433 4264 JMS OUERR /ERROR-COULD NOT FIND THE
/DEVICE NAME.
/NOW ENTER THE FILE
01434 7200 CLA
01435 3772 DCA I KFOCNT /ZERO COUNT OF # OF BLOCKS WRITTEN
01436 1132 TAD PFILN2
01437 3244 DCA FOONAM /POINTER TO FILE NAME
01440 1231 TAD OSDEV2 /DEVICE NUMBER
01441 6212 CIF 10
01442 4550 JMS I K7700A /CALL USR
01443 0003 3 /ENTER.
01444 0000 FOONAM, 0 /POINTER TO FILE NAME.
01445 0000 FOCNT, 0 /LENGTH OF FILE.
01446 5264 JMP OUERR /ERROR RETURN
01447 1244 TAD FOONAM /GET STARTING BLOCK NUMBER
01450 3307 DCA FOUREC
01451 4354 JMS FOSETP /SET UP POINTERS.
01452 1232 TAD OSPAG /HANDLER LOCATION
01453 3127 DCA OHNDR
/SET POINTER TO PROPER VALUE ROUTINE

```

```
01454 1146 TAD PIFOCHAR
01455 3144 ORET, DCA KOUTCHAR
01456 3143 DCA RVAL /RETURN NIL.
01457 1200 TAD OOPENR
01460 5133 JMP FIRFT /RETURN.
```

```
01461 7200 /WANT TO OUTPUT TO LINEPRINTER.
OSPEC, CLA
01462 1145 TAD PILPTOUT
01463 5255 JMP ORET
```

```
01464 6213 /ERROR OPENING OUTPUT FILE.
OUERR, CDF CIF 10
01465 4524 JMS I PIERR
```

```
01466 2405 KPCHAR, PCHAR
01467 2124 KPOUTCH, POUTCH
01470 6600 POUDBUF, OUDBUF
```

/POINTER TO OUTPUT DEVICE LOCATION

01454	1146		TAD	P1FOCHAR
01455	3144	ORET,	DCA	KOUTCHAR
01456	3143		DCA	RVAL /RETURN NIL.
01457	1200		TAD	ODPENR
01460	5133		JMP	F1RET /RETURN.

01461	7200	/WANT TO OUTPUT TO LINEPRINTER.		
01462	1145	OSPEC,	CLA	
01463	5255		TAD	P1LPTOUT
			JMP	ORET

01464	6213	/ERROR OPENING OUTPUT FILE.		
01465	4524	OUERR,	ODF CIF 10	
			JMS I	PIERR

01466	2405	KPCHAR,PCHAR		
01467	2124	KPOUTCH,POUTCH		
01470	6600	POUDBUF,OUDBUF		

/POINTER TO OUTPUT DEVICE LOCATION

```

/PUT A CHARACTER ROUTINE.
01471 0000 PTCHAR, 0
01472 4544 JMS I KOUTCHAR/GO TO OUTPUT ROUTINE.
01473 6213 CDF CIF 10
01474 5671 JMP I PTCHAR /RETURN.

/OUTPUT A CHARACTER TO OUTPUT FILE.
01475 0000 FOCHAR, 0
01476 3365 DCA TEMOUT /SAVE AC TO RESTORE ON RETURN.
01477 1365 TAD TEMOUT
01500 3366 DCA FOUTMP
01501 2317 FOLOOP, ISZ FOUJMP
01502 2367 ISZ FOCHCT /BUMP CHARACTER COUNT
01503 5317 FOJMP, JMP FOUJMP /TAKE A BRANCH OF THE
/THREE WAY JUMP.
01504 4527 JMS I OHNDLR /BUFFER FULL. WRITE IT OUT.
01505 4200 4200 /WRITE 2 PAGES
01506 5600 FOURUF, OUBUF /BUFFER LOCATION.
01507 0000 FOUREC, 0 /BLOCK NUMBER
01510 5164 JMP OUERR1 /WRITE ERROR.
01511 2307 ISZ FOUREC /INCREMENT BLOCK NUMBER.
01512 2772 ISZ I KFOCNT /INCREMENT COUNT OF
/BLOCKS WRITTEN.
01513 4354 JMS F0SETP /RESET POINTERS.
01514 2245 ISZ F0CNT /INCREMENT COUNT OF BLOCKS
01515 5301 JMP FOLOOP /NOW GO PUT THE CHARACTER
/INTO THE NEW BUFFER.
01516 5164 JMP OUERR1 /ERROR-NO MORE ROOM FOR FILE
01517 5317 FOUJMP, JMP . /THREE WAY SWITCH.
01520 5347 JMP FOUCH1
01521 5344 JMP FOUCH2
01522 1366 FOUCH3, TAD FOUTMP
01523 7006 RTL
01524 7006 RTL
01525 3366 DCA FOUTMP
01526 1366 TAD FOUTMP
01527 0151 AND FI7400
01530 1770 TAD I FOPOLD /PUT HIGH-ORDER BITS
/OF CHARACTER 3
01531 3770 DCA I FOPOLD /INTO HIGH-ORDER BITS
/OF CHARACTER 1.
01532 1366 TAD FOUTMP
01533 7006 RTL
01534 7006 RTL
01535 0151 AND FI7400
01536 1771 TAD I FOUPTX /PUT LOW-ORDER BITS
/OF CHARACTER 3
01537 3771 DCA I FOUPTX /INTO HIGH-ORDER BITS OF
/CHARACTER 2.
01540 1303 TAD FOJMP
01541 3317 DCA FOUJMP
01542 2371 ISZ FOUPTX
01543 5351 JMP DFEXIT /RETURN.
01544 1371 FOUCH2, TAD FOUPTX
01545 3370 DCA FOPOLD /SAVE POINTER TO CHAR 1.

```



```

01471 0000 /PUT A CHARACTER ROUTINE.
01472 4544 PTCHAR, 0
01473 6213 JMS I KOUTCHAR/GO TO OUTPUT ROUTINE.
01474 5671 CDF CIF 10
JMP I PTCHAR /RETURN.

01475 0000 /OUTPUT A CHARACTER TO OUTPUT FILE.
01476 3365 FOCHAR, 0
01477 1365 DCA TEMOUT /SAVE AC TO RESTORE ON RETURN.
01500 3366 TAD TEMOUT
01501 2317 FOLOOP, ISZ FOUTMP
01502 2367 ISZ FOUJMP
01503 5317 FOJMP, JMP FOUCHT /BUMP CHARACTER COUNT
FOUJMP FOUJMP /TAKE A BRANCH OF THE
/THREE WAY JUMP.
01504 4527 JMS I OHNDLR /BUFFER FULL. WRITE IT OUT.
01505 4200 4200 /WRITE 2 PAGES
01506 5600 FOURBUF, OUBUF /BUFFER LOCATION.
01507 0000 FOUREC, 0 /BLOCK NUMBER
01510 5164 JMP QUERR1 /WRITE ERROR.
01511 2307 ISZ FOUREC /INCREMENT BLOCK NUMBER.
01512 2772 ISZ I KFOCCNT /INCREMENT COUNT OF
/BLOCKS WRITTEN.
01513 4354 JMS F0SETP /RESET POINTERS.
01514 2245 ISZ F0OCNT /INCREMENT COUNT OF BLOCKS
01515 5301 JMP F0LOOP /NOW GO PUT THE CHARACTER
/INTO THE NEW BUFFER.
01516 5164 JMP QUERR1 /ERROR-NO MORE ROOM FOR FILE
01517 5317 FOUJMP, JMP /THREE WAY SWITCH.
01520 5347 JMP FOUCH1
01521 5344 JMP FOUCH2
01522 1366 FOUCH3, TAD FOUTMP
01523 7006 RTL
01524 7006 RTL
01525 3366 DCA FOUTMP
01526 1366 TAD FOUTMP
01527 0151 AND FI7400
01530 1770 TAD I F0POLD /PUT HIGH-ORDER BITS
/OF CHARACTER 3
/INTO HIGH-ORDER BITS
/OF CHARACTER 1.
01531 3770 DCA I F0POLD
01532 1366 TAD FOUTMP
01533 7006 RTL
01534 7006 RTL
01535 0151 AND FI7400
01536 1771 TAD I F0PTR /PUT LOW-ORDER BITS
/OF CHARACTER 3
/INTO HIGH-ORDER BITS OF
/CHARACTER 2.
01537 3771 DCA I F0PTR
01540 1303 TAD F0JMP
01541 3317 DCA FOUJMP
01542 2371 ISZ F0PTR
01543 5351 JMP DFEXIT /RETURN.
01544 1371 FOUCH2, TAD F0PTR
01545 3370 DCA F0POLD /SAVE POINTER TO CHAR 1.

```

01546	2371		ISZ	FOUPTR	
01547	1366	FOUCH1,	TAD	FOUTMP	
01550	3771		DCA I	FOUPTR	/STORE CHAR 1 OR 2
01551	1365	DFEXIT,	TAD	TEMOUT	/RESTORE AC
01552	5675		JMP I	FOCHAR	/RETURN.
01553	0600	PLPTOUT,	LPTOUT		/POINTER TO LINE PRINTER /ROUTINE.
01554	0000	FOSETP,	0		
01555	1364		TAD	F07177	
01556	3367		DCA	FOCHCT	/INITIALIZE OUTPUT CHARACTER /COUNT.
01557	1306		TAD	FOUBUF	
01560	3371		DCA	FOUPTR	/POINTER TO BUFFER.
01561	1303		TAD	FOJMP	
01562	3317		DCA	FOUJMP	/SET 3-WAY SWITCH.
01563	5754		JMP I	FOSETP	
01564	7177	F07177,	7177		/WRITE 600 CHARACTERS/BUFFER. /STORE CHARACTER TEMPORARILY
01565	0000	TEMOUT,	0		
01566	0000	FOUTMP,	0		
01567	0000	FOCHCT,	0		/OUTPUT CHARACTER COUNT.
01570	0000	FOPOLD,	0		
01571	0000	FOUPTR,	0		/POINTER TO NEXT LOCATION /IN OUTPUT BUFFER.
01572	1643	KFOCCNT,	FOCCNT		

01546	2371		ISZ	FOUPTR	
01547	1366	FOUCH1,	TAD	FOUTMP	
01550	3771		DCA I	FOUPTR	/STORE CHAR 1 OR 2
01551	1365	DFEXIT,	TAD	TEMOUT	/RESTORE AC
01552	5675		JMP I	FOCHAR	/RETURN.
01553	0600	PLPTOUT,	LPTOUT		
01554	0000	FOSETP,	0		/POINTER TO LINE PRINTER
01555	1364		TAD		/ROUTINE.
01556	3367		DCA	FO7177	
01557	1306		TAD	FOCHCT	/INITIALIZE OUTPUT CHARACTER
01560	3371		DCA	FOUBUF	/COUNT.
01561	1303		TAD	FOUPTR	/POINTER TO BUFFER.
01562	3317		DCA	FOJMP	
01563	5754		JMP I	FOUJMP	/SET 3-WAY SWITCH.
01564	7177	FO7177,	7177	FOSETP	
01565	0000	TEMOUT,	0		/WRITE 600 CHARACTERS/BUFFER.
01566	0000	FOUTMP,	0		/STORE CHARACTER TEMPORARILY
01567	0000	FOCHCT,	0		
01570	0000	FOPOLD,	0		/OUTPUT CHARACTER COUNT.
01571	0000	FOUPTR,	0		
01572	1643	KFOCCNT,	FOCCNT		/POINTER TO NEXT LOCATION
					/IN OUTPUT BUFFER.

1600

PAGE

/CLOSE INPUT FILE-JUST RESET POINTER TO
/TELETYPE.

```

01600 0000 ICLOSR, 0
01601 7200 CLA
01602 1210 TAD KPTTYIN /POINTER TO TTY INPUT
                                /ROUTINE.
01603 6211 CDF 10
01604 3611 DCA I PPINSUB
01605 3143 DCA RVAL /RETURN NIL
01606 1200 TAD ICLOSR
01607 5133 JMP FIRET /RETURN.
01610 3155 KPTTYIN,INSUB
01611 0100 PPINSUB,PINSUB
    
```

/CLOSE OUTPUT FILE. IF SPECIAL OUTPUT DEVICE,
/JUST RESET POINTER. OTHERWISE, OUTPUT =2
/AND CLOSE OUTPUT FILE.

```

01612 0000 OCLOSR, 0
01613 7200 CLA
01614 1104 TAD NUMB1
01615 7440 SZA
01616 5245 JMP CNGPT /SPECIAL OUTPUT-CHANGE POINTER
    
```

/OUTPUT A =2

```

01617 1257 TAD K232
01620 4654 JMS I PFOCHAR
01621 6201 CDF 0
    
```

/WRITE OUT THE LAST BLOCK.

```

01622 7200 CLA
01623 1660 TAD I KFOUBUF
01624 3231 DCA COUBUF
01625 1661 TAD I KFOUREC
01626 3232 DCA COUREC /BLOCK NUMBER
01627 4527 JMS I OHNDLR
01630 4200 4200
    
```

/WRITE 2 PAGES.

```

01631 0000 COUBUF, 0 /BUFFER LOCATION
01632 0000 COUREC, 0 /BLOCK NUMBER
01633 5662 JMP I KOUERR /ERROR.
01634 2243 ISZ FOCCNT /INCREMENT COUNT OF
                                /BLOCKS WRITTEN.
    
```

```

01635 6212 CIF 10
01636 7200 CLA
01637 1655 TAD I POSDEV2 /GET DEVICE NUMBER.
01640 4550 JMS I K7700A /CALL USR
01641 0004 4 /CLOSE FILE
    
```

FOCNAM, OUFIL1 /FILE NAME LOCATION.
FOCCNT, 0 /CLOSING LENGTH.

```

01644 5656 JMP I POUERR /ERROR.
01645 7200 CNGPT, CLA
01646 1171 TAD P1OUTSUB/POINTER TO OUTPUT ROUTINE
01647 6211 CDF 10
01650 3572 DCA I PPOUTCH /RESET POINTER TO OUTPUT ROUTINE
01651 3143 DCA RVAL /RETURN NIL
01652 1212 TAD OCLOSR
    
```

```

1600          PAGF
/CLOSE INPUT FILE-JUST RESET POINTER TO
/TELETYPE.

01600 0000 ICLOSR, 0
01601 7200      CLA
01602 1210      TAD      KPTTYIN /POINTER TO TTY INPUT
                                /ROUTINE.

01603 6211      CDF      10
01604 3611      DCA I    PPINSUB
01605 3143      DCA      RVAL    /RETURN NIL
01606 1200      TAD      ICLOSR
01607 5133      JMP      FIRET  /RETURN.
01610 3155      KPTTYIN,INSUB
01611 0100      PPINSUB,PINSUB

/CLOSE OUTPUT FILE. IF SPECIAL OUTPUT DEVICE,
/JUST RESET POINTER. OTHERWISE,OUTPUT =Z
/AND CLOSE OUTPUT FILE.
OCLOSR, 0

01612 0000      CLA
01613 7200      TAD      NUMB1
01614 1104      SZA
01615 7440      JMP      CNGPT  /SPECIAL OUTPUT-CHANGE POINTER
01616 5245      /OUTPUT A =Z

01617 1257      TAD      KP32
01620 4654      JMS I    PFOCHAR
01621 6201      CDF      0

/WRITE OUT THE LAST BLOCK.
CLA
TAD I    KFOUBUF
DCA      COUBUF
TAD I    KFOUREC
DCA      COUREC  /BLOCK NUMBER
JMS I    GHNDLR
4200
COUBUF, 0      /WRITE 2 PAGES.
COUREC, 0      /BUFFER LOCATION
JMP I    KOUERR /BLOCK NUMBER
ISZ      FOCCNT /ERROR.
CIF      10     /INCREMENT COUNT OF
                                /BLOCKS WRITTEN.

01635 6212      CIF      10
01636 7200      CLA
01637 1655      TAD I    POSDEV2 /GET DEVICE NUMBER.
01640 4550      JMS I    K7700A  /CALL USR
01641 0004      4          /CLOSE FILE
01642 0115      FOCNAM, OUFIL1 /FILE NAME LOCATION.
01643 0000      FOCCNT, 0     /CLOSING LENGTH.
01644 5656      JMP I    POUERR /ERROR.
01645 7200      CNGPT, CLA
01646 1171      TAD      P1OUTSUB/POINTER TO OUTPUT ROUTINE
01647 6211      CDF      10
01650 3572      DCA I    PPGUTCH /RESET POINTER TO OUTPUT ROUTINE
01651 3143      DCA      RVAL    /RETURN NIL
01652 1212      TAD      OCLOSR

```

01653	5133	JMP	F1RET	/RETURN.
01654	1475	PFOCHAR,FOCHAR		
01655	1431	POSDEV2,OSDEV2		/POINTER TO OUTPUT DEVICE #.
01656	1464	POUERR, OUERR		
01657	0232	K232, 232		/CODE FOR Z.
01660	1506	KFOUBUF,FOUBUF		
01661	1507	KFOUREC,FOUREC		
01662	1464	KOUERR, OUERR		

01653	5133	JMP	F1RET
01654	1475	PFOCHAR,FOCHAR	
01655	1431	POSDEV2,OSDEV2	
01656	1464	POUERR,OUERR	
01657	0232	K232, 232	
01660	1506	KFOUBUF,FOUBUF	
01661	1507	KFOUREC,FOUREC	
01662	1464	KOUERR,OUERR	

/RETURN.
/POINTER TO OUTPUT DEVICE #.
/CODE FOR =2.

/MOVE A1P,APP,AND A3P TO
/7A1P,ZA2P,AND ZA3P RESPECTIVELY.
/RETURNS WITH DATA FIELD =10.

```
MOVARG, 0
01663 0000
01664 6211      CDF      10
01665 7200      CLA
01666 1500      TAD I   PA1P
01667 3035      DCA     ZA1P
01670 1501      TAD I   PA2P
01671 3037      DCA     ZA2P
01672 1502      TAD I   PA3P
01673 3041      DCA     ZA3P
01674 5663      JMP I   MOVARG
```

/ZEXPR ROUTINE. JUMPS TO
/THE LOCATION SPECIFIED AS THE
/FIRST ARGUMENT, WITH POINTERS TO THE
/SECOND AND THIRD ARGUMENTS IN
/FIELD 0 LOCATIONS ZA2P AND ZA3P.

```
01675 4263 ZEXPR0, JMS      MOVARG /MOVE THE ARGUMENT
                                           /POINTERS.
01676 1435      TAD I   A1P      /GET ADDRESS TO TRANSFER TO.
01677 3036      DCA     TEMPAD
01700 1437      TAD I   APP      /HAVE 2ND ARGUMENT IN AC.
01701 6201      CDF     3
01702 5436      JMP I   TEMPAD  /GO TO THIS ROUTINE.
```

/CHANGE FIELD 0 LOCATION SPECIFIED IN AC.
/SAVE ADDRESS.

```
01703 3036 CNGLOC, DCA     TEMPAD
01704 6211      CDF     10
01705 1441      TAD I   ZA3P
CNGLOC7,
01706 3436      DCA I   TEMPAD /CHANGE LOCATION.
01707 5042      JMP     ZRET2  /RETURN.
```

/RETURN WITH THE CONTENTS OF THE ADDRESS SPECIFIED IN
/THE ACCUMULATOR.

```
01710 3036 GETCON, DCA     TEMPAD
01711 1436      TAD I   TEMPAD
01712 5044      JMP     ZVRET2 /RETURN THIS NUMERICAL VALUE.
```

/PRINT CHARACTER SPECIFIED IN 2ND ARGUMENT
/ON THE LINE PRINTER.

```
01713 4716 PRLPT, JMS I   PLPT  /HAVE CHAR IN AC ON ENTRY.
01714 7200      CLA     /RETURN VALUE NIL.
01715 5042      JMP     ZRET2  /RETURN.
01716 0600 PLPT,  LPTOUT /POINTER TO LINE PRINTER ROUTINE.
```


/MOVE A1P,APP,AND A3P TO
/7A1P,ZA2P,AND ZA3P RESPECTIVELY.
/RETURNS WITH DATA FIELD =10.

01663	0000	MOVARG,	0	
01664	6211	CDF	10	
01665	7200	CLA		
01666	1500	TAD I	PA1P	
01667	3035	DCA	ZA1P	
01670	1501	TAD I	PA2P	
01671	3037	DCA	ZA2P	
01672	1502	TAD I	PA3P	
01673	3041	DCA	ZA3P	
01674	5663	JMP I	MOVARG	

/ZEXPR ROUTINE. JUMPS TO
/THE LOCATION SPECIFIED AS THE
/FIRST ARGUMENT, WITH POINTERS TO THE
/SECOND AND THIRD ARGUMENTS IN
/FIELD 0 LOCATIONS ZA2P AND ZA3P.

01675	4263	ZEXPR0,	JMS	MOVARG	/MOVE THE ARGUMENT /POINTERS.
01676	1435		TAD I	A1P	/GET ADDRESS TO TRANSFER TO.
01677	3036		DCA	TEMPAD	
01700	1437		TAD I	APP	/HAVE 2ND ARGUMENT IN AC.
01701	6201		CDF	0	
01702	5436		JMP I	TEMPAD	/GO TO THIS ROUTINE.

01703	3036	/CHANGE FIELD 0 LOCATION SPECIFIED IN AC.		
01704	6211	CNGLOC,	DCA	TEMPAD /SAVE ADDRESS.
01705	1441		CDF	10
			TAD I	ZA3P
		CNGLOC,		
01706	3436		DCA I	TEMPAD /CHANGE LOCATION.
01707	5042		JMP	ZRET2 /RETURN.

		/RETURN WITH THE CONTENTS OF THE ADDRESS SPECIFIED IN /THE ACCUMULATOR.		
01710	3036	GETCON,	DCA	TEMPAD
01711	1436		TAD I	TEMPAD
01712	5044		JMP	ZVRET2 /RETURN THIS NUMERICAL VALUE.

		/PRINT CHARACTER SPECIFIED IN 2ND ARGUMENT /ON THE LINE PRINTER.		
01713	4716	PRLPT,	JMS I	PLPT /HAVE CHAR IN AC ON ENTRY.
01714	7200		CLA	/RETURN VALUE NIL.
01715	5042		JMP	ZRET2 /RETURN.
01716	0600	PLPT,	LPTOUT	/POINTER TO LINE PRINTER ROUTINE.

```

01717 3036 /CHANGE FIELD 2 LOCATION SPECIFIED IN AC
CNGLO2, DCA TEMPAD /SAVE ADDRESS
01720 6211 CDF 10
01721 1441 TAD I ZA3P /GET VALUE TO BE SAVED
01722 6221 CDF 20
01723 5306 JMP CNGLOZ

01724 3036 /CHANGE FIELD 3 LOCATION SPECIFIED IN AC
CNGLO3, DCA TEMPAD /SAVE ADDRESS
01725 6211 CDF 10
01726 1441 TAD I ZA3P /GET VALUE TO BE SAVED
01727 6231 CDF 30
01730 5306 JMP CNGLOZ

01731 6221 /GET FIELD 2 CONTENT OF ADDRESS IN AC
GETCO2, CDF 20 /SET DF
01732 5310 JMP GETCON

01733 6231 /GET FIELD 3 CONTENT OF ADDRESS IN AC
GETCO3, CDF 30 /SET DF
01734 5310 JMP GETCON

01735 6211 /XOR OF ARG2 AND ARG3
XORX, CDF 10 /RESET DF WITH ARG2 IN AC
01736 1441 TAD I A3P /ADD ARG3
01737 3036 DCA TEMPAD /TEMPAD = A+B
01740 1441 TAD I A3P /GET ARG2
01741 0437 AND I A2P /MASK WITH ARG3
01742 7040 CMA
01743 1036 TAD TEMPAD /AC = A+B-(A.B)=A.XOR.B
01744 5044 JMP ZVRET2

01745 6211 /OR OF ARG2 AND ARG3. NO EAE
ORX, CDF 10 /RESET DF, ARG2 IN AC
01746 7040 CMA /
01747 3036 DCA TEMPAD /
01750 1441 TAD I A3P /A.OR.B =
01751 7040 CMA /
01752 0036 AND TEMPAD /.NOT.(.NOT.A.AND..NOT.B)
01753 7040 CMA /
01754 5044 JMP ZVRET2 /RETURN VALUE

01755 7421 /OR OF ARG2 AND ARG3, MODE A EAE
OREAEX, MQL /ARG2 TO MQ
01756 6211 CDF 10 /RESET DF
01757 1441 TAD I A3P /ARG3 TO AC
01760 7501 MQA /AC.OR.MQ TO AC
01761 5044 JMP ZVRET2 /RETURN VALUE
    
```

```

01717 3036 /CHANGE FIELD 2 LOCATION SPECIFIED IN AC
01720 6211 CNGLO2, DCA TEMPAD /SAVE ADDRESS
01721 1441 CDF 10
01722 6221 TAD I ZA3P /GET VALUE TO BE SAVED
01723 5306 CDF 20
JMP CNGLOZ

01724 3036 /CHANGE FIELD 3 LOCATION SPECIFIED IN AC
01725 6211 CNGLO3, DCA TEMPAD /SAVE ADDRESS
01726 1441 CDF 10
01727 6231 TAD I ZA3P /GET VALUE TO BE SAVED
01730 5306 CDF 30
JMP CNGLOZ

01731 6221 /GET FIELD 2 CONTENT OF ADDRESS IN AC
01732 5310 GETCO2, CDF 20 /SET DF
JMP GETCON

01733 6231 /GET FIELD 3 CONTENT OF ADDRESS IN AC
01734 5310 GETCO3, CDF 30 /SET DF
JMP GETCON

01735 6211 /XOR OF ARG2 AND AND ARG3
01736 1441 XORX, CDF 10 /RESET DF WITH ARG2 IN AC
01737 3036 TAD I A3P /ADD ARG3
01740 1441 DCA TEMPAD /TEMPAD = A+B
01741 0437 TAD I A3P /GET ARG2
01742 7040 AND I A2P /MASK WITH ARG3
01743 1036 CMA
01744 5044 TAD TEMPAD /AC = A+B-(A.B)=A.XOR.B
JMP ZVRET2

01745 6211 /OR OF ARG2 AND ARG3. NO EAE
01746 7040 ORX, CDF 10 /RESET DF, ARG2 IN AC
01747 3036 CMA /
01750 1441 DCA TEMPAD /
01751 7040 TAD I A3P /A.OR.B =
01752 0036 CMA /
01753 7040 AND TEMPAD /.NOT.(.NOT.A.AND..NOT.B)
01754 5044 CMA /
JMP ZVRET2 /RETURN VALUE

01755 7421 /OR OF ARG2 AND ARG3, MODE A EAE
01756 6211 OREAEX, MQL /ARG2 TO MQ
01757 1441 CDF 10 /RESET DF
01760 7501 TAD I A3P /ARG3 TO AC
01761 5044 MQA /AC.OR.MQ TO AC
JMP ZVRET2 /RETURN VALUE

```

```

2000 *2000
/LOGICAL SHIFT ARG2*(2**ARG3), NO EAE
02000 3036 LFTSHX, DCA TEMPAD /SAVE ARG2
02001 6211 CDF 10 /RESTORE DF
02002 1441 TAD I A3P /GET ARG3
02003 7450 SNA /ARG3=0?
02004 5216 JMP NOSHIFT /YES RETURN ARG2
02005 7510 SPA /N > 0?
02006 5220 JMP RIGHTSH /NO, RIGHT SHIFTS
02007 7041 CMA IAC /LEFT SHIFTL0OP
02010 3253 DCA TEMPAX /SAVE COUNT
02011 1036 TAD TEMPAD
02012 7104 CLL RAL
02013 2253 ISZ TEMPAX
02014 5212 JMP .-2
02015 5044 JMP ZVRET2 /RETURN VALUE
02016 1036 NOSHIFT, TAD TEMPAD /PICK UP ARG2
02017 5044 JMP ZVRET2 /RETURN IT
02020 3253 RIGHTSH, DCA TEMPAX /STORE COUNT
02021 1036 TAD TEMPAD /GET ARG2
02022 7110 CLL RAR /SHIFT RIGHT
02023 2253 ISZ TEMPAX /STEP COUNT
02024 5222 JMP .-2 /ONCE MORE
02025 5044 JMP ZVRET2 /RETURN VALUE

/LOGICAL SHIFT ARG2*(2**ARG3), EAE VERSION
02026 3036 LFTFAX, DCA TEMPAD /STORE ARG2
02027 6211 CDF 10 /RESTORE DF
02030 1441 TAD I A3P /GET ARG3
02031 7450 SNA
02032 5216 JMP NOSHIFT /ARG3=0
02033 7510 SPA
02034 5245 JMP RIGEAS /ARG3 > 0, RIGHT SHIFT
02035 7041 CMA IAC /SUBTRACT BY ONE
02036 7040 CMA
02037 3243 DCA LFTSHC
02040 7621 CAM /CLEAR MQ
02041 1036 TAD TEMPAD
02042 7413 SHL /SHIFT IT LEFT
02043 0000 LFTSHC, .-.
02044 5044 JMP ZVRET2 /RETURN RESULT
02045 7040 RIGEAS, CMA /CHANGE SIGN AND BACK ONE
02046 3251 DCA RIGSHC /STORE IN SHIFTCOUNT
02047 1036 TAD TEMPAD /GET ARG2
02050 7417 LSR /LOGICAL RIGHT SHIFT
02051 0000 RIGSHC, .-.
02052 5044 JMP ZVRET2 /RETURN VALUE

/REMAINDER (ARG2 ARG3) IS RETURNED
/QUOTIENT IS RETURNED IN 15
/RETRIEVED BY EXPR(3172 15 -1)
/
02053 0000 TEMPAX, 0 /TEMP STORAGE
02054 3036 REXX, DCA TEMPAD /STORE ARG2
02055 6211 CDF 10 /RESTORE DF
02056 3434 DCA I PQUOTI /CLEAR QUOTIENT
02057 1441 TAD I A3P /GET ARG3
    
```

```

2000 *2000
/LOGICAL SHIFT ARG2*(2**ARG3), NO EAE
02000 3036 LFTSHX, DCA TEMPAD /SAVE ARG2
02001 6211 CDF 10 /RESTORE DF
02002 1441 TAD I A3P /GET ARG3
02003 7450 SNA /ARG3=0?
02004 5216 JMP NOSHIFT /YES RETURN ARG2
02005 7510 SPA /N > 0?
02006 5220 JMP RIGHTSH /NO, RIGHT SHIFTS
02007 7041 CMA IAC /LEFT SHIFTLOOP
02010 3253 DCA TEMPAX /SAVE COUNT
02011 1036 TAD TEMPAD
02012 7104 CLL RAL
02013 2253 ISZ TEMPAX
02014 5212 JMP .-2
02015 5044 JMP ZVRET2 /RETURN VALUE
02016 1036 NOSHIFT, TAD TEMPAD /PICK UP ARG2
02017 5044 JMP ZVRET2 /RETURN IT
02020 3253 RIGHTSH, DCA TEMPAX /STORE COUNT
02021 1036 TAD TEMPAD /GET ARG2
02022 7110 CLL RAR /SHIFT RIGHT
02023 2253 ISZ TEMPAX /STEP COUNT
02024 5222 JMP .-2 /ONCE MORE
02025 5044 JMP ZVRET2 /RETURN VALUE
/LOGICAL SHIFT ARG2*(2**ARG3), EAE VERSION
02026 3036 LFTFAX, DCA TEMPAD /STORE ARG2
02027 6211 CDF 10 /RESTORE DF
02030 1441 TAD I A3P /GET ARG3
02031 7450 SNA /ARG3=0
02032 5216 JMP NOSHIFT /ARG3=0
02033 7510 SPA RIGEAS /ARG3 > 0, RIGHT SHIFT
02034 5245 JMP IAC /SUBTRACT BY ONE
02035 7041 CMA IAC
02036 7040 CMA
02037 3243 DCA LFTSHC
02040 7621 CAM /CLEAR MQ
02041 1036 TAD TFMPAD
02042 7413 SHL /SHIFT IT LEFT
02043 0000 LFTSHC, .-.
02044 5044 JMP ZVRET2 /RETURN RESULT
02045 7040 RIGEAS, CMA /CHANGE SIGN AND BACK ONE
02046 3251 DCA RIGSHC /STORE IN SHIFTCOUNT
02047 1036 TAD TEMPAD /GET ARG2
02050 7417 LSR /LOGICAL RIGHT SHIFT
02051 0000 RIGSHC, .-.
02052 5044 JMP ZVRET2 /RETURN VALUE
/REMAINDER (ARG2 ARG3) IS RETURNED
/QUOTIENT IS RETURNED IN 15
/RETRIEVED BY EXPR(3172 15 -1)
/
02053 0000 TEMPAX, 0
02054 3036 REMX, DCA TEMPAD /TEMP STORAGE
02055 6211 CDF 10 /STORE ARG2
02056 3434 DCA I PQUOTI /RESTORE DF
02057 1441 TAD I A3P /CLEAR QUOTIENT
 /GET ARG3

```

```

02060 7450      SNA           /=0?
02061 5322      JMP           FEX          /YES, ERROR
02062 3253      DCA           TEMPAX       /STORE ARG3
02063 1253      TAD           TEMPAX       /GET IT AGAIN
02064 7161      CLL CML CMA IAC /-ARG3, 13 BITS
02065 1036      TAD           TEMPAD       /ADD ARG2
02066 7530      SZL           SPA          /STILL GREATER
02067 5273      JMP           .+4          /NO, READY
02070 3036      DCA           TEMPAD       /STORE NEW ONE
02071 2434      ISZ I        PQUOTI       /STEP QUOTIENT
02072 5263      JMP           .-7          /ONCE MORE
02073 7200      CLA
02074 1036      TAD           TEMPAD       /GET LAST REM
02075 5044      JMP           ZVRET2      /RETURN IT

/REMAINDER, EAE VERSION
02076 7421      REMEAE, MQL          /ARG2 TO MQ
02077 6211      CDF           10        /RESTORE DF
02100 1441      TAD I        A3P        /GET ARG3
02101 3303      DCA           .+2       /STORE IN 2:ND WORD
02102 7407      RENDVT, DVI          /DIVIDE ARG2/ARG3
02103 0000      .-.
02104 7430      SZL
02105 5322      JMP           FFX        /OVERFLOW
02106 7521      SWP
02107 3434      DCA I        PQUOTI     /LET AC AND MQ EXCHANGE CONTENT
02110 7701      MQA          CLA        /AC - QUOTIENT
02111 5044      JMP           ZVRET2     /MQ - REMAINDER

/PRODUCT, EAE VERSION FOR QUICK TIMES
02112 7421      TIMEAE, MQL          /ARG2 TO MQ
02113 6211      CDF           10        /GET DF
02114 1441      TAD I        A3P        /GET ARG3
02115 3317      DCA           .+2       /STORE IN 2:ND WORD
02116 7405      MUY          /ARG2*ARG3, 12 BITS
02117 0000      .-.
02120 7701      MQA          CLA        /
02121 5044      JMP           ZVRET2     /12 LAST BITS TO AC
02122 7200      FEX,        CLA        /RETURN IT
02123 6213      CIF          CDF 10
02124 4524      JMS I        PIERR

/PRODUCT, TWO. WORD RESULT
/ARG2*ARG3+<15> - <15>, RESULT
02125 7421      TIMEXT, MQL          /ARG2 TO MQ
02126 6211      CDF           10        /RESTORE DF
02127 1441      TAD I        A3P        /GET ARG3
02130 3333      DCA           .+3       /STORE IN 2:ND WORD
02131 1434      TAD I        PQUOTI     /GET <15>
02132 7405      MUY          /MULTIPLY
02133 0000      .-.
02134 3434      DCA I        PQUOTI     /
02135 7501      MQA          /STORE FIRST WORD
02136 5044      JMP           ZVRET2     /GET 2:ND ONE
/RETURN IT
/QUOTIENT, TWO WORD NOMINATOR
/(<15>,ARG)/ARG3 - RESULT,<15>
/ARG3 > <15>
/

```

```

02060 7450      SNA
02061 5322      JMP          FEX          /=0?
02062 3253      DCA          TEMPAX     /YES, ERROR
02063 1253      TAD          TEMPAX     /STORE ARG3
02064 7161      CLL CML CMA IAC /GET IT AGAIN
02065 1036      TAD          TEMPAD     /-ARG3, 13 BITS
02066 7530      SZL          SPA        /ADD ARG2
02067 5273      JMP          .+4         /STILL GREATER
02070 3036      DCA          TEMPAD     /NO, READY
02071 2434      ISZ I PQUOTI /STORE NEW ONE
02072 5263      JMP          .-7         /STEP QUOTIENT
02073 7200      CLA
02074 1036      TAD          TEMPAD     /ONCE MORE
02075 5044      JMP          ZVRET2     /GET LAST REM
                                /RETURN IT
/REMAINDER, EAE VERSION
02076 7421      REMEAE, MQL
02077 6211      CDF          10         /ARG2 TO MQ
02100 1441      TAD I A3P          /RESTORE DF
02101 3303      DCA          .+2       /GET ARG3
02102 7407      REMDVI, DVI          /STORE IN 2:ND WORD
02103 0000      .-.
02104 7430      SZL          /DIVIDE ARG2/ARG3
02105 5322      JMP          FFX        /OVERFLOW
02106 7521      SWP
02107 3434      DCA I PQUOTI /LET AC AND MQ EXCHANGE CONTENT
02110 7701      MQA          CLA       /AC - QUOTIENT
02111 5044      JMP          ZVRET2     /MQ - REMAINDER
/PRODUCT, EAE VERSION FOR QUICK TIMES
02112 7421      TIMEAE, MQL
02113 6211      CDF          10         /ARG2 TO MQ
02114 1441      TAD I A3P          /GET DF
02115 3317      DCA          .+2       /GET ARG3
02116 7405      MUY
02117 0000      .-.
02120 7701      MQA          CLA       /STORE IN 2:ND WORD
02121 5044      JMP          ZVRET2     /ARG2*ARG3, 12 BITS
02122 7200      FFX,          CLA       /
02123 6213      CIF          CDF 10    /12 LAST BITS TO AC
02124 4524      JMS I P1ERR          /RETURN IT
/PRODUCT, TWO. WORD RESULT
/ARG2*ARG3+<15> - <15>, RESULT
02125 7421      TIMEXT, MQL
02126 6211      CDF          10         /ARG2 TO MQ
02127 1441      TAD I A3P          /RESTORE DF
02130 3333      DCA          .+3       /GET ARG3
02131 1434      TAD I PQUOTI /STORE IN 2:ND WORD
02132 7405      MUY
02133 0000      .-.
02134 3434      DCA I PQUOTI /GET <15>
02135 7501      MQA          /MULTIPLY
02136 5044      JMP          ZVRET2     /
                                /STORE FIRST WORD
/QUOTIENT, TWO WORD NOMINATOR
/(<15>,ARG)/ARG3 - RESULT,<15>
/ARG3 > <15>
/

```

02137	7421	REMEXT,	MO		/ARG2 TO MO
02140	6211		COF	10	/RESTORE DF
02141	1441		TAD I	A3P	/GET ARG3
02142	3303		DCA	REMDVI+1	/STORE IND 2:ND WORD
02143	1434		TAD I	PQUOTI	/<15> TO AC
02144	5302		JMP	REMDVI	/DIVIDE


```

2200 *2200
/13 BIT ADDER, UNSIGNED, EAE INDEPENDENT
/<15> + ARG2 + ARG3 => <15>(CARRY), RESULT
/<15> IS THE QUOTIENT CELL, USED FOR CARRY
02200 6211 ADDWCA, CDF 10 /RESET DF
02201 7100 CLL /CLEAR LINK BIT
02202 1441 TAD I A3P /ADD ARG2
02203 1434 TAD I PQUOTI /ADD OLD CARRY
02204 3777 DCA TEMPAX /SAVE AC IN TEMPAX
02205 7004 RAL /LINK TO AC
02206 3434 DCA I PQUOTI /STORE IN <15>
02207 1777 TAD TEMPAX /GET SUM TO AC
02210 5044 JMP ZVRET2 /RETURN VALUE

/BINARY PUNCH ROUTINE
/IF ARG3 >=0, PUNCH ARG2, ARG3
/IF ARG3 <0, PUNCH ARG2. -ARG3 TIMES
02211 3036 STUTX, DCA TEMPAD /SAVE ARG2
02212 6211 CDF 10 /RESTORE DF
02213 1036 TAD TEMPAD /GET ARG2
02214 4231 JMS STANSA /PUT IT
02215 1441 TAD I A3P /GET ARG3
02216 7510 SPA />=0?
02217 5222 JMP STUX /NO, REPEAT
02220 4231 JMS STANSA /PUT IT
02221 5042 JMP ZRET2 /EXIT
02222 3777 STUX, DCA TEMPAX /SAVE COUNT
02223 5226 JMP .+3 /BYPASS ONCE
02224 1036 TAD TEMPAD /GET ARG2
02225 4231 JMS STANSA /PUT IT ONCE MORE
02226 2777 ISZ TEMPAX /STEP COUNT
02227 5224 JMP .-3 /ONCE MORE
02230 5042 JMP ZRET2 /EXIT
02231 0000 STANSA, 0 /BASIC PUNCH ROUTINE
02232 6026 6026
02233 6021 6021
02234 5233 JMP .-1
02235 7600 P7600, 7600 /CLA AND A CONSTANT
02236 5631 JMP I STANSA

02237 6211 SETDEC, CDF 10 /SET DECIMAL MODE
02240 1267 TAD SETDA /1037
02241 3670 DCA I SETDA+1 /2506
02242 1271 TAD SETDA+2 /1750
02243 3672 DCA I SETDA+3 /2034
02244 1273 TAD SETDA+4 /144
02245 3674 DCA I SETDA+5 /2035
02246 1275 TAD SETDA+6 /12
02247 3676 DCA I SETDA+7 /2036
02250 1277 TAD SETDA+10 /7061
02251 3700 DCA I SETDA+11 /2046
02252 5042 JMP ZRET2 /EXIT

02253 6211 SETOCT, CDF 10 /SET OCTAL UNSIGNED MODE
02254 1301 TAD SETDA /7000
02255 3670 DCA I SETDA+1 /2506

```

```

02256 1302      TAD      SETOA+1 /1000
02257 3672      DCA I    SETDA+3 /2034
02260 1303      TAD      SETOA+2 /100
02261 3674      DCA I    SETDA+5 /2035
02262 1304      TAD      SETOA+3 /10
02263 3676      DCA I    SFTDA+7 /2036
02264 1305      TAD      SETOA+4 /7000
02265 3700      DCA I    SFTDA+11/2046
02266 5042      JMP      ZRET2
02267 1037      SETDA,  1037; RDNUM1; 1750; K1000; 144; K100
02270 2536
02271 1750
02272 2034
02273 0144
02274 2035
02275 0012      12; K10; 7061; PRNTA5
02276 2036
02277 7061
02300 2046
02301 7000      SETOA,  7000; 1000; 100; 10; 7000
02302 1000
02303 0100
02304 0010
02305 7000
02306 0235      CPAGE,  AND      P7600  /MASK OUT PAGE
02307 7041      CMA IAC
02310 3036      DCA      TEMPAD  /STORE NEGATIVE ARG2  MASKED
02311 6211      CDF 10
02312 1437      TAD I    A2P      /GET ARG 2
02313 1441      TAD I    A3P      /ADD ARG 3
02314 0235      AND      P7600  /MASK OUT PAGE
02315 3231      DCA      STANSA  /SAVE IT A WHILE
02316 1231      TAD      STANSA  /PIC IT UP
02317 1036      TAD      TEMPAD  /COMPARE WITH MASKED ARG 2
02320 7640      SZA CLA
02321 5324      JMP      CPAGE1  /NOT SAME PAGE
02322 1437      TAD I    A2P      /SAME PAGE, GET ARG 2
02323 5044      JMP      ZVRET2  /EXIT
02324 1231      CPAGE1, TAD      STANSA  /NOT SAME PAGE, GET NEXT PAGE START
02325 5044      JMP      ZVRET2  /EXIT
    
```

02377	2053			
	5400		*5400	
05400	0000	/BEGINNING OF TELETYPE INPUT BUFFER.		
	5577	TRUF, 0		
			*5577	
05577	0000	/END OF TELETYPE INPUT BUFFER.		
		LASTL, 0		
	5600		*5600	
05600	0000	OUBUF, 0		/LOCATION OF OUTPUT BUFFER.
	6200		*6200	
06200	0000	INBUFL, 0		/LOCATION OF INPUT BUFFER
	6600		*6600	
06600	0000	OUDBUF, 0		/LOCATION TO LOAD OUTPUT DEVICE HANDLER
	7200		*7200	
07200	0000	INDRUF, 0		/LOCATION TO LOAD INPUT DEVICE HANDLER

0001 FIELD 1
/PAGE ZERO LOCATIONS

/LOCATION 102 IS STILL UNUSED.

	0000		*0	
10000	0000	NIL,	0	/ATOM NIL
10001	0000	NL1,	0	
10002	0002	K2,	2	
10003	0003	K3,	3	
10004	0004	K4,	4	
10005	0005	K5,	5	
10006	0000	GCNT,	0	/CUMULATIVE NUMBER OF TIMES THE /GARBAGE COLLECTOR HAS BEEN CALLED
10007	0077	K77,	77	
10010	0000	XR10,	0	/THESE FOUR INDEX REGISTERS /ARE USED BY SEVERAL PARTS /OF THE LISP SYSTEM.
10011	0000	XR11,	0	
10012	0000	XR12,	0	
10013	0000	XR13,	0	
10014	0000	CHAR,	0	/INPUT CHARACTER BUFFER
10015	0000	QUOTIENT,	0	/USED BY ZEXPR ROUTINES FOR /MULTIPLY AND DIVIDE AND MULTIPLE /PRECISION INTEGER ARITHMETIC ROUTINES.
10016	0000	LINCNT,	0	/LINE COUNT, COUNTING FROM -77 TO 0.
10017	0000	CGENSYM,	0	/COUNTER USED BY GENSYM
10020	3624	L20,	PAPVAL	
				/THESE LOCATIONS ARE /USED FOR STORING DIFFERENT /THINGS AT DIFFERENT TIMES.
10021	0000	TEMP1,	0	
10022	0000	L22,	0	
10023	0000	L23,	0	
10024	3622	PTRUE,	TRUE	/POINTER TO THE ATOM "T"
10025	0000	ALP,	0	/POINTER TO THE ASSOCIATION LIST
10026	3764	POBJST,	OBJST	/POINTER TO THE START OF THE /OBJECT LIST
10027	0000	SP,	0	/STACK POINTER
10030	0000	FLIST,	0	/POINTER TO THE NEXT CELL IN /THE FREE LIST.
10031	0000	L31,	0	/THESE LOCATIONS ARE USED /FOR STORING VALUES
10032	0000	L32,	0	
10033	0000	L33,	0	
10034	3676	PB1ARG,	B1ARG	/POINTER TO THE BEGINNING OF THE /SYSTEM SUBROUTINES WITH /ONE ARGUMENT.
10035	0000	A1P,	0	/POINTER TO THE FIRST ARGUMENT
10036	3714	PB2ARG,	B2ARG	/POINTER TO THE BEGINNING OF THE /SYSTEM SUBROUTINES WITH TWO /ARGUMENTS.
10037	0000	A2P,	0	/POINTER TO THE SECOND ARGUMENT
10040	3742	PB3ARG,	B3ARG	/POINTER TO THE BEGINNING OF THE /SYSTEM SUBROUTINES WITH THREE /ARGUMENTS.
10041	0000	A3P,	0	/POINTER TO THE THIRD ARGUMENT
10042	3754	POBJ,	OBJ	/POINTER TO OBJECT.
10043	3614	PSOBJ,	SOBJ	/POINTER TO THE SYSTEM OBJECT LIST
10044	3765	PBEG,	LBEG	/POINTER TO THE BEGINNING OF

			/THE LIST SPACE
10045	4166	LLEN, LBEG-LEND	/-LENGTH OF THE LIST SPACE
10046	3265	PSYMT, SYMT	/POINTER TO THE ATOMIC SYMBOL TABLE
10047	0216	PDISP, DISP	/POINTER TO THE DISPATCH ROUTINE
10050	1136	PASSOC, ASSOC	/POINTER TO ASSOC ROUTINE
10051	2650	PCKUSER, CKUSER	/POINTER TO ROUTINE WHICH /CHECKS TO SEE IF IT IS USER- /DEFINED.
10052	1012	PGETARG, GETARG	/POINTER TO THE ROUTINE TO /GET AN ARGUMENT.
10053	1520	PGETTOP, GETTOP	/POINTER TO GETTOP ROUTINE
10054	0771	PCDR, CDR	/POINTER TO CDR ROUTINE
10055	1652	PGARB, GARB	/POINTER TO ROUTINE WHICH /CHECKS TO SEE IF A GARBAGE /COLLECTION IS NECESSARY.
10056	0672	PLIST1, LIST1	
10057	0720	PLIST5, LIST5	
10060	3134	PERR, ERR	/POINTER TO THE ERROR ROUTINE
10061	1116	PGET, GET	/POINTER TO THE GET ROUTINE
10062	2211	PPRINCC, PRINCC	/POINTER TO THE PRINT CHARACTER ROUTINE
10063	2172	PPRINT, PRINT	/POINTER TO THE PRINT /S-EXPRESSION ROUTINE
10064	2510	PREAD, READ	/POINTER TO THE READ /S-EXPRESSION ROUTINE
10065	3224	PRDPCK, RDPCK	/POINTER TO THE READ AND /PACK 2 CHARACTERS ROUTINE
10066	2312	PFETCHC, FETCHC	/POINTER TO THE FETCH A /CHARACTER ROUTINE
10067	2151	PTERPRI, TERPRI	/POINTER TO THE PRINT A /CARRIAGE RETURN AND LINE /FEED ROUTINE
10070	3207	PA1PPL1, A1PPL1	
10071	1160	PLOOKUP, LOOKUP	
10072	1475	PCAR, CAR	/POINTER TO THE CAR ROUTINE
10073	0000	INRET, 0	/RETURN ADDRESS FROM THE /INPUT ROUTINE.

/PAGE ZERO ROUTINES AND POINTERS

/TELETYPE INPUT ROUTINE

```

10074 6203 TTYIN, CDF CIF 0 /GO TO BUFFERED TTYIN ROUTINE.
10075 4476 JMS I .+1
10076 0200 BTTY
10077 5473 JMP I INRET /RETURN.

```

```

10100 3155 PINSUB, INSUB /POINTER TO THE BASIC
/INPUT ROUTINE.
10101 1504 PSCR6, SCR6 /POINTER TO THE SCALE RIGHT
/SIX ROUTINE
10102 0000 0 /THIS LOCATION IS UNUSED.
10103 3040 PSETM2, SETM2 /POINTER TO THE ROUTINE TO
/SET THE ACCUMULATOR TO -2

```

```

/LISP NUMBER ROUTINE. CHECKS TO SEE IF
/ARGUMENT IS A NUMBER. RETURNS NIL IF IT
/IS NOT. OTHERWISE, IT RETURNS A POINTER TO "TRUE".

```

```

10104 0000 NUMBER, 0
10105 1035 TAD A1P
10106 3011 DCA XR11
10107 7040 CMA
10110 1411 TAD I XR11
10111 7650 SNA CLA
10112 1024 TAD PTRUE /HAD A NUMBER
10113 5504 JMP I NUMBER

```

```

/LISP ATOM ROUTINE. CHECKS TO SEE IF THE ARGUMENT
/IS AN ATOM. IF IT IS, RETURNS A POINTER TO
/"TRUE". OTHERWISE, RETURNS NIL.

```

```

10114 0000 ATOM, 0
10115 4470 JMS I PA1PPL1
10116 7001 IAC
10117 0421 AND I TEMP1
10120 7640 SZA CLA
10121 1024 TAD PTRUE /IT WAS AN ATOM.
10122 5514 JMP I ATOM /RETURN.

```

```

/POP ROUTINE. POPS THE STACK. RETURNS WITH
/THE PREVIOUS CONTENTS OF THE TOP OF THE
/STACK IN THE AC.

```

```

10123 0000 POP, 0
10124 7200 CLA
10125 1027 TAD SP /STACK POINTER
10126 3010 DCA XR10
10127 1427 TAD I SP
10130 3027 DCA SP /RESET THE STACK
/POINTER TO POINT TO

```

```

10131 1410      TAD I   XR10   /CELL BEFORE THIS.
10132 5523      JMP I   POP     /GET THE CONTENTS OF
                    /THE POPPED CELL.
    
```

/PUSH ROUTINE. PUSHES THE CONTENTS OF THE
/ACCUMULATOR ON THE TOP OF THE STACK.

```

10133 0000      PUSH,   0
10134 2030      ISZ     FLIST  /FLIST NOW POINTS TO THE
                    /DATA PART OF THE NEXT FREE
                    /CELL.
10135 3430      DCA I   FLIST  /PUSH THE AC.
10136 1027      TAD     SP
10137 3023      DCA     L23
10140 7040      CMA
10141 1030      TAD     FLIST  /AC NOW CONTAINS POINTER
                    /TO THIS CELL.
10142 3027      DCA     SP   /SAVE THE POINTER TO
                    /TO THE TOP OF THE STACK.
10143 1427      TAD I   SP   /POINTER TO THE NEXT
                    /CELL AVAILABLE IN FREE LIST
10144 3030      DCA     FLIST  /RESET FREE LIST POINTER
10145 1023      TAD     L23   /POINTER TO PREVIOUS TOP
                    /OF STACK.
10146 3427      DCA I   SP   /NOTE THAT THE STACK IS
                    /MERELY A LIST IN THE FREE
                    /SPACE.
10147 4455      JMS I   PGARB  /SEE IF FREE SPACE IS
                    /EXHAUSTED, AND IF SO,
                    /INITIATE A GARBAGE COLLECT.
10150 5533      JMP I   PUSH  /RETURN.
    
```

/NUCEL ROUTINE.
/CONS ROUTINE. GETS A NEW CELL FROM THE FREE
/LIST, AND PLACES C(A1P) IN THE BOTTOM HALF,
/AND PLACES C(A2P) IN THE TOP HALF.
/RETURNS A POINTER TO THE CELL.

```

10151 0000      NUCEL,
10152 2030      CONS,   0
10153 1035      ISZ     FLIST  /POINT TO BOTTOM OF NEXT CELL
10154 3430      TAD     A1P
10155 7040      DCA I   FLIST  /SAVE C(A1P) IN BOTTOM OF CELL
10156 1030      CMA
10157 3035      TAD     FLIST
10160 1435      DCA     A1P   /SAVE POINTER TO THIS CELL
                    /POINTER TO NEXT CELL IN
                    /FREE SPACE.
10161 3030      TAD I   A1P
10162 1037      DCA     FLIST  /RESET THE FREE LIST POINTER
10163 3435      TAD     A2P
10164 3037      DCA I   A1P   /SAVE C(A2P) IN TOP OF CELL
                    DCA     A2P
    
```

10165 4055 JMS I PGARB /SEE IF FREE SPACE IS EXHAUSTED,
/AND IF SO, INITIATE A
10166 1035 TAD A1P /GARBAGE COLLECT.
10167 5551 JMP I CONS /POINTER TO THE CELL

10170 4123 /POP A1P AND EV, AND RETURN WITH A1P IN AC.
LRET1, JMS POP

10171 3035 /POP EV AND RETURN
LRET2, DCA A1P /SAVE AC TEMPORARILY

10172 4123 /POP EV, AND LOAD A1P IN AC.
LRET3, JMS POP
10173 3176 DCA EV

10174 1035 /LOAD A1P AND RETURN
LRET4, TAD A1P
10175 5576 JMP I EV

/EVALUATE SUBROUTINE

```

10176 0000 EV, 0
10177 4114 JMS ATOM /CHECK IF IT IS AN ATOM
10200 7650 SNA CLA
10201 5225 JMP EV1 /HAD AN ATOM
10202 4451 JMS I PCKUSER /SEE IF IT IS A USER-DEFINED
/FUNCTION.
10203 5174 JMP LRET4 /SYSTEM FUNCTION
10204 4104 JMS NUMBER /HAD USER-DEFINED FUNCTION.
/SEE IF IT IS A NUMBER.
10205 7640 SZA CLA
10206 5174 JMP LRET4 /IT WAS A NUMBER
10207 1020 TAD L20
10210 4471 JMS I PLOOKUP
10211 7420 SNL
10212 4460 JMS I PERR /VALUE OF THIS VARIABLE
/IS NOT DEFINED.
10213 5576 JMP I EV /RETURN
10214 1367 PROU9, ROU9
10215 3630 PFEXPP, FFXPR
    
```

/DISPATCH ROUTINE. CALLED BY EVALQUOTE, WITH
 /A POINTER TO THE FIRST S-EXPRESSION IN A1P
 /AND A POINTER TO THE SECOND S-EXPRESSION IN A2P.

```

10216 0000 DISP, 0
10217 1216 TAD DISP
10220 3176 DCA EV /SAVE RETURN ADDRESS.
10221 1037 TAD A2P /POINTER TO SECOND
/S-EXPRESSION
10222 3033 DJISP14, DCA L33
10223 7240 CLA CMA
10224 5233 JMP EV2
10225 1035 EV1, TAD A1P
10226 3031 DCA L31
10227 1421 TAD I TEMP1
10230 3035 DCA A1P
10231 1431 TAD I L31
10232 3033 DCA L33
10233 3032 EV2, DCA L32
10234 1035 TAD A1P /POINTER TO 1ST S-EXPRESSION
10235 7450 EV3, SNA
10236 5576 JMP I EV /NIL FUNCTION-RETURN NIL
10237 3035 DCA A1P
10240 4104 JMS NUMBER /SEE IF 1ST ARGUMENT WAS
/A NUMBER
10241 7640 SZA CLA
10242 4460 JMS I PFERR /ERROR- A NUMBER IS
/STANDING IN THE PLACE OF
/A FUNCTION
10243 1435 TAD I A1P
    
```

10244	3037		DCA	A2P	
10245	4114		JMS	ATOM	
10246	7650		SNA	CLA	
10247	5374		JMP	EV4	/NOT AN ATOM
10250	4451		JMS I	PCKUSER	/SEE IF USER-DEFINED
10251	5307		JMP	EV5	/SYSTEM-DEFINED FUNCTION
10252	1022		TAD	L22	/USER-DEFINED
10253	4471		JMS I	PLOOKUP	
10254	7430		SZL		
10255	5235		JMP	EV3	
10256	1215		TAD	PFEXPR	
10257	3037		DCA	A2P	
10260	1031		TAD	L31	
10261	3035		DCA	A1P	
10262	4461		JMS I	PGET	
10263	7420		SNL		
10264	5614		JMP I	PROU9	
10265	3031		DCA	L31	
10266	1025		TAD	ALP	/GET ASSOCIATION LIST POINTER
10267	3035		DCA	A1P	
10270	3037		DCA	A2P	
10271	4151		JMS	NUCEL	/PUT A1P AND A2P IN A CELL
10272	3037		DCA	A2P	/SAVE POINTER TO THIS CELL
10273	1033		TAD	L33	
10274	3035		DCA	A1P	
10275	4151		JMS	NUCEL	
10276	3033		DCA	L33	
10277	1031		TAD	L31	
10300	3035		DCA	A1P	
10301	5223		JMP	EV1-2	
10302	4452	T,	JMS I	PGETARG	
10303	3035		DCA	A1P	
10304	5177		JMP	EV+1	
10305	3664	PSYSSUBS,SYSSUBS			
10306	0033	K33,	33		
10307	1305	EV5,	TAD	PSYSSUBS	
10310	7161		CLL CML	CIA	
10311	1035		TAD	A1P	
10312	7630		SZL CLA		
10313	5437		JMP I	A2P	
10314	1176		TAD	EV	
10315	4133		JMS	PUSH	/PREPARE FOR RECURSION
10316	1035		TAD	A1P	
10317	4133		JMS	PUSH	
10320	4456		JMS I	PLIST1	
10321	4123		JMS	POP	
10322	3031		DCA	L31	
10323	1306		TAD	K33	
10324	3011		DCA	XR11	
10325	5336		JMP	EV7	
10326	1033	EV6,	TAD	L33	

10327 7450
10330 4460

SNA
JMS I PERR

/BUILT IN FUNCTION HAS
/TOO FEW ARGUMENTS

10331 3010
10332 1433
10333 3033
10334 1410

DCA XR10
TAD I L33
DCA 33
TAD I XR10

10335 3411
10336 1411

DCA I XR11
TAD I XR11

EV7,

10337 7161
10340 1031

CLL CML CIA
TAD L31

10341 7620
10342 5326

SNL CLA
JMP EV6

10343 1033
10344 7640

TAD L33
SZA CIA

10345 4460

JMS I PERR

/BUILT-IN FUNCTION HAS
/TOO MANY ARGUMENTS

10346 1431
10347 3021

TAD I L31
DCA TEMP1

/SAVE ADDRESS OF FUNCTION
/GO TO BUILT-IN FUNCTION

10350 4421
10351 5171

JMS I TEMP1
JMP LRET2

/RETURN

```

10352 1033 EVA4, TAD L33
10353 4133 JMS PUSH
10354 1176 TAD EV
10355 4133 JMS PUSH
10356 2032 ISZ L32
10357 5366 JMP EVA1
10360 4176 JMS EV
10361 3035 DCA A1P
10362 4123 JMS POP
10363 3176 DCA EV
10364 4123 JMS POP
10365 5222 JMP DISP14
10366 4176 EVA1, JMS EV
10367 3035 DCA A1P
10370 4123 JMS POP
10371 3176 DCA EV
10372 4123 JMS POP
10373 5232 JMP EV2-1
10374 1421 EV4, TAD I TEMP1
10375 7161 CLL CML CIA
10376 1043 TAD PSOBJ
10377 7450 SNA
10400 5255 JMP EVA19
10401 1004 TAD K4
10402 7640 SZ A CLA
10403 5614 JMP I PEVA4
10404 4242 JMS PUSHA
10405 4456 JMS I PLIST1
10406 4453 JMS I PGETTOP
10407 1421 TAD I TEMP1
10410 3025 DCA ALP
10411 1410 TAD I XR10
10412 3423 DCA I L23
10413 5257 JMP EVA6
10414 0352 PEVA4, EVA4
10415 3600 K3600, 3600

10416 1022 FUNC1, TAD L22
10417 4471 JMS I PLOOKUP
10420 7420 SNL
10421 4460 JMS I PERR /ERROR-THIS FUNCTIONAL
/ARGUMENT IS NO FUNCTION.
10422 7410 SKP

/LIPS FUNCTY ROUTINE.
10423 4452 FUNCTY, JMS I PGETARG
10424 3035 DCA A1P
10425 4114 JMS ATOM
10426 7640 SZ A CLA
10427 5216 JMP FUNC1
10430 1435 TAD I A1P
10431 3035 DCA A1P
10432 1025 TAD ALP
10433 3037 DCA APP

```

10434	4151	JMS	NUCEL
10435	3037	DCA	A2P
10436	1215	TAD	K3600
10437	3035	DCA	A1P
10440	4151	JMS	NUCEL
10441	5576	JMP I	EV

/PUSHA ROUTINE			
10442	0000	PUSHA,	0
10443	1176	TAD	EV
10444	4133	JMS	PUSH
10445	1025	TAD	ALP
10446	4133	JMS	PUSH
10447	1037	TAD	A2P
10450	4133	JMS	PUSH
10451	5642	JMP I	PUSHA

/LISP PROG ROUTINE.			
10452	1033	PROG,	TAD L33
10453	3037		DCA A2P
10454	3033		DCA L33
10455	4242	EVA19,	JMS PUSHA
10456	4456		JMS I PLIST1
10457	4453	EVA6,	JMS I PGETTOP
10460	1021		TAD TEMP1
10461	3031		DCA L31
10462	1421		TAD I TEMP1
10463	3021		DCA TEMP1
10464	1410	EVA11,	TAD I XR10
10465	7450		SNA
10466	5317		JMP EVA8
10467	3010		DCA XR10
10470	1410		TAD I XR10
10471	3035		DCA A1P
10472	1033		TAD L33
10473	7440		S7A
10474	5301		JMP EVA9
10475	1421		TAD I TEMP1
10476	7640		S7A CLA
10477	5305		JMP EVA10
10500	4460		JMS I PERR

/ERROR-LAMBDA FORM HAS
/TOO FEW ARGUMENTS.

10501	3011	EVA9,	DCA XR11
10502	1433		TAD I L33
10503	3033		DCA L33
10504	1411		TAD I XR11
10505	3037	EVA10,	DCA A2P
10506	4151		JMS NUCEL
10507	4503		JMS I PSETM2
10510	1010		TAD XR10
10511	3010		DCA XR10
10512	1025		TAD ALP
10513	3037		DCA A2P

10514	4151	JMS	NUCEL	
10515	3025	DCA	ALP	
10516	5264	JMP	EVA11	
10517	1033	EVA8, TAD	L33	
10520	7640	SZA	CLA	
10521	4460	JMS I	PERR	/LAMBDA FORM HAS TOO /MANY ARGUMENTS.
10522	1421	TAD I	TEMP1	
10523	7640	SZA	CLA	
10524	5331	JMP	EVA12	
10525	2021	ISZ	TEMP1	
10526	1421	TAD I	TEMP1	
10527	3035	DCA	A1P	
10530	5377	JMP	EVA13	
10531	1021	EVA12, TAD	TEMP1	
10532	4133	JMS	PUSH	
10533	4453	EVA14, JMS I	PGETTOP	
10534	7420	SNL		
10535	5375	JMP	EVA15	
10536	1421	TAD I	TEMP1	
10537	3423	DCA I	L23	
10540	1410	TAD I	XR10	
10541	3035	DCA	A1P	
10542	4114	JMS	ATOM	
10543	7450	SNA		
10544	4176	JMS	EV	
10545	5333	JMP	EVA14	
/CKPROG ROUTINE				
10546	0000	CKPROG, 0		
10547	1576	TAD I	EV	
10550	7041	CIA		
10551	1345	TAD	CKPROG-1	
10552	7640	SZA	CLA	
10553	4460	JMS I	PERR	/ERROR-GO, RETURN, OR COND /WITH UNDEFINED VALUE HAS /BEEN ENCOUNTERED OUTSIDE OF /A PROG.
10554	5746	JMP I	CKPROG	

/LISP GO ROUTINE.

10555	4346	GO,	JMS	CKPROG	
10556	4452		JMS I	PGETARG	
10557	3037		DCA	A2P	
10560	1427		TAD I	SP	
10561	3010		DCA	XR10	
10562	1410		TAD I	XR10	
10563	3035		DCA	A1P	
10564	4461		JMS I	PGET	
10565	7420		SNL		
10566	4460		JMS I	PERR	/ERROR-GO HAS UNKNOWN
					/LAREL
10567	4453		JMS I	PGETTOP	
10570	1035		TAD	A1P	
10571	3423		DCA I	L23	
10572	5333		JMP	EVA14	

/LISP RETURN ROUTINE

10573	4346	RETURN,	JMS	CKPROG	
10574	4452		JMS I	PGETARG	
10575	3035	EVA15,	DCA	A1P	
10576	4123		JMS	POP	
10577	4123	EVA13,	JMS	POP	
10600	4176	EVAL1,	JMS	EV	
10601	3035	EVAL2,	DCA	A1P	
10602	4123		JMS	POP	
10603	3025		DCA	ALP	
10604	5172		JMP	LRET3	

/LISP EVAL ROUTINE

10605	0000	EVAL,	Ø		
10606	1205		TAD	EVAL	
10607	4133		JMS	PUSH	
10610	1025		TAD	ALP	
10611	4133		JMS	PUSH	
10612	1037		TAD	A2P	
10613	3025		DCA	ALP	
10614	5200		JMP	EVAL1	

/LISP APPLY ROUTINE.

10615	0000	APPLY,	Ø		
10616	1215		TAD	APPLY	
10617	4133		JMS	PUSH	
10620	1025		TAD	ALP	
10621	4133		JMS	PUSH	
10622	1041		TAD	A3P	
10623	3025		DCA	ALP	
10624	4447		JMS I	PDISP	
10625	5201		JMP	EVAL2	

/LISP COND ROUTINE

10626	1176	COND,	TAD	EV	
-------	------	-------	-----	----	--

10627	4133		JMS	PUSH
10630	1033		TAD	L33
10631	4133		JMS	PUSH
10632	5236		JMP	COND1
10633	4453	COND3,	JMS I	PGETTOP
10634	1421		TAD I	TEMP1
10635	3423		DCA I	L23
10636	4453	COND1,	JMS I	PGETTOP
10637	7420		SNL	
10640	5256		JMP	COND2
10641	1410		TAD I	XR10
10642	3010		DCA	XR10
10643	1410		TAD I	XR10
10644	3035		DCA	A1P
10645	4176		JMS	EV
10646	7650		SNA	CLA
10647	5233		JMP	COND3
10650	4453		JMS I	PGETTOP
10651	1410		TAD I	XR10
10652	3035		DCA	A1P
10653	1435		TAD I	A1P
10654	3010		DCA	XR10
10655	1410		TAD I	XR10
10656	3035	COND2,	DCA	A1P
10657	4123		JMS	POP
10660	4123		JMS	POP
10661	3176		DCA	EV
10662	7430		SZL	
10663	5177		JMP	EV+1
10664	4666		JMS I	PCKPROG
10665	5576		JMP I	EV
10666	0546	PCKPROG,CKPROG		


```

/LISP LIST ROUTINE.
10667 1176 LIST, TAD EV
10670 3272 LIST6, DCA LIST1
10671 7410 SKP
10672 0000 LIST1, 0
10673 1033 TAD L33
10674 2032 ISZ L32 /IF L32 IS -1 RETURN.
10675 7450 SNA /IF L33 IS 0 RETURN
10676 5672 JMP I LIST1
10677 4133 JMS PUSH
10700 4453 LIST2, JMS I PGETTOP
10701 1272 TAD LIST1
10702 3423 DCA I L23
10703 7420 SNL
10704 5317 JMP LIST4
10705 1410 TAD I XR10
10706 3035 DCA A1P
10707 1421 TAD I TEMP1
10710 4133 JMS PUSH
10711 4176 JMS EV
10712 3272 DCA LIST1
10713 5300 JMP LIST2
10714 1033 LIST3, TAD L33
10715 3435 DCA I A1P
10716 1035 TAD A1P
10717 3033 LIST4, DCA L33
10720 1027 LIST5, TAD SP
10721 3035 DCA A1P
10722 4123 JMS POP
10723 3021 DCA TEMP1
10724 1021 TAD TEMP1
10725 7161 CLL CML CIA
10726 7440 SZA
10727 1043 TAD PSOBJ
10730 7670 SNL SNA CLA
10731 5314 JMP LIST3
10732 1033 TAD L33
10733 5421 JMP I TEMP1
    
```

```

/LISP SET ROUTINE.
10734 0000 SET, 0
10735 1037 TAD A2P
10736 3033 DCA L33
10737 1025 TAD ALP /ASSOCIATION LIST POINTER
10740 3037 DCA A2P
10741 4450 JMS I PASSOC
10742 7450 SNA
10743 4460 JMS I PERR /ERROR- FIRST ARGUMENT OF
/SET OR SETQ IS NOT ATOMIC
10744 3021 DCA TEMP1
10745 1033 TAD L33
10746 3421 DCA I TEMP1
    
```

```

10747 1033      TAD      L33
10750 5734      JMP I   SET      /RETURN

```

/LISP SETQ ROUTINE

```

10751 1176      SETQ,   TAD      EV
10752 4133      JMS     PUSH
10753 1033      TAD     L33
10754 3010      DCA    XR10
10755 1433      TAD I   L33
10756 3033      DCA    L33
10757 1410      TAD I   XR10
10760 4133      JMS     PUSH
10761 4452      JMS I   PGETARG
10762 3035      DCA    A1P
10763 4176      JMS     EV
10764 3037      DCA    A2P
10765 4123      JMS     POP
10766 3035      DCA    A1P
10767 4334      JMS     SET
10770 5171      JMP     LRET2   /RETURN

```

/LISP CDR ROUTINE.

```

10771 0000      CDR,    0
10772 1035      TAD     A1P
10773 7640      SZA    CLA
10774 1435      TAD I   A1P      /GET CDR
10775 5771      JMP I   CDR      /RETURN.

```

/LISP STOP ROUTINE.

```

10776 7402      STOP,   HLT
10777 5576      JMP I   EV      /RETURN TO EVALQUOTE
                          /WHEN CONTINUE PUSHED.

```

/LISP QUOTE ROUTINE

```

11000 4212      QUOTE,  JMS     GETARG
11001 5576      JMP I   EV

```

/LISP RPLACAR ROUTINE. REPLACE THE CAR PART.

```

11002 0000      RPLACA, 0
11003 4114      JMS     ATOM
11004 7440      SZA
11005 7201      CLA    IAC
11006 1037      TAD     A2P
11007 3421      DCA I   TEMP1
11010 1035      TAD     A1P
11011 5602      JMP I   RPLACA

```

11012	0000	/GETARG ROUTINE.	
11013	7240	GETARG, 0	
11014	1033	CLA CMA	
11015	3010	TAD L33	/-1 IN AC
11016	1433	DCA XR10	
11017	2010	TAD I L33	
11020	7640	ISZ XR10	
11021	4460	SZA CLA	
		JMS I PERR	/ERROR-WRONG NUMBER OF
11022	1410	TAD I XR10	/ARGUMENTS IN THIS FUNCTION
11023	5612	JMP I GETARG	

/LISP EQ ROUTINE.

```

EQ,      0
11024    0000
11025    4104      JMS      NUMBRER  /SEE IF ARGUMENT IS A NUMBER
11026    7640      SZA CLA
11027    4251      JMS      SWAP
11030    4104      JMS      NUMBER
11031    7640      SZA CLA
11032    5237      JMP      EQ1
11033    1035      TAD      A1P
11034    7041      CIA
11035    1037      TAD      A2P
11036    5242      JMP      EQ2
11037    1435      EQ1,    TAD I    A1P
11040    7041      CIA
11041    1437      TAD I    A2P
11042    7650      EQ2,    SNA CLA  /SKIP IF NOT EQUAL
11043    1024      TAD      PTRUE  /POINTER TO "T"
11044    5624      JMP I    EQ

```

/LISP NULL ROUTINE.

```

NULL,    0
11045    0000
11046    3037      DCA      APP
11047    4224      JMS      EQ
11050    5645      JMP I    NULL

```

/SWAP ROUTINE. SWAPS A1P AND A2P.

```

SWAP,    0
11051    0000
11052    1035      TAD      A1P
11053    3011      DCA      XR11
11054    1037      TAD      A2P
11055    3035      DCA      A1P
11056    1011      TAD      XR11
11057    3037      DCA      A2P
11060    5651      JMP I    SWAP

```

/LISP EQUAL ROUTINE.

```

EQUAL,    0
11061    0000
11062    1261      TAD      EQUAL
11063    4133      JMS      PUSH    /PREPARE FOR RECURSION
11064    4114      EQUAL2, JMS      ATOM
11065    7650      SNA CLA
11066    4251      JMS      SWAP
11067    4114      JMS      ATOM
11070    7650      SNA CLA
11071    5274      JMP      EQUAL1
11072    4224      JMS      EQ
11073    5171      JMP      LRET2
11074    1435      EQUAL1, TAD I    A1P
11075    4133      JMS      PUSH

```

11076	1437	TAD I	A2P
11077	4133	JMS	PUSH
11100	1411	TAD I	XR11
11101	3035	DCA	A1P
11102	1421	TAD I	TEMP1
11103	3037	DCA	A2P
11104	4261	JMS	EQUAL
11105	3041	DCA	A3P
11106	4123	JMS	POP
11107	3035	DCA	A1P
11110	4123	JMS	POP
11111	3037	DCA	A2P
11112	1041	TAD	A3P
11113	7640	SZA CLA	
11114	5264	JMP	EQUAL2
11115	5171	JMP	LRET2

/LISP GET ROUTINE.

11116	0000	GET,	0
11117	4451	GFT1,	JMS I PCKUSER
11120	5716		JMP I GET
11121	1035		TAD A1P
11122	3010		DCA XR10
11123	1435		TAD I A1P
11124	3035		DCA A1P
11125	1410		TAD I XR10
11126	7141		CLL CIA
11127	1037		TAD A2P
11130	7640		SZA CLA
11131	5317		JMP GET1
11132	1035		TAD A1P
11133	3011		DCA XR11
11134	1411		TAD I XR11
11135	5716		JMP I GET

/LISP ASSOC ROUTINE.

11136	0000	ASSOC,	0
11137	7300	ASSOC1,	CLA CLL
11140	1037		TAD A2P
11141	7450		SNA
11142	5736		JMP I ASSOC
11143	3010		DCA XR10
11144	1437		TAD I A2P
11145	3037		DCA A2P
11146	1410		TAD I XR10
11147	3010		DCA XR10
11150	1410		TAD I XR10
11151	7041		CIA
11152	1035		TAD A1P
11153	7440		SZA
11154	5337		JMP ASSOC1
11155	7140		CLL CMA

/RETURN

11156	1010	TAD	XR10	
11157	5736	JMP I	ASSOC	/RETURN

/LOOKUP ROUTINE.
LOOKUP, 0

11160	0000			
11161	3023	DCA	L23	
11162	1025	TAD	ALP	
11163	3037	DCA	A2P	
11164	4336	JMS	ASSOC	/LOOK UP THE 1ST ARG
11165	7420	SNL		
11166	5372	JMP	LKUP1	
11167	3021	DCA	TEMP1	
11170	1421	TAD I	TEMP1	
11171	5760	JMP I	LOOKUP	
11172	1035	LKUP1, TAD	A1P	
11173	3031	DCA	L31	
11174	1023	TAD	L23	
11175	3037	DCA	A2P	
11176	4316	JMS	GET	
11177	5760	JMP I	LOOKUP	

/LISP RPLACDR ROUTINE. REPLACE CDR PART.
RPLACD, 0

11200	0000			
11201	1037	TAD	A2P	
11202	3435	DCA I	A1P	
11203	1035	TAD	A1P	
11204	5600	JMP I	RPLACD	

/LISP DEFLIS ROUTINE.

```

11205 0000 DEFLIS, 0
11206 1205 TAD DEFLIS
11207 4133 JMS PUSH
11210 1037 TAD A2P
11211 3041 DCA A3P
11212 1035 DEFL2, TAD A1P
11213 3031 DCA L31
11214 4451 JMS I PCKUSER
11215 5457 JMP I PLIST5
11216 4472 JMS I PCAR
11217 3035 DCA A1P
11220 1035 TAD A1P
11221 3037 DCA A2P
11222 4472 JMS I PCAR
11223 3035 DCA A1P
11224 1041 TAD A3P
11225 3421 DCA I TEMP1
11226 4114 JMS ATOM
11227 7650 SNA CLA
11230 4460 JMS I PFERR /ERROR-FIRST ELEMENT OF A
/PAIR IN DEFINE OF DEFLIS
/IS NOT A NAME.

11231 4451 JMS I PCKUSER
11232 5261 JMP DEFL4
11233 1435 TAD I A1P
11234 3033 DCA L33
11235 4200 JMS RPLACD
11236 4133 JMS PUSH
11237 1437 TAD I A2P
11240 3037 DCA A2P
11241 1033 TAD L33
11242 3010 DCA XR10
11243 1410 TAD I XR10
11244 7041 CIA
11245 1041 TAD A3P
11246 7640 SZA CLA
11247 5254 JMP DEFL1
11250 1433 TAD I L33
11251 3033 DCA L33
11252 1433 TAD I L33
11253 7410 SKP
11254 1033 DEFL1, TAD L33
11255 3437 DCA I A2P
11256 1431 DEFL3, TAD I L31
11257 3035 DCA A1P
11260 5212 JMP DEFL2
11261 1421 DEFL4, TAD I TEMP1
11262 3035 DCA A1P
11263 4151 JMS NUCEL
11264 4133 JMS PUSH
11265 1426 TAD I POBJST
11266 3037 DCA A2P
11267 4151 JMS NUCEL
11270 3426 DCA I POBJST

```

11271 5256 JMP DEFL3

```
11272 0000 /LISP DEFINE ROUTINE.  
11273 1022 DEFINE, 0  
11274 3037 TAD L22  
11275 4205 OCA ARP  
11276 5672 JMS DEFLIS  
JMP I DEFINE
```


/THIS SECTION IS FOR C....R ROUTINES

11277 0000
11300 2011
11301 5311
11302 1010
11303 4501
11304 7161
11305 5677

ROU2,
ROU3,

0
ISZ XR11
JMP ROU1
TAD XR10
JMS I PSCR6
CLL CML CIA
JMP I ROU2

11306 4073

JMS INRET

/ROUTINE TO RETURN WITH
/SINGLE CHARACTER+X AND
/MASK THE TAPE READER.

11307 5710
11310 3173

JMP I .+1
RMask

11311 7040
11312 3011
11313 1021
11314 7450
11315 5677
11316 3010
11317 1421
11320 3021
11321 1410
11322 3010
11323 1007
11324 0010
11325 5304
11326 0016
11327 0043
11330 0045

ROU1,

CMA
DCA XR11
TAD TEMP1
SNA
JMP I ROU2
DCA XR10
TAD I TEMP1
DCA TEMP1
TAD I XR10
DCA XR10
TAD K77
AND XR10
JMP ROU3

K16,
KA,
KC,

16
43
45

/CONSTANT FOR "A"
/CONSTANT FOR "C"

11331 0000
11332 4453
11333 7040
11334 1410
11335 3021
11336 7001
11337 3023
11340 3011
11341 4277
11342 1330
11343 7640
11344 4460

ROU4,

0
JMS I PGETTOP
CMA
TAD I XR10
DCA TEMP1
IAC
DCA L23
DCA XR11
JMS ROU2
TAD KC
SZA CLA
JMS I PERR

ROU8,

/ERROR-NAME IN POSITION
/OF A FUNCTION WHICH IS
/NOT A FUNCTION.

11345 4277
11346 1327
11347 7450
11350 7020
11351 7440
11352 1003
11353 7440

ROU7,

JMS ROU2
TAD KA
SNA
CML
SZA
TAD K3
SZA

/SKIP IF 0

11354	5361		JMP	ROU6	
11355	1023		TAD	L23	
11356	7004		RAL		
11357	3023		DCA	L23	
11360	5345		JMP	ROU7	
11361	1326	ROU6,	TAD	K16	/46+16=64="R"
11362	7450		SNA		
11363	4277		JMS	ROU2	
11364	7440		SZA		
11365	5344		JMP	ROU8	
11366	5731		JMP I	ROU4	
11367	1176	ROU9,	TAD	EV	
11370	4133		JMS	PUSH	
11371	1031		TAD	L31	
11372	4133		JMS	PUSH	
11373	4331		JMS	ROU4	
11374	4456		JMS I	PLIST1	
11375	4452		JMS I	PGETARG	
11376	3035		DCA	A1P	
11377	4331		JMS	ROU4	
11400	1023	ROU11,	TAD	L23	
11401	7110		CLL	RAR	
11402	7440		SZA		
11403	5206		JMP	ROU10	
11404	4123		JMS	POP	
11405	5172		JMP	LRET3	
11406	3023	ROU10,	DCA	L23	
11407	7420		SNL		
11410	4454		JMS I	PCDR	
11411	7430		SZL		
11412	4275		JMS	CAR	
11413	3035		DCA	A1P	
11414	5200		JMP	ROU11	

11415 0670 PLIST6, LIST6

/PLUS1 SUBROUTINE.

```

11416 0000 PLUS1, 0
11417 3037 DCA A2P
11420 7001 IAC
11421 3035 DCA A1P
11422 1176 TAD EV
11423 4133 JMS PUSH
11424 4151 JMS NUCEL
11425 4133 JMS PUSH
11426 1216 TAD PLUS1
11427 5615 JMP I PLIST6

```

PLUS2, 0

```

11430 0000 PLUS2, 0
11431 7200 CLA
11432 1033 TAD L33
11433 7450 SNA
11434 5170 JMP LRET1
11435 3010 DCA XR10
11436 1433 TAD I L33
11437 3033 DCA L33
11440 1410 TAD I XR10
11441 3035 DCA A1P
11442 4453 JMS I PGETTOP
11443 1421 TAD I TEMP1
11444 5630 JMP I PLUS2

```

/LISP PLUS ROUTINE.

```

11445 4216 PLUS, JMS PLUS1
11446 4230 PLUS3, JMS PLUS2
11447 1435 TAD I A1P
11450 3421 DCA I TEMP1
11451 5246 JMP PLUS3

```

/LISP MINUS ROUTINE.

```

11452 4216 MINUS, JMS PLUS1
11453 4230 MINUS2, JMS PLUS2
11454 1435 TAD I A1P
11455 7041 CTA
11456 3421 DCA I TEMP1
11457 5253 JMP MINUS2

```

/LISP LESSP ROUTINE.

```

11460 0000 LFSSP, 0
11461 1437 TAD I A2P
11462 7161 CLL CML CIA
11463 7500 SMA
11464 7100 CLL
11465 3023 DCA L23
11466 1435 TAD I A1P
11467 7510 SPA

```

```

11470 7020      CML
11471 1023      TAD          L23
11472 7630      SZL CLA
11473 1024      TAD          PTRUE
11474 5660      JMP I        LESSP

```

/LISP CAR ROUTINE

```

11475 0000      CAR,      0
11476 4114      JMS          ATOM
11477 7640      SZA CLA
11500 4460      JMS I        PERR      /ERROR-THE CAR OF AN ATOM
                               /HAS BEEN TAKEN.
11501 4503      JMS I        PSETM2
11502 0421      AND I        TMP1
11503 5675      JMP I        CAR

```

/SCR6 ROUTINE. SCALES AC RIGHT 6 PLACES.

```

11504 0000      SCR6,    0
11505 7112      CLL RTR
11506 7112      CLL RTR
11507 7112      CLL RTR
11510 7120      STL
11511 0007      AND          K77
11512 5704      JMP I        SCR6

```

/LISP EXPR ROUTINE.

```

11513 0000      EXPR,    0
11514 1435      TAD I        A1P      /ADDRESS TO JUMP TO.
11515 3313      DCA          EXPR
11516 1437      TAD I        A2P      /GET 2ND ARGUMENT IN AC
11517 5713      JMP I        EXPR      /JUMP TO THIS ROUTINE.

```

/GETTOP ROUTINE. PLACES THE TOP ELEMENT OF THE
/STACK IN TEMP1 AND XR10 WITHOUT POPPING
/THE STACK.

```

11520 0000      GETTOP,  0
11521 7321      CLA CLL CML IAC /AC=1, LINK=1
11522 1027      TAD          SP
11523 3023      DCA          L23      /STACK POINTER+1
11524 1423      TAD I        L23      /ITEM ON TOP OF STACK
11525 3021      DCA          TEMP1
11526 1021      TAD          TEMP1
11527 7450      SNA
11530 7100      CLL
11531 3010      DCA          XR10
11532 5720      JMP I        GETTOP

```

/LISP GENSYM ROUTINE.

```

GENSYM, 0
11533 0000
11534 1333 TAD GENSYM
11535 3464 DCA I PREAD
11536 3032 DCA L32
11537 3023 DCA L23
11540 1017 TAD CGENSY
11541 0373 AND K17
11542 3021 DCA TEMP1
11543 1017 TAD CGENSY
11544 7006 RTL
11545 0374 AND GEN1
11546 1021 TAD TEMP1
11547 1375 TAD GEN2
11550 3372 DCA GEN3
11551 1017 TAD CGENSY
11552 7012 RTR
11553 0374 AND GEN1
11554 1375 TAD GEN2
11555 3370 DCA GEN4
11556 2017 ISZ CGENSY
11557 1365 TAD GEN5
11560 3010 DCA XR10
11561 3037 DCA 42P
11562 4151 JMS NUCEL
11563 3033 DCA L33
11564 5766 JMP I GEN6
11565 1567 GEN5, GEN7
11566 2742 GEN6, NXTA6
11567 1571 GEN7, GEN0+1
11570 0000 GEN4, 0
11571 0000 0
11572 0000 GEN3, 0
11573 0017 K17, 17
11574 1700 GEN1, 1700
11575 5151 GEN2, 5151
11576 0000 0
11577 0000 0

```

/GARBAGE COLLECTION ROUTINES.
 /IF A GARBAGE COLLECTION IS NECESSARY,
 /THIS WILL GO THROUGH AND MARK ALL CELLS
 /REACHABLE FROM THE OBJECT LIST, SP,
 /A1P, A2P, A3P, ALP, L31, AND L33. IF THE CELL
 /HAS THE CDR PART = 1 (IMPLIES THIS IS A
 /NUMBER), THE SYSTEM WILL CHANGE THE 1 TO A 5.
 /OTHERWISE, THIS WILL SET THE RIGHT-MOST
 /BIT OF THE CDR PART TO 1. WHEN ALL
 /REACHABLE CELLS HAVE BEEN MARKED, THE COLLECTION
 /STARTS. ALL CELLS WITH CDR PART 1 WILL BE
 /COLLECTED (UNMARKED NUMBERS), AND ALL CELLS
 /WITHOUT THE RIGHTMOST BIT OF THE CDR PART
 /SET WILL BE COLLECTED. THE OTHER CELLS
 /WILL BE UNMARKED.

11600	1600		PAGE		
11600	0000	GL1,	0		/POINTER TO THE NEXT CELL /IN THE OBJECT LIST.
11601	0000	GL2,	0		
11602	7774	KM4,	-4		
11603	1005	GARB4,	TAD	K5	/CELL IS A NUMBER /REPLACE THE 1 WITH 5.
11604	3601		DCA I	GL2	
11605	7340	GARB3,	CLA CLL	CMA	/-1 IN AC
11606	1012		TAD	XR12	
11607	3201		DCA	GL2	
11610	1601		TAD I	GL2	/MOVE TO NEXT CELL IN /OBJECT LIST.
11611	7450		SNA		
11612	5633		JMP I	GMARK	
11613	3200		DCA	GL1	/POINTER TO NEXT CELL /IN ORLIST
11614	3601		DCA I	GL2	
11615	7040		CMA		
11616	1201		TAD	GL2	
11617	3012		DCA	XR12	
11620	4351	GARB2,	JMS	GMARKS	
11621	7440		SZA		
11622	5240		JMP	GARB5	
11623	1601	GARB6,	TAD I	GL2	
11624	7010		RAR		
11625	7420		SNL		
11626	5235		JMP	GARB7	
11627	7104		CLL	RAL	
11630	3200		DCA	GL1	
11631	4351		JMS	GMARKS	
11632	5230		JMP	.-2	
11633	0000	GMARK,	0		
11634	7410		SKP		
11635	7004	GARB7,	RAL		
11636	3200		DCA	GL1	
11637	5220		JMP	GARB2	
11640	3412	GARB5,	DCA I	XR12	
11641	1412		TAD I	XR12	

```

11642 7640          SZA CLA
11643 5223          JMP      GARB6
                /PRINT ERROR SYMBOL
11644 1251  GAR4,  TAD      KCAT      /NOW HAVE EITHER SYMBOL
                /FOR "@" OR "?" IN AC
11645 4462          JMS I   PPRINCC
11646 7402          HLT
11647 5650          JMP I   .+1      /REINITIALIZE WHEN CONTINUE
                /IS PRESSED.
11650 3006          INIT2+4
11651 0042  KCAT,  42      /CHARACTER FOR "@"

```

/ROUTINES CALL GARB TO SEE IF FREE SPACE IS
/EXHAUSTED. IF IT IS, GARB INITIATES A
/GARBAGE COLLECT.

```

11652 0000  GARB,  0
11653 1030          TAD      FLIST
11654 7640          SZA CLA
11655 5652          JMP I   GARB      /STILL ROOM LEFT. RETURN
11656 2006          ISZ      GCCNT      /INCREMENT GARBAGE
                /COLLECTOR COUNT AND
                /START GARBAGE COLLECTION.
11657 7000          NOP
11660 1046          TAD      PSYMT
11661 3012          DCA      XR12      /POINTER TO THE SYSTEM
                /ATOMIC SYMBOL TABLE

```

```

11662 1266          TAD      PL23
11663 3270          DCA      GLCNT
11664 1426          TAD I   POBJST      /POINTER TO THE
                /START OF THE OBJECT LIST

```

/FIRST MARK CELLS POINTED TO BY THE OBJECT LIST
/THEN MARK CELLS POINTED TO BY ALP, SP, L31, L33,
/A1P, A2P, AND A3P.

```

11665 5274          JMP      GARB1
11666 0023  PL23,  L23
11667 7737  KMA3P, -A3P      /TO SEE IF AT END OF POINTERS.
11670 0000  GLCNT,  0
11671 2270  GARBB,  ISZ      GLCNT
11672 2270          ISZ      GLCNT
11673 1670          TAD I   GLCNT
11674 4233  GARB1,  JMS      GMARK      /MARK THE CELLS
11675 1270          TAD      GLCNT
11676 1267          TAD      KMA3P
11677 7640          SZA CLA
11700 5271          JMP      GARBB

```

/HAVE NOW MARKED ALL THE CELLS. NOW COLLECT AND
/UNMARK.

```

11701 1045          TAD      LLEN
11702 7130          CLL CML RAR      /LENGTH/2
11703 3200          DCA      GL1      /NEGATIVE COUNT OF NUMBER
                /OF CELLS IN FREE LIST
11704 1044          TAD      PREG

```

11705	3012		DCA	XR12	/XR12 POINTS TO THE NEXT /CELL TO EXAMINE
11706	1012		TAD	XR12	
11707	3013		DCA	XR13	/XR13 POINTS TO THE CURRENT /CELL.
11710	1412	GAR3,	TAD I	XR12	
11711	3201		DCA	GL2	
11712	7040		CMA		
11713	1412		TAD I	XR12	
11714	7450		SNA		
11715	5342		JMP	GARB9	/COLLECT THE CELL
11716	1202		TAD	KM4	
11717	7640		SZA	CLA	
11720	5324		JMP	GAR1	/SEE IF BIT 11 IS MARKED
11721	2013		ISZ	XR13	/REPLACE 5 WITH 1
11722	7001		IAC		
11723	5347		JMP	GAR2	
			/CHECK IF BIT 11 IS MARKED, AND IF NOT, /COLLECT THE CELL.		
11724	1201	GAR1,	TAD	GL2	
11725	7010		RAR		
11726	7420		SNL		
11727	5342		JMP	GARB9	/CELL WAS NOT MARKED. COLLECT.
11730	7104		CLL	RAL	/UNMARK CELL.
11731	3413		DCA I	XR13	
11732	2013		ISZ	XR13	
11733	2200	GAR5,	ISZ	GL1	/INCREMENT COUNT OF CELLS /STILL TO GO THROUGH.
11734	5310		JMP	GAR3	
11735	1030		TAD	FLIST	/DONE COLLECTING.
11736	7640		SZA	CLA	
11737	5652		JMP I	GARB	/RETURN
11740	7240		CLA	CMA	/NO MORE FREE SPACE. /PRINT "?" AND HALT
11741	5244		JMP	GAR4	
			/COLLECT THE CELL.		
11742	7200	GARB9,	CLA		
11743	1030		TAD	FLIST	
11744	3413		DCA I	XR13	
11745	1013		TAD	XR13	
11746	3030		DCA	FLIST	
11747	3413	GAR2,	DCA I	XR13	/ZERO CAR PART
11750	5333		JMP	GAR5	
11751	0000	GMARKS,	0		
11752	1200		TAD	GL1	
11753	7161		CLL	CML CIA	
11754	1044		TAD	PREG	
11755	7620		SNL	CLA	
11756	5205		JMP	GARB3	/POINTS TO SYSTEM AREA- /DON'T MARK.
11757	7001		IAC		
11760	1200		TAD	GL1	
11761	3201		DCA	GL2	/POINTS TO SECOND WORD /OF CELL.

11762 7040
11763 1601
11764 7450
11765 5203

11766 1202
11767 7650
11770 5205

11771 1600
11772 7010
11773 7430
11774 5205
11775 7004
11776 2600
11777 5751

CMA
TAD I GL2 /POINTER TO NAME.
SNA
JMP GAR84 /VALUE WAS 1.THIS CELL
/IS A NUMBER. REPLACE BY 5.
TAD KM4
SNA CLA
JMP GAR83 /VALUE WAS 5. CELL
/IS ALREADY MARKED.
TAD I GL1
RAR
SZL
JMP GAR83 /CELL IS ALREADY MARKED
/NOT MARKED-MARK IT.
RAL
ISZ I GL1
JMP I GMARKS

```

/PRINT NAME OF ATOM ROUTINE.
12000 3023 PRINTR, DCA L23
12001 3041 DCA A3P
12002 1023 TAD L23 /POINTER TO ATOM
12003 3021 PRINTD, DCA TEMP1
12004 1421 TAD I TEMP1
12005 2041 ISZ A3P
12006 7440 SZA
12007 2041 ISZ A3P
12010 7440 SZA
12011 5203 JMP PRINTD
12012 2021 ISZ TEMP1
12013 1421 TAD I TEMP1
12014 0232 AND KKM100 /AND WITH 7700 TO GET
/SECOND CHARACTER.

12015 7640 SZA CLA
12016 2041 ISZ A3P
12017 1041 TAD A3P
12020 4362 JMS PROM /SEE IF THERE IS ROOM
/ON THIS LINE FOR THE
/ATOM

12021 1023 PRINTF, TAD L23
12022 7450 SNA
12023 5317 JMP PRINTF /NIL-SO RETURN
/FROM PRINTING ATOM

12024 3010 DCA XR10
12025 1423 TAD I L23
12026 3023 DCA L23
12027 1410 TAD I XR10
12030 4325 JMS PRINTC /PRINT THE ONE OR TWO
/CHARACTERS IN ACCUMULATOR
/GET NEXT PAIR OF CHARACTERS.

12031 5221 JMP PRINTE

12032 7700 KKM100, -100

12033 2033 KLOC, KLOC /TABLE USED IN CONVERTING
/A NUMBER TO 4 CHARACTERS.
/THESE 3 LOCATIONS ARE CHANGED
/FOR OCTAL PRINTING

12034 1750 K1000, 1750
12035 0144 K100, 144
12036 0012 K10, 12
12037 0000 0. /THIS TERMINATES THE TABLE

12040 7160 PRINTA, CLL CMA CML /PRINT ATOM ROUTINE-
/FIRST SEE IF ATOM IS
/A NUMBER.
12041 1421 TAD I TEMP1 /IF IT IS A NUMBER, POINTER
/WILL BE 1.
12042 7440 SZA
12043 5200 JMP PRINTB /NOT A NUMBER.
12044 1435 TAD I A1P /HAD A NUMBER. GET IT.
12045 7510 SPA
PRNTA5,
12046 7061 CML CIA /***THIS IS CHANGED FOR
/***PRINTING WITHOUT SIGN.
12047 3023 DCA L23 /SAVE THE NUMBER.

```



```

12121 7775 KM3, -3
12122 7751 KM27, -27
12123 0236 K236, 236
12124 3217 POUTCH, OUTSUB

```

```

/PRINTC ROUTINE. DECODES THE CHARACTER
/IN THE RIGHT-HAND 6 BITS OF AC,
/AND PRINTS IT. DECODES THE CHARACTER
/IN THE LEFT-HAND 6 BITS OF AC,
/AND PRINTS IT. IGNORES ZEROS.

```

```

12125 0000 PRINTC, 0
12126 7450 SNA
12127 5725 JMP I PRINTC /RETURN IF ZERO.
12130 3123 DCA POP /SAVE TEMPORARILY
12131 1123 TAD POP
12132 0007 AND K77
12133 3021 DCA TEMP1
12134 1021 TAD TEMP1 /NOW CONVERT THE CHARACTER
/TO ASCII FROM THE INTERNAL
/COOE.

12135 1321 TAD KM3
12136 7440 SZA /SKIP IF 3 (I.E. IF
/IT IS A LINE FEED)

12137 1321 TAD KM3
12140 7650 SNA CLA /SKIP IF IT IS NOT
/A CARRIAGE RETURN OR
/LINE FEED.

12141 1322 TAD KM27
12142 1021 TAD TEMP1 /ADD CHARACTER
12143 1323 TAD K236 /NOW HAVE ASCII CHARACTER
12144 4724 JMS I POUTCH /GO TO THE OUTPUT ROUTINE
12145 7200 CLA
12146 1123 TAD POP
12147 4501 JMS I PSCR6 /NOW HAVE 2ND CHARACTER
/IN RIGHT-HAND 6 BITS.

12150 5326 JMP PRINTC+1

```

```

/TERPRI ROUTINE. PRINTS A CARRIAGE RETURN
/AND A LINE FEED.

```

```

12151 0000 TERPRI, 0
12152 1232 TAD KKM100
12153 3016 DCA LINCNT /REINITIALIZE THE LINE COUNT
12154 1357 TAD K306
12155 4325 JMS PRINTC /PRINT CARRIAGE RETURN
/AND LINE FEED.

12156 5751 JMP I TERPRI

12157 0306 K306, 306 /INTERNAL CODE FOR CARRIAGE
/RETURN AND LINE FEED.

```

```

/ROUTINE TO PRINT A SINGLE CHARACTER WHOSE
/INTERNAL REPRESENTATION IS IN X.

```

12160 4462
12161 5171

JMS I PPRINCC
JMP LRET2

/ROUTINE TO SEE IF THERE IS ROOM ON THE
/CURRENT LINE FOR THE PRINTING WHICH IS
/NECESSARY. ENTER WITH THE NUMBER OF
/CHARACTERS NECESSARY TO PRINT.

12162 0000
12163 1016
12164 3016

PROOM, 0

TAD LINCNT
DCA LINCNT

/LINCNT IS MODIFIED
/BY THE CONTENTS OF
/THE AC ON ENTRY TO PROOM

12165 1016
12166 7710

TAD LINCNT
SPA CLA

/SKIP IF NOT ENOUGH
/ROOM ON CURRENT LINE.

12167 5762
12170 4351
12171 7410

JMP I PROOM
JMS TERPRI
SKP

/RETURN
/GO TO A NEW LINE.

/LISP PRINT ROUTINE.
/WILL PRINT THE S-EXPRESSION POINTED TO
/BY A1P.

12172	0000	PRINT,	0		
12173	4114	JMS		ATOM	/SEE IF IT IS AN ATOM
12174	7640	SZA	CLA		
12175	5240	JMP		PRINTA	/IT WAS AN ATOM
12176	1372	TAD		PRINT	/NOT AN ATOM. PREPARE /FOR RECURSION.
12177	4133	JMS		PUSH	
12200	1035	TAD		A1P	
12201	4133	JMS		PUSH	/HAVE NOW SAVED /RETURN AND POINTER /TO S-EXPRESSION.
12202	1206	TAD		KLP	
12203	4211	JMS		PRINCC	/PRINT A LEFT PARENTHESIS
12204	1035	TAD		A1P	
12205	5231	JMP		PRINT1	
12206	0012	KLP,	12		/INTERNAL CODE FOR LEFT /PARENTHESIS
12207	0013	KRP,	13		/INTERNAL CODE FOR RIGHT /PARENTHESIS
12210	0020	KPER,	20		/INTERNAL CODE FOR PERIOD.

/PRINCC ROUTINE. WILL PRINT A CHARACTER AND
/INCREMENT COUNT.

12211	0000	PRINCC,	0		
12212	2016	ISZ		LINCNT	
12213	5222	JMP		PRINC1	/NOT AT END OF LINE
12214	3023	DCA		L23	/AT END OF A LINE. /SAVE THE CHARACTER /TEMPORARILY.
12215	4467	JMS I		PTERPRI	/PRINT A C.R. AND L.F.
12216	1023	TAD		L23	/RESTORE CHARACTER
12217	7450	SNA			
12220	5611	JMP I		PRINCC	/HAD A BLANK AT END OF /LINE. DO NOT PRINT IT.
12221	2016	ISZ		LINCNT	/INCREMENT LINE COUNT
12222	7450	PRINC1,	SNA		
12223	1002	TAD		K2	/HAD A BLANK- CHANGE TO /THE OTHER CODE FOR BLANK
12224	4626	JMS I		PPRIN	/PRINT THE CHARACTER
12225	5611	JMP I		PRINCC	/RETURN
12226	2125	PPRIN,		PRINTC	
12227	4463	PRINT4,	JMS I	PPRINT	/CALL PRINT AGAIN. /HAD ATOM IN A LIST.
12230	4123	JMS		POP	
12231	4243	PRINT1,	JMS	PRTERM	/PRINT THE NEXT TERM
12232	7650	SNA	CLA		/SKIP IF NOT ATOM.

12233	5227		JMP	PRINT4	/HAD ATOM
12234	4463	PRINT5,	JMS I	PPRINT	/CALL PRINT AGAIN
12235	4123		JMS	POP	
12236	4243		JMS	PRTERM	
12237	7650		SNA	CLA	
12240	5227		JMP	PRINT4	/HAD ATOM
12241	4211		JMS	PRINCC	/PRINT THE CHARACTER
12242	5234		JMP	PRINT5	
12243	0000	PRTERM,	0		
12244	7450		SNA		
12245	5264		JMP	PRINT3	/AT END OF A SUBEXPRESSION, /SO PRINT A RIGHT PARENTHESIS
12246	3035		DCA	A1P	
12247	4114		JMS	ATOM	
12250	7640		SZA	CLA	
12251	5260		JMP	PRINT2	/HAD AN ATOM-PRINT /A PERIOD. /NOT AN ATOM
12252	1435		TAD I	A1P	
12253	4133		JMS	PUSH	
12254	1421		TAD I	TEMP1	
12255	3035		DCA	A1P	
12256	4114		JMS	ATOM	
12257	5643		JMP I	PRTERM	/RETURN
12260	1210	PRINT2,	TAD	KPER	/PRINT A PERIOD
12261	4211		JMS	PRINCC	
12262	4463		JMS I	PPRINT	/CALL PRINT ROUTINE AGAIN
12263	7200		CLA		
12264	1207	PRINT3,	TAD	KRP	/PRINT A RIGHT PARENTHESIS
12265	4211		JMS	PRINCC	
12266	5170		JMP	LRET1	/POP AND RETURN

/FETCHC WILL USE THE BASIC INPUT ROUTINE
 /TO READ A CHARACTER. THEN IT WILL
 /CONVERT THE CHARACTER TO THE SPECIAL
 /SIX-BIT INTERNAL CHARACTER CODE.

/FOR ASCII CHARACTERS WITH A CODE OF LESS
 /THAN 236, THE INTERNAL CODE IS FOUND
 /BY SUBTRACTING 207.

/FOR ASCII CHARACTERS WITH A CODE OF
 /GREATER THAN OR EQUAL TO 236, THE INTERNAL
 /CODE IS FOUND BY SUBTRACTING 236.

/THIS SUBROUTINE RETURNS TO THE LOCATION
 /AFTER THE CALL IF LEADER-TRAILER WAS FOUND
 /AND RETURNS TO THE SECOND LOCATION AFTER
 /THE CALL FOR ANY OTHER CHARACTER.
 /ON RETURN, THE CHARACTER WILL BE BOTH
 /IN THE ACCUMULATOR AND IN THE LOCATION
 /CHAR.

12267	3115	/CONSTANTS USED.			
		PCHMODE,	CHMODE		/POINTER TO ROUTINE TO
					/CHECK THE MODE WITH THE
					/PARAMETER AND SKIP IF
					/THE APPROPRIATE BITS ARE
					/NOT SET.
12270	3217	POUTSUB,	OUTSUB		/POINTER TO THE BASIC OUTPUT
					/ROUTINE.
12271	0027	K27,	27		
12272	0141	K141,	141		
12273	0177	K177,	177		
12274	7601	KM177,	-177		
12275	1014	FETCHP,	TAQ	CHAR	/HAD ASCII CODE. CONVERT
					/TO INTERNAL FORM.
12276	1274		TAQ	KM177	
12277	7450		SNA		
12300	5317		JMP	FETCH4	/IGNORE RUBOUTS.
12301	1272		TAQ	K141	
12302	7510		SPA		/SKIP IF CHARACTER
					/WAS >=236.
12303	1271		TAQ	K27	/CHARACTER WAS <236
12304	2312	FETCH1,	ISZ	FETCHC	/THE NORMAL RETURN IS
					/TWO LOCATIONS AFTER
					/THE CALL. THE LOCATION
					/AFTER THE CALL IS THE
					/RETURN FOR LEADER TRAILER
					/OR HEADER TAPE.

12305	7410		SKP			
12306	2324	CNGTTY,	RDASCII			/THIS LOCATION IS /USED AS A TRANSFER /POINTER TO EITHER THE /CODE FOR ASCII OR THE /CODE FOR CCITT2. IT IS /INITIALLY SET FOR ASCII. /SAVE THE CODED CHARACTER /IN CHAR. /RETURN WITH IT ALSO /IN THE AC. /RETURN
12307	3014		DCA	CHAR		
12310	1014		TAD	CHAR		
12311	5712		JMP I	FETCHC		
12312	0000	FETCHC,	0			/THIS IS THE SUBROUTINE /ENTRY POINT.
12313	7200		CLA			
12314	1014		TAD	CHAR		
12315	7440		SZA			/IF CHAR IS NON-ZERO, /THE PREVIOUS CHARACTER /READ HAS NOT YET BEEN /USED. RETURN IT. /RETURN CHAR.
12316	5304		JMP	FETCH1		
12317	4500	FETCH4,	JMS I	PINSUB		/GO TO THE BASIC INPUT ROUTINE
12320	0273		AND	K177		/MASK OFF HIGH-ORDER BIT.
12321	7440		SZA			
12322	5706		JMP I	CNGTTY		/GO TO EITHER ASCII OR /CCITT2 SECTION.
12323	4306		JMS	CNGTTY		/CHANGE POINTER TO POINT TO /ASCII SECTION. HAD LEADER-TRAILER /OR HEADER TAPE. /SAVE MASKED CHARACTER /ASCII
12324	3014	RDASCII,	DCA	CHAR		
12325	5275		JMP	FETCH2		

/LISP TIMES ROUTINE
/ACCEPTS AN INFINITE NUMBER OF ARGUMENTS.

12326	7201	TIMES,	CLA IAC	/SET PRODUCT TO 1 INITIALLY
12327	4750		JMS I PPLUS1	/SET UP CELLS FOR RETURN
12330	7200	TLOOP,	CLA	
12331	1033		TAD L33	
12332	7450		SNA	
12333	5170		JMP LRET1	/HAD NIL POINTER. ALL OF THE /TERMS OF THE PRODUCT HAVE /BEEN USED. /RETURN.
12334	3010		DCA XR10	
12335	1433		TAD I L33	
12336	3033		DCA L33	/POINT TO NEXT ARGUMENT.
12337	1410		TAD I XR10	/GET ADDRESS OF ARGUMENT.
12340	3035		DCA A1P	
12341	4453		JMS I PGETTOP	
12342	1421		TAD I TEMP1	/GET PREVIOUSLY SAVE PRODUCT.
12343	3037		DCA A2P	/SAVE PREVIOUS VALUE
12344	1435		TAD I A1P	/GET CURRENT ARGUMENT
12345	4351		JMS MULT	/GET PRODUCT
12346	3421		DCA I TEMP1	/SAVE RESULT AS NEW PRODUCT
12347	5330		JMP TLOOP	
12350	1416	PPLUS1,	PLUS1	
12351	0000	MULT,	0	
12352	3035		DCA A1P	
12353	1370		TAD KM14	
12354	3312		DCA FETCHC	
12355	7104	MULTL,	CLL RAL	
12356	3041		DCA A3P	/TEMPORARY RESULT
12357	1035		TAD A1P	
12360	7104		CLL RAL	
12361	3035		DCA A1P	
12362	7430		SZL	
12363	1037		TAD A2P	/BIT WAS 1, SO ADD.
12364	1041		TAD A3P	
12365	2312		ISZ FETCHC	
12366	5355		JMP MULTL	/LOOP NOT DONE.
12367	5751		JMP I MULT	/RETURN
12370	7764	KM14,	-14	

/LISP EXIT ROUTINE. RETURNS TO PS/8
/MONITOR AT 7600.

12371	6203	EXIT,	CDF CIF 0	
12372	5773		JMP I .+1	
12373	7600		7600	/LOCATION OF MONITOR.

/IOPEN ROUTINE.
/HAS THREE ARGUMENTS.

12374	0000	IOPEN,	0	
12375	6203		CDF CIF 0	
12376	4777		JMS I .+1	
12377	1200		IOPENR	

```

/GET A CHARACTER FROM THE OPEN INPUT
/FILE ROUTINE. RETURNS WITH THE
/CHARACTER IN THE ACCUMULATOR.
12400 0000 GCHAR, 0
12401 6203 CDF CIF 0
12402 4604 JMS I PGTCHAR
12403 5473 JMP I INRET /RETURN.
12404 1260 PGTCHAR,GTCHAR

/WRITE A CHARACTER FROM THE AC TO THE
/OPEN OUTPUT FILE ROUTINE. RETURNS
/WITH THE ACCUMULATOR UNCHANGED.
12405 0000 PCHAR, 0
12406 6203 CDF CIF 0
12407 4611 JMS I PPTCHAR
12410 5605 JMP I PCHAR
12411 1471 PPTCHAR,PTCHAR /POINTER TO THE ROUTINE.

/OOPEN ROUTINE.
/HAS THREE ARGUMENTS.
12412 0000 OOPEN, 0
12413 6203 CDF CIF 0
12414 4615 JMS I .+1
12415 1400 OOPENR

/ICLOSE ROUTINE.
/HAS NO ARGUMENTS.
12416 0000 ICLOSE, 0
12417 6203 CDF CIF 0
12420 4621 JMS I .+1
12421 1600 ICLOSR /POINTER TO ICLOSE ROUTINE

/OCLOSE ROUTINE.
/HAS NO ARGUMENTS.
12422 0000 OCLOSE, 0
12423 6203 CDF CIF 0
12424 4625 JMS I .+1
12425 1612 OCLOSR /POINTER TO OCLOSE ROUTINE

12426 7760 KM20, -20

12427 0000 0 /UNUSED*****

```

/THE RDTST ROUTINE WILL USE THE FETCHC
 /ROUTINE TO READ A CHARACTER. IT WILL RETURN
 /TO THE LOCATION AFTER THE CALL IF A
 /DELIMITER IS FOUND, AND WILL RETURN TO TWO
 /LOCATIONS AFTER THE CALL OTHERWISE.

/IF NO DELIMITER WAS FOUND, RDTST RETURNS
 /WITH THE CHARACTER IN THE ACCUMULATOR.
 /A ZERO IMPLIES THAT A QUOTE WAS FOUND.

/IF A DELIMITER WAS FOUND, THE ACCUMULATOR
 /WILL BE ZERO, AND A3P WILL POINT
 /TO THE ROUTINE FOR THE DELIMITER FOUND.

```

12430 0000 RDTST, 0
12431 4466 JMS I PFETCHC /FETCH A CHARACTER
12432 4460 JMS I PERR /ERROR- LEADER-TRAILER
                                     /CANNOT OCCUR IN A
                                     /LISP EXPRESSION.
/ NOW CHECK TO SEE IF THE CHARACTER IS A DELIMITER
12433 1226 TAD KM20
12434 7450 SNA
12435 5246 JMP RDTST2 /HAD A PERIOD
12436 1005 TAD K5
12437 7450 SNA
12440 5245 JMP RDTST1 /HAD A CLOSING PARENTHESIS
12441 7001 IAC
12442 7440 SZA
12443 5253 JMP RDTST5
12444 7001 IAC /HAD AN OPENING PARENTHESIS
12445 7001 RDTST1, IAC /HAD CLOSING PARENTHESIS
12446 7001 RDTST2, IAC /HAD PERIOD
12447 1252 RDTST3, TAD PREAD6 /HAD INTERNAL CODE OF 10
                                     /OR LESS.
12450 3041 DCA A3P /SAVE POINTER TO APPROPRIATE
                                     /JUMP INSTRUCTION.
12451 5630 JMP I RDTST /RETURN
12452 2465 PREAD6, READ6 /POINTER TO FIRST OF JUMPS.
12453 7001 RDTST5, IAC
12454 7450 SNA
12455 5261 JMP RDTST6 /HAD QUOTE
12456 7710 SPA CIA
12457 5247 JMP RDTST3 /HAD INTERNAL CODE OF
                                     /10 OR LESS, E.G. CARRIAGE
                                     /RETURN OR LINE FEED OR BLANK.
12460 1014 TAD CHAR /NO DELIMITER. PUT CHARACTER
                                     /IN ACCUMULATOR
12461 2230 RDTST6, ISZ RDTST /SKIP DELIMITER RETURN
12462 5630 JMP I RDTST /RETURN
  
```

/READ WILL READ IN AN S-EXPRESSION.
 /IT IS A FUNCTION OF NO ARGUMENTS.
 /ALL IDENTIFIERS READ FOR THE FIRST TIME
 /ARE PUT ON THE ORLIST. IDENTIFIERS MAY
 /CONSIST OF ANY NUMBER OF CHARACTERS
 /AND ANY CHARACTER EXCEPT LEFT PARENTHESIS,
 /RIGHT PARENTHESIS, DOT, SPACE, CARRIAGE
 /RETURN, LINE-FEED, BLANK, AND APOSTROPHE.
 /HOWEVER, THESE CHARACTERS CAN BE
 /"QUOTED" BY PRECEDING THEM WITH '
 /THEN, THEY MAY BE A CHARACTER OF A NAME.
 /A NAME MUST START WITH A LETTER. AN
 /OBJECT STARTING WITH A DIGIT OR
 /A PLUS SIGN OR A MINUS SIGN IS REGARDED
 /AS A NUMBER (EXCEPT WHEN PRECEDED BY ').

12463	3014	READ2,	DCA	CHAR	/COME HERE WHEN A
12464	5441		JMP I	A3P	/DELIMITER IS FOUND.
					/RDTST PLACED A JUMP
					/TO THE APPROPRIATE
					/DELIMITER ROUTINE IN
					/A3P.
					/NOW GO TO THIS ROUTINE.
12465	5313	READ6,	JMP	READ1	/DELIMITER WAS A C.R.
12466	5272		JMP	READ7	/OR L.F. OR SPACE
12467	5300		JMP	READ9	/DELIMITER WAS PERIOD.
					/DELIMITER WAS RIGHT
					/PARENTHESIS
12470	1310		TAD	READ	/DELIMITER WAS RIGHT
					/PARENTHESIS.
12471	5275		JMP	READ8	
12472	4310	READ7,	JMS	READ	/HAD PERIOD.
12473	3033	READ5,	DCA	L33	
12474	4310		JMS	READ	
12475	4133	READ8,	JMS	PUSH	/HAD (, SO PUSH
					/PREVIOUS VALUE OF READ,
					/AND GO READ AGAIN.
12476	5273		JMP	READ5	
12477	2475	PREA08,	READ8		
12500	1310	READ9,	TAD	READ	/HAD ')'
12501	7041		CIA		
12502	1277		TAD	PREA08	
12503	7440		SZA		/SKIP IF CLOSING PARENTHESIS
					/RIGHT AFTER OPENING
					/PARENTHESIS.
12504	4460		JMS I	PERR	/ERROR-CLOSING PARENTHESIS
					/CANNOT OCCUR HERE.
12505	5457		JMP I	PLIST5	
12506	4012	K4012,	4012		
12507	3744	K3744,	3744		

```

12510 0000 READ, 0
12511 7240 CLA CMA
12512 3021 DCA TEMP1 /-1 IN TEMP1
                               /-1 INDICATES THAT THE NUMBER
                               /DOES NOT NEED TO BE COMPLEMENTED.
                               /IF A MINUS SIGN IS FOUND,
                               /THIS IS CHANGED TO ZERO.
12513 4230 READ1, JMS RDTST /GET A CHARACTER, AND SEE
                               /IF IT IS A DELIMITER.
12514 5263 JMP READ2 /HAD A DELIMITER
                               /SEE IF IT WAS A NUMBER
12515 1307 TAD K3744
12516 7500 SMA
12517 1306 TAD K4012
12520 7510 SPA
12521 5360 JMP RDEXP /NOT A NUMBER.

                               /HAD A DIGIT OR PLUS OR MINUS, SO KEEP PICKING
                               /UP DIGITS TILL NUMBER IS COMPLETE. NO CHECK
                               /IS MADE FOR OVERFLOW OR UNDERFLOW.
12522 3037 RDNUM, DCA A2P
12523 3014 DCA CHAR /ZERO CHAR SO NEXT CHARACTER
                               /CAN BE READ.
12524 4466 JMS I PFETCHC /READ NEXT CHARACTER
12525 4460 JMS I PERR /ERROR- LEADER TRAILER
                               /AFTER A NUMBER HAS BEEN FOUND.

                               /NOW SEE IF THIS IS ALSO A DIGIT.
12526 1307 TAD K3744
12527 7500 SMA
12530 1306 TAD K4012
12531 7510 SPA
12532 5342 JMP READD /AT END OF NUMBER
12533 3035 DCA A1P /HAD ANOTHER DIGIT

                               /MULTIPLY PREVIOUS NUMBER BY 10 (OR 8 FOR OCTAL)
12534 1037 TAD A2P
12535 7106 CLL RTL
                               RDNUM,
12536 1037 TAD A2P /THIS IS CHANGED TO A NOP
                               /FOR OCTAL READING.
12537 7104 CLL RAL /NOW HAVE 10 (OR 8)
                               /TIMES THE PREVIOUS NUMBER
12540 1035 TAD A1P /NOW ADD THIS DIGIT
12541 5322 JMP RDNUM

12542 7201 READD, CLA IAC /HAVE COMPLETED THE NUMBER
12543 3035 DCA A1P
12544 1037 TAD A2P
12545 2021 ISZ TEMP1 /SKIP IF NO MINUS SIGN
12546 7041 CIA /HAD A MINUS SIGN.
12547 3037 DCA A2P
12550 4151 JMS NUCEL /BOTTOM HALF IS 1 IF
                               /CELL IS A NUMBER.

```

12551	5710	JMP I	READ		/TOP HALF CONTAINS THE /ACTUAL NUMBER. /RETURN WITH AC POINTING /TO THE CELL CONTAINING THE /NUMBER.
12552	1014	RDEXP1,	TAD	CHAR	/HAD A PLUS SIGN OR /A MINUS SIGN TO /GET HERE.
12553	3032	DCA	L32		
12554	3014	DCA	CHAR		
12555	4230	JMS	RDTST		/READ THE NEXT CHARACTER
12556	5367	JMP	RDEXP2		/HAD A DELIMITER-A PLUS / BY ITSELF IS A VALID /NAME. /NO DELIMITER, SO IT MUST /BE A NUMBER, SO IGNORE /THE PLUS OR MINUS SIGN.
12557	5313	JMP	READ1		
12560	1003	RDEXP,	TAD	K3	/SEE IF IT WAS A /MINUS SIGN.
12561	7450	SNA			
12562	2021	ISZ	TEMP1		/HAD A MINUS SIGN. /THEN SKIP THE NEXT /INSTRUCTION. /SEE IF IT WAS A /PLUS SIGN.
12563	1002	TAD	K2		
12564	7650	SNA	CLA		
12565	5352	JMP	RDEXP1		/HAD A PLUS SIGN OR /A MINUS SIGN. /READ AND PACK THE TWO /NEXT CHARACTERS. /IF A DELIMITER IS /FOUND AFTER ONLY ONE /CHARACTER, L32 /WILL ONLY CONTAIN THIS /ONE CHARATER. OTHERWISE /IT WILL CONTAIN BOTH CHARS.
12566	4465	JMS I	PRDPCK		

12567	1426	RDEXP2,	TAD I	POBJST	/POINTER TO THE BEGINNING /OF THE OBJECT LIST
12570	3033		DCA	L33	
12571	4773		JMS I	PGTATOM	
12572	5376		JMP	RDEXP3	
12573	2634	PGTATOM,		GTATOM	
12574	4465	READN4,	JMS I	PRDPCK	/READ NEXT 2 CHARACTERS.
12575	1423		TAD I	L23	
12576	3023	RDEXP3,	DCA	L23	/POINTER TO ATOM
12577	1032		TAD	L32	/USER CHARACTERS
12600	7650		SNA CLA		
12601	5217		JMP	READ3	/END OF USER CHARACTERS
12602	1023	READ4,	TAD	L23	
12603	7450		SNA		
12604	5213		JMP	READN5	
12605	3010		DCA	XR10	
12606	1410		TAD I	XR10	
12607	7041		CIA		
12610	1032		TAD	L32	/SEE IF OUR CHARACTERS /MATCH THOSE IN THE /CURRENT ATOM.
12611	7650		SNA CLA		
12612	5615		JMP I	PREADN6	/YES, THEY MATCH. GET /MORE OF ATOM AND COMPARE /AGAIN.
12613	4257	READN5,	JMS	NXTATOM	/NO MATCH. GET POINTER /TO NEXT OBJECT, AND SEE /IF IT MATCHES.
12614	5202		JMP	READ4	
12615	2574	PREADN6,		READN6	
12616	4257	READN7,	JMS	NXTATOM	
12617	1023	READ3,	TAD	L23	
12620	7640		SZA CLA		
12621	5216		JMP	READN7	
12622	4234		JMS	GTATOM	/HAD NIL
12623	7041		CIA		
12624	1232		TAD	READN8	/ADD POINTER TO "NIL"
12625	7650		SNA CLA		
12626	5633		JMP I	READN9	
12627	7040		CMA		
12630	1010		TAD	XR10	
12631	5633		JMP I	READN9	
12632	3400	READN8,	NILM		/POINTER TO "NIL"
12633	2551	READN9,	RDEXP1-1		
12634	0000	GTATOM,	0		/SUBROUTINE TO GO DOWN /A LIST TILL IT FINDS AN


```

12635 7450          SNA
12636 1033          TAD      L33
12637 7410          SKP
12640 7004          RAL
12641 3010          DCA      XR10
12642 1410          TAD I   XR10
12643 7010          RAR
12644 7420          SNL
12645 5240          JMP      .-5      /NOT AN ATOM.
12646 7104          CLL RAL  /CHOP OFF ATOM MARK.
12647 5634          JMP I   GTATOM

```

```

12650 0000  CKUSER, 0
                                     /SEE IF C(A1P)>=OBJ
                                     /IF SO, SKIP NEXT
                                     /INSTRUCTION.

```

```

12651 1035          TAD      A1P
12652 7160          CLL CMA  CML
12653 1042          TAD      POBJ
12654 7630          SZL CLA
12655 2250          ISZ      CKUSER
12656 5650          JMP I   CKUSER

```

```

/NXTATOM ROUTINE. GOES DOWN A LIST AND GETS
/THE NEXT ATOM.
NXTATOM, 0

```

```

12657 0000
12660 1033          TAD      L33
12661 3035          DCA      A1P
12662 4250  NXTA1, JMS      CKUSER
12663 5326          JMP      NXTA5  /C (L33) <OBJ
12664 1435          TAD I   A1P      /C (L33) >= OBJ
12665 7450          SNA
12666 1043          TAD      PSOBJ  /HAD NIL- GO THROUGH
                                     /SYSTEM NAMES.

```

```

12667 3035          DCA      A1P
12670 4234  NXTA2, JMS      GTATOM
12671 3041          DCA      A3P      /SAVE POINTER TO
                                     /ATOM POINTED TO BY L33

```

```

12672 1035          TAD      A1P
12673 4234          JMS      GTATOM
12674 3037  NXTA3, DCA      A2P      /SAVE POINTER TO ATOM
                                     /NAME.

```

```

12675 1041          TAD      A3P
12676 7041          CIA
12677 1023          TAD      L23
12700 7640          SZL CLA
12701 5307          JMP      NXTA4
12702 1035          TAD      A1P
12703 3033          DCA      L33      /SAVE POINTER TO NEW
                                     /ATOM

```

```

12704 1037          TAD      A2P
12705 3023          DCA      L23      /SAVE POINTER TO NEW
                                     /ATOM NAME.
12706 5657          JMP I   NXTATOM /RETURN.

```

12707	1037	NXTA4,	TAD	A2P	
12710	7450		SNA		
12711	5262		JMP	NXTA1	
12712	3011		DCA	XR11	/HAVE TO RETRACE STEPS
12713	1041		TAD	A3P	
12714	3010		DCA	XR10	
12715	1410		TAD I	XR10	
12716	7041		CIA		
12717	1411		TAD I	XR11	
12720	7640		SZA	CLA	
12721	5262		JMP	NXTA1	
12722	1441		TAD I	A3P	
12723	3041		DCA	A3P	
12724	1437		TAD I	A2P	
12725	5274		JMP	NXTA3	
12726	2035	NXTA5,	ISZ	A1P	
12727	2035		ISZ	A1P	
12730	4250		JMS	CKUSER	
12731	5270		JMP	NXTA2	/STILL ON THE SYSTEM /OBJECT LIST.
/COULD NOT FIND THE NAME ON THE OBJECT LIST, /SO PUT IT ON.					
12732	4234		JMS	GTATOM	
12733	3010		DCA	XR10	
12734	3037		DCA	A2P	
12735	4151		JMS	NUCEL	/CELL POINTING TO THE /NEW OBJECT
12736	3033		DCA	L33	
12737	1426		TAD I	POBJST	
12740	3037		DCA	A2P	
12741	4151		JMS	NUCEL	
12742	3426	NXTA6,	DCA I	POBJST	/ADD THIS TO THE OBJECT LIST
12743	1033		TAD	L33	
12744	7001		IAC		
12745	3035		DCA	A1P	
12746	7001		IAC		
12747	1030	NEWAT1,	TAD	FLIST	
12750	3435		DCA I	A1P	
12751	1010		TAD	XR10	
12752	7041		CIA		
12753	1023		TAD	L23	
12754	7650		SNA	CLA	
12755	5367		JMP	NEWAT3	
12756	1010		TAD	XR10	
12757	3021		DCA	TEMP1	
12760	1410		TAD I	XR10	
12761	3035		DCA	A1P	
12762	1421		TAD I	TEMP1	
12763	3010		DCA	XR10	
12764	4151	NEWAT2,	JMS	NUCEL	
12765	7200		CLA		
12766	5347		JMP	NEWAT1	
12767	1032	NEWAT3,	TAD	L32	/HAVE NEW PACKED CHARACTERS
12770	7450		SNA		

12771	5375	JMP	NEWAT4	/DONE WITH THIS OBJECT
12772	3035	DCA	A1P	
12773	4465	JMS I	PRDPCK	
12774	5364	JMP	NEWAT2	
		/COME HERE WHEN THE NEW OBJECT HAS BEEN		
		/COMPLETELY READ IN AND ADDED TO THE		
		/OBJECT LIST.		
12775	3435	NEWAT4, DCA I	A1P	/PUT NIL AT
				/LAST CELL POINTER.
12776	1033	TAD	L33	/POINTER TO THE LIST.
12777	5633	JMP I	READN9	/RETURN.

3000

PAGE

/STARTING AT INIT, THE WHOLE SYSTEM IS
/CLEARED. THE OBLIST IS EMPTIFD AND
/THE GENSYM COUNT IS ZEROED.

13000 5263 INIT, JMP CLEAR

/STARTING AT INIT1, THE SYSTEM IS
/CLEARED, BUT THE SYSTEM WILL KEEP
/OBLIST AND ALL PROPERTIES OF
/THE OBJECTS.

13001 6046 INIT1, TLS /THIS IS TO SET FLAG

13002 1002 INIT2, TAD K2

13003 6014 CHNGMD, RFC /CLEAR HIGH SPEED

/READER FLAG

13004 3354 DCA MODE /SET THE MODE

13005 3014 DCA CHAR /INITIALIZE CHARACTER BUFFER

/THIS LOOP ZEROES THE CDR PART OF
/THE PERMANENT ATOMS WHICH ARE AT THE
/END OF NAMES.

13006 1046 TAD PSYMT

13007 3012 DCA XR12

13010 3412 DCA I XR12

13011 1412 TAD I XR12

13012 7640 S7A CLA

13013 5210 JMP .-3

13014 7200 INIT3, CLA

13015 3025 DCA ALP /CLEAR ASSOCIATION LIST

/POINTER

13016 3027 DCA SP /CLEAR STACK POINTER

13017 3035 DCA A1P /CLEAR POINTER TO

/FIRST ARGUMENT

13020 3037 DCA A2P /CLEAR POINTER TO

/SECOND ARGUMENT

13021 3041 DCA A3P /CLEAR POINTER TO

/THIRD ARGUMENT

13022 3031 DCA L31

13023 3033 DCA L33

13024 4467 JMS I PTERPRI /PRINT CARRIAGE RETURN

/AND LINE FEED.

13025 4466 JMS I PFETCHC /READ A CHARACTER

13026 5225 JMP .-1 /IGNORE LEADER

13027 7201 CLA IAC

13030 3334 DCA MODE1

13031 4464 JMS I PREAD /READ IN THE FIRST S-EXPRESSION

13032 3035 DCA A1P /SAVE POINTER TO THE S-EXPRESSION

13033 4104 JMS NUMBER /SEE IF THE S-EXPRESSION

/WAS A NUMBER

/SKIP IF IT WAS A NUMBER.

13034 7650 SNA CLA

13035 5244 JMP NONUMB

13036 1435 TAD I A1P /YES, IT WAS A NUMBER

13037 5203 JMP CHNGMD /CHANGE THE MODE,

/AND RESTART EVALQUOTE

/SETM2 SETS THE ACCUMULATOR TO 7776 (-2)

```

13040 0000 SETM2, 0
13041 7340     CLA CLL CMA
13042 7004     RAL
13043 5640     JMP I  SETM2

```

```

DO DEF 1 /WE HAVE FOUND THE FIRST S-EXPRESSION
BY GETTING THE NUMBER. NOW GET THE SECOND
/S-EXPRESSION.

```

```

13044 1035 NONUMR, TAD  A1P
13045 4303     JMS  PRINTS  /PRINT THE S-EXPRESSION IF
/MODE BIT 1 WAS SELECTED.
13046 4133     JMS  PUSH   /PUSH DOWN POINTER TO FIRST
/S-EXPRESSION
13047 4464     JMS I  PREAD  /READ IN THE SECOND S-EXPRESSION
13050 4303     JMS  PRINTS  /PRINT THE SECOND S-EXPRESSION
/IF MODE BIT 1 WAS SELECTED.
13051 2334     ISZ  MODE1
13052 3037     DCA  A2P   /SAVE POINTER TO SECOND
/S-EXPRESSION
13053 4453     JMS I  PGETTOP
13054 1021     TAD  TEMP1  /GETTOP PLACES THE VALUE
/WHICH WAS AT THE TOP
/OF THE STACK INTO TEMP1,
/WITHOUT POPPING STACK.
13055 3035     DCA  A1P   /A1P NOW POINTS TO 1ST
/S-EXPRESSION
13056 1037     TAD  A2P
13057 4133     JMS  PUSH   /PUSH POINTER TO SECOND
/S-EXPRESSION
13060 4447     JMS I  PDISP  /GO TO THE APPROPRIATE ROUTINE
/I.E., EVALUATE THE EXPRESSIONS.
13061 4303     JMS  PRINTS  /PRINT THE RESULT IF THE
/PROPER MODE BIT WAS SELECTED.
13062 5214     JMP  INIT3  /GET THE NEXT EVALQUOTE
/PAIR.

```

/INITIALIZE THE WHOLE SYSTEM

```

13063 1042 CLEAR, TAD POBJ
13064 3426 DCA I POBJST /INITIALIZE THE OBJECT LIST
13065 3017 DCA CGENSY /CLEAR THE GENSYM COUNT
13066 1044 TAD PBEG
13067 3010 DCA XR10 /POINTER TO FIRST CELL OF
/ LIST SPACE
13070 1045 TAD LLEN
13071 7130 CLL CML RAR /HAVE NUMBER OF CELLS
13072 3021 DCA TEMP1 /SET UP LOOP COUNTER
/NOW LINK TOGETHER THE LIST SPACE
13073 3410 DCA I XR10
13074 3410 DCA I XR10
13075 7040 CMA
13076 1010 TAD XR10
13077 2021 ISZ TEMP1
13100 5273 JMP .-5 /NOT DONE YET
13101 3030 DCA FLIST /ADDRESS OF LAST CELL
13102 5201 JMP INIT1

```

```

/SUBROUTINE TO PRINT AN S-EXPRESSION IF
/THIS IS SPECIFIED BY THE MODE
PRINTS, 0

```

```

13103 0000
13104 4315 JMS CHMODE /CHECK THE MODE
13105 3134 MODF1
13106 5314 JMP PRINSR /DO NOT PRINT THE S-EXPRESSION
13107 3035 DCA AIP
13110 7420 SNL
13111 4467 JMS I PTERPRI /PRINT A CARRIAGE RETURN
/AND LINE FEED
13112 4462 JMS I PPRINCC /PRINT A CHARACTER
13113 4463 JMS I PPRINT /PRINT THE S-EXPRESSION
13114 5703 PRINSR, JMP I PRINTS

```

```

/SUBROUTINE TO CHECK TO SEE IF THE MODE
/HAS THE BITS SPECIFIED BY THE ARGUMENT
/SELECTED. IF SO, SKIPS
/THE NEXT LOCATION.

```

```

13115 0000 CHMODE, 0
13116 3114 DCA ATOM /SAVE AC TEMPORARILY
13117 1715 TAD I CHMODE /GET ARGUMENT
13120 3104 DCA NUMBER
13121 1354 TAD MODE
13122 0504 AND I NUMBER
13123 2315 ISZ CHMODE
13124 7640 SZA CLA
13125 2315 ISZ CHMODE
13126 1334 TAD MODE1
13127 7010 RAR
13130 7200 CLA
13131 1114 TAD ATOM /RESTORE AC.
13132 5715 JMP I CHMODE

```

13133 3662 PPSTOP, PSTOP

/PRINT AN ERROR MESSAGE AND RESTART

```

MODE1,
ERR, 0
13134 0000
13135 0001 0001 /THIS CLEARS THE AC.
13136 4467 JMS I PTERPRI /PRINT A CARRIAGE RETURN
/AND LINE FEED.
13137 1333 TAD PPSTOP
13140 4346 JMS PNTERR /PRINT "STOP"
13141 1060 TAD PERR
13142 4346 JMS PNTERR /PRINT ADDRESS CALLED FROM
13143 1031 TAD L31
13144 4346 JMS PNTERR /PRINT THE REST OF THE
/CURRENT S-EXPRESSION.
13145 5202 JMP INIT2

```

/PRINT THE LIST OR NUMBER POINTED TO BY AC.

```

13146 0000 PNTERR, 0
13147 3035 DCA A1P
13150 4463 JMS I PPRINT /LISP PRINT ROUTINE
13151 7200 CLA
13152 4462 JMS I PPRINCC
13153 5746 JMP I PNTERR

```

```

13154 0000 MODE, 0 /MODE WORD.

```

/BASIC INPUT ROUTINE

```

INSUB, 0
13155 0000
13156 1355 TAD INSUB
13157 3073 DCA INRET
13160 4315 JMS CHMODE /SEE IF LOW-SPEED READER
13161 0004 K4
13162 5074 JMP TTYIN /LOW-SPEED READER
13163 6011 PTRIN, RSF /HIGH-SPEED READER
13164 5363 JMP .-1
13165 6016 RFC RRB /READ CHARACTER
13166 5473 JMP I INRET

```

```

13167 0000      0
                /ROUTINE TO RETURN SWITCH REGISTER +FIRST
                /ARGUMENT MASKED BY SECOND ARGUMENT
13170 7604      LAS
13171 7410      SKP
13172 3037      DCA      A2P
13173 1437      RMASK,  TAD I  A2P      /GET MASK
13174 0441      AND I   A3P      /LOGICAL AND OF 1ST
                                /AND 2ND ARGUMENTS
13175 3037      DCA      A2P
13176 7001      IAC
13177 3035      DCA      A1P
13200 4151      JMS      NUCEL      /PUT RESULT IN A CELL
                                /IT IS A NUMBER.
13201 5171      JMP      LRET2      /RETURN
13202 3021      DCA      TEMP1
13203 1441      TAD I   A3P
13204 3421      DCA I   TEMP1
13205 5171      JMP      LRET2
13206 3616      PPNIL,  PNIL      /POINTER TO POINTER TO
                                /NIL.

                /THE FOLLOWING ROUTINE PUTS A1P +1 IN TEMP1 IF
                /A1P IS NON-ZERO. IF A1P IS ZERO, PUTS POINTER
                /TO "NIL" IN TEMP1.
13207 0000      A1PPL1, 0      /A1P PLUS ONE ROUTINE
13210 7200      CLA
13211 1035      TAD      A1P
13212 7450      SNA
13213 1206      TAD      PPNIL
13214 7001      IAC
13215 3021      DCA      TEMP1
13216 5607      JMP I   A1PPL1

                /BASIC OUTPUT ROUTINE
13217 0000      OUTSUB, 0
13220 6041      TSF
13221 5220      JMP .-1      /WAIT TILL TELETYPE FREE
13222 6046      TFS      /TYPE CHARACTER IN AC.
13223 5617      JMP I   OUTSUB /RETURN

                /RDPCK WILL READ IN 2 CHARACTERS AND PACK THEM
                /IN LOCATION L32.
13224 0000      RDPCK, 0
13225 3032      DCA      L32      /CLEAR L32
13226 4242      JMS      GETC      /GET A CHARACTER
13227 3032      DCA      L32
13230 3014      DCA      CHAR      /CLEAR CHARACTER BUFFER.
13231 4242      JMS      GETC      /GET A CHARACTER
13232 7106      CLL     RTL
13233 7106      CLL     RTL
13234 7106      CLL     RTL

```



```

13235 1032          TAD      L32      /ADD PREVIOUS CHARACTER
                                         /TO THIS CHARACTER. GET
                                         /SECOND CHARACTER IN
                                         /LEFT-HAND 6 BITS AND
                                         /FIRST CHARACTER IN RIGHT-
                                         /HAND 6 BITS.
13236 3032          DCA      L32
13237 3014          DCA      CHAR
13240 5624          JMP I   ROPCK  /CLEAR CHARACTER BUFFER
                                         /RETURN.
13241 2430  PRDTST, RDTST          /POINTER TO RDTST ROUTINE

/GETC WILL FETCH A CHARACTER. IF IT IS
/A QUOTE, IT WILL DIRECTLY FETCH THE
/NEXT CHARACTER WITHOUT CLASSIFYING IT.
/IF A DELIMITER IS FOUND, RETURN
/WILL BE TO ROUTINE WHICH CALLED ROPCK.

13242 0000  GETC,  0
13243 4641          JMS I   PRDTST /READ A CHARACTER AND
                                         /SEE IF IT IS A DELIMITER
13244 5624          JMP I   ROPCK  /HAD A DELIMITER
13245 7440          SZA
13246 5642          JMP I   GETC  /NOT A QUOTE
13247 3014          DCA      CHAR  /WAS QUOTE. CLEAR CHARACTER
                                         /BUFFER.
13250 4466          JMS I   PFETCHC /GET A CHARACTER
                                         /WITHOUT TESTING TO
13251 4460          JMS I   PERR  /SEE IF IT IS A DELIMITER
                                         /ERROR-LEADER TRAILER
13252 5642          JMP I   GETC  /HAS BEEN FOUND AFTER QUOTE
                                         /RETURN

/APVAL FUNCTION
13253 4466  APVAL, JMS I   PFETCHC /GET A CHARACTER
13254 7000          NOP          /DON'T CARE IF IT
                                         /IS LEADER-TRAILER.
13255 7650          SNA CLA
13256 1024          TAD      PTRUE
13257 5576          JMP I   EV

/TEXPR ROUTINE. JUMPS TO FIELD 0 ADDRESS
/SPECIFIED IN 1ST ARGUMENT.
13260 0000  ZEXPR,  0
13261 6202          CIF      0
13262 5663          JMP I   .+1
13263 1675          ZEXPR0

```

/NOW COME THE SYSTEM NAMES. THEY ARE IN
/THE FORM OF A LIST. THE FIRST SECTION HAS
/THE CDR POINTER NIL.

13264	0000		0	
13265	0000	SYMT,	0	
13266	0000		0	
13267	0056	NL,	56	/"L"
13270	0000		0	
13271	0073	NY,	73	/"Y"
13272	0000		0	
13273	0060	NN,	60	/"N"
13274	0000		0	
13275	0045	NC,	45	/"C"
13276	0000		0	
13277	5761	NOM,	5761	/"OM"
13300	0000		0	
13301	0064	NR,	64	/"R"
13302	0000		0	
13303	4765	NSE,	4765	/"SE"
13304	0000		0	
13305	4660	NND,	4660	/"ND"
13306	0000		0	
13307	6560	NNS,	6560	/"NS"
13310	0000		0	
13311	4760	NNE,	4760	/"NE"
13312	0000		0	
13313	6553	NIS,	6553	/"IS"
13314	0000		0	
13315	6347	NEQ,	6347	/"EQ"
13316	0000		0	
13317	5643	NAL,	5643	/"AL"
13320	0000		0	
13321	6462	NPR,	6462	/"PR"
13322	0000		0	
13323	5164	NRG,	5164	/"RG"
13324	0000		0	
13325	5366	NTI,	5366	/"TI"
13326	0000		0	
13327	5773	NYM,	5773	/"YM"
13330	0000		0	
13331	0066	NT,	66	/"T"
13332	0000		0	
13333	6151	NGO,	6151	/"GO"
13334	0000		0	
13335	4346	NDA,	4346	/"DA"
13336	0000		0	
13337	0062	NP,	62	/"P"
13340	0000		0	
13341	6665	NST,	6665	/"ST"
13342	0000		0	
13343	0065	NS,	65	/"S"
13344	0000		0	
13345	5656	NLL,	5656	/"LL"
13346	0000		0	

13347	6447	NFR,	6447	/"ER"
13350	0000		0	
13351	6567	NUS,	6567	/"US"
13352	0000		0	
13353	5161	NOG,	5161	/"OG"
13354	0000		0	
13355	0047	NE,	47	/"E"
13356	0000		0	
13357	4643	NAD,	4643	/"AD"
13360	0000		0	
13361	6064	NRN,	6064	/"RN"
13362	0000		0	
13363	4345	NCA,	4345	/"CA"
13364	0000		0	
13365	4645	NCD,	4645	/"CD"
13366	0000		0	
13367	6366	NTQ,	6366	/"TQ"
13370	0000		0	
13371	6261	N1OP,	6261	/"OP"
13372	0000		0	
13373	5364	NRI,	5364	/"RI"
13374	0000		0	
13375	6653	NIT,	6653	/"IT"
13376	0000		0	
13377	0000		0	

/THIS IS STILL THE SYSTEM NAME TABLE.
 /THESE NAMES DO NOT HAVE THEIR
 /CDR PART NULL.

13400	3266	NILN,	NL-1	
13401	5360	NNIL,	5360	/"NI"
13402	3404		NPLY-1	
13403	6243	NAPPLY,	6243	/"AP"
13404	3270		NY-1	
13405	5662	NPLY,	5662	/"PL"
13406	3374		NIT-1	
13407	7247	NEXIT,	7247	/"EX"
13410	3412		NMES-1	
13411	5366	NTIMES,	5366	/"TI"
13412	3342		NS-1	
13413	4757	NMES,	4757	/"ME"
13414	3416		NVAL-1	
13415	6243	NAPVAL,	6243	/"AP"
13416	3266		NL-1	
13417	4370	NVAL,	4370	/"VA"
13420	3422		NSOC-1	
13421	6543	NASSOC,	6543	/"AS"
13422	3274		NC-1	
13423	6165	NSOC,	6165	/"SO"
13424	3276		NOM-1	
13425	6643	NATOM,	6643	/"AT"
13426	3300		NR-1	
13427	4345	NCAR,	4345	/"CA"
13430	3300		NR-1	
13431	4645	NCDR,	4645	/"CD"
13432	3304		NND-1	
13433	6145	NCOND,	6145	/"CO"
13434	3306		NNS-1	
13435	6145	NCONS,	6145	/"CO"
13436	3440		NFINE-1	
13437	4746	NDEFINE,	4746	/"DE"
13440	3310		NNE-1	
13441	5350	NFINE,	5350	/"FI"
13442	3444		NFLIS-1	
13443	4746	NDEFLIS,	4746	/"DE"
13444	3312		NIS-1	
13445	5650	NFLIS,	5650	/"FL"
13446	3450		NUAL-1	
13447	6347	NEQUAL,	6347	/"EQ"
13450	3266		NL-1	
13451	4367	NUAL,	4367	/"UA"
13452	3316		NAL-1	
13453	7047	NEVAL,	7047	/"EV"
13454	3320		NPR-1	
13455	7247	NEXPR,	7247	/"EX"
13456	3462		NXPR-1	
13457	4750	NFEXPR,	4750	/"FE"
13460	3462		NXPR-1	
13461	4774	NZEXPR,	4774	/"ZE"
13462	3300		NR-1	
13463	6272	NXPR,	6272	/"XP"

13464	3466	NNARG-1	
13465	6750	NFUNARG,6750	/"FU"
13466	3322	NRG-1	
13467	4360	NNARG, 4360	/"NA"
13470	3472	NNCTI-1	
13471	6750	NFUNCTI,6750	/"FU"
13472	3324	NT1-1	
13473	4560	NNCTI, 4560	/"NC"
13474	3476	NNSYM-1	
13475	4751	NGENSYM,4751	/"GE"
13476	3326	NYM-1	
13477	6560	NNSYM, 6560	/"NS"
13500	3330	NT-1	
13501	4751	NGET, 4751	/"GE"
13502	3504	NMBDA-1	
13503	4356	NLAMBDA,4356	/"LA"
13504	3334	NDA-1	
13505	4457	NMBDA, 4457	/"MR"
13506	3510	NSSP-1	
13507	4756	NLESSP, 4756	/"LE"
13510	3336	NP-1	
13511	6565	NSSP, 6565	/"SS"
13512	3340	NST-1	
13513	5356	NLIST, 5356	/"LI"
13514	3516	NNUS-1	
13515	5357	NMINUS, 5357	/"MI"
13516	3342	NS-1	
13517	6760	NNUS, 6760	/"NU"
13520	3344	NLL-1	
13521	6760	NNULL, 6760	/"NU"
13522	3524	NMBER-1	
13523	6760	NNUMBER,6760	/"NU"
13524	3346	NER-1	
13525	4457	NMBER, 4457	/"MR"
13526	3512	NLIST-1	
13527	4461	NOBLIST,4461	/"OR"
13530	3534	NPEN-1	
13531	6153	NIOPEN, 6153	/"IO"
13532	3534	NPEN-1	
13533	6161	NOOPEN, 6161	/"OO"
13534	3272	NN-1	
13535	4762	NPEN, 4762	/"PE"
13536	3542	NLOSE-1	
13537	4553	NICLOSE,4553	/"IC"
13540	3542	NLOSE-1	
13541	4561	NOCLOSE,4561	/"OC"
13542	3302	NSE-1	
13543	6156	NLOSE, 6156	/"LO"
13544	3546	NEAR-1	
13545	5645	NCLEAR, 5645	/"CL"
13546	3300	NR-1	
13547	4347	NEAR, 4347	/"EA"
13550	3350	NUS-1	
13551	5662	NPLUS, 5662	/"PL"
13552	3554	NINT-1	

13553	6462	NPRINT,	6462	/"PR"
13554	3330		NT-1	
13555	6053	NINT,	6053	/"IN"
13556	3352		NOG-1	
13557	6462	NPROG,	6462	/"PR"
13560	3562		NOTE-1	
13561	6763	NQUOTE,	6763	/"QU"
13562	3354		NE-1	
13563	6661	NOTE,	6661	/"OT"
13564	3356		NAD-1	
13565	4764	NREAD,	4764	/"RE"
13566	3570		NTURN-1	
13567	4764	NRETURN,	4764	/"RE"
13570	3360		NRN-1	
13571	6766	NTURN,	6766	/"TU"
13572	3574		NLACA-1	
13573	6264	NRPLACA,	6264	/"RP"
13574	3362		NCA-1	
13575	4356	NLACA,	4356	/"LA"
13576	3600		NLACD-1	
13577	6264	NIRPLACD,	6264	/"RP"
13600	3364		NCD-1	
13601	4356	NLACD,	4356	/"LA"
13602	3330		NT-1	
13603	4765	NSET,	4765	/"SE"
13604	3366		NTQ-1	
13605	4765	NSETQ,	4765	/"SE"
13606	3370		NICP-1	
13607	6665	NSTOP,	6665	/"ST"
13610	3612		NRPRI-1	
13611	4766	NTERPRI,	4766	/"TE"
13612	3372		NRI-1	
13613	6264	NRPRI,	6264	/"RP"

/NOW COMES THE SYSTEM OBJECT LIST.
 /THE FIRST CELL POINTS TO THE ADDRESS OF
 /THE ROUTINE, AND THE SECOND CELL POINTS
 /TO THE NAME OF THE ROUTINE.

/THESE FIRST ONES ARE NOT SUBROUTINES

13614	0000	SOBJ,		
13615	3503	LAMBDA,	0	/THIS HAS NO ADDRESS
13616	0000	PNIL,	0	NLAMBDA
13617	3401		0	NNIL
13620	0000	FUNARG,	0	NFUNARG
13621	3465		0	NT
13622	0302	TRUE,	T	
13623	3331		T	
13624	3253	PAPVAL,	APVAL	
13625	3415		APVAL	
13626	0626		NAPVAL	
13627	3433		COND	
13630	0000	FEXPR,	0	NCOND
13631	3457		0	NFEYPR
13632	0423		0	NFUNCTJ
13633	3471		0	NFUNCTI
13634	0555		0	GO
13635	3333		0	NGO
13636	3063		0	CLEAR
13637	3545		0	NCLFAR
13640	0667		0	LIST
13641	3513		0	NLIST
13642	1452		0	MINUS
13643	3515		0	NMINUS
13644	1445		0	PLUS
13645	3551		0	NPLUS
13646	0452		0	PROG
13647	3557		0	NPROG
13650	1000		0	QUOTE
13651	3561		0	NQUOTE
13652	0573		0	RETURN
13653	3567		0	NRETURN
13654	2371		0	EXIT
13655	3407		0	NEXIT
13656	2326		0	TIMES
13657	3411		0	NTIMES
13660	0751		0	SETQ
13661	3605		0	NSETQ

/THE FOLLOWING ARE SUBROUTINES WITH
 /NO ARGUMENTS.

13662	0776	PSTOP,	
13663	3607	BQARG,	STOP
13664	1533		NSTOP
		SYSSUPS,	GENSYM

13665	3475	NGENSYM
13666	2510	READ
13667	3565	NREAD
13670	2416	ICLOSE
13671	3537	NICLOSE
13672	2422	OCLOSE
13673	3541	NOCLOSE
13674	2151	TERPRI
13675	3611	NTERPRI

/THE FOLLOWING HAVE 1 ARGUMENT

13676	0114	BIARG,	ATOM
13677	3425		NATOM
13700	1475		CAR
13701	3427		NCAR
13702	0771		CDR
13703	3431		NCDR
13704	1272		DEFINE
13705	3437		NDEFINE
13706	1045		NULL
13707	3521		NNULL
13710	0104		NUMBER
13711	3523		NNUMBER
13712	2172		PRINT
13713	3553		NPRINT

/THE FOLLOWING HAVE 2 ARGUMENTS

13714	1136	B2ARG,	ASSOC
13715	3421		NASSOC
13716	0151		CONS
13717	3435		NCONS
13720	1205		DEFLIS
13721	3443		NDEFLIS
13722	1024		EQ
13723	3315		NEQ
13724	1061		EQUAL
13725	3447		NEQUAL
13726	0605		EVAL
13727	3453		NEVAL
13730	1116		GET
13731	3501		NGET
13732	1460		LESSP
13733	3507		NLESSP
13734	1002		RPLACA
13735	3573		NRPLACA
13736	1200		RPLACD
13737	3577		NRPLACD
13740	0734		SET
13741	3603		NSET

/THE FOLLOWING HAVE 3 ARGUMENTS

13742	0615	B3ARG,	APPLY
13743	3403		NAPPLY
13744	2374		IOPFN
13745	3531		NIOPEN
13746	2412		OOPFN
13747	3533		NOOPEN
13750	1513		EXPR
13751	3455		NEXPR
13752	3260		ZEXPR
13753	3461		NZEXPR

```
                /THIS IS THE OBJECT LIST
13754 0000 OBJ, 0
13755 3756      .+1
13756 3760      .+2
13757 3527      NOBLIST
13760 3762      .+2
13761 3624      PAPVAL
13762 0000      0
13763 3764      OBJST
13764 3754 OBJST, OBJ /POINTER TO THE OBJECT LIST
```

```
13765 0000 LBEG, 0 /BEGINNING OF THE LIST
                /SPACE -1
```

/THE LIST SPACE GETS CHAINED TOGETHER BY CLEAR.

S

ADDWCA	2200	COUPED	1632	FETCH4	2317	GAR4	1644
ALP	0025	CPAGE	2306	FEX	2122	GAR5	1733
ALTM	0316	CPAGE1	2324	FEXPR	3630	GCCNT	0006
APPLY	0615	CPOINT	0267	FICHCT	1335	GCHAR	2400
APVAL	3253	CRET	0314	FIGET	1305	GENSYM	1533
ARG1N	1161	CRRFT	0210	FINBUF	1272	GEN1	1574
ARG2N	1167	DEFINE	1272	FINPTR	0130	GEN2	1575
ARG2P	1170	DEFLIS	1205	FINREC	1273	GEN3	1572
ASDEV1	1217	DEFL1	1254	FINTMP	1336	GEN4	1570
ASDEV2	1220	DFFL2	1212	FINXX	1316	GEN5	1565
ASERR	1255	DEFL3	1256	FIN10	1337	GEN6	1566
ASPAG	1221	DEFL4	1261	FITHRD	1325	GEN7	1567
ASR	7415	DFEXIT	1551	FI200	1271	GET	1116
ASSOC	1136	DTSP	0216	FI7200	1310	GETARG	1012
ASSOC1	1137	DISP14	0222	FI7400	0151	GETC	3242
ATOM	0114	DVI	7407	FLIST	0030	GETCON	1710
A1P	0035	ECHO	0271	FLUCNT	1233	GETCO2	1731
A1PPL1	3207	ECHO1	0306	FLUNAM	1232	GETCO3	1733
A2P	0037	EQ	1024	FNXTCH	1262	GETEXT	1104
A3P	0041	EQUAL	1061	FOCCNT	1643	GETFLN	1040
BPOINT	0270	EQUAL1	1074	FOCHAR	1475	GETNAM	1000
BRET	0212	EQUAL2	1064	FOCHCT	1567	GETTOP	1520
BTTY	0200	EQ1	1037	FOCNAM	1642	GET1	1117
B0ARG	3662	EQ2	1042	FOJMP	1503	GLCNT	1670
B1ARG	3676	ERR	3134	FOLOOP	1501	GL1	1600
B2ARG	3714	ERROR1	0161	FOCNT	1445	GL2	1601
B3ARG	3742	ERROR2	1330	FOONAM	1444	GMARK	1633
CAM	7621	EV	0176	FOPOLD	1570	GMARKS	1751
CAR	1475	EVAL	0605	FOSETP	1554	GO	0555
CDR	0771	EVAL1	0600	FOUBUF	1506	GATOM	2634
CGENSY	0017	EVAL2	0601	FOUCH1	1547	GTCHAR	1260
CHAR	0014	EVA1	0366	FOUCH2	1544	ICLOSE	2416
CHMODE	3115	EVA10	0505	FOUCH3	1522	ICLOSR	1600
CHNGMD	3003	EVA11	0464	FOUJMP	1517	IHNDLR	0126
CKPROG	0546	EVA12	0531	FOUPTP	1571	INBUFL	6200
CKUSER	2650	EVA13	0577	FOUREC	1507	INDBUF	7200
CLEAR	3063	EVA14	0533	FOUTMP	1566	INDEV1	0105
CNGLOC	1703	EVA15	0575	FO7177	1564	INDEV2	0106
CNGLOZ	1706	EVA19	0455	FUNARG	3620	INFIL1	0107
CNGLO2	1717	EVA4	0352	FUNCTI	0423	INIT	3000
CNGLO3	1724	EVA6	0457	FUNCI	0416	INIT1	3001
CNGPT	1645	EVA8	0517	F1RET	0133	INIT2	3002
CNGTTY	2306	EVA9	0501	GARB	1652	INIT3	3014
CNTC	0405	EV1	0225	GARB1	1674	INRET	0073
CNTR	0374	EV2	0233	GARB2	1620	INSUB	3155
CNTRC	0407	EV3	0235	GARB3	1605	IOPEN	2374
CNTRR	0376	EV4	0374	GARB4	1603	IOPENR	1200
CNTRU	0323	EV5	0307	GARB5	1640	KA	1327
CNTU	0310	EV6	0326	GARB6	1623	KC	1330
COND	0626	EV7	0336	GARB7	1635	KCAT	1651
COND1	0636	EXIT	2371	GARB8	1671	KFOCCN	1572
COND2	0656	EXPR	1513	GARB9	1742	KFOUBU	1660
COND3	0633	FETCHC	2312	GAR1	1724	KFOURE	1661
CONS	0151	FETCH1	2304	GAR2	1747	KGCHAR	1342
COLIBUF	1631	FETCH2	2275	GAR3	1710	KKM100	2032

KLLS	6356	K3600	0415	NC	3275	NNARG	3467
KLOC	2033	K3744	2507	NCA	3363	NNCTI	3473
KLP	2206	K4	0004	NCAR	3427	NND	3305
KLSF	6351	K4012	2506	NCD	3365	NNE	3311
KMA3P	1667	K5	0005	NCDR	3431	NNIL	3401
KMIN	2073	K55	0176	NCLEAR	3545	NNS	3307
KMLAST	0266	K6546	0175	NCOND	3433	NNSYM	3477
KM12	0365	K77	0007	NCONS	3435	NNULL	3521
KM14	2370	K7700A	0150	NCTR	0157	NNUMBE	3523
KM177	2274	LAMBDA	3614	NDA	3335	NNUS	3517
KM20	2426	LASTL	5577	NDEFIN	3437	NOBLIS	3527
KM215	0623	LREG	3765	NDEFLI	3443	NOCLOS	3541
KM27	2122	LEND	7577	NE	3355	NOG	3353
KM3	2121	LESSP	1460	NEAR	3547	NOM	3277
KM377	0370	LFEAX	2026	NEQ	3315	NONUMB	3044
KM4	1602	LFTSHC	2043	NEQUAL	3447	NOOPEN	3533
KM6	0154	LFTSHY	2000	NER	3347	NOSHIF	2016
KN3	0147	LINCNT	0016	NEVAL	3453	NOTE	3563
KOUERR	1462	LIST	0667	NEWAT1	2747	NP	3337
KOUTCH	0144	LIST1	0672	NEWAT2	2764	NPEN	3535
KPCHAR	1466	LIST2	0700	NEWAT3	2767	NPLUS	3551
KPER	2210	LIST3	0714	NEWAT4	2775	NPLY	3405
KPL3	0622	LIST4	0717	NEXIT	3407	NPR	3321
KPOUTC	1467	LIST5	0720	NEXPR	3455	NPRINT	3553
KPTTYI	1610	LIST6	0670	NFEXPR	3457	NPROG	3557
KP17	0366	LKUP1	1172	NFINE	3441	NQUOTE	3561
KP212	0313	LLEN	0045	NFLIS	3445	NR	3301
KP3	0367	LOOKUP	1160	NFUNAR	3465	NREAD	3565
KP3600	0153	LPTLS8	0626	NFUNCT	3471	NRETUR	3567
KP377	1343	LPTOUT	0600	NGENSY	3475	NRG	3323
KP45	0373	LRET1	0170	NGET	3501	NRI	3373
KP77	0152	LRET2	0171	NGO	3333	NRN	3361
KRP	2207	LRET3	0172	NICLOS	3537	NRPLAC	3573
K1INSU	1341	LRET4	0174	NIL	0000	NRPRI	3613
K10	2036	LSR	7417	NILN	3400	NS	3343
K100	2035	L20	0020	NIL1	0001	NSE	3303
K1000	2034	L22	0022	NINT	3555	NSET	3603
K141	2272	L23	0023	NIOPEN	3531	NSETQ	3605
K150	0372	L31	0031	NIS	3313	NSOC	3423
K16	1326	L32	0032	NIT	3375	NSSP	3511
K17	1573	L33	0033	NL	3267	NST	3341
K177	2273	MINUS	1452	NLACA	3575	NSTOP	3607
K2	0002	MINUS2	1453	NLACD	3601	NT	3331
K21	2074	MODE	3154	NLAMBD	3503	NTERPR	3611
K212	0625	MODE1	3134	NLESSP	3507	NTI	3325
K215	0312	MOVARG	1663	NLIST	3513	NTIMES	3411
K22	0624	MULT	2351	NLL	3345	NTQ	3367
K232	1657	MULTL	2355	NLOSE	3543	NTURN	3571
K236	2123	MUY	7425	NMBDA	3505	NUAL	3451
K27	2271	NAD	3357	NMBER	3525	NUCEL	0151
K3	0003	NAL	3317	NMES	3413	NULL	1045
K306	2157	NAPPLY	3403	NMJ	7411	NUMB	0103
K33	0306	NAPVAL	3415	NMINUS	3515	NUMBER	0104
K334	0371	NASSOC	3421	NMLOOP	1132	NUMB1	0104
K36	0155	NATOM	3425	NN	3273	NUS	3351

RVAL	0143	ZRET2	0042
SAVEXT	1125	ZVRET2	0044
SAVNAM	1172		
SCA	7441		
SCL	7641		
SCP6	1504		
SET	0734		
SETDA	2267		
SETDEC	2237		
SETM2	3040		
SETOA	2301		
SETOCT	2253		
SETQ	0751		
SHL	7413		
SOBJ	3614		
SP	0027		
STANSA	2231		
STOP	0776		
STUTX	2211		
STUX	2222		
SWAP	1051		
SYMT	3265		
SYSSUB	3664		
T	0302		
TBIIF	5400		
TCHAR	0621		
TEMOUT	1565		
TEMP	0364		
TEMPAD	0036		
TEMPAX	2053		
TEMP1	0021		
TERPPI	2151		
TFLAG	0264		
TIMEAE	2112		
TIMES	2326		
TIMEYT	2125		
TLOOP	2330		
TMCHAR	0363		
TMNAM	0156		
TMSTR	0361		
TREAD	0214		
TRUE	3622		
TSLOOP	0351		
TSTRIN	0344		
TTYIN	0074		
XOPX	1735		
XR10	0010		
XR11	0011		
XR12	0012		
XR13	0013		
ZA1P	0035		
ZA2P	0037		
ZA3P	0041		
ZEXPR	3260		
ZEXPR0	1675		

