

IDENTIFICATION

Product Code: DEC-12-ZR4A-D
Product Name: DIAL-MS PRINTMS Program
Description
Date Created: July 1, 1970
Maintainer: Software Services

LAP6-DIAL is an editor, filing system and assembler for use with the PDP-12 computer. The editor and filing portions are derived from the basic LINC program LAP6¹ by Mary Allen Wilkes of Washington University. The assembly portion is derived from several programs used for the PDP-8 computer including PAL-D².

The Digital Equipment Corporation wishes to express to the author, Mary Allen Wilkes (Clark), and the Computer Research Laboratory of Washington University, St. Louis, Missouri, its appreciation for the development set forth in LAP6 as well as its thanks for permission to use parts of the LAP6 program.

¹M. A. Wilkes, LAP6 Handbook, Computer Research Laboratory Tech. Rep. No. 2, Washington University, St. Louis, May 1, 1967.

²PAL-D Assembler Programmer's Reference Manual DEC-D8-ASAA-D.

1.0 PROGRAM OVERVIEW

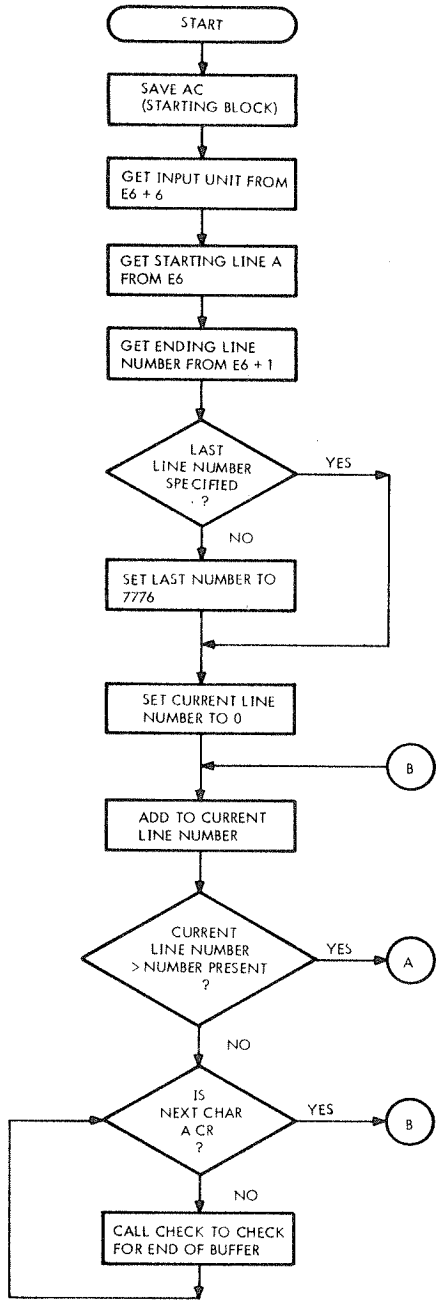
The PRINTMS program prints a source program from the file area by name or from the Working Area on the Teletype. The starting unit is in E6+6 and the starting block number is in the AC from FILECOMS. PRINTMS reads in blocks, converts them to 8-bit ASCII, and prints it on the Teletype until a $\emptyset\emptyset$ character (end of file) is encountered or a carriage return is typed. In addition, it has a counter so that it will skip over C(E6) lines before printing and it will only print C(E6+1) - C(E6)+1 lines so long as C(E6+1) \neq C(E6). If C(E6+1) < C(E6), nothing is printed and DIAL is restarted.

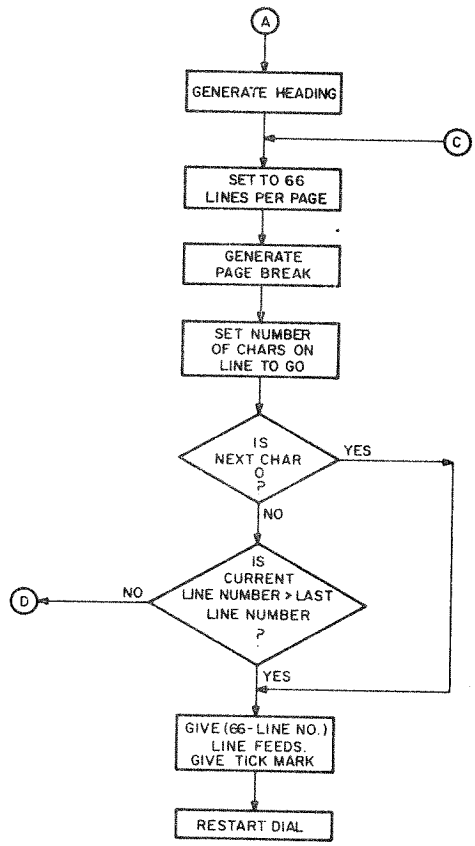
2.0 ENVIRONMENT

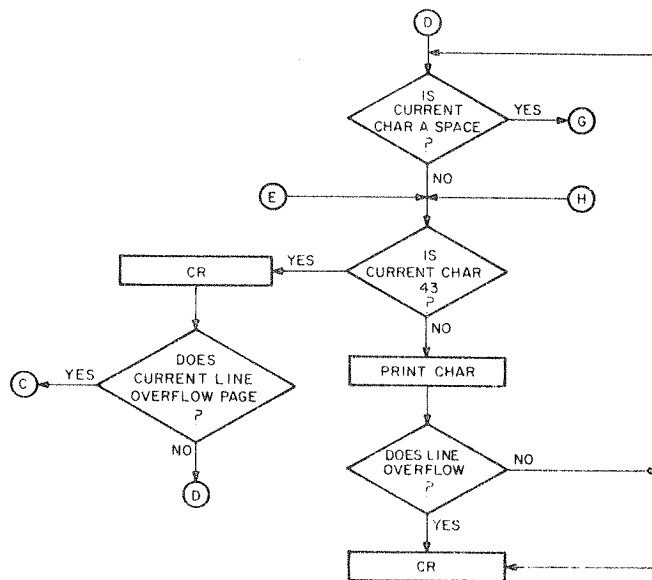
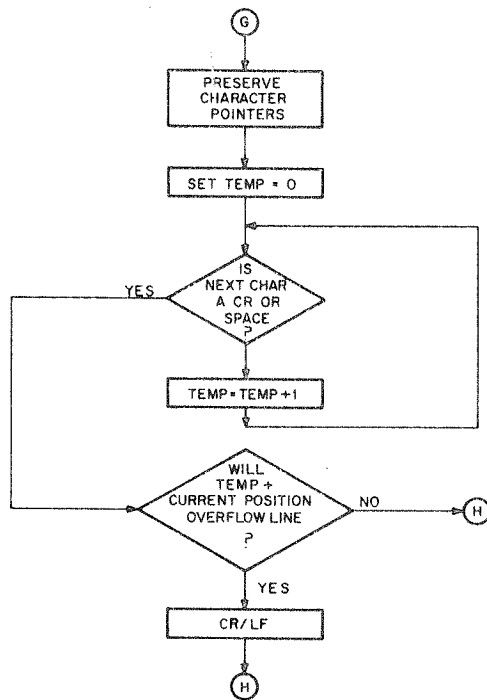
PRINTMS is two blocks long (363 and 364) and resides in memory locations 50000-5777.

3.0 FLOW DIAGRAM (Attached)

4.0 PROGRAM LISTING (Attached)







```

0000
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0070
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0073

/ PS V3.3
/ LAP6-DIAL : PRINT MANUSCRIPT (SOURCE)
/ ASSEMBLE WITH TELETYPE
/ BLOCK 363, WITH THE TELETYPE ROUTINES IN BLOCK 364
*1000

ENTER WITH STARTING BLOCK OF SOURCE TO BE PRINTED IN AC
OTHER RELEVANT PARAMETERS IN E6

STC SIN*2 /START BLOCK TO I/O LIST
LDA /PICK UP I/O UNIT NO
E6*6
STC SIN /...ALSO TO I/O LIST
SET I 5 /POINTER TO LINE NUMBERS
E6 /GET THE FIRST LINE NUMBER
LDA I 5 /A TEMP FOR 8 MODE ADDRESSING
STA I /SECOND LINE NUMBER
0 /SECOND TEMP
LDA I 5 /GET INTO 8 MODE FOR GOOD COMPARES.
STA I
0
PDP
PMODE
CLA
TAD X1 /GET THE FIRST LINE NUMBER
CLL CML CIA /COMPLEMENT AC AND SET LINK
TAD X2 /NUMBER 2 -- LINC CLEARED IF LN2 GE LN1
LINC
LMODE /GET BACK INTO LINC MODE
LZE /WERE NUMBERS OK?
JMP B8 /NOPE, EXIT.
SET I 5
E6
SET I 3
J9*2
LDA 5 /1ST LINE
AZE /STARTING LINE NO
STC STRTLN /GET A DUMMY INSTRUCTION IN THE AC.
ADD /AND STORE IN THE PAGE BREAK ROUTINE
STC JBN08K /THIS INSURES THAT IT WILL ONLY GIVE TWO LINES INITIALLY.
ADD P1
STC L8
LDA I 5 /LN2
AZE
ADD P1 /INCR IF SPECIF
AZE
STC STOPLN /HOLD FOR COMPARE IF SPECIFIED
LDA I 5
SAE I
7777
JMP I*3
LDA I
5443
STA 3
LDA I 5
STA I 3
LDA I 5
STA I 3
1000 5307
1001 1000
1002 2377
1003 5305
1004 0065
1005 2371
1006 1005
1007 1060
1010 0000
1011 1025
1012 1060
1013 0000
1014 0002
5015 7200
5016 1210
5017 7161
5020 1213
5021 6141
1022 0452
1023 7420
1024 0065
1025 2371
1026 0063
1027 0773
1030 1005
1031 0450
1032 5073
1033 3033
1034 5431
1035 3256
1036 5455
1037 1025
1040 0450
1041 3256
1042 0450
1043 5106
1044 1025
1045 1460
1046 7777
1047 7052
1050 1020
1051 5443
1052 1043
1053 1025
1054 1063
1055 1025
1056 1063

```

```

0074 1027 LDA I 2
0075 1063 STA I 3
0076 1061 LDA I
0077 1062 7777 -0
0100 1063 STA I 3
0101 1064 0063 SET I 3
0102 1065 7377 7377
0103 1066 0065 SET I 5
0104 1067 7776 -1
0105 1070 1000 LDA
0106 1071 1260 CURLIN
0107 1072 1460 SAE I
0110 1073 0001 STRTLN, 1
0111 1074 7111 JMP S5
0112 1075 5474 STC C8
0113 1076 0016 NOP
0114 1077 7424 JMP Z8
0115 1100 7504 JMP X8
0116 1101 0073 SET I 13
0117 1102 6777 -1000
0120 1103 1000 LDA
0121 1104 1260 CURLIN
0122 1105 1460 SAE I
0123 1106 7776 STOPLN, 7776
0124 1107 7120 JMP L5
0125 0125 /DONE
0126 1110 7417 JMP B8-1
0127 0127 /PARTIAL PRINT
0130 1111 7255 JMP BUMPLN
0131 1112 1020 LDA I
0132 1113 0043 43
0133 1114 1423 SHD I 3
0134 1115 7070 JMP K5-7
0135 1116 7261 JMP CHECK
0136 1117 7112 JMP I-5
0137 0137 /PRINT LINE
0140 1120 7255 JMP BUMPLN
0141 1121 0042 SET 2
0142 1122 0003 3
0143 1123 1322 LDH I 2
0144 1124 1420 SHD I
0145 1125 0000 0000
0146 1126 7400 JMP A8
0147 1127 0073 SET I 13
0150 1130 7703 -74
0151 1131 7261 JMP CHECK
0152 1132 1323 LDH I 3
0153 1133 1420 SHD I
0154 1134 4700 4700
0155 1135 0456 SKP
0156 1136 7162 JMP NOTAB
0157 1137 1000 LDA
0160 1140 1630 TBCONT
0161 1141 1120 ADA I
0162 1142 7767 -10
0163 1143 0471 APO I
0164 1144 7141 JMP
0165 1145 0470 AZE I
0166 1146 7141 JMP
0167 1147 0017 COM
0170 1150 1120 ADA I
0171 1151 7776 -1
0172 1152 2013 ADD

```

/CURRENT LINE NO
/STARTING LINE NO
/NOT YET
/KLUUDGE--DO NOT REMOVE
/WAIT FOR KEY
/GO TO NEXT LINE
/PARTIAL PRINT
/JUP LINE
/00=END OF FILE CHARACTER???
/END OF THE LISTING!
/CHECK FOR A TAB
/NOT A TAB
/GET THE OUTPUT POSITION
/SOP DOWN BY 8
/STILL POSITIVE
/AND NONZERO
/NOW GET THE POSITIVE REMAINDER
/AND ZAP DOWN FOR THE XSK TO FOLLOW
/ADD IN NUMBER OF CHARS TO GO


```

0273 ADD P1
0274 STC C8
0275 STC YBCONT /ZERO TAB CONTROL
0276 XSK I 5
0277 JMP K5+1
0300 JMP K5
0301 /MS ADDRESS CHECK AND UP LINE NUMBER
0302 LDA I
0303 PI 1
0304 ADM I
0305 /CURRENT LINE
0306 /SAVE RETURN
0307 /BETA 3 CONTAINS ADDR IN SOURCE BLOCK
0310 LDA 3
0311 /END OF BLOCK?
0312 SAE I
0313 7377
0314 JMP 6
0315 /NO-RETURN
0316 PDP /YES-ENTER PHODE FOR READ
0317 PHODE
0320 CDF 0
0321 CIP 10 /GET ONE BLOCK
0322 JMS I READ
0323 SIN
0324 ISZ SIN*2 /INCREMENT BLOCK NO
0325 LINC
0326 LMODE
0327 LDF 1 /FORCE CORRECT DATA FIELD
0330 SET I 3 /RESET SOURCE POINTER
0331 6777
0332 SET 2
0333 3
0334 JMP 6
0335 / I/O CONTROL BLOCK
0336 /
0337 SIN /UNIT
0340 0000 /MEM ADDR = 3000
0341 0006 /START BLOCK
0342 0000 /READ ONE ONLY
0343 /
0344 READ=21 /POINTER TO READ ROUTINE
0345 /
0346 /
0347 /
0350 /
0351 /
0352 /
0353 /
0354 /
0355 /
0356 /
0357 /
0360 /
0361 /

```

```

ASMIFM 1377-;
UH=0H == THIS ROUTINE IS TOO BIG

/DIAL PRINT MS(SRC)
/ADD TELETYPE HERE BEFORE ASSEMBLY
/
EJECT

```

TELETYPE ROUTINES

N.B: DONT CHANGE THIS CODE UNLESS CHANGES ARE REFLECTED IN PDKX,

KBOPR=1400

E6=2371
A6=2001
G7=346
D7=300
E7=0
J9=771

*1400
/DIAL TELETYPE ROUTINE
/44-END PRINT

```

1400 LDA I
1401 -4
1402 ADM
1403 5
1404 JMP T8
1405 XSK I 5
1406 JMP -2
1407 LDA I
1408 55
1409 JMP W8
1410 SET I 5
1411 -14
1412 JMP X8
1413 XSK I 5
1414 JMP -2
1415 NOP
1416 PDP
1417 PHODE
1418 CIF CDF 10
1419 JMP I ,+1
1420 7777
1421 LMODE
1422 /PAGE PRESET
1423 SET I 5
1424 -4
1425 SET 14
1426 0
1427 JMP X8
1428 JMP T8
1429 XSK I 5
1430 JMP ,+2
1431 LDA I
1432 55
1433 JMP W8 /-
1434 JMP X8
1435 JMP T8
1436 LDH
1437 J9+2
1438 SHD I
1439 5400
1440 JMP ,+7
1441 SET I 2
1442 J9+2-4000
1443 JMP Y8 /NAME
1444 LDA I

```

/TO COMPENSATE FOR NO BREAK AT THE END
/BOP DOWN LINE NUMBER COUNTER
/DO A LINE FEED
/DONE YET??
/DOWN TO BOTTOM OF PAGE,
/THE MINUS SIGN
/PRINT IT
/ENOUGH TO GET PAST TEAR RIM,
/C.R. S
/ALL DONE??
/NOPE,

```

1400 1020
1401 7773
1402 1140
1403 0005
1404 7536
1405 0225
1406 7404
1407 1020
1408 0055
1409 7613
1410 0065
1411 7763
1412 7504
1413 0225
1414 7414
1415 0016
1416 0002
1417 B8,
1418 5421
1419 5422
1420 5423
1421 1424
1422 1425
1423 1426
1424 1427
1425 1430
1426 1431
1427 1432
1428 1433
1429 1434
1430 1435
1431 1436
1432 1437
1433 1440
1434 1441
1435 1442
1436 1443
1437 1444
1438 1445
1439 1446
1440 1447
1441 1448
1442 1449
1443 1450
1444 1451
1445 1452
1446 1453
1447 1454
1448 1455
1449 1456
1450 1457

```

JBN0BK,

0004
0005
0006
0007
0008
0009
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0014
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0016
0017
0018
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0059
0060

ADDRESS	OPERATION	OPERANDS	COMMENT
0462	JMP	P8	
0463	LDA	I	
0464	ADD	4	
0465	STC	5	
0466	ADD	C8	/LINE NUMBER
0467	AZE	I	
0470	JMP	X8-6	
0471	JMP	W8-2	
0472	JMP	W8-2	
0473	SET	I 2	
0474	S8	4000	/LN=
0475	JMP	Y8	
0476	LDA	I	
0477	Ø		/LN
0500	JMP	P8	/PRINT NUMBER
0501	JMP	X8	
0502	JMP	T8	
0503	SET	I 5	
0504	-71		TBCONT
0505	STC	14	/KST; CARRIAGE RETURN
0506	JMP	14	
0507	SET	7	
0510	Ø		
0511	KST		
0512	JMP	3	+6
0513	LIF	3	
0514	JMP		KBDOPR
0515	SHD	I	
0516	4300		
0517	JMP	B8	
0520	PDP		
0521	PMODE		
0522	CLA	P215	
0523	TAD	P215	
0524	JMS	I TYPOA	
0525	TAD	P212	
0526	JMS	I TYPOA	
0527	LINC		
0530	LMODE		
0531	JMP	7	
0532	215		
0533	TYPOA		
0534	212		
0535	Ø		
0536	TSF		
0537	JMP	-1	
0540	TLS		
0541	CLA		
0542	JMP	I TYPO	
0543	LMODE		
0544	PDP		
0545	PMODE		
0546	CLA		
0547	TAD	P212	
0550	JMS	I TYPES	
0551	LINC		
0552	LMODE		
0553	JMP	Ø	
0554	1543		
0555	6000		
0556	1543		
0557	6000		

/ZERO OUT THE TAB COUNTER, A NEW LINE IS HERE.
/EXIT,

0560	1544	5530	TYPES,	TYFO
0561	1545	0044	R8,	/LINEFEED ONLY
0562	1546	0000		SET 4
0563	1547	7575		
0564	1550	1120		JMP M8
0565	1551	0060		ADA I
0566	1552	7613		60
0567	1553	7603		JMP W8
0570	1554	7547		JMP N8
0571				JMP R8+2
0572				/PRINT NUMBER, NO LEADS
0573	1555	0044	P8,	SET 4
0574	1556	0000		
0575	1557	0450		AZE
0576	1560	7565		JMP +5
0600	1561	1120		ADA I
0601	1562	0060		60
0602	1563	7613		JMP W8
0603	1564	6004		JMP 4
0604	1565	7575	P8S,	JMP M8
0605	1566	0450		AZE
0606	1567	7572		JMP +3
0607	1570	7603		JMP N8
0610	1571	7565		JMP P8S
0611	1572	1120		ADA I
0612	1573	0060		60
0613	1574	7552		JMP R8+5
0614	1575	0243	M8,	/NUMBER SUBS
0615	1576	1060		ROL 3
0616	1577	0000		STA I
0617	1600	1560		0
0620	1601	7770		BCL I
0622	1602	6000		7770
0623	1603	1000	N8,	JMP 0
0624	1604	1577		LDA
0625	1605	1520		M8+2
0626	1606	3567		SRO I
0627	1607	6000		3567
0630	1610	6004		JMP 0
0631	1611	1020		JMP 4
0632	1612	0040		/PRINT
0633	1613	0002	M8,	LDA I
0634				40
0635	5614	4631		PDP
0636	5615	3277		PMODE
0637	5616	1277		JMS I CONV
0641	5617	1300		DCA TEMP
0642	5620	7650		TAD TEMP
0643	5621	5322		TAD M211A
0644	5622	1277		SNA CLA
0645	5623	4627		JMP TABP
0646	5624	2230		TAD TEMP
0647	5625	6141	LNRT,	JMS I TYP
0650	1626	6000		ISZ TBCONT
0651	1627	5530		LINC
0652	1630	0000	TYPES,	LMODE
0653	1631	5703	TBCONT,	JMP 0
0654			CONVT,	TYP
0655	1632	0073	CONVT,	0
				/PRINT LINE OR LABEL

0627	1635	0000	LDH I 2
0660	1636	1322	SHD I
0661	1637	1420	4300
0662	1640	4300	JMP 7 /END DIAL LINE
0663	1641	6007	SHD I
0664	1642	1420	7700 /END NAME
0665	1643	7700	JMP 7
0666	1644	6007	JMP W8
0667	1645	7613	XSK I 13
0670	1646	0233	JMP Y8+4
0671	1647	7636	LDH I 2 /END OF TT LINE
0672	1650	1322	SHD I
0673	1651	1420	4300
0674	1652	4300	JMP 7
0675	1653	6007	XSK I 5
0676	1654	0225	JMP J8
0677	1655	7656	/TTLINE CONTINUES PAST PAGE BREAK
0700			J8,
0701	1656	7504	JMP X8
0702	1657	0067	SET I 7
0703	1660	7133	JMP M5+2
0704	1661	0074	SET I 14
0705	1662	7765	-12
0706	1663	7611	JMP W8-2
0707	1664	0234	XSK I 14
0710	1665	7663	JMP -2
0711	1666	0073	SET I 13
0712	1667	7711	-66
0713	1670	1302	LDH 2
0714	1671	7637	JMP Y8+5
0715			A7=370
0716			B7=0
0717			PMODE
0720	5672	7731	M47,
0721	5673	7740	M40,
0722	5674	0240	P240,
0723	5675	0100	P100,
0724	5676	0211	P211,
0725	5677	0000	TEMP,
0726	5700	7567	M211A,
0727	5701	7770	M10,
0730	5702	0077	P77,
0731	5703	0000	CONVRT,
0732	5704	0302	AND P77
0733	5705	3277	DCA TEMP
0734	5706	1277	TAD TEMP
0735	5707	1272	TAD M47
0736	5710	7650	SNA CLA
0737	5711	5320	JMP TABCV
0740	5712	1277	TAD TEMP
0741	5713	1273	TAD M40
0742	5714	7510	SPA
0743	5715	1275	TAD P100
0744	5716	1274	TAD P240
0745	5717	5703	JMP I CONVRT
0746	5720	1276	TAD P211
0747	5721	5703	JMP I CONVRT
0750	5722	1230	TAD TBCONT
0751	5723	1301	TAD M10
0752	5724	7500	SMA
0753	5725	5323	JMP -2
0754	5726	4332	JMS SKIP
0755			

0756	5727	3230		DCA TBCONT
0757	5730	5225		JMP LNRT
0760	5731	0000	T4,	Ø
0761	5732	0000	SKIP,	Ø
0762	5733	3331		DCA T4
0763	5734	1274		TAD P240
0764	5735	4627		JMS I TYPS
0765	5736	2331		ISZ T4
0766	5737	5334		JMP I-3
0767	5740	5732		JMP I SKIP
0770				LMODE
0771	1741	4040	D5,	4040
0772	1742	4040	4040	
0773	1743	4040	4040	
0774	1744	4040	4040	
0775	1745	4040	4040	
0776	1746	4040	4040	
0777	1747	2317	2317	
1000	1750	2522	2522	
1001	1751	0305	0305	
1002	1752	4040	4040	
1003	1753	4040	4040	
1004	1754	0211	0211	
1005	1755	1601	1601	
1006	1756	2231	2231	
1007	1757	4340	4340	
1010	1760	4016	4016	
1011	1761	0115	0115	
1012	1762	0540	0540	
1013	1763	4040	E5,	4040
1014	1764	4002	4002	
1015	1765	1640	1640	
1016	1766	4002	4002	
1017	1767	1413	1413	
1020	1770	2343	2343	
1021	1771	1416	S8,	1416
1022	1772	7543	7543	



NO ERRORS

SYMBOL VALUE DEF REFERENCES

A6	2001	0370	
A7	0370	0716	
A8	5400	0402	0146
BUMPLN	5255	0302	0130 0140
B7	0000	0717	
B8	5420	0422	0037 0126 0522
CHECK	5261	0306	0135 0151 0220 0244
CONVRT	5703	0752	0653 0746 0750
CONVT	5631	0653	0635
CURLIN	5260	0305	0106 0121 0272
C5	5215	0240	0215
C8	5474	0501	0112 0274 0470
DOIT	5157	0177	0174
D5	5741	0771	
D7	0300	0372	
E5	5763	1013	
E6	2371	0367	
E7	0000	0373	
GETBLK	5270	0315	0014 0017 0041
G7	0346	0371	
JBN0BK	5431	0436	0050 0204
J8	5656	0702	0700
J9	0771	0374	0043 0447 0454
KBDOPR	1400	0366	0517
K5	5077	0114	0134 0277 0300
LNRT	5625	0646	0757
L5	5120	0140	0124
L8	5455	0462	0053
M10	5701	0730	0752
M211A	5700	0727	0640
M40	5673	0722	0742
M47	5672	0721	0736
M5	5131	0151	0217 0235 0704
M8	5575	0614	0564 0603 0623
NOPE	5161	0201	0176
NOTAB	5162	0202	0156
N5	5176	0216	0261 0266 0267
N8	5603	0622	0570 0606
P1	5256	0303	0052 0056 0273
P100	5675	0724	0744
P211	5676	0725	0747
P212	5527	0537	0530 0553
P215	5525	0535	0526
P240	5674	0723	0745 0763
P5	5245	0271	0210 0224
P77	5702	0731	0733
P8	5555	0573	0463 0502
P8S	5565	0603	0607
Q5	5252	0276	
READ	0021	0344	0321
R8	5545	0562	0571 0612
SIN	5305	0337	0012 0015 0322 0323
SKIP	5732	0761	0755 0767
STOPLN	5106	0123	0060
STRTLN	5073	0110	0046
S5	5111	0130	0111
S8	5771	1021	0476
TABCV	5720	0747	0740

SYMBOL VALUE DEF REFERENCES

TYPES	5544	0560	0554	
TYPO	5530	0541	0536	0546 0560 0651
TYPOA	5526	0536	0527	0531
TYPES	5627	0651	0644	0764
T4	5731	0760	0762	0765
T8	5536	0550	0203	0406 0436 0445 0504
W8	5613	0633	0211	0413 0443 0460 0473 0474 0567 0601 0670 0707
X1	5010	0022	0031	
X2	5013	0025	0033	
X8	5504	0512	0115	0231 0416 0435 0444 0472 0503 0702
Y8	5632	0655	0455	0477 0672 0715
Z8	5424	0431	0114	0230