
 ** VM/SP Service Level 0013 **** CPU Serial 013039 CPU Model 4341 *****

DALY	RSCS	Userid	Origin
LISPWATR	YKTVMZ	Distcode	System
LISPWATR	ASSEPACK	Filename	Filetype
2/21/86	16:58:03	File Creation Date	
02/21/86	16:58:35	File Print Date	
4A0	A	Device	Class
16:58:03	003344	Tracker Id Count	
SHORT		Forms	

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          4444
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        44 44
       44 44 3333333333
      44 44 33
     44 44 33
    444444444444 33
                   3333333
                   33
                   33
                   33
                   33333333
*****
** VM/SP **
** Release 1 **
*****
          4444
         44 44
        44 44
       44 44
      44 44
     44 44
    44 44
   44 44
  44 44
 44 44
44 44
1111111
  
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DALY
 LISPWATR
 ASSEPACK
 LISPWATR

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*****
&NAME MACRO          00001000
      ERROR          00002000
      LCLA           &MSG          00003000
      LCLA           &L           00004000
&NAME BAL           0,ERROR       00005000
&L  SETA           K'&MSG        00006000
      DC           AL2(&L+2),C'    ' ,C&MSG 00007000
      CNOP          2,4           00008000
      MEND          00009000
*****
&NAME MACRO          00010000
      SNAPS         &IDENT, &FROM, &TO 00011000
      CNOP          0,4           00012000
&NAME STM           13,3,SNPPSER  00013000
      BAL           14,SNAPROUT    00014000
      DC           CL8'&IDENT',A(&FROM, &TO),PL2'0' 00015000
      LM           13,3,SNPPSER    00016000
      MEND          00017000
*****
&NAME MACRO          00018000
      PUTMSG        &DATA          00019000
      LCLA           &L           00020000
&NAME STM           14,1,WRSV      VOL1 00021000
      AIF           (T'&DATA EQ 'U').A 00022000
      LA            0, &DATA        00023000
      BAL           2,PUTMSG        00024000
      MEXIT         00025000
      CNOP          0,4           00026000
      SETA          K'&DATA+2      00027000
      LA            2,*+8+(&L+1)/2*2 00028000
      BAL           0,PUTMSG        00029000
      DC           AL2(&L),C'    ' ,C&DATA 00030000
      MEND          00031000
*****
&LABEL MACRO         00032000
      ECHO          &NAME, &PROP, &RTN, &ACNT 00033000
      LCLA          &LNGLTH, &K, &KK, &ARGS 00034000
      LCLC          &P, &PP, &N, &NN, &PPP, &NNN 00035000
&ARGS SETA         0              00036000
&LNGLTH SETA       K'&NAME        00037000
&K SETA           20              00038000
&KK SETA         12              VOL1 00039000
&P SETC          'NIL'           00040000
&PP SETC         'NIL'           00041000
&PPP SETC        'NIL'           00042000
&N SETC          '&NAME'(1,4).'    ' 00043000
      AIF          (&LNGLTH LT 5).A 00044000
&KK SETA         &KK+8           00045000
&K SETA         &K+8             00046000
&PP SETC        '*+3'           VOL1 00047000
&NN SETC        '&NAME'(5,4).'    ' 00048000
      AIF          (&LNGLTH LT 9).G 00049000
&KK SETA         &KK+8           00050000
&K SETA         &K+8             00051000
&PPP SETC        '*+3'           VOL1 00052000

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§NNN	SETC	' &NAME' (9,4) . ' ' .	00056000
.G	AIF	(T' &PROP EQ 'O') .B	00057000
	AIF	(T' &ACNT EQ 'O') .F	00058000
§ARGS	SETA	§ARGS+§ACNT	00059000
.F	ANOP		00060000
§P	SETC	'*+' . ' &KK'	00061000
§K	SETA	§K+24	00062000
.B	DC	A(*+8-NIL, *+§K-NIL)	00063000
§LABEL	DC	X'80', AL3(*+7-NIL), A(§P-NIL)	VOL1 00064000
	DC	CL4'§N', X'40', AL3(§PP-NIL)	00065000
	AIF	(§LENGTH LT 5) .C	00066000
	DC	CL4'§NN', X'40', AL3(§PPP-NIL)	00067000
.C	AIF	(§LENGTH LT 9) .E	00068000
	DC	CL4'§NNN', X'40', AL3(NIL-NIL)	00069000
.E	AIF	(T' &PROP EQ 'O') .D	00070000
	DC	A(§PROP-NIL, *+4-NIL), A(*+8-NIL, NIL-NIL)	00071000
	DC	AL1(§ARGS), AL3(§RTN), X'40', AL3(NIL-NIL)	00072000
.D	MEXIT		00073000
	MEND		00074000
*****			00075000
	MACRO		00076000
§NAME	SAVE	§R	00077000
§NAME	ST	§R, 0 (PDS)	00078000
	BXH	PDS, K4, ERG2	00079000
	MEND		00080000
*****			00081000
	MACRO		00082000
§NAME	UNSAVE	§R	00083000
§NAME	SR	PDS, K4	00084000
	L	§R, 0 (PDS)	00085000
	MEND		00086000
	EJECT		00087000
*	INTERPRETER	DESIGNED AND CODED BY-	00088000
*		J.F.BOLCE	00089000
*		COMPUTING CENTRE,	00090000
*		UNIVERSITY OF WATERLOO,	00091000
*		WATERLOO, ONTARIO, CANADA	00092000
		JULY 1967	00093000
*****			00094000
*****	REGISTER	ASSIGNMENTS *****	00095000
*****			00096000
*****	0	LOCAL WORK REGISTER	00097000
*****	1	LOCAL WORK REGISTER	00098000
*****	2	LINKAGE REGISTER	00099000
*****	3	WORK REGISTER - RESTORE PLEASE	00100000
*****	4	K4 CONSTANT F'4'-FOR UNSAVE ETC	00101000
*****	5	NILR ADDR OF NIL	00102000
*****	6	FREE FWS POINTER	00103000
*****	7	PDS STACK POINTER	00104000
*****	8	A FIRST ARGUMENT	00105000
*****	9	Q SECOND ARGUMENT	00106000
*****	10	M TEMP LIST SAVE- GARBAGE COLLECTED	00107000
*****	11	BASE REGISTER	00108000
*****	12	BASE REGISTER	00109000
*****	13	SAVE AREA AND BASE REGISTER	00110000
*****	14	LOCAL WORK REGISTER	

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*****          15          LOCAL WORK REGISTER          00111000
*****          *****          *****          00112000
LISP          START          00113000
*****          *****          *****          00114000
STACKSIZ EQU          4000 WORDSFOR PUSH DOWN STACK          00115000
ATMSZ EQU          80          SIZE OF PNAME MAX          00116000
CDEND EQU          72          MAX CD COL FOR S-EXPR          00117000
CBUFFSZ EQU          80          CHARACTER BUFFER FOR PACK          00118000
*          00119000
*****          *****          *****          00120000
REGISTER DEFINITIONS          *****          00121000
K4 EQU          4          00122000
FREE EQU          6          00123000
NILR EQU          5          00124000
PDS EQU          7          00125000
A EQU          8          REGISTER DEFINITION          00126000
Q EQU          9          00127000
M EQU          10          00128000
F0 EQU          0          00129000
F2 EQU          2          00130000
F4 EQU          4          00131000
F6 EQU          6          00132000
*          00133000
CAR EQU          0          00134000
CDR EQU          4          00135000
LOGIC EQU          X'DO'          NOTE.. FLOAT & BOOL ARE ALSO FIX          00136000
FLOAT EQU          X'EO'          00137000
FIX EQU          X'CO'          00138000
ATOM EQU          X'80'          00139000
FWD EQU          X'40'          FULL WORD MARK, IE-DATA          00140000
TRACEB EQU          X'08'          TRACE BIT IN ATOM HEAD          00141000
PRINT          NOGEN          00142000
EJECT          00143000
*****          *****          *****          00144000
*****          *****          *****          00145000
MAIN PROGRAM          *****          00146000
MAIN STM          14,12,12(13)          00147000
LR          K4,15          00148000
USING          MAIN,K4          00149000
LA          11,AGN          00150000
USING          AGN,11          00151000
LA          12,4095(11)          00152000
USING          AGN+4095,12          VOL1 00153000
LR          15,13          VOL1 00154000
L          13,SVA          00155000
USING          SAVEBLK,13          VOL1 00156000
ST          15,SAVEBLK+4          00157000
L          NILR,NILA          00158000
USING          NIL,NILR          NOTE USE OF NILR AS A BASE          00159000
*          REGISTER TO COVER OBJECT LIST          00160000
LR          A,1          SAVE PARM PTR          00161000
SPIE          TRAPS,((1,13),15)          00162000
DROP          K4          00163000
B          SETUP          THIS OPENS FILES, GETMAINS, ETC          00164000
AGN EQU          *          00165000
BAL          2,READ          READ THE FUNCTION
    
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	ST	A,GARBT	HOLD IT	00166000
	PUTMSG	MA		00167000
	BAL	2,PRINT		00168000
	BAL	2,READ	READ ARGUMENTS	00169000
	ST	A,GARBT+4	HOLD THEM	00170000
	BAL	2,PRINT		00171000
	TTIMER			00172000
	ST	0,STIM	DONT COUNT READ TIME	00173000
NOBUG	LM	A,Q,GARBT		00174000
	BAL	2,EVALQUOT		00175000
	TTIMER			00176000
	L	1,STIM		00177000
	ST	0,STIM		00178000
	SR	1,0		00179000
	M	0,=F'26'	CLOCK CYCLES INTO MICROSECS	00180000
	D	0,=F'1000'	INTO MILLISECS	00181000
	CVD	1,TEA	INTO DECIMAL	00182000
	MVC	MB+11(8),MASK		00183000
	ED	MB+11(8),TEA+4		00184000
	PUTMSG	MB		00185000
	BAL	2,PRINT		00186000
	B	AGN		00187000
STOP	EQU	*		00188000
	CLOSE	(CARDIN,,PRINTCB,,LIBCB)	VOL1	00189000
	L	13,SAVEBLK+4		00190000
	RETURN	(14,12)		00191000
SVA	DC	A(SAVEBLK)	VOL1	00192000
MA	DC	AL2(34),C' 0 ARGUMENTS FOR EVALQUOTE ...'		00193000
STIM	DC	F'2000000000' 20		00194000
TEA	DC	D'0' DP WORK AREA		00195000
MASK	DC	X'40',5X'20',X'2120'		00196000
MB	DC	AL2(36),C' 0 TIME MS, VALUE IS ...'		00197000
	EJECT			00198000
				00199000
		***** TRAP SUPERVISOR *****		00200000
		*****		00201000
TRAPS	EQU	*		00202000
	CR	FREE,K4 A GARBCOLL TRAP		00203000
	BL	GARBCOLL		00204000
	SR	15,15 MOVE ERROR MSG	VOL1	00205000
	IC	15,7(1) ERROR TYPE	VOL1	00206000
	SLA	15,3	VOL1	00207000
	LA	15,ETBL-8(15)	VOL1	00208000
	MVC	PIT(8),0(15)	VOL1	00209000
	PUTMSG	PI	VOL1	00210000
	MVC	SAVEBLK+12(8),4(1) MOVE PSW		00211000
	SNAPS	TRAP_PSW,SAVEBLK+12,SAVEBLK+19		00212000
	MVC	SAVEBLK+12(12),20(1)		00213000
	STM	3,7,SAVEBLK+24		00214000
	SNAPS	REGS0-7,SAVEBLK+12,SAVEBLK+43		00215000
	STM	8,13,SAVEBLK+12		00216000
	MVC	SAVEBLK+36(8),12(1)		00217000
	SNAPS	REGS8-15,SAVEBLK+12,SAVEBLK+43		00218000
	CLI	7(1),X'06' IF NOT A BAD ERROR		00219000
	BH	0(14)		00220000

	MVC	9(3,1),=AL3(SYSER)	00221000		
	BR	14	00222000		
CONS1	ST	A,CAR(FREE)	00223000		
	BR	14	00224000		
SYSER	L	1,SYSERC	LIMIT ERRORS	VOL1	00225000
	BCT	1,*+8	VOL1	00226000	
	B	STOP	VOL1	00227000	
	ST	1,SYSERC	VOL1	00228000	
	ERROR	'0 *** F4-FN ERROR INSIDE ATOM'	VOL1	00229000	
SYSERC	DC	F'10'	ALLOW 10 ERRORS	VOL1	00230000
ETBL	DC	C'OP CODE PRIV OPNEXECUTE PROTECT ADDRESS SPECIFCN'	VOL1	00231000	
	DC	C'DATA	FIXD OVFFIXD DIVDEC OVFLDEC DIVDEXP OVFL'	VOL1	00232000
	DC	C'SIGNIFICFP DIVD'	VOL1	00233000	
PI	DC	AL2(34),C' 0	PROGRAM INTERRUPT-	VOL1	00234000
PIT	DC	8C' '	VOL1	00235000	
	EJECT				00236000
LIBCB	DCB	MACRF=R,LRECL=80,EODAD=LEOF,DSORG=PO,BUFL=80,	VOL1	C00237000	
		DDNAME=LISPLIB,BLKSIZE=80,BFALN=F	VOL1	00238000	
CARDIN	DCB	DSORG=PS,MACRF=(GL),DDNAME=SYSIN,RECFM=FB,		C00239000	
		LRECL=80,BLKSIZE=80,EODAD=LASTCARD,EROPT=SKP		00240000	
PRINTCB	DCB	DSORG=PS,MACRF=(PM),DDNAME=SYSPRINT,RECFM=VBA,		C00241000	
		LRECL=136,BLKSIZE=500,EROPT=ACC		00242000	
SNAPROUT	ST	14,SNPSV		00243000	
	L	2,8(14)	LOWER BOUND	00244000	
	MVC	SNPA(8),0(14)		00245000	
	AP	16(2,14),SNP1		00246000	
	UNPK	SNPA+9(3),16(2,14)		00247000	
	OI	SNPA+11,X'F0'		00248000	
SNPLN	ST	2,SNPA+31		00249000	
	UNPK	SNPA+13(7),SNPA+31(5)		00250000	
	TR	SNPA+13(6),SNPTR-240		00251000	
	MVI	SNPA+19,C' '		00252000	
	MVC	SNPA+20(103),SNPA+19		00253000	
	LA	1,SNPA+22		00254000	
	LA	3,8		00255000	
SNPAL	C	2,12(14)		00256000	
	BH	SNPOUT		00257000	
	UNPK	0(9,1),0(5,2)		00258000	
	TR	0(8,1),SNPTR-240		00259000	
	MVI	8(1),C' '		00260000	
	LA	1,09(,1)		00261000	
	LA	2,4(,2)		00262000	
	BCT	3,SNPAL		00263000	
SNPOUT	PUT	PRINTCB,SNPA-5		00264000	
	L	14,SNPSV		00265000	
	C	2,12(14)	UPPER	00266000	
	BH	18(14)		00267000	
	B	SNPLN		00268000	
SNP1	DC	PL1'1'		00269000	
SNPSV	DC	F'0'		00270000	
SNPPSER	DC	7F'0'		00271000	
	DC	AL2(136),C' '		00272000	
SNPA	DC	CL131'		00273000	
SNPTR	DC	C'0123456789ABCDEF'		00274000	
*	SNAPS	OBJLIST,OBJECT,EFWS		00275000	

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*          SNAPS      STACK,PUSH,PUSH+4*STACKSIZ      00276000
EJECT                                           00277000
*****                                           00278000
***** EVALQUOTE(FN,ARGS)  NON REC ***** 00279000
*****                                           00280000
EVS      DC          3F'0'                          00281000
EVALQUOT STM        A,Q,EVS+4                        00282000
          ST          2,EVS                          00283000
          LA          Q,FEXPR                        TRY FEXPR 00284000
          BAL         2,GET                          00285000
          CR          A,NILR                          IS IT    00286000
          BNE         EVL                            ITS EXPR 00287000
          L           A,EVS+4                        00288000
          LA          Q,FSUBR                        TRY FSUBR 00289000
          BAL         2,GET                          00290000
          CR          A,NILR                          IS IT    00291000
          BNE         EVL                            IT IS FSUBR 00292000
*        APPLY(FN,ARGS,NIL)                       00293000
          ST          NILR,ARGS                       00294000
          LM          A,Q,EVS+4                       00295000
          BAL         2,APPLY                         00296000
          L           2,EVS                           00297000
          BR          2                               00298000
*        EVAL(CONS(FN,ARGS),NIL)                   00299000
EVL      LM          A,Q,EVS+4                       00300000
          BAL         2,CONS                          00301000
          LR          Q,NILR                          00302000
          BAL         2,EVAL                          00303000
          L           2,EVS                           00304000
          BR          2                               00305000
          EJECT                                       00306000
*****                                           00307000
***** EVAL(FORM,A)  RECURSIVE ***** 00308000
*****                                           00309000
TRACEIND DC          X'0000'                          00310000
EVAL      SAVE        2                               SAVE RET 00311000
EVALL    CR          A,NILR                          00312000
          BE          RETURN                          RET NIL  00313000
          TM          CAR(A),FIX                      A NUMBER 00314000
          BO          RETURN                          YES      00315000
          STM        A,Q,EVLSV                        SAVE PARAMS 00316000
          TM          CAR(A),ATOM                      00317000
          BZ          EVALST                          NO       00318000
          LA          Q,APVAL                          IS IT APVAL 00319000
          BAL         2,GET                          00320000
          CR          A,NILR                          00321000
          BE          EVNAP                          NO       00322000
          L           A,CAR(A)                        YES      00323000
EVATM    TM          TRACEIND,X'01'                  TRACING  00324000
          BNO        RETURN                          00325000
          ST          A,EVLSV+4                      00326000
          L           A,EVLSV                        00327000
          MVC        LINE(29),=C' *** ENTERING EVAL WITH ATOM-' 00328000
          LA          P,LINE+35                      00329000
          BAL         2,PUTATOM                      00330000

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	MVI	0(P),C'='		00331000
	LA	P,1(,P)		00332000
	ST	P,PRTAB		00333000
	L	A,EVLSV+4		00334000
	BAL	2,PRINT		00335000
	L	A,EVLSV+4		00336000
	B	RETURN		00337000
EVNAP	LM	A,Q,EVLSV	AN ATOM AND NOT APVAL	00338000
	LA	1,ERRA8		00339000
	BAL	2,SASSOC		00340000
	L	A,CDR(A)		00341000
	B	EVATM		00342000
ERRA8	ERROR	' *** A8-UNDEFINED VARIABLE'		00343000
ERRA9	ERROR	' *** A2-FUNCTION NOT DEFINED(EVAL)-'		00344000
EVALST	EQU	*		00345000
	TM	TRACEIND,X'01'	TRACING	00346000
	BNO	NTEV	NO	00347000
	MVC	LINE(29),=C' *** ENTERING EVAL WITH FORM-'		00348000
	MVC	PRTAB(4),=A(LINE+35)		00349000
	BAL	2,PRINT		00350000
	LM	A,Q,EVLSV		00351000
NTEV	EQU	*		00352000
	L	A,CAR(A)	FORM NOT AN ATOM, TRY QUOTE	00353000
	TM	CAR(A),ATOM		00354000
	BZ	EVNA	NO	00355000
	LA	1,QUOTE		00356000
	CR	A,1		00357000
	BNE	EVNQ	NOT QUOTE	00358000
	L	A,EVLSV		00359000
	L	A,CDR(A)		00360000
	L	A,CAR(A)	CADR(FORM)	00361000
	B	RETURN		00362000
EVNQ	LA	1,COND	TRY COND	00363000
	CR	A,1		00364000
	BNE	EVNC	NOT COND	00365000
	L	A,EVLSV	IT IS COND	00366000
	L	A,CDR(A)		00367000
	BAL	2,EVCON		00368000
	B	RETURN		00369000
EVNC	LR	M,A		00370000
	LA	Q,EXPR		00371000
	BAL	2,GET		00372000
	CR	A,NILR		00373000
	BE	EVNXP	NOT EXPR	00374000
*	APPLY(---,EVNLIS(CDR(FORM),A),A)			00375000
	SAVE	A		00376000
	LM	A,Q,EVLSV		00377000
	SAVE	Q		00378000
	L	A,CDR(A)		00379000
	TM	CAR(M),TRACEB	TRACE IT	00380000
	BO	TRACEF	YES	00381000
	BAL	2,EVLIS		00382000
	UNSAVE	Q		00383000
	ST	Q,ARGS	ASSOC LIST	00384000
	LR	Q,A		00385000

	UNSAVE	A		00386000
	B	APPLY		00387000
* TRACEF	PRODUCE A	TRACE OF FUNCTION CALL AND VALUE		00388000
	SAVE	M	FUNCTION	00389000
	BAL	2,EVLIS		00390000
	UNSAVE	M	FN	00391000
	ST	A,EVLSV		00392000
	ST	M,EVLSV+4		00393000
	MVC	LINE(16),=C' TRACE ENTERING-'		00394000
	LA	P,LINE+24		00395000
	ST	P,PRTAB		00396000
	LR	A,M		00397000
	BAL	2,PRIN1		00398000
	L	A,EVLSV		00399000
	BAL	2,PRINT		00400000
	L	A,EVLSV		00401000
	L	M,EVLSV+4		00402000
	UNSAVE	Q		00403000
	ST	Q,ARGS		00404000
	LR	Q,A		00405000
	UNSAVE	A		00406000
	SAVE	M		00407000
	BAL	2,APPLY		00408000
	UNSAVE	M		00409000
	ST	A,EVLSV		00410000
	MVC	LINE(24),=C' TRACED FUNCTION/VALUE- '		00411000
	LA	P,LINE+24		00412000
	ST	P,PRTAB		00413000
	LR	A,M		00414000
	BAL	2,PRIN1		00415000
	L	P,PRTAB		00416000
	LA	P,1(,P)	SPACE ONE	00417000
	ST	P,PRTAB		00418000
	L	A,EVLSV		00419000
	BAL	2,PRINT		00420000
	L	A,EVLSV		00421000
	B	RETURN		00422000
EVNXP	LR	A,M	CAR(FORM)	00423000
	LA	Q,SUBR	TRY SUBR	00424000
	BAL	2,GET		00425000
	CR	A,NILR		00426000
	BE	EVNS	NOT SUBR	00427000
	SAVE	A	SUBR ADDR	00428000
	L	Q,EVLSV+4		00429000
	SAVE	Q	ALIST	00430000
	SAVE	M	SAVE FORM IN CASE OF ERROR	00431000
	L	A,EVLSV		00432000
	L	A,CDR(A)		00433000
	BAL	2,EVLIS		00434000
	UNSAVE	Q	IN CASE OF ARG CNT ERROR	00435000
	STM	A,Q,TAPPL		00436000
	UNSAVE	Q	ALIST	00437000
	ST	Q,ALIST		00438000
	BAL	2,SPREAD		00439000
	UNSAVE	14	SUBR ADDR	00440000

	B	EXSUBR	EXECUTE SUBR, COUNT ARGS	00441000
EVNS	LR	A, M		00442000
	LA	Q, FEXPR		00443000
	BAL	2, GET	IS IT FEXPR	00444000
	CR	A, NILR		00445000
	BE	EVNFXP		00446000
*	APPLY (---	LIST (CDR (FORM) A) A)		00447000
	LR	M, A		00448000
	L	A, EVLSV+4	ALIST	00449000
	ST	A, ARGS		00450000
	LR	Q, NILR		00451000
	BAL	2, CONS		00452000
	LR	Q, A		00453000
	L	A, EVLSV		00454000
	L	A, CDR (A)		00455000
	BAL	2, CONS		00456000
	LR	Q, A		00457000
	LR	A, M		00458000
	B	APPLY		00459000
EVNFXP	LR	A, M		00460000
	LA	Q, FSUBR		00461000
	BAL	2, GET		00462000
	CR	A, NILR		00463000
	BE	EVNFS		00464000
	LR	14, A		00465000
	LM	A, Q, EVLSV		00466000
	L	A, CDR (A)		00467000
	B	EXSUBRB	EXECUTE SUBR DONT COUNT ARGS	00468000
*	EVAL (CONS	(CDR (SASSOC (CAR (FORM) , A, U)) , CDR (FORM)) , A)		00469000
EVNFS	LR	A, M	CAR (FORM)	00470000
	L	Q, EVLSV+4		00471000
	LA	1, ERRA9		00472000
	BAL	2, SASSOC		00473000
	L	A, CDR (A)		00474000
	L	Q, EVLSV		00475000
	L	Q, CDR (Q)		00476000
	BAL	2, CONS		00477000
	L	Q, EVLSV+4		00478000
	B	EVALL		00479000
*	APPLY (CAR	(FORM) , EVLIS (CDR (FORM) , A) , A)		00480000
EVNA	SAVE	A	CAR (FORM)	00481000
	L	Q, EVLSV+4		00482000
	SAVE	Q	ALIST	00483000
	L	A, EVLSV		00484000
	L	A, CDR (A)		00485000
	BAL	2, EVLIS		00486000
	UNSAVE	Q		00487000
	ST	Q, ARGS		00488000
	LR	Q, A		00489000
	UNSAVE	A		00490000
	B	APPLY		00491000
	EJECT			00492000
				00493000
		APPLY (FN, ARGS, A)	RECURSIVE	00494000
				00495000

APPLY	SAVE	2		00496000
APPLY	CR	A,NILR		00497000
	BE	RETURN	IF FN=NIL RETURN NIL	00498000
	TM	TRACEIND,X'01'	TRACING	00499000
	BNO	NTAP	NO	00500000
	STM	A,Q,TAPPL		00501000
	MVC	LINE(28),=C' *** ENTERING APPLY WITH FN-		00502000
	MVC	PRTAB(4),=A(LINE+35)		00503000
	BAL	2,PRINT		00504000
	L	A,TAPPL+4		00505000
	MVC	LINE(14),=C' *** AND ARGS-		00506000
	MVC	PRTAB(4),=A(LINE+35)		00507000
	BAL	2,PRINT		00508000
	LM	A,Q,TAPPL		00509000
NTAP	EQU	*		00510000
	TM	CAR(A),ATOM	IS FN ATOM	00511000
	BZ	APPNATM	NO	00512000
	STM	A,Q,TAPPL	SAVE ARGS	00513000
	LA	Q,EXPR		00514000
	BAL	2,GET		00515000
	CR	A,NILR		00516000
	BE	APNEXPR	LIST WASNT AN EXPR	00517000
*	APPLY(---,ARGS,A)			00518000
	L	Q,TAPPL+4		00519000
	B	APPLY		00520000
APNEXPR	LA	Q,SUBR	TRY SUBR	00521000
	L	A,TAPPL		00522000
	BAL	2,GET		00523000
	CR	A,NILR		00524000
	BE	APNSUBR	NOT A SUBR	00525000
	L	Q,ARGS	ITS A SUBR	00526000
	ST	Q,ALIST	SET UP ALIST	00527000
	LR	14,A	ADDR OF SUBR	00528000
	L	A,TAPPL+4		00529000
	BAL	2,SPREAD	RETURNS ARG CNT IN R1	00530000
EXSUBR	EQU	*		00531000
*	EXECUTE SUBR, R14 PTS TO ADDR OF SUBRTN, R1 HAS ARGS COUNTED			00532000
***	CHECK ARG CNTS HERE			00533000
	STC	1,*+5		00534000
	CLI	CAR(14),X'00'		00535000
	BE	EXSUBRB		00536000
	LM	A,Q,TAPPL		00537000
	BL	SUBRER		00538000
	ERROR	' *** F3-TOO FEW ARGUMENTS-SUBR'		00539000
SUBRER	ERROR	' *** F2-TOO MANY ARGUMENTS-SUBR'		00540000
EXSUBRB	L	14,CAR(14)	RTN ADDR	00541000
	BALR	2,14		00542000
	B	RETURN		00543000
*	APPLY(CDR(SASSOC(FN,A,U)),ARGS,A)			00544000
APNSUBR	L	Q,ARGS		00545000
	L	A,TAPPL		00546000
	LA	1,ERRA2		00547000
	BAL	2,SASSOC		00548000
	L	A,CDR(A)		00549000
	L	Q,TAPPL+4		00550000

	B	APPLY		00551000
APPNATM	L	14,CAR(A)		00552000
	LA	15,LAMBDA	TRY LAMBDA	00553000
	CR	14,15		00554000
	BE	APLAM	ITS LAMBDA	00555000
	LA	15,LABEL	TRY LABEL	00556000
	CR	14,15		00557000
	BE	APLBL	A LABEL	00558000
	LA	15,FUNARG	TRY FUNARG	00559000
	CR	14,15		00560000
	BE	APFUN	YES	00561000
*		APPLY(EVAL(FN,A),ARGS,A)		00562000
	SAVE	Q		00563000
	L	Q,ARGS	ASSOC LIST	00564000
	SAVE	Q		00565000
	BAL	2,EVAL		00566000
	UNSAVE	Q		00567000
	ST	Q,ARGS		00568000
	UNSAVE	Q		00569000
	B	APPLY		00570000
*		APPLY(CADDR(FN),ARGS,CONS(CONS(CADR(FN),CADDR(FN)),A))		00571000
APLBL	SAVE	Q	PROCESS LABEL	00572000
	L	Q,CDR(A)		00573000
	L	A,CAR(Q)	CADR	00574000
	L	Q,CDR(Q)	CDDR	00575000
	L	Q,CAR(Q)	CADDR	00576000
	SAVE	Q		00577000
	BAL	2,CONS		00578000
	L	Q,ARGS		00579000
	BAL	2,CONS		00580000
	ST	A,ARGS		00581000
	UNSAVE	A	CADDR	00582000
	UNSAVE	Q	ARGS	00583000
	B	APPLY		00584000
*		APPLY(CADR(FN),ARGS,CADDR(FN))		00585000
APFUN	L	A,CDR(A)		00586000
	L	14,CDR(A)	CDDR	00587000
	L	14,CAR(14)	CADDR	00588000
	ST	14,ARGS		00589000
	L	A,CAR(A)	CADR	00590000
	B	APPLY		00591000
*		EVAL(CADDR(FN),NCONC(PAIR(CADR(FN),ARGS),A))		00592000
APLAM	L	A,CDR(A)	LAMBDA	00593000
	ST	A,TAPPL		00594000
	L	A,CAR(A)	CADR	00595000
	BAL	2,PAIR		00596000
	L	Q,ARGS		00597000
	BAL	2,NCONC		00598000
	LR	Q,A		00599000
	L	A,TAPPL		00600000
	L	A,CDR(A)		00601000
	L	A,CAR(A)		00602000
	MVI	PROGIND,0	SET OFF FOR LAMBDA EXPR	00603000
	BAL	2,EVAL		00604000
	B	RETURN		00605000

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ERRA2  ERROR      ' *** A2-FUNCTION NOT DEFINED(APPLY)-'      00606000
      EJECT      00607000
*****
***** EVCON(C,A) RECURSIVE ***** 00608000
*****
***** EVCON(C,A) RECURSIVE ***** 00609000
*****
EVCON  SAVE      2      00611000
      SAVE      A      EXTRA SAVE IN CASE OF COND ERROR 00612000
EVCONN CR        A,NILR 00613000
      BE        EVERA3 00614000
*      EVAL(CAAR(C),A) 00615000
      O        A,PROGIND SAVE PROGIND ALSO 00616000
      SAVE      A      00617000
      SAVE      Q      00618000
      L        A,CAR(A) 00619000
      L        A,CAR(A) CAAR 00620000
      BAL      2,EVAL 00621000
      LR       M,A 00622000
      UNSAVE   Q      00623000
      UNSAVE   A      00624000
      LR       1,A 00625000
      SRL      1,24 00626000
      STC      1,PROGIND 00627000
      CR       M,NILR 00628000
      BNE      EVCE 00629000
*      EVCON(CDR(C),A) 00630000
      L        A,CDR(A) 00631000
      B        EVCONN 00632000
*      EVAL(CADAR(C),A) 00633000
EVCE   L        A,CAR(A) 00634000
      L        A,CDR(A) CADR 00635000
      L        A,CAR(A) CADAR 00636000
      BAL      2,EVAL 00637000
      UNSAVE   1      EXTRA SAVE WASNT NEEDED 00638000
      B        RETURN 00639000
EVERA3 UNSAVE   A      PRINT ORIGINAL LIST 00640000
      TM       PROGIND,X'01' IF PROG ITS OK 00641000
      BO       RETURN 00642000
      ERROR    ' *** A3-NO ARGS OF COND TRUE' 00643000
      EJECT    00644000
*****
***** EVLIS(M,A) RECURSIVE ***** 00645000
*****
***** EVLIS(M,A) RECURSIVE ***** 00646000
*****
***** EVLIS(M,A) RECURSIVE ***** 00647000
*****
EVLIS  CR        A,NILR  NIL LIST 00648000
      BE        0(2) 00649000
      SAVE      2 00650000
      LR       1,NILR 00651000
EVLISS SAVE      A 00652000
      SAVE      Q 00653000
      SAVE      1 00654000
      L        A,CAR(A) 00655000
      BAL      2,EVAL 00656000
      LR       Q,NILR 00657000
      BAL      2,CONS 00658000
      LR       Q,A 00659000
      UNSAVE   A 00660000
    
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BAL      2,NCONC      00661000
LR       1,A         00662000
UNSAVE  Q           00663000
UNSAVE  A           00664000
L       A,CDR(A)     00665000
CR      A,NILR      00666000
BNE     EVLISS     00667000
LR      A,1         00668000
B       RETURN     00669000
EJECT                    00670000
*****                    00671000
***** GET(X,Y) NON REC ***** 00672000
*****                    00673000
* SEARCH LIST X FOR ITEM Y, RETURN CAR OF REST OF LIST, ELSE NIL 00674000
GET CR      A,NILR      IS X NIL 00675000
BCR     8,2           YES, EXIT 00676000
C       Q,CAR(A)      COMP Y TO CAR(X) 00677000
L       A,CDR(A)     00678000
BNE     GET          00679000
L       A,CAR(A)     00680000
BR      2            00681000
EJECT                    00682000
*****                    00683000
***** SASSOC(X,Y,U) NON REC ***** 00684000
*****                    00685000
* SEARCHES LIST Y OF DOTTED PAIRS FOR X IN CAR, RET PTR TO PAIR 00686000
* INTERNAL ENTRY POINT SASSOC - R1 IS ERROR MACRO ADDRESS 00687000
* LISP ENTRY POINT SASSOCC - U IS ERROR FUNCTION 00688000
SASSOCC SR      1,1      SET SW 00689000
SASSOC  STM     A,Q,ERSV  INTERNAL ENTRY- R1 IS ADDR OF ER 00690000
LR      M,Q         00691000
SASSOCS CR      M,NILR   00692000
BE      SASSER      00693000
LM      Q,M,CAR(M)    00694000
C       A,CAR(Q)     00695000
BNE     SASSOCS     00696000
LR      A,Q         00697000
BR      2            00698000
SASSER  LTR     1,1      INTERNAL CALL 00699000
BNZ     SINER       YES 00700000
L       A,ARGS      00701000
L       Q,ALIST     00702000
ST      Q,ARGS      00703000
LR      Q,NILR      00704000
B       APPLY       00705000
SINER  LM      A,Q,ERSV  00706000
BR      1            00707000
EJECT                    00708000
*****                    00709000
***** PAIR(X,Y) NON REC ***** 00710000
*****                    00711000
* PAIR FORMS LIST ((XN YN)...(X1 Y1)) FROM LISTS X AND Y 00712000
TA     EQU      14      POINTS AT X LIST 00713000
TQ     EQU      15      POINTS AT Y LIST 00714000
PAIR   STM     A,Q,GARBT+4  IN CASE OF GARB COLLN 00715000

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	ST	2,PSV		00716000
	LR	TA,A		00717000
	LR	TQ,Q		00718000
	LR	M,NILR	LINK OF NEW LIST	00719000
PAIRR	CR	TA,NILR		00720000
	BE	PANIL	END OF X LIST	00721000
	CR	TQ,NILR		00722000
	BE	PQNIL	END OF Y LIST	00723000
	L	A,CAR(TA)		00724000
	L	Q,CAR(TQ)		00725000
	BAL	2,CONS	(XN.YN)	00726000
	LR	Q,M	LAST LINK IN LIST	00727000
	BAL	2,CONS	ADD TO LIST	00728000
	LR	M,A		00729000
	L	TA,CDR(TA)		00730000
	L	TQ,CDR(TQ)		00731000
	B	PAIRR		00732000
PANIL	L	2,PSV		00733000
	CR	TQ,NILR		00734000
	BE	0(2)	BOTH A AND Q NIL	00735000
	LM	A,Q,GARBT+4		00736000
	ERROR	' *** F2-TOO MANY ARGUMENTS-EXPR '		00737000
PQNIL	LM	A,Q,GARBT+4		00738000
	ERROR	' *** F3-TOO FEW ARGUMENTS-EXPR '		00739000
	EJECT			00740000
				00741000
		***** APPEND(X,Y) NON REC ***** \$\$\$		00742000
		*****		00743000
	*	FORM LIST (X Y) FROM LISTS X AND Y		00744000
	*	NCONC(COPY(X),Y)		00745000
APT	DC	F'0'		00746000
APPEND	ST	2,APT		00747000
	CR	A,NILR	A NIL	00748000
	BE	APXNIL	YES	00749000
	ST	Q,GARBT	HOLD Q	00750000
	LM	A,Q,CAR(A)	MAKE NEW X LIST	00751000
	BAL	2,CONS		00752000
	LR	M,A	SAVE NEW LIST	00753000
APAGN	CR	Q,NILR	AT END	00754000
	BE	APDN	YES	00755000
	LR	1,A	HOLD A A SEC	00756000
	LM	A,Q,CAR(Q)	NEXT CELL	00757000
	BAL	2,CONS		00758000
	ST	A,CDR(1)	LINK IT	00759000
	B	APAGN		00760000
APDN	L	Q,GARBT		00761000
	ST	Q,CDR(A)	LINK ON Y	00762000
	LR	A,M		00763000
	B	EPX		00764000
APXNIL	LR	A,Q	RETURN Y	00765000
EPX	L	2,APT		00766000
	BR	2		00767000
		***** APPEND1(X,Y) ** SUBR *****		00768000
	*	APPEND(X,CONS(Y,NIL))		00769000
APPEND1	LR	1,2		00770000

LR	M,A		00771000
LR	A,Q		00772000
LR	Q,NILR		00773000
BAL	2,CONS		00774000
LR	Q,A		00775000
LR	A,M		00776000
LR	2,1		00777000
B	NCONC		00778000
EJECT			00779000

***** SPREAD(X) NON REC *****			

*	PUTS ELEMENTS OF LIST X INTO ARG CELLS.		00783000
*	REG1 RETURNS NUMBER OF ARGUMENTS FOUND, MAX IS 22.		00784000
SPREAD	LA	1,0 SET ARG CNT ZERO	00785000
	CR	A,NILR NO ARGS	00786000
	BCR	8,2	00787000
	LR	M,A IN CASE OF ERROR	00788000
	C	NILR,CDR(A) ONE ARG	00789000
	BE	SPANIL YES	00790000
	L	Q,CDR(A)	00791000
	C	NILR,CDR(Q) TWO ARGS	00792000
	BE	SPQNIL YES	00793000
SPRNXT	C	1,=A(80) MAX OF 22 ARGS	00794000
	BE	SPERR ERR - OVER 22	00795000
	L	Q,CDR(Q)	00796000
	L	0,CAR(Q) GET ARG	00797000
	ST	0,ARGS(1) STORE ARG	00798000
	AR	1,K4	00799000
	C	NILR,CDR(Q) AT END YET	00800000
	BNE	SPRNXT NO	00801000
	SRA	1,2 DIVIDE BY 4	00802000
	L	Q,CDR(A) SET UP A , Q	00803000
SPQNIL	L	Q,CAR(Q)	00804000
	LA	1,1(,1) UP CNT	00805000
SPANIL	L	A,CAR(A)	00806000
	LA	1,1(,1) UP CNT	00807000
	BR	2 EXIT FAIT ACCOMPLI	00808000
SPERR	LR	A,M	00809000
	ERROR	' *** A7-MORE THAN 22 ARGS '	00810000
	EJECT		00811000

***** NCONC(X,Y) NON REC *****			

*	JOINS LIST X TO LIST Y		00815000
NCONC	LR	1,A	00816000
	CR	A,NILR	00817000
	BNE	NCA	00818000
	LR	A,Q	00819000
	BR	2	00820000
NCC	L	1,CDR(1)	00821000
NCA	C	NILR,CDR(1)	00822000
	BNE	NCC	00823000
	ST	Q,CDR(1)	00824000
	BR	2	00825000


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***** 00826000
***** ATTRIB(X,E) NON REC ***** 00827000
***** 00828000
* PUTS LIST E ON END OF LIST X, RETURNS E 00829000
ATTRIB ST Q,GARBT 00830000
LR 15,2 00831000
BAL 2,NCONC 00832000
L A,GARBT 00833000
BR 15 00834000
EJECT 00835000
***** 00836000
***** PROG((X1,X2,...),A) REC ***** 00837000
***** 00838000
PROGIND DC F'0' PROG SWITCH 00839000
PROG SAVE 2 00840000
ST A,PROGT HOLD PRGM 00841000
SAVE A SAVE IT WHILE WE EVALUATE IT 00842000
ST NILR,GOLIST 00843000
* PUT PROG VARIABLES ON ALIST 00844000
ST Q,ALIST 00845000
L A,CAR(A) 00846000
PROGV CR A,NILR AT NIL 00847000
BE PROGA YES 00848000
LR M,A SAVE A 00849000
L A,CAR(A) VARIABLE 00850000
LR Q,NILR 00851000
BAL 2,CONS PAIR IT TO NIL 00852000
L Q,ALIST 00853000
BAL 2,CONS ADD TO ALIST 00854000
ST A,ALIST 00855000
L A,CDR(M) NEXT VAR 00856000
B PROGV 00857000
PROGA L A,PROGT 00858000
* BUILD GOLIST 00859000
PROGL L M,CDR(A) 00860000
CR M,NILR END OF PROG 00861000
BE PROGE YES 00862000
L A,CAR(M) TRY FOR LABEL 00863000
TM CAR(A),ATOM LABEL 00864000
BO PROGY YES 00865000
LR A,M RESET A 00866000
B PROGL TRY AGAIN 00867000
PROGY L Q,CDR(M) ADDR OF PGM STMT 00868000
BAL 2,CONS 00869000
L Q,GOLIST 00870000
BAL 2,CONS LINK INTO GOLIST 00871000
ST A,GOLIST 00872000
LR A,M RESET A 00873000
B PROGL FIND NEXT LABEL 00874000
* BEGIN EXECUTION OF PROG 00875000
PROGE L Q,PROGT START OF PROGM 00876000
PROGEX L Q,CDR(Q) FIRST STMT 00877000
CR Q,NILR AT END 00878000
LR A,NILR 00879000
BE PEX END OF PROG LIST 00880000

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L      A,CAR(Q)          -A- HAS PTR TO STMT          00881000
TM     CAR(A),ATOM      IS NEXT PGM STMT A LABEL    00882000
BO     PROGEX           YES SKIP OVER IT          00883000
MVI    PROGINDE,X'01'   SET IND ON              00884000
SAVE   Q               SAVE PTR TO REST OF PGM     00885000
L      Q,GOLIST         00886000
SAVE   Q               SAVE GOLIST                00887000
L      Q,ALIST          00888000
SAVE   Q               SAVE ALIST                 00889000
BAL    2,EVAL           EVAL STMT                 00890000
*      NOTE AT THIS POINT (PROGR) IS ADDR IN STACK- USED IN GO & RET 00891000
PROGR  UNSAVE Q         00892000
      ST      Q,ALIST   00893000
      UNSAVE Q         00894000
      ST      Q,GOLIST 00895000
      UNSAVE Q         REST OF PGM                00896000
      B      PROGEX    NEXT STMT                 00897000
      EJECT                                     00898000
***** 00899000
***** GO(X) FSUBR ***** 00900000
***** 00901000
ERA6   ERROR          ' ***A6-UNDEF LABEL IN GO'    00902000
GO     LA             1,PROGR                       00903000
GOL    UNSAVE        15                             SCAN DOWN STACK FOR EVAL 00904000
      LA             15,0(,15)                       STRIP OFF BITS FOR COMPARE 00905000
      CR             15,1                             00906000
      BNE            GOL                               R14 HAS RET ADDR -DONT LOSE IT 00907000
      UNSAVE        Q                                 ALIST                     00908000
      ST            Q,ALIST                           00909000
      UNSAVE        Q                                 00910000
      ST            Q,GOLIST                           00911000
      UNSAVE        M                                 REST OF PGM, NOT NEEDED   00912000
      L             A,CAR(A)                           CAR(X)                    00913000
      LA            1,ERA6                             00914000
      BAL           2,SASSOC                           FIND ON ASSOC LIST       00915000
      B             GOLB                               00916000
GOB    LR            A,M                             00917000
GOLB   L             M,CDR(A)                         LOCN IN PGM              00918000
      L             A,CAR(M)                         PGM START                00919000
      TM            CAR(A),ATOM                       IS IT A LABEL            00920000
      BO            GOB                               00921000
      SAVE          M                                 PROGM                    00922000
      L             M,GOLIST                           00923000
      SAVE          M                                 00924000
      L             Q,ALIST                           00925000
      SAVE          Q                                 00926000
      SAVE          15                                -INK                     00927000
      B             EVALL                             00928000
***** 00929000
***** RETURN(X) ** SUBR ***** 00930000
***** 00931000
GORET  LA            1,PROGR                         00932000
GORR   UNSAVE        Q                               00933000
      LA            Q,0(,Q)                           STRIP BITS               00934000
      CR            1,Q                               00935000

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BNE GORR 00936000
UNSAVE Q ALIST 00937000
UNSAVE Q GOLIST 00938000
UNSAVE Q PGM 00939000
PEX UNSAVE Q PROG 00940000
MVI PROGIND,0 00941000
B RETURN 00942000
EJECT EXIT FROM PROG 00943000
***** 00944000
***** SET(X,Y) NON REC ***** 00945000
***** 00946000
* SETS X=Y ON ALIST 00947000
SETSV DC 2F'0' 00948000
SET ST 2,SETSV 00949000
ST Q,SETSV+4 00950000
LA 1,ERA5 00951000
L Q,ALIST 00952000
BAL 2,SASSOC 00953000
LM 1,2,SETSV 00954000
ST 2,CDR(A) 00955000
LR A,2 00956000
BR 1 00957000
ERA5 ERROR ' ***A5-SET VARIABLE UNDEF' 00958000
***** 00959000
***** SETQ(X,A) REC ***** 00960000
***** 00961000
SETQ SAVE 2 00962000
LA 2,SET 00963000
SETC SAVE 2 COMMON FOR SETQ & CSETQ 00964000
SAVE A ARG LIST 00965000
SAVE Q ALIST 00966000
L A,CDR(A) 00967000
L A,CAR(A) 00968000
BAL 2,EVAL 00969000
UNSAVE Q 00970000
ST Q,ALIST 00971000
LR Q,A 00972000
UNSAVE A 00973000
L A,CAR(A) 00974000
UNSAVE 1 00975000
UNSAVE 2 00976000
BR 1 00977000
***** 00978000
***** CSET(OB,VAL) NON REC ***** 00979000
***** 00980000
* PUT VAL AS AN APVAL ON PROPERTY LIST OF OB 00981000
CSET TM CAR(A),ATOM SHOULD BE ATOM 00982000
BZ 0(2) ISNT 00983000
LR 1,2 SAVE 2 00984000
LR M,A HOLD A 00985000
LR A,Q 00986000
LR Q,NILR 00987000
BAL 2,CONS 00988000
BAL 2,CONS 00989000
LR Q,A 00990000

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	LA	A,APVAL	SET IND	00991000	
	BAL	2,CONS		00992000	
	ST	A,CDR(M)	LINK TO ATOM	00993000	
	BR	1	EXIT	00994000	
CSETQ	SAVE	2		00995000	
	LA	2,CSET		00996000	
	B	SETC		00997000	
	EJECT			00998000	
	*****	*****	*****	00999000	
	*****	REMPROP(X,IND)	NON REC	*****	01000000
	*****	*****	*****	*****	01001000
	*	SEARCH LIST X FOR INDICATOR IND, WHEN FOUND REMOVE IT AND		01002000	
	*	FOLLOWING PROPERTY FROM LIST		01003000	
REMPROP	CR	A,NILR	NIL LIST	01004000	
	BE	REX		01005000	
	L	1,CDR(A)		01006000	
	CR	1,NILR	NO INDICATORS	01007000	
	BE	REX		01008000	
	C	Q,CAR(1)	CHECK IND	01009000	
	BE	RFND	FOUND	01010000	
	L	A,CDR(1)	CONT SEARCH	01011000	
	B	REMPROP		01012000	
RFND	L	1,CDR(1)	FOUND IND	01013000	
	CR	1,NILR	NO PROP	01014000	
	BE	REX		01015000	
	L	1,CDR(1)	EXISE IND & PROP	01016000	
	ST	1,CDR(A)		01017000	
	B	REMPROP	TRY FOR MORE	01018000	
REX	LR	A,NILR		01019000	
	BR	2	EXIT	01020000	
	EJECT			01021000	
	*****	*****	*****	01022000	
	*****	DEFINE(X)	NON REC	*****	01023000
	*****	*****	*****	*****	01024000
DEFINE	LA	Q,EXPR		01025000	
	B	DEFLIST		01026000	
	*****	*****	*****	*****	01027000
	*****	DEFLIST(X,IND)	NON REC	*****	01028000
	*****	*****	*****	*****	01029000
DEFLIST	ST	2,ERSV		01030000	
	STM	A,Q,GARBT		01031000	
	LR	M,A	DEFINE LIST POSN	01032000	
DAGN	L	A,CAR(M)	NEXT FN	01033000	
	LR	14,A	SAVE (FN.LAMBDA)	01034000	
	L	A,CAR(A)	CAAR- ATOM BEING DEFINED	01035000	
	LR	15,A	SAVE FN	01036000	
	BAL	2,REMPROP	GET RID OF ANY OTHERS	01037000	
	L	Q,CDR(15)	LINK INTO ATOM	01038000	
	L	A,CDR(14)	GET LAMBDA	01039000	
	L	A,CAR(A)	CADAR- PROPERTY	01040000	
	BAL	2,CONS	INSERT PROP	01041000	
	LR	Q,A		01042000	
	L	A,GARBT+4	IND	01043000	
	BAL	2,CONS	INSERT IND	01044000	
	ST	A,CDR(15)	LINK INTO ATOM	01045000	

ST	15,CAR(M)	MAKE LIST OF FNS	01046000
L	Q,GARBT+4	GET IND FOR NEXT ROUND	01047000
L	A,CDR(M)	REST OF LIST	01048000
LR	M,A	SAVE IT	01049000
CR	A,NILR	AT END OF LIST	01050000
BNE	DAGN NO		01051000
L	A,GARBT	DEFINED LIST, NO LAMBDA	01052000
L	2,ERSV		01053000
BR	2		01054000
EJECT			01055000
*****			01056000
*****	ADD1 * SUB1 * MINUS	SUBR *****	01057000
*****			01058000
ADD1	SR M,M	SET ADD SWITCH	01059000
	B ASM1		01060000
SUB1	LR M,K4	SET SUB1 SW	01061000
	B ASM1		01062000
MINUS	LA M,8		01063000
ASM1	LR 14,2	HOLD 2	01064000
	TM CAR(A),FLOAT		01065000
	BO ASMFL		01066000
	TM CAR(A),FIX		01067000
	BO ASMFXT		01068000
ARITHER	ERROR ' *** I3-BAD ARITH ARG'		01069000
ASMFXT	L A,CAR(A)		01070000
	L A,CAR(A)		01071000
	EX 0,ASMFXT(M)		01072000
MKFXAT	LR Q,NILR		01073000
	BAL 2,CONS		01074000
	MVI CDR(A),FWD		01075000
	BAL 2,CONS		01076000
	MVI CAR(A),FIX	SET ATOM TYPE	01077000
	BR 14		01078000
ASMFXT	AH A,=H'1'	ADD1	01079000
	SH A,=H'1'	SUB1	01080000
	LCR A,A	-X	01081000
ASMFL	L A,CAR(A)		01082000
	LE 0,CAR(A)		01083000
	EX 0,ASMFLT(M)		01084000
MKFLAT	LR Q,NILR	MAKE FLOAT ATOM	01085000
	BAL 2,CONS		01086000
	STE 0,CAR(A)		01087000
	MVI CDR(A),FWD		01088000
	BAL 2,CONS		01089000
	MVI CAR(A),FLOAT		01090000
	BR 14		01091000
ASMFLT	AE 0,=E'1.'	ADD1.	01092000
	SE 0,=E'1.'	SUB1.	01093000
	LCER 0,0	-X	01094000
DPA	DC D'0'		01095000
DPAA	DC D'0'		01096000
NZERO	DC X'4E',7X'00'	NORMAL ZERO	01097000
*****			01098000
*****	PLUS * TIMES	FSUBR *****	01099000
*****			01100000

PLUS	SR	M,M	SET PLUS SW	01101000
	B	PLTI		01102000
TIMES	LR	M,K4	SET TIMES SW	01103000
PLTI	SAVE	2		01104000
	SAVE	M		01105000
	BAL	2,EVLIS	EVAL ARGS	01106000
	UNSAVE	M		01107000
	SR	15,15	SET FIXPT SW	01108000
	LR	1,M		01109000
	SRA	1,2	SET FOR MULT OR ADD	01110000
	LR	Q,A		01111000
PTLOOP	CR	Q,NILR	END OF LIST	01112000
	BE	PTDONE	YES	01113000
	LM	A,Q,CAR(Q)		01114000
	LTR	15,15	TEST MODE	01115000
	BNZ	PTFLOAT	FLOAT MODE	01116000
	TM	CAR(A),FLOAT		01117000
	BO	PTFL		01118000
	TM	CAR(A),FIX		01119000
	BNO	ARITHER	BAD NUMBER	01120000
	L	A,CAR(A)		01121000
	EX	0,INTI(M)		01122000
	LTR	M,M	ADDING	VOL1 01123000
	BZ	PTLOOP	YES	VOL1 01124000
	LR	A,0	CHECK FOR OVERFLOW	VOL1 01125000
	LR	0,1		VOL1 01126000
	SRDA	0,32		VOL1 01127000
	CR	0,A		VOL1 01128000
	BE	PTLOOP		VOL1 01129000
	PUTMSG	'0 FIXED PT OVFL IN TIMES'		VOL1 01130000
	B	PTLOOP		01131000
INTI	A	1,CAR(A)		01132000
	M	0,CAR(A)		01133000
PTFL	BAL	2,FLOAT1		01134000
	LR	15,K4	SET FLOAT SW	01135000
PTFFL	L	A,CAR(A)		01136000
	MVC	DPAA(4),CAR(A)	MOVE INTO DP AREA	01137000
	EX	0,FLTI(M)		01138000
	B	PTLOOP		01139000
FLTI	AD	0,DPAA		01140000
	MD	0,DPAA		01141000
PTFLOAT	TM	CAR(A),FLOAT		01142000
	BO	PTFFL	FLOAT MODE & FLOAT NUMBER	01143000
	TM	CAR(A),FIX		01144000
	BO	PTFINT	INTEGER ENCOUNTERED	01145000
	B	ARITHER		01146000
PTFINT	L	A,CAR(A)		01147000
	L	1,CAR(A)		01148000
	LDR	2,0		01149000
	BAL	2,FLOAT1		01150000
	EX	0,FLTII(M)		01151000
	B	PTLOOP		01152000
FLTII	ADR	0,2		01153000
	NOPR	0		01154000
	MDR	0,2		01155000

PTDONE	UNSAVE	14		01156000
	LTR	15,15		01157000
	BNZ	MKFLAT		01158000
	LR	A,1		01159000
	B	MKFXAT		01160000
FLOAT1	MVI	DPA,X'4E'	SWITCH FIX REG1 TO FLOAT REG0	01161000
	LTR	1,1		01162000
	BNM	*+10		01163000
	LCR	1,1		01164000
	MVI	DPA,X'CE'	NEG EXP	01165000
	ST	1,DPA+4		01166000
	LD	0,DPA		01167000
	AD	0,ZERO		01168000
	BR	2		01169000
*****				01170000
***** DIFFERENCE * QUOTIENT SUBR *****				01171000
*****				01172000
DIFF	SR	M,M	SET DIFF SW	01173000
	B	DIQ		01174000
QUOTIENT	LR	M,K4	SET QU SW	01175000
DIQ	LR	14,2	HOLD 2 FOR MFXAT, MKFLAT	01176000
	BAL	2,GLIP		01177000
	B	MKFXAT	FIXED RESULT	01178000
	B	MKFLAT	FLOAT	01179000
GLIP	LR	15,2	COMPUTE DIFF OR QUOTIENT	01180000
	TM	CAR(A),FLOAT		01181000
	BO	XFLT		01182000
	TM	CAR(A),FIX	X INTEGER	01183000
	BNO	ARITHER	NO	01184000
	TM	CAR(Q),FLOAT		01185000
	BO	XYM		01186000
	TM	CAR(Q),FIX	X INT, TRY Y	01187000
	BNO	ARITHER	NO	01188000
	L	A,CAR(A)		01189000
	L	1,CAR(Q)		01190000
	L	A,CAR(A)		01191000
	SRDA	A,32		01192000
	EX	0,DQB(M)		01193000
	LR	A,Q		01194000
	BR	15	FIX RET	01195000
DQB	S	Q,CAR(1)		01196000
	D	A,CAR(1)		01197000
XFLT	TM	CAR(Q),FLOAT	Y FLOAT	01198000
	BO	XYFLT		01199000
	TM	CAR(Q),FIX	X FLOAT, TRY Y	01200000
	BNO	ARITHER	NO	01201000
	LR	1,Q	X FLOAT, Y INTEGER	01202000
	LR	Q,A	SWITCH A&Q	01203000
	LR	A,1		01204000
	LA	M,8(M)		01205000
	LA	2,DPAA		01206000
	B	MIXED		01207000
XYFLT	L	A,CAR(A)	X,Y FLOAT	01208000
	L	Q,CAR(Q)		01209000
	LE	0,CAR(A)		01210000

	EX	0, DQT(M)		01211000
	B	4(15)	FLOAT RET	01212000
DQT	SE	0, CAR(Q)		01213000
	DE	0, CAR(Q)		01214000
XYM	LA	2, DPA	X INT, Y FLOAT	01215000
MIXED	L	A, CAR(A)		01216000
	L	Q, CAR(Q)		01217000
	L	1, CAR(A)		01218000
	SRL	M, 1		01219000
	L	1, CAR(A)		01220000
	BAL	2, FLOAT1		01221000
	LE	2, CAR(Q)		01222000
	EX	0, MTA(M)		01223000
	EX	0, MTA+8(M)		01224000
	B	4(15)	FLOAT RET	01225000
MTA	SDR	0, 2		01226000
	DDR	0, 2		01227000
	SDR	2, 0		01228000
	DDR	2, 0		01229000
	NOPR	0		01230000
	NOPR	0		01231000
	LDR	0, 2		01232000
	LDR	0, 2		01233000
				01234000
				01235000
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				01240000
				01241000
				01242000
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				01250000
				01251000
				01252000
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				01259000
				01260000
				01261000
				01262000
				01263000
				01264000
				01265000

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*****
***** REMAINDER(X Y) *** SUBR *****
*****
* FIXPT REM(X/Y)
* FLOAT X-INTEG(X/Y)*Y
REMAIND LR 14, 2
TM CAR(A), FIX
BNO ARITHER
TM CAR(Q), FIX
BNO ARITHER
TM CAR(A), FLOAT
BO REMXFL X FLOAT
TM CAR(Q), FLOAT
BO REMXY X FIX, Y FLOAT
L A, CAR(A) COMPUTE MOD
L Q, CAR(Q)
L 0, CAR(A)
SRDA 0, 32
D 0, CAR(Q)
LR A, 0 VOL1
B MKFXAT
REMXFL TM CAR(Q), FLOAT
BO REMXYF X, Y FLOAT
L Q, CAR(Q) X FLOAT, Y FIX
L 1, CAR(Q)
BAL 2, FLOAT1 FLOATED INTO FRO
LDR F2, FO
L A, CAR(A)
LE F0, CAR(A)
B AMOD
REMYX L A, CAR(A) X FIX, Y FLOAT
L 1, CAR(A)

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	BAL	2, FLOAT1	FLOAT INTO F0	01266000
	L	Q, CAR(Q)		01267000
	LE	F2, CAR(Q)		01268000
	B	AMOD		01269000
REMXF	L	A, CAR(A)	X, Y FLOAT	01270000
	LE	F0, CAR(A)		01271000
	L	Q, CAR(Q)		01272000
	LE	F2, CAR(Q)		01273000
AMOD	DER	F0, F2		01274000
	LD	F6, ZERO		01275000
	LER	F6, F0	EXPAND TO DP	01276000
	LDR	F0, F6		01277000
	AW	F0, NZERO	INTEGERIZE IT	01278000
	AD	F0, ZERO	NORMALIZE	01279000
	MER	F0, F2		01280000
	LCER	F0, F0		01281000
	AER	F0, F2		01282000
	B	MKFLAT		01283000
*****				01284000
***** ZEROP *** MINUSP *** SUBRS *****				01285000
*****				01286000
***	ZEROP(X) T IF X.EQ.0 OR ABS(X).GT. 1.E-6			01287000
***	MINUSP(X) T IF X.LT.0			01288000
ZEROP	LR	M, K4		01289000
	B	ZMP		01290000
MINUSP	SR	M, M	SET MINUSP	01291000
ZMP	TM	CAR(A), FLOAT		01292000
	BO	ZMFLT		01293000
	TM	CAR(A), FIX		01294000
	BNO	ARITHER		01295000
	L	A, CAR(A)		01296000
MFP	L	A, CAR(A)		01297000
	LTR	A, A		01298000
	LR	A, NILR		01299000
	EX	0, ZMBR+6(M)		01300000
	LA	A, T		01301000
	BR	2		01302000
ZMFLT	L	A, CAR(A)		01303000
	LE	0, CAR(A)		01304000
	EX	0, ZMBR(M)	TEST SIGN	01305000
	SE	0, FTOL		01306000
	LR	A, NILR		01307000
	BNM	0(2)		01308000
	LA	A, T		01309000
	BR	2		01310000
ZMBR	B	MFP		01311000
	LPER	0, 0		01312000
	BNM	0(2)		01313000
	BNZ	0(2)		01314000
*****				01315000
***** LESSP *** GREATERP *** SUBRS *****				01316000
*****				01317000
***	LESSP(X, Y) T IF X-Y.LT.0			01318000
***	GREATERP(X, Y) T IF X-Y.GT.0			01319000
LESSP	ST	2, ERSV		01320000

	SR	M,M	DIFF SW	01321000
	SR	14,14	LESSP SW	01322000
	B	TKDIF	TAKE DIFFERENCE	01323000
GREATERP	ST	2,ERSV		01324000
	SR	M,M		01325000
	LR	14,K4	SET GP SW	01326000
TKDIF	BAL	2,GLIP		01327000
	B	GLFX	FIXED	01328000
GLFL	LTER	0,0		01329000
	L	2,ERSV		01330000
	LR	A,NILR		01331000
	EX	0,GLFC(14)		01332000
	LA	A,T		01333000
	BR	2		01334000
GLFX	LTR	A,A		01335000
	B	GLFL+2		01336000
GLFC	BNM	0(2)		01337000
	BNH	0(2)	NIL IF (X-Y)LEO	01338000
	EJECT			01339000
*****				01340000
***** ERROR *****				01341000
*****				01342000
ERRORR	SR	Q,Q	PRINT A ONLY	01343000
	ERROR	'*** A1-CALL TO ERROR'		01344000
ERSV	DC	2F'0'		01345000
ERRORIND	DC	2X'00'		01346000
ERROR	EQU	*		01347000
	STM	14,1,WRSV		01348000
	BAL	2,PUTMSG	PRINT THE ERROR	01349000
	ST	Q,ERSV		01350000
	BAL	2,ERCK		01351000
	L	A,ERSV	PRINT Q LIST	01352000
	BAL	2,ERCK		01353000
	TM	ERRORIND,X'01'		01354000
	BO	ERDN	NO PDS	01355000
	PUTMSG	'0*** TRACE-BACK FOLLOWS'		01356000
ERNXT	CL	PDS,PUSHA		01357000
	BE	ERDN		01358000
	UNSAVE	A		01359000
	BAL	2,ERCK		01360000
	B	ERNXT		01361000
ERDN	EQU	*		01362000
	TM	ERRORIND,X'02'		01363000
	BO	STOP	TERMINAL ERROR	01364000
	MVI	ERRORIND,X'00'	SET OFF	01365000
	L	PDS,PUSHA	RESET PDL	01366000
	B	AGN		01367000
ERCK	C	A,OBJECTA	CHECK RANGE OF PTR	01368000
	BL	0(2)		01369000
	C	A,BOTTOM		01370000
	BH	0(2)		01371000
	ST	2,ERSV+4		01372000
	MVI	LINE+1,C'*		01373000
	BAL	2,PRINT		01374000
	L	2,ERSV+4		01375000

VOL1

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BR                2                                01376000
***** TRACE(X) *****< 01377000
* IF X IS ATOM FULL TRACE OCCURS 01378000
* IF X IS LIST, LIST OF FUNCTIONS IS TRACED 01379000
TRACE TM CAR(A),ATOM 01380000
BO FTRACE DO FULL TRACE 01381000
LR Q,A 01382000
NXTR LM A,Q,CAR(Q) SCAN LIST 01383000
OI CAR(A),TRACEB MARK ON 01384000
CR Q,NILR AT END OF LIST 01385000
BNE NXTR NO 01386000
LR A,NILR 01387000
BR 2 01388000
FTRACE MVI TRACEIND,1 SET IND ON 01389000
BR 2 01390000
***** UNTRACE(X) ***** 01391000
UNTRACE TM CAR(A),ATOM 01392000
BO UFTRACE 01393000
LR Q,A 01394000
NXUTR LM A,Q,CAR(Q) 01395000
NI CAR(A),255-TRACEB MARK OFF 01396000
CR Q,NILR 01397000
BNE NXUTR 01398000
LR A,NILR 01399000
BR 2 01400000
UFTRACE MVI TRACEIND,0 01401000
BR 2 01402000
EJECT 01403000
***** 01404000
***** ATOM(X) NON REC ***** 01405000
***** 01406000
* RETURN TRUE IF X IS AN ATOM 01407000
ATOMP TM CAR(A),ATOM IS IT AN ATOM 01408000
B LTST 01409000
LOGP TM CAR(A),LOGIC LOGICAL ATOM 01410000
B LTST 01411000
FLOATP TM CAR(A),FLOAT 01412000
B LTST 01413000
* RETURN TRUE IF X IS A NUMERIC ATOM 01414000
NUMBERP TM CAR(A),FIX 01415000
LTST LR A,NILR NO MAYBE 01416000
BNO 0(2) DEFINITLY 01417000
LA A,T IS AN ATOM 01418000
BR 2 01419000
FIXP LR Q,A 01420000
LR A,NILR NO MAYBE 01421000
TM CAR(Q),FIX IS IT NUMERIC 01422000
BNO 0(2) NO 01423000
TM CAR(Q),X'30' NOT FLOAT OR BOOL 01424000
BM 0(2) 01425000
LA A,T ITS FIX 01426000
BR 2 01427000
EVENP TM CAR(A),FIX 01428000
BNO ARITHER 01429000
TM CAR(A),FLOAT 01430000

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BO	ARITHER		01431000
L	A,CAR(A)		01432000
TM	CAR+3(A),1	ODD	VOL1 01433000
LR	A,NILR		VOL1 01434000
BO	0(2)	ITS ODD	VOL1 01435000
LA	A,T	EVEN	VOL1 01436000
BR	2		VOL1 01437000
EJECT			01438000

			01439000

	EQ(X,Y)	NON REC	01440000

			01441000

*	RETURN TRUE IF X=Y		01442000
EQ	CR	A,Q	ARE THEY EQUAL
	LR	A,NILR	NO MAYBE
	BNE	0(2)	THEY ARENT
	LA	A,T	TRUE
	BR	2	

			01447000

			01448000

	EQUAL(X,Y)	NON REC	01449000

			01450000

*	RETURNS TRUE IF LIST X EQUALS	LIST Y	01451000
EQUAL	SAVE	2	SAVE RET
	LR	M,A	USE Q, M
	LA	A,T	SET TRUE RET
EQTST	CR	M,Q	ALL ALPHA EQ
	BE	RETURN	TRUE YET
	TM	CAR(M),ATOM	
	BO	TSTY	YES
	TM	CAR(Q),ATOM	
	BO	RETNIL	
	LM	14,15,CAR(M)	
	SAVE	15	
	LR	A,14	
	LM	14,15,CAR(Q)	
	SAVE	15	
	LR	Q,14	
	BAL	2,EQUAL	RECURSIVE ENTRY
	UNSAVE	Q	
	UNSAVE	M	
	CR	A,NILR	
	BE	RETURN	
	B	EQTST	
RETNIL	LR	A,NILR	
	B	RETURN	
TSTY	TM	CAR(Q),FIX	
	BNO	RETNIL	
	TM	CAR(M),FIX	
	BNO	RETNIL	
*	X, Y ARE	ATOMS, PROBABLY NUMERIC	
	LR	A,M	
	SR	M,M	SET DIFF SW
	BAL	2,GLIP	
	B	EQFX	FIXED RESULT
	LPER	0,0	
	SE	0,FTOL	

	BNM	RETNIL	01486000
	LA	A,T	01487000
	B	RETURN	01488000
EQFX	LTR	A,A	01489000
	BNZ	RETNIL	01490000
	LA	A,T	01491000
	B	RETURN	01492000
FTOL	DC	E'3.E-6'	01493000
	EJECT	TOLERANCE	01494000

***** LOGOR * LOGAND * LOGXOR *** FSUBRS *****			

LOGOR	SR	M,M	01495000
	B	LOGS	01496000
LOGAND	LR	M,K4	01497000
	B	LOGS	01498000
LOGXOR	LA	M,8	01499000
LOGS	SAVE	2	01500000
	SAVE	M	01501000
	BAL	2,EVLIS	01502000
	UNSAVE	M	01503000
	UNSAVE	14	01504000
	LM	A,Q,CAR(A)	01505000
	L	A,CAR(A)	01506000
	L	1,CAR(A)	01507000
LOGLP	CR	Q,NILR	01508000
	BE	LEND	01509000
	LM	A,Q,CAR(Q)	01510000
	L	A,CAR(A)	01511000
	EX	0,LGFN(M)	01512000
	B	LOGLP	01513000
LGFN	O	1,CAR(A)	01514000
	N	1,CAR(A)	01515000
	X	1,CAR(A)	01516000
LEND	LR	A,1	01517000
MKLGAT	LR	Q,NILR	01518000
	BAL	2,CONS	01519000
	MVI	CDR(A),FWD	01520000
	BAL	2,CONS	01521000
	MVI	CAR(A),LOGIC	01522000
	BR	14	01523000

***** LEFTSHIFT(X,N) ***** SUBR *****			

LEFTSHIF	LR	14,2	01527000
	TM	CAR(A),FIX	01528000
	BNO	ARITHER	01529000
	TM	CAR(Q),FIX	01530000
	BNO	ARITHER	01531000
	L	A,CAR(A)	01532000
	L	A,CAR(A)	01533000
	L	Q,CAR(Q)	01534000
	L	Q,CAR(Q)	01535000
LTR	Q,Q	NEG	01536000
BM	SHIFTRT		01537000
			01538000
			01539000
			01540000

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SLL      A,0(Q)                01541000
B        MKLGAT                01542000
SHIFTRT LCR      Q,Q           01543000
SRL      A,0(Q)                01544000
B        MKLGAT                01545000
EJECT                                         01546000
*****
***** AND *** OR * FSUBRS *****
*****
AND      SR      M,M           SET -AND- SWITCH 01550000
B        ANDOR                                         01551000
OR       LR      M,K4         01552000
ANDOR    SAVE    2            01553000
ATST     CR      A,NILR       END OF LIST      01554000
        BE      ANDE         01555000
        SAVE    Q            ALIST            01556000
        LM      0,1,CAR(A)   01557000
        SAVE    1            REST OF LIST    01558000
        SAVE    M            THE SWITCH      01559000
        LR      A,0         FUNCTION        01560000
        BAL     2,EVAL       EVALUATE IT    01561000
        LR      0,A         HOLD A         01562000
        UNSAVE  M            AND-OR SW      01563000
        UNSAVE  A            REST OF LIST    01564000
        UNSAVE  Q            ALIST            01565000
        CR      0,NILR       VOL1 01566000
        EX      0,ATB(M)     TEST           VOL1 01567000
*                                         VOL1 01568000
        LR      A,0         VOL1 01569000
        B        *+8         01570000
ANDE     EX      0,ATB+8(M)   SET ANSWER   01571000
        UNSAVE  2            01572000
        BR      2            01573000
ATB      BNE     ATST        VOL1 01574000
        BE      ATST        VOL1 01575000
        LA      A,T         01576000
        LA      A,NIL       01577000
*****
***** MEMBER(X,Y) NON REC *****
*****
* TEST IF X IS A MEMBER OF LIST Y 01581000
MEMM     L      Q,CDR(Q)     LOAD CDR        01582000
MEMBER   CR      Q,NILR     01583000
        BNE     MEM         01584000
        LR      A,NILR     01585000
        BR      2            01586000
MEM      C      A,CAR(Q)     COMP X WITH CAR(Y) 01587000
        BNE     MEMM        01588000
        LA      A,T         SET RETURN TRUE 01589000
        BR      2            01590000
EJECT                                         01591000
*****
***** UNPACK(A) *****
*****
* RETURNS LIST OF CHARS OF PNAME OF A 01595000

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UNPACK	TM	CAR(A),ATOM	A ATOM	01596000
	BNO	0(2)	IGNORE IT	01597000
	ST	2,RDSV2	SAVE RET	01598000
	L	3,CAR(A)	SAVE PNAME LIST POINTER	01599000
	BAL	2,CONS	START LIST	01600000
	LR	M,A	HOLD LIST	01601000
	ST	M,EVLSV	SAVE START OF LIST	01602000
UNPLOOP	LR	15,K4	LOOP 4 TIMES	01603000
	L	1,CAR(3)	PNAME	01604000
	L	3,CDR(3)	REST OF LIST	01605000
	LA	3,0(,3)	STRIP BITS	01606000
UNPLOOPP	SDDL	0,8	FIRST CHAR	01607000
	SLL	0,24	SHIFT OVER	01608000
	LTR	0,0	IS THERE A CHAR	01609000
	BZ	ENDUNP	NO	01610000
	BAL	2,CONS	GET LIST ELEMENT	01611000
	ST	A,CDR(M)	LINK IT	01612000
	LR	M,A		01613000
	LR	A,0	CHAR	01614000
	BAL	14,MKAATOM	MAKE AN ATOM	01615000
	ST	A,CAR(M)	LINK IT	01616000
	BCT	15,UNPLOOPP		01617000
	CR	3,NILR	END OF PNAME	01618000
	BNE	UNPLOOP	NO	01619000
ENDUNP	ST	NILR,CDR(M)	END OF LIST	01620000
	L	A,EVLSV		01621000
	L	A,CDR(A)	LIST	01622000
	L	2,RDSV2		01623000
	BR	2	EXIT	01624000
				01625000
		ADVANCE()		01626000
				01627000
				01628000
				01629000
				01630000
				01631000
				01632000
				01633000
				01634000
				01635000
				01636000
				01637000
				01638000
				01639000
				01640000
				01641000
				01642000
				01643000
				01644000
				01645000
				01646000
				01647000
				01648000
				01649000
				01650000


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***** CCLASS(X,Y) ***** 01706000
***** 01707000
* T IF CHAR X IS IN SET OF CHARS Y 01708000
CCLASS L A,CAR(A) POINT TO CHAR 01709000
L Q,CAR(Q) POINT TO PNAME LIST 01710000
SR 14,14 01711000
SR 15,15 01712000
IC 14,CAR(A) 01713000
CCLOOP LR M,K4 SET 4 COUNT 01714000
BCTR Q,0 BACK UP ONE 01715000
CCLOOPP IC 15,CAR(Q,M) 01716000
CR 14,15 01717000
BE CCYES 01718000
BCT M,CCLOOPP 01719000
L Q,CDR+1(Q) ***IGNORE ASM ERROR ON THIS STMT 01720000
LA Q,0(,Q) STRIP BITS 01721000
CR Q,NILR END OF PNAME 01722000
BNE CCLOOP 01723000
LR A,NILR NOT IN SET 01724000
BR 2 01725000
CCYES LA A,T 01726000
BR 2 01727000
EJECT 01728000
***** 01729000
***** GARBAGE COLLECTOR ***** 01730000
***** 01731000
GARBTEMP DC 4F'0' SAVE ALL NEEDED REGISTERS 01732000
GARBCOLL STM 0,3,GARBTEMP 01733000
SAVE A 01734000
SAVE Q 01735000
SAVE M 01736000
PUTMSG ' COLLECTING ' 01737000
LR A,K4 01738000
LR Q,PDS TOP OF STACK 01739000
L 0,BOTTOM 01740000
LA M,TEMPORAR 01741000
NXTPUSH L 1,0(M) LOAD R1 WITH FIRST CELL 01742000
CR 1,NILR IN BOUNDS 01743000
BL GARBCONT 01744000
CR 1,0 IS R1 WITHIN BOUNDS 01745000
BH GARBCONT 01746000
SR 2,2 ZERO 2 01747000
SAVE 2 01748000
RECRALFA TM CDR(1),X'80' IS LIST IN (R1) ALREADY MARKED 01749000
BO UNEQ5 IF IT IS GO TO 01750000
TM CDR(1),FWD IF FULLWORD GO TO 01751000
BO RECRBETA RECRBETA 01752000
OI CDR(1),X'80' SET ACTIVE MARK 01753000
LM 1,2,CAR(1) 01754000
TM CDR(2),X'80' MARKED 01755000
BO RECRALFA YES 01756000
SAVE 2 01757000
B RECRALFA 01758000
RECRBETA OI CDR(1),X'80' SET ACTIVE MARK 01759000
L 1,CDR(1) 01760000

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	TM	CDR(1),X'80'	MARKED	01761000
	BZ	RECRBETA	NO	01762000
UNEQ5	UNSAVE	1		01763000
	LTR	1,1		01764000
	BNZ	RECRALFA		01765000
GARBCONT	BXLE	M,A,NXTPUSH		01766000
	LA	1,FWSQ	ADDR OF FWS BLOCK LIST	01767000
	AR	A,A	SET UP BXLE TO LOOP THRULISTS	01768000
	LR	3,NILR	START FIRST SCAN	01769000
	B	GARBSCN+4		01770000
GARBSCN	LA	3,8(,1)	START SCAN HERE	01771000
	L	Q,4(1)	NEXT BLOCK	01772000
GARB51	TM	CDR(3),X'80'	IS CELL IN USE	01773000
	BZ	GARBNO	NO	01774000
	NI	CDR(3),X'7F'	YES, SET BIT OFF	01775000
GARBON	BXLE	3,A,GARB51	REPEAT LOOP	01776000
	L	1,0(1)	LINK TO NEXT BLOCK	01777000
	LTR	1,1	ZERO IF END OF LIST	01778000
	BNZ	GARBSCN		01779000
	UNSAVE	M		01780000
	UNSAVE	Q		01781000
	UNSAVE	A		01782000
	LM	0,3,GARBTEMP		01783000
	CR	FREE,K4	COLLECT ANY	01784000
	BNL	CONS1	YES	01785000
	OI	ERRORIND,X'01'	NO PDL	01786000
	LA	M,*+10		01787000
	ST	M,8(1)		01788000
	BR	14		01789000
	ERROR	' *** GC2-STORAGE EXHAUSTED '		01790000
GARBNO	ST	FREE,CDR(3)	INTO LIST	01791000
	LR	FREE,3		01792000
	B	GARBON		01793000
	EJECT			01794000
				01795000
		REPLACA(X,Y)	NON REC	01796000
				01797000
		REPLACE CAR OF X BY Y		01798000
RPLACA	IC	1,CAR(A)		01799000
	ST	Q,CAR(A)		01800000
	STC	1,CAR(A)		01801000
	BR	2		01802000
				01803000
		REPLACD(X,Y)	NON REC	01804000
				01805000
		REPLACE CDR OF X BY Y		01806000
RPLACD	IC	1,CDR(A)		01807000
	ST	Q,CDR(A)		01808000
	STC	1,CDR(A)		01809000
	BR	2		01810000
				01811000
		NULL(X)	NON REC	01812000
				01813000
		RETURN TRUE IF X IS NIL		01814000
NULL	CR	A,NILR	IS IT NIL	01815000

LR	A,NILR	IS NOW	01816000
BNE	0(2)	IT WASNT, FALSE RETURN	01817000
LA	A,T	IT WAS	01818000
BR	2		01819000
*****			01820000
*****	FUNCTION(X) NON REC FSUBR	*****	01821000
*****			01822000
FUNCTION LR	14,2	SAVE RET	01823000
LR	M,A	SAVE A	01824000
LR	A,Q	ALIST	01825000
LR	Q,NILR		01826000
BAL	2,CONS		01827000
LR	Q,A		01828000
L	A,CAR(M)		01829000
BAL	2,CONS		01830000
LR	Q,A		01831000
LA	A,FUNARG		01832000
BAL	2,CONS		01833000
BR	14	EXIT	01834000
EJECT			01835000
*****			01836000
*****	CAR * CDR * CADR * ETC ***SUBRS	*****	01837000
*****			01838000
CARR	L A,CAR(A)		01839000
	BR 2		01840000
CDRR	L A,CDR(A)		01841000
	BR 2		01842000
CADR	L A,CDR(A)		01843000
	L A,CAR(A)		01844000
	BR 2		01845000
CDDR	L A,CDR(A)		01846000
	L A,CDR(A)		01847000
	BR 2		01848000
CAAR	L A,CAR(A)		01849000
	L A,CAR(A)		01850000
	BR 2		01851000
CDAR	L A,CAR(A)		01852000
	L A,CDR(A)		01853000
	BR 2		01854000
CADDR	L A,CDR(A)		01855000
	L A,CDR(A)		01856000
	L A,CAR(A)		01857000
	BR 2		01858000
CADAR	L A,CAR(A)		01859000
	L A,CDR(A)		01860000
	L A,CAR(A)		01861000
	BR 2		01862000
CAADR	L A,CDR(A)		01863000
	L A,CAR(A)		01864000
	L A,CAR(A)		01865000
*		VOL1	01866000
	BR 2		01867000
PROG2	LR A,Q		01868000
	BR 2		01869000
EJECT			01870000

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***** 01871000
***** GENSYM ***** VOL1 01872000
***** 01873000
GA      DS      0F      01874000
P1      DC      C'G000',F'0' 01875000
G       DC      PL1'1'      01876000
GENSYM  LR      PL3'0'      01877000
        LR      14,2      01878000
        AP      G,P1      01879000
        UNPK    GA+1(5),G  01880000
        OI      GA+5,X'F0' 01881000
        LR      Q,NILR    01882000
        L       A,GA+4    01883000
        BAL     2,CONS    01884000
        MVI     CDR(A),FWD 01885000
        LR      Q,A      01886000
        L       A,GA      01887000
        BAL     2,CONS    01888000
        MVI     CDR(A),FWD 01889000
        LR      Q,NILR    01890000
        BAL     2,CONS    01891000
        MVI     CAR(A),ATOM 01892000
        BR      14      01893000
***** 01894000
***** LIBRARY(X) ***** VOL1 01895000
***** 01896000
SVCHAR  DS      F      SAVE READ BUFFER POINTER 01897000
LMES    DC      AL2(36),AL2(0),C'0*** L1-NOT IN LIBRARY- ' 01898000
LCARD   DS      80C     BUFFER AREA 01899000
LMEMB   EQU     LCARD  01900000
LIBRARY DS      0H     01901000
        L       Q,LIBLIST 01902000
        EJECT  01903000
        LR      14,2      SAVE RET 01904000
        BAL     2,NCONC    PUT ON LIST 01905000
        ST      A,LIBLIST 01906000
LSETUP  NOP     0(14)     SET UP YET 01907000
        MVI     NOTDOT+1,C')' INITIALIZE TO EBCDIC 01908000
        MVI     CKLP+1,C'(' 01909000
        MVI     NOTMIN+1,C'+ ' 01910000
        MVI     TRYRPAR+1,C')' 01911000
        MVC     SVCHAR(4),LASTCHAR 01912000
        LA      1,CARD     BUFFER POINTER 01913000
        ST      1,LASTCHAR 01914000
        MVI     LIBRD+1,X'F0' SET TO READ FROM LIBRARY 01915000
        OI      LSETUP+1,X'F0' WE'RE SET UP NOW 01916000
        MVI     LIBRDD+1,X'F0' DO A FIND FIRST 01917000
        BR      14      01918000
LERR    ST      2,WRSV+20 01919000
        LA      0,LMES    01920000
        BAL     2,PUTMSG  01921000
        L       2,WRSV+20 01922000
LEOF    L       14,LIBLIST 01923000
        CR      14,NILR   END OF LIST 01924000
        BE      LDNE     01925000

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	LM	14,15,CAR(14)	ATOMHEAD	01926000
	ST	15,LIBLIST		01927000
	L	14,CAR(14)	PNAME LIST	01928000
	LM	0,1,CAR(14)	PNAME	01929000
	ST	0,LMEMB	PNAME	01930000
	LA	1,0(,1)	STRIP BITS	01931000
	SR	0,0		01932000
	CR	1,NILR	4 CHAR	01933000
	BE	LSHT		01934000
	LM	0,1,CAR(1)	8 CHARS	01935000
LSHT	ST	0,LMEMB+4		01936000
	LA	1,LMEMB+7		01937000
LBCK	CLI	0(1),0	SCAN OFF ZEROS	01938000
	BNE	LOUT		01939000
	MVI	0(1),C' '	SET BLANK	01940000
	BCT	1,LBCK		01941000
LOUT	FIND	LIBCB,LMEMB,D		01942000
	LTR	15,15	ERROR	01943000
	BNZ	LERR	ERROR	01944000
	MVI	LIBRDD+1,0	DID A FIND	01945000
LIBRDD	B	LEOF	DO A FIND FIRST	01946000
	READ	LDECB,SF,LIBCB,LCARD		01947000
	CHECK	LDECB		01948000
	LA	CHAR,LCARD	SET BUFFER PTR	01949000
	MVI	CDEND(CHAR),0	SET END OF CARD MARK	01950000
	LM	14,1,WRSV		01951000
	BR	2		01952000
LDNE	MVC	NOTDOT+1(1),CURBRK+1	RESTORE DELIMETERS	01953000
	MVC	CKLP+1(1),CURBRK		01954000
	MVC	NOTMIN+1(1),CURBRK+2		01955000
	MVC	TRYRPAR+1(1),CURBRK+1		01956000
	MVI	LIBRD+1,0	RESTORE TO SYSIN	01957000
	NI	LSETUP+1,X'0F'	DO A SETUP AGAIN	01958000
	LM	14,1,WRSV		01959000
	L	CHAR,SVCHAR	BACK TO SYSIN BUFFER	01960000
	B	GETCHAR	WHERE WE LEFT OFF	01961000
				01962000
				01963000
				01964000
				01965000
				01966000
				01967000
				01968000
				01969000
				01970000
				01971000
				01972000
				01973000
				01974000
				01975000
				01976000
				01977000
				01978000
				01979000
				01980000
				01981000
				01982000
				01983000
				01984000
				01985000
				01986000
				01987000
				01988000
				01989000
				01990000
				01991000
				01992000
				01993000
				01994000
				01995000
				01996000
				01997000
				01998000
				01999000
				02000000

 ***** EXPT(X,Y) ***** SUBR *****

 * X AND Y MAY BE EITHER MODE. IF Y IS FIX MULT IS USED, ELSE LOGS
 EXPT LR 3,14 01965000
 USING EXPT,3 01966000
 ST 2,EXPSV SET UP BASE REG 01967000
 TM CAR(A),FIX RET ADDR 01968000
 BNO ARITHER ARITHMETIC 01969000
 TM CAR(Q),FIX NO 01970000
 BNO ARITHER MEME CHOSE 01971000
 TM CAR(A),FLOAT 01972000
 BO EXPXFL X IS FLOAT 01973000
 TM CAR(Q),FLOAT 01974000
 BO EXPYFL X IS FIX , Y IS FLOAT 01975000
 * COMPUTE I**J 01976000
 L A,CAR(A) 01977000
 L Q,CAR(Q) 01978000
 L 14,CAR(A) 01979000
 01980000

	L	2,CAR(Q)	INDEX IN R2	01981000
	SRDA	14,32	SET UP FACTOR X IN R14,15	01982000
	LA	1,1	PRODUCT IN R0,1	01983000
	SR	0,0		01984000
	MVI	EXPS+1,X'F0'		01985000
	SR	A,A		01986000
	LTR	15,15		01987000
	BZ	EXPIX	RETURN ZERO 0**J	01988000
	LTR	2,2		01989000
	BZ	EXPXX	RETURN ONE I**0	01990000
	BH	EXP2	J>0	01991000
	MVI	EXPS+1,0	J<0, SET SWITCH	01992000
	LPR	2,2	SET INDEX PLUS	01993000
	B	EXP2		01994000
EXP1	MR	14,15	SQUARE FACTOR	01995000
EXP2	EX	2,EXPTM	INDEX ODD	01996000
	BZ	EXP3	NO	01997000
	MR	0,15		01998000
EXP3	SRA	2,1		01999000
	BNZ	EXP1		02000000
EXPXX	LR	A,1		02001000
EXPIX	L	14,EXPSV		02002000
EXPS	B	MKFXAT	FIXED RESULT	02003000
	BAL	2,FLOAT1	I**-J , FLOAT R1->F0	02004000
	LDR	F2,F0		02005000
	LD	F0,CTBL	1.DO	02006000
	DDR	F0,F2	INVERSE	02007000
	B	MKFLAT	RETURN FLOAT ATOM	02008000
EXPTM	TM	XTEST,0	TEST IF ODD	02009000
XTEST	DC	X'01'		02010000
EXPXFL	TM	CAR(Q),FLOAT		02011000
*	BO	EXPXYFL	X AND Y FLOAT	02012000
	L	14,EXPSV	X**J	02013000
	L	A,CAR(A)		02014000
	LD	F2,ZERO		02015000
	LE	F2,CAR(A)	LOAD NUMBER	02016000
	LD	F0,ZERO		02017000
	L	Q,CAR(Q)		02018000
	L	Q,CAR(Q)		02019000
	MVI	EXPMDS,X'2C'	INDEX	02020000
	LTER	F2,F2	SET MULT	02021000
	BZ	MKFLAT		02022000
	LD	F0,CTBL	RETURN ZERO 0**J	02023000
	LTR	Q,Q	1.DO	02024000
	BZ	MKFLAT		02025000
	BH	EXP21	RETURN 1. X**0	02026000
	MVI	EXPMDS,X'2D'		02027000
	LPR	Q,Q	SET DIVIDE	02028000
	B	EXP21		02029000
EXP11	MDR	F2,F2		02030000
EXP21	EX	Q,EXPTM	ODD	02031000
	BZ	EXP31	NO	02032000
EXPMDS	MDR	F0,F2		02033000
EXP31	SRA	Q,1		02034000
				02035000

	BH	EXP11		02036000
	B	MKFLAT		02037000
EXPYFL	L	A,CAR(A)	X FIX, Y FLOAT I**X	02038000
	L	1,CAR(A)		02039000
	BAL	2,FLOAT1		02040000
	B	EXPIT		02041000
EXPXYFL	L	A,CAR(A)	X**Y	02042000
	LD	F0,ZERO		02043000
	LE	F0,CAR(A)		02044000
EXPIT	L	Q,CAR(Q)		02045000
	LD	F2,ZERO		02046000
	LE	F2,CAR(Q)		02047000
	LTDR	F0,F0		02048000
	BZ	EXPZR	RETURN ZERO 0**Y	02049000
	BL	ERI2	X IS NEG	02050000
	LTDR	F2,F2		02051000
	BZ	EXPONE	RETURN 1. X**0	02052000
	BAL	2,DLOG	LOGE(X)	02053000
	MDR	F0,F2	Y*LOGE(X)	02054000
	BAL	2,DEXP	X**Y	02055000
EXPZR	L	14,EXPSV		02056000
	B	MKFLAT		02057000
EXPONE	LD	F0,CTBL	1.D0	02058000
	B	EXPZR		02059000
ERI2	ERROR	' *** I2-(-X)**Y'		02060000
*		LOG FUNCTION- ARG IN F0, RETURN IN F0		02061000
*		USES REGS 0,1,14,15,F4		02062000
*		WRITE X=(16**P)*(2**-Q)*M, Q BETWEEN 0 AND 3, M BETWEEN .5&1.		02063000
*		IF M GT SQRT2/2 THEN A=1, B=0 ELSE A=.5, B=1.		02064000
*		WRITE Z=(M-A)/(M+A) THEN LOG(X)=(4P-Q-B)*LOG(2)+LOG((1+Z)/(1-Z))		02065000
DLOG	STD	F0,DBUFF		02066000
	LM	0,1,DBUFF		02067000
	LR	14,0		02068000
	SRDL	14,24	EXP IN 14	02069000
	SLL	14,2		02070000
	STH	14,IPART+2	FLOAT 4*EXP	02071000
	SR	14,14		02072000
	SLDL	14,4	FIRST DIGIT	02073000
	IC	14,DLOGTB(14)	NUMBER OF LEADING ZEROS	02074000
	SLDL	0,0(14)	SHIFT THEM	02075000
	STM	0,1,DBUFF		02076000
	MVI	DBUFF,X'40'	M=FRACTION*2**Q IN DBUFF	02077000
	LA	1,8		02078000
	LD	F0,DBUFF	PICK UP M	02079000
	CE	F0,DLOGM	IF M GT SQRT2/2, R1=8	02080000
	BH	GOLOG		02081000
	SR	1,1	ELSE R1=0 AND	02082000
	LA	14,1(14)	ADD 1 TO 14 =Q+B	02083000
GOLOG	LDR	F4,F0	COMPUTE Z=(M-A)/(M+A), A=1 OR .5	02084000
	SD	F0,HALF	SUB A	02085000
	SD	F0,DZERO(1)		02086000
	AD	F4,HALF(1)	M+A HAS 53 BITS	02087000
	DDR	F0,F4		02088000
	STD	F0,DBUFF		02089000
	MDR	F0,F0	COMPUTE LOG((1+Z)/(1-Z))	02090000

LDR	F4,F0	BY CHEBYSHEV INTERPOLATION	02091000
MD	F4,DLOGC7	POLYNOMIAL DEGREE 7	02092000
AD	F4,DLOGC6		02093000
MDR	F4,F0		02094000
AD	F4,DLOGC5		02095000
MDR	F4,F0		02096000
AD	F4,DLOGC4		02097000
MDR	F4,F0		02098000
AD	F4,DLOGC3		02099000
MDR	F4,F0		02100000
AD	F4,DLOGC2		02101000
MDR	F4,F0		02102000
AD	F4,DLOGC1		02103000
MDR	F4,F0	F=ZSQ*(C1+ZSQ*(C2+.. ZSQ*C7))..	02104000
LD	F0,DBUFF	LOG((1+Z)/(1-Z))=Z+Z+Z*F	02105000
MDR	F4,F0		02106000
ADR	F4,F0		02107000
ADR	F4,F0		02108000
LD	F0,IPART	4*CHARACTERISTIC	02109000
LA	14,256(14)	ADD 4*BASE CHARAC=4*64 TO Q+B	02110000
STH	14,IPART+2	FLOAT AND OBTAIN 4P-Q-B	02111000
SE	F0,IPART		02112000
MD	F0,LOGE2	BASE 2 TO BASE E	02113000
ADR	F0,F4	AND ADD TO LOG((1+Z)/(1-Z))	02114000
BR	2		02115000
EXPSV	DC	F'0'	02116000
DBUFF	DC	D'0'	02117000
IPART	DC	X'4600000000000000'	02118000
DLOGTB	DC	X'0303020201010101'	02119000
DZERO	DC	D'0'	02120000
HALF	DC	X'4080000000000000'	02121000
	DC	X'4110000000000000'	02122000
DLOGC7	DC	X'4025E9B17CA9B973'	.1480971268990510
DLOGC6	DC	X'40273337E26DBA7F'	.1531252792171731
DLOGC5	DC	X'402E8CD32A425C06'	.1818363168880382
DLOGC4	DC	X'4038E38A00083F6B'	.2222219705656678
DLOGC3	DC	X'4049249251450212'	.2857142876064318
DLOGC2	DC	X'406666666665EBAA3'	.3999999999930233
DLOGC1	DC	X'40AAAAAAAAAAD6C'	.666666666666764
LOGE2	DC	X'40B17217F7D1CF7B'	02130000
DLOGM	DC	X'40B504F3'	1/SQRT 2
*	EXPONENTIAL FUNCTION-	ARG IN F0, RETURN IN F0	02132000
DEXP	CE	F0,DEXPMAX	MAX=63*LOG16=174.67309
	BH	DOVF	IF GREATER GIVE ERROR
	CE	F0,DEXPMIN	MIN=-65LOG16=-180.21867
	BNH	DEXPSM	IF LESS GIVE ZERO
	DD	F0,DLOGE2	Y=X*LOG2(E)
	STE	F0,SIGN	SAVE SIGN
	LER	F2,F0	DECOMPOSE Y=(-4A'-B'-C'/16)-D'
	AU	F2,SCALER	BY FORCING CHARACTERISTIC OF X'45'
	STE	F2,FIELDS	-4A'-B'-C'/16, UNNORMALIZED
	SDR	F2,F2	02142000
	AE	F2,FIELDS	NORMALIZE AND SUBTRACT
	SDR	F0,F2	IT FROM Y TO OBTAIN -D' IN F0
	L	14,FIELDS	02145000

	TM	SIGN,X'80'	IF Y NEG	02146000
	BO	DEXPR	GO	02147000
	SD	F0,ONO16	-D=/D'/-1-16	02148000
	LA	14,1(14)	-4A-B-C/16=-(-4A'-B'-(C'+1)/16)	02149000
DEXPR	LCR	14,14	NOW B,C AND D ARE +	02150000
	SR	15,15		02151000
	SRDL	14,4	C IN HIGH 15	02152000
	SRL	15,25		02153000
	SRDL	14,2	B IN HIGH 15, C IN LOW 15	02154000
	SLL	14,24		02155000
	LCR	0,14	A(IN SCALE B7) IN R0, CHAR MODIFIER	02156000
	SR	14,14		02157000
	SIDL	14,2	B IN R14, 8*C IN R15	02158000
	LDR	F2,F0		02159000
	ME	F0,DEXPC6	COMPUTE 2**-D BY USE OF	02160000
	AD	F0,DEXPC5	CHEBYSHEV INTERPOLATION	02161000
	MDR	F0,F2	POLYNOMIAL OF DEGREE 6	02162000
	AD	F0,DEXPC4		02163000
	MDR	F0,F2		02164000
	AD	F0,DEXPC3		02165000
	MDR	F0,F2		02166000
	AD	F0,DEXPC2		02167000
	MDR	F0,F2		02168000
	AD	F0,DEXPC1		02169000
	MDR	F0,F2		02170000
	AD	F0,DEXPC0A	ADD C0=1.	02171000
	AD	F0,DEXPC0A		02172000
	LTR	15,15	MULTIPLY 2**(-C/16)	02173000
	BZ	DEXP2		02174000
	CE	F0,DEXPONE		02175000
	BL	DEXP1		02176000
	LD	F0,MCONST-8(15)		02177000
	B	DEXP2		02178000
DEXP1	MD	F0,MCONST-8(15)		02179000
DEXP2	LTR	14,14	MULTIPLY 2**(-B)	02180000
	BZ	DEXP3	BY HALVING B TIMES	02181000
	HDR	F0,F0		02182000
	BCT	14,*-2		02183000
DEXP3	STD	F0,SIGN	ADD A TO CHARACTERISTIC	02184000
	A	0,SIGN		02185000
	ST	0,SIGN		02186000
	SDR	F0,F0		02187000
	AD	F0,SIGN		02188000
	BR	2		02189000
DEXPSM	SDR	F0,F0		02190000
	BR	2		02191000
DOVF	ERROR	' ***I5-EXPT TOO LARGE'		02192000
SIGN	DC	D'0'		02193000
FIELDS	EQU	SIGN+4		02194000
DLOGE2	DC	X'40B17217F7D1CF79'	LOG2(BE) TRUNCATED	02195000
ONO16	DC	X'4010000000000000'		02196000
DEXPONE	DC	X'41100000'		02197000
DEXPC6	DC	X'3D9E0F1E'	.1507368551403575E-3	02198000
DEXPC5	DC	X'3E575D42BB7276D4'	.1333073417706260E-2	02199000
DEXPC4	DC	X'3F276553A5F9BC94'	.9618117095313700E-2	02200000

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DEXPC3 DC X'3FE35846A61AEE7A' .5550410840231345E-1 02201000
DEXPC2 DC X'403D7F7BFF0289DE' .2402265069563678 02202000
DEXPC1 DC X'40B17217F7D1CC79' .6931471805599346 02203000
DEXPCOA DC X'4080000000000000' .5CO/2 02204000
MCONST DC X'40F5257D152486CC' 2**(-1/16E 02205000
DC X'40EAC0C6E7DD2439' 2**(-2/16) 02206000
DC X'40E0CCDEEC2A94E1' 2**(-3/16) 02207000
DC X'40D744FCCAD69D6B' 2**(-4/16) 02208000
DC X'40CE248C151F8481' 2**(-5/16) 02209000
DC X'40C5672A115506DB' 2**(-6/16) 02210000
DC X'40BD08A39F580C37' 2**(-7/16) 02211000
DC X'40B504F333F9DE65' 2**(-8/16) 02212000
DC X'40AD583EEA42A14B' 2**(-9/16) 02213000
DC X'40A5FED6A9B15139' 2**(-10/16) 02214000
DC X'409EF5326091A112' 2**(-11/16) 02215000
DC X'409837F0518DB8A9' 2**(-12/16) 02216000
DC X'4091C3D373AB11C3' 2**(-13/16) 02217000
DC X'408B95C1E3EA8BD7' 2**(-14/16) 02218000
DC X'4085AAC367CC487B' 2**(-15/16) 02219000
SCALER DC X'45000000' 02220000
DEXPMAX DC X'42AEAC4E' 174.6731 02221000
DEXPMIN DC X'C2B437DF' -180.2187 02222000
DROPT 3 02223000
EJECT 02224000
SAVEBLK DC 18F'0' 02225000
***** 02226000
***** READ ROUTINE ***** 02227000
***** 02228000
* SYNTAX ERRORS 02229000
* ERRB A . AFTER A ( 02230000
* DOTERR1 THE SECOND S-EXPRESSION IN DOTTED PAIR IS NOT 02231000
* FOLLOWED BY ) 02232000
* DOTERR2 A , . OR ) FOLLOWS A . 02233000
* REG -CHAR- HAS POINTER TO CURRENT CHARACTER 02234000
CHAR EQU 3 POINTER TO CURRENT CHARACTER 02235000
WKU EQU M VOL1 02236000
ERRIND DC X'00' X'01' INDICATES SYNTAX ERROR 02237000
* X'04' LABEL OR NUMB TRUNC 02238000
LASTCHAR DC A(CARD) 02239000
RDSV2 DC 2F'0' NOT RECURSIVE 02240000
READ EQU * 02241000
STM 2,3,RDSV2 SAVE EM 02242000
L CHAR, LASTCHAR 02243000
MVI ERRIND, X'00' SET ERRIND OFF 02244000
LR A, NILR SET TO NIL LIST 02245000
LR Q, NILR 02246000
BAL 2, CONS START NEW LIST 02247000
MVI LINKS+3, X'00' SET FOR CAR ATOM 02248000
MVI ATOMEQ+3, X'00' SET FOR CAR ATOM 02249000
RDIG BAL 2, TRYATOM -A- IS ADDR OF CELL 02250000
B RDOUT GOT ATOM 02251000
B RDIG DOT OR RT PAR 02252000
OI ERRIND, X'10' STARTING READ 02253000
BAL 2, TRYRPAR 02254000
B RDOUT ATOM IS NIL 02255000

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	ST	A,EVLSV		02256000
	BAL	2,UPPER		02257000
RDOUR	ST	CHAR, LASTCHAR	-A- HAS POINTER TO TOP OF LI	02258000
	L	A, CAR(A)		02259000
	TM	ERRIND, X'01'		02260000
	BZ	RT2		02261000
	PUTMSG	' *** R1-SYNTAX ERROR'		02262000
RT2	TM	ERRIND, X'04'		02263000
	BZ	RTOK		02264000
	PUTMSG	' *** R5-NAME OR NUMBER TOO LONG'		02265000
RTOK	LM	2,3,RDSV2		02266000
	BR	2		02267000
*				02268000
*****		RECURSIVE ENTRY FOR UPPER BRANCH	*****	02269000
*				02270000
UPPER	SAVE	2		02271000
	SAVE	A		02272000
	LR	WKU, A	HOLD -A-	02273000
	BAL	2, CONS	GET A CELL	02274000
	ST	A, CAR(WKU)	SET PTR DOWN	02275000
	B	RDS	READ S EXPRESSION	02276000
*				02277000
*****		RECURSIVE ENTRY FOR LOWER BRANCH	*****	02278000
*				02279000
LOWER	SAVE	2		02280000
	SAVE	A		02281000
RDCNO	LR	WKU, A		02282000
	LR	A, NILR	PREVENT A LOOP IN PRINT IF ABEND	02283000
	BAL	2, CONS	GET A CELL	02284000
	ST	A, CDR(WKU)	SET PTR DOWN	02285000
RDS	MVI	LINKS+3, CAR	SET FOR CAR ATOM	02286000
	MVI	ATOMEQ+3, CAR	SET FOR CAR ATOM	02287000
	BAL	2, TRYATOM		02288000
	B	RDBATM	GOT ONE	02289000
	B	RDBERB		02290000
	BAL	2, TRYRPAR		02291000
	B	RDBRP		02292000
	BAL	2, UPPER		02293000
RDBATM	BAL	2, TRYRPAR		02294000
	B	RDRET		02295000
	B	RDCDOT		02296000
RDRET	UNSAVE	A		02297000
	B	RETURN		02298000
RDBERB	LA	1, ERRB	LOAD ADDR OF ERRB	02299000
	ST	1, CAR(A)		02300000
	OI	ERRIND, X'01'		02301000
	B	RDBATM		02302000
RDBRP	ST	NILR, CAR(A)	SET CAR TO NIL	02303000
	B	RDBATM		02304000
RDCDOT	BAL	2, TRYDOT		02305000
	B	RDCDOTT		02306000
	B	RDCNO		02307000
RDCDOTT	MVI	LINKS+3, CDR	SET FOR CDR ATOM	02308000
	MVI	ATOMEQ+3, CDR	SET FOR CDR ATOM	02309000
	BAL	2, TRYATOM		02310000

	B	RDCATM		02311000
	B	RDCDTER		02312000
	BAL	2, TRYRPAR		02313000
	B	RDRET		02314000
	BAL	2, LOWER		02315000
RDCATM	BAL	2, TRYRPAR		02316000
	B	RDRET		02317000
	LA	1, DOTERR1		02318000
	ST	1, CDR (A)	SET CDR TO DOTERR1	02319000
	OI	ERRIND, X'01'		02320000
	B	RDRET		02321000
RDCDTER	LA	1, DOTERR2		02322000
	ST	1, CDR (A)	SET CDR TO DOTERR2	02323000
	OI	ERRIND, X'01'		02324000
	B	RDCATM		02325000
	EJECT			02326000
*****				02327000
***** TRYATOM *****				02328000
*****				02329000
ATOMIND	DC	X'00'	BIT SWITCHES	02330000
*	BIT	8	ATOMIND	02331000
*		7	NUMIND	02332000
*		6	FLOATIND	02333000
*		5	EXPIND	02334000
*		4	NEGEXP	02335000
*		3	NEGINT	02336000
*		2	LOGICAL	02337000
ATMSV2	DC	1F'0'	SAVE RETURN, NON RECURSIVE	02338000
CURBRK	DC	C'()+0'		02339000
CHARATA	DC	AL2(ATMSZ),H'0',(ATMSZ+4)C' ' CHAR ATOM SCAN AREA	VOL1	02340000
ZERO	DC	3D'0'		02341000
	CNOP	4,8		02342000
DIGATA	DC	H'16',H'0',4F'0'	DIGIT SCAN AREA	02343000
EXPA	DC	H'2',H'0',F'0'	EXP SCAN AREA	02344000
EXP	DC	H'-16'	DIGATA*10**(EXP+EXPA)	02345000
*		SCAN AREA=MAX LENGTH,CURR LENGTH,DATA		02346000
*		REG -A- CONTAINS CURRENT CELL IN LIST		02347000
TRYATOM	EQU	*		02348000
	ST	2, ATMSV2	SAVE RETURN	02349000
	NI	ATOMIND, X'00'	CLEAR BITS	02350000
	CLI	0 (CHAR), C' '	BLANK	02351000
	BNE	NOTBL		02352000
NEXTCHAR	BAL	2, GETCHAR		02353000
ATLOK	CLI	0 (CHAR), C' '	BLANK	02354000
	BNE	NOTBL		02355000
	TM	ATOMIND, X'80'		02356000
	BZ	NEXTCHAR		02357000
	B	ALLATOM		02358000
NOTBL	CLI	0 (CHAR), C', '		02359000
	BNE	NOTCOM		02360000
	TM	ATOMIND, X'80'		02361000
	BO	ALLATOM		02362000
	B	NEXTCHAR	IGNORE COMMA	02363000
NOTCOM	CLI	0 (CHAR), C', '.'		02364000
	BNE	NOTDOT		02365000

	TM	ATOMIND,X'40'	WAS IT A NUMBER COLLECTION	02366000
	BZ	CKATM	NO	02367000
	OI	ATOMIND,X'20'	SET FLOAT IND ON	02368000
CKATM	B	NEXTCHAR		02369000
	TM	ATOMIND,X'80'		02370000
	BO	ALLATOM		02371000
	BAL	2,GETCHAR		02372000
	L	2,ATMSV2		02373000
	B	4(2)	DOT & RT PAR RETURN	02374000
NOTDOT	CLI	0(CHAR),C')'		02375000
	BE	CKATM		02376000
CKLP	CLI	0(CHAR),C'('		02377000
	BNE	NOTLP		02378000
	TM	ATOMIND,X'80'		02379000
	BO	ALLATOM		02380000
	BAL	2,GETCHAR		02381000
	L	2,ATMSV2		02382000
	B	8(2)	LEFT PAR RETURN	02383000
NOTLP	CLI	0(CHAR),C'-'		02384000
	BNE	NOTMIN		02385000
	BAL	2,GETCHAR		02386000
	BAL	2,CKDIG	IS IT DIGIT	02387000
	B	RDDASH	NO	02388000
	TM	ATOMIND,X'10'	IN EXPONENT	02389000
	BZ	NOEXP		02390000
	OI	ATOMIND,X'08'	SET NEG EXPONENT	02391000
	B	NOTBL		02392000
NOEXP	OI	ATOMIND,X'04'	SET NEG INTEGER	02393000
	B	NOTBL		02394000
NOTMIN	CLI	0(CHAR),C'+'		02395000
	BNE	NOTPLUS		02396000
	BAL	2,GETCHAR		02397000
	BAL	2,CKDIG	IS IT DIGIT	02398000
	B	RDPLUS	NO	02399000
	B	NOTBL	YES	02400000
NOTPLUS	BAL	2,CKDIG	IS IT DIGIT	02401000
	B	NOTDIGIT	NO	02402000
	TM	ATOMIND,X'40'		02403000
	BO	STNAT		02404000
	TM	ATOMIND,X'80'		02405000
	BO	CHARATM		02406000
	OI	ATOMIND,X'C0'	ATOMIND & NUMBIND	02407000
	MVC	DIGATA+2(18),ZERO		02408000
	MVC	EXPA+2(6),ZERO		02409000
	LH	1,=H'-16'		02410000
	STH	1,EXP		02411000
STNAT	TM	ATOMIND,X'10'	IN EXPONENT	02412000
	BO	ACEXP	YES	02413000
	LA	1,DIGATA	SET PTR	02414000
	BAL	2,STOCHAR		02415000
	TM	ATOMIND,X'20'	FLOAT NUMBER	02416000
	BO	NEXTCHAR	YES	02417000
	LH	1,EXP		02418000
	AH	1,=H'1'		02419000
	STH	1,EXP		02420000

	B	NEXTCHAR		02421000
ACEXP	LA	1,EXPA	EXPONENT AREA	02422000
	BAL	2,STOCHAR	STORE IT	02423000
	B	NEXTCHAR	CONT	02424000
CKDIG	CLI	0(CHAR),C'0'		02425000
	BL	0(2)	NOT DIGIT	02426000
	CLI	0(CHAR),C'9'		02427000
	BH	0(2)	NOT DIGIT	02428000
	B	4(2)	DIGIT	02429000
NOTDIGIT	TM	ATOMIND,X'40'	A NUMBER	02430000
	BO	CKEXP	YES	02431000
	CLI	0(CHAR),C'\$'	LITERAL	02432000
	BE	LITERAL		02433000
CHARATM	TM	ATOMIND,X'80'	ATOM	02434000
	BO	ATOK	YES	02435000
	MVC	CHARATA+2(16),ZERO		02436000
	MVC	CHARATA+16(ATMSZ-16),CHARATA+4		02437000
	OI	ATOMIND,X'80'	ATOM & LETTER	02438000
ATOK	LA	1,CHARATA	SET PTR	02439000
	BAL	2,STOCHAR		02440000
	B	NEXTCHAR		02441000
CKEXP	CLI	0(CHAR),C'E'	EXP	02442000
	BNE	NOTEXP		02443000
	OI	ATOMIND,X'10'	SET EXP ON	02444000
	B	NEXTCHAR		02445000
NOTEXP	CLI	0(CHAR),C'Q'	LOGICAL	02446000
	BNE	NOTLOG		02447000
	OI	ATOMIND,X'12'	SET EXP, LOG ON	02448000
	B	NEXTCHAR		02449000
NOTLOG	OI	ERRIND,X'01'	INVALID SYNTAX	02450000
	NI	ATOMIND,X'00'		02451000
	B	NEXTCHAR		02452000
RDDASH	EQU	*		02453000
	TM	ATOMIND,X'80'		02454000
	BO	ALLATOM		02455000
	LA	14,DASH		02456000
	B	ATOMEQ		02457000
RDPLUSS	EQU	*		02458000
	TM	ATOMIND,X'80'		02459000
	BO	ALLATOM		02460000
	LA	14,PLUSS		02461000
	B	ATOMEQ		02462000
STOCHAR	LH	15,2(1)	CURR LENGTH	02463000
	CH	15,0(1)	AT MAX	02464000
	BL	STOIT	NO	02465000
	OI	ERRIND,X'04'	LABEL OR NUMBER TRUNCATED	02466000
	BR	2	DROP CHAR	02467000
STOIT	IC	0,0(CHAR)	PICK IT UP	02468000
	STC	0,4(1,15)		02469000
	LA	0,1(,15)	ADD 1	02470000
	STH	0,2(1)		02471000
	BR	2		02472000
LITERAL	TM	ATOMIND,X'80'	LITERAL=>\$\$D.. ...D	02473000
	BO	ATOK	BUILDING ATOM	02474000
	MVC	CHARATA+2(16),ZERO		02475000

	MVC	CHARATA+16(ATMSZ-16),CHARATA+4	02476000
	OI	ATOMIND,X'80' ATOM & LETTER	02477000
	LA	1,CHARATA	02478000
	BAL	2,STOCHAR STO IT FOR NOW	02479000
	BAL	2,GETCHAR GET NEXT CHAR	02480000
	CLI	0(CHAR),C'\$'	02481000
	BNE	ATLOK NOT A LITERAL	02482000
	LH	15,CHARATA+2	02483000
	BCTR	15,0 BACK UP ONE, IE TO \$	02484000
	STH	15,CHARATA+2	02485000
LITOK	BAL	2,GETCHAR GET DELIMETER	02486000
	IC	0,0(CHAR) PICK IT UP	02487000
	STC	0,DELM+1 STO IT	02488000
LITON	BAL	2,GETCHAR NEXT CHAR	02489000
DELM	CLI	0(CHAR),C'9' SCAN FOR DELIMETER	02490000
	BE	LITDN	02491000
	LA	1,CHARATA SET PTR	02492000
	BAL	2,STOCHAR	02493000
	B	LITON	02494000
LITDN	BAL	2,GETCHAR	02495000
	B	ALLATOM ALL OF LITERAL	02496000
	EJECT		02497000
*		ALL REQUIRED CHARACTERS HAVE BEEN PICKED OFF THE CARD.	02498000
*		AN ALPHABETIC OR NUMERIC ATOM MAY NOW BE CONSTRUCTED.	02499000
*		REGISTERS 0,1,14,15 USED HERE- CONS MUST NOT ALTER THEM.	02500000
ALLATOM	TM	ATOMIND,X'40' NUMB ATOM	02501000
	BO	NUMAT YES	02502000
	MVI	ATMTYP+1,ATOM SET ATOM TYPE	02503000
STSCH	L	15,OBJECTA START SEARCH POINTER	02504000
SCHAGN	L	0,CHARATA+4 SCHARG	02505000
	BAL	2,SERCH	02506000
	B	BUILDATM NOT THERE	02507000
***		FOUND ONE, SO COMPARE REST OF NAME	02508000
	LA	1,0 SET TO ZERO	02509000
	L	2,CAR(14) SET UP 2 FOR SCAN OF OBJLIST	02510000
SCHEQ	L	2,CDR(2)	02511000
	LA	2,0(,2) ZERO EXTRA BITS	02512000
	CR	2,NILR NIL YET	02513000
	BE	CKATEND CHECK END OF AREA	02514000
	L	0,CAR(2) NEXT PART OF NAME	02515000
	C	0,CHARATA+8(1)	02516000
	BNE	SCHAGN SEARCH REST OF OBJLIST	02517000
	AR	1,K4	02518000
	B	SCHEQ TRY NEXT 4 BYTES	02519000
CKATEND	SR	2,2	02520000
	C	2,CHARATA+8(1) SHOULD BE ZERO	02521000
	BNE	SCHAGN CHECK REST OF LIST	02522000
	MVZ	TTST+1(1),CAR(14)	02523000
TTST	CLI	ATMTYP+1,0 IS ATOM OF SAME TYPE	02524000
	BNE	SCHAGN	02525000
ATOMEQ	ST	14,CAR(A) SET PTR TO ATOM	02526000
AEXIT	L	2,ATMSV2 RESTORE 2	02527000
	BR	2 FOUND ATOM	02528000
***		SERCH SCANS OBJLIST FOR ATOM HAVING 4CHARS OF PNAME EQ TO SCHARG	02529000
*		R0 IS SCHARG, R15 IS PTR TO OBJLIST,	02530000

*	RETURNS 4(2), R14 PTR TO ATOM HEAD IF FOUND,	02531000
*	RETURNS 0(2) IF END OF OBJLIST REACHED.	02532000
SERCH	CR 15,NILR NIL	02533000
	BE 0(2) YES- END OF OBJLIST	02534000
	LM 14,15,CAR(15) NEXT POINTER	02535000
	L 1,CAR(14) PTR TO PNAME	02536000
	C 0,CAR(1) EQUAL	02537000
	BNE SERCH NO, TRY AGAIN	02538000
	B 4(2) FOUND ONE, EXIT	02539000
***	ATOM NOT ON OBJLIST SO WE ADD IT TO FRONT	02540000
BUILDATM	LR 15,A SAVE-A- PNTS TO CURR CELL ABUILDING	02541000
	LR Q,NILR Q=NIL	02542000
	BAL 2,CONS ATOM HEAD	02543000
LINKS	ST A,CAR(15) LINK CELL TO LIST	02544000
	LR 14,A SAVE-A- PNTS TO ATOM HEAD	02545000
	L 1,OBJECTA ADD ATOM TO FRONT OF OBJLIST	02546000
	L Q,CDR(1)	02547000
	BAL 2,CONS ADD TO OBJECT LIST	02548000
	ST A,CDR(1) LINK IT	02549000
	LR Q,NILR	02550000
	BAL 2,CONS FIRST DATA CELL	02551000
	ST A,CAR(14) LINK TO ATOM HEAD	02552000
ATMTYP	MVI CAR(14),ATOM MARK ATOM HEAD	02553000
	SR 1,1	02554000
	MVI CDR(A),FWD MARK ALPHA CELL	02555000
	L 0,CHARATA+4 PNAME	02556000
STNEXT	ST 0,CAR(A) STORE NAME	02557000
	L 0,CHARATA+8(1) GET NEXT PART OF NAM E	02558000
	C 0,ZERO END OF ST R ING	02559000
	BE BTEXT YES	02560000
	LR 14,A SAVE-A-	02561000
	BAL 2,CONS ANOTHER CELL	02562000
	MVI CDR(A),FWD MARK AS ALPHA	02563000
	ST A,CDR(14) LINK INTO LIST	02564000
	MVI CDR(14),FWD MARK AS ALPHA	02565000
	AR 1,K4	02566000
	B STNEXT	02567000
BTEXT	LR A,15 RESET A	02568000
	B ATEXT	02569000
***	DATA SCANNED WAS A NUMERIC ATOM -- CONVERT TO FIX OR FLOAT	02570000
NUMAT	TM ATOMIND,X'20' FLOATIND	02571000
	BO FLOATINP	02572000
	TM ATOMIND,X'02' LOGICAL	02573000
	BO LOGINP	02574000
	LH 1,DIGATA+2 CONST LENGTH	02575000
BCTR	1,0 LESS ONE	02576000
EX	1,PCK PACK IT	02577000
CVB	1,DIGATA+12 TO BIN	02578000
TM	ATOMIND,X'04' NUMB NEG	02579000
BZ	*+6	02580000
LCR	1,1 YES, COMPLEMENT IT	02581000
MVI	ATMTYP+1,FIX SET CORRECT TYPE	02582000
BAL	15,CONEXP CONVERT EXP TO BINARY R2	02583000
LTR	2,2 ZERO EXP	02584000
BZ	NUMIT YES	02585000

	MH	1,=H'10'		02586000
	BCT	2,*-4		02587000
NUMIT	ST	1,CHARATA+4		02588000
	MVC	CHARATA+8(4),ZERO		02589000
	B	STSCH	MAKE AN ATOM	02590000
LGMSK	DC	F'7'		02591000
LOGINP	MVI	ATMTYP+1,LOGIC		02592000
	LH	15,DIGATA+2	LENGTH	02593000
	SR	1,1		02594000
	SR	2,2		02595000
LOGLOOP	SR	14,14		02596000
	IC	14,DIGATA+3(15)	GET CHAR	02597000
	N	14,LGMSK		02598000
	SLL	14,0(2)		02599000
	ALR	1,14		02600000
	LA	2,3(,2)	UP SHIFT	02601000
	BCT	15,LOGLOOP		02602000
	BAL	15,CONEXP	CONVERT EXP TO BINARY R2	02603000
	LTR	2,2		02604000
	BZ	NUMIT		02605000
	LR	14,2		02606000
	SLL	2,1		02607000
	AR	2,14	RESULT IS OCTAL SHIFT	02608000
	CH	2,=H'32'		02609000
	BL	*+10		02610000
	SR	1,1	EXP IS TOO LARGE	02611000
	B	NUMIT		02612000
	SLL	1,0(2)	SHIFT EXP	02613000
	B	NUMIT		02614000
FLOATINP	PACK	DIGATA+4(8),DIGATA+4(8)		02615000
	PACK	DIGATA+12(8),DIGATA+12(8)		02616000
	OI	DIGATA+11,X'0F'	SET SIGN PLUS	02617000
	OI	DIGATA+19,X'0F'	SET SIGN PLUS	02618000
	CVB	1,DIGATA+4		02619000
	CVB	2,DIGATA+12		02620000
	M	0,TEN8		02621000
	ALR	1,2		02622000
	BC	12,*+8	NO OVERFLOW	02623000
	AH	0,=H'1'		02624000
	STM	0,1,DIGATA+4		02625000
	LH	0,EXP		02626000
	BAL	15,CONEXP	CONVERT EXP TO BINARY R2	02627000
	TM	ATOMIND,X'08'	NEG EXP	02628000
	BZ	*+6	NO	02629000
	LCR	2,2		02630000
	AR	0,2	ADD EXPS	02631000
FIXPT	SR	1,1	ZERO 1	02632000
	MVI	DIGATA+4,X'4E'	SET EXP	02633000
	TM	ATOMIND,X'04'	WAS NUMBER NEG	02634000
	BZ	*+8	NO	02635000
	MVI	DIGATA+4,X'CE'	SET SIGN	02636000
	LD	0,DIGATA+4		02637000
	AD	0,ZERO	NORMALIZE IT	02638000
	AH	0,=H'64'		02639000
	BP	PLEXP		02640000


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***** PRINT ***** 02696000
***** 02697000
P EQU 3 POINTER TO LINE POSITION 02698000
PRSV DC 2F'0' SAVE 2,3 02699000
PSV DC F'0' 02700000
LINEMAX DC A(LINE+100) LIMIT WHEN OUTPUTING CHARS 02701000
SUPMAX DC A(LINE+120) LIMIT FOR ATOMS 02702000
PRINT STM 2,3,PRSV 02703000
L P,PRTAB 02704000
TM CDR(A),FWD 02705000
BZ PGOES NO 02706000
PEXIT LM 2,3,PRSV 02707000
BR 2 02708000
PGOES TM CAR(A),ATOM 02709000
BZ PUTLIST ITS A LIST 02710000
BAL 2,PUTATOM 02711000
PWRT BAL 2,WRLINE 02712000
B PEXIT 02713000
PUTLIST LR Q,A 02714000
LA A,0 02715000
***** Q POINTS TO LIST BEING CURRENTLY OUTPUT 02716000
***** A IS A SCRATCH REG USED FOR SAVING PTRS 02717000
SAVE A 02718000
PLFTP MVI 0(P),C'(' LEFT PAREN 02719000
BAL 2,PCKOVR CHECK BUFFER AREA 02720000
PRNXT L A,CAR(Q) 02721000
TM CAR(A),ATOM 02722000
BO PATM YES 02723000
LM Q,M,CAR(Q) 02724000
SAVE M 02725000
B PLFTP 02726000
PATM BAL 2,PUTATOM 02727000
L Q,CDR(Q) 02728000
CR Q,NILR 02729000
BE FNDNIL 02730000
PRLIST TM CAR(Q),ATOM 02731000
BO PRDOT YES 02732000
BAL 2,PCKOVR 02733000
B PRNXT 02734000
PRDOT MVI 1(P),C'.' 02735000
LA P,2(,P) BLANKS AROUND DOT 02736000
BAL 2,PCKOVR 02737000
LR A,Q 02738000
BAL 2,PUTATOM 02739000
FNDNIL MVI 0(P),C')' 02740000
BAL 2,PCKOVR 02741000
UNSAVE Q 02742000
LTR Q,Q 02743000
BZ PWRT 02744000
CR Q,NILR 02745000
BE FNDNIL 02746000
B PRLIST 02747000
PCKOVR LA P,1(,P) UP BY ONE 02748000
C P,LINEMAX 02749000
BL 0(2) OK YET 02750000

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	ST	2,PSV	BETTER PRINT	02751000
	BAL	2,WRLINE		02752000
	L	2,PSV	RESTORE 2	02753000
	BR	2		02754000
***	PUT ATOM	-A- TO BUFFER, PRINT	IF OVER, -P- POINTS TO BUFF	02755000
PUTATOM	ST	2,PSV	SAVE IT	02756000
	TM	CAR(A),FIX		02757000
	BO	PRNUMB		02758000
	L	A,CAR(A)		02759000
PUTNXT	MVC	0(4,P),CAR(A)	MOVE ATOM NAME	02760000
	AR	P,K4		02761000
	L	A,CDR(A)		02762000
	LA	A,0(,A)	STRIP BITS	02763000
	CR	A,NILR		02764000
	BE	TSTNUL	EXIT	02765000
	C	P,SUPMAX		02766000
	BL	PUTNXT		02767000
	BAL	2,WRLINE		02768000
	B	PUTNXT		02769000
	MVI	0(P),C' '	VOL1	02770000
TSTNUL	BCTR	P,0	BACK UP ONE	02771000
	CLI	0(P),X'00'	NULL CHAR	02772000
	BE	TSTNUL-4	VOL1	02773000
SCANOFF	LA	P,1(,P)	ONE MORE	02774000
	B	PUTAX		02775000
PRNUMB	TM	CAR(A),FLOAT		02776000
	BO	PRFLT	YES	02777000
	TM	CAR(A),LOGIC	LOGICAL ATOM	02778000
	BO	PRLOGIC	YES	02779000
	L	A,CAR(A)		02780000
	L	A,CAR(A)	NUMBER	02781000
	CVD	A,TEA	TO PACKED	02782000
	MVC	WKA(12),MSK	EDIT MASK	02783000
	LA	1,WKA+11		02784000
	EDMK	WKA(12),TEA+2		02785000
	BNM	PRNO	NOT NEG	02786000
	BCTR	1,0	ROOM FOR SIGN	02787000
	MVI	0(1),C'-'	SET SIGN	02788000
PRNO	LA	2,WKA+11	END OF AREA	02789000
	SR	2,1	LENGTH OF NUMB-1	02790000
	STC	2,*+5	SET LENGTH	02791000
	MVC	0(1,P),0(1)	TO PRINT AREA	02792000
	LA	P,1(P,2)	UP P	02793000
TSTOVR	C	P,LINEMAX		02794000
	BL	PUTAX		02795000
	BAL	2,WRLINE		02796000
PUTAX	L	2,PSV		02797000
	LR	A,NILR		02798000
	BR	2		02799000
PRLOGIC	EQU	*	PRINT LOGICAL NUMBERS	02800000
	L	A,CAR(A)		02801000
	L	15,CAR(A)	LOAD NUMBER	02802000
	SR	14,14		02803000
	LA	1,1	LENGTH IN BUFF	02804000
	LA	2,10	SHIFT 10 DIGITS	02805000

	L	0,LMSK	ZONE MASK	02806000
	SLDL	14,2	SHIFT OFF ODD BITS	02807000
	OR	14,0	OR IN ZONE	02808000
	STC	14,WKA	STORE IT	02809000
LGLOOP	SR	14,14		02810000
	SLDL	14,3	SHIFT OCTAL DIGIT	02811000
	OR	14,0	OR IN ZONE	02812000
	STC	14,WKA(1)	STORE IT	02813000
	LA	1,1(,1)	UP POINTER	02814000
	BCT	2,LGLOOP	REST OF WORD	02815000
	PACK	TEA(6),WKA(11)	PACK IT FOR AN EDIT	02816000
	MVC	WKA(12),MSK	MASK	02817000
	LA	1,WKA+11		02818000
	LR	2,1		02819000
	EDMK	WKA(12),TEA	STRIP LEADING ZEROS	02820000
	SR	2,1		02821000
	STC	2,*+5	LENGTH	02822000
	MVC	0(1,P),0(1)	TO PRINT AREA	02823000
	LA	P,1(P,2)	UP P	02824000
	MVI	0(P),C'Q'		02825000
	LA	P,1(,P)		02826000
	B	TSTOVR		02827000
PRFLT	EQU	*		02828000
	L	A,CAR(A)		02829000
	MVC	TEA(4),CAR(A)	MOVE NUMBER	02830000
	MVI	TEA,X'40'	SET EXP	02831000
	LE	0,TEA	LOAD FP REG	02832000
	IC	1,CAR(A)	EXPONENT	02833000
	SLDL	0,29	ALL BUT 3 BITS	02834000
	SRL	1,26	BACK TO ADDRESS DBL WORDS	02835000
	LR	2,1	SAVE IT	02836000
	SRDL	0,4	NEXT 4	02837000
	SRL	1,25	TO ADDR DBL WD	02838000
	DD	0,DTRA(1)		02839000
	SRL	1,2	TO HALF	02840000
	LH	M,DTRAH(1)		02841000
	CE	0,DPNCON		02842000
	BL	*+20		02843000
	LA	2,8(,2)	UP BY ONE DBL WD	02844000
	STE	0,TEA		02845000
	MVI	TEA,X'40'		02846000
	LE	0,TEA		02847000
	DD	0,DTRB(2)		02848000
	SRL	2,2	TO HALF	02849000
	AH	M,DTRBH(2)		02850000
	STD	0,TEA		02851000
	TM	TEA,X'01'		02852000
	MVI	TEA,X'00'		02853000
	LM	0,1,TEA		02854000
	BZ	*+8		02855000
	SLDA	0,4		02856000
*		AT THIS POINT 0 AND 1 CONTAIN A 14 DIGIT BINARY INTEGER		02857000
*		M HAS DECIMAL EXPONENT		02858000
FPA	EQU	CHARATA+4		02859000
	D	0,=F'1000000000'	10**9	02860000

CVD	0,TEA	LT 10**9	02861000
UNPK	FPA+10(9),TEA+3(5)		02862000
OI	FPA+18,X'F0'	SET ZONE	02863000
CVD	1,TEA		02864000
UNPK	FPA(10),TEA+2(6)	NOW A 19 DIGIT NUMBER AT FPA	02865000
OI	FPA+9,X'F0'	DECIMAL POINT AT RIGHT OF FPA+18	02866000
LA	1,FPA+3	SET UP TRT	02867000
TRT	FPA(3),TRTBL-240	FIND FIRST NON ZERO	02868000
LA	2,FPA+18		02869000
SR	2,1	COMPUTE DECIMAL POINT	02870000
AR	M,2	EXPONENT	02871000
TM	CAR(A),X'80'	WAS NUMB NEG	02872000
BZ	*+12		02873000
MVI	0(P),C'-'	YES	02874000
LA	P,1(P)		02875000
MVC	0(1,P),0(1)	MOVE ONE DIGIT	02876000
MVI	1(P),C'.'		02877000
MVC	2(6,P),1(1)	6 MORE DIGITS	02878000
MVC	8(4,P),DMSK		02879000
CVD	M,TEA		02880000
ED	8(4,P),TEA+6	EDIT EXP	02881000
MVI	9(P),C'+'	SET PLUS	02882000
BP	*+8	SHOULD IT BE	02883000
MVI	9(P),C'-'	NO	02884000
LA	P,13(P)	-N.NNNNNE-NN	02885000
B	TSTOVR		02886000
***			02887000
PRTAB	DC	A(LINE+5)	START VALUE
PRIN1	STM	2,3,PRSV	02888000
	L	P,PRTAB	LEFT OFF HERE
	TM	CAR(A),ATOM	02890000
	BZ	0(2)	NO
	BAL	2,PUTATOM	02891000
	BCTR	P,0	02892000
	BAL	2,PCKOVR	02893000
	ST	P,PRTAB	02894000
	LM	2,3,PRSV	02895000
	BR	2	02896000
***			02897000
*	MOVE OVER	N POSNS	02898000
XTAB	L	Q,CAR(A)	02899000
	L	Q,CAR(Q)	02900000
	LPR	Q,Q	MUST BE POSITIVE
	A	Q,PRTAB	02901000
	LR	A,NILR	02902000
	C	Q,LINEMAX	02903000
	BH	WRLINE	PRINT IT
	ST	Q,PRTAB	02904000
	BR	2	02905000
*	MOVE TO N'	TH POSITION	02906000
TTAB	L	Q,CAR(A)	02907000
	L	Q,CAR(Q)	02908000
	LPR	Q,Q	MUST BE POS
	LA	M,LINE	02909000
	AR	Q,M	02910000
			02911000
			02912000
			02913000
			02914000
			02915000

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LR          A,NILR          02916000
C           Q,SUPMAX       02917000
BH          0(2)           02918000
ST          Q,PRTAB       02919000
BR          2              02920000
DMSK       DC             X'C5212020' 02921000
TRTBLE     DC             X'00'          02922000
MSK        DC             X'4020202020202020202120' BDD,DDD,DDD,DSD 02923000
WKA        DC             4F'0'         02924000
TEN8       DC             F'1000000000' 02925000
LMSK       DC             X'000000F0'   02926000
DPNCON     DC             X'41100000'   02927000
           CNOP           0,8          02928000
DTRA       DC             X'401DA48CE468E7C7' 1 02929000
           DC             X'404504787C5F878A' 2 02930000
           DC             X'40A0B19D2AB70E6E' 3 02931000
           DC             X'40256A18DD89E626' 4 02932000
           DC             X'40571CBEC554B60D' 5 02933000
           DC             X'40CAD2F7F5359A3B' 6 02934000
           DC             X'402F394219248446' 7 02935000
           DC             X'406DF37F675EF6EA' 8 02936000
           DC             X'40FFFFFFFFFFFFFFF' 9 02937000
           DC             X'403B9AC9FFFFFFFFF' 10 02938000
           DC             X'408AC7230489E800' 11 02939000
           DC             X'40204FCE5E3E2502' 12 02940000
           DC             X'404B3B4CA85A86C4' 13 02941000
           DC             X'40AF298D050E4395' 14 02942000
           DC             X'4028C87CB5C89A25' 15 02943000
           DC             X'405EF4A74721E864' 16 02944000
DTRAH      DC             H'-78,-68,-58,-49,-39,-29,-20,-10,0,9,19,28,38' 02945000
           DC             H'48,57,67' 02946000
DTRB       DC             X'40B877AA3236A4B4' 1 02947000
           DC             X'40734ACA5F6226F0' 2 02948000
           DC             X'40480EBE7B9D5856' 3 02949000
           DC             X'402D09370D425736' 4 02950000
           DC             X'401C25C268497681' 5 02951000
           DC             X'40AFEBFF0BCB24AA' 6 02952000
           DC             X'406DF37F675EF6EA' 7 02953000
           DC             X'4044B82FA09B5A52' 8 02954000
           DC             X'402AF31DC4611873' 9 02955000
DTRBH      DC             H'-17,-16,-15,-14,-13,-11,-10,-9,-8' 02956000
           EJECT          02957000
*****          02958000
***** RETURN *****          02959000
*****          02960000
RETURN     UNSAVE        2          GET LINK ADDR 02961000
           BR            2          02962000
*****          02963000
***** SAVE *****          02964000
*****          02965000
ERG2       OI            ERRORIND,X'01'      NO PDL 02966000
           LA            PDS,NIL+8          RESTORE CLOBBED CELL 02967000
           ST            PDS,NIL           02968000
           MVI           NIL,ATOM          02969000
           L              PDS,PUSHA        02970000
    
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ERROR      ' ***G2- PUSHDOWN STACK OVERFLOW'          02971000
EJECT                                             02972000
*****
***** CONS *****                                02973000
*****
* MUST NOT DESTROY ANY REGISTERS                    02974000
* END OF FREE LIST IS MARKED BY FREE EQUAL TO 1. THIS GIVES A 02975000
* SPECIFICATION EXCEPTION TO CAUSE A GARBAGE COLLECTION 02976000
CONS      ST      A,CAR(FREE)                        02977000
          LR      A,FREE                              02978000
          L       FREE,CDR(FREE)                      02979000
          ST      Q,CDR(A)                            02980000
          BR      2                                    02981000
          EJECT                                       02982000
*****
***** GETCHAR *****                             02983000
*****
CARD      DC      CL1' ',X'00'                      INIT LASTCHAR TO HERE 02984000
GETCHAR   LA      CHAR,1(,CHAR)                      NEXT CHAR              02985000
          CLI     0(CHAR),X'00'                      END OF CARD            02986000
          BNE    0(2)                                  NO                     02987000
GETCD     EQU     *                                    02988000
          NOP    MKATMER                               FOR MKATOM             02989000
          STM    14,1,WRSV                             VOL1 02990000
LIBRD     NOP    LIBRDD                               DO GET FROM LIBRARY   VOL1 02991000
          GET    CARDIN                               READ LOCATE MODE      02992000
          LR     CHAR,1                               LOCN OF CARD          02993000
          MVI    CDEND(CHAR),0                       END OF CARD MARKER    VOL1 02994000
          LM     14,1,WRSV                             VOL1 02995000
          BR     2                                    03000000
LASTCARD  TM     ERRIND,X'10'                       WERE WE READING A LIST 03001000
          BZ     OKEOF                                NO                     03002000
          MVI    ERRORIND,X'03'                      TERMINAL ERROR        03003000
          L      A,EVLSV                              03004000
          L      A,CAR(A)                             03005000
          SR     Q,Q                                  03006000
OKEOF     ERROR  ' *** R2-BAD BRACKET COUNT'        03007000
          PUTMSG ' *** END OF DATA'                03008000
          B      STOP                                03009000
          EJECT                                       03010000
*****
***** WRLINE *****                              03011000
*****
WRSV     DC      6F'0'                                03012000
*** WRLINE IS USED TO OUTPUT DATA AREA 'LINE' AND RESET IT 03013000
* TO BLANKS                                       03014000
DC       AL2(128),C' '                            03015000
LINE     DC      124CL1'                              03016000
WRLINE   ST      2,WRSV+20                          03017000
          PUTMSG LINE-4                              03018000
          MVI    LINE,C' '                          03019000
          MVC    LINE+1(123),LINE                   03020000
          LA     P,LINE+5                            03021000
          ST     P,PRTAB                             03022000
          L      2,WRSV+20                          03023000
          L      2,WRSV+20                          03024000
          L      2,WRSV+20                          03025000

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	BR	2		03026000
***	PUTMSG IS	USED TO OUTPUT A MESSAGE, A VARIABLE LENGTH RECO:		03027000
PUTMSG	PUT	PRINTCB, (0)		03028000
	LM	14, 1, WRSV	VOL1	03029000
	BR	2		03030000
	EJECT			03031000
	LTORG			03032000
FWSQ	DC	A(0, EFWS-1)		03033000
PUSHA	DC	A(PUSH)		03034000
NILA	DC	A(NIL)		03035000
BOTTOM	DC	A(0)	POINTER TO HIGHEST FWS ADDR	03036000
TEMPORAR	EQU	*	THIS IS THE START OF A 25	03037000
*		WORD AREA FOR THE STORAGE OF PTRS THAT MAY BE NEEDED AT		03038000
*		GARBAGE COLLECTION.		03039000
OBJECTA	DC	A(OBJECT)	POINTER TO START OF OBJECTLIST	03040000
ALIST	DC	A(0)	ADDR OF ASSOCIATION LIST	03041000
ARGS	DC	20F'0'	CELLS FOR ARGS 3 TO 22	03042000
GARBT	DC	3F'0'		03043000
TAPPL	EQU	*		03044000
EVLSV	DC	3F'0'		03045000
PROGT	EQU	GARBT	TEMP IN CASE OF GARB COLLN	03046000
GOLIST	EQU	GARBT+4	TEMP IN CASE OF GARB COLLN	03047000
LIBLIST	DC	A(NIL)	LIST OF REQUESTED LIB FNS	VOL1 03048000
	EJECT			03049000
PUSH	DS	F		03050000
*		THE FOLLOWING CODING IS OVERLAID BY THE PDS.		03051000
BCDBK	DC	C'%<', X'5000'	VOL1	03052000
SETUP	LA	M, SETUP		03053000
	USING	SETUP, M		03054000
	L	1, 0(A)	LOAD PARM POINTER	03055000
	LH	2, 0(1)	COUNT	03056000
	LTR	2, 2		03057000
	BZ	NOPARM		03058000
	CLC	2(3, 1), =C'BCD'		03059000
	BE	RDBCD		03060000
	PUTMSG	' *** INVALID PARM'		03061000
	B	NOPARM		03062000
RDBCD	MVI	NOTDOT+1, C'<'		03063000
	MVI	CKLP+1, C'%'		03064000
	MVI	NOTMIN+1, X'50'	+	03065000
	MVI	TRYRPAR+1, C'<'		03066000
	L	14, BCDBK	VOL1	03067000
	ST	14, CURBRK	VOL1	03068000
NOPARM	EQU	*		03069000
	OPEN	(CARDIN, (INPUT), PRINTCB, (OUTPUT))		03070000
	OPEN	(LIBCB, (INPUT))	VOL1	03071000
	STIMER	TASK, TUINTVL=STIM	START CLOCK	03072000
	L	PDS, PUSHA	SET UP STACK POINTER	03073000
	LA	FREE, 1	THIS CAUSES A SPECIF EXCEPTION	03074000
	LA	K4, 4		03075000
*		OBJLIST IS RELOCATABLE, FIX IT		03076000
	LR	1, NILR		03077000
	LA	2, 8	SET UP BXLE	03078000
	L	3, FWSQ+4		03079000
ADDL	TM	CDR(1), FWD		03080000

	BO	ACDR	03081000
	LM	A,Q,CAR(1)	03082000
	ALR	Q,NILR	03083000
	ALR	A,NILR	03084000
	STM	A,Q,CAR(1)	03085000
ABXL	BXLE	1,2,ADDL	03086000
	GETMAIN	VC,LA=SZRNG,A=WHERE GET BLOCK FOR FWS	03087000
	CR	15,K4 TEST RETURN CODE	03088000
	BNE	GOTSOME SPACE WAS ALLOCATED	03089000
	OI	ERRORIND,X'03' FATAL ERROR	03090000
	ERROR	' *** GC1-NO STORAGE ALLOCATED'	03091000
ACDR	L	Q,CDR(1) CDR ONLY	03092000
	ALR	Q,NILR	03093000
	ST	Q,CDR(1)	03094000
	B	ABXL	03095000
GOTSOME	L	A,WHERE LOCATION	03096000
	LA	0,2048 FREE IT 2K	03097000
	L	1,WHERE+4 LENGTH	03098000
	SR	1,0 LESS 2K	03099000
	ST	1,WHERE+4	03100000
	AR	1,A WHERE	03101000
	FREEMAIN	R,LV=(0),A=(1)	03102000
	C	A,FWSQ+4 IS IT CONTIGOUS	03103000
	BNE	NOTCON NO	03104000
	A	A,WHERE+4	03105000
	BCTR	A,0	03106000
	ST	A,FWSQ+4	03107000
	ST	A,BOTTOM	03108000
	B	GMMMSG	03109000
NOTCON	ST	A,FWSQ LINK OBLIST INTO AREA	03110000
	SR	0,0	03111000
	ST	0,0(A) MARK LAST LINK	03112000
	LR	Q,A	03113000
	A	Q,WHERE+4 END OF BLOCK	03114000
	BCTR	Q,0	03115000
	ST	Q,4(A)	03116000
	ST	Q,BOTTOM	03117000
GMMMSG	L	Q,WHERE+4 LENGTH OF AREA	03118000
	SRA	Q,3 BY 8	03119000
	CVD	Q,TEA	03120000
	MVC	GMM+6(8),MASK	03121000
	ED	GMM+6(8),TEA+4	03122000
	PUTMSG	GMM	03123000
	B	AGN	03124000
	LTORG		03125000
GMM	DC	AL2(36),C' 0 00000000 LISP CELLS ALLOCATED.'	03126000
WHERE	DC	2F'0' AT,LENGTH	03127000
SZRNG	DC	A(20000,1024000) MIN, MAX SIZED AREA	03128000
	DROP	M	03129000
	ORG	PUSH+4*STACKSIZ	03130000
	EJECT		03131000
	*****		03132000
	***** OBJECT LIST *****		03133000
	*****		03134000
*	THE MACRO 'ECHO' IS USED TO DEFINE THE OBJECT LIST.		03135000

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* THE MACRO IS LABELLED IF THE GENERATED ATOM IS TO BE 03136000
* REFERRED TO BY ANOTHER ATOM. 03137000
* THE PARAMETERS ARE AS FOLLOWS. 03138000
* 1 - PRINT NAME (1 TO 8 CHARS) REQD 03139000
* 2 - PROPERTY OPTIONAL 03140000
* 3 - INTERNAL SUBRTN NAME REQD WITH 2 03141000
* 4 - NUMBER OF ARGS FOR 3 ZERO ASSUMED 03142000
* 03143000
* 03144000
* ATOMHEAD ***** 03145000
* *X'MM' A(P1)* A(P2)* 03146000
* ***** 03147000
* 03148000
* P1 *'ABCD' *X'40' A(P3)* 03149000
* ***** 03150000
* 03151000
* P3 *'EF00' *X'40' A(NIL)* 03152000
* ***** 03153000
* 03154000
* 03155000
* P2 * A(PROPERTY)* A(P4)* 03156000
* ***** 03157000
* 03158000
* 03159000
* P4 * A(P5)* A(NIL)* 03160000
* ***** 03161000
* 03162000
* 03163000
* P5 *X'NN' A(SUBRTN)*X'40' A(NIL)* 03164000
* ***** 03165000
* 03166000
* 03167000
* 03168000
* MM X'80' ALPHABETIC ATOM 03169000
* X'C0' FIXED POINT ATOM 03170000
* X'E0' FLOATING POINT ATOM 03171000
* X'D0' LOGICAL ATOM 03172000
* X'08' TRACE INDICATOR 03173000
* 03174000
* NN IS THE NUMBER OF ARGUMENTS REQUIRED BY SUBRTN 03175000
* P2 AND P3 MAY BE NIL 03176000
* CNOP 0,8 03177000
NIL ECHO NIL,APVAL,NIL MUST BE AT FRONT OF OBLIST 03178000
OBJECT DC A(NIL-NIL,#+4-NIL) START OF OBJECT LIST 03179000
ECHO CAR,SUBR,CARR,1 03180000
ECHO CDR,SUBR,CDRR,1 03181000
QUOTE ECHO QUOTE 03182000
ECHO CONS,SUBR,CONS,2 03183000
ECHO EVAL,SUBR,EVAL,2 03184000
ECHO DEFINE,SUBR,DEFINE,1 03185000
ECHO EQ,SUBR,EQ,2 03186000
ECHO EQUAL,SUBR,EQUAL,2 03187000
ECHO ATOM,SUBR,ATOMP,1 03188000
ECHO LEFTSHIFT,SUBR,LEFTSHIF,2 03189000
ECHO DIFFERENCE,SUBR,DIFF,2 03190000

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	ECHO	REMAINDER, SUBR, REMAIND, 2	03191000
	ECHO	QUOTIENT, SUBR, QUOTIENT, 2	03192000
	ECHO	NULL, SUBR, NULL, 1	03193000
	ECHO	ADD1, SUBR, ADD1, 1	03194000
	ECHO	SUB1, SUBR, SUB1, 1	03195000
	ECHO	MINUS, SUBR, MINUS, 1	03196000
	ECHO	PLUS, FSUBR, PLUS	03197000
	ECHO	TIMES, FSUBR, TIMES	03198000
COND	ECHO	COND	03199000
LAMBDA	ECHO	LAMBDA	03200000
T	ECHO	T, APVAL, T	03201000
	ECHO	APPEND, SUBR, APPEND, 2	03202000
	ECHO	PROG, FSUBR, PROG	03203000
	ECHO	GO, FSUBR, GO, 1	03204000
	ECHO	RETURN, SUBR, GORET, 1	03205000
	ECHO	SET, SUBR, SET, 2	03206000
	ECHO	CSET, SUBR, CSET, 2	03207000
	ECHO	CSETQ, FSUBR, CSETQ, 2	03208000
	ECHO	SETQ, FSUBR, SETQ, 2	03209000
	ECHO	CADR, SUBR, CADR, 1	03210000
	ECHO	CDDR, SUBR, CDDR, 1	03211000
	ECHO	CAAR, SUBR, CAAR, 1	03212000
	ECHO	CDAR, SUBR, CDAR, 1	03213000
	ECHO	CADDR, SUBR, CADDR, 1	03214000
	ECHO	CADAR, SUBR, CADAR, 1	03215000
	ECHO	CAADR, SUBR, CAADR, 1	03216000
	ECHO	PRINT, SUBR, PRINT, 1	03217000
	ECHO	READ, SUBR, READ, 0	03218000
	ECHO	F, APVAL, NIL	03219000
	ECHO	GET, SUBR, GET, 2	03220000
	ECHO	MEMBER, SUBR, MEMBER, 2	03221000
	ECHO	EVLIS, SUBR, EVLIS, 2	03222000
	ECHO	NCONC, SUBR, NCONC, 2	03223000
	ECHO	PAIR, SUBR, PAIR, 2	03224000
	ECHO	APPLY, SUBR, APPLY, 3	03225000
	ECHO	APPEND1, SUBR, APPEND1, 2	03226000
APVAL	ECHO	APVAL	03227000
EXPR	ECHO	EXPR	03228000
SUBR	ECHO	SUBR	03229000
FEXPR	ECHO	FEXPR	03230000
FSUBR	ECHO	FSUBR	03231000
LABEL	ECHO	LABEL	03232000
FUNARG	ECHO	FUNARG	03233000
ERRB	ECHO	ERRB	03234000
DOTERR1	ECHO	DOTERR1	03235000
DOTERR2	ECHO	DOTERR2	03236000
DASH	ECHO	-	03237000
PLUSS	ECHO	+	03238000
	ECHO	AND, FSUBR, AND	03239000
	ECHO	OR, FSUBR, OR	03240000
	ECHO	LOGOR, FSUBR, LOGOR	03241000
	ECHO	LOGAND, FSUBR, LOGAND	03242000
	ECHO	LOGXOR, FSUBR, LOGXOR	03243000
	ECHO	EVENP, SUBR, EVENP, 1	03244000
	ECHO	MINUSP, SUBR, MINUSP, 1	03245000

ECHO	ZEROP, SUBR, ZEROP, 1	03246000
ECHO	LESSP, SUBR, LESSP, 2	03247000
ECHO	GREATERP, SUBR, GREATERP, 2	03248000
ECHO	ERROR, SUBR, ERRORR, 1	03249000
ECHO	XTAB, SUBR, XTAB, 1	03250000
ECHO	TTAB, SUBR, TTAB, 1	03251000
ECHO	NOT, SUBR, NULL, 1	03252000
ECHO	FIXP, SUBR, FIXP, 1	03253000
ECHO	FLOATP, SUBR, FLOATP, 1	03254000
ECHO	LIST, FSUBR, EVLIS, 2	03255000
ECHO	LOGP, SUBR, LOGP, 1	03256000
ECHO	PRIN1, SUBR, PRIN1, 1	03257000
ECHO	TERPRI, SUBR, WRLINE, 0	03258000
ECHO	DEFLIST, SUBR, DEFLIST, 2	03259000
ECHO	REMPROP, SUBR, REMPROP, 2	03260000
ECHO	FUNCTION, FSUBR, FUNCTION, 1	03261000
ECHO	ATTRIB, SUBR, ATTRIB, 2	03262000
ECHO	PROG2, SUBR, PROG2, 2	03263000
ECHO	NUMBERP, SUBR, NUMBERP, 1	03264000
ECHO	RPLACA, SUBR, RPLACA, 2	03265000
ECHO	RPLACD, SUBR, RPLACD, 2	03266000
ECHO	OBLIST, APVAL, OBJECT	03267000
ECHO	LIBRARY, SUBR, LIBRARY, 1	VOL1 03268000
ECHO	GENSYM, SUBR, GENSYM, 0	VOL1 03269000
ECHO	EXPT, SUBR, EXPT, 2	03270000
ECHO	UNPACK, SUBR, UNPACK, 1	03271000
ECHO	ADVANCE, SUBR, ADVANCE, 0	03272000
ECHO	ENDREAD, SUBR, ENDREAD, 0	03273000
ECHO	STARTREAD, SUBR, STARTRD, 0	03274000
ECHO	UNTRACE, SUBR, UNTRACE, 1	03275000
ECHO	TRACE, SUBR, TRACE, 1	03276000
ECHO	PACK, SUBR, PACK, 1	03277000
ECHO	CLEARBUFF, SUBR, CLEARBUF, 0	03278000
ECHO	MKATOM, SUBR, MKATOM, 0	03279000
ECHO	CCLASS, SUBR, CCLASS, 2	03280000
DC	A(**+16-NIL, NIL-NIL) MARK END OF LIST	03281000
ECHO	SASSOC, SUBR, SASSOCC, 3	03282000
EQU	*	03283000
END	MAIN	03284000

EFWS