

- 1. IDENTIFICATION
- 1.1 Digital-8-21-U-Sym
- 1.2 Symbolic Tape Format Generator
- 1.3 May 2, 1965

## 2. ABSTRACT

The format generator allows the user to create PDP-8 symbolic tapes with formatting. It may be used to condense tapes with spaces by inserting tabs, or merely to align tabs, instructions, and comments.

## 3. REQUIREMENTS

### 3.1 Storage

Uses 4096-word core memory for buffering and program storage. The program itself occupies locations 0020-0665.

### 3.3 Equipment

PDP-8 with ASR 33 or with 750/75A High-Speed Reader/Punch.

## 4. USAGE

### 4.1 Loading

The program is loaded with the Binary Loader (see Digital-8-2-U).

### 4.3 Switch Settings

There are two switch options:

4.3.1 Bit 0 : If bit 0 is up, input and output are by means of the high speed reader and punch.

If bit 0 is down, input and output are by means of the ASR 33.

4.3.2 Bit 11: If bit 11 is up, tabs, followed by rubouts, are generated. If bit 11 is down, spaces are generated.

### 4.4 Start up/Entry

4.4.1 Load binary tape.

4.4.2 Set C(SR) = 0200 (starting address of program).

4.4.3 Press LOAD ADDRESS.

4.4.4 Set C(SR) for options (see 4.3).

4.4.5 Turn on punch; put symbolic tape in reader; turn on reader.

4.4.6 Press START.

4.4.7 When using high-speed I/O, the program will halt at the end of the tape. Using ASR 33, program will not halt.

- 5. RESTRICTIONS (Not Applicable)
- 6. DESCRIPTION
- 6.1 The format generator uses a fixed algorithm that is explained in the flow diagram.
- 6.2 The following is an example of its usage. It is the original input symbolic:

```
*200
/EXAMPLE OF FORMAT
/GENERATOR
BEGIN,0/START OF PROGRAM
KCC
KSF/WAIT FOR FLAG
JMP .-1/FLAG NOT SET YET
KRB/READ IN CHARACTER
DCA CHAR
TAD CHAR
TAD MSPACE/IS IT A SPACE?
SNA CLA
HLT/YES
JMP BEGIN+2/NO INPUT AGAIN
CHAR,0/TEMPORARY STORAGE
MSPACE,-240/-ASCII EQUIVALENT

/END OF EXAMPLE
$
```

This is the output symbolic:

```
*200
/EXAMPLE OF FORMAT
/GENERATOR
BEGIN,      0           /START OF PROGRAM
              KCC
              KSF           /WAIT FOR FLAG
              JMP .-1     /FLAG NOT SET YET
              KRB         /READ IN CHARACTER
              DCA CHAR
              TAD CHAR
              TAD MSPACE  /IS IT A SPACE?
              SNA CLA
              HLT         /YES
```

```
CHAR,      JMP BEGIN+2      /NO INPUT AGAIN
           0                /TEMPORY STORAGE
MSPACE,    - 240           /-ASCII EQUIVALENT
/END OF EXAMPLE
           $
```

7. METHODS (Not Applicable)

8. FORMAT

8.1 Input Data

The program will accept blank tape, or code 200 for Leader/Trailer. Rubouts are removed except when preceded by tabs. Any legal symbolic tape for the PAL II or MACRO assemblers will be correctly formatted.

8.3 Output Data

Output is compatible with either assembler and with the Symbolic Tape Editor.

9. EXECUTION TIME

Limited by input/output time.

10. PROGRAM

10.4 PALII Assembly Listing

```

/PAGE 1
*20
/CONSTANTS
0020 1000 RBGN, 1000
0021 0400 HIRDPT, HIRD
0022 7540 MSPACE, -240
0023 0000 FIELD1, 0
0024 0000 CHAR, 0
0025 0000 FCOUNT, 0
0026 0377 C377, 0377
0027 0211 TAB, 0211
0030 7766 MTAB1, -12
0031 7775 M3, -3
0032 7564 MFFEED, -214
0033 0014 MLEADR, 214-200
0034 7521 MSLASH, -257
0035 7563 MCR, -215
0036 0215 CARRTN, 215
0037 0212 LFEED, 212
0040 0000 RCNT, 0
0041 7526 MASTER, -252
0042 1400 RKON, 1000-7400
0043 7566 MLFEED, -212
0044 7401 MRBOUT, -377
0045 7567 MTAB, -211
0046 0240 SPACE, 240
0047 0000 TEM6, 0
0050 0000 SW11, 0
0051 0000 COMMFL, 0
0052 0000 EQFLAG, 0
0053 7524 MCOMMA, -254
0054 0000 GET, 0 /GET A CHARACTER FROM
0055 7200 CLA /LINE BUFFER
0056 1413 TAD I 13
0057 3024 DCA CHAR
0060 5454 JMP I GET
0061 0000 SPIGNR, 0 /ROUTINE TO IGNORE SPACES
0062 4054 JMS GET
0063 1024 TAD CHAR
0064 1022 TAD MSPACE
0065 7650 SNA CLA
0066 5062 JMP SPIGNR+1
0067 5461 JMP I SPIGNR
0070 0600 RDLIN, READL

```

```

/PAGE 2
*200
0200 7240          CLA CMA          /SET UP INPUT ROUTINE
0201 3040          DCA RCNT
0202 3050          DCA SWTI
0203 1030  START, TAD MTAB1      /SET UP TAB COUNT
0204 3025          DCA FCOUNT
0205 3023          DCA FIELD1
0206 4470          JMS I RDLINE   /READ IN A LINE
0207 1051          TAD COMMFL    /COMMA SEEN??
0210 7640          SZA CLA
0211 5233          JMP PGO      /YES
0212 1052          TAD EQFLAG    /EQUAL SEEN??
0213 7640          SZA CLA
0214 5310          JMP ECHO-1    /YES ECHO LINE
0215 4061          JMS SPIGNR
0216 1024          TAD CHAR      /CHARACTER ="*"?
0217 1041          TAD MASTER
0220 7650          SNA CLA
0221 5311          JMP ECHO      /YES ECHO
0222 1024          TAD CHAR
0223 1034          TAD MSLASH
0224 7650          SNA CLA      /CHARACTER ="/"?
0225 5311          JMP ECHO      /YES-ECHO
0226 1024          TAD CHAR
0227 1035          TAD MCR      /CHARACTER =CR?
0230 7650          SNA CLA
0231 5271          JMP CRLF     /YES
0232 5276          JMP TAB1A    /NONE OF THESE-TAB TO 1
0233 4061  PGO,   JMS SPIGNR    /IGNORE LEADING SPACES
0234 4320          JMS PUNCH    /PUNCH
0235 4054          JMS GET      /GET NEXT
0236 1024          TAD CHAR      /COMMA?
0237 1053          TAD MCOMMA
0240 7640          SZA CLA
0241 5234          JMP PGO+1    /NO
0242 4320          JMS PUNCH    /YES PUNCH IT

```

```

/PAGE 3
0243 1023 TAB1, TAD FIELD1 /IN FIELD?
0244 7650 SNA CLA
0245 4352 JMS TABIT /NO- TAB OVER
0246 4061 JMS SPIGNR /IGNORE SPACES
0247 1024 PG01, TAD CHAR
0250 1022 TAD MSPACE
0251 7650 SNA CLA /SPACE?
0252 5266 JMP SPUNCH /PUNCH IT AND IGNORE SPACES
0253 1024 TAD CHAR
0254 1035 TAD MCR /CR?
0255 7650 SNA CLA
0256 5271 JMP CRLF /YES
0257 1024 TAD CHAR
0260 1034 TAD MSLASH /"/"?
0261 7650 SNA CLA
0262 5302 JMP TAB3 /YES TAB TO STOP 3
0263 4320 PG02, JMS PUNCH /PUNCH IT
0264 4054 JMS GET /GET NEXT
0265 5247 JMP PG01
0266 4320 SPUNCH, JMS PUNCH
0267 4061 JMS SPIGNR
0270 5247 JMP PG01
0271 1036 CRLF, TAD CARRTN /PUNCH CR, LF
0272 4331 JMS PUN
0273 1037 TAD LFEED
0274 4331 JMS PUN
0275 5203 JMP START
0276 1023 TAB1A, TAD FIELD1 /TAB TO STOP 1
0277 7650 SNA CLA
0300 4352 JMS TABIT
0301 5263 JMP PG02
0302 1031 TAB3, TAD M3 /IN FIELD 3?
0303 1023 TAD FIELD1
0304 7650 SNA CLA
0305 5311 JMP ECHO /YES
0306 4352 JMS TABIT /NO TAB OVER 1
0307 5302 JMP TAB3
0310 4054 JMS GET
0311 4320 ECHO, JMS PUNCH /ECHO UNTIL CR
0312 4054 JMS GET
0313 1024 TAD CHAR
0314 1035 TAD MCR
0315 7650 SNA CLA
0316 5271 JMP CRLF
0317 5311 JMP ECHO

```

	/PAGE 4		
0320	0000	PUNCH,	0 /PUNCH AND COUNT
0321	1024		TAD CHAR
0322	4331		JMS PUN
0323	2025		ISZ FCOUNT
0324	5720		JMP I PUNCH
0325	1030		TAD MTAB1
0326	3025		DCA FCOUNT
0327	2023		ISZ FIELD1
0330	5720		JMP I PUNCH
0331	0000	PUN,	0 /PUNCH CHARACTER IN AC
0332	3351		DCA TEMP
0333	7604		CLA OSR
0334	7700		SMA CLA /OUTPUT??
0335	5344		JMP TGO /33ASR
0336	1351		TAD TEMP /PUNCH IT H.SPEED
0337	6026		PLS
0340	6021		PSF
0341	5340		JMP .-1
0342	7200		CLA
0343	5731		JMP I PUN
0344	1351	TGO,	TAD TEMP
0345	6046		TLS
0346	6041		TSF
0347	5346		JMP .-1
0350	5342		JMP TGO-2
0351	0000	TEMP,	0
0352	0000	TABIT,	0
0353	7604		CLA OSR /TABS OR SPACES
0354	7010		RAR
0355	7620		SNL CLA
0356	5367		JMP SPACIT /SPACES
0357	1027		TAD TAB
0360	4331		JMS PUN
0361	1026		TAD C377
0362	4331		JMS PUN
0363	1030		TAD MTAB1
0364	3025		DCA FCOUNT
0365	2023		ISZ FIELD1
0366	5752		JMP I TABIT
0367	1046	SPACIT,	TAD SPACE
0370	4331		JMS PUN
0371	2025		ISZ FCOUNT
0372	5367		JMP SPACIT
0373	5363		JMP SPACIT-4



/PAGE 5  
/READ ROUTINES

\*400  
HIRD,

0400	0000	0	
0401	7604	CLA 0SR	/INPUT SOURCE?
0402	7700	SMA CLA	
0403	5256	JMP K00	/33ASR
0404	2040	ISZ Z RCNT	/IS BUFFER EMPTY?
0405	5247	JMP GCHR	/NO
0406	2050	ISZ Z SWT1	/DID TAPE END?
0407	7410	SKP	
0410	5252	JMP ENBF	/YES - GO HALT
0411	3050	DCA Z SWT1	
0412	1020	TAD Z RBGN	/YES - READ IN A BUFFER FULL
0413	3010	DCA Z 10	
0414	1042	TAD Z RKON	
0415	3040	DCA Z RCNT	
0416	6014	RFC	/GET A CHARACTER
0417	6047	DCA Z TEM6	/START COUNTING
0420	2047	ISZ Z TEM6	/COUNTER OVERFLOW
0421	7410	SKP	
0422	5235	JMP FULL	/YES - END OF TAPE
0423	6011	RSF	/NO - FLAG SET YET?
0424	5220	JMP .-4	/NO - COUNT AGAIN
0425	7200	CLA	/YES - READ IN CHARACTER
0426	6012	RRB	
0427	4264	JMS TEST	/TEST INPUT
0430	5216	JMP RDIN	/IGNORE IT
0431	3410	DCA I 10	/STORE IT
0432	2040	ISZ Z RCNT	/IS BUFFER FULL YET?
0433	5216	JMP RDIN	/NO
0434	5241	JMP FULL	/YES

RDIN,

/PAGE 6

0435	7240	FULL,	CLA CMA	
0436	3050		DCA Z SWTI	/TAPE RAN OFF END
0437	1040		TAD Z RCNT	/SET END OF TAPE SWITCH
0440	7041		CMA IAC	
0441	1042	FULL,	TAD Z RKON	
0442	7450		SNA	
0443	5252		JMP ENBF	
0444	3040		DCA Z RCNT	
0445	1020		TAD Z RBGN	/RESET COUNTER FOR READ
0446	3012		DCA Z 12	
0447	1412	GCHR,	TAD I Z 12	/PICK UP A CHAR FROM BUFFER
0450	3024		DCA CHAR	
0451	5600		JMP I HIRD	/YES
0452	7240	ENBF,	CLA CMA	
0453	3040		DCA Z RCNT	
0454	7402		HLT	
0455	5254		JMP .-1	
0456	6031	KGO,	KSF	
0457	5256		JMP .-1	
0460	6036		KRB	
0461	4264		JMS TEST	/TEST INPUT
0462	5256		JMP KGO	/IGNORE IT
0463	5250		JMP GCHR+1	
0464	0000	TEST,	0	/TEST INPUT
0465	3024		DCA CHAR	/RETURN TO CALL+1
0466	1024		TAD CHAR	/IF TO BE IGNORED
0467	1043		TAD MLFEED	/IS IT LINEFEED?
0470	7650		SNA CLA	
0471	5664		JMP I TEST	/YES-IGNORE
0472	1024		TAD CHAR	
0473	1044		TAD MRBOUT	/IS IT RUBOUT?
0474	7650		SNA CLA	
0475	5664		JMP I TEST	/YES-IGNORE
0476	1024		TAD CHAR	
0477	1045		TAD MTAB	/IS IT TAB?
0500	7640		SZA CLA	
0501	5304		JMP .+3	/NO GET ORIGINAL
0502	1046		TAD SPACE	/YES-CHANGE TO SPACE
0503	7410		SKP	
0504	1024		TAD CHAR	
0505	2264		ISZ TEST	
0506	5664		JMP I TEST	

/PAGE 7  
 \*600  
 /ROUTINE TO READ A LINE

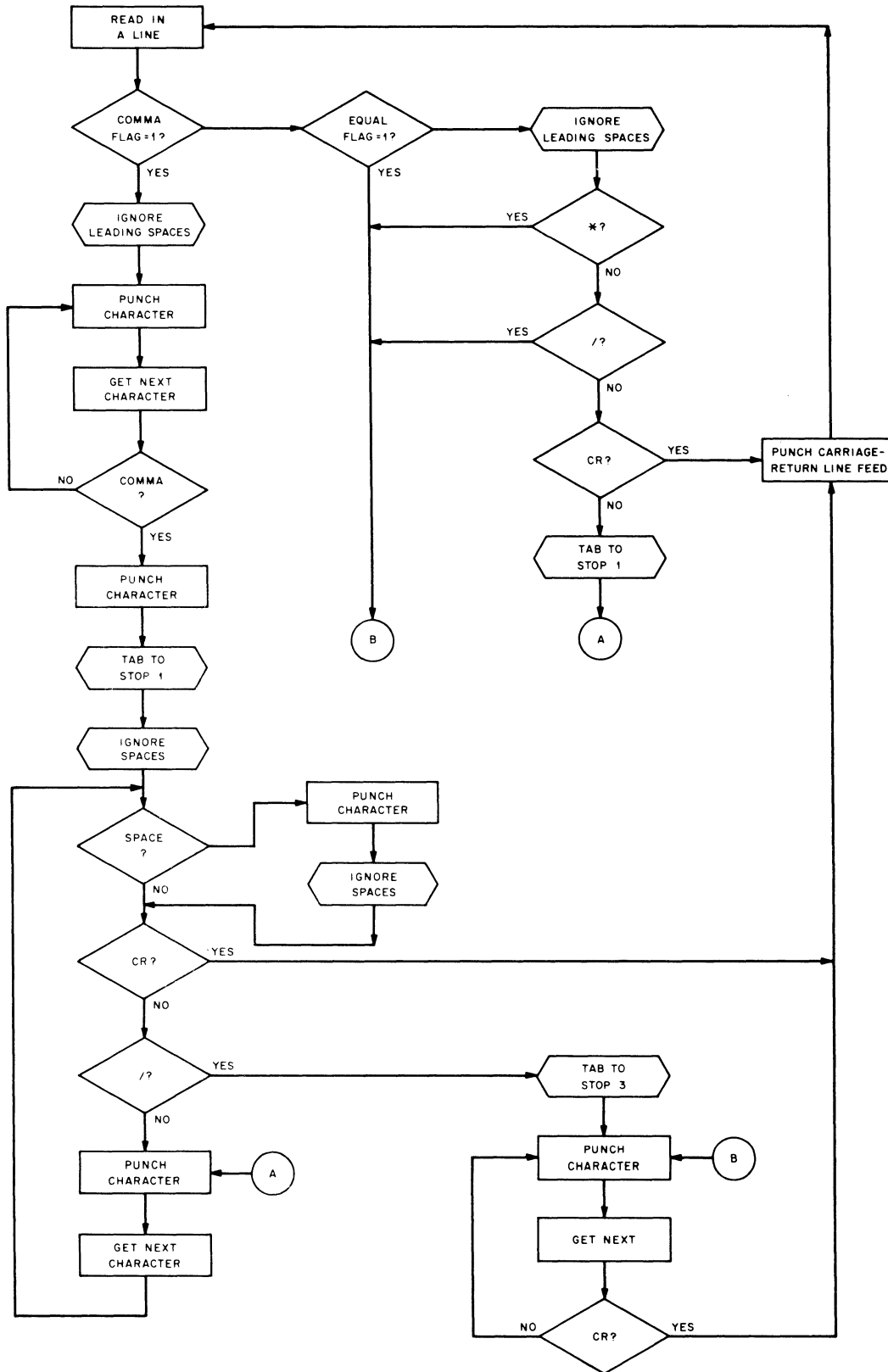
0600	0000	READL,	0	
0601	3052		DCA EQFLAG	
0602	3051		DCA COMMFL	
0603	3257		DCA SFLAG	/0 TO ALL FLAGS
0604	1265		TAD BUF1	
0605	3013		DCA I3	/SET BUFFER POINTER
0606	4421	RG0,	JMS I HIRDPT	/READ A CHARACTER
0607	1024		TAD CHAR	
0610	7450		SNA	
0611	5260		JMP PG07	/PUNCH BLANK
0612	1032		TAD MFFEED	/FORM FEED?
0613	7450		SNA	
0614	5260		JMP PG07	/YES-PUNCH IT
0615	1033		TAD MLEADR	/CODE 200?
0616	7650		SNA CLA	
0617	5260		JMP PG07	/YES PUNCH IT
0620	1024		TAD CHAR	
0621	3413		DCA I 13	/NONE::STORE IT
0622	1024		TAD CHAR	
0623	1034		TAD MSLASH	/IS IT SLASH?
0624	7640		SZA CLA	
0625	5230		JMP .+3	/NO
0626	2257		ISZ SFLAG	/YES SET COMMENT FLAG
0627	5206		JMP RG0	
0630	1024		TAD CHAR	
0631	1264		TAD MEQUL	/IS IT EQUAL SIGN?
0632	7650		SNA CLA	
0633	5247		JMP SET1	/SET =FLAG IF NOT IN COMMENT
0634	1024		TAD CHAR	
0635	1053		TAD MCOMMA	/IS IT A COMMA?
0636	7650		SNA CLA	
0637	5253		JMP SET2	/SET ,FLAG IF NOT IN COMMENT
0640	1024		TAD CHAR	
0641	1035		TAD MCR	/IS IT CR?
0642	7640		SZA CLA	
0643	5206		JMP RG0	/NO:CONTINUE
0644	1265		TAD BUF1	/YES SET UP BUFFER
0645	3013		DCA I3	
0646	5600		JMP I READL	/EXIT
0647	1257	SET1,	TAD SFLAG	
0650	7650		SNA CLA	
0651	2052		ISZ EQFLAG	
0652	5206		JMP RG0	
0653	1257	SET2,	TAD SFLAG	
0654	7650		SNA CLA	
0655	2051		ISZ COMMFL	
0656	5206		JMP RG0	
0657	0000	SFLAG,	0	
0660	1024	PG07,	TAD CHAR	
0661	4663		JMS I .+2	
0662	5206		JMP RG0	
0663	0331		PUN	
0664	7503	MEQUL,	-275	
0665	0666	BUF1,	+.1	

BUF1 0665  
CARRTN 0036  
CHAR 0024  
COMMFL 0051  
CRLF 0271  
C377 0026  
ECHO 0311  
ENBF 0452  
EQFLAG 0052  
FCOUNT 0025  
FIELD1 0023  
FULL 0441  
FUL1 0435  
GCHR 0447  
GET 0054  
HIRD 0400  
HIRDPT 0021  
KGO 0456  
LFEEED 0037  
MASTER 0041  
MCOMMA 0053  
MCR 0035  
MEQUL 0664  
MFFEEED 0032  
MLEADR 0033  
MLFEEED 0043  
MRBOUT 0044  
MSLASH 0034  
MSPACE 0022  
MTAB 0045  
MTAB1 0030  
M3 0031  
PGO 0233  
PG01 0247  
PG02 0263  
PG07 0660  
PUN 0331  
PUNCH 0320  
RBGN 0020  
RCNT 0040  
RDIN 0416  
RDLINE 0070  
READL 0600  
RGO 0606  
RKON 0042  
SET1 0647  
SET2 0653  
SFLAG 0657  
SPACE 0046  
SPACIT 0367

SPIGNR 0061  
SPUNCH 0266  
START 0203  
SWT1 0050  
TAB 0027  
TABIT 0352  
TAB1 0243  
TAB1A 0276  
TAB3 0302  
TEMP 0351  
TEM6 0047  
TEST 0464  
TGO 0344

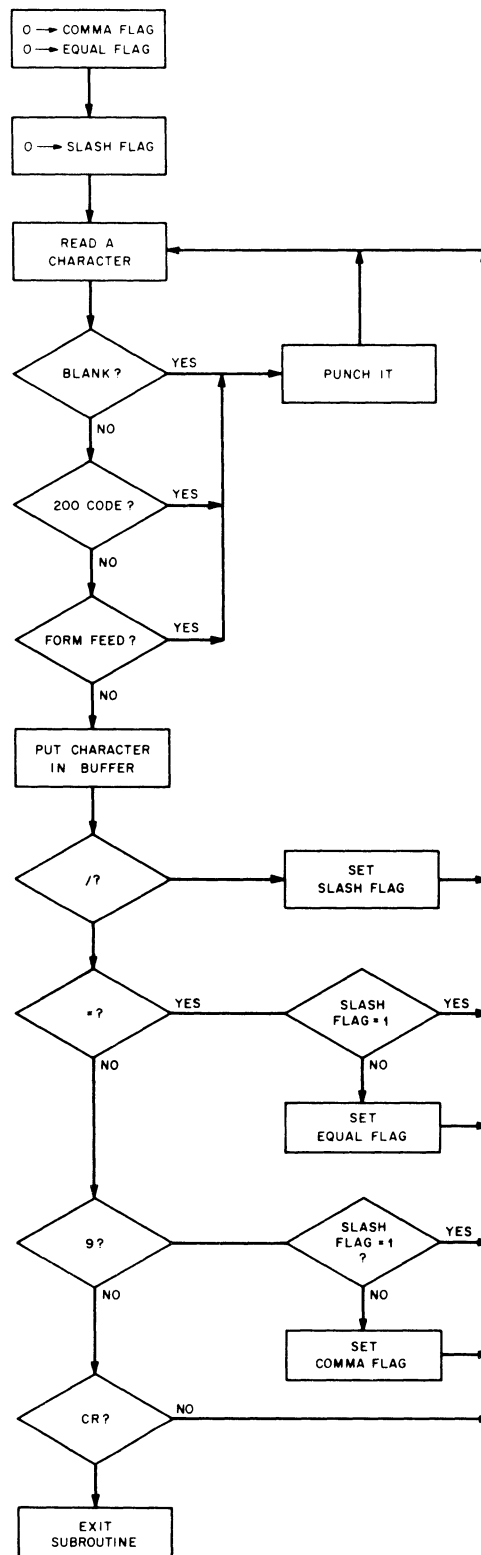
11.1 Flow Charts

11.1.1 Main Algorithm





11.1.2 Read-Line Subroutine



12. REFERENCES (Not Applicable)
13. ADDENDA (Not Applicable)