IDENTIFICATION: RANDOM WRITE-READ IIA
Diagnostic Routine

AUTHOR: W. S. LaSor, PBC

ACCEPTED: 28 September 1961

PURPOSE:

1. To test the read-write circuitry of the PB250 under operator control.

2. To test operation of the PB250 under various marginal conditions.

RESTRICTIONS:

1. Line 06 must be in the machine if error punch-out is to be performed.

2. If an error occurs due to parity, the machine will halt. Clearing parity will resume testing and punch-out.

3. No sequence of lines that includes line 37 may be tested. Such a sequence must be divided into two shorter sequences, the first ending with line 36, the second beginning with line 40.

STORAGE: All sectors of line 01 are used by the program and its bootstrap. In addition, all channels of line 00 are used for temporary storage.

TIMING: Approximately 3.0 seconds to write and read one line (optimized).

USE:

1. Loading

The program has its own bootstrap which may be loaded by the FILL switch on the computer console. After the bootstrap is loaded, the remainder of the tape may be read in by depressing the ENABLE and BREAKPOINT switches, striking the I key, and raising the ENABLE switch. When loading is completed, the light on the Flexowriter will come on and the computer will loop, waiting for a keyboard entry.

USE (cont.):

2. Input

After the bootstrap is loaded, insert the following sequence:

K FF LL ±nnnnnnn (C/R)

where:

K is a control letter.

FF is the first line to be tested.

LL is the last line to be tested.

±nnnnnnn is a signed, seven octal digit number used by the program as the first random number.

If

K = C, the program will write-read continuously.

K = O, the program will write-read once and return control to the keyboard.

K = R, the program will read continuously.

For example, if the operator wishes to test all command lines continuously, the following input sequence might be used:

C 02 07 +1234567 (C/R)

A space must separate the control letter, the first line, the last line, and the random number. A carriage return will start the computation. If an erroneous configuration is typed, the ENABLE and BREAKPOINT switches should be depressed, the I key struck and the ENABLE switch raised. This will reset the control and the correct sequence may be typed.

When using the R mode, the memory must first be filled with random numbers using the O mode. Then the R mode is inserted using the same first random number.

USE (cont.):

3. Output

If an error is found, the program will punch the following:

SSSLL ±bbbbbbb ±wwwwwww

where:

SSSLL = the sector and line where error occurred.

±bbbbbbb = a signed, seven octal digit number which should have been found in this location.

±wwwwwww = a signed, seven octal digit number which was found in this location.

In the event that the error involved included a parity error, the machine will halt when this number is picked up for punch-out. Punch-out may be resumed by clearing parity with the ENABLE and BREAKPOINT switches. If, at any time, five consecutive sectors are found to be bad, it is assumed that the entire line is bad and no further punch-out for that line will occur. Anything less than five consecutive erroneous sectors will cause normal punchout; i. e., each sector where an error occurred will be punched out.

METHOD:

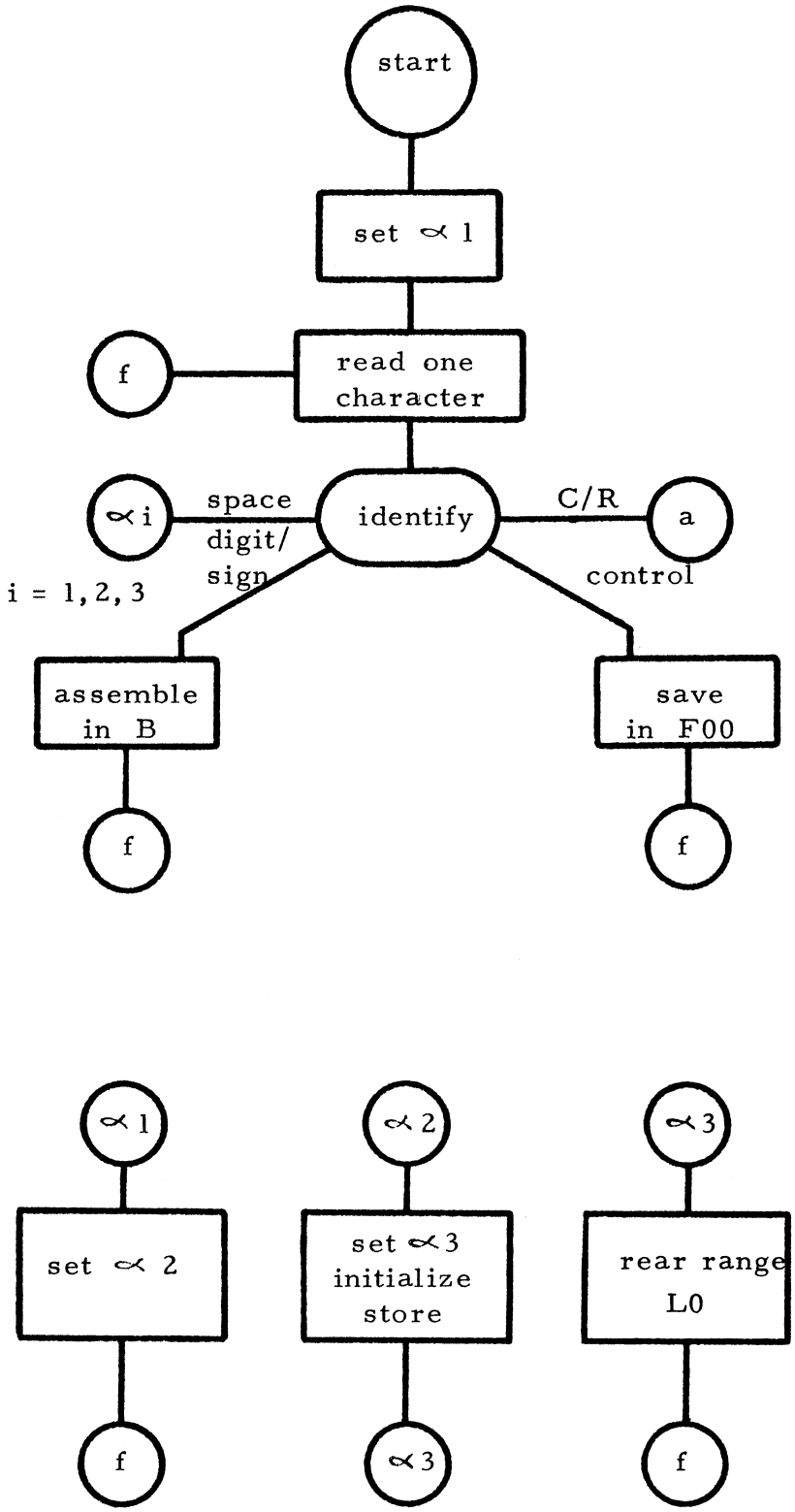
The program generates a series of random numbers beginning with the initial number inserted. Each generated number is written into a different sector of the line. After writing, the program again generates the same series of numbers and compares against those previously written. If the numbers do not compare, an error occurs.

Since the random numbers are generated by multiplication, an initial number of zero will cause the program to clear the specified memory area and compare for zero. If no initial number is typed, it will automatically be zero.

Flow Diagram

RANDOM WRITE-READ IIA

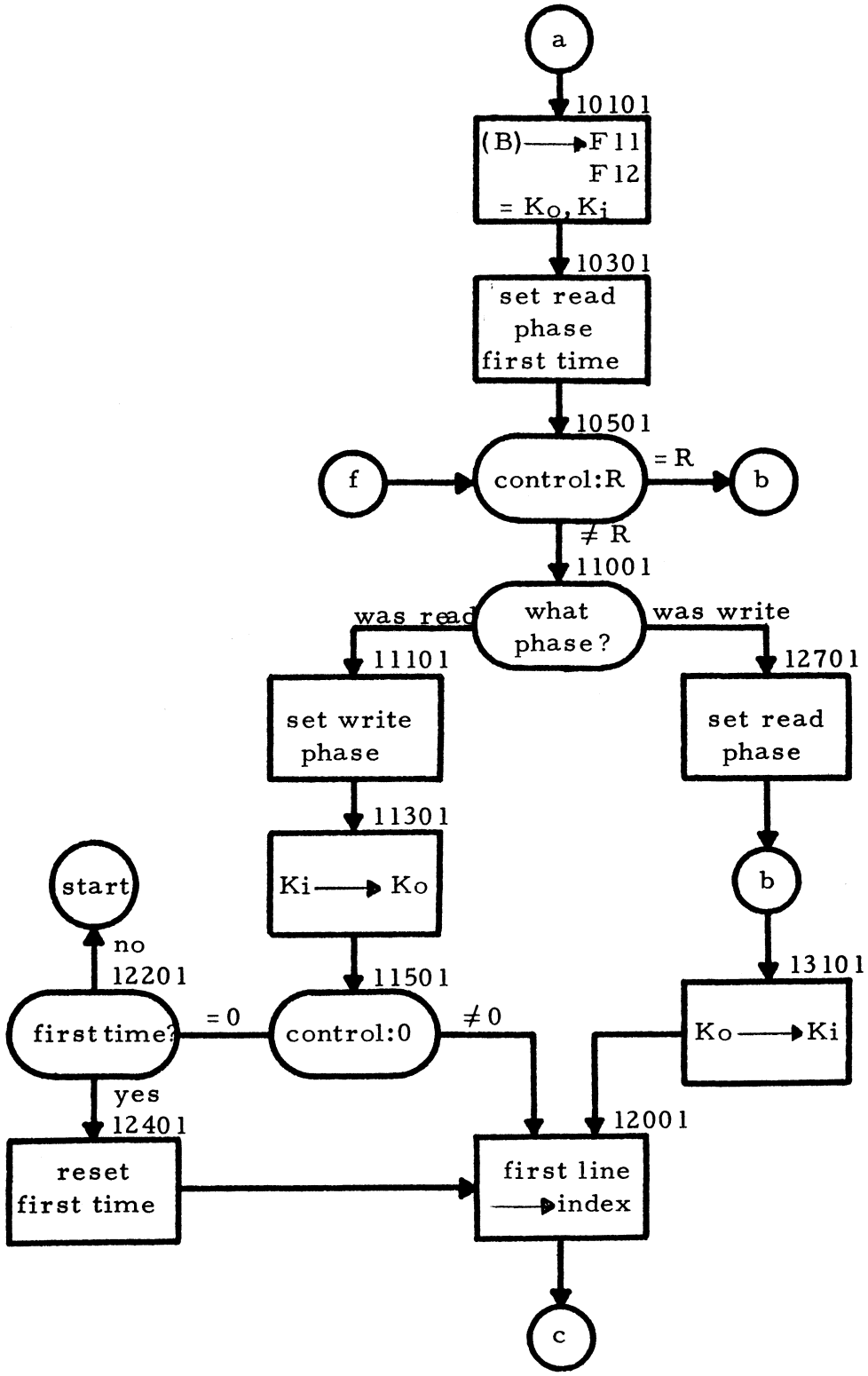
Catalog Number 9001A



Flow Diagram

RANDOM WRITE-READ IIA

Catalog Number 9001A



Flow Diagram

RANDOM WRITE-READ IIA

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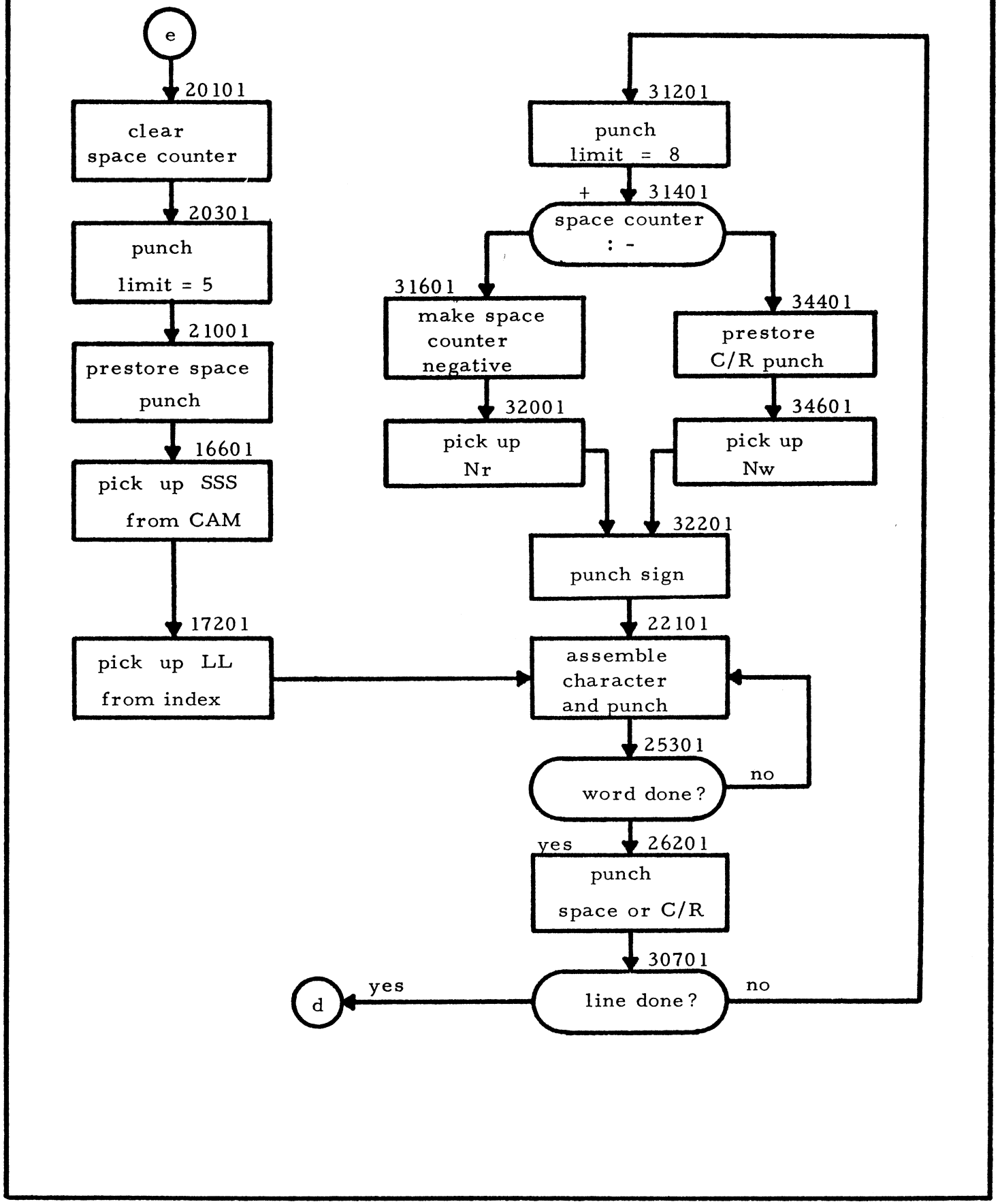

Flow Diagram

RANDOM WRITE-READ IIA

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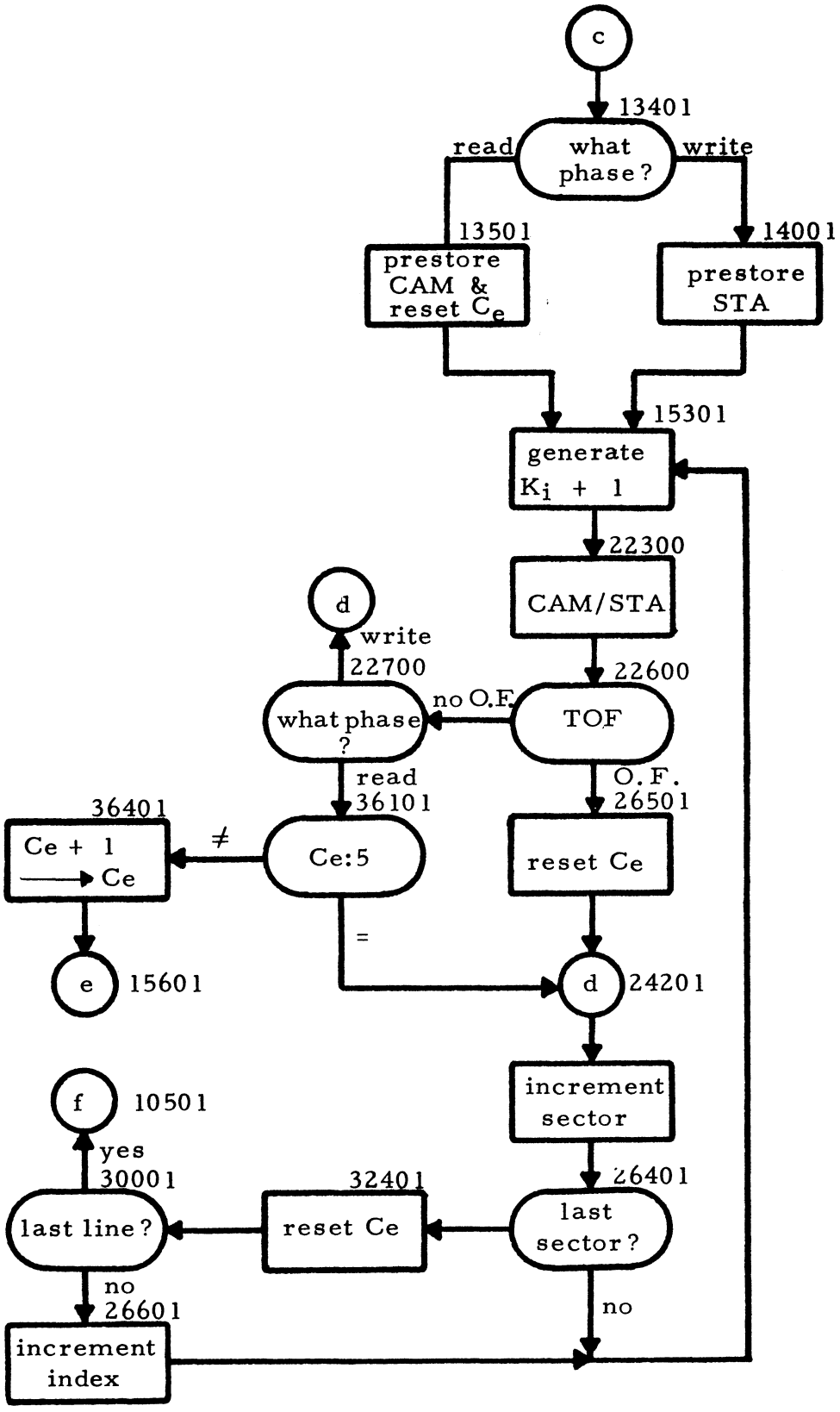

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PB 250 PROGRAM LISTING

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PROBLEM Random Write-Read II A

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PROGRAMMER W. S. LaSor, Jr.

DATE 9/6/61

LOCATION	INSTRUCTION	SYMBOLIC OP CODE	REMARKS
000	024S4300;	CLB	Initially 007SLDC01;
001	-7740000	CONST	EBP mask & sector increment
002	013S2100;	LSD	8
003	006 5501;	LAI	New character → A
004	017 3601;	TBN	Transfer if word complete
005	001S4001;	EBP	To fill sign of A
006	+0000377	CONST	LAI mask
007	+0007332	CONST	Line count
010	011S0701;	LDP	Put marker in B
011	+0000077	CONST	
012	002S5200;	RPT	
013	014 5200;	RPT	Reject last character
014	013 7736;	TES	
015	012 7736;	TES	Wait for next character
016	014S5700;	CIB	
017	000 3401;	TCN	Transfer if line complete
020	[025] 1101;	STA	Store word away
021	020 0501;	LDA	Increment store address
022	001 1501;	SUB	
023	020 1101;	STA	
024	010S3701;	TRU	Return for next word
025	232 0401;	LDC	Set exit for first space
026	046 1001;	STC	
027	032S4500;	CLA	
030	271 5501;	LAI	Read in new character
031	037S5601;	CAM	Compare for "C"
032	027S5100;	RTK	
033	034 5100;	RTK	Reject last character
034	033 7736;	TES	
035	032 7736;	TES	Wait for next character

LOCATION	INSTRUCTION	SYMBOLIC OP CODE	REMARKS
036	034S5700;	CIB	
037	000 0054I	CONST	"C" code
040	056 7501;	TOF	Transfer if C
041	243 5601;	CAM	Transfer if 0
042	056 7501;	TOF	
043	263 5601;	CAM	Transfer if R
044	056 7501;	TOF	
045	370 5601;	CAM	Transfer if space
046	060 7501;	TOF	
047	360 5601;	CAM	Transfer if C/R
050	101 7501;	TOF	
051	000 0200;	IBC	Assemble character in B
052	056 2210;	RST	
053	000 0100;	IAC	
054	100 2210;	RST	
055	032S4500;	CLA	Return to read next character
056	000 1100;	STA	Store control character and
057	026S4300;	CLB	return to read sequence
060	376 0401;	LDC	First space; set exit for
061	046 1001;	STC	second space
062	026S4300;	CLB	Return to read sequence
063	325 0501;	LDA	Second space; set exit
064	046 1101;	STA	for third space
065	377 0401;	LDC	Initialize first line store
066	070S3701;	TRU	
067	355 0401;	LDC	Initialize last line store
070	000 4500;	CLA	
071	077 1001;	STC	
072	114 2110;	LST	
073	017 1100;	STA	Rearrange Lo

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LOCATION	INSTRUCTION	SYMBOLIC OP CODE	REMARKS
074	000 4500;	CLA	
075	104 2110;	LST	
076	017 1400;	ADD	
077	002 1100;	STA	Store address in fast line
100	026S4300;	CLB	Return to read sequence
101	011 1200;	STB	R.N. $\longrightarrow K_o, K_i$
102	012 1200;	STB	
103	000 4400;	CLC	Set first time mode
104	013 1000;	STC	(Read phase in C)
105	000 0500;	LDA	
106	263 5601;	CAM	Control: R
107	130 7501;	TOF	
110	127 3401;	TCN	What phase?
111	113 2100;	LSD	Was read, set write
112	145 1001;	STC	
113	012 0500;	LDA	$K_o \longrightarrow K_i$
114	011 1100;	STA	
115	000 0500;	LDA	
116	243 5601;	CAM	Control: 0
117	122 7501;	TOF	
120	002 0500;	LDA	First line $\longrightarrow$ Index
121	133S1137;	STA	
122	013 0500;	LDA	First time?
123	000 3501;	TAN	Yes. Return to start
124	277 1401;	ADD	
125	013 1100;	STA	No. Reset first time flag
126	120S3701;	TRU	
127	131 2200;	RSI	
130	145 1001;	STC	Was write, set read
131	011 0500;	LDA	$K_o \longrightarrow K_i$

LOCATION	INSTRUCTION	SYMBOLIC OP CODE	REMARKS
132	012 1100;	LDA	
133	120S3701;	TRU	
134	140 3401;	TCN	What phase?
135	152 0501;	LDA	
136	143 1100;	STA	Read prestore CAM
137	143S3701;	TRU	
140	141S0501;	LDA	
141	200 1100I	STA	Write prestore STA
142	143 1100;	STA	
143	151S7100;	MCL	
144	225S0400;	LDC	
145	000 0000;	CONST	Store error test in fast line
146	242 7501;	TOF	
147	242 3401;	TCN	
150	356S3701;	TRU	
151	324S3701;	TRU	→ Clear Ce
152	200 5600I	CAM	
153	154S0401;	LDC	
154	046 2233I	CONST	Generate K_{i+1}
155	205S3200;	MUP	
156	157S1101;	STA	
157	000 0000;	CONST	Save N_r
160	003 0500;	LDA	
161	162S1501;	SUB	
162	000 5100;	CONST	Pick up Nw
163	164 1101;	STA	
164	000 0000;	LDA	
165	013 1101;	STA	
166	003 0600;	LDB	
167	000 4500;	CLA	

LOCATION	INSTRUCTION	SYMBOLIC OP CODE	REMARKS
170	202 2110;	LST	
171	000 0100;	IAC	
172	174 0637;	LDB	Pick up SSSLL
173	214 2110;	LST	
174	000 0100;	IAC	
175	210 2210;	RST	
176	014 1200;	STB	
177	376 0706;	LDP	Save 37606 and 37706
200	016 1300;	STD	
201	000 4500;	CLA	Clear space counter
202	015 1100;	STA	
203	206S0601;	LDB	Punch limit = 5
204	000 6116;	WOC	C/R
205	212S1200;	STB	Store K_{i+1}
206	000 0001;	CONST	
207	254 1201;	STB	
210	211S0401;	LDC	
211	000 6020;	WOC	Prestore space punch
212	214S3701;	TRU	
213	223S3700;	TRU	→ Fast line
214	273 1001;	STC	
215	014 0600;	LDB	
216	000 4500;	CLA	Pick up next digit
217	223 2110;	LST	
220	014 1200;	STB	
221	000 4300;	CLB	
222	000 4400;	CLC	
223	224 0000;	MAC	
224	001 5601;	CAM	Assemble in A
225	000 4100;	GTB	

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LOCATION	INSTRUCTION	SYMBOLIC OP CODE	REMARKS
226	000 0100;	IAC	
227	372 3401;	TCN	
230	370S1401;	ADD	
231	232S4500;	CLA	
232	060 7501;	TOF	Clear Ce
233	234S1101;	STA	
234	000 0000;	CONST	
235	243S0500;	LDA	Pick up CAM/STA
236	376 1106;	STA	
237	240S0501;	LDA	
240	253S3701;	TRU	
241	247S3701;	TRU	Punch assembled digit
242	243S0500;	LDA	
243	000 0041;	CONST	Punch limit
244	245S1401;	ADD	
245	001 0000;	CONST	Increment sector
246	263S1100;	STA	
247	377 1106;	STA	
250	251S0401;	LDC	
251	000 1400;	CONST	→ Punch
252	376S3706;	TRU	
253	254S0501;	LDA	
254	000 0000;	CONST	
255	256S1501;	SUB	Word done?
256	000 00001	CONST	
257	262 3501;	TAN	
260	254 1101;	STA	
261	215S3701;	TRU	No. Return for next digit
262	273S0701;	LDP	Yes
263	000 00021	CONST	R code

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PROBLEM Random Write-Read IIA

PROGRAMMER W. S. LaSor

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LOCATION	INSTRUCTION	SYMBOLIC OP CODE	REMARKS
264	266 7501;	TOF	Last sector?
265	152S0600;	LDB	No. Return for $K_i + 1$
266	267S0437;	LDC	
267	000 2000;	CONST	
270	271S4201;	AMC	Yes. Pick up index
271	000 00571	CONST	
272	276S0300;	ROT	
273	000 6000;	WOC	
274	307S3701;	TRU	
275	376 1306;	STD	Punch space or C/R
276	267 0401;	LDC	
277	376S3706;	TRU	
300	301S5600;	CAM	
301	000 2000;	CONST	Last line?
302	306 7501;	TOF	
303	304S1401;	ADD	
304	000 0040;	CONST	No. Increment index
305	323S1137;	STA	
306	325S0400;	LDC	Pick up phase constant
307	273 0501;	LDA	
310	204 5601;	CAM	Punching complete?
311	350 7501;	TOF	
312	243 0601;	LDB	
313	254 1201;	STB	No. Punch limit = 8
314	015 0500;	LDA	
315	344 3501;	TAN	Space counter negative?
316	277 1401;	ADD	
317	015 1100;	STA	No. Make negative
320	157 0501;	LDA	
321	014 1100;	STA	Pick up N_r

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PROGRAMMER W. S. LaSor, Jr. DATE 9/6/61

LOCATION	INSTRUCTION	SYMBOLIC OP CODE	REMARKS
322	332 3501;	TAN	
323	327S0701;	LDP	
324	352S4500;	CLA	
325	066 7501;	TOF	
326	105S3701;	TRU	
327	000 6036;	WOC	
330	340S3701;	TRU	
331	335S3701;	TRU	Punch sign
332	333S0701;	LDP	
333	000 6037;	WOC	
334	340S3701;	TRU	
335	376 1306;	STD	
336	301 0401;	LDC	
337	376S3706;	TRU	
340	014 0600;	LDB	
341	343 2110;	LST	Pick up digit
342	014 1200;	STB	
343	216S3701;	TRU	
344	204 0501;	LDA	
345	273 1101;	STA	Yes. Prestore C/R punch
346	013 0501;	LDA	
347	321S3701;	TRU	Pick up Nw
350	016 0700;	LDP	
351	376 1306;	STD	Restore 37606 and 37706
352	242S3701;	TRU	Return
353	234 1101;	STA	Clear Ce
354	152S0600;	LDB	Return to generate K_{i+1}
355	001 1100;	STA	Last line store
356	234 0401;	LDC	
357	360S0100;	IAC	Pick up Ce

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LOCATION	INSTRUCTION	SYMBOLIC OP CODE	REMARKS
360	000 0053;	CONST	C/R code
361	362S5601;	CAM	
362	000 00011	CONST	= 5 ?
363	242 7501;	TOF	
364	365S1401;	ADD	
365	000 00001	CONST	No. Increment Ce
366	234 1101;	STA	
367	155S0100;	IAC	→ Punch out
370	000 0004;	CONST	
371	230 7501;	TOF	
372	375 2110;	LST	
373	374S1401;	ADD	Assemble digit for punch out
374	000 6000;	WOC	
375	236S3701;	TRU	
376	063 7501;	TOF	Second space exit
377	002 1100;	STA	First line store