IDENTIFICATION: DECAID I

AUTHORS: F. I. Magidson and F. L. Reed, PBCC

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PURPOSE:

1. To load a program which has been coded in a relocatable decimal format with either numeric or mnemonic operation codes.
2. To provide debugging aids to simplify program checkout.

RESTRICTIONS:

1. DECAID I inserts the required line bits for shift, divide, and normalize commands if the mnemonic operation code is used. The required line bits must be indicated by the programmer if numeric operation codes are used.
2. Address references on the flow charts are in decimal in the form LLSSS.

STORAGE: DECAID I uses all sectors of Lines 1 and 2 plus additional memory as follows:

1. When punching-Sectors 254 and 255 of Line 06.
2. When typing-Sectors 254 and 255 of Line 05.
3. Fast Line Sectors 2, 7, 11, 12, 13, 14, and 15.

The index register is used by DECAID I.

TIMING: DECAID I reads relocatable decimal tapes at approximately 9 characters per second. All other operations proceed at the maximum rate of the flexowriter - about 10 characters per second for reading and typing and 15 characters per second for punching.

ERROR DETECTION: The following errors will be found by DECAID I and cause a series of G's to be typed on the flexowriter:

1. Incorrect mnemonic operation code.
2. Numeric operation code not octal.

3. Non-numeric characters in address field. (If an index tag is present, it must precede the numeric address.)
4. Delimiter missing from operation code or address fields.
5. Any character other than A, W, or S in special field.
6. Check sum did not compare (Binary Tape).
7. First character read by Binary Tape Input (BTI) pseudo-op was not "G". (Tape feed and code delete codes are ignored until a G is found on the binary tape.)

USE:

1. Loading Program:

DECAID I has a bootstrap and is self-loading. To load the program, insert the tape in the reader before the first set of holes. Raise the FILL switch and clear parity by depressing both the ENABLE and BREAKPOINT switches. Be sure to raise one of these after the tape starts moving and before the last character of the bootstrap is read.

The tape will stop after the bootstrap has been loaded. To read the remainder of the program, first lower the FILL switch, then clear parity and initialize by depressing both the ENABLE and BREAKPOINT switches and striking the I key. When the ENABLE switch is raised, the tape will be read under program control. (The BREAKPOINT switch may be up or down.)

When the tape is read in correctly (the check sum compares), the light on the flexowriter will come on indicating keyboard control. The program tape is made up of three binary blocks, each with a checksum. If either of the first two checksums do not compare, the program halts and an operation 00 and operand 37_8 will be displayed. If the third checksum did not compare an error print will be typed on the flexowriter. In either case, the program should be loaded again.

2. Word Format:

1	2	3
op code	address	special

An instruction word for DECAID I consists of three fields as follows:

a. Operation code - Any numeric operation code $(00 - 77)_8$ or any mnemonic operation code or one of the special pseudo-operation codes followed by either a space or a tab to terminate field one. DECAID I accepts WOC for the numeric operation code 60 and WOK for the numeric code 61.

b. Address-Addresses for DECAID I must be written in decimal, in the form LLSSS, where LL represents line number and SSS represents sector. Leading zeroes may be omitted. Indexing is indicated by preceding the decimal address by an apostrophe. Since the index register acts as a line replacement register, the apostrophe may be used instead of a line number on instructions to be "indexed". The address field is also terminated by either a space or a tab.

c. Special - An S in this field indicates that this instruction has a sequence tag. Since decimal programs written for DECAID I may be line and sector relocatable, the special field is also used to indicate the desired modifier. An A in this field results in the preset modifier being added to the address in the address field. (There is no carry from sector to line.) A W in this field results in the sector portion of the preset modifier being added to the sector portion of the address in the address field. (The line portion of the address field is unaffected by W.) An instruction will not normally have both A and W in this field.

Spaces and tabs are ignored in this field and any other characters result in an error print on the flexowriter. A blank field (only a space or tab) causes DECAID I to insert zero in that field. A carriage return or comma is used to terminate an instruction word and must be placed after the last field. If the

special field is not required, the carriage return or comma should follow the address field. If neither the address nor the special field is required, the carriage return or comma should follow the operation code field. To store a zero word, only a carriage return or comma is necessary.

3. Input Codes:

a. Start Fill (STF) -

STF LLSSS causes the specified address to be stored as the Start Fill Counter. The first instruction entered will be stored into location LLSSS, the next into LLSSS + 1, and so on sequentially until another STF psuedo-op is entered.

The address of the STF pseudo-op may be modified by placing either an A or a W in the special field.

b. Set Modifier (SET) -

SET LLSSS causes the specified address to be stored as the modifier to be used whenever an A or a W is found in the special field of an instruction to be stored.

The address of the SET pseudo-op may be modified by placing either an A or a W in the special field.

c. Paper Tape Input (PTI) -

The PTI pseudo-op followed by a space, tab, carriage return or comma causes DECAID I to start reading paper tape.

d. Binary Tape Input (BTI) -

BTI LLSSS causes the program to read binary tape into the line specified. The sector portion of the specified address is not used. The specified address may be modified by placing an A in the special field (only the modified line will be significant since sector is not used).

The BTI LLSSS may be placed on the front of a binary tape or it may be typed from the keyboard. The reader will be selected when the terminating carriage return or comma is read. If BTI LLSSS is punched on the binary tape, the PTI pseudo-op should be used to select the reader.

A "G" is punched at the beginning of the binary tape to mark the start of the block. After loading the line specified, the checksum on tape is compared with the checksum computed during loading. If the computed checksum was correct, the program will continue to read paper tape unless the BREAKPOINT switch is down, in which case control returns to the keyboard. If the checksums do not compare, an error print will be typed on the flexowriter and control returns to the keyboard.

A KBI pseudo-op followed by a space, tab, carriage return or comma at the end of the tape will return control to the keyboard regardless of the position of the BREAKPOINT switch.

e. Enter Information (C/R or Comma) -

The carriage return or comma will enter an instruction into the location specified by the Start Fill Counter. After the instruction is stored, the Start Fill Counter is increased by one, with sector 000 following 255. Each time the carriage return or comma is given, the contents of the program accumulator are stored into the location specified by the Start Fill Counter.

(1) A data word may be entered by placing the pseudo-op OCT in the operation code field and a data word in the address field. The special field is not used by the OCT pseudo-op. A data word consists of a sign (+ or -) and 0 - 7 octal digits. Plus signs (+) may be omitted from positive data words and leading zeroes may be omitted from both positive and negative data words. The minus

sign (-) causes a one bit to be entered in the sign position; plus (+) causes a zero bit to be entered in the sign position.

(2) For class one commands (see programming manual for a list of class one commands), the sector address of the instruction is used to designate the first sector number in which execution is discontinued. This class of commands consists of all those which require an extended interval of execution such as shifting, multiplication, and division.

The sector address is normally determined in the following manner:

(1) N = Sector location of the command + S +1

where:

N = computed sector address of the instruction
S = required number of word times

DECAID I allows for a simplified way to obtain the sector address. The programmer may write the sector portion of the address for a class one command in the form 9XX where XX is the required number of word times of execution. DECAID I will compute and store the proper sector address. For example:

A 22 word time multiply instruction may be written as follows:

MUP 922

DECAID I will compute the sector address required using Equation (1).

An A or W should never be used in the special field of an instruction that contains a sector in the form 9XX.

(3) The following operation codes have two meanings depending on the line portion of the address used with the operation code:

NAD - NOR (20)
LSD - SLT (21)
RSI - SRT (22)
DIV - DVR (31)
SBR - LRS (33)

If the programmer uses the numeric operation code, he must be sure to insert the proper bit in the line portion of the address to specify which operation he wants to perform. (See programming manual for description of commands.) If he uses the appropriate mnemonic (SLT for Shift Left and LSD for Left Shift and Decrement) he should use a zero line address. DECAID I will insert the proper line bit for him.

4. Output Codes:

a. Binary Tape Output (BTO) -

BTO LLSSS causes the program to punch the specified line in binary format in the following sequence: Sectors 127, 126, 125 .... 1, 0, 255, 254 .... 128. The specified sector is not used. The specified address may be modified by placing an A in the special field (only the modified line will be significant since sector is not used). In this format, three characters on tape are required for each word in memory. The first is a 6-bit character and the next two are 8-bit characters. A checksum is punched at the end of the tape and control returns to the keyboard. A "G" is punched to mark the beginning of the binary tape.

5. Transfer and Control Codes:

a. Transfer (TRA) -

TRA LLSSS causes DECAID I to transfer control to the specified address. The address of the TRA pseudo-op may be modified by placing an A or W in the special field.

b. Keyboard Input (KBI) -

When read from tape, KBI followed by a space, tab, carriage return, or comma will cause control to return to the keyboard. This pseudo-op should be the last word on a decimal tape.

c. Enable - I:

Control may be returned to the keyboard at any time from any place by depressing the ENABLE and BREAKPOINT switches and depressing the I key. Control will return to the keyboard when the ENABLE switch is raised.

DECAID I - OPTIONAL LINE

STORAGE: The optional line uses all sectors of one long line plus additional memory as follows:

1. When typing - Sectors 254 and 255 of Line 05.
2. Fast Line Sectors 1, 4, 7, 8, 13, 14, and 15.

TIMING: All output proceeds at the maximum rate of the flexowriter.

RESTRICTIONS: DECAID I must be in Lines 1 and 2.

USE:

1. Loading Program:

This program is in a line-relocatable decimal format and must be loaded by DECAID I using a STF and SET with zero sectors. This program may occupy any long line except 05 and 06 since the last two sectors of these lines are used for typing and punching. The TRA pseudo-op in DECAID I is used to transfer to sector zero of this program. If the following two changes are made, the optional line may be linked directly to DECAID I and it will not be necessary to transfer to sector zero of this program to use the optional line:

```
01182     TOF     LL005
LL098     TOF     01000
```

where LL is the location of the optional line. The following output codes are available to the programmer:

2. Output Codes:

a. Memory Print-Command Format (MPC) -

The format for this pseudo-op is as follows:

MPC $LLSSS_1$, $LLSSS_2$

where $LLSSS_1$ is the initial location to print and $LLSSS_2$ is the final location to print. Either one or both of these addresses may be modified by placing an A or a W in the special field of each address. The output format is location, three spaces and the contents of the location in command format followed by a carriage return. Typing will continue (one word per line) until the contents of $LLSSS_2$ have been printed. Control remains on the optional line and another MPC may be entered. If the optional line is linked directly to DECAID (see Use), control will return to DECAID I. To transfer to DECAID I, depress the ENABLE and BREAKPOINT switches and depress the I key. Control will transfer to DECAID I when the ENABLE switch is raised.

If only the contents are desired, the printing of the location and three spaces may be suppressed at any time by depressing the BREAKPOINT switch.

To print one word only, the MPC pseudo-op should be followed by one address ($LLSSS_1$) and a carriage return. (The comma and $LLSSS_2$ are omitted.)

b. Memory Print- Octal Format (MPO) -

The procedure is the same as for MPC. The output will be in octal format rather than in command format.

c. Address Stop and Print (ASP) -

Use: ASP allows the user to execute his program up to the point indicated by the address in ASP, then have the contents of the registers printed as of the point of exit.

ASP LLSSS causes the program to insert a transfer instruction into the specified location and return control to the keyboard. LLSSS may be modified by placing an A or W in the special field.

When this transfer instruction is executed from the program being checked, the contents of the A, B, and C registers are printed. The output (one register per line) is command format

followed by three spaces and octal format. After the contents of the A, B, and C registers have been printed, the transfer instruction is replaced by the original program instruction and control transfers to DECAID I.

In the event that this transfer instruction is not executed by the program being checked, the original program instruction should be restored to the program being checked by executing a transfer to the optional line Sector 212. Only one ASP may be in memory at any time.

3. Function Codes:

a. Clear a Line (CLR) -

CLR LLSSS causes the specified line to be set to zero (the specified sector is not used). LLSSS may be modified by placing an A in the special field (only the modified line will be significant since sector is not used). The STF pseudo-op should be used, following a CLR, before loading any instructions with DECAID I.

EXAMPLE - DECAID I INPUT CODES

The left hand column shows instructions as they could be written by the programmer and the right hand column shows how these instructions will be stored in memory by DECAID I:

Location	Instruction	Location	Instruction
	STF 2005		
	SET 2005		
0	LDA 1 SA	2005	LDA 2006 S
1	OCT - 4	2006	- 0000004
2	STA 3 SW	2007	STA 8 S
3		2008	+ 0000000
4	SLT 902	2009	SLT 8012

1. The Start Fill Counter is set to Line 2 Sector 005 by the STF pseudo-op.
2. The modifier is set to Line 2 Sector 005 by the SET pseudo-op.
3. The A in the special field of the LDA instruction causes the line and sector portions of the address to be modified.
4. The data word does not require leading zeroes regardless of the sign.
5. The W in the special field of the STA instruction causes the sector portion of the address to be modified.
6. An extra C/R caused a zero word to be stored in Location 2008.
7. The SLT instruction had the proper sector computed by DECAID I. A 1 was inserted in bit position 16 by DECAID I since the mnemonic-op code SLT was used.

TABLE FOR WOC - WOK COMMANDS

In the following table the numeric op code 60 may be used in place of WOC and the numeric op code 61 may be used in place of WOK:

Alphabetic Characters (available in both upper and lower case)		Numeric & Special Characters			Control Characters	
		Upper	Lower			
A WOK 01	N WOC 05	)	0	WOK 00	U. C.	WOK 26
B WOK 02	O WOC 06	π	1	WOC 01	L. C.	WOK 28
C WOK 19	P WOC 23	√	2	WOC 02	TAB	WOK 30
D WOK 04	Q WOC 24	=	3	WOC 19	C/R	WOK 24
E WOK 21	R WOC 09	[	4	WOC 04	STOP	WOC 11
F WOK 22	S WOK 18	]	5	WOC 21	DELETE	WOK 31
G WOK 07	T WOK 03	Ω	6	WOC 22	SPACE	WOC 16
H WOK 08	U WOK 20	&	7	WOC 07		
I WOK 25	V WOK 05	*	8	WOC 08		
J WOC 17	W WOK 06	(	9	WOC 25		
K WOC 18	X WOK 23	?	+	WOC 30		
L WOC 03	Y WOK 24	_	-	WOC 31		
M WOC 20	Z WOK 09	:	;	WOK 16		
		"	'	WOC 27		
		,	,	WOK 27		
		.	.	WOK 11		
		/	$	WOK 17		

The above table gives the op-code and line number required to form a "Write Output Character" command.

SUMMARY OF OPERATIONS

DECAID I

Set Location Counter	STF LLSSS
Set a Modifier	SET LLSSS
Enter accumulated word and advance location counter	C/R or Comma
Paper Tape Input	PTI
Binary Tape Input	BTI LLSSS
Binary Tape Output	BTO LLSSS
Transfer to Specified Location	TRA LLSSS
Keyboard Input	KBI

DECAID OPTIONAL LINE

*Memory Print - Command Format	MPC $LLSSS_1$, $LLSSS_2$
*Memory Print - Octal Format	MPO $LLSSS_1$, $LLSSS_2$
Clear a Line	CLR LLSSS
Address Stop & Print A, B, and C Registers	ASP LLSSS

Before typing one of the optional line pseudo-ops, it is necessary to transfer to sector zero of the optional line.

*MPO and MPC do not return control to DECAID I. Control remains on the optional line.

Note: DECAID I ignores code deletes and tape feed codes when reading paper tape (EXCEPT for Binary Tape Input).

OPERATION CODE TABLE

Mnemonic	Numeric	Meaning
ADD	14	Add
AMC	42	AND M & C
AOC	46	AND OR Combined
BSI	73	Block Serial Input
BSO	72	Block Serial Output
CAM	56	COMPARE A and M
CIB	57	Clear Input Buffer
CLA	45	Clear A
CLB	43	Clear B
CLC	44	Clear C
DIU	50	Disconnect Input Unit
DIV	31	Divide
DPA	16	Double Precision Add
DPS	17	Double Precision Subtract
DVR	31	Divide Remainder
EBP	40	Extend Bit Pattern
EXF	47	Extract Field
GTB	41	Gray to Binary
HLT	00	Halt
IAC	01	Interchange A & C
IAM	25	Interchange A & M
IBC	02	Interchange B & C
LAI	55	Load A From Input Buffer
LDA	05	Load A
LDB	06	Load B
LDC	04	Load C
LDP	07	Load Double Precision
LRS	33	Logical Right Shift
LSD	21	Left Shift and Decrement
MAC	00	Merge A Into C
MCL	71	Move Command Line Block
MLX	26	Move Line X to Line 7
MUP	32	Multiply

OPERATION TABLE CODE (CONT.)

Mnemonic	Numeric	Meaning
NAD	20	Normalize and Decrement
NOP	24	No Operation
NOR	20	Normalize
*OCT	-	Octal Constant (Data Word)
PTU	70	Pulse to Specified Unit
RFU	53	Read Fast Unit
ROT	03	Rotate
RPT	52	Read Paper Tape
RSI	22	Right Shift & Increment
RTK	51	Read Typewriter Keyboard
SAI	23	Scale Right and Increment
SBR	33	Shift B Right
SLT	21	Shift Left
SQR	30	Square Root
SRT	22	Shift Right
STA	11	Store A
STB	12	Store B
STC	10	Store C
STD	13	Store Double Precision
SUB	15	Subtract
TAN	35	Transfer if A Negative
TBN	36	Transfer if B Negative
TCN	34	Transfer if C Negative
TES	77	Transfer on External Signal
TOF	75	Transfer on Overflow
TRU	37	Transfer Unconditionally
WOC	60	Write Output Character
/ WOK	61	Write Output Character

* This pseudo-op may only be used when coding for DECAID I.

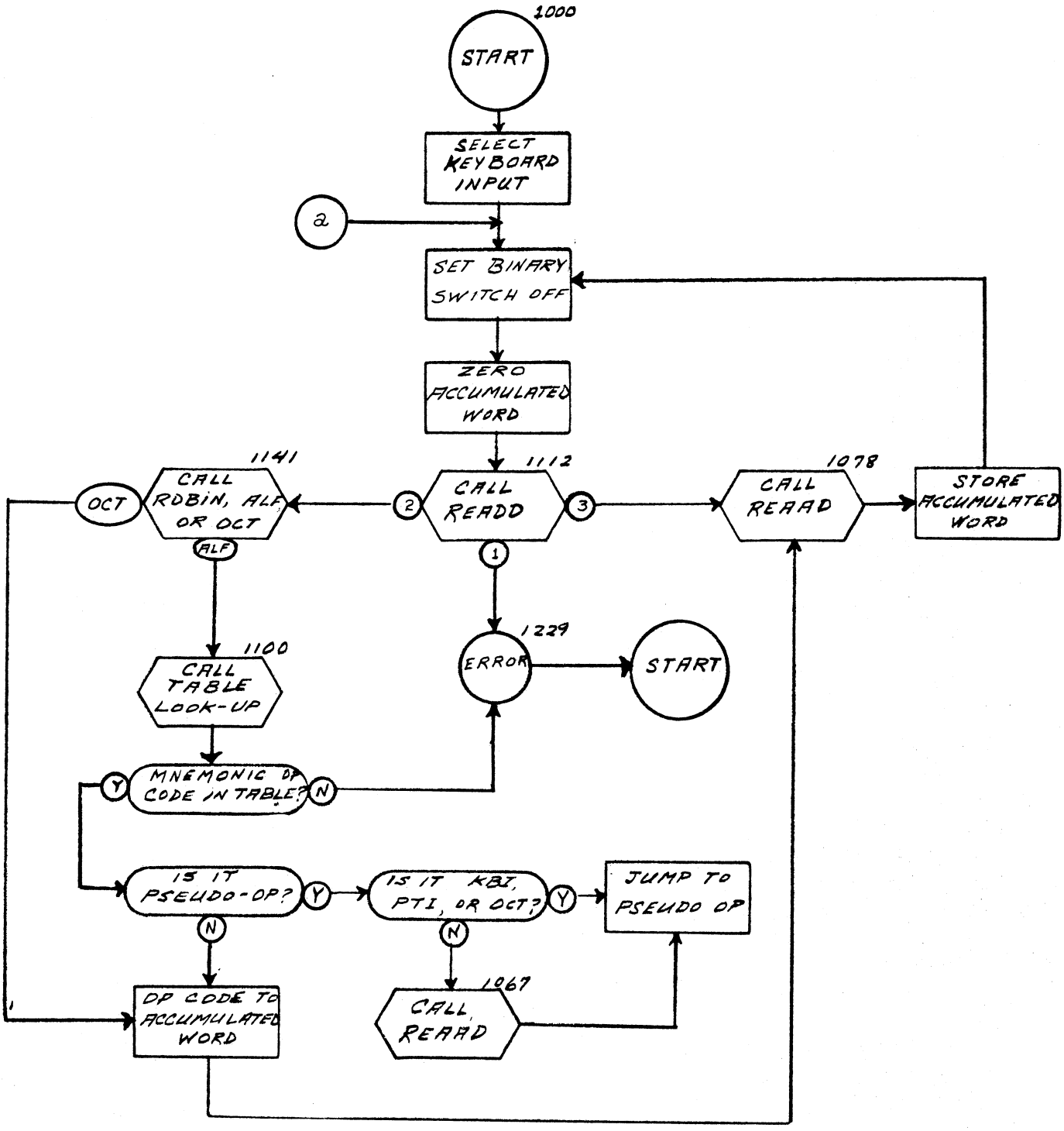
/ This mnemonic was added for use with DECAID I.

DECIMAL RECIRCULATION CHART, FAST LINE

F00	F01	F02	F03	F04	F05	F06	F07	F08	F09	F10	F11	F12	F13	F14	F15
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111
112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143
144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159
160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191
192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207
208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223
224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239
240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255

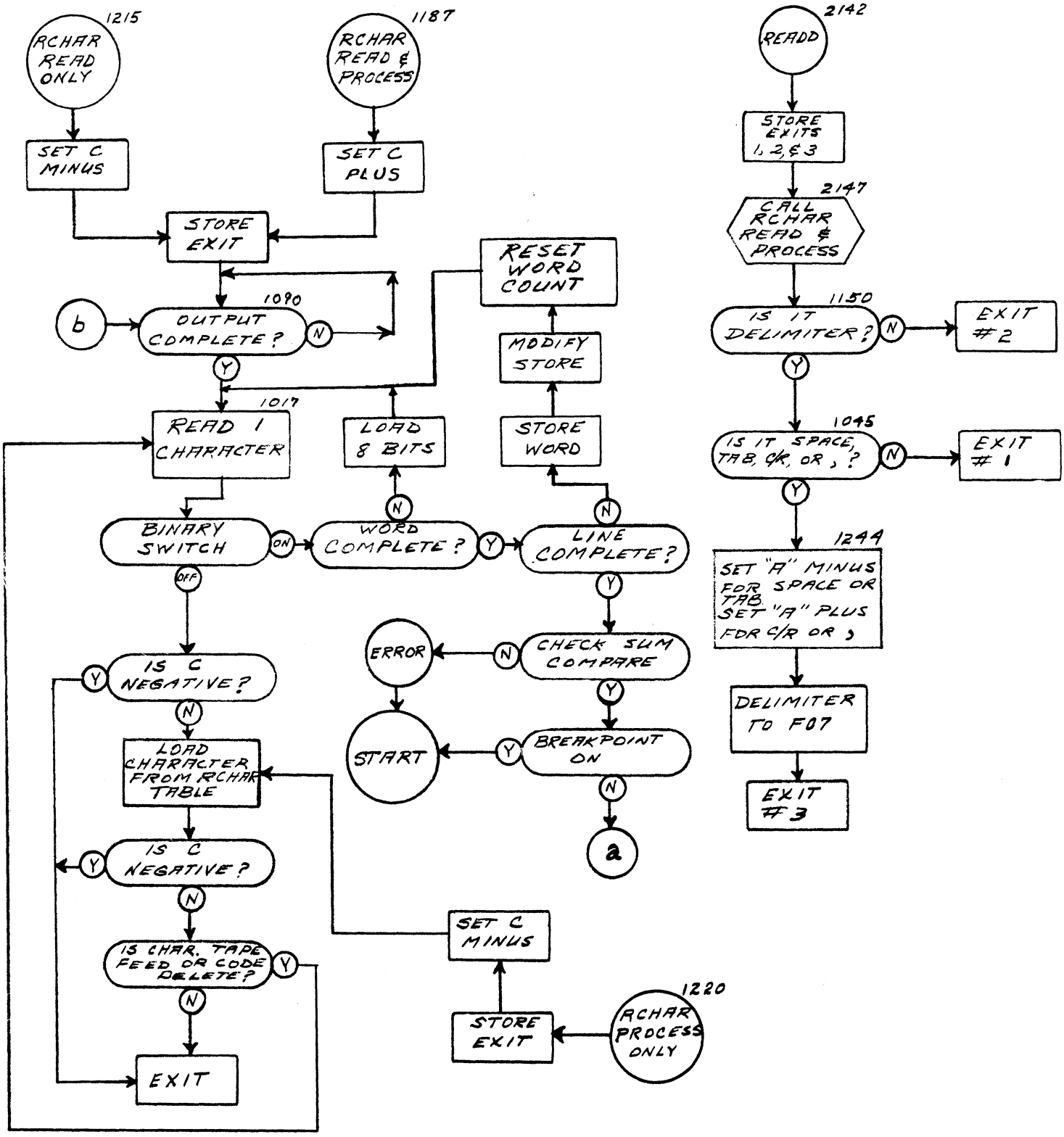
DECAID I

FLOW DIAGRAM - OVERALL

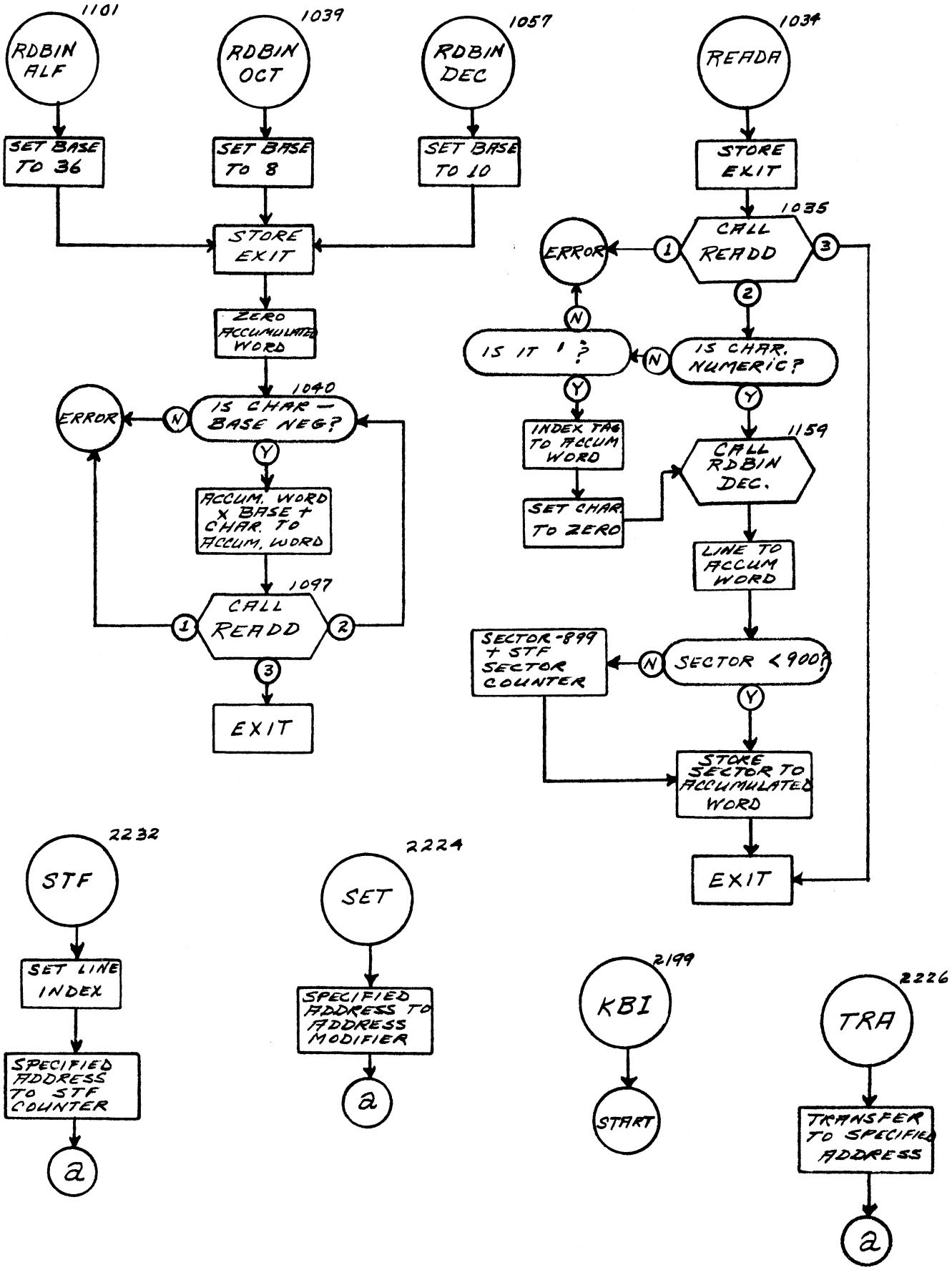


DECAID I

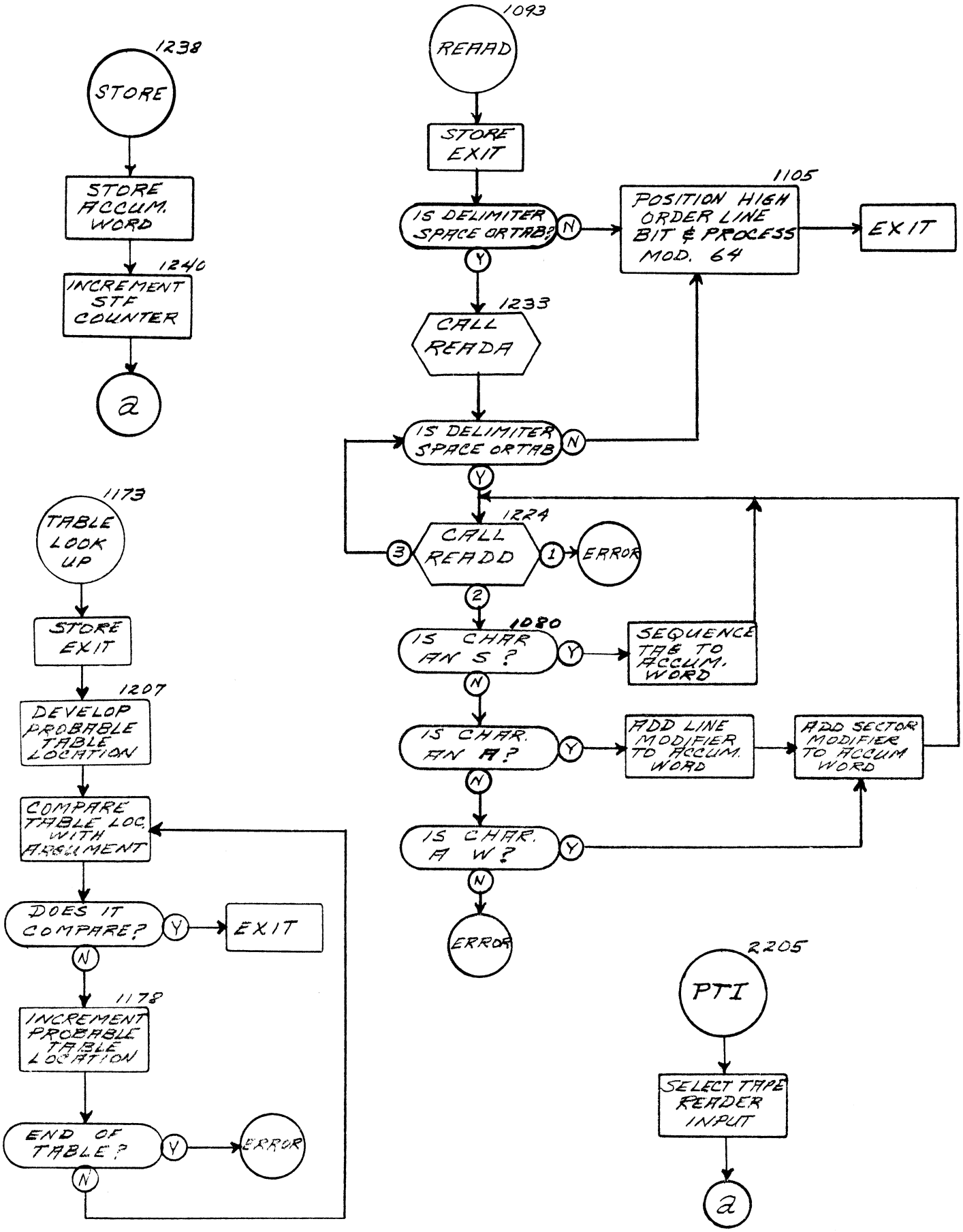
FLOW DIAGRAM



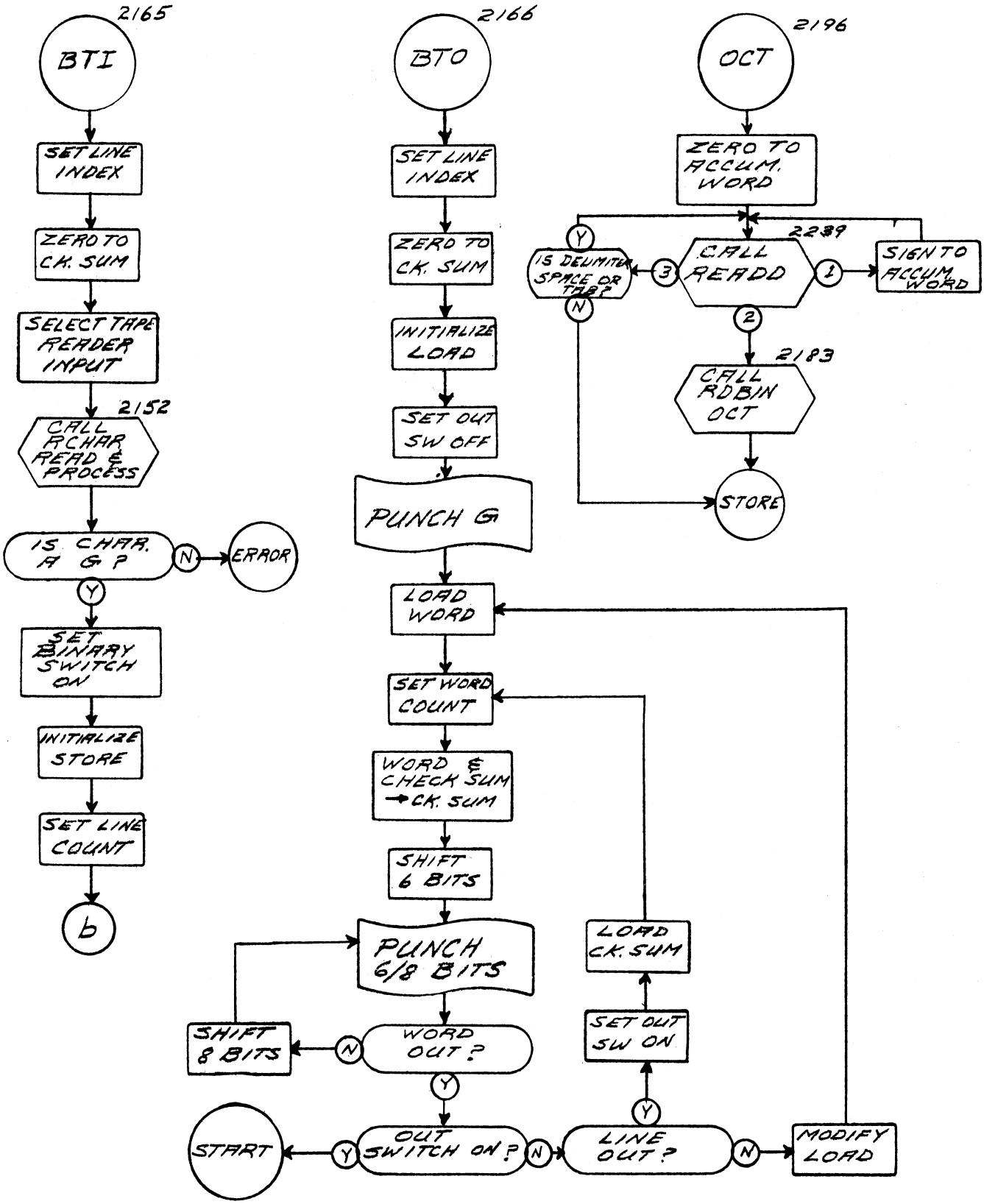
DECAID I
FLOW DIAGRAM



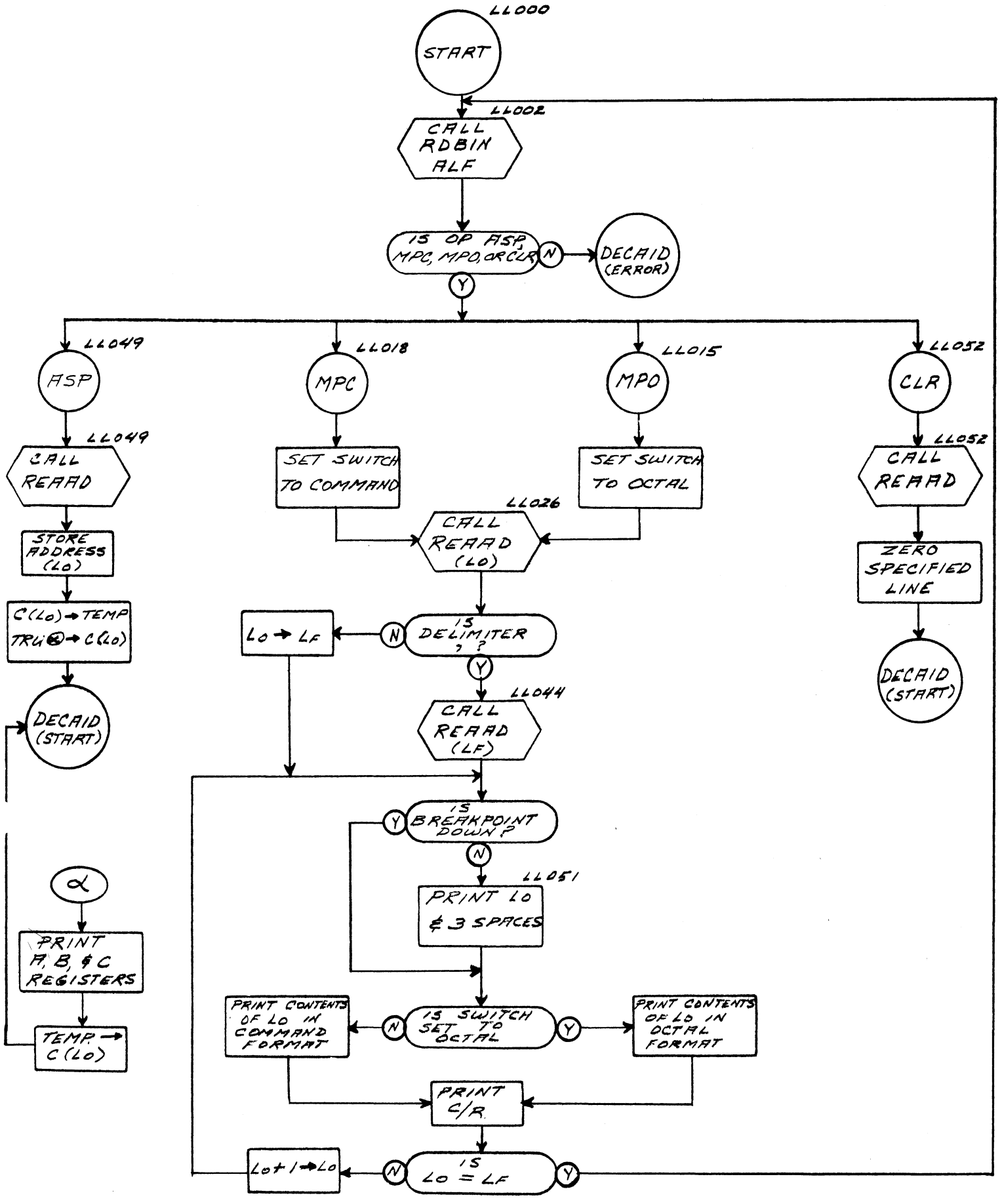
DECAID I
FLOW DIAGRAM



DECAID I
FLOW DIAGRAM



DECAID I
OPTIONAL LINE
FLOW DIAGRAM



pb Packard Bell Computer

PB 250 DECIMAL CODING SHEET

CAT. NO. 0004

PROBLEM DECAID I

PAGE 1 OF 14

PROGRAMMER FRED MAGIDSON & FRANK REED

DATE 7-23-62

DESCRIPTION

LINE 01

SECTOR	INSTRUCTION			REMARKS
	OP.	ADDRESS	SP.	
000	LDP	2 191	S	Load RTK's
1	STB	1 147		R Char. exit
2	CLB	89	S	
3	OCT	-77 40000		Sector decrement
4	STA	1 011		To temp. store
5	LDP	1 016	S	To load marker
6	LAI	1 022	S	Binary switch
7	TBN	1 010		Word complete
8	EBP	1 003		To fill sign of A
9	LSD	908	S	N. C. from 1018
010	TCN	1 077		Line complete
1	[		]	Temp. store
2	ADD	2		Check sum
3	STA	2		Check sum
4	LDA	1 011		With temp. store
5	ADD	1 003	S	Sector decrement
6	OCT	+4040		Marker (OP code for NOR)
7	RTK	1 005	S	Changeable read
8	RTK	1 000		Instructions
9	TES	30 018		To reject old character
020	TES	30 017		To sense new character
1	CIB	1 019	S	Back to test
2	OCT	+377		LAI Mask
3	TCN	1 147		To exit for R char. read only
4	LDB	1 133	S	With R char. bring order
5	CAM	2 039		With G
6	LDP	2 171		To load binary switch
7	STA	1 006		Binary switch on
8	STB	1 011		Initialize temp. store
9	LDC	1 255		Line count
030	TOF	1 005		To read binary tape
1	TRU	1 229	S	To error
2	CLA	1 158	S	
3	LDA	87	S	Delimiter
4	STC	1 055		To READA exit READA
5	LDA	1 036	S	With exit from READD
6	TRU	1 126	S	Exit instr. from READD
7	TRU	2 142	S	To READD
8	CLB	208	S	
9	LDB	1 253	S	With 8 @ 21 RDBIN (OCT)

PB 250 DECIMAL CODING SHEET

CAT. NO. 0004

PROBLEM DECAID I

PROGRAMMER FRED MAGIDSON & FRANK REED

DATE 7/23/62

DESCRIPTION

LINE 01

SECTOR	INSTRUCTION			REMARKS
	OP.	ADDRESS	SP.	
040	TAN	1 042		To add back base
1	TRU	1 229	S	To error
2	ADD	55	S	Base
3	EBP	1 044	S	To test delimiter
4	OCT	-74 00000		-1 @ 14
5	TAN	1 244		To determine delimiter
6	⊏	⊐		Exit 1 from READD
7	LRS	901	S	1 next instruction from 1049
8	ADD	1 210		Divisor
9	TAN	1 048		To add divisor
050	SUB	2 153		899 @ 21
1	CLB	1 151	S	
2	ADD	2 194		Start fill sector
3	ADD	15		Instr. sector
4	STA	15		
5	⊏	⊐		Exit from READA
6	SLT	901	S	1 next instruction from 1058
7	LDB	2 253	S	With 10 @ 21 RDBIN (DEC)
8	LDB	11		Binarized number
9	LDC	71	S	Base
060	SLT	907	S	7 next instr. from 1068
1	ADD	1 135	S	Ungoof line
2	CAM	1 063	S	62 op. code
3	OCT	+14400		
4	TOF	76		To f12 for pseudo op jump
5	CAM	1 066	S	63 op code
6	OCT	+14600		
7	TOF	1 069		To READD and then pseudo op jump
8	STA	77	S	Op code to f13
9	LDC	92	S	Pseudo op jump
070	OCT	-777600		- 1 @ 14
1	SUB	39	S	Base
2	MUP	16 923	S	23 next instr. from 1096
3	⊏	⊐		Exit from binary punch
4	LDC	1 011		Temp (word to punch)
5	ROT	153	S	
6	LDC	1 210	S	Divisor
7	CAM	226	S	Check sum
8	LDC	1 092	S	With exit from READD
9	OCT	+20000		Sequence tag

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PROBLEM DECAID I

PAGE 3 OF 14

PROGRAMMER FRED MAGIDSON & FRANK REED

DATE 7/23/62

DESCRIPTION

LINE 01

SECTOR	INSTRUCTION			REMARKS
	OP.	ADDRESS	SP.	
080	CAM	2 050		S
1	TOF	1 106		To insert sequence tag
2	CAM	2 033		A
3	TOF	1 184		To modify line & sector
4	CAM	2 038		W
5	TOF	1 109		To modify sector only
6	TRU	1 229	S	To error
7	LDC	1 079	S	Sequence tag
8	TAN	1 224		To call READD
9	TRU	1 105	S	To process line
090	TES	31 090		Output complete?
1	TRU	1 018	S	Yes
2	LDA	237	S	Op code
3	STC	1 177		To REAAD exit REAAD
4	LDA	103	S	With delimiter
5	LDC	1 038	S	With exit from RDBIN
6	STB	11		Binarized number to f11
7	LDA	1 098	S	With exit from READD
8	TRU	1 123	S	Exit instr. from READD
9	TRU	2 142	S	To READD
100	LDA	1 167	S	Exit instr. from RDBIN
1	LDB	1 102	S	RDBIN (ALF)
2	OCT	+44		36 @ 21 ALF base
3	TRU	1 254	S	To store base
4	TAN	1 233		To call READA
5	LDB	110	S	Instr. line @ 21 goofed
6	LDP	14		Instr. line & sector
7	MAC	108		Merge sector & sequence tag
8	IAC	191	S	
9	LDP	2 197		Line & sector modifiers
110	CLB	184	S	
1	SLT	924	S	24 next instr. from 1136
2	LDA	1 190	S	With exit from READD
3	CAM	1 114	S	For index tag
4	OCT	-7742247		
5	TOF	1 117		To index instr.
6	TRU	1 229	S	To error
7	LDA	2 255		1 @ 21
8	STA	31	S	Instr. sector to f15
9	ADD	2 153	S	899

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PROBLEM DECAID I

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PROGRAMMER FRED MAGIDSON & FRANK REED

DATE 7/23/62

DESCRIPTION

LINE 01

SECTOR	INSTRUCTION			REMARKS
	OP.	ADDRESS	SP.	
120	STC	1 125		To RDBIN Exit
1	CLE			
2	STB	123	S	
3	TRU	1 229	S	To error
4	EBP	1 070	S	To clean character
5	⊏	⊐		Exit from RDBIN
6	TRU	1 229	S	To error
7	EBP	1 157	S	To test numeric
8	TRU	1 055	S	To exit READA
9	STC	255		Sector decrement
130	STA	1 131		
1	⊏	⊐		Store instruction
2	TRU	1 194	S	To initialize
3	OCT	+504000		Load instr. for R char
4	SRT	908	S	8 next instr. from 1143
5	OCT	+202		130 @ 21
6	EBP	1 164	S	To test line bit
7	TRU	1 229	S	To error
8	EBP	1 140	S	To test for ALF or numeric
9	CLA	67	S	Set op to zero
140	OCT	-4000000		-1 @ 1
1	TAN	1 095		To call RDBIN oct
2	LDC	1 100	S	To call RDBIN ALF
3	STB	1 144		R char pick-up instr.
4	⊏	⊐		R char pick-up
5	TCN	1 147		For process only
6	TAN	1 018		For illegal character
7	⊏	⊐		Exit from R char
8	LDC	1 023	S	Flag for R char process only
9	OCT	-0000000		- 1 @ 0
150	TAN	1 043		To test delimiter
1	⊏	⊐		Exit 2 from READD
2	TAN	1 119		Not 900 series sector
3	SRT	908	S	8 next instr. from 1162
4	SRT	908	S	8 next instr. from 1163
5	LSD	908		8
6	TOF	2 176	S	Turn ov. off & go to 2176
7	OCT	-6000000		- 1 @ 2
8	TAN	1 113		Not numeric
9	LDC	1 160	S	With exit from RDBIN

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PROBLEM DECAID I — PAGE 5 OF 14

PROGRAMMER FRED MAGIDSON & FRANK REED — DATE 7/23/62

DESCRIPTION — LINE 01

SECTOR	INSTRUCTION			REMARKS
	OP.	ADDRESS	SP.	
160	CLA	194	S	Exit instr. from RDBIN
1	TRU	1 057	S	To RDBIN (DEC)
2	ROT	50	S	
3	ROT	51	S	
4	OCT	-7777400		Mask for EBP on line
5	TAN	1 061		To ungoof line
6	IAC	173	S	
7	OCT	+177777		Mask for 16 bit extract
8	LDC	1 171	S	With exit from table look-up
9	OCT	+6204		DVR op.
170	STB	171	S	Argument to f11
1	IAC	207	S	Exit instr. from table look-up
2	STA	1 177		Mask for AMC
3	STC	1 203	S	To table look-up exit TLU
4	LDP	14		Instr. line & sector
5	MAC	176	S	Merge sector with ungoofed line
6	AMC	1 177	S	6 or 16 bit extract
7	⊏	⊐		Mask for AMC - exit from READ
8	ADD	1 179	S	Increment sector or bring order
9	OCT	+40000		1 @ 7 sector increment
180	CAM	1 181	S	With end of table bring order
1	LDC	2 143		Bring order for end of table
2	TOF	1 229		To error
3	ROT	184	S	
4	LDP	2 197		Line & sector modifiers
5	DPA	190	S	Instr. line & sector
6	CAM	187	S	With argument in f11
7	CLC		S	Flag R CHAR READ & PROCESS
8	TOF	1 203		Op. code found
9	IAC	218	S	To check next op in table
190	TRU	1 137	S	Exit instr. from READD
1	TRU	2 142	S	To read delimiter
2	STD	222	S	Modified instr. (sector &/or line)
3	STD	1 017		RTK'S
4	LDC	2 247	S	Binary switch off
5	LDB	11		
6	SLT	901		1
7	LDC	1 210		Divisor
8	DIV	922		22
9	STB	46	S	Line to f14

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PROBLEM DECAID I — PAGE 6 OF 14

PROGRAMMER FRED MAGIDSON & FRANK REED — DATE 7/23/62

DESCRIPTION — LINE 01

SECTOR	INSTRUCTION OP.	ADDRESS	SP.	REMARKS
200	OCT	+4240		SLT op
1	TES	31 201		Output complete
2	TRU	5 254	S	To WOC G (error print)
3	⌐	¬		Exit from table look-up
4	MCL	206	S	01205 to 00205
5	TRU	1 176	S	To 01176 from line 00
6	TAN	1 217		To op look-up for MPC
7	CLA	238	S	
8	EXF	1 212	S	First 6 bits
9	LDA	59	S	With numeric op code
210	OCT	+1750		1000 @ 21
1	DIV	922	S	22 next instr. from 1234
2	OCT	+177777		Mask for 6 bit exf
3	ADD	1 222	S	
4	LDC	2 040		Constant for initial bring order
5	LDC	1 000	S	Flag — R CHAR READ ONLY
6	ROT	217	S	
7	LDA	1 218	S	With bring order for MPC
8	LDC	2 064		Bring order for 1st op in table
9	STA	220	S	Bring order to f12
220	STB	1 147	S	R CHAR PROCESS ONLY
1	TRU	236	S	To bring order
2	OCT	+5726600		
3	STA	236	S	Pseudo op jump to f12
4	LDA	1 225	S	With exit from READD
5	TRU	1 086	S	Exit instr. from READD
6	TRU	2 142	S	To READD
7	TOF	1 235		To test B.P.
8	TRU	1 229	S	To error
9	LDB	2 186		With WOC G — ERROR
230	LDA	2 199		With return instr.
1	STD	5 254		
2	IBC	200	S	Counter
3	LDC	1 033	S	With exit from READA
4	SLT	916	S	16 next instr. from 1251
5	TES	29 000		Breakpoint on (down)
6	TRU	1 194	S	To initialization
7	SBR	909	S	9 next instr. from 1247
8	MAC	239	S	Merge op into instruction
9	LDB	75	S	Argument

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PROBLEM DECAID I

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PROGRAMMER FRED MAGIDSON & FRANK REED

DATE 7/23/62

DESCRIPTION

LINE 01

SECTOR	INSTRUCTION			REMARKS
	OP.	ADDRESS	SP.	
240	LDA	2 194		Start fill sector
1	ADD	1 179		Increment sector
2	STA	2 194		STF sector
3	ADD	1 129	S	
4	EBP	2 254		To test delimiter
5	STA	7		Exit delimiter to f07
6	[	]		Exit 3 from READD
7	STA	251	S	f11 cleared (for oct)
8	STC	1 006		Binary switch off
9	SBR	923		23 A&B cleared
250	STD	110	S	Instr. line & sector
1	DPA	1 214	S	
2	ROT	60	S	
3	OCT	+ 10		8 @ 21 (RDBIN)
4	STB	119	S	Base to f07
5	OCT	+ 10010		Line count

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PROBLEM DECAID I — PAGE 8 OF 14

PROGRAMMER FRED MAGIDSON & FRANK REED — DATE 7/23/62

DESCRIPTION — LINE 02

SECTOR	INSTRUCTION OP.	ADDRESS	SP.	INT	EXT	#	REMARKS
000	OCT	-0010000		Tf	0	0	
1	OCT	+2000201		1	1	1	
2	OCT	+2000402		2	2	2	
3	OCT	+1004625		L	3	3	
4	OCT	+2001004		4	4	4	
5	OCT	+1005227		N	5	5	
6	OCT	+1005430		O	6	6	
7	OCT	+2001607		7	7	7	
8	OCT	+2002010		8	8	8	
9	OCT	+1006233		R	9	9	
010	OCT	-0010200			A	10	
1	OCT	+3710457		Stop	B	11	
2	OCT	-0014600			C	12	
3	OCT	-0011000			D	13	
4	OCT	-0015200			E	14	
5	OCT	-0015400			F	15	RCHAR TABLE
6	OCT	+6351661		Space	G	16	
7	OCT	+1012023		J	H	17	
8	OCT	+1016224		K	I	18	
9	OCT	+2004203		3	J	19	
020	OCT	+1004426		M	K	20	
1	OCT	+2000605		5	L	21	
2	OCT	+2005006		6	M	22	
3	OCT	+1001231		P	N	23	
4	OCT	+1001432		Q	O	24	
5	OCT	+2005611		9	P	25	
6	OCT	-0006000			Q	26	
7	OCT	+3442247		'	R	27	
8	OCT	-0014400			S	28	
9	OCT	-0010600			T	29	
030	OCT	+4015044		+	U	30	
1	OCT	+4451245		-	V	31	
2	OCT	+2011400		0	W	32	
3	OCT	+1015612		A	X	33	
4	OCT	+1016013		B	Y	34	
5	OCT	+1012235		T	Z	35	
6	OCT	+1007415		D	+	36	
7	OCT	+1007637		V	-	37	
8	OCT	+1014040		W	;	38	
9	OCT	+1006620		G	'	39	

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PROBLEM DECAID I

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PROGRAMMER FRED MAGIDSON & FRANK REED

DATE 7/23/62

DESCRIPTION

LINE 02

SECTOR	INSTRUCTION OP.	ADDRESS	SP.	INT	EXT	#	REMARKS
040	OCT	+1012621		H	.	40	
1	OCT	+1016643		Z	,	41	
2	OCT	-0014200			$	42	
3	OCT	+5516450		-	U.C.	43	
4	OCT	-0017000			L.C.	44	
5	OCT	-0017400			TAB	45	
6	OCT	+7253456		C.R.	C.R.	46	
7	OCT	-0002600			STOP	47	
8	OCT	+3517646		;	DELE.	48	
9	OCT	+3404052		$	SPACE	49	
050	OCT	+1000034		S		50	
1	OCT	+1000014		C		51	
2	OCT	+1000036		U		52	RCHAR TABLE
3	OCT	+1010016		E		53	
4	OCT	+1000017		F		54	
5	OCT	+1000041		X		55	
6	OCT	+1000042		Y		56	
7	OCT	+1000022		I		57	
8	OCT	+3640053		U.C.		58	
9	OCT	+5200051		,		59	
060	OCT	+3600054		L.C.		60	
1	OCT	-0000000				61	
2	OCT	+6700055		TAB		62	
3	OCT	-0000060		DELETE		63	
4	OCT	+3032201		ADD			
5	OCT	-0432704		AMC			
6	OCT	-1433014		AOC			
7	OCT	-4600333		063			
8	OCT	-3437076		CAM			
9	OCT	-4400332		062			
070	OCT	-4635726		BTI			
1	OCT	-4635734		BTO			
2	OCT	-1237676		CLA			OP TABLE
3	OCT	-0637677		CLB			
4	OCT	-1037700		CLC			
5	OCT	+3442536		DPA			
6	OCT	-3637523		CIB			
7	OCT	+6242167		DIV			
8	OCT	+3642560		DPS			
9	OCT	-4443107		DVR			

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PROBLEM DECAID I

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PROGRAMMER FRED MAGIDSON & FRANK REED

DATE 7/23/62

DESCRIPTION

LINE 02

SECTOR	INSTRUCTION			REMARKS		
	OP.	ADDRESS	SP.	INT	EXT	#
080	OCT	-0044205		EBP		
1	OCT	-6635662		BSI		
2	OCT	-2042166		DIV		
3	OCT	-1645623		EXF		
4	OCT	+0054441		HLT		
5	OCT	+0256224		IAC		
6	OCT	+0456270		IBC		
7	OCT	+5256236		IAM		
8	OCT	-6435670		BSO		
9	OCT	-3000270		054		
090	OCT	-7000400		074		
1	OCT	-0252437		GTB		
2	OCT	+1256056		LDA		
3	OCT	+1466057		LDB		
4	OCT	+1066060		LDC		
5	OCT	+1666075		LDP		
6	OCT	-3265712		LAI		OP TABLE
7	OCT	+6471661		MUP		
8	OCT	+0070324		MAC		
9	OCT	+4267115		LSD		
100	OCT	-4467070		LRS		
1	OCT	-4475515		OCT		
2	OCT	+5471165		MLX		
3	OCT	-6270445		MCL		
4	OCT	-4463336		KBI		
5	OCT	-4473753		NOR		
6	OCT	+4072745		NAD		
7	OCT	+5073751		NOP		
8	OCT	+0706055		ROT		
9	OCT	-2506121		RPT		
110	OCT	-4501266		PTI		
1	OCT	-7400402		076		
2	OCT	+2310736		STA		
3	OCT	+2510737		STB		
4	OCT	+2110740		STC		
5	OCT	+7312117		TAN		
6	OCT	+3311003		SUB		
7	OCT	-4510321		SLT		
8	OCT	-4510651		SRT		
9	OCT	+7512163		TBN		

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PROBLEM DECAID I — PAGE 11 OF 14

PROGRAMMER FRED MAGIDSON & FRANK REED — DATE 7/23/62

DESCRIPTION — LINE 02

SECTOR	INSTRUCTION			REMARKS
	OP.	ADDRESS	SP.	INT
120	OCT	+7112227		TCN
1	OCT	+2710741		STD
2	OCT	+7713272		TRU
3	OCT	-7313077		TOF
4	OCT	-7712344		TES
5	OCT	+6707547		SBR
6	OCT	+4506262		RSI
7	OCT	+6110603		SQR
8	OCT	-2306330		RTK
9	OCT	-4707725		SET
130	OCT	+4707472		SAI
1	OCT	-4713246		TRA OP TABLE
2	OCT	-4122554		WOC
3	OCT	-4322564		WOK
4	OCT	+5600117		027
5	OCT	-5000334		064
6	OCT	-4710743		STF
7	OCT	-6101302		PTU
8	OCT	-5200335		065
9	OCT	-2705352		RFU
140	OCT	-5400336		066
1	OCT	-5600337		067
2	STA	1 046		Store exit 1 READD
3	ADD	1 179		1 @ 7
4	STA	1 151		Store exit 2
5	ADD	1 179		1 @ 7
6	STA	1 246		Store exit 3
7	LDB	2 148	S	With exit from Rchar
8	EBP	1 149	S	Return from Rchar (to line 1)
9	TOF	1 187	S	To Rchar
150	LDP	2 206		RPT'S
1	STD	1 017		
2	LDB	2 161	S	With exit from R char
3	OCT	+ 1603		899 @ 21 (READA)
4	TRU	1 073	S	Return to BTO from line 06
5	SBR	901	S	Next instruction from 2157
6	ADD	158	S	Sign bit (OCT)
7	STA	2		Clear check sum
8	STB	31 149	S	Line to index register
9	IAC			

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PROBLEM DECAID I — PAGE 12 OF 14

PROGRAMMER FRED MAGIDSON & FRANK REED — DATE 7/23/62

DESCRIPTION — LINE 02

SECTOR	INSTRUCTION OP.	ADDRESS	SP.	REMARKS
160	TRU	1 240	S	To store routine
1	TRU	1 025	S	Exit instr. from R char
2	TOF	1 187	S	Turn ov. off & go to R char
3	LDC	2 223		Char. count
4	CLA	174	S	
5	IBC	154	S	BTI
6	IBC			BTO
7	SBR	901		1
8	STB	31 247	S	Line to index register
9	OCT	+4440		SRT op
170	TRU	1 068	S	To store op
1	STA	127		Initial store for BTI
2	LAI	1 022		Binary switch on (BTI)
3	WOC			
4	LDA	1 169	S	With DVR op
5	LSD	906		6
6	STB	1 011		To temp (word to punch)
7	CLB			
8	SLT	902		2
9	ADD	2 173		WOC
180	STA	6 254		
1	IAC	188	S	
2	CLB	234	S	
3	LDC	2 237	S	With RDBIN exit
4	TAN	2 239		To call READD
5	LDA	155	S	Binarized octal number
6	WOK	7 005		WOC G
7	TRU	2 218	S	Return to BTO FROM LINE 6
8	STD	6 254		
9	LDC	1 016		Counter
190	TRU	6 254	S	To punch
1	RTK	5	S	
2	RTK			
3	C	]		STF line counter
4	C	]		STF sector counter
5	LDA	2 210	S	With LRS op
6	LDA	183	S	With delimiter OCT
7	C	]		Line modifier
8	C	]		Sector modifier
9	TRU	1 000	S	To start KBI

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PROBLEM DECAID I — PAGE 13 OF 14

PROGRAMMER FRED MAGIDSON & FRANK REED — DATE 7/23/62

DESCRIPTION — LINE 02

SECTOR	INSTRUCTION			REMARKS
	OP.	ADDRESS	SP.	
200	LDA	1 016		With NOR op
1	TRU	1 068	S	To store op
2	LDA	2 242		With out switch
3	STA	1 073		
4	LDB	162	S	Check sum
5	LDP	2 206	S	RPT'S PTI
6	RPT	5	S	
7	RPT		S	
8	STD	1 017		
9	TRU	2 225	S	To initialization
210	OCT	+ 6700		LRS op
1	TRU	1 068	S	To store op
2	LDA	1 200	S	With SLT op
3	LDA	2 169	S	With SRT op
4	LDA	2 220		
5	ADD	1 003		Decrement sector
6	STA	2 220		
7	TOF	2 202		Line complete
8	LDA	2 154		With BTO return from line 6
9	STA	6 255		
220	[	]		(Temp load instr.)
1	STA	1 011		To temp (word to punch)
2	ADD	242	S	Check sum
3	OCT	+ 20		Char count for BTO
4	STD	2 197		Line & sector modifiers SET
5	TRU	1 194	S	To initialization
6	LDA	2 227	S	With TRU op TRA
7	TRU		S	
8	MAC	229		Merge with sector & line
9	STC	2 230		To temp
230	[	]		TRA JUMP
1	STD	2 193		STF counter STF
2	IEC			
3	SRT	901		1
4	STB	31 224	S	STF line to index register
5	SRT	901		
6	STB	238	S	
7	TRU	2 184	S	Exit instr from RDBIN
8	TRU	1 039	S	To RDBIN
9	LDA	2 240	S	WITH READD EXIT

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PROBLEM DECAID I

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PROGRAMMER FRED MAGIDSON & FRANK REED

DATE 7/23/62

DESCRIPTION

LINE 02

SECTOR	INSTRUCTION			REMARKS
	OP.	ADDRESS	SP.	
240	TRU	2 182	S	Exit instr. from READD
1	TRU	2 142	S	To READD
2	TAN	1 000		Out switch
3	LDB	1 011		With (word to punch)
4	STA	162	S	Check sum
5	LDA	127		Initial load for BTO
6	TAN	2 214		Word complete out switch
7	LAI	1 022	S	Binary switch off
8	STA	2		Check sum cleared
9	LDP	2 245		Initialize for BTO
250	STA	1 073		
1	STB	2 220		
2	LDP	2 186	S	To punch G code
3	OCT	+ 12		10 @ 21 (RDBIN)
4	OCT	-7600000		- 1 @ 5
5	OCT	+ 1		1 @ 21

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PROBLEM BOOTSTRAP DECAID I

PAGE 1 OF 2

PROGRAMMER FRED MAGIDSON & FRANK REED

DATE 7-23-62

DESCRIPTION

LINE 01

SECTOR	INSTRUCTION			REMARKS	
	OP.	ADDRESS	SP.		
255	OCT	[+7170]		Line count (for line 01)	
000	[CLA	22]	S		
1	STB	1 147			
2	CLB	89	S		
3	OCT	-77 40000		Sector decrement	
4	STA	1 011		To temp. store	
5	LDP	1 016	S	To load marker	
6	LAI	1 022		To load buffer	
7	TBN	1 010		Word complete	
8	EBP	1 003		To fill sign of A	
9	LSD	908	S	Next instruction from sector 018	
010	[TCN	1 026]		Line complete	BOOTSTRAP
1	[STA	1 000]		Temp. store	
2	ADD	2		Check sum	
3	STA	2		Check sum	
4	LDA	1 011		With temp. store	
5	ADD	1 003	S	Sector decrement	
6	OCT	+4040		Marker	
7	RPT	1 005	S		
8	RPT	1 000			
9	TES	30 018		To reject old character	
020	TES	30 017		To sense new character	
1	CIB	1 019	S	Back to test	
2	OCT	+377		LAI mask	
3	LDC	1 255		With line count	
4	STA	2		Check sum	
5	TRU	1 005	S		
6	CAM	2		Check sum	
7	[TOF	1 029]		Check sum jump	
8	HLT	31 000	S	Check sum error	USED TO READ
9	LDP	1 030	S	To initialize load line 02	LINE 2
030	TOF	1 035		Line 2 check sum jump	REPLACED BY
1	STA	2 000		Temp. store	BLOCK 3
2	STA	1 011		To temp. store	
3	STB	1 027		To check sum jump	
4	CLA	22	S		
5	LDP	1 036	S	To initialize load block 3	
6	TCN	1 077		Line complete	
7	STA	1 041		To temp. store	
8	STD	1 010			

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PROBLEM DECAID I BOOTSTRAP

PAGE 2 OF 2

PROGRAMMER FRED MAGIDSON & FRANK REED

DATE 7/23/62

DESCRIPTION

LINE 01

SECTOR	INSTRUCTION			REMARKS
	OP.	ADDRESS	SP.	
039	LDC	1 040	S	
040	OCT	+ 470		Line count (for block 3)
041	CLA	1 023	S	To replace line 01 (sectors 23-41)

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PROBLEM DECAID-OPTIONAL LINE PAGE 1 OF 7

PROGRAMMER FRED MAGIDSON & FRANK REED DATE 7/23/62

DESCRIPTION LINE RELOCATABLE ONLY LINE

SECTOR	INSTRUCTION			REMARKS
	OP.	ADDRESS	SP.	
000	SBR	923		
1	STD	14		0 to f14 & f15
2	LDC	3	SA	
3	TRU	5	SA	
4	TRU	1 101	S	To RDBIN
5	LDA	11		
6	CAM	168	A	
7	TOF	15	A	To MPO
8	CAM	176	A	
9	TOF	18	A	To MPC
010	CAM	182	A	
1	TOF	49	A	To ASP
2	CAM	184	A	
3	TOF	52	A	To CLR
4	TRU	1 229	S	To error
5	LDB	16	SA	MPO
6	LDA	82	SA	Call "oct." inst.
7	LDA	21	SA	
8	LDB	19	SA	MPC
9	STB	88	S	Call "com." inst.
020	LDA	21	SA	
1	TRU	23	SA	
2	STB	25	SA	
3	LDC	24	SA	
4	TRU	31	SA	Print CR; check L0 & L6
5	[	]		LDA for oct; STB for com
6	LDC	27	SA	
7	TRU	30	SA	
8	STA	75	A	To exit for bring
9	TRU	1 093	S	To READ
030	STC	36	S	Store L0 to f04
1	LDA	32	SA	
2	TRU	36	SA	
3	LDB	34	SA	
4	61	14 000		WOC "cr"
5	TRU	229	SA	
6	LDA	84	S	L0
7	LDB	39	S	Bring Delimiter from f07
8	TRU	56	SA	
9	STB	88	S	To "com"

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PROBLEM DECAID-OPTIONAL LINE — PAGE 2 OF 7

PROGRAMMER FRED MAGIDSON & FRANK REED — DATE 7/23/62

DESCRIPTION LINE RELOCATABLE ONLY — LINE

SECTOR	INSTRUCTION			REMARKS
	OP.	ADDRESS	SP.	
040	SLT	907		
1	TBN	48	A	One word only
2	SBR	923		
3	STD	14		0 to f14 & f15
4	LDA	45	SA	
5	TRU	48	SA	
6	STA	1 177		Store exit for READ
7	TRU	1 233	S	To READ
8	STC	49	S	To Lf (f01)
9	LDC	87	SA	ASP
050	TES	29 066		Test B.P. DN→ NO LOCATIONS
1	LDB	52	S	LO
2	LDC	67	SA	CLR
3	LDA	54	SA	
4	TRU	59	SA	
5	STB	56	S	
6	LDA	148	SA	
7	STA	252	A	To "com" exit
8	TRU	169	SA	
9	LDA	60	SA	
060	TRU	66	SA	
1	LDB	62	SA	
2	60	16 001		WOC "space"
3	LDC	64	SA	
4	OCT	+45 000		
5	TRU	231	SA	
6	LDC	68	S	LO
7	TRU	72	SA	
8	TRU	1 093	S	To READ
9	LDA	70	SA	
070	LDB			
1	MAC	72	S	
2	IBC	188	S	
3	STC	74	A	
4	[	]		Bring instruction
5	[	]		Exit from bring
6	LDA	204	A	
7	CAM	2 255		1 @ 21
8	TOF	201	A	
9	SRT	921		

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PROBLEM DECAID-OPTIONAL LINE — PAGE 3 OF 7

PROGRAMMER FRED MAGIDSON & FRANK REED — DATE 7/23/62

DESCRIPTION LINE RELOCATABLE ONLY — LINE

SECTOR	INSTRUCTION			REMARKS
	OP.	ADDRESS	SP.	
080	LDC	203	A	
1	DIV	922	S	Next inst. from sector 104
2	OCT	+17	A	"oct"
3	STC	117	A	To "oct" exit
4	SLT	901	S	
5	CAM	97	S	Lf
6	IAC	101	S	
7	TRU	103	SA	
8	TRU	1093	S	To READD
9	STC	252	A	"com"
090	EXF	96	SA	
1	LDB	216	A	
2	STA	94	A	
3	STA	172	A	
4	[	]		LDB +2
5	LDC	38	SA	
6	OCT	-77 60177		
7	SLT	909	S	Next inst from sector 107
8	TOF	0	A	DONE Lo = Lf
9	ADD	1 179		1 @ 7
100	STA	4		New Lo
1	TRU	50	SA	
2	CLA	104	S	
3	IAC	126	S	
4	ROT	200	S	
5	SRT	901		
6	STB	109	S	To f13
7	LDA	108	SA	
8	OCT	-7600000		
9	LDC	122	SA	
110	IBC	111	S	
1	LDA	137	SA	
2	SLT	902	S	
3	LDA	114	SA	
4	TRU	116	SA	
5	TRU	225	SA	
6	LDC	117	SA	
7	[	]		Exit from "oct"
8	LDP	119	SA	
9	OCT	+10		8 @ 21

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PROBLEM DECAID-OPTIONAL LINE — PAGE 4 OF 7

PROGRAMMER FRED MAGIDSON & FRANK REED — DATE 7/23/62

DESCRIPTION LINE RELOCATABLE ONLY — LINE

SECTOR	INSTRUCTION			REMARKS
	OP.	ADDRESS	SP.	
120	OCT	+10 00000		8 @ 21
1	STC	201	SA	To print routine
2	TRU	124	SA	
3	TRU	1 170	S	To Table Look-up
4	EXF	108	A	
5	STB	141	S	To f13
6	CLA	149	SA	
7	ADD	154	A	
8	STA	131	A	
9	ADD	248	A	"rot"
130	STA	134	A	
1	[	]		Load inst. for "ASP"
2	LDA	133	SA	
3	TRU	212	SA	
4	[	]		Store inst. for "ASP"
5	STB	141	A	
6	TRU	1 000	S	To DECAID
7	TRU	218	SA	
8	TRU	33	SA	
9	LDA	141	A	
140	TRU	134	SA	
1	[	]		TEMP for "ASP"
2	LDC	143	SA	
3	LDA	152	S	
4	LDP	145	SA	
5	OCT	+44		36 @ 21
6	OCT	+2420		36 @ 21
7	STC	201	SA	
8	TRU	172	SA	
9	TRU	61	SA	Print 3 spaces
150	SLT	901		
1	LDC	204	A	
2	DIV	922	S	Next inst. from 175
3	SRT	901	S	
4	LDB			Constant for "ASP"
5	TBN	158	A	
6	LDB	62	A	
7	LDA	161	SA	
8	LDB	159	SA	
9	60	27 000		WOC "!"

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PROBLEM DECAID-OPTIONAL LINE

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PROGRAMMER FRED MAGIDSON & FRANK REED

DATE 7/23/62

DESCRIPTION LINE RELOCATABLE ONLY

LINE

SECTOR	INSTRUCTION			REMARKS
	OP.	ADDRESS	SP.	
160	LDA	161	SA	
1	TRU	163	SA	
2	TRU	229	SA	
3	LDB	168	S	F 08
4	LRS	901	S	
5	ADD	204	A	
6	TAN	165	A	
7	STA	189	S	To f13
8	OCT	+7 1374		Const. for "MPO"
9	EXF	170	SA	Keep line
170	OCT	-77 77601		
1	ROT	172	S	
2	[	]		LDB for "ASP"
3	LDC	196	SA	
4	SRT	902	S	
5	IBC	163	S	
6	OCT	+71 360		Const. for "MPC"
7	TBN	179	A	
8	IAC	182	S	
9	ADD	180	SA	
180	OCT	+ 40		1 @ 16
1	IAC	182	S	
2	OCT	+33251		Const. for "ASP"
3	LDB	184	S	F08
4	OCT	+37717		Const. for "CLR"
5	EXF	186	SA	Keep sector
6	OCT	+37777		
7	CLA	188		
8	SLT	909	S	Next inst. from 198
9	SRT	901	S	
190	IAC	191	S	
1	STB	31 198	S	
2	LDB	193	SA	
3	TRU	195	SA	
4	TOF	1 220	S	To RCHAR PROCESS
5	SRT	927	S	Next inst. from sector 223
6	TRU	111	SA	
7	LDA	82	SA	To "oct"
8	IBC	199	S	
9	LDC	209	SA	

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PROBLEM DECAID=OPTIONAL LINE

PROGRAMMER FRED MAGIDSON & FRANK REED

DATE 7/23/62

DESCRIPTION LINE RELOCATABLE ONLY

LINE

SECTOR	INSTRUCTION			REMARKS
	OP.	ADDRESS	SP.	
200	LDC	1 210	S	1000 @ 21
1	[	]		Exit from print routine
2	STD	203	SA	
3	[	]		Base
4	[	]		Divisor
5	LDB	125	S	
6	TCN	1 000		To DECAID
7	IAM	' 208	S	
8	LSD	901	S	
9	OCT	+ 400		1 @ 13
210	CLA	205	S	
1	MUP	16 923	S	Next inst. from sector 235
2	STC	214	A	
3	STD	215	SA	
4	[	]		C
5	[	]		B
6	[	]		A
7	LDA	91	SA	
8	LDA	94	A	
9	CAM	234	A	
220	TOF	139	A	
1	SUB	1 179		1 @ 7
2	TRU	92	SA	
3	LDA	224	SA	
4	TRU	76	SA	
5	LDC	226	SA	
6	60			
7	AOC	228	SA	
8	OCT	-77 77403		
9	LDC	230	SA	
230	OCT	+3 232		
1	STD	5 254		
2	TES	31 232		
3	TRU	5 254	S	
4	LDB	214	A	Const. for "ASP"
5	STB	237	S	To f13
6	LDB	62	A	
7	LDA	244	SA	
8	LDC	239	SA	
9	TRU	247	SA	

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PROBLEM DECAID-OPTIONAL LINE

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PROGRAMMER FRED MAGIDSON & FRANK REED

DATE 7/23/62

DESCRIPTION LINE RELOCATABLE ONLY

LINE

SECTOR	INSTRUCTION			REMARKS
	OP.	ADDRESS	SP.	
240	LDP	241	SA	
1	OCT	+ 12		10 @ 21
2	OCT	+20420		10 @ 21
3	STC	201	SA	
4	TRU	246	SA	
5	TRU	229	SA	
6	LDB	254	SA	
7	LDA	248	S	f08
8	ROT			
9	EBP	250	SA	
250	OCT	-7740000		-1 @ 7
1	TAN	236	A	
2	[	7		Exit from "com"
3	TRU	229	SA	
4	61	18 000		WOC "S"
5	LDA	252	SA	