

REVISIONS

| SYM | DESCRIPTION | APPROVED | DATE |
|-----|---------------------------------|--------------------|---------|
| X | PRE PRODUCTION RELEASE | <i>[Signature]</i> | 5/25/71 |
| A | PRODUCTION RELEASE PER EN 5586. | | |
| B | REVISED PER EN # 80281 | B.B. | 6-6-72 |
| C | REVISED PER EN # 80792 | B.B. | 6-7-72 |

DWG NO

[Signature]

J. P. Spencer
 Director
 Engineering Services

[Signature]

L. E. Taylor
 Director
 Development

| | | |
|------|--------------------|---------|
| DR | S. Greaves | 1/8/71 |
| CHK | | |
| DSGN | <i>[Signature]</i> | 2/1/71 |
| ENGR | <i>[Signature]</i> | 4/9/71 |
| APPD | <i>[Signature]</i> | 2/21/71 |
| APPD | <i>[Signature]</i> | 1/22/71 |



varian data machines / a varian subsidiary
 2722 michelson drive / irvine / california / 92604

TITLE

SOFTWARE PERFORMANCE SPECIFICATION
 620 CARD READER TEST

THIS DOCUMENT MAY CONTAIN PROPRIETARY INFORMATION AND SUCH INFORMATION MAY NOT BE DISCLOSED TO OTHERS FOR ANY PURPOSE OR USED TO PRODUCE THE ARTICLE OR SUBJECT, WITHOUT WRITTEN PERMISSION FROM VDM

| | | | |
|----------------|---------|---------|-----|
| CODE IDENT NO. | SIZE | DWG NO. | REV |
| 21101 | A | 89A0180 | C |
| SCALE | SHEET 1 | | 51 |

96A0153-0006

TABLE OF CONTENTS

| | | |
|-------------------|---------------------------------------|-----------|
| SECTION 1: | TEST PROGRAM OVERVIEW | 3 |
| | Introduction | 3 |
| | Program Design Overview | 3 |
| | Hardware Summary | 4 |
| SECTION 2: | EXTERNAL SPECIFICATIONS | 6 |
| | General | 6 |
| | Loading Procedure | 6 |
| | Operating Procedure | 7 |
| | Output Statements | 13 |
| | Input Statements | 14 |
| | Halt Table | 14 |
| SECTION 3: | INTERNAL SPECIFICATIONS | 17 |
| | Component Specifications | 17 |
| | Memory Map | 17 |
| | I/O Commands Tested | 17 |
| | Component Descriptions and Flowcharts | 19 |
| SECTION 4: | TEST SPECIFICATIONS | 50 |
| | Objectives | 50 |
| | Configuration | 50 |
| | Test Recommendations | 50 |



varian data machines
a varian subsidiary

**CODE
IDENT. NO**

89A0180

REV
C

PREPARED BY

APPV.

SNT 2 OF 51

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



varian data machines
a control subsidiary

CODE
IDENT. NO

89A0180

REV

C

PREPARED BY

APPR.

SHT 3 OF 51

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.



varian data machines
A JAFFAN subsidiary

CODE
IDENT. NO

89A0180

REV

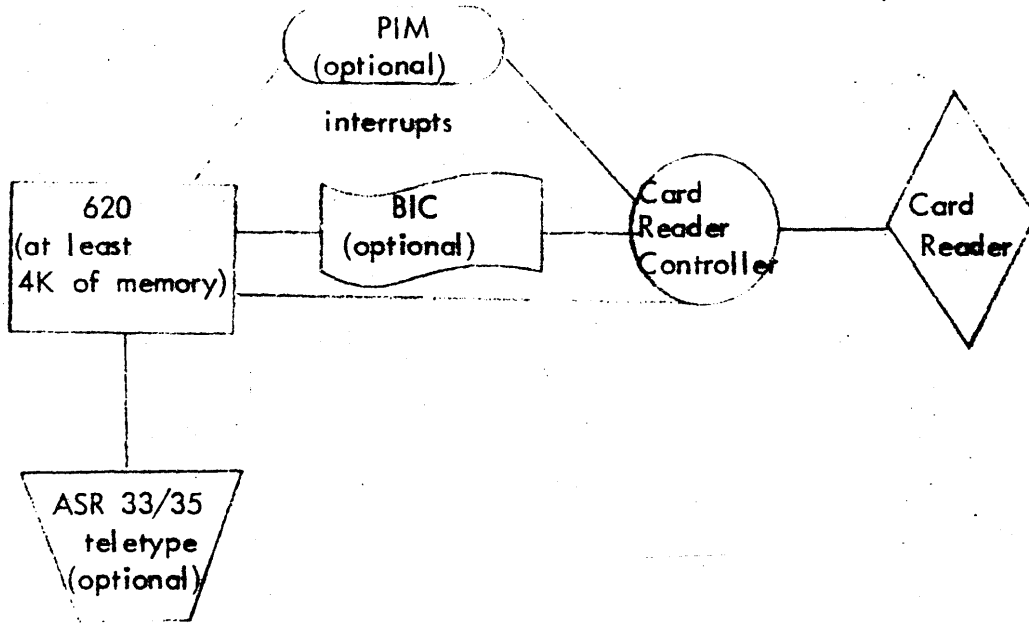
C

PREPARED BY

APP.

SHT 4 OF 51

A hardware diagram is given below:



varian data machines
a varian subsidiary

CODE
IDENT. NO

89A0180

REV

C

PREPARED BY

APPR.

SHT 5 OF 51

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).



varian data machines
a varian subsidiary

CODE
IDENT. NO

89A0180

REV

C

PREPARED BY

APPR.

SHT 6 OF 51

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</u> | <u>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.



varian data machines
a varian subsidiary

CODE
IDENT. NO

89A0180

REV

C

PREPARED BY

APPR.

SHT 7 OF 51

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



varian data machines
a varian subsidiary

CODE IDENT. NO

89A0180

REV
C

PREPARED BY

APPR

SHT 8 OF 51

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 ' ← '.



varian data machines
a varian subsidiary

CODE
IDENT. NO

89A0180

REV

C

PREPARED BY

APPR.

SHT 9 OF 51

| <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



varian data machines
a varian subsidiary

CODE
IDENT. NO

89A0180

REV

C

PREPARED BY

APP.

SHT 10 OF 51

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.



varian data machines
a varian subsidiary

CODE
IDENT. NO

89A0180

REV

C

PREPARED BY

APPR

SHT 11 OF 51

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 |



varian data machines
a varian subsidiary

CODE
IDENT. NO

89A0180

REV

0

PREPARED BY

APPR.

SHT 12 OF 51

| <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



varian data machines
 a varian subsidiary

CODE
 IDENT NO.
21101

89A0180

SH 13 OF 51 REV

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. |



varian data machines
 a varian subsidiary

CODE
 IDENT. NO

89A0180

REV

C

PREPARED BY

APPR.

SHT 14 OF 51

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. |



varian data machines
a varian subsidiary

CODE IDENT. NO

89A0180

REV

C

PREPARED BY

APPR.

SHT 15 OF 51

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 |



varian data machines
a varian subsidiary

CODE IDENT. NO

89A0180

REV

C

PREPARED BY

APPR.

SHT 16 OF 51

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)



varian data machines
a varian subsidiary

CODE
IDENT. NO

89A0180

REV

C

PREPARED BY

APPD

SHT 17 OF 51

| <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 |



varian data machines
a varian subsidiary

CODE
IDENT. NO

89A0180

REV
C

PREPARED BY

APPR.

SHT 13 OF 5

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.



varian data machines
a varian subsidiary

CODE
IDENT. NO

89A0180

REV

C

PREPARED BY

APPR

SHT 19 OF 51

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.



varian data machines
a varian subsidiary

CODE
IDENT. NO

89A 0180

REV

C

PREPARED BY

APPR.

SHT 2 OF 51

Flowchart Worksheet

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

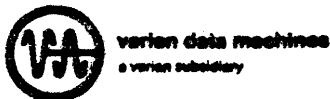
START

```

    graph TD
      ENTER([ENTER]) --> CT00
      CT00 --> D1_01{CONSOLE MODE?}
      D1_01 -- YES --> A4_04[/A4 04/]
      D1_01 -- NO --> O1_01{{OUTD TYPE 'G20 CARD READER TEST'}}
      O1_01 --> D1_01
      D1_01 -- YES --> A4_04
      D1_01 -- NO --> O1_01
      O1_01 --> G1((G1))
      G1 --> S1[SET FLAG FOR NO OPTIONS]
      S1 --> A3_02[/A3 02/]
      G1 --> D2_01{CONSOLE MODE?}
      D2_01 -- YES --> A4_04
      D2_01 -- NO --> O2_01{{OUTD TYPE 'OPTIONS'}}
      O2_01 --> G1
      O2_01 --> CT31
      CT31 --> O3_01{{OUTC CARRIAGE RETURN AND LINE FEED}}
      O3_01 --> H1((H1))
      H1 --> I1_01{{INPD INPUT 'Y' OR 'N'}}
      I1_01 --> D3_01{H1}
      D3_01 --> H1
      D3_01 --> A3((A3))
      A3 --> D4_01{WAS INPUT 'Y'?}
      D4_01 -- YES --> A5((A5))
      D4_01 -- NO --> O4_01{{OUTG TYPE 'INVALID'}}
      O4_01 --> G1
      A5 --> S2[SET FLAG FOR OPTIONS]
      S2 --> O5_01{{OUTD REQUEST CARD READER DEV. ADDR}}
      O5_01 --> D5((D5))
      D5 --> I2_01{{INPC GET CARD READER DEV. ADDR}}
      I2_01 -.-> D6_01{D5}
      D6_01 -.-> D5
      D5 --> G5((G5))
      G5 --> S3[STORE CARD READER DEVICE ADDRESS]
      S3 --> O6_01{{OUTD TYPE 'PERFORM INITIALIZATION TEST?'}}
      O6_01 --> A1_02[/A1 02/]
  
```

↑ OLD UNDER AT DOTTED LINE

H1: SS3 SET RETURN
 H1: ABORT INPUT RETURN
 A3: NORMAL RETURN
 A3: DELETE LAST CHART RETURN
 D5: SS3 SET RETURN
 D5: ABORT INPUT RETURN
 G5: SS3 SET RETURN
 G5: ABORT INPUT RETURN
 G5: DELETE LAST CHART RETURN



CODE IDENT. NO.

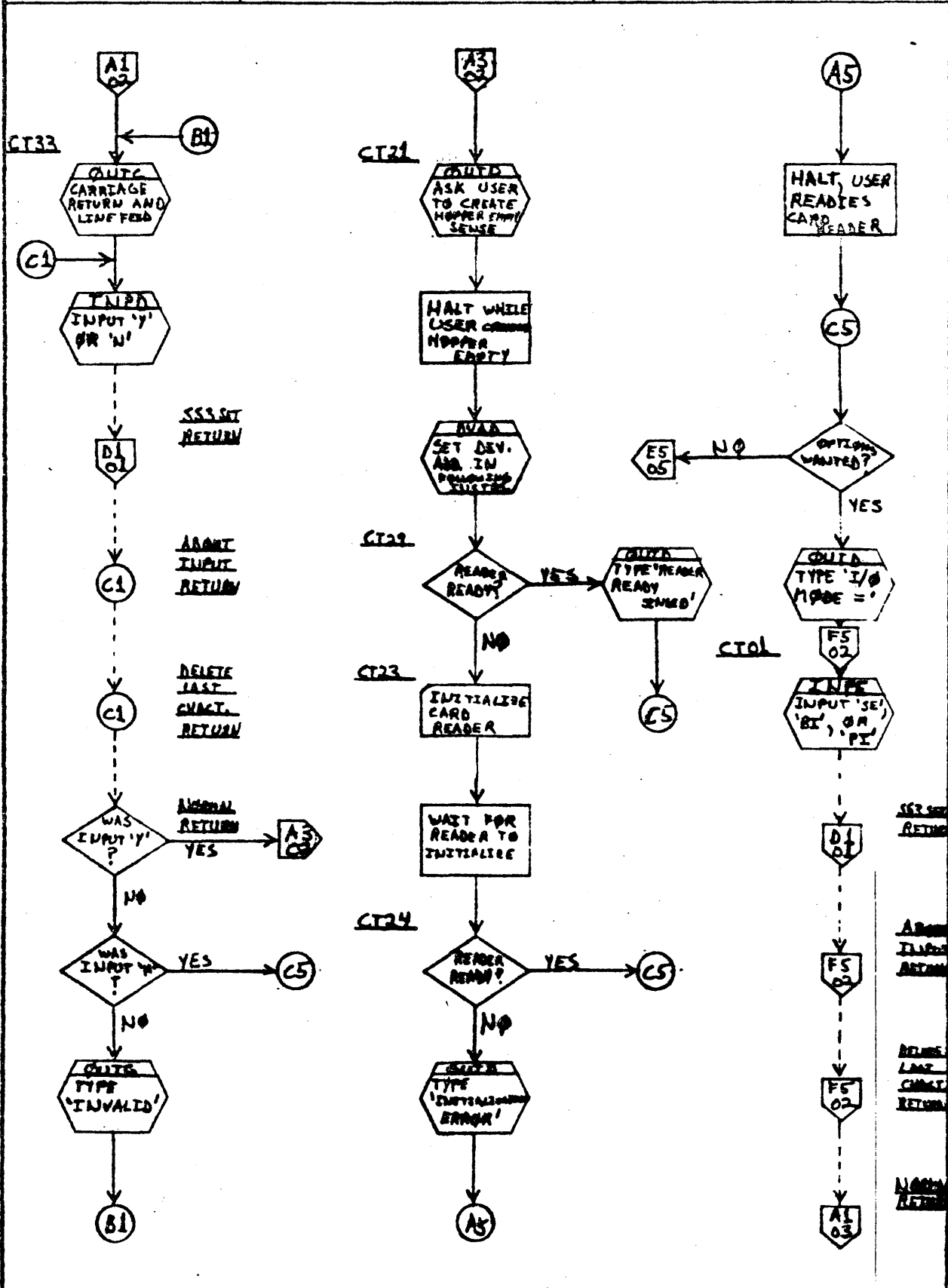
89A0100

PREPARED BY

APPROVED BY

Flowchart Worksheet

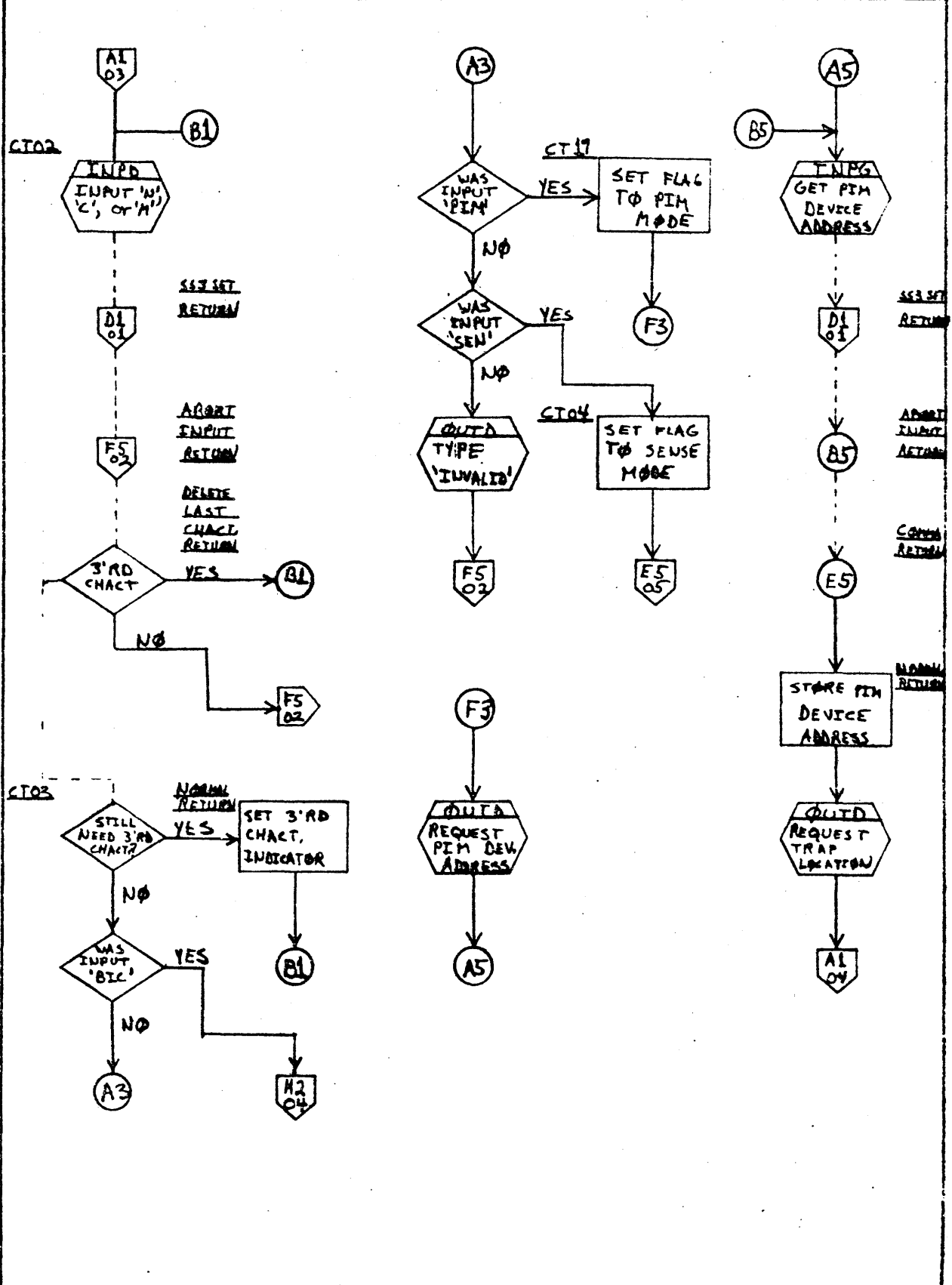
| | | | |
|-------------|--------------|--------------|--------|
| PROGRAMMER: | PROGRAM NO.: | DATE: | PAGE 2 |
| CHART I.D. | CHART NAME | PROGRAM NAME | |



| | | | |
|---------------------------------------------|-----------------|-------------|----------------|
| varian data machines a varian subsidiary | CODE IDENT. NO. | 89A0186 | SER. C |
| | PREPARED BY | APPROVED BY | SHEET 22 OF 51 |

Flowchart Worksheet

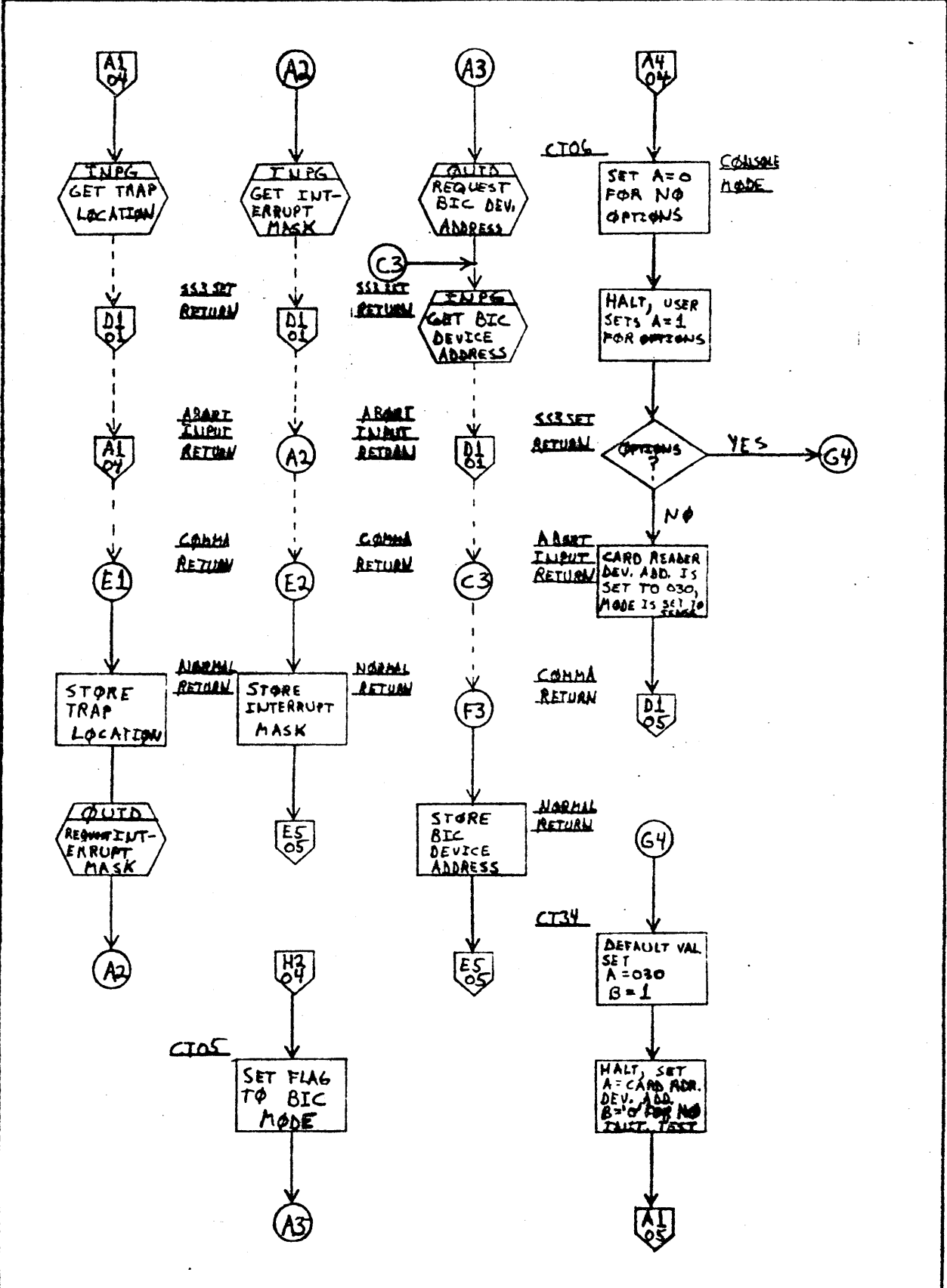
| | | | |
|-------------|--------------|--------------|--------|
| PROGRAMMER: | PROGRAM NO.: | DATE | PAGE 3 |
| CHART I.D. | CHART NAME | PROGRAM NAME | |



| | | | | |
|-------------------------------------------------------------------|-----------------|-------------|----------------|----------|
| varian data machines <small>a varian subsidiary</small> | CODE IDENT. NO. | | 89A0150 | REV C |
| | PREPARED BY | APPROVED BY | SHEET 23 of 51 | |

Flowchart Worksheet

| | | | |
|-------------|--------------|--------------|---------|
| PROGRAMMER: | PROGRAM NO.: | DATE: | PAGE 11 |
| CHART I.D. | CHART NAME | PROGRAM NAME | |

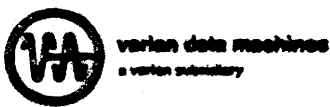
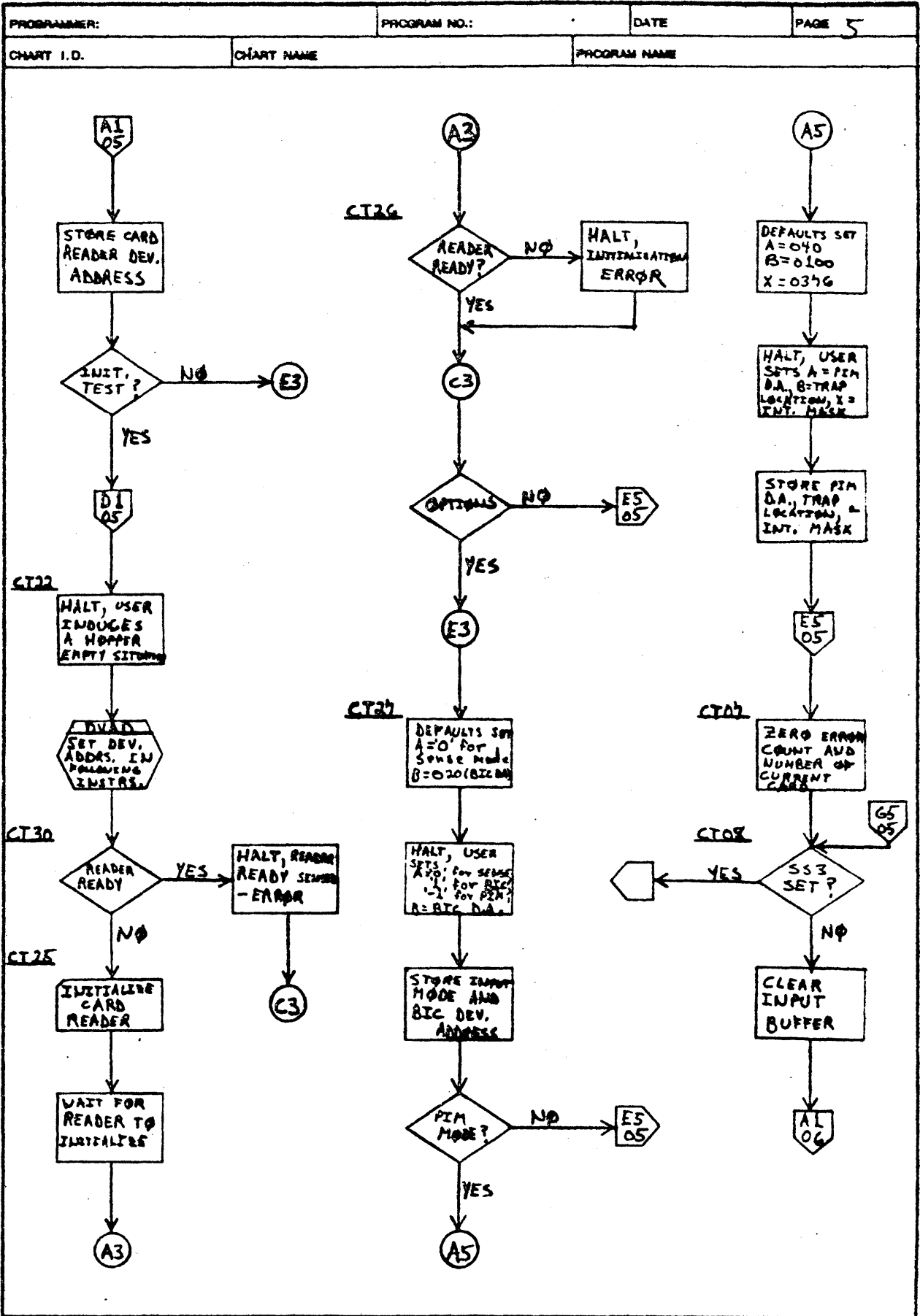


FOLD UNDER AT DOTTED LINE

FOLD UNDER AT DOTTED LINE

| | | | |
|-------------------------------------------------------------------|-----------------|-------------|----------------|
| verion data machines <small>a verion subsidiary</small> | CODE IDENT. NO. | | 89A0180 |
| | PREPARED BY | APPROVED BY | SHEET 24 OF 51 |
| | | | REV. C |

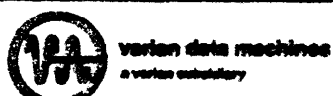
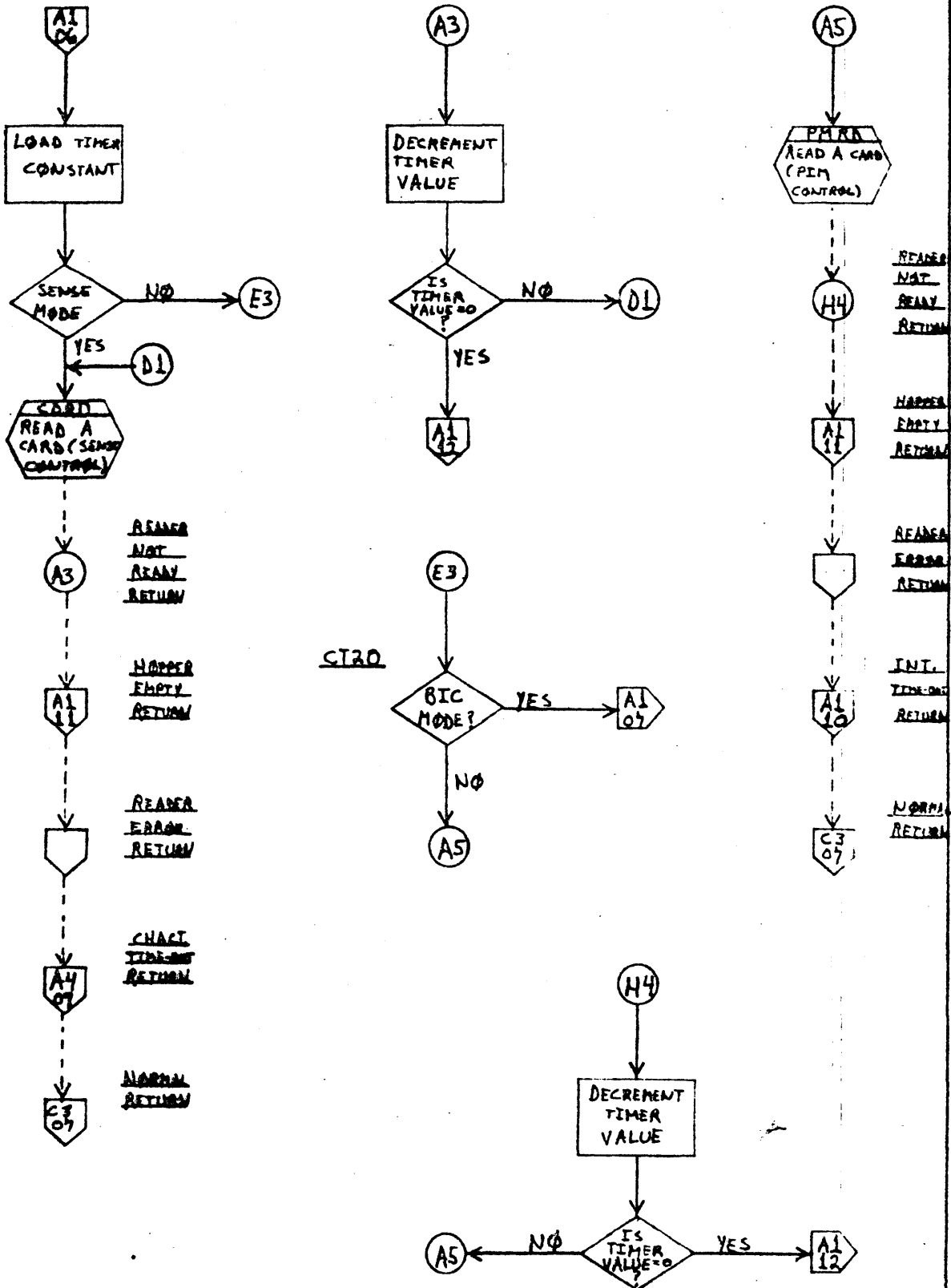
Flowchart Worksheet



| | | | |
|-----------------|-------------|----------------|--------|
| COM. IDENT. NO. | | 87A0180 | REV. C |
| PREPARED BY | APPROVED BY | SHEET 25 OF 51 | |

Flowchart Worksheet

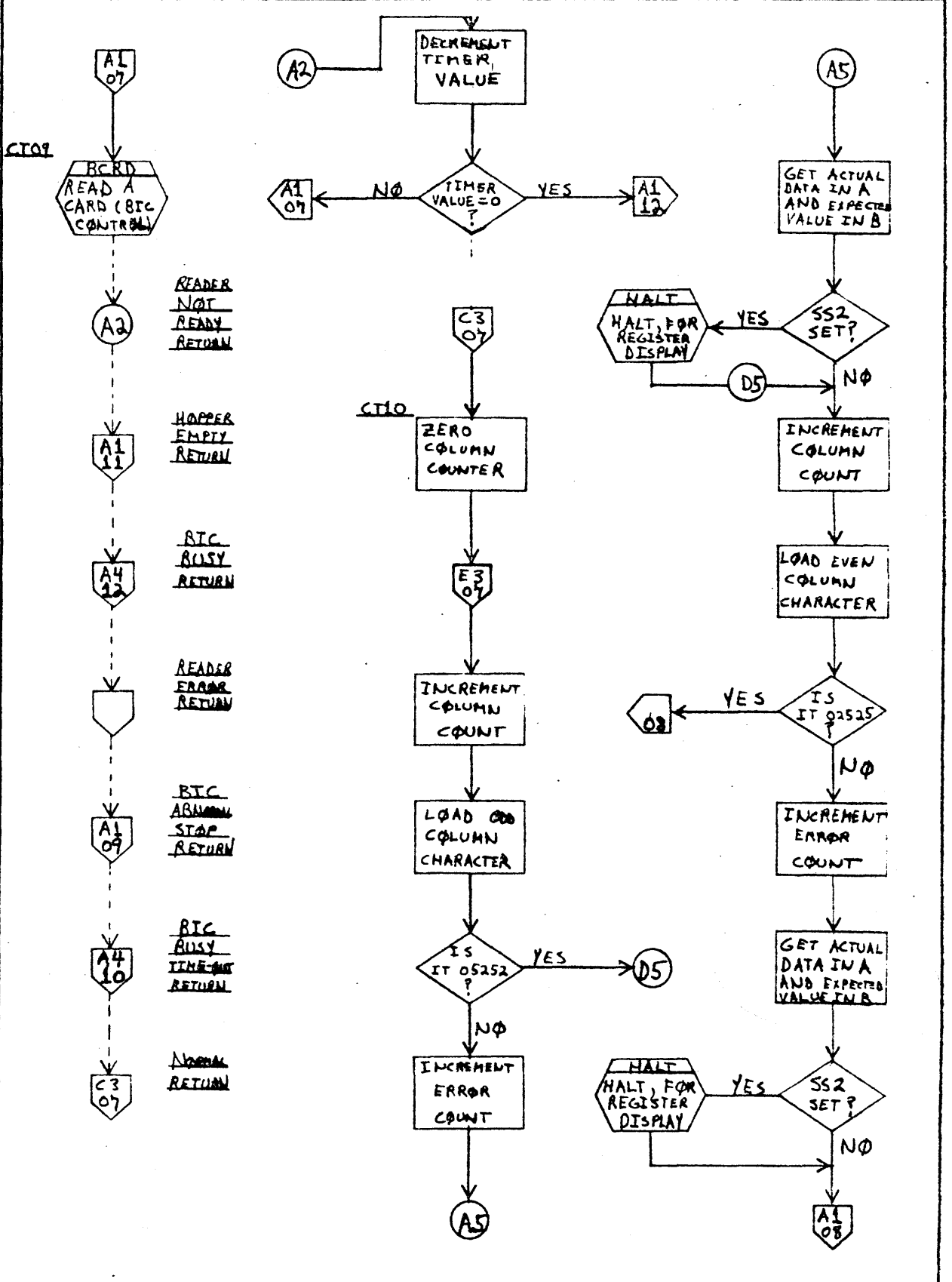
| | | | |
|-------------|--------------|--------------|--------|
| PROGRAMMER: | PROGRAM NO.: | DATE: | PAGE 6 |
| CHART I.D. | CHART NAME | PROGRAM NAME | |



| | | | |
|-----------------|-------------|----------------|-------|
| CODE IDENT. NO. | | 89A0180 | REV C |
| PREPARED BY | APPROVED BY | SHEET 26 OF 51 | |

Flowchart Worksheet

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



↑ FOLD UNDER AT DOTTED LINE

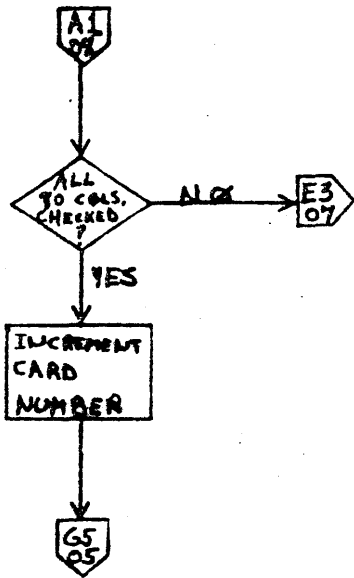
↑ FOLD UNDER AT DOTTED LINE



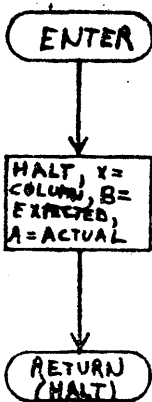
| | | | |
|-----------------|-------------|----------------|--------|
| CODE IDENT. NO. | | 89A0180 | REV. C |
| PREPARED BY | APPROVED BY | SHEET 27 of 51 | |

Flowchart Worksheet

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




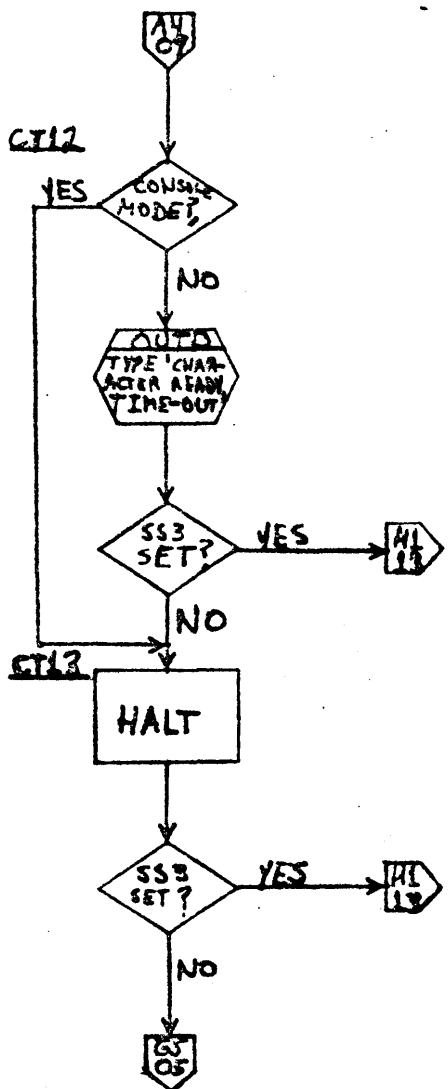
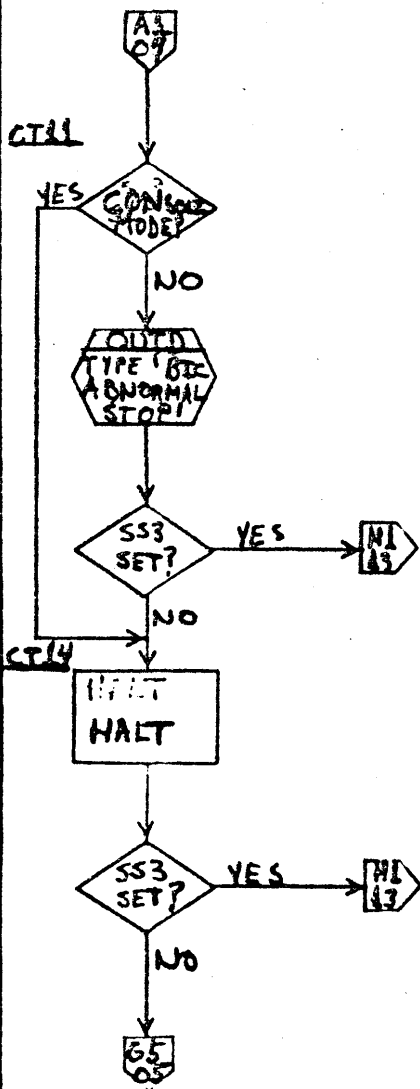
HALT



↑ FOLD UNDER AT DOTTED LINE

↑ FOLD UNDER AT DOTTED LINE

| | | | |
|---------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------|----------------|
|  varian data machines a varian subsidiary | CODE IDENT. NO. | 87A0180 | REV. C |
| | PREPARED BY | APPROVED BY | SHEET 28 of 51 |

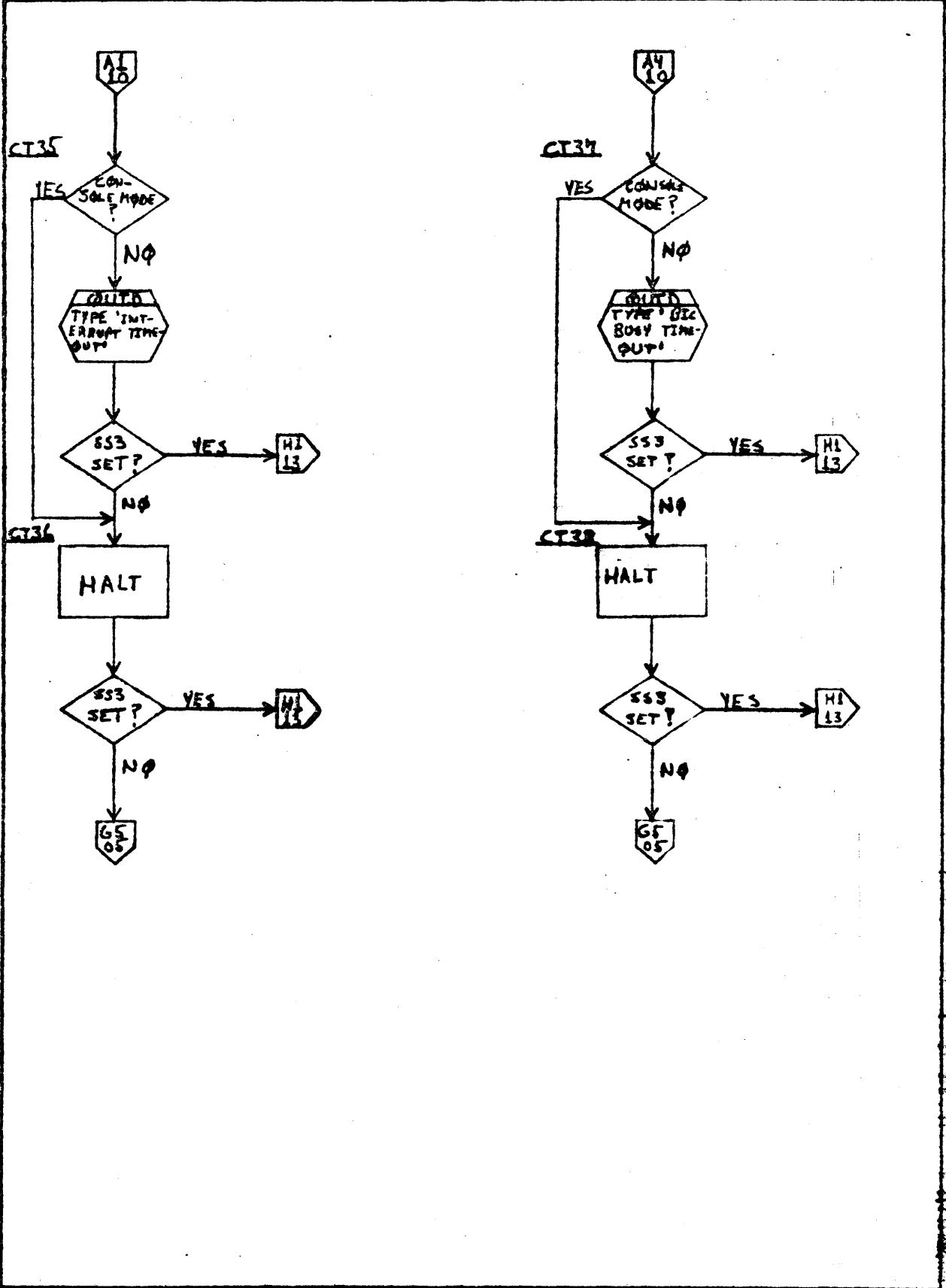


↑ FOLD HERE AT DOTTED LINE

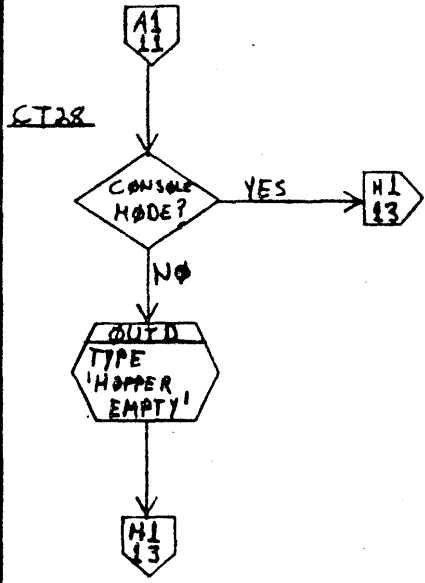
↑ FOLD HERE AT DOTTED LINE

Flowchart Worksheet

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



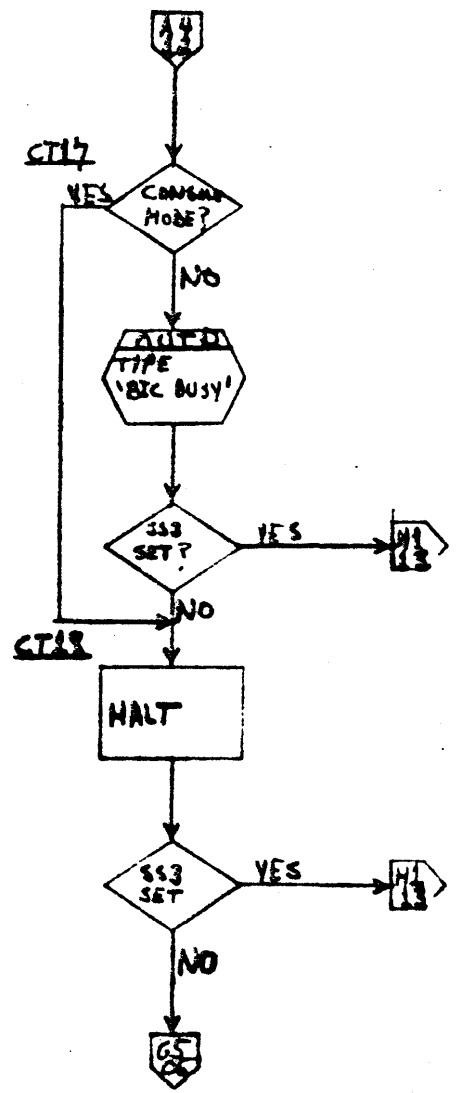
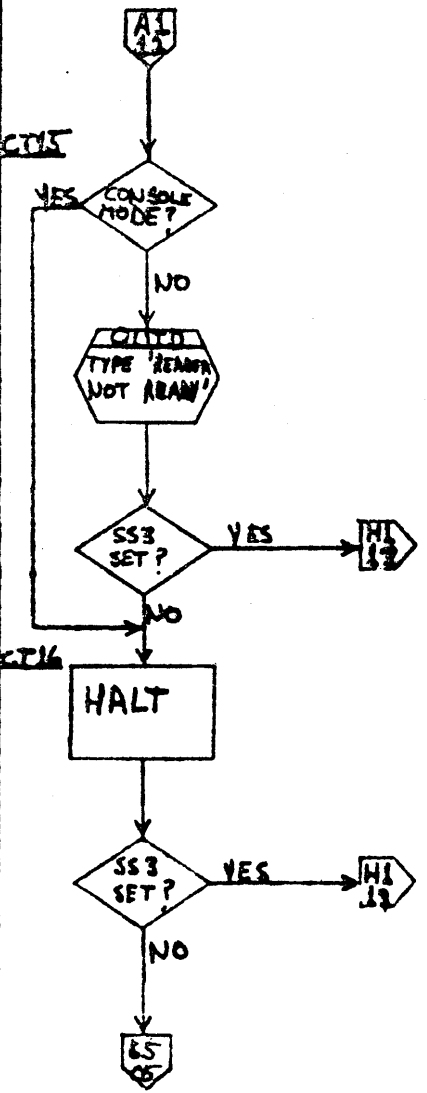
| | | | |
|---------------------------------------------|-----------------|-------------|----------------|
| verion data machines a verion subsidiary | CODE IDENT. NO. | 89A0180 | SP C |
| | PREPARED BY | APPROVED BY | SHEET 30 of 51 |



↑ FOLD UNDER AT DOTTED LINE

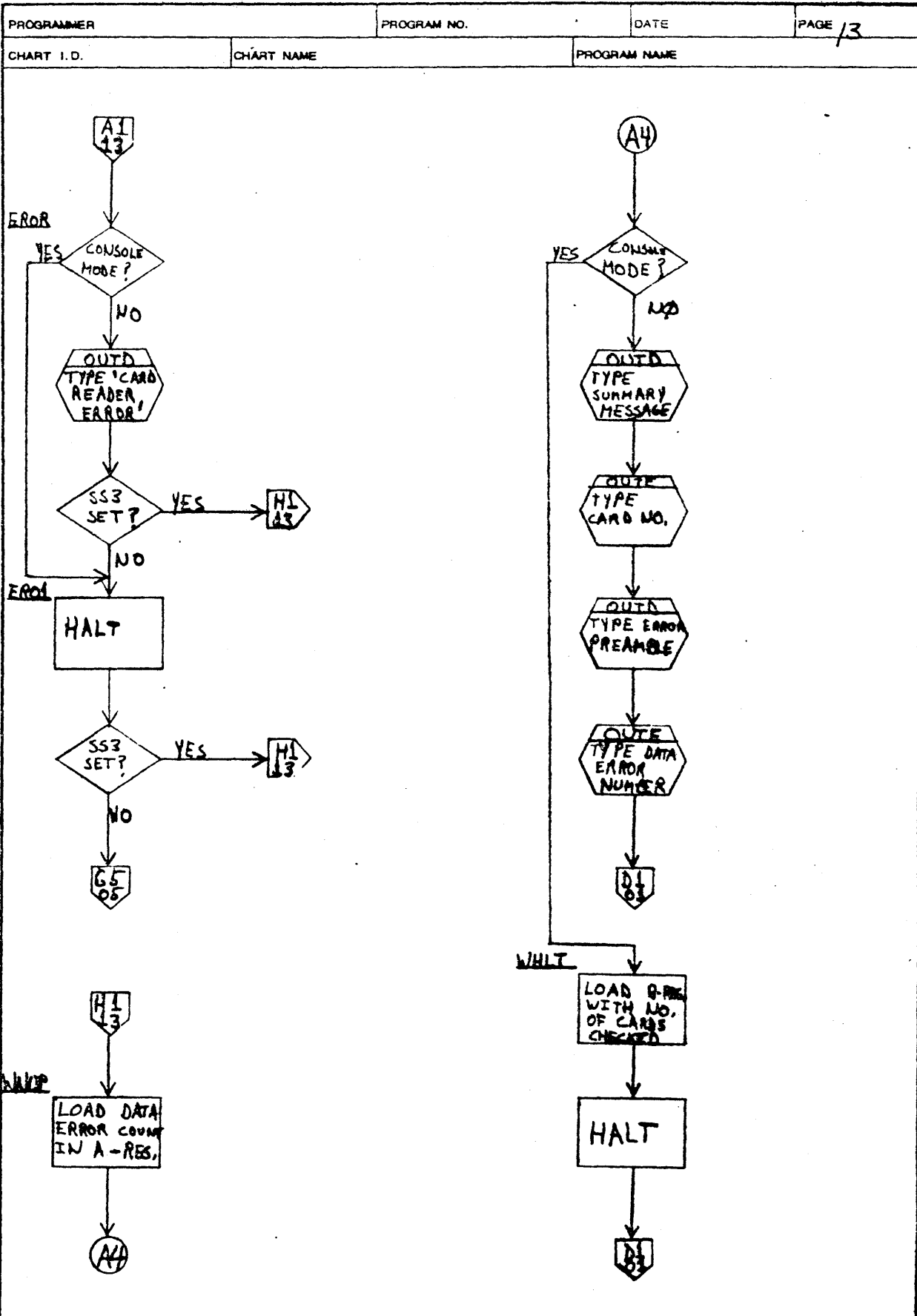
↑ FOLD UNDER AT DOTTED LINE

MA 2240-000A



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.



varian data machines
a varian subsidiary

CODE
IDENT. NO

89A0180

REV

C

PREPARED BY

DATE

SHT 24 OF

51

Comments: N.A.

Special Notation: N.A.

Hardware Details: N.A.

Flowcharts: See following sheet.



varian data machines
a varian subsidiary

CODE
IDENT. NO

89A0180

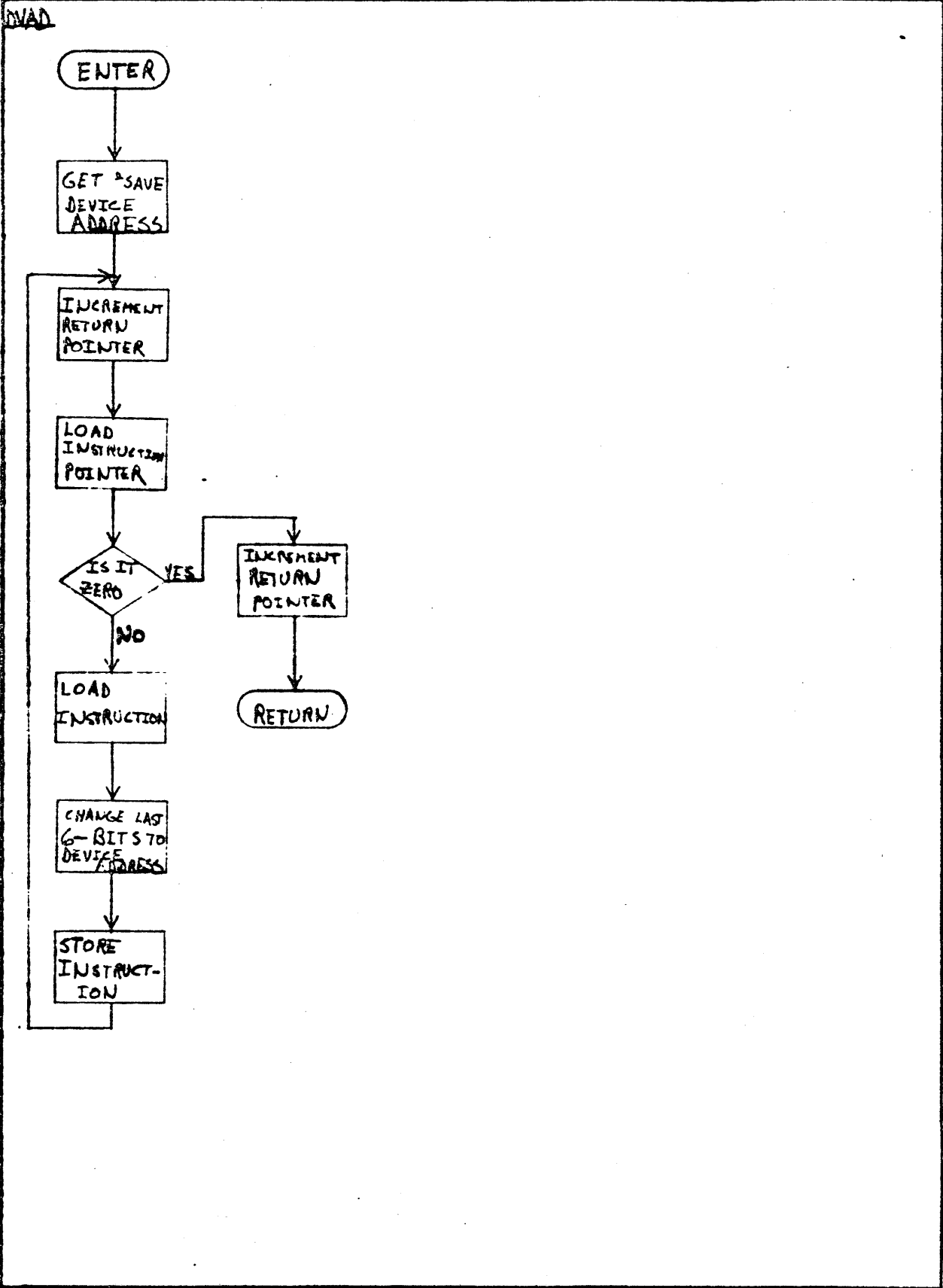
REV

C

PREPARED BY

APPR.

SHT 35 OF 51



↑ 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)



varian data machines
a varian subsidiary

CODE
IDENT. NO

89A0180

REV

C

PREPARED BY

APPR.

SHT. 3 OF 51

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.



varian data machines
a varian subsidiary

**CODE
IDENT. NO**

89A0180

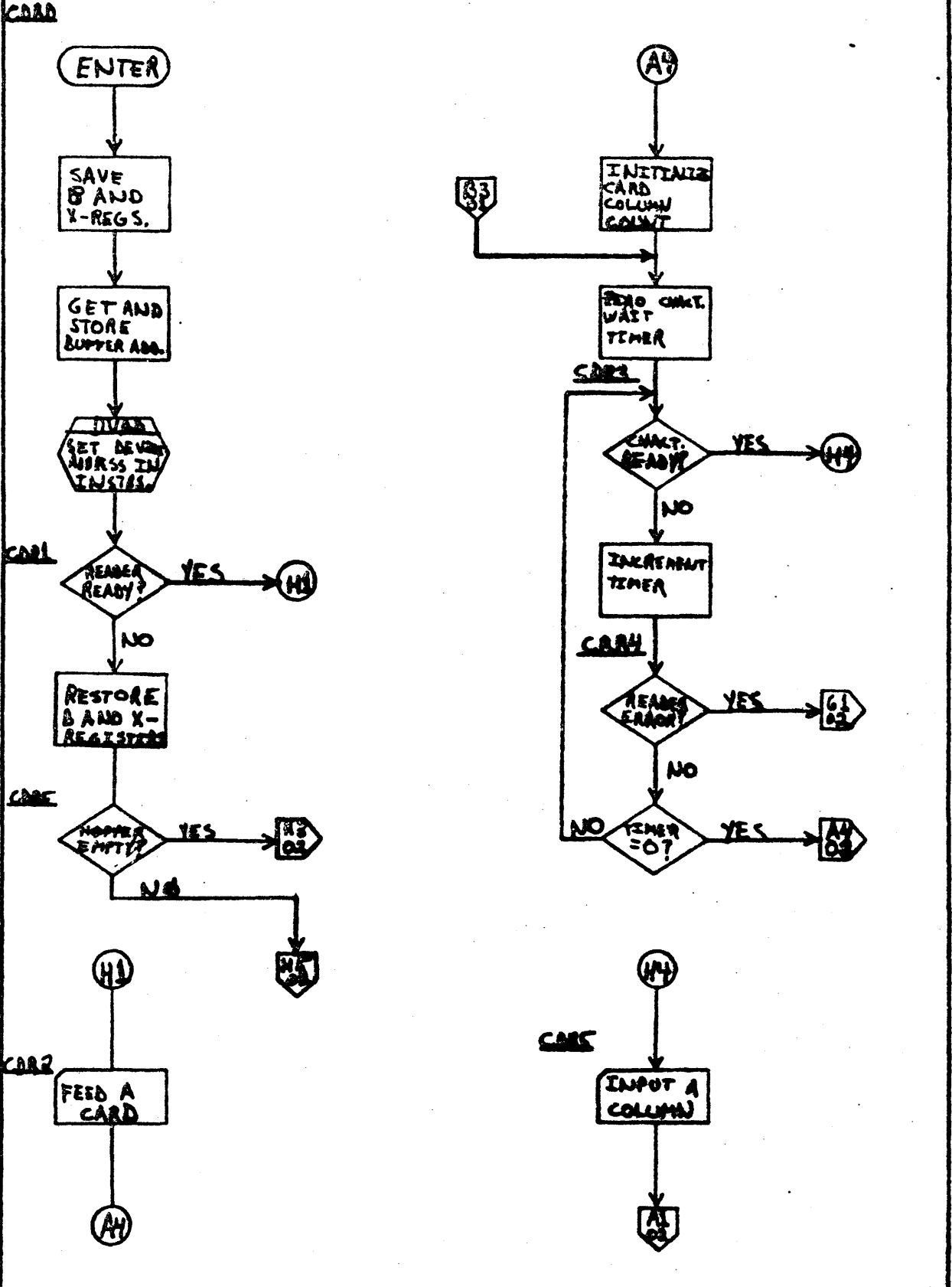
REV

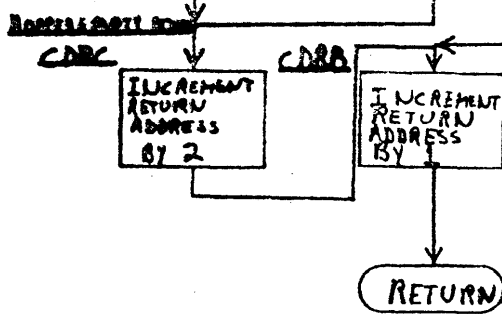
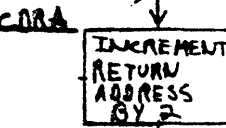
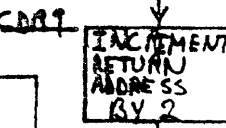
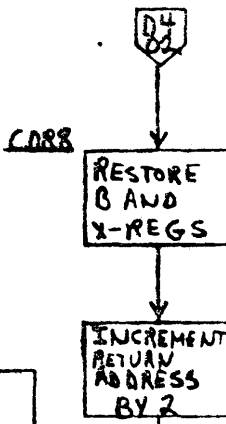
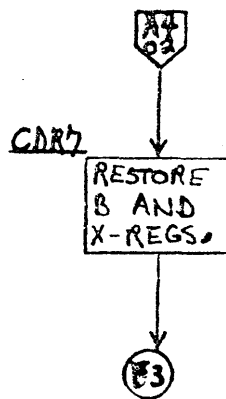
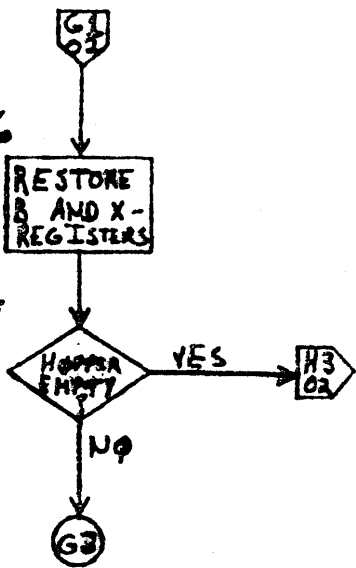
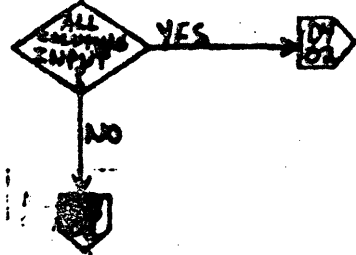
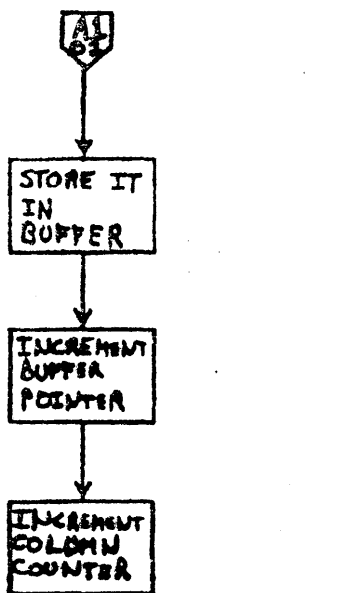
C

PREPARED BY

APPD

SHT 38 OF 51





NORMAL EXIT

TIME-OUT EXIT

READER EXIT

READER NOT READY EXIT

↑ PULL HERE AT DOTTED LINE

↑ PULL HERE AT DOTTED LINE

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.



varian data machines
a varian subsidiary

CODE
IDENT. NO

89A0180

REV

C

PREPARED BY

APPR.

SHT 4 OF 51

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.



varian data machines
a varian subsidiary

CODE
IDENT. NO

89A0180

REV

C

PREPARED BY

APPR.

SHT 49 OF 51

Flowchart Worksheet

| | | | |
|-----------------------------|--------------|-------------------------------------|---------------|
| PROGRAMMER: <u>P. White</u> | PROGRAM NO.: | DATE: | PAGE <u>1</u> |
| CHART I.D. <u>PMRD</u> | CHART NAME | PROGRAM NAME <u>Interrupt Entry</u> | |

PMRD

```

graph TD
    ENTER1([ENTER]) --> SAVE[SAVE B AND X REGISTERS]
    SAVE --> GET[GET AND STORE BUFFER ADDRESS]
    GET --> DVAD1{{DVAD SET DEVICE ADDRESS IN CARD READER INSTRS}}
    DVAD1 --> DVAD2{{DVAD SET DEVICE ADDRESS IN PIM INSTRS}}
    DVAD2 --> PMR1{READER READY?}
    PMR1 -- YES --> PIM1
    PMR1 -- NO --> RSTO{{RSTO RESTORE B AND X}}
    RSTO --> HOPPER{HOPPER EMPTY?}
    HOPPER -- YES --> H2{{H2 O2}}
    HOPPER -- NO --> F3{{F3 O2}}
    
```

PMR2

```

graph TD
    FEED[FEED A CARD] --> INIT[INITIALIZE CARD COLUMN COUNT]
    INIT --> PIM1[CLEAR AND DISABLE PIM]
    PIM1 --> TRAP[SET TRAP BRANCH]
    TRAP --> PIM2[OUTPUT PIM MASK]
    PIM2 --> PIM3[ENABLE PIM]
    PIM3 --> ZERO[ZERO INTERRUPT WAIT TIMER]
    ZERO --> PIM4{READER ERROR?}
    PIM4 -- YES --> A1{{A1 O2}}
    PIM4 -- NO --> INCR[INCREMENT TIMER]
    INCR --> TIMER{TIMER = 0?}
    TIMER -- YES --> D1{{D1 O2}}
    TIMER -- NO --> ZERO
    
```

PMR5

```

graph TD
    ENTER2([ENTER]) --> INPUT[INPUT A COLUMN]
    INPUT --> STORE[STORE CHARACTER IN BUFFER]
    STORE --> INCR[INCREMENT BUFFER POINTER]
    INCR --> ALL{ALL COLUMNS INPUT?}
    ALL -- YES --> H1{{H1 O2}}
    ALL -- NO --> REEN[RE-ENABLE PIM]
    REEN --> PIM3
    
```

PMRE

```

graph TD
    HOPPER -- YES --> H2
    HOPPER -- NO --> F3
    
```



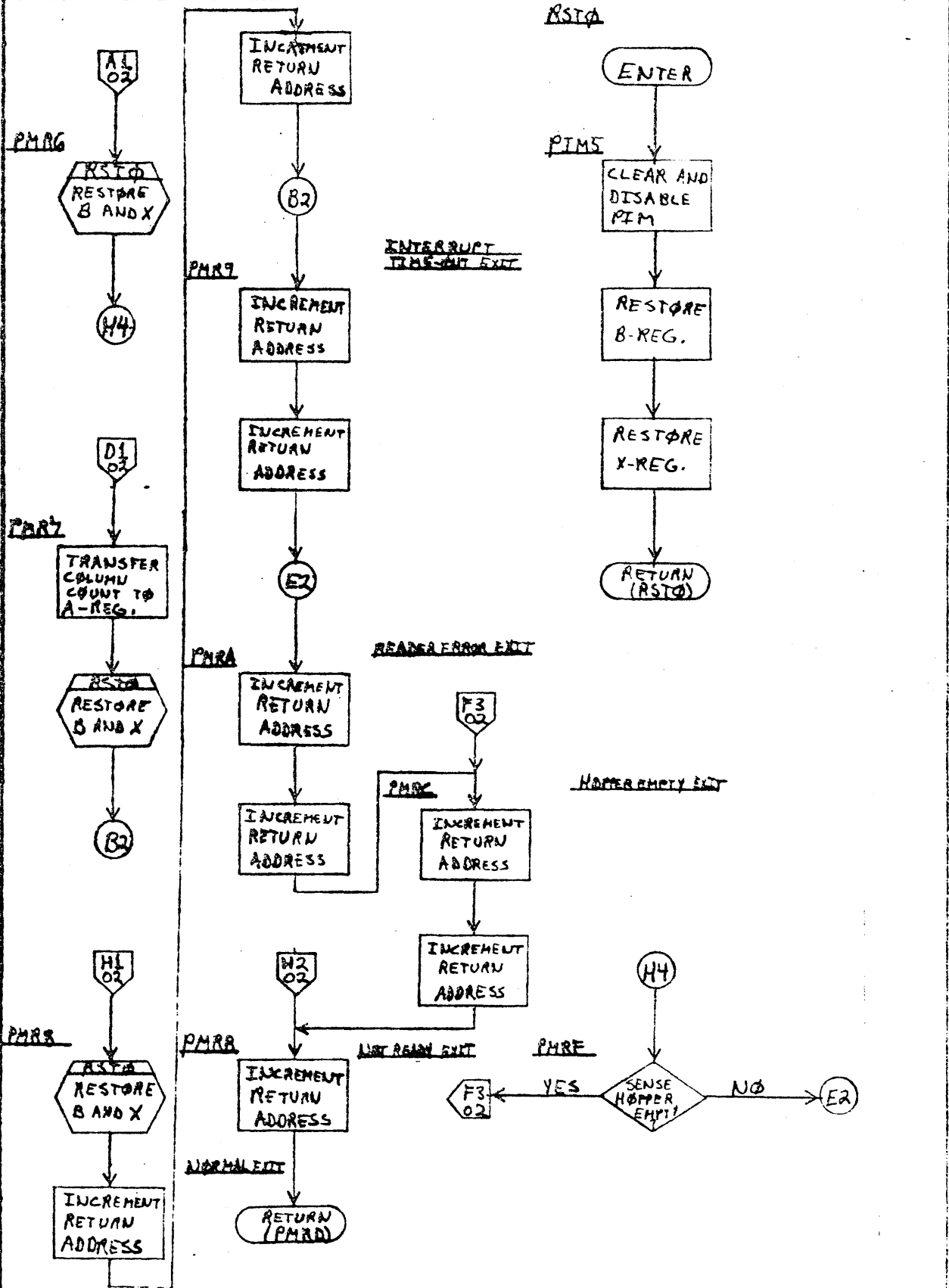
varian data machines
a varian subsidiary

| | | | |
|-----------------|-------------|------------------------------|---------------|
| CODE IDENT. NO. | | 89A0183 | REV. <u>C</u> |
| PREPARED BY | APPROVED BY | SHEET <u>43</u> OF <u>51</u> | |

Flowchart Worksheet

| | | | |
|-------------|--------------|-------|--------|
| PROGRAMMER: | PROGRAM NO.: | DATE: | PAGE 2 |
|-------------|--------------|-------|--------|

| | | |
|------------|------------|--------------|
| CHART I.D. | CHART NAME | PROGRAM NAME |
|------------|------------|--------------|



| | | | |
|---------------------------------------------|-----------------|-------------|----------|
| varian data machines a varian subsidiary | CODE IDENT. NO. | 89A0180 | POM C |
| | PREPARED BY | APPROVED BY | SHEET 44 |

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.



varian data machines
a varian subsidiary

CODE
IDENT. NO

89A0180

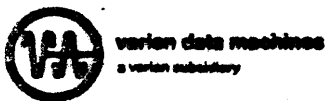
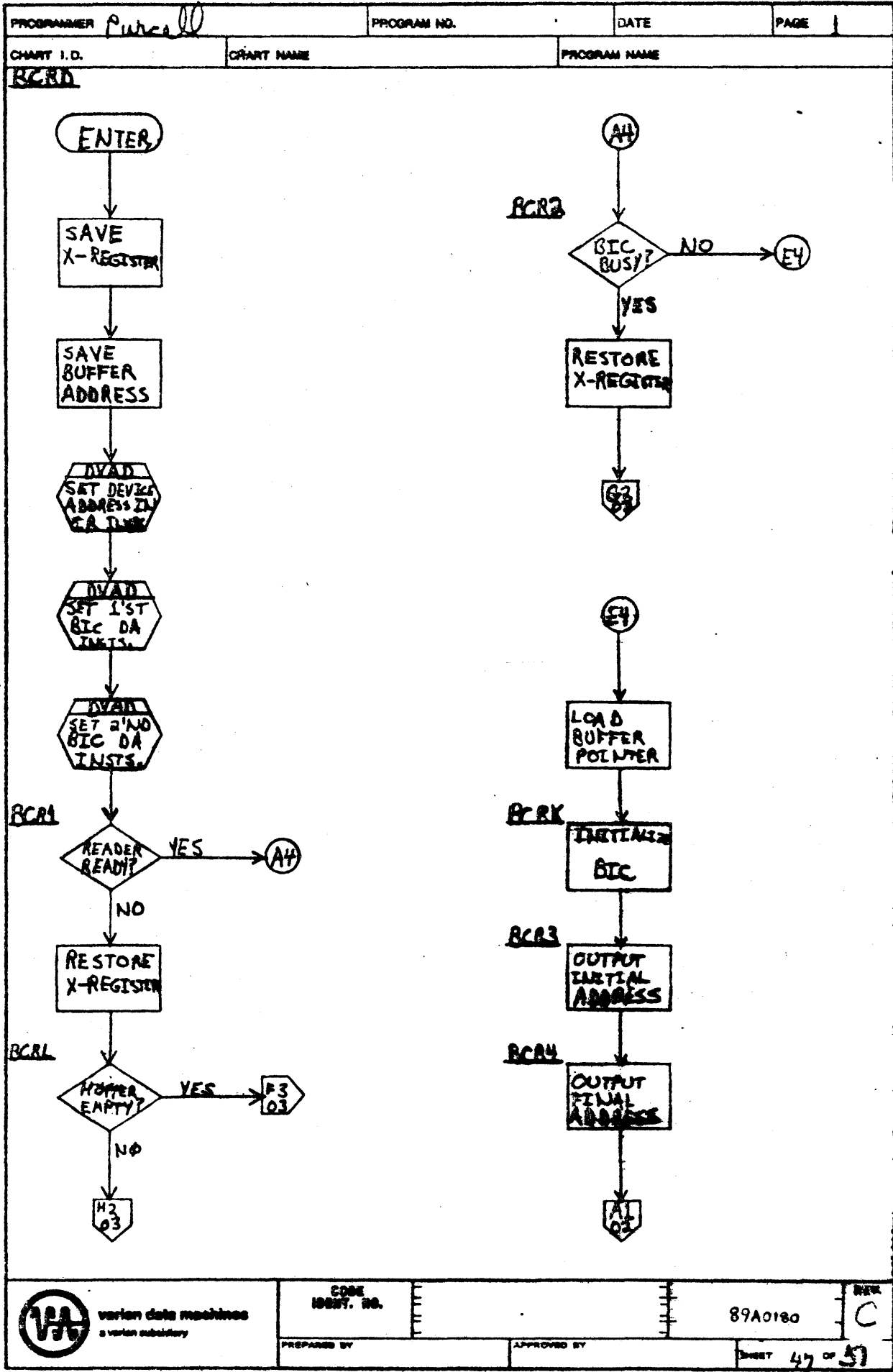
REV

C

PREPARED BY

APPR.

SHT 46 OF 51



CODE IDENT. NO.

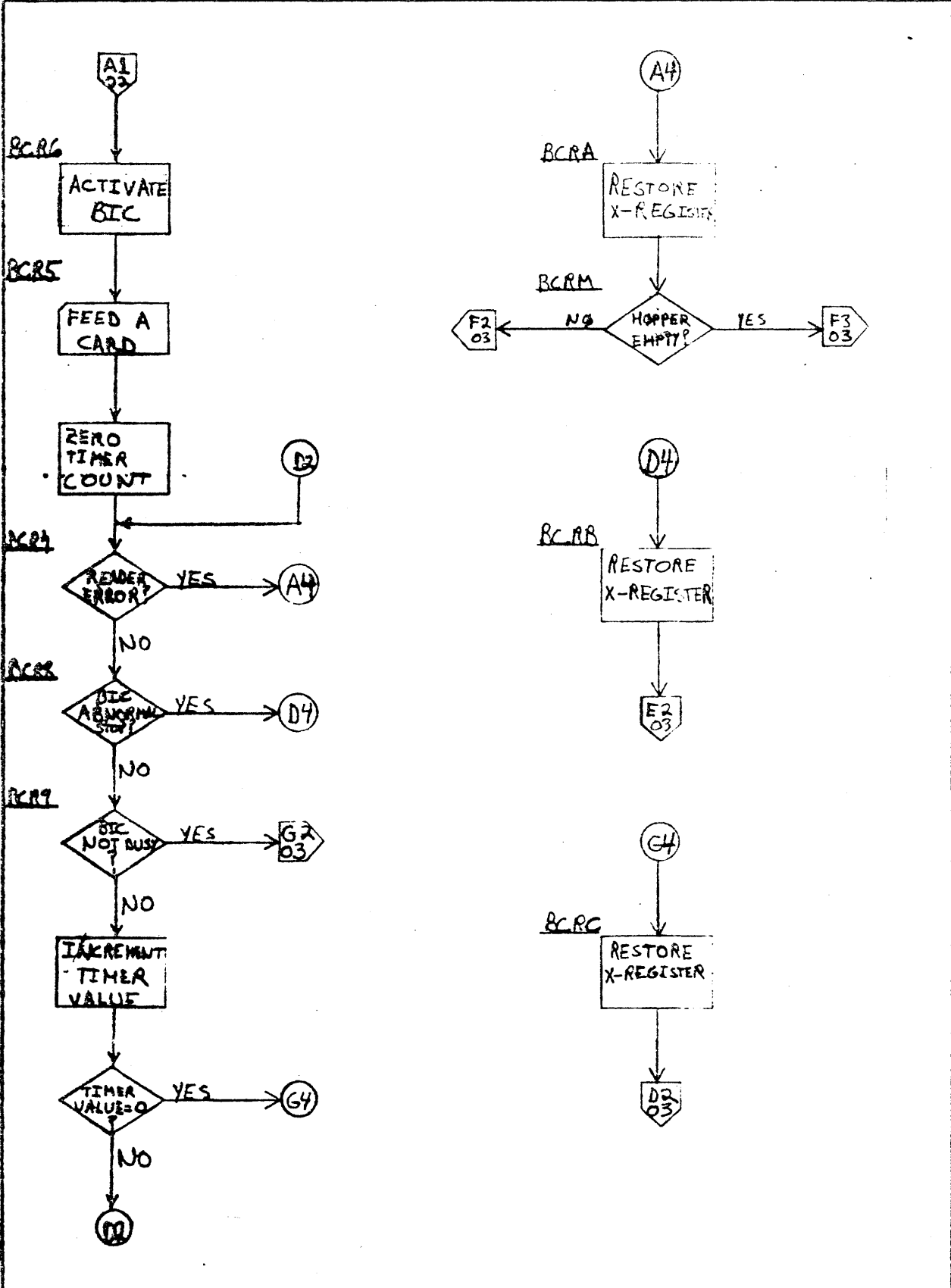
89A0180

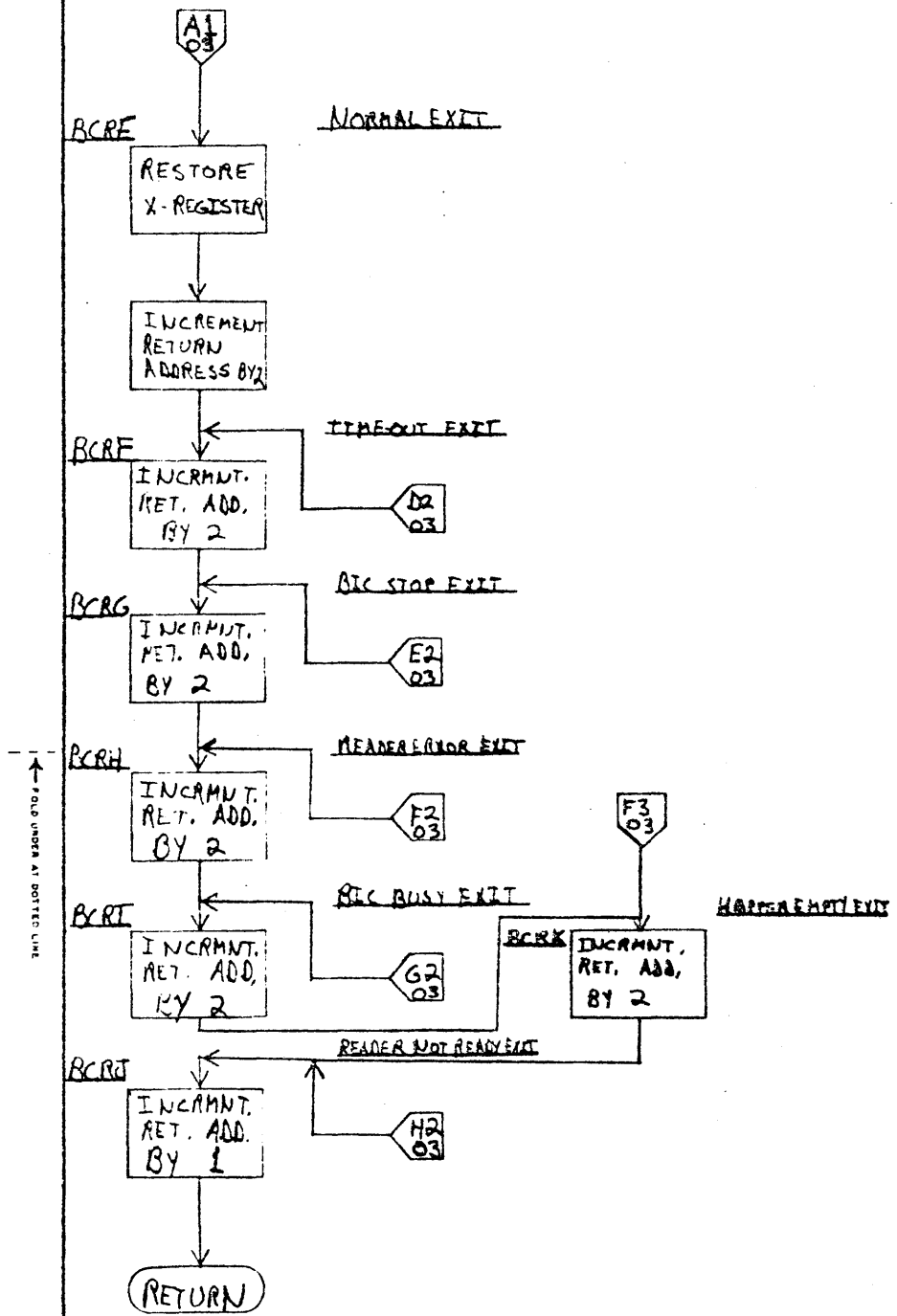
REV C

PREPARED BY

APPROVED BY

SHEET 47 OF 57





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*



varian data machines
a varian subsidiary

CODE
IDENT. NO

89A0180

REV

PREPARED BY

APPR.

SHT 50 OF 51

