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DWG NO

J.P. Spencer

J. P. Spencer
Director
Engineering Services

L.E. Taylor

L. E. Taylor
Director
Development

DR	S. Greaves	1/8/71
CHK		
DSGN	<i>Denis Purdy</i>	2/5/71
ENGR	<i>SA [Signature]</i>	4/9/71
APPD	<i>[Signature]</i>	2/21/71
APPD	<i>[Signature]</i>	1/22/71



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2722 michelson drive / irvine / california / 92604

TITLE

SOFTWARE PERFORMANCE SPECIFICATION
620 CARD READER TEST

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SECTION 1: TEST PROGRAM OVERVIEW

1.1 INTRODUCTION

The 620 Card Reader Test determines whether or not the card reader is functioning correctly in conjunction with the 620 computer. Card reader models 620-22 and 620-25 can be thus tested.

The 620 Card Reader Test operates with the 620 Test Executive and thus uses standard teletype I/O routines and is equipped with both a Console Mode and a Teletype Mode (see SPS 89A0122).

1.2 PROGRAM DESIGN OVERVIEW

1.2.1

An optional initialization check is provided to test the initialization command (EXC 030 for card reader device address 030). This command is currently implemented only on the model 620-25.

The program will attempt to read one card using the user indicated I/O mode; if reader ready comes on and no error is detected, each of the 80 characters will be stored in memory. If reader ready does not come on or a mechanical error is sensed or recognized by a time-out, the program will report it to the user and halt.

1.2.2

Each communn is tested for preset bif configuration and if the data is correct, the next card is read. If the data is incorrect, the error count is incremented and if SS2 is set, the program will halt with the error information in the registers. If SS2 is not set, the next column will be tested.

1.2.3

Each column of each card is thus tested. If SS3 is set at any time or if the hopper becomes empty, the total data error count will be provided to the user and a halt will be executed. Otherwise the program will continue to run



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until a reader ready condition does not come on and/or an error condition is sensed.

1.2.4

The user may determine whether I/O is to be performed under sense, PIM, or BIC control by providing the appropriate parameter.

1.3 HARDWARE SUMMARY

The following hardware items are required or are optional to use this program:

1. A 620 series computer with at least 4K of memory.
2. A Model 620-22 or 620-25, Card Reader.
3. (Optional) A model ASR33 or ASR35 teletype.
4. (Optional) BIC.
5. (Optional) PIM.



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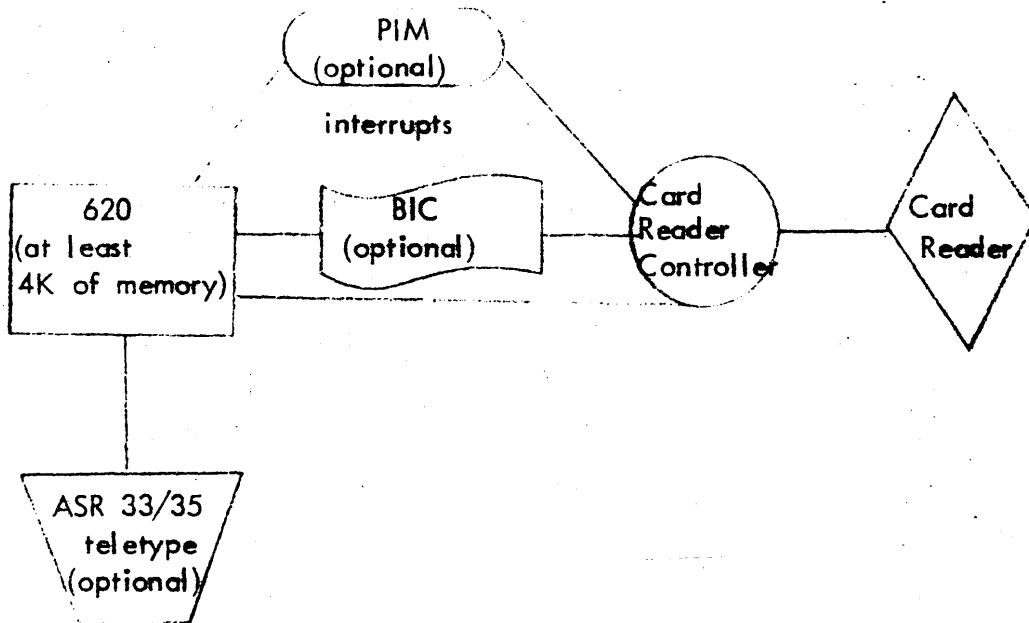
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A hardware diagram is given below:



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SECTION 2: EXTERNAL SPECIFICATIONS

2.1 GENERAL

The external specification provides all the operating procedures and information pertinent to user interface.

2.2 LOADING PROCEDURE

The 620 Card Reader Test is available as an object tape or as an object card deck.

2.2.1

If the object tape is used, the user must secure a copy of the 620 Test Executive object tape (part number 92U0107-001, SPS 89A0122). The device used to load the tapes can be the ASR33 or ASR35 teletype paper tape reader or the high speed paper tape reader. The 620 Test Executive is loaded first and executed to set the Console/ Teletype Mode flag (see 2.3) according to the user's entry point. The 620 Card Reader Test object tape is then loaded, either by executing an 'L.' from the 620 Test Executive (if a teletype is being used), or by loading it from the console.

2.2.2

If the object card deck is used, the user must enter the card reader bootstrap given below. The card deck provided (part number 92J0101060A) contains the card binary loader, 620 Card Reader Test, and 620 Test Executive in that order. This deck is placed in the read hopper of the card reader and the card reader readied. The A, B, X and Instruction registers are then cleared; the P register set to 0131; and 'SYSTEM RESET' then hit 'RUN' on the 620 console. When the 'READY' light comes on, on the card reader, the cards will begin to load (there may be some warm-up time before 'READY' comes on).



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A successful load is designated by a halt at 06177 in the 620 Test Executive. From there the user picks the entry point to the 620 Test Executive (SPS 89A0122) to set the Console/Teletype Mode flag and hits 'RUN'. The actual 620 Card Reader Test is started at 0500, after the Console/Teletype Mode flag has been set.

2.2.3 CARD OBJECT BOOTSTRAP LOADER*

<u>Location</u>	<u>Coding</u>	<u>Symbolic Program</u>		
000114	102530	BOOR	CIA	030
000115	004250		LRLA	8
000116	101130		SEN	0130, BOOS
000117	000122			
000120	001000		JMP	*-2
000121	000116			
000122	102130	BOOS	INA	030
000123	055000		STA	0,1
000124	005144		IXR	
000125	001000		JMP	BOOU
000126	000131			
000127	000000	BOOT	DATA	PLD
000130	100230		EXC	0230
000131	101130	BOOU	SEN	0130, BOOR
000132	000114			
000133	101630		SEN*	0630, BOOT
000134	100127			
000135	001000		JMP	*-4
000136	000131			

* The assumed device address is 030. To change for a different device address, change the last two octal digits of each I/O command to the desired device address.

2.3 OPERATING PROCEDURE

After loading the 620 Test Executive, and the 620 Card Reader Test, and setting the Console/Teletype Mode flag by entry point to the 620 Test Executive (SPS 89A0122), the user sets the program counter to 0500 and resets SS3. The two procedures for Console and for Teletype Mode are given next.



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2.3.1 SENSE SWITCH SETTINGS

<u>Switch</u>	<u>'Set'</u>	<u>'Reset'</u>
1	Not used	
2	Halt on data error	On data error, count it and continue
3	Wind-up test and prepare for a new one	Continue with test

SEE PAGE 10

2.3.2 TELETYPE MODE

After starting the program at 0500 the teletype prints:

620 CARD READER TEST
OPTIONS?

The user responds with a 'Y' or an 'N' for 'yes' or 'no', respectively (no period or comma is input). If no options are requested, the parameters remain unchanged and the initialization test is performed (see below). If options are requested the following message is output:

CARD READER DA= 30

The user then responds with the octal device address of the card reader and a period or comma.

INITIALIZATION TEST PERFORMED? Y

The user responds with a 'Y' or an 'N' for 'yes' or 'no', respectively (no period or comma is input). If 'Y' is input the following is typed:

EMPTY HOPPER OF CARD READER AND THEN RESTORE CARDS

The program then halts at IR=1* to allow the user to comply with this request. The user then hits 'RUN'.

The program then senses for a reader ready condition. If the reader is ready when sensed, indicating a malfunction of the reader ready sense-line, the following is printed:

READER READY SENSED

* IR is the Instruction Register



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The rest of the parameters are then input (or if no options were specified, the test tries to read a card).

If 'READER READY' is not sensed the program executes a card reader initialize command (currently implemented only on the model 620-25 card reader). A wait occurs to allow the reader to be mechanically initialized by this command. The reader ready sense is then executed again. If the reader is not ready, the following message is printed and a halt occurs at IR = 2.

INITIALIZATION ERROR

Hit 'SYSTEM RESET' and 'RUN' to continue with the test. If the reader is ready, the initialization was satisfactorily performed. In either case, if options were not specified, the program attempts to read a card using the sense mode, if options were specified, the program prints:

I/O MODE= BIC

The user then types BIC, SEN, or PIM* (no period or comma is input). If he types neither, the program types 'INVALID' and again waits for BIC, SEN, or PIM.

If he types SEN or PIM, the following message is skipped; otherwise the teletype types:

BIC DA= 22

The user must then type the octal device address of the BIC followed by a period or comma.

If he types BIC or SEN the following messages are skipped; otherwise the teletype types:

PIM DA=
TRAP LOCATION=
INTERRUPT MASK=

The user must type the corresponding octal values followed by a period or a comma after each '=' (reference following table for interrupt mask).

<u>Interrupt Line</u>	<u>Most Common Trap Location</u>	<u>Interrupt Mask</u>
0	0100	0376
1	0102	0375
2	0104	0373

* While inputting BIC, SEN, or PIM, the user may delete the previous character input with a ' ← '.



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<u>Interrupt Line</u>	<u>Most Common Trap Location</u>	<u>Interrupt Mask</u>
3	0106	0367
4	0110	0357
5	0112	0337
6	0114	0277
7	0116	0177

If the 'READY' condition does not come true on the card reader, the program will type 'READER NOT READY' and subsequently halt at IR = 3 unless SS3 is set, in which case the summary message will be typed. If no reader error is detected, each of the 80 characters will be stored in memory. If a card reader error is sensed and the hopper is not empty, the program will type the following:

CARD READER ERROR

This will be followed by a halt at IR = 4.

If a card reader error is sensed and the hopper is empty, the following message will be typed followed by the summary message.

HOPPER EMPTY

Other abnormal conditions which would prevent the reading of a card are also typed when appropriate. The messages are generally self explanatory and are given below together with the subsequent halt location:

<u>Message</u>	<u>Halt</u>
CHARACTER READY TIME-OUT	IR = 5
BIC BUSY (prior to initialization of BIC)	IR = 6
BIC ABNORMAL STOR	IR = 7
INTERRUPT TIME-OUT	IR = 010
BIC BUSY TIME OUT (after initialization of BIC)	IR = 011

After any such error, it is only necessary to hit 'SYSTEM RESET' and then 'RUN' to resume the attempt to read a card.

Each column is tested for a preset bit configuration, and if the data is correct the next card is read. If any data is incorrect, the error count is incremented and if SS2 is set, the program will halt at IR = 0100, with the X, B, and A - registers containing the



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column, the expected value, and the actual value, respectively. Hit 'RUN' to continue.

Each column of each card is thus tested. If SS3 is set at any time during the read operation or if a 'hopper empty' is sensed, the program types the following:

END OF TEST, NUMBER OF CARDS READ IS XXXXXX

TOTAL NUMBER OF ERRORS IS YYYYYY

where XXXXXX and YYYYYY are 6-digit octal numbers.

The test then prints 'OPTIONS?' to restart the given sequence. The following messages may be printed as detected:

CARD IN READ STATION STATUS	IR = 012
PREMATURE END OF CARD STATUS	IR = 013

2.3.3 CONSOLE MODE

After starting the program at 0500, the program halts at IR0201.

The user then enters a '1' in the A-register and hits 'RUN' if he wishes to input parameter options. Otherwise he just hits "RUN". If no options are to be input, the parameters remain unchanged, sense mode will be used, and the initialization test is begun (see below).

If options are to be input, the test halts at IR=0202. The default values here are 030 for the card reader device address and a '1' to indicate that the initialization test is to be performed. If the user is not satisfied with these values, he must key-in the card reader device address in the A-register and/or a '0' in the B-register to indicate that the initialization test is not to be performed. If no initialization is to be performed, the initialization section is skipped.

If initialization is to be performed, the test halts at IR=0203. The user then empties the card reader hopper and subsequently restores the cards to the card reader hopper to induce a hopper empty and a reader not ready condition. The user then hits 'RUN'. The sense reader ready is then executed, and if it is true an error halt occurs at IR=0204. The user may then hit 'RUN' to continue after the initialization section of the test.

If the reader is not sensed as ready, an initialization command is executed and a wait executed in order to allow the initialization command to be mechanically effected. A sense reader ready is then executed. This time if the result is 'TRUE' no message is printed, and the test proceeds.



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If the result of this sense reader ready is 'FALSE', an error halt occurs at IR = 0205. The user may continue with the test by hitting 'SYSTEM RESET' followed by 'RUN'.

If the 'options' alternative was not specified, the test tries to read a card using the sense mode. If the 'options' alternative was specified, the test halts at IR = 0206.

The user then enters the I/O mode in the A-register ('0' for sense, '1' for BIC, and '-1' for PIM); and, if appropriate, the BIC device address in the B-register. The default values are A-register = 0, B-register = 020. 'RUN' is then hit.

If the PIM is specified, the program halts at IR=0207 and the user must enter the PIM device address in the A-register, the trap location in the B-register, and the interrupt mask in the X-register. The default values are A = 040, B = 0100, X = 0376; see the following table to obtain the interrupt mask:

<u>Interrupt Line</u>	<u>Most Common Trap Location</u>	<u>Interrupt Mask</u>
0	0100	0376
1	0102	0375
2	0104	0373
3	0106	0367
4	0110	0357
5	0112	0337
6	0114	0277
7	0116	0177

If the 'READY' condition comes on, on the card reader, the program will read one card; otherwise, the program will halt at IR = 3. If no error is detected, each of the 80 characters will be stored in memory. If a card reader error is sensed and the hopper is not empty, the program will halt at IR = 4.

If a card reader error is sensed and the hopper is empty, the test will halt at the IR=0210 summary location (see below). Other abnormal conditions which would prevent the reading of a card also produce halts when appropriate. They are:

<u>Halt</u>	<u>Explanation</u>
IR = 5	No character ready after sufficient interval
IR = 6	BIC busy prior to BIC initialization
IR = 7	BIC abnormal stop



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<u>Halt</u>	<u>Explanation</u>
IR = 010	No character ready interrupt after sufficient interval
IR = 011	BIC busy time-out after initialization of BIC

After any such error, it is only necessary to hit 'SYSTEM RESET' and then 'RUN' to resume the attempt to read a card.

Each column is tested for a preset bit configuration and if the data is correct, the next card is read. If the data is incorrect, the error count is incremented and if SS2 is set, the program will halt at IR = 0100 with the X, B, and A-registers containing the column, the expected value, and the actual value, respectively. Hit 'RUN' to continue.

Each column of each card is thus tested. If SS3 is set at any time during the read operation of if a 'hopper empty' is sensed, the program will halt at IR = 0210 with the following information in the registers:

A register = data error count
 B register = number of cards read

The following halts may be executed as detected:

IR = 012	Card in read station status
IR = 013	Premature end of card status
IR = 014	Reader ready while reading

2.4 OUTPUT STATEMENTS

620 CARD READER TEST
 CARD READER DA =
 I/O MODE
 BIC DA =
 PIM DA =
 TRAP LOCATION =
 INTERRUPT MASK =
 INVALID
 CHARACTER READY TIME-OUT
 CARD READER ERROR
 END OF TEST, NUMBER OF CARDS READ IS XXXXXX,*
 TOTAL NUMBER OF ERRORS IS XXXXXX,*
 BIC ABNORMAL STOP
 READER NOT READY
 BIC BUSY
 PERFORM INITIALIZATION TEST?
 EMPTY HOPPER OF CARD READER AND THEN RESTORE CARDS
 DO NOT MAKE READER READY
 HOPPER EMPTY
 READER READY SENSED
 IT SHOULD NOT HAVE BEEN

* Octal numbers



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INITIALIZATION ERROR
 OPTIONS ?
 INTERRUPT TIME-OUT
 BIC BUSY TIME-OUT
 CARD IN READ STATION STATUS
 PREMATURE END OF CARD STATUS
 READER READY WHILE READING

2.5 INPUT STATEMENTS

The following output statements require that the user input octal numbers followed by a period or comma:

CARD READER DA =
 PIM DA =
 BIC DA =
 TRAP LOCATION =
 INTERRUPT MASK =

The following output statements require that the user input 'Y' for 'yes' or 'N' for 'no'.

OPTIONS ?
 PERFORM INITIALIZATION TEST ?

The following output statement requires that the user input 'BIC', 'SEN', or 'PIM'.

I/O MODE =

2.6 HALT TABLE

Instruction
 Register

Significance

1	User removes cards from reader and then replaces them (initialization test-Teletype mode). Hit 'RUN' to continue.
2	Initialization error (Teletype Mode). Hit 'SYSTEM RESET' and 'RUN' to continue.
0201	Set: A = 1 to input options. If no options wanted, leave A = 0. (Console Mode). Hit 'RUN' to continue.
0202	Set: A = card reader device address, B = '0' for no initialization test, and '1' for initialization test.



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Instruction Register

Significance

	or leave defaults A = 030, B = 1 (Console Mode). Hit 'RUN' to continue.
0203	User removes cards from reader and then replaces them (initialization test-Console Mode). Hit 'RUN' to continue.
0204	Reader ready sensed before initialization error (Console Mode). Hit 'RUN' to continue.
0205	Initialization error (Console Mode). Hit 'SYSTEM RESET' and 'RUN' to continue.
0206	Set: A = '0' for sense mode, '1' for BIC mode, '-1' for PIM mode; and B = BIC device address, if appropriate. Default values are A = 0, B = 020 (Console Mode). Hit 'RUN' to continue.
0207	Set: A = PIM device address, B = trap location, X = interrupt mask. Default values are A = 040, B = 0100, X = 0376 (Console Mode). Hit 'RUN' to continue.
0100	Data error (SS2 set). X = column B = expected data A = actual data Hit 'RUN' to continue.
7	BIC abnormal stop. Hit 'SYSTEM RESET' and 'RUN' to continue.
5	Character ready time-out. Hit 'SYSTEM RESET' and 'RUN' to continue.
010	Interrupt time-out (PIM mode). Hit 'SYSTEM RESET' and 'RUN' to continue.
011	BIC busy time-out after initialization of BIC (BIC Mode). Hit 'SYSTEM RESET' and 'RUN' to continue.
3	Reader not ready. Hit 'SYSTEM RESET' and 'RUN' to continue.



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Instruction Register

Significance

6	BIC busy prior to initialization. Hit 'SYSTEM RESET' and 'RUN' to continue.
4	Card reader error. Hit 'SYSTEM RESET' and 'RUN' to continue.
0210	Test summary (Console Mode). A = number of data errors B = number of cards read



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SECTION 3: INTERNAL SPECIFICATIONS

3.1 COMPONENT SPECIFICATIONS

The mainline section of coding performs all the functions of the 620 Card Reader Test except inputting a card. The actual teletype communication subroutines referenced in the mainline section, however, are actually in the 620 Test Executive. These subroutines are OUTD, OUTG, INPD, INPE, and INPG.

There are three card reader I/O routines - one which utilizes sense control only, one which utilizes the BIC, and one which utilizes the PIM. The routine utilized is determined by the user.

3.2 MEMORY MAP

<u>Location</u>	<u>Contents</u>
500-2070	Mainline section
2071-2266	Card Reader Driver (Sense Control)
2267-2433	Card Reader Driver (PIM Control)
2434-2571	Card Reader Driver (BIC control)
2572-2620	Device Address Setter
2620-3341	Teletype Messages
0-01 040-043 0400-0477 05100-07777	620 Maintain II Test Executive and Loaders

3.3 I/O COMMANDS TESTED

3.3.1 Card Reader (assumed device address = 030)



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<u>Command</u>	<u>Meaning</u>
SEN 0630	Reader ready?
SEN 0330	Hopper empty?
SEN 0230	Reader error?
SEN 0130	Character ready?
EXC 030	Initialize Card Reader (implemented only on 620-25)
EXC 0230	Feed a card
CIA 030	Input Character Buffer
SEN 030	Card in Read Station

3.3.2 PIM (assumed device address = 040)

<u>Command</u>	<u>Meaning</u>
EXC 0540	Clear and disable PIM
EXC 0240	Enable PIM
OAR 040	Output PIM interrupt mask

3.3.3 BIC (assumed device addresses = 020 and 021)

<u>Command</u>	<u>Meaning</u>
EXC 020	Activate BIC
EXC 021	Initialize BIC
SEN 020	BIC busy?
SEN 021	BIC abnormal stop?
OAR 020	Output to BIC initial address register
OAR 021	Output to BIC final address register



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3.4 COMPONENT DESCRIPTIONS AND FLOWCHARTS

Title: Mainline Program (not a closed subroutine)

Symbolic Name: START

Purpose: To input user parameters; optionally, perform initialization test; check card input data; and communicate error conditions.

Description: There are two modes: Teletype and Console. In Teletype mode, the Options parameter, Initialization Test parameter, card reader device address, I/O mode, BIC device address (if appropriate) and PIM device address, trap location, and interrupt mask (if appropriate) are input from the teletype. The cards are then input and checked until a data error occurs (with SS2 set), or a card reader problem occurs, or the user sets SS3. All messages, except data error, are output to the teletype. The Console mode is the same but register entry and display are used instead of the teletype.

Entry Points: START

Calling Sequence: N.A.

Entrance Parameters: N.A.

Exit Point: The program is a continuous loop. Any halt followed by a 'RUN' on the 620 console will restart or continue it.

Exit Parameters: N.A.

Tables or Files Modified or Read: N.A.

Tables or Files Created: The card data input buffer, IBUF, is used for data input.

Called by: N.A.

Called from: CDRD, PMRD, and BCRD - the Card Reader Drivers; DVAD - the Device Address Setter; and 620 Executive I/O routines.

Exception Conditions: See 2.3.2 and 2.3.3.

Timing: 900 cards per minute for 620-22, and 300 cards per minute for 620-25.



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Size: 01371 words, including data blocks.

Comments: This program is designed to be run in conjunction with the 620 Test Executive and uses flags and I/O routines residing in that program. Console mode is set by starting the 620 Test Executive at 06152; Teletype mode is set by starting it at 07000.

Special Notation: N.A.

Hardware Details: A Model 620-22 or 620-25 card reader is required. Also: SEN 0630 and, optionally, EXC 030*.

Flowcharts: See following sheets.

* A device address of 030 is assumed for the card reader.



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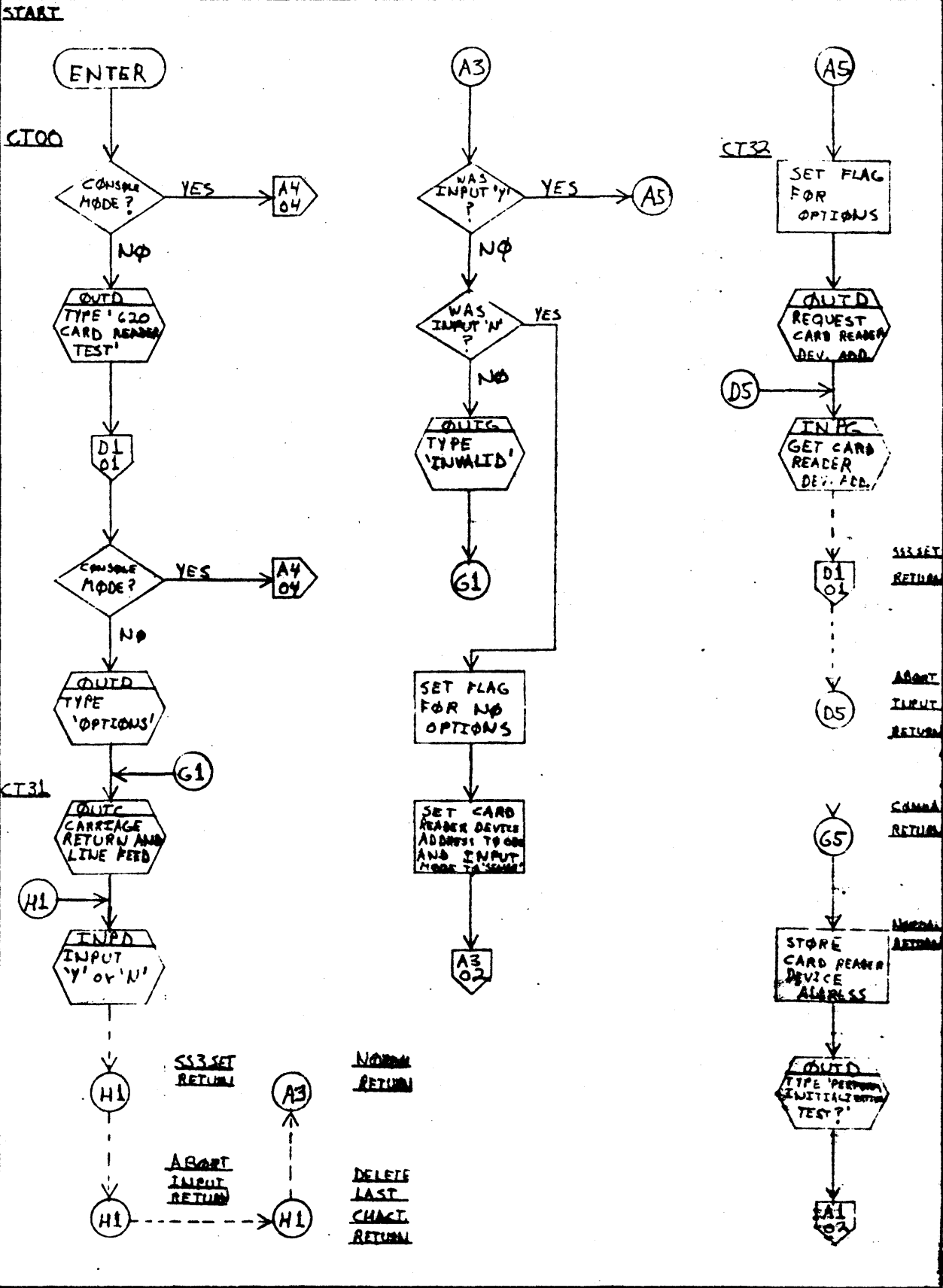
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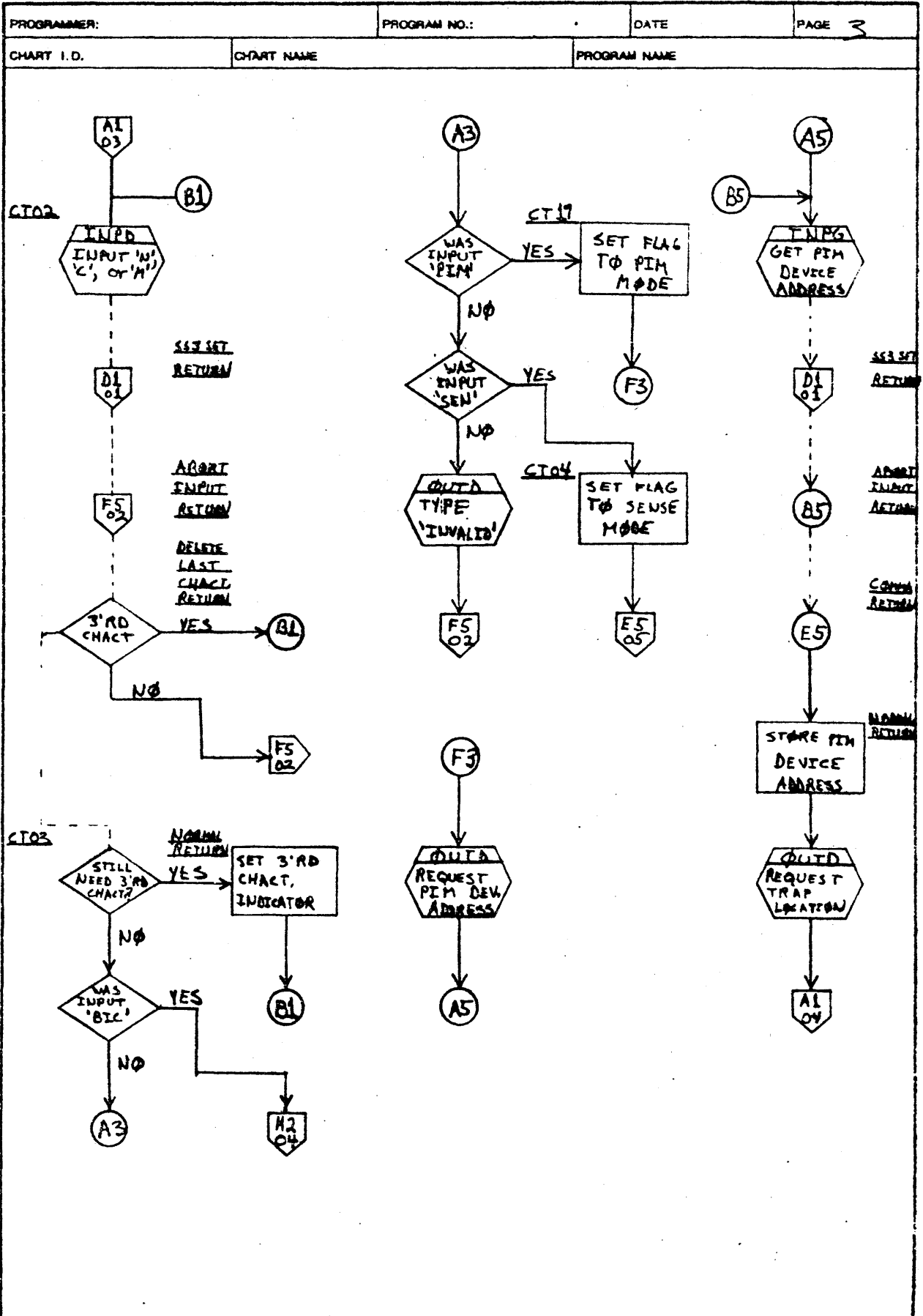
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Flowchart Worksheet

PROGRAMMER: <u>PLURGE II</u>	PROGRAM NO.:	DATE:	PAGE <u>1</u>
CHART I.D.	CHART NAME	PROGRAM NAME	

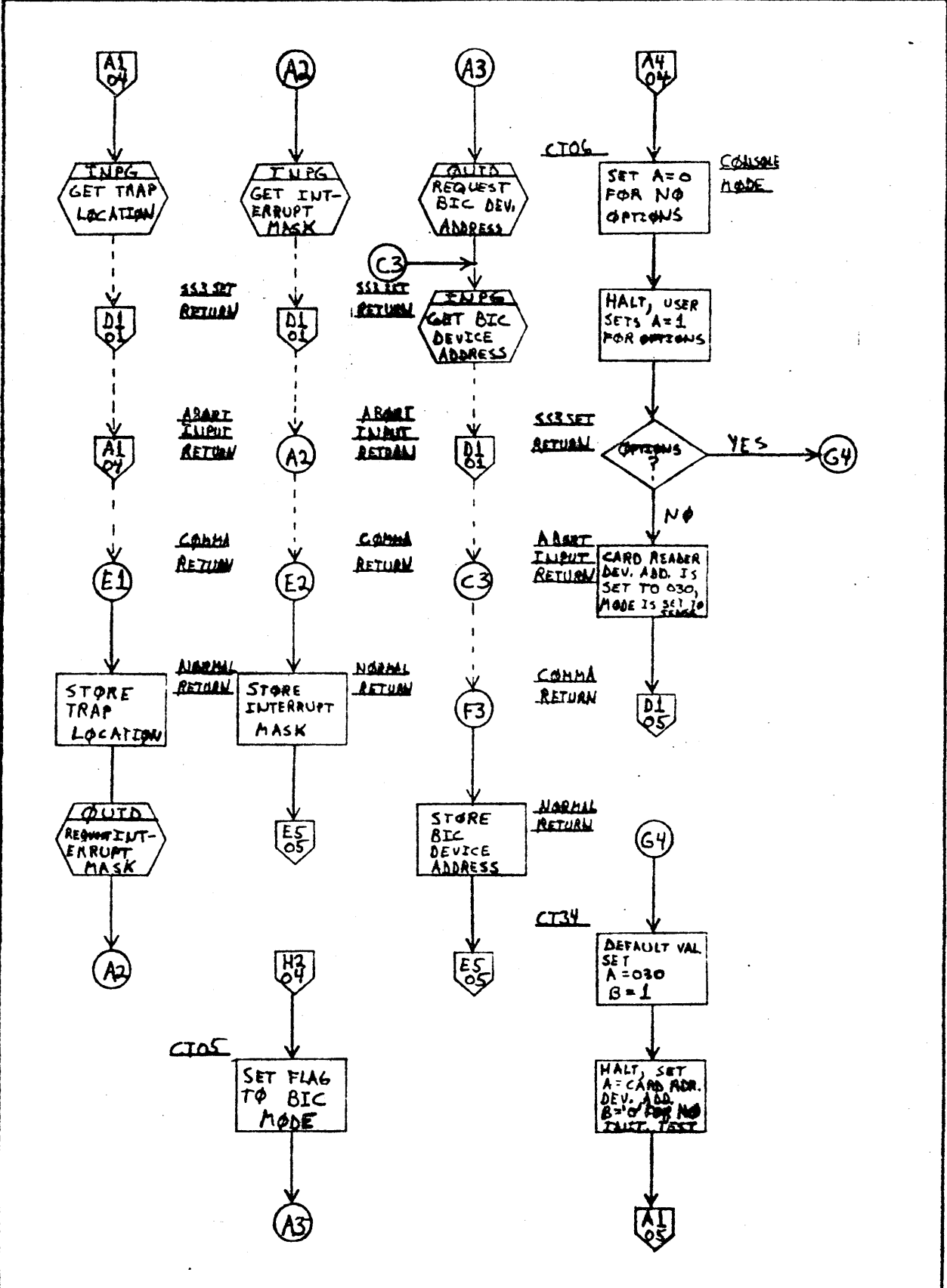


Flowchart Worksheet



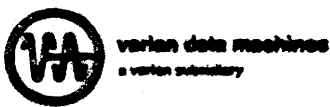
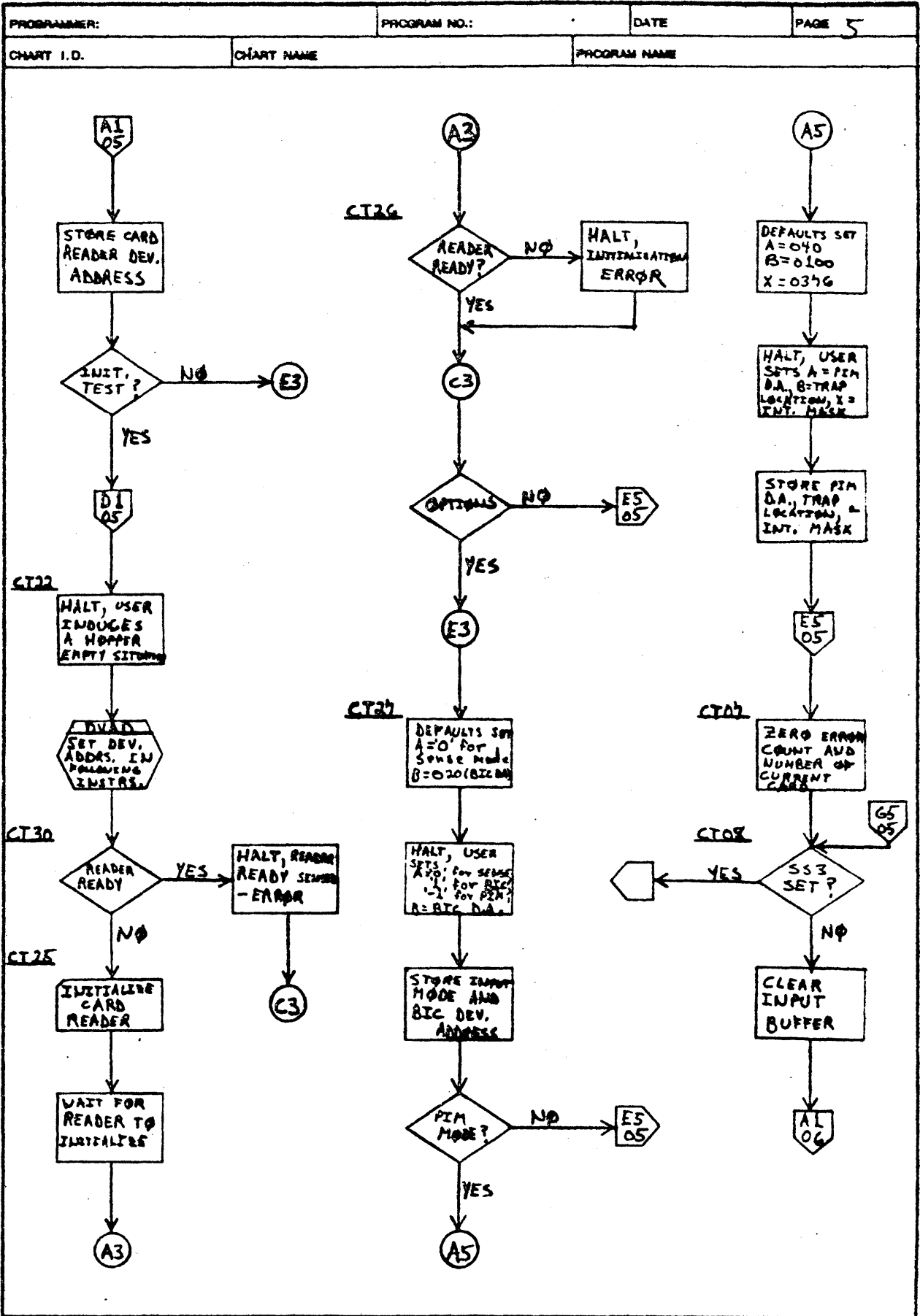
Flowchart Worksheet

PROGRAMMER:	PROGRAM NO.:	DATE:	PAGE 41
CHART I.D.	CHART NAME	PROGRAM NAME	



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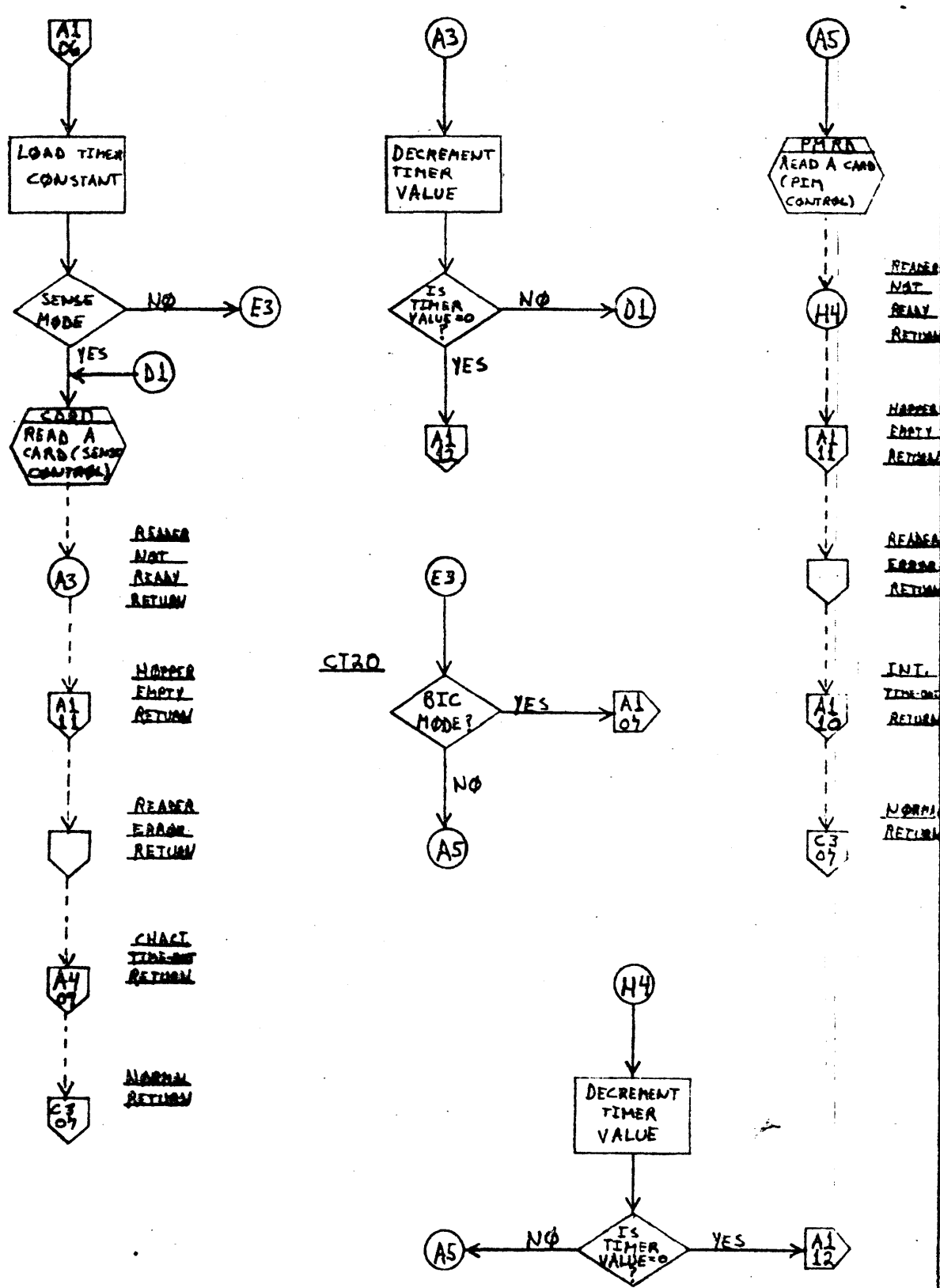
Flowchart Worksheet



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Flowchart Worksheet

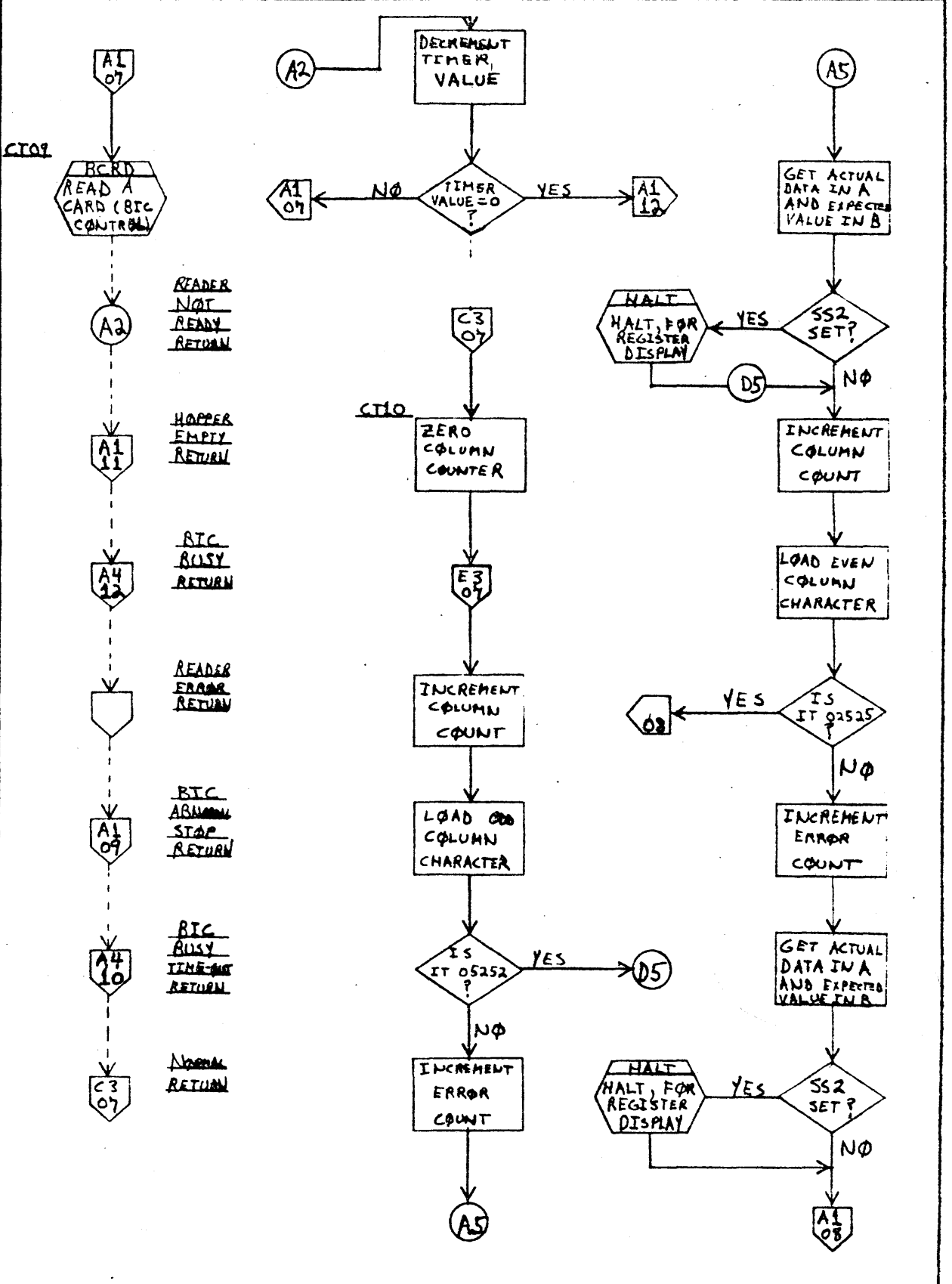
PROGRAMMER:	PROGRAM NO.:	DATE:	PAGE 6
CHART I.D.:	CHART NAME:	PROGRAM NAME:	



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Flowchart Worksheet

PROGRAMMER:	PROGRAM NO.:	DATE	PAGE 7
CHART I. D.	CHART NAME	PROGRAM NAME	



↑ FOLD UNDER AT DOTTED LINE

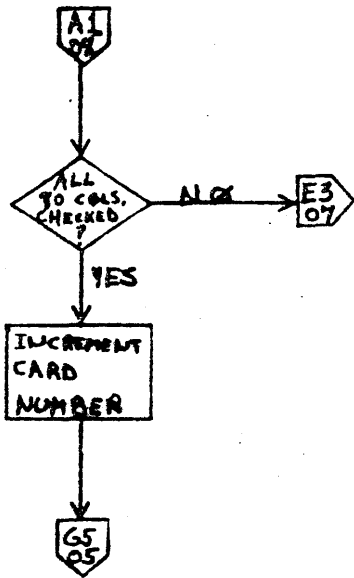
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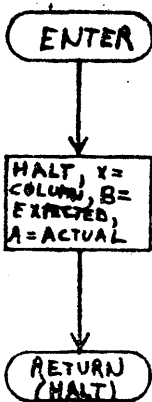
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Flowchart Worksheet

PROGRAMMER:	PROGRAM NO.:	DATE	PAGE 8
CHART I.D.	CHART NAME	PROGRAM NAME	




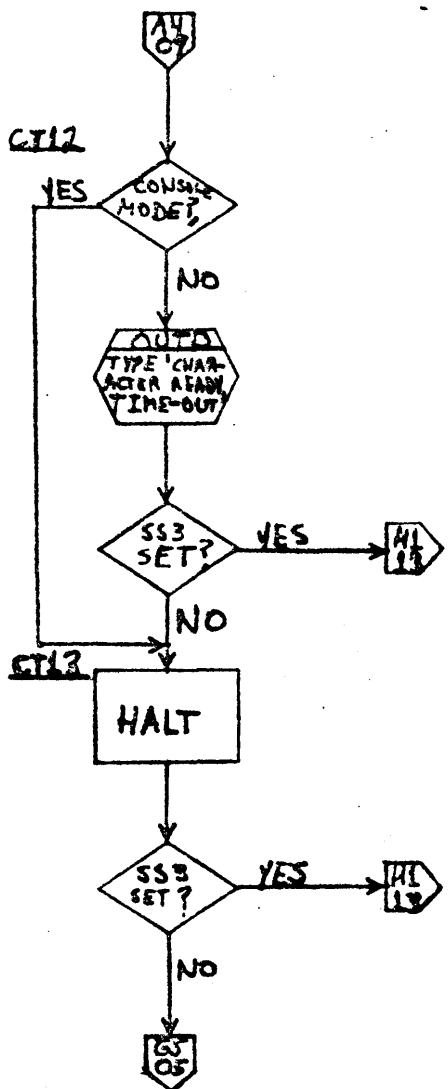
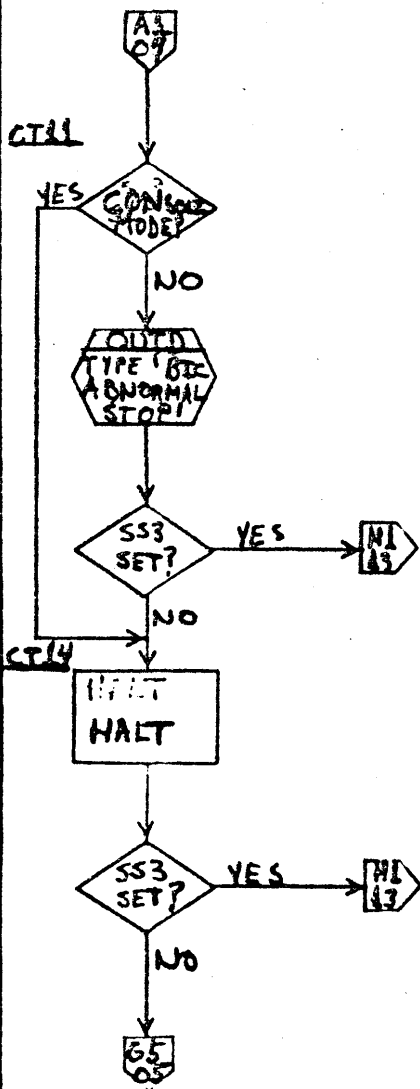
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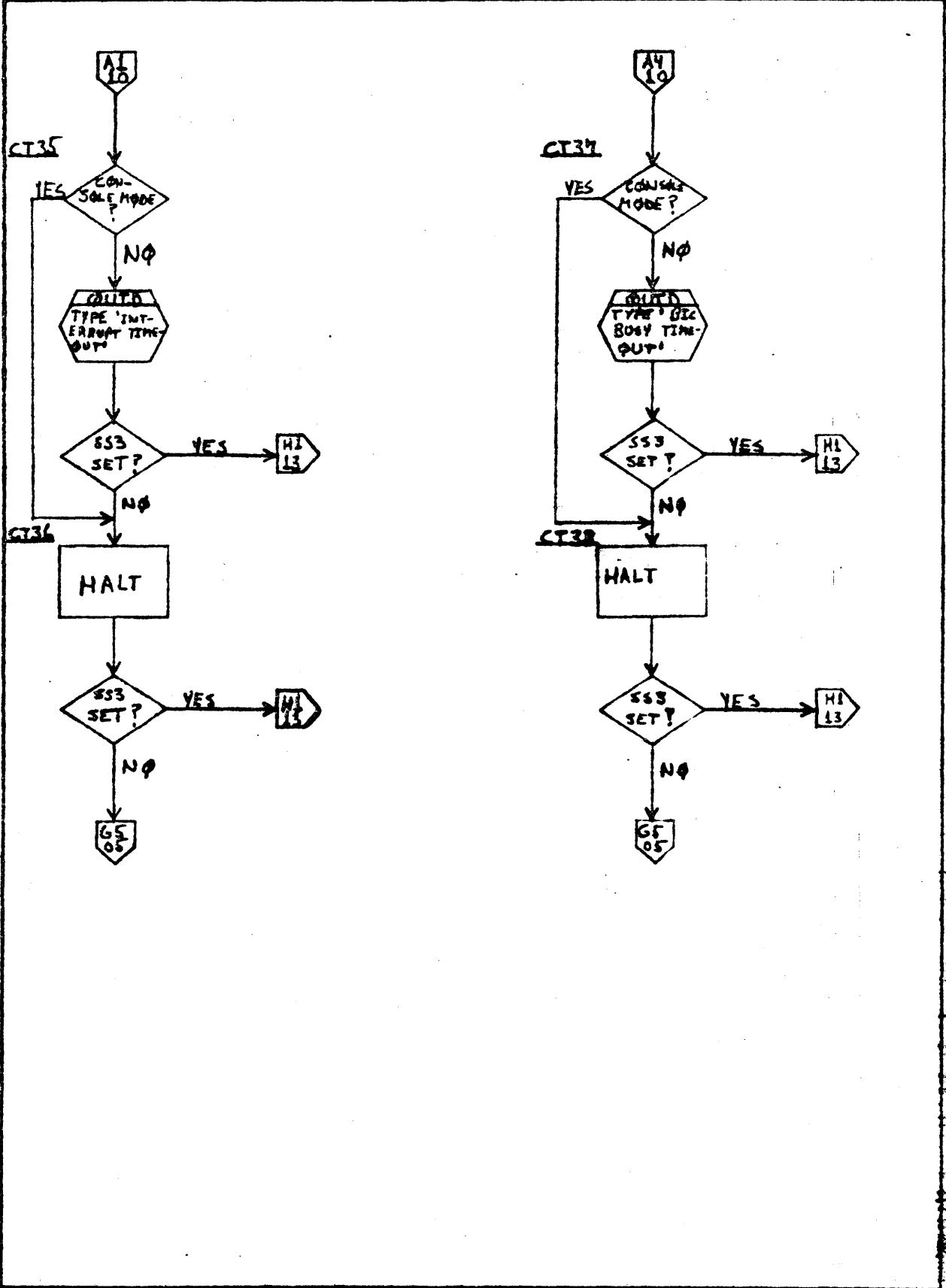


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Flowchart Worksheet

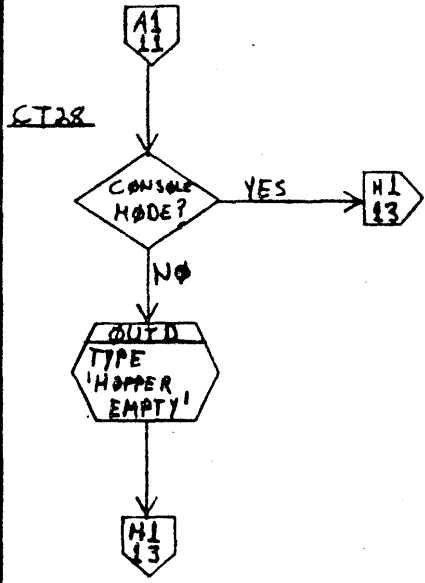
PROGRAMMER:	PROGRAM NO.:	DATE:	PAGE 10
CHART I.D.:	CHART NAME:	PROGRAM NAME:	



↑ PULL UNDER AT NOTED LINE

↑ PULL UNDER AT NOTED LINE

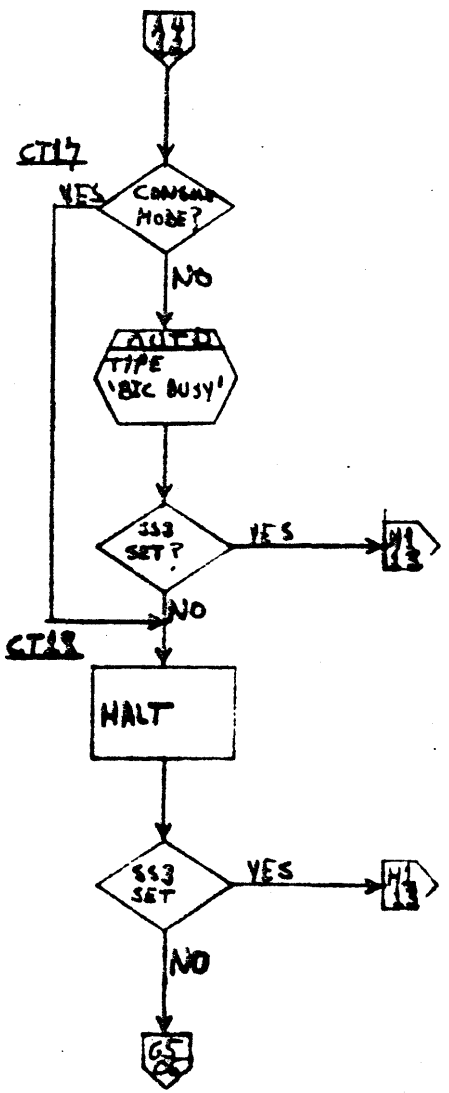
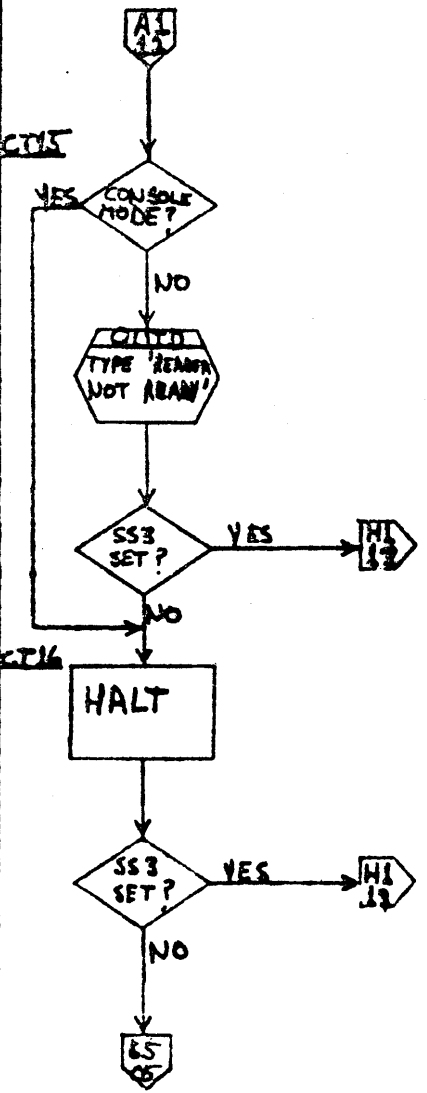
verion data machines <small>a verion subsidiary</small>	CODE IDENT. NO.	89A0180	SP C
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↑ FOLD UNDER AT DOTTED LINE

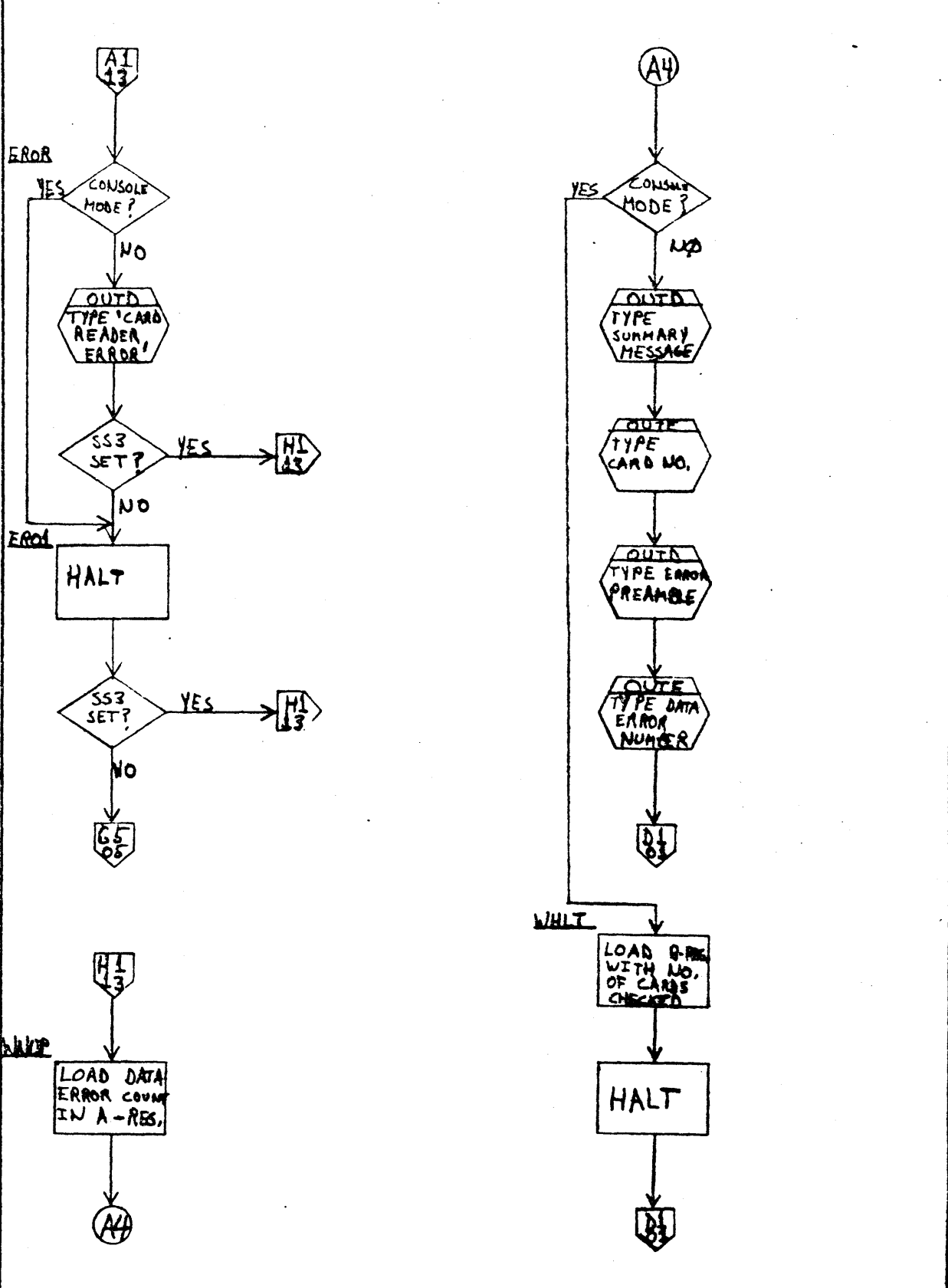
↑ FOLD UNDER AT DOTTED LINE

VA 89240-000A



SHIFT COLLAR UP BEFORE CT15

SHIFT COLLAR UP BEFORE CT17



↑ FOLD UNDER AT DOTTED LINE

↑ FOLD UNDER AT DOTTED LINE

Title: DEVICE ADDRESS SETTER

Symbolic Name: DVAD

Purpose: To set the device addresses of I/O instructions referred to in the calling sequence, according to the parameter specified in the calling sequence.

Description: The device address to be used is gotten from the calling sequence. Each instruction is fetched from the calling sequence pointers, altered, and stored back. When all the specified addresses are altered, the program returns.

Entry Points: The only entry point is DVAD.

Calling Sequence: CALL DVAD, (Device address); ---a sequence of addresses of instructions to be altered---; (a zero); return location.

Entrance Parameters: The device address is specified in the first data word after the call to DVAD. The subsequent data words are all addresses of instructions to be altered. The final data word is a zero.

Exit Point: The subroutine will exit right after the zero following the instruction address-list explained in Entrance Parameters.

Exit Parameters: N.A.

Table of Files Modified or Read: Each specified instruction has its last 6 bits set to the given device address.

Table or Files Created: N.A.

Called By: START - Mainline section; and CDRD, PMRD, and BCRD - the Card Reader Drivers.

Called From: N.A.

Exception Conditions: N.A.

Timing: About 22 cycles per instruction altered + 13 cycles.

Size: 027 words.



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Comments: N.A.

Special Notation: N.A.

Hardware Details: N.A.

Flowcharts: See following sheet.



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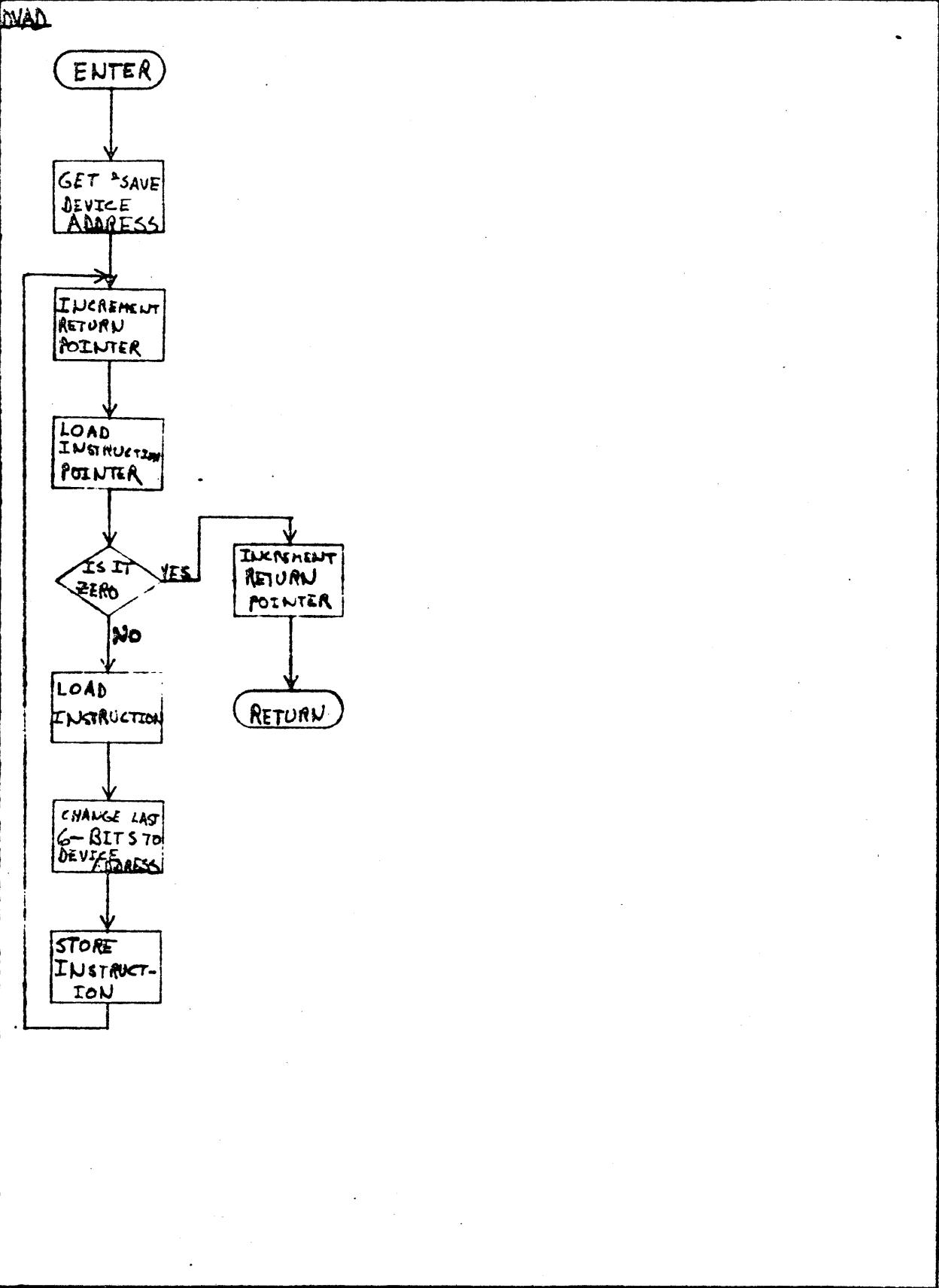
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↑ READ UNDER AT DOTTED LINE

↑ READ UNDER AT DOTTED LINE

Title: CARD READER DRIVER (SENSE CONTROL)

Symbolic Name: CDRD

Purpose: To input and store 80 columns of data from 1 card using sense control.

Description: The B and X registers are preserved, and the card reader device address is set in all I/O instructions by calling DVAD. A reader ready sense is performed, and if the sense response is true, a card is fed, and each character is input and stored in the buffer given in the calling sequence when sense character ready comes true. If the reader is not ready originally, if there is a reader error sensed during character input wait, or if character ready is not sensed true, and or hopper empty is sensed, an appropriate exit is taken. Otherwise, the normal exit is taken.

Entry Points: The only entry point is at CDRD.

Calling Sequence: CALL CDRD; (Buffer Address); (Reader ^{1 word} Not Ready Return);
(Hopper Empty Return); (Reader Error Return); (Character Ready Time-out Return);
^{2 words} ^{2 words} ^{2 words}
(Normal Return).

Entrance Parameters: The buffer address is specified in the ~~first~~ data word after the call to CDRD. No registers need be set for entry.

Exit Point: The exit points are given in the calling sequence and, with the exception of the normal return, must contain JMP instructions to the appropriate processing area.

Exit Parameters: The B and X registers are restored at exit time.

Table or Files Modified or Read: 80 characters are stored in the given buffer, IBUF, starting from the buffer beginning.

Tables or Files Created: N.A.

Called By: Mainline program (START)

Called From: Device Address Setter (DVAD)



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Exception Conditions: The device address of the card reader must be stored in \$CRD before entry.

Timing: 900 cards per minute for 620-22, and 300 cards per minute for 620-25.

Size: 0176

Comments: The user must set \$CRD to the card reader device address before calling CDRD. The return points must also contain jumps to the appropriate processors.

Special Notation: N.A.

Hardware Details: SEN 0630, SEN 30, SEN 0330, EXC 0230, SEN 0130, SEN 0230
CIA 030 (a device address of 30 assumed).

Flowcharts: See following sheets.



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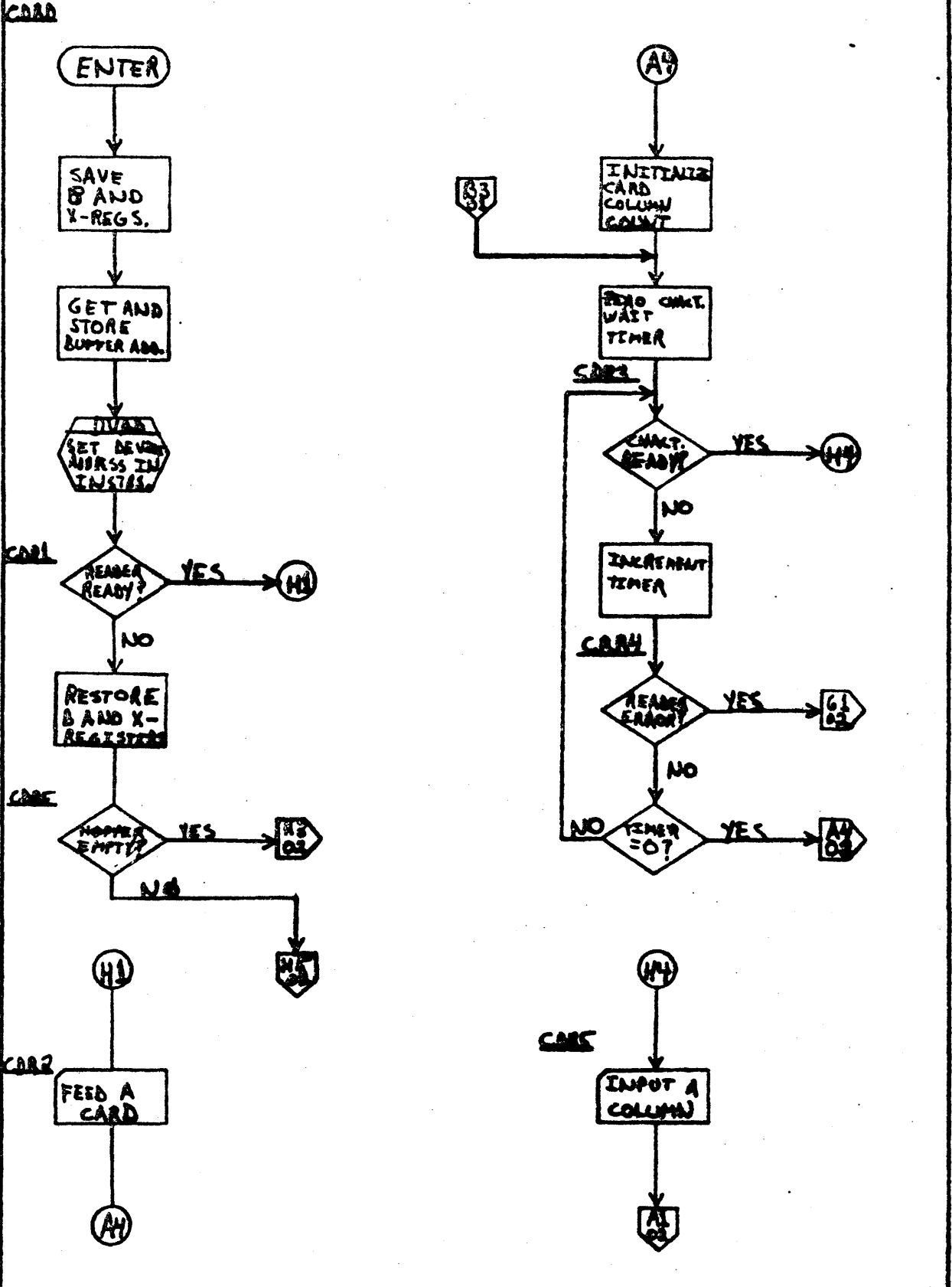
REV

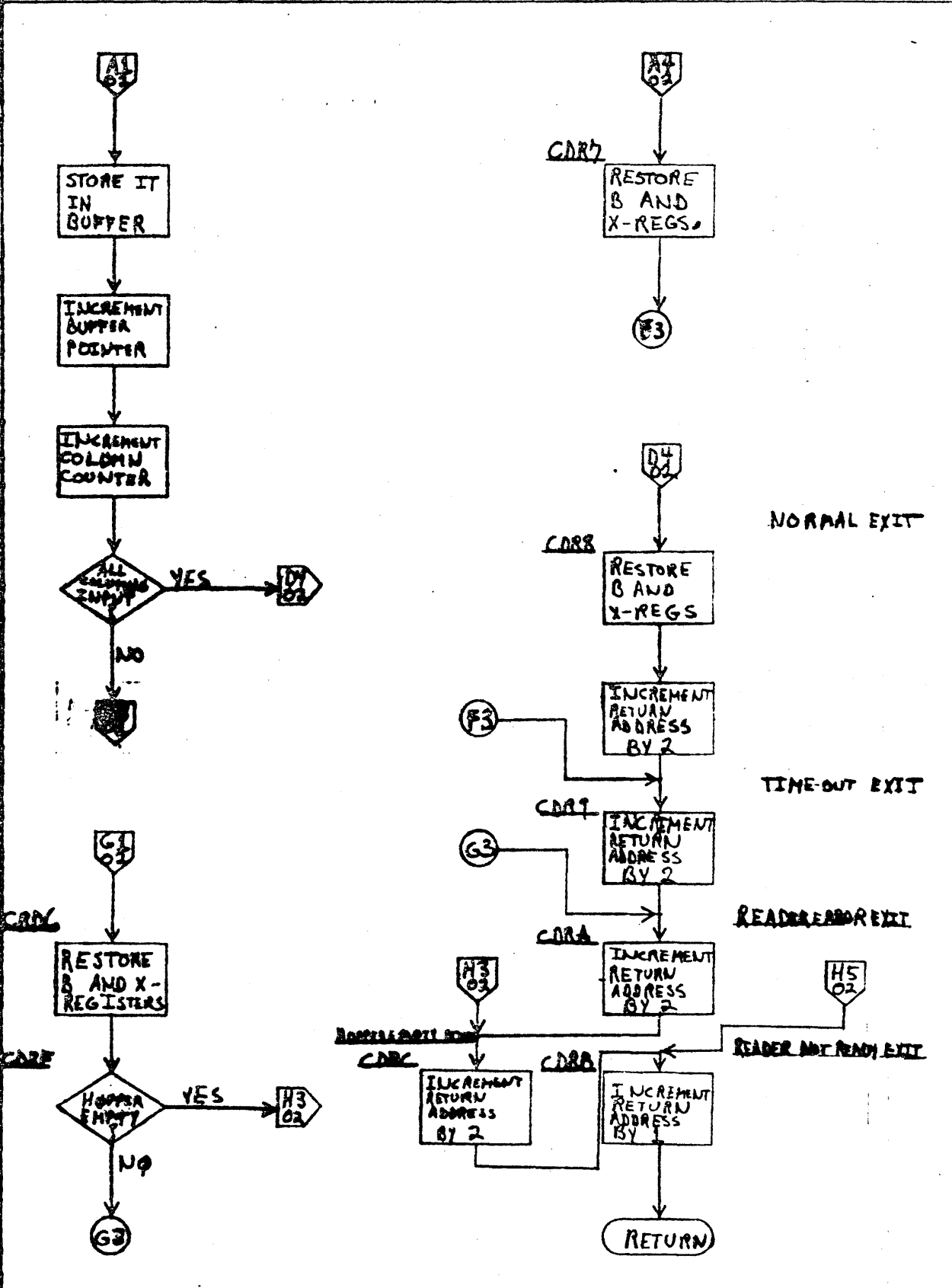
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Title: CARD READER DRIVER (PIM CONTROL)

Symbolic Name: PMRD

Purpose: To input and store 80 columns of data from 1 card using PIM control.

Description: The X and B registers are saved and the card reader and PIM device addresses are set by calls to DVAD. A reader ready is sensed, and if true a card is fed. The PIM is then disabled, the trap branch set, and the PIM enabled. Columns are then input when each interrupt is received. If reader ready was sensed originally, or a reader error is sensed, and/or a hopper empty condition is sensed, or too long is spent waiting for an interrupt - an appropriate error exit is taken. Otherwise a normal exit is taken.

Entry Points: The only entry point is PMRD.

Calling Sequence: CALL PMRD. (Buffer Address); (Reader Not Ready Return); (Hopper Empty Return); (Reader Error Return); (Interrupt Time-out Return); (Normal Return).

Entrance Parameters: The buffer address is specified in the first data word after the call to PMRD. No registers need be set for entry.

Exit Point: The exit points are given in the calling sequence and with the exception of the normal return, must contain JUMP instructions.

Exit Parameters: The B and X registers are returned to their original state.

Table or Files

Modified or Read: 80 characters are stored in the given buffer, IBUF starting from the beginning.



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Tables or Files
Created: N.A.

Called By: Mainline Program (START)

Called From: Device Address Setter (DVAD)

Exception Conditions: The device address of card reader and PIM and the trap location and interrupt mask must be stored in \$CRD, \$PIM, INLO, and MASK, respectively.

Timing: 900 cards per minute for 620-22 and 300 cards per minute for 620-25.

Size: 0145 words.

Comments: The user must set \$CRD, \$PIM, INLO, and MASK to the card reader device address, PIM device address, trap location, and interrupt mask, respectively, before calling PMRD. The return points must also contain jumps to the appropriate processors.

Special Notation: N.A.

Hardware Details: SEN 0630, SEN 0330, EXC 0230, EXC 0540, OAR 040, EXC 0240, SEN 0230, CIA 030*.

Flowcharts: See following sheets.

* Device addresses of 030 and 040 are assumed for the card reader and PIM, respectively.



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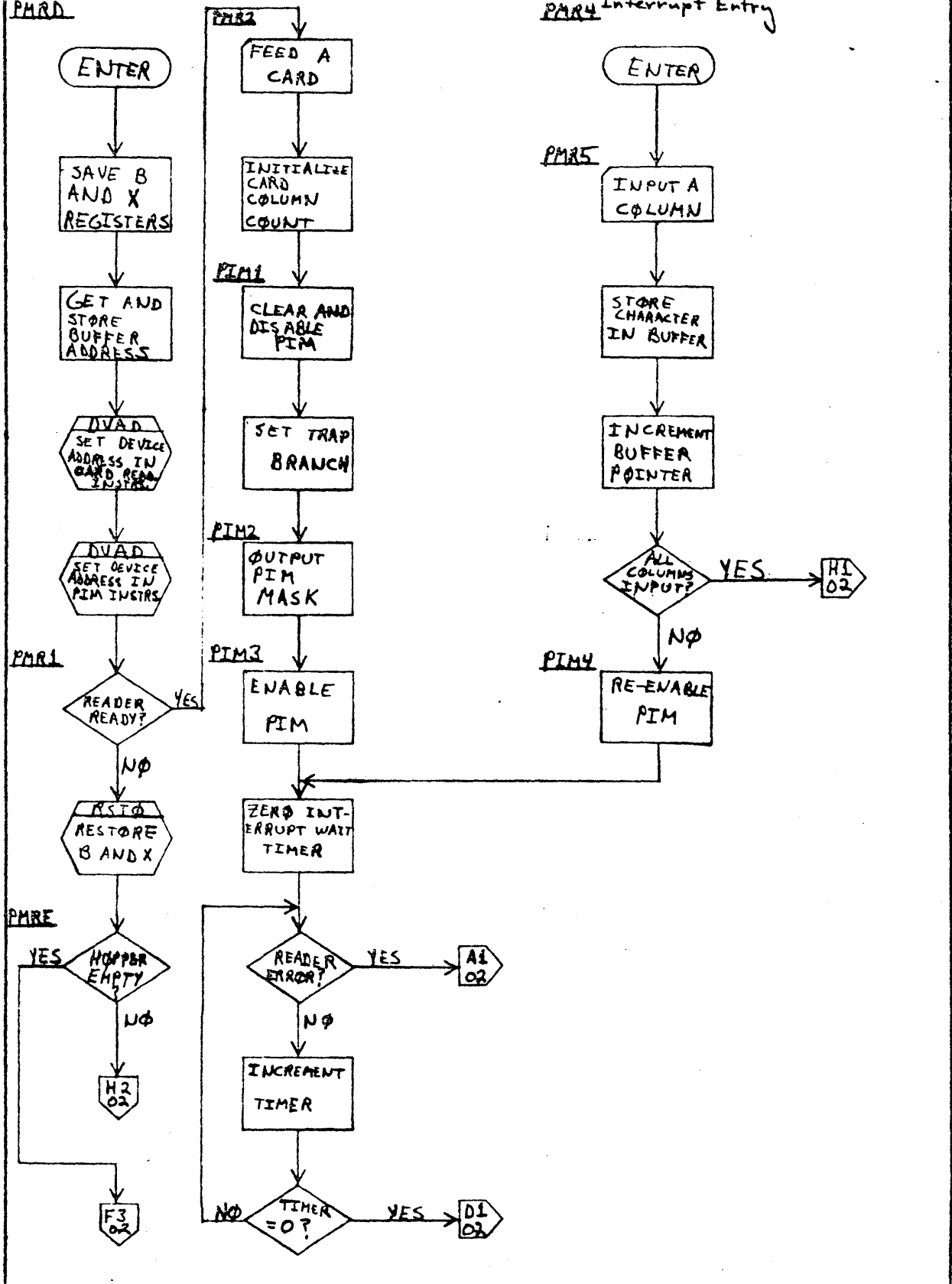
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Flowchart Worksheet

PROGRAMMER: P. Wallace PROGRAM NO.: DATE PAGE 1

CHART I.D. PMRD CHART NAME PROGRAM NAME Interrupt Entry



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Exception Conditions: The device address of card reader and the first device address of BIC must be stored in \$CRD and \$BIC before entry.

Timing: 900 cards per minute for 620-22 and 300 cards per minute for 620-25.

Size: 0136 words.

Comments: The user must set \$CRD and \$BIC to the card reader device address and first BIC device address before calling BCRD. The return points must also contain jumps to the appropriate processors.

Special Notation: N.A.

Hardware Details: SEN 0630, SEN 0330, SEN 020, EXC 021, OAR 020, OAR 021, EXC 020, EXC 0230, SEN 0230, SEN 021*

Flowcharts: See following sheets.

*Device addresses of 30 and 20 are assumed for the card reader and BIC, respectively.



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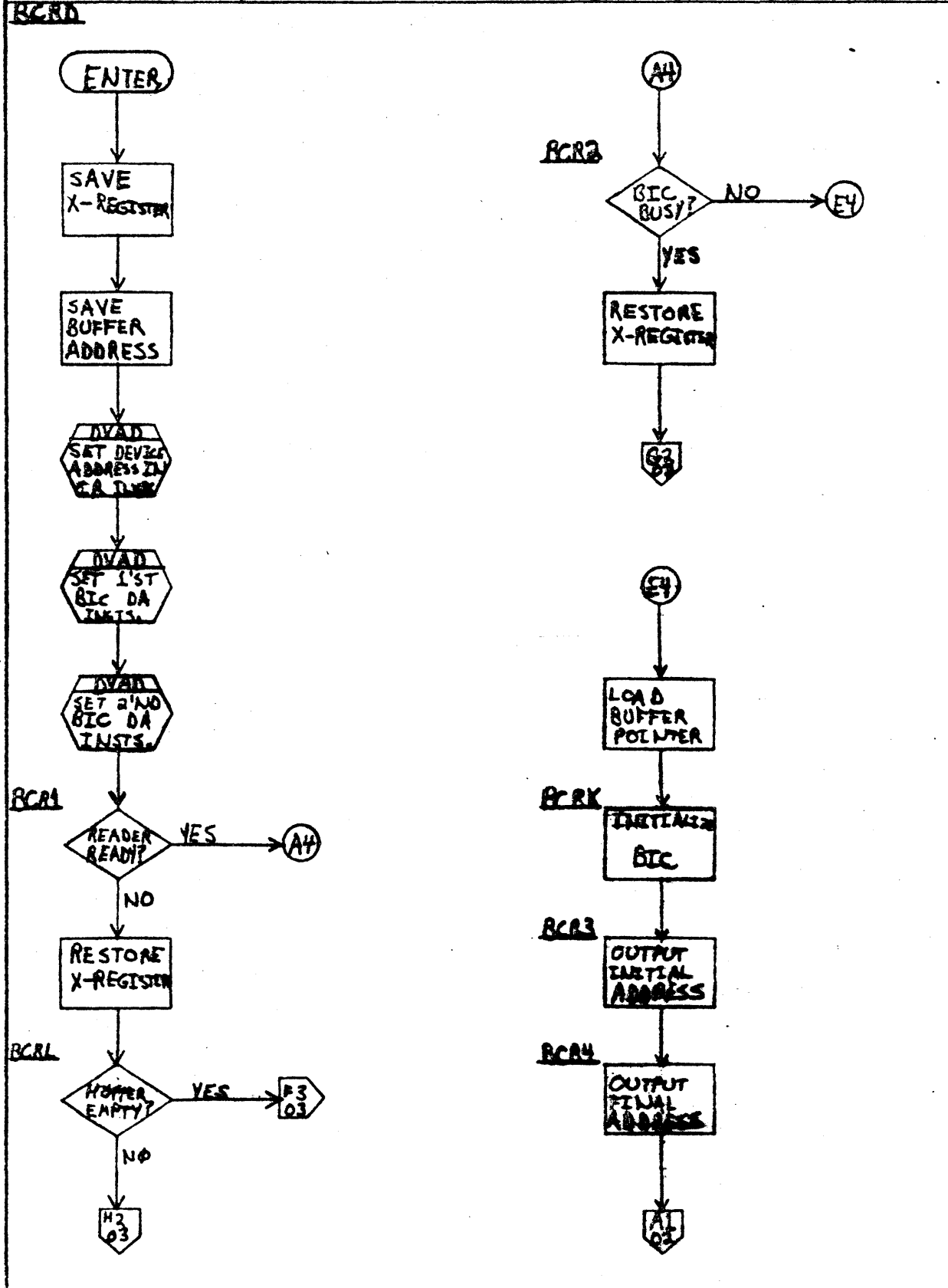
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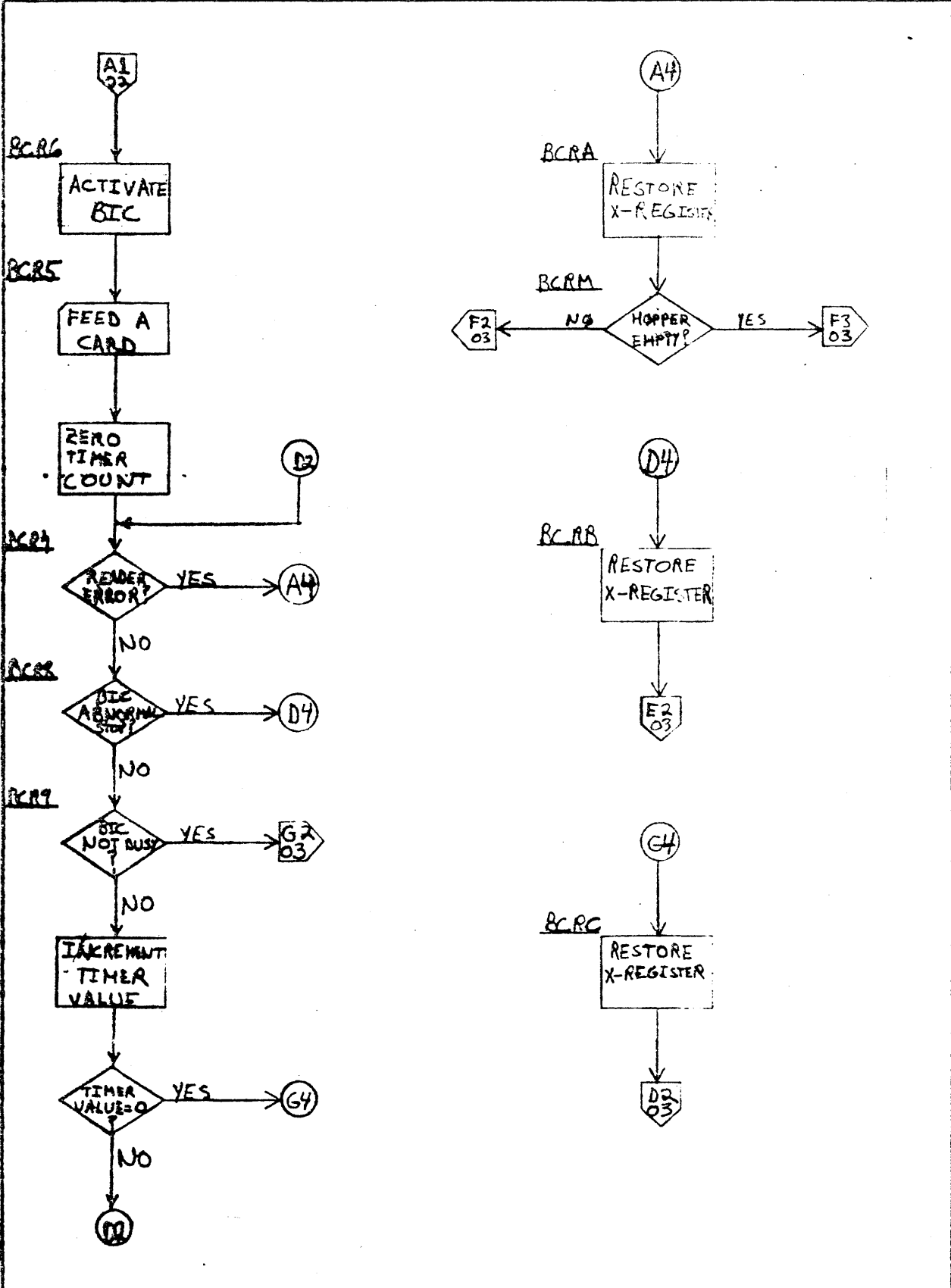
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↑ - PLS REFER AT DOTTED LINE



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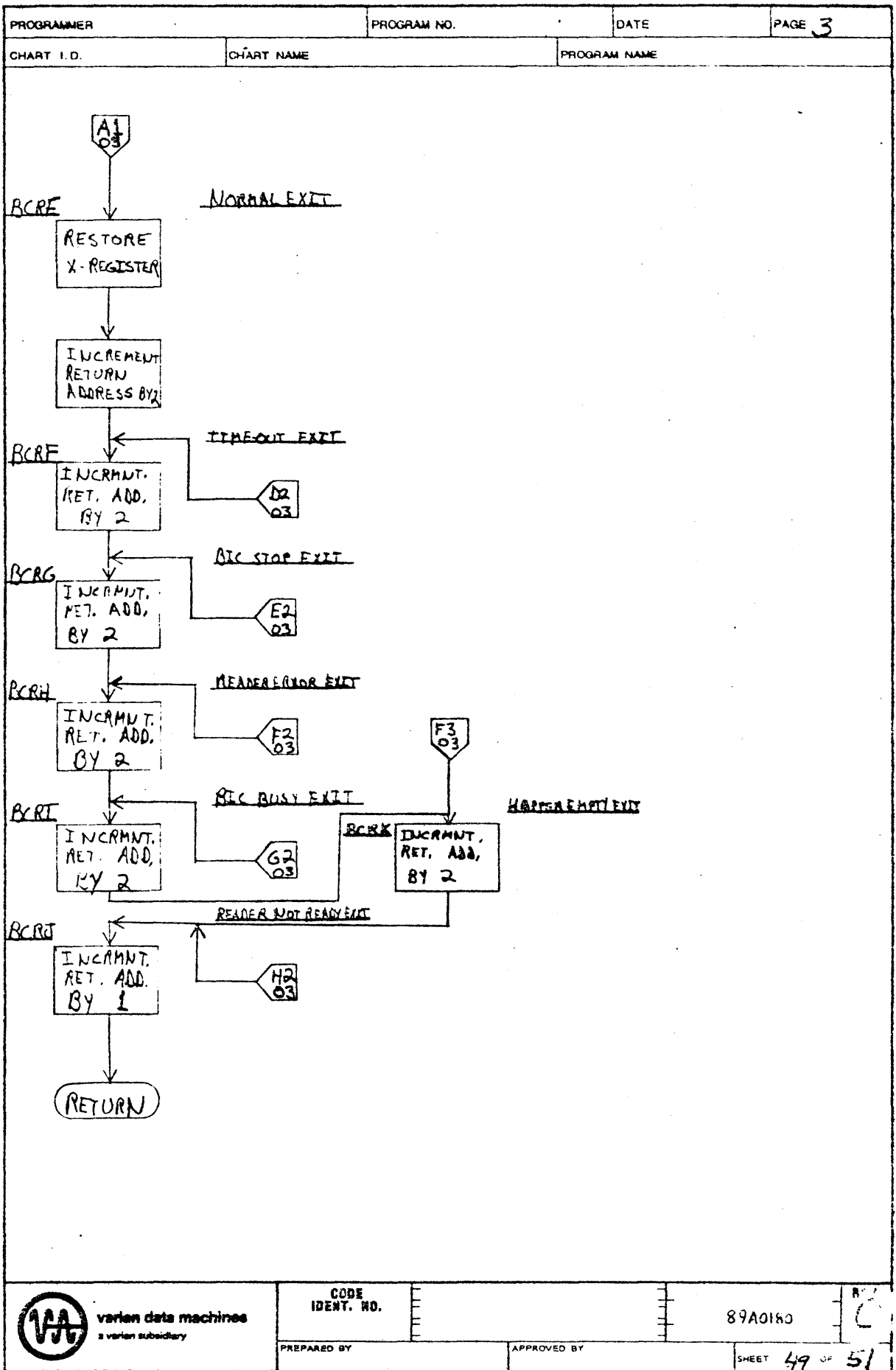
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SECTION 4: TEST SPECIFICATIONS

4.1 OBJECTIVES

The purpose of this section is to provide the user with information as to which hardware configurations have been run with the 620 Card Reader Test and give hardcopy examples of TTY output as a result of running the test in Teletype Mode. Within reason, a concerted attempt was made to test as many combinations of conditions as possible and provide example output.

4.2 CONFIGURATION

The following hardware configurations were successfully checked out with the program:

620/F-100 with 620-25

4.3 TEST RECOMMENDATIONS

In order to thoroughly test the card reader, it is necessary to simulate certain error conditions to see if a card reader error (or in the case of a dark check reader not ready is sensed) is then sensed. A pick failure is created by placing the thumb below the bottom of the deck in the input hopper during the reading of cards. Produce enough upward pressure to keep the next card from being fetched but do not push-up the deck and thereby produce a hopper empty.

A hopper empty is best produced by allowing the cards to run-out in the input hopper.

The stop button should be pressed (only momentarily, or a time-out will occur) during the reading of cards, and then the reader re-readied to insure that no interference with data transfer takes place.

A light check is produced by inputting card A (on the following page) nested in a deck of good cards: *GREEN Lamp*

A dark check is produced by inputting card B (on the following page) nested in a deck of good cards: *RED Lamp*



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