

**Fermilab**

TM-1111  
2300.000

**CAMAC Crate Controller  
Diagnostic Test Procedures**

**James T. Meadows**

**July 1, 1981**

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## I. Concepts

### I.1 Abstract

The basic idea of this diagnostic routine is to check out a parallel type A1 CAMAC Crate Controller using "CDL".

### I.2 Program

This program was written in "CAMAC Diagnostic Language" (CDL-PN93.1) in a modular design. Modular design allows the technician checking out the crate controller to run individual parts of the whole test. So, when the program detects a failure, it leads the technician to a specific fault area. The technician can now loop on that individual subroutine for further testing.

### I.3 Program Synopsis

The full test runs a quick check (Pretest Run) of the Branch Driver's abilities to properly detect and latch data, to see if any crates are on-line, transfer its register and data buffers to "core" locations, see if a DTM-399 Dataway Display Module is in any crate (at station - "1", specifically) and printout if it saw a module and crate.

Next the test runs a set-up program which allows the technician to enter locations of the test module, the LAM latch module, and memory modules which will be used later in the testing & checkout of "Data Bits".

The program then checks to see if any crates can be seen "on-line". If so, the program runs the individual sub-tests, as listed on the printouts and descriptions of the individual "sub-routines".

I.4 The program runs the loop BZ, SETI, SETC, CLRI, EBD, and TSTBD thru 100 cycles. During that time the program lets you see and test the crate controller indicator lights. The "D" (Branch Demand) light is to be cycled by the technician by pressing the lam latch extension box buttons.

I.5 At the end of the 100 cycles, the program sets up to test "GRADED-L" operations using the LAM box or the DTM-399/299 test module. The program prompts the technician on what to do and waits for the "LAM" in the dataway to cause a "Branch Highway" D-demand to occur. The program "thanks you" and suggests a further important operation to proceed.

NOTE: A full graded-L connector is required on the crate controller to assure any module at any slot/station can produce a "LAM", to Crate, to "D", to "BD" Cycle under "TSTGL" subroutine.

## II. Prerequisites

- A. LSI, PDP11 with 28K of Memory
- B. Floppy, Disk, Tape, etc.
- C. DTM 399/299 "Dataway Test Display Module" at Station 1. See Attached Data Sheet.
- D. LAM Latch Module with Extension box any other Station (2-23). See Attached Data Sheet.
- E. CAMAC Crate with power supply
- F. Branch Driver, JY411 or BD011
- G. 2 TR-Network Memory Modules - See Attached Data Sheet.

## III. To Run

- A. Enter - R CDLBD CR>
- B. Enter - READ 'Crate.CDL/N' CR>
- C. Enter - Run (If this is second time through)

NOTE: Program is self-starting otherwise.

## IV. Starting

- A. Run CR>
- B. Enter - procedure name of subtest for running individual parts of Diag. See "CDL-PN 93.1".

## V. Loading

NOTE: Loading of floppy disk and other media are usually done with a "local" set of instruction.

"Local" - (at the site)

## VI. Halting Execution

- A. Strike/Push: (CR) twice stops CDL programs
- B. Enter "control c" halts CDL and returns to RT11 monitor

VII. Restarting in Subroutines

- A. Enter - Subroutine name - runs the individual routine  
as Per PN93.1
- B. Enter - Subroutine name XX (X = Decimal) - runs  
routine "X" times then stops

## VIII. Description of "Run"

### VIII.1 Run

- a) Sets up to loop 100 times - Default is 100 times
- b) Pretest
  - 1. Disables x-fail alarms - Note 1
  - 2. Checks Drivers DATA Registers - 24 Bits
  - 3. Checks Drivers ability to Latch and Hold Data
  - 4. Checks for crates & DTM's at Station 1
  - 5. Quick checks if data can go to and from Driver to DTM Registers - Note 2
  - 6. Re-enable x-fail alarms
  - 7. Call next step
- c) Set-up - where is "everything"
- d) Again a quick check if any crates are on-line
- e) Explain XL & QL meanings
- f) Cycles BZ, SETI, CLRI, EBD, TSTBD, checks "X" & "Q" - NOTE 3
- g) Loop 100 times
- h) Test graded-L connector & crate controllers Graded L operations
- i) Re-enable function x-failure in program - CDL - NOTE 4
- j) Call to set up For FNA test and more comprehensive data & function checks

End

## NOTES

- 
1. See Glossary for terminology.
  2. DTM must be in slot 1 of crate.
  3. Sub-routines
  4. See Glossary for some terminology.

IX. Outline of Other Test

IX.1 CRTRUN.Run (this runs the test)

1. Pretest
2. Set Up
3. Loop 100 Times
4. TSTGL

End

IX.2 CRTLS1.Run (this is a subpart called under  
CRTRUN)

1. NOCRAT
2. SETI
3. SETC
4. BZ
5. CLRI
6. EBD
7. TSTBD

IX.3 CRTLS2.Run (this is a subpart called under  
CRTRUN)

1. TSTGL
2. SNR - NOTE: May not be installed due to size limitation  
of "Procedure Buffer" can be run individually as per  
PN93.1.

End

IX.4 FNATS1.CDL (this is a full F, N, & A test of  
the crate controller)

IX.5 F & N & A & Data Cycles

Checking Crosstalk

End

IX.6 SKPLSI.CDL

(this is a random block x-fer of  
data in and out of CAMAC)

1. Checks full data patterns and system
2. Checks CAMAC to Driver Data

End

IX.7 SNR Run

1. Sets up SNR to do operations to DTM and or Memory Modules

## X. Descriptions of Individual Sub-Test Run Procedures

NOCRAT.CDL - (found on Media as NOCRAT.CDL)

### X.1 NOCRAT

- a) Set CS 1 Do a Reset
  - b) Set \*X 1 Set crate variable to Crate 1
  - c) Set \*F 0 Set variable function to "0"
  - d) Set \*N 1 Set station variable to Station 1
  - e) Set \*B 1 Set assumed station of DTM 399 to Station "1"
  - f) Disable X-alarm failure printouts
  - g) Do a CAMAC cycle FNAC - F 0 1 0 (\*X = crate)
  - h) Check value of "XL": if set a crate & module is at  
Station "1"
  - i) increment Crate No.
  - j) Check if Crate No. is greater than "8"
  - k) Re-enable X-fail printouts and
- End

### X.2 CRTLS1.Run

#### SETI

- a) Enable "I" on crate "FNAC"  
F 26 30 9 \*C
- b) test "X" of driver to see if crate & cycle was accepted
- c) test crate controller for X&Q,
- d) if "I" is set (Q=1)
- e) If X not set Say so  
If Q not set Say so

- f) Print test failed  
Print value of "X" & "Q"
- g) End

### X.3 CLRI

- a) Disable "I"/turn off "FNAC"  
F 24 30 0 \*C
  - b) Check "X"; accepted by crate
  - c) Test crate for "X" & "Q" Q=1 if "I" is still set
  - d) If "X" not = 1 Say so
  - e) If "Q" not = 0 Print failure
- End

### X.4 SETC

- a) Disable X-fail alarms  
Set "C" "FNAC"  
F 26 28 9 \*C
  - b) Wait for 100 milliseconds to complete CAMAC cycle
  - c) Check if "X" accepted function
  - d) Re-enable x-fail alarms
- End

X.5 BZ

- a) Disable x-fail alarms
  - b) Do a BZ from "Driver"  
     set CS 1 (cycles BZ Branch Highway Line)
  - c) Do BZ to crate "FNAC"  
     F 26 28 8 \*C
  - d) Check X=1           accepted
  - e) Check Q=0           Okay
- End

X.6 EBD

- a) Disable x-fail alarms
  - b) Enable "BD" "FNAC"  
     F 26 30 10 \*C
  - c) Check X=1  
     Q=0
  - d) Check if enabled: F, 27, 30, 10, \*C  
     X=1
  - e) Q=1 (means crate BD-enable is set)
  - f) Re-enable X-fail alarm
- End

X.7 TSTBD

- a) Enable BD "FNAC"  
     F, 26, 30, 10, \*C

- b) Check "X" = 1
  - c) Check if "Q" not previously set
  - d) If "Q" previously set then
  - e) Reset = set CS 1
  - f) Now check if "Q" not set  
F, 27, 30, 10, \*C
  - g) Check Q not set Print failure if set
  - h) Enable "BD on" FNAC  
F, 26, 30, 10, \*C  
this is to allow the 100 iteration cycle under run to set  
and light the "D" light on the crate controller
- End

X.8 CRTSL2.Run - Crate List No. 2 (found on Media as  
CRTSL2.Run)

TSTGL

- a) Set timer
- b) This checks crate controller for set & test of "BD"
- c) Enables DTM 399/299 for "LAM" Enable to Dataway.
- d) Gives aid and information for "LAMS" from LAM-Latch box  
and DTM 399/299
- e) Print "1" minutes still no "LAM"; if no LAM was received  
for "1" (one) minute or LAM "lost".
- f) Check if driver can see demand from crate controller
- g) Do FNAC Graded-L
- h) F, 0, 30, 7, \*C

- i) Say Got It
  - j) Check X & Q    Q=1 for Graded L
  - k) Print value of button pushed on box
  - l) Enable X-fail
- End

TABLE VII Contact Assignments at Branch Highway Ports: By Contact Numbers

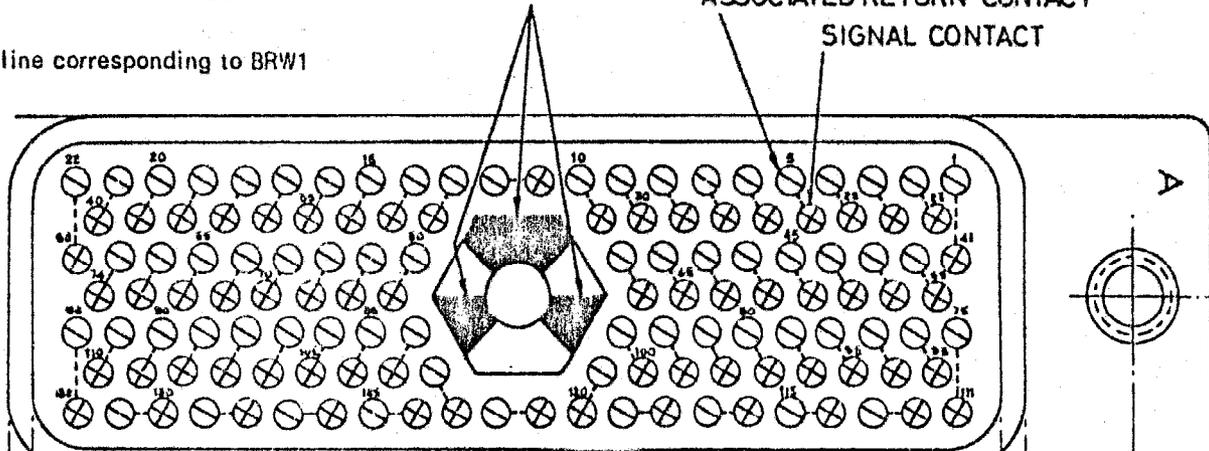
| Contact Signal |
|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 1 BA1(R)       | 18 BN2(R)      | 35 BCR4        | 52 BCR7(R)     | 69 BCR7        | 86 BRW11(R)    | 103 BRW9       | 120 BTB6       |
| 2 BA2(R)       | 19 BN4(R)      | 36 BN1         | 53 BF1(R)      | 70 BF1         | 87 BRW12(R)    | 104 BRW10      | 121 BTB7       |
| 3 BA4(R)       | 20 BN8(R)      | 37 BN2         | 54 BF2(R)      | 71 BF2         | 88 BRW13(R)    | 105 BRW11      | 122 BTB7(R)    |
| 4 BA8(R)       | 21 BN16(R)     | 38 BN4         | 55 BF4(R)      | 72 BF4         | 89 BRW14(R)    | 106 BRW12      | 123 BTB5       |
| 5 BV1(R)       | 22 BTB3(R)     | 39 BN8         | 56 BF8(R)      | 73 BF8         | 90 BRW15(R)    | 107 BRW13      | 124 BRW21      |
| 6 BV2(R)       | 23 BA2         | 40 BN16        | 57 BF16(R)     | 74 BF16        | 91 BRW16(R)    | 108 BRW14      | 125 BRW21(R)   |
| 7 BV3(R)       | 24 BA4         | 41 BA1         | 58 BTB3        | 75 BSC(R)      | 92 BTB4(R)     | 109 BRW15      | 126 BRW22      |
| 8 BV4(R)       | 25 BA8         | 42 BG(R)       | 59 BG          | 76 BRW1(R)     | 93 BRW1        | 110 BRW16      | 127 BRW22(R)   |
| 9 BV5(R)       | 26 BV1         | 43 BD(R)       | 60 BD          | 77 BRW2(R)     | 94 BRW2        | 111 BSC        | 128 BRW23      |
| 10 BTB1(R)     | 27 BV2         | 44 BQ(R)       | 61 BQ          | 78 BRW3(R)     | 95 BRW3        | 112 BRW17      | 129 BRW23(R)   |
| 11 BTB2        | 28 BV3         | 45 BZ(R)       | 62 BZ          | 79 BRW4(R)     | 96 BRW4        | 113 BRW17(R)   | 130 BRW24      |
| 12 BTB2(R)     | 29 BV4         | 46 BTA(R)      | 63 BTA         | 80 BRW5(R)     | 97 BRW5        | 114 BRW18      | 131 BRW24(R)   |
| 13 BCR1(R)     | 30 BV5         | 47 BV6(R)      | 64 BV6         | 81 BRW6(R)     | 98 BRW6        | 115 BRW18(R)   | 132 BTB4       |
| 14 BCR2(R)     | 31 BTB1        | 48 BV7(R)      | 65 BV7         | 82 BRW7(R)     | 99 BRW7        | 116 BRW19      |                |
| 15 BCR3(R)     | 32 BCR1        | 49 BX (R)      | 66 BX          | 83 BRW8(R)     | 100 BRW8       | 117 BRW19(R)   |                |
| 16 BCR4(R)     | 33 BCR2        | 50 BCR5(R)     | 67 BCR5        | 84 BRW9(R)     | 101 BTB6(R)    | 118 BRW20      |                |
| 17 BN1(R)      | 34 BCR3        | 51 BCR6(R)     | 68 BCR6        | 85 BRW10(R)    | 102 BTB5(R)    | 119 BRW20(R)   |                |

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POLARIZING BOSS PROJECTIONS

ASSOCIATED RETURN CONTACT  
SIGNAL CONTACT

N.B. BRW1(R) is the return line corresponding to BRW1



CAMAC  
 MODELS DTM-299/DTM-399  
 JUNE 1979

DATAWAY DISPLAY  
 DIAGNOSTIC TESTING  
 ALARM CONDITION MONITORING

## CAMAC TEST MODULES THAT INFORMS PEOPLE AND COMPUTERS WHAT IS REALLY HAPPENING ON THE DATAWAY

### FEATURES:

**MODEL DTM-299 (Standard Version)**  
 -Displays ALL dataway signal  
 -Both Track and Latch mode  
 -Manual LAM generation  
 -Read of previous dataway cycle  
 Data and Status F, A, etc.  
 -Stretched display of B, S1, S2, L

**MODEL DTM-399 (Enhanced Version)**  
 -Power supply failure detection  
 -Ambient temperature monitor

### DESCRIPTION:

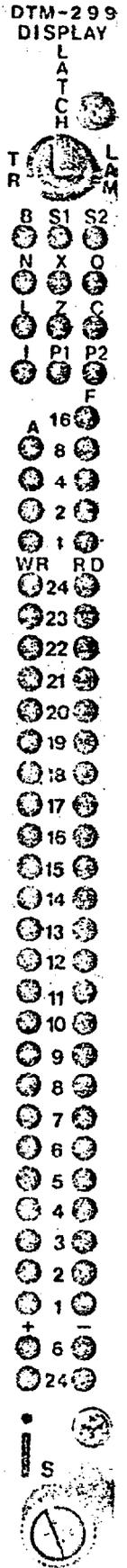
This series of Dataway Test Modules is designed for use as a low-cost diagnostic, test and display aid for troubleshooting CAMAC, from both a hardware and software viewpoint. Status and dataway conditions can be seen at a glance, also computer controlled systems can run self diagnostics through to the dataway level. (Confidence factor for system programmers)!

Front panel LED indicators display the status of all dataway signals in either Latch or Track (continuous) mode. Write data, control signals, and status for the previous dataway operations may be read back for system self diagnosis. A front panel manual LAM switch is also available to test the crate and software LAM handling capability.

In addition to these features the MODEL DTM-399 includes monitoring of ambient temperature and the four standard CAMAC power supplies. Should a preset limit be exceeded by high ambient temperature, a voltage failure, current spike or power supply oscillation a LAM will be generated. The detection and logic circuitry is powered by voltage steering and any supply may fail without affecting the modules operation.

PRICE DTM-299 \$325.00  
 DTM-399 \$425.00

DELIVERY FROM STOCK [IMMEDIATE]!



**I** INTERFACE STANDARDS

THE CAMAC MICROCOMPUTER COMPANY

**COMMANDS:**

DTM-299

NA[0]F[0] Read data Q,X=1

Reads previously Latched write data onto Dataway read lines. R1-R24

NA[0]F[1] Read status Q,X=1

Reads previously Latched status, function code, subaddress, etc. onto Dataway read lines, plus reads position status of front panel switch.

|     |    |    |    |    |    |    |     |    |    |    |    |    |    |    |    |
|-----|----|----|----|----|----|----|-----|----|----|----|----|----|----|----|----|
| R17 | 15 | 14 | 13 | 12 | 11 | 10 | 9   | 8  | 7  | 6  | 5  | 4  | 3  | 2  | R1 |
| TR  | Q  | P1 | P2 | C  | Z  | I  | F16 | F8 | F4 | F2 | F1 | A8 | A4 | A2 | A1 |

NA[0]F[8] Test LAM X=1  
Test LAM status, Q=1 if setNA[0]F[10] Reset LAM Q,X=1  
Resets LAM request.

## DTM-399 [ADDITIONAL COMMANDS]

NA[0]F[1] Read Status Q,X=1

|            |    |    |     |     |      |  |
|------------|----|----|-----|-----|------|--|
| R24        |    |    |     | R18 |      |  |
| MAN<br>LAM | +6 | -6 | +24 | -24 | TEMP |  |

NA[0]F[24] Disable LAM Q,X=1

NA[0]F[26] Enable LAM Q,X=1

**SPECIFICATIONS:**

## SIGNALS DISPLAYED

Latched at S1

|          |       |            |       |
|----------|-------|------------|-------|
| Read     | R(24) | Write      | W(24) |
| Function | F(5)  | Subaddress | A(4)  |
| Stn. No. | N     | Q Response | Q     |
| P1 Bus   | P1    | X Response | X     |
| P2 Bus   | P2    |            |       |

Continuous [Track]

|          |      |           |       |
|----------|------|-----------|-------|
| ±6 Volts | 6(2) | ±24 Volts | 24(2) |
| inhibit  | 1(1) |           |       |

Power Requirements

|                    |
|--------------------|
| +6V - 1.8 A Max    |
| -6V. ±24V - 16 ma. |

Latches at S2

|            |   |       |   |
|------------|---|-------|---|
| Initialize | Z | Clear | C |
|------------|---|-------|---|

Operational Modes

LATCH — Dataway signals are latched with the appropriate strobe

TRACK — Real Time continuous display of dataway signals

Stretched [200 MS]

|          |    |          |    |
|----------|----|----------|----|
| Strobe 1 | S1 | Strobe 2 | S2 |
| Busy     | B  | LAM      | L  |

Mechanical

Single width module

## DTM-399 [ONLY]

Temperature set point range: 25-60°C

Voltage set point range:

|                |                   |
|----------------|-------------------|
| +6 = +3 to +6v | +24 = +21 to +24v |
| -6 = -3 to -6v | -24 = -21 to -24v |

Minimum voltage excursion time for detection (voltage spike) = 1 usec.

Reference stability = ± .1% 24 hours.

i

S

INTERFACE STANDARDS

45845-D WARM SPRINGS BLVD.  
FREMONT, CA. 94538  
(415) 857-5100

COMMANDS

NA[0]F[0] Read Data

Q,X=1

Must be in the Latch mode. Reads latched write data from previous dataway operation onto corresponding dataway. Read lines 1-24.

NA[0]F[1] Read Status

Must be in the Latch mode. Reads latched status, function code and sub-address from previous dataway operation.

|     |    |    |    |    |    |    |    |     |    |    |    |    |    |    |    |    |
|-----|----|----|----|----|----|----|----|-----|----|----|----|----|----|----|----|----|
| R17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9   | 8  | 7  | 6  | 5  | 4  | 3  | 2  | R0 |
| TR  | Q  | X  | P1 | P2 | C  | Z  | I  | F16 | F8 | F4 | F2 | F1 | A8 | A4 | A2 | A1 |

R10, [I], R17 and [TR] may be read in either Track or Latch mode. Track is an internal signal. When active, indicates select switch in Track mode.

NA[0]F[8]

X=1

Test LAM status, Q=1 if set.

NA[0]F[10] Reset LAM

Q,X=1

Resets manual LAM request.

|         |    |    |     |     |      |     |
|---------|----|----|-----|-----|------|-----|
| R24     | 23 | 22 | 21  | 20  | 19   | R18 |
| MAN LAM | +6 | -6 | +24 | -24 | TEMP | --  |

NA[0]F[24] Disable LAM

Q,X=1

NA[0]F[26] Enable LAM

Q,X=1

TABLE I

| MEMORY MODULE |    |                  |       |                        |                     |                         |                    |                |               |     |     |    |    |      |      |      |      |      |      |      |      |      |      |
|---------------|----|------------------|-------|------------------------|---------------------|-------------------------|--------------------|----------------|---------------|-----|-----|----|----|------|------|------|------|------|------|------|------|------|------|
| 24            | 23 | 22               | 21    | 20                     | 19                  | 18                      | 17                 | 16             | 15            | 14  | 13  | 12 | 11 | 10   | 9    | 8    | 7    | 6    | 5    | 4    | 3    | 2    | 1    |
| 0             | 0  | ENABLE<br>0 SCAN | TRANS | WC=1L<br>WD<br>INHIBIT | TIME OUT<br>INHIBIT | EQUAL LENGTH<br>INHIBIT | MAR INC<br>INHIBIT | LAM<br>REQUEST | LAM<br>ENABLE | BDF | BNE | OF | EL | WC 9 | WC 8 | WC 7 | WC 6 | WC 5 | WC 4 | WC 3 | WC 2 | WC 1 | WC 0 |

STATUS REGISTER

| 16 | 15 | 14 | 13 | 12 | 11 | 10    | 9     | 8     | 7     | 6     | 5     | 4     | 3     | 2     | 1     |
|----|----|----|----|----|----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0  | 0  | 0  | 0  | 0  | 0  | MAR 9 | MAR 8 | MAR 7 | MAR 6 | MAR 5 | MAR 4 | MAR 3 | MAR 2 | MAR 1 | MAR 0 |

MEMORY ADDRESS REGISTER

CAMAC COMMANDS

F(0) · A(n)  
 F(1) · A(0)  
 F(1) · A(1)  
 F(1) · A(2)  
 F(2) · A(n)  
 F(8) · A(0) · SI  
 F(10) · A(0) · SI  
 F(11) · A(0) · SI  
 F(11) · A(2) · SI  
 F(16) · A(n) · SI  
 F(17) · A(1) · SI  
 F(17) · A(2) · SI  
 F(18) · A(n) · SI  
 F(19) · A(0) · SI  
 F(24) · A(0) · SI  
 F(26) · A(0) · SI  
 F(27) · A(0) · SI  
 (Z + C) · S2

FUNCTION

MEMORY BLOCK READ  
 READ WC & STATUS REGISTER  
 READ SINGLE MEMORY LOCATION [AS f(MAR)]  
 READ MAR  
 OPTIONAL BLOCK READ [INSTEAD OF F(0)]  
 TEST LAM Q=1 IF LAM REQ. · MASK  
 RESET LAM REQ.  
 CLEAR WC & STATUS REGISTER  
 CLEAR MAR  
 MEMORY BLOCK WRITE  
 LOAD SINGLE MEMORY LOCATION [AS f(MAR)]  
 LOAD MAR  
 OPTIONAL BLOCK WRITE [INSTEAD OF F(16)]  
 SELECTIVE SET WC & STATUS REGISTER  
 DISABLE LAM  
 ENABLE LAM  
 TEST LAM Q=1 IF LAM REQ.  
 CLEAR ALL REGISTERS

NOTE: "X" RESPONSE GENERATED FOR ALL VALID COMMANDS AND  
 "Q" RESPONSE GENERATED FOR READ AND WRITE OPERATIONS

XIV. Glossary

|                |   |
|----------------|---|
| Abort          | Quit operations in progress either by normal expiration or failure to complete properly.    |
| BD011/JY411    | CAMAC drivers designed for DEC PDP-11 Systems   |
| BIT            | Either on or off at a specific BIT position   |
| BIT Positions  | Bits from (1-24) for a CAMAC word 0-15 for a computer word.                                 |
| Binary         | A numerical weighting system used in computers  |
| Boot           | Load system computer with a program   |
| Branch Driver  | JY411, BD011  |
| Branch         | A junction in a program where a decision is made to jump to another portion of the program. |
| Branch Highway | Communication lines between crate controller and branch driver.                             |
| Buffer         | A block of computer memory used for storage of a lot of computer words.                     |
| CDL            | CAMAC Diagnostic Language - PN-93.1.  |
| CORE           | A computer memory location.   |
| <u>Demand</u>  | A CAMAC system request from a crate controller  |
| Dataway        | The back plane pin contacts inside a CAMAC crate at each station.                           |

|                     |  |
|---------------------|--|
| FNAC<br>Floppy disk | Function, station, sub-address, crate<br>A flexible magnetic disk used as<br><br>a mass storage device with computers (holds<br>programs & data)                       |
| DEC RK05            | Same as above but is rigid and holds<br>more data  |
| LAM                 | CAMAC "Dataway" request "Look at Me"<br>(initiates crate controller "Demand")  |
| Graded-L            | A crate controller operation that<br>places the dataway stations "LAM lines" on to<br>the BRW lines (crate controller needs a<br>graded-L connector on the back panel) |
| Loop                | A repeating set of instruction or<br>"procedures" inside a program. (See<br>procedures)  |
| Local               | Wherever a test or computer system is at.  |
| OCTAL               | $10_{10} = 10$ Decimal<br>$10_8 = 8$ Octal<br>$10_2 = 2$ Binary<br>Example: Binary 111 011 011 001 <sub>2</sub><br>Octal 7 3 3 1 <sub>8</sub>                          |
| Procedure           | A single or group of instructions<br>under CDL starting with "Define" and ending<br>with "END".  |
| RT-11               | Is the operating system that CDL<br>is controlled and run under.   |
| X-fail              | A printout that can occur when No-X  |

(improper CAMAC function) is detected by CDL'S monitoring and error checking

section. The printout can occur when a non-existent crate is called or an invalid function is attempted to a module that is not there or cannot be done by that module.

X-fail is valid for BDoll's only if a crate is not available.

|          |  |
|----------|--|
| BRW-(XX) | Branch Highway Read and Write Lines                                |
| "BX"     | CAMAC function accepted  |
| "BQ"     | Used as a condition indicator in CAMAC modules & crate controllers |
| "BD"     | Branch Demand  |
| "GL"     | Graded-L   |
| "BN"     | Branch N-line  |
| "BF"     | Branch F-line  |
| "BA"     | Branch A-line  |

XVI. PrintoutsXVI.1 How to Obtain CopiesXVI.2 Printed on Console

1. Under RTll Enter - R PIP (CR)
2.                   Enter - TT:<CRATE.CDL (CR)
3.                   or Enter - TT:<CDL Program Name.Ext (CR)

XVI.3 Printed on Line Printer

1. Under RTll Enter - R PIP (CR)
2.                   Enter - LP:<CDL Program Name.Ext (CR)