CR80 AMOS

TITLE: MASTERCLEAR UTILITIES (AMU)

USER's MANUAL

DOCUMENT NO: CSS/395/USM/0040

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1. ### SCOPE

The purpose of this document is to describe the use of
the CR80 AMOS, Masterclear Utilities (AMU). The AMU
is identified as CSS/395.

The AMU program provides the user of the CR80 system
with a range of utilities. The utilities are to be
used by both programmers and maintenance personnel.

The AMU is a PROM-resident program which enables the
operator of the CR80 access to a range of utilities.
The following set of utilities is available to the
operator:

- Boot Direct/Indirect via DMA from FD
- Copy
- Dump
- IO-Utilities Read, Write, Sense, Control
- Load Direct/Indirect via DMA from FD
- Memory-Check
- Options
- Patch
- Switch-CPU
- Return Calling Process
- Search
- Test CPU (only if CSM/100 is present)
- Unit Mapper
- Wait for Interrupt
- Execute
- Set Memory Parity

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2.   APPLICABLE DOCUMENTS AND GENERAL SYNTAX RULES

2.1   APPLICABLE DOCUMENTS

None.

2.2 <u>Commands, General</u> Syntax Rules

A command to the AMU program consists of one character
followed by command dependent parameters.

In the detailed description of the commands in the
succeeding sections, the following definitions are
used:

<command>::=   B|C|D|I|L|M|O|P|Q|R|S|T|U|W|X|Z|<

<page>::=   0|1|2|3   is the memory section

<hexa_numbers>::=   <hexa_number>|<hexa_numbers>
                        <delimiter><hexa_number>

<hexa_number>::=   <hexa>|<hexa_number><hexa>
                    if more than 4 hexa characters are
                    entered only the last four are con-
                    sidered valid.
                    <DELETE> or <RUB_OUT> immediately
                    following a hexa_number will result
                    in its cancellation.

<hexa>::=   <digit>|A|B|C|D|E|F

<digits>::=   0|1|2|3|4|5|6|7|8|9

<delimiter>::=   <any non-hexadecimal character
                     except <CR>>

<blinds>::=   <blind>|<blind><blinds>

<blind>::=   <SP>|<NULL>

<SP>   is the space character (ASCII 32).

<NULL>   is the null character (ASCII 0).

<CR>   is a carriage return character (ASCII 13).

$\text{<starting-address>}::=\text{<hexa\_number>}\left[\begin{matrix}.\text{<off-set>}\\.\underline{0}\end{matrix}\right]$

the resulting start address is made up as the sum of the hexa_number and the off-set.

<off-set>::=   <hexa_number>

<no_words_to_xxx>::= <hexa_number> hexadecimal count specifying the size of the memory area under consideration.
Note that +0 implies 64K,not zero.

<break>::=   pressing break during a print-out or the CPU test will result in the cancellation of the command in question and the program will be waiting for its next command.

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3. GENERAL INTRODUCTION AND OVERVIEW

The AMU program has # 200 as base. Upon master clear

```
CSS/395/01   791015
CPU 0
>
```

or emergency action

```
EMERGENCY ACTION BY 0200
>
```

locations # 200 through # 221 inclusive are destroyed
while all other memory locations are left unchanged.
Only these locations are used as long as the user
restricts himself to the following set of commands

```
C - Copy,
D - Dump,
I - IO-utilities,
M - Memory Check,
O - Options,
P - Patch,
R - Return Calling Process,
S - Search
X - execute,
Z - Set Memory Parity.
```

The remaining utilities except the CPU-test will claim
from # 0000 through # 0247 inclusive.
The detailed memory allocation is shown on figure 3-1.

In a multiprocessor configuration the CPU which is
fastest will win, i.e. be master CPU, while the re-
maining will be "parked" with base # 0020 waiting for a
CPU interrupt. This implies that locaions # 0020 through
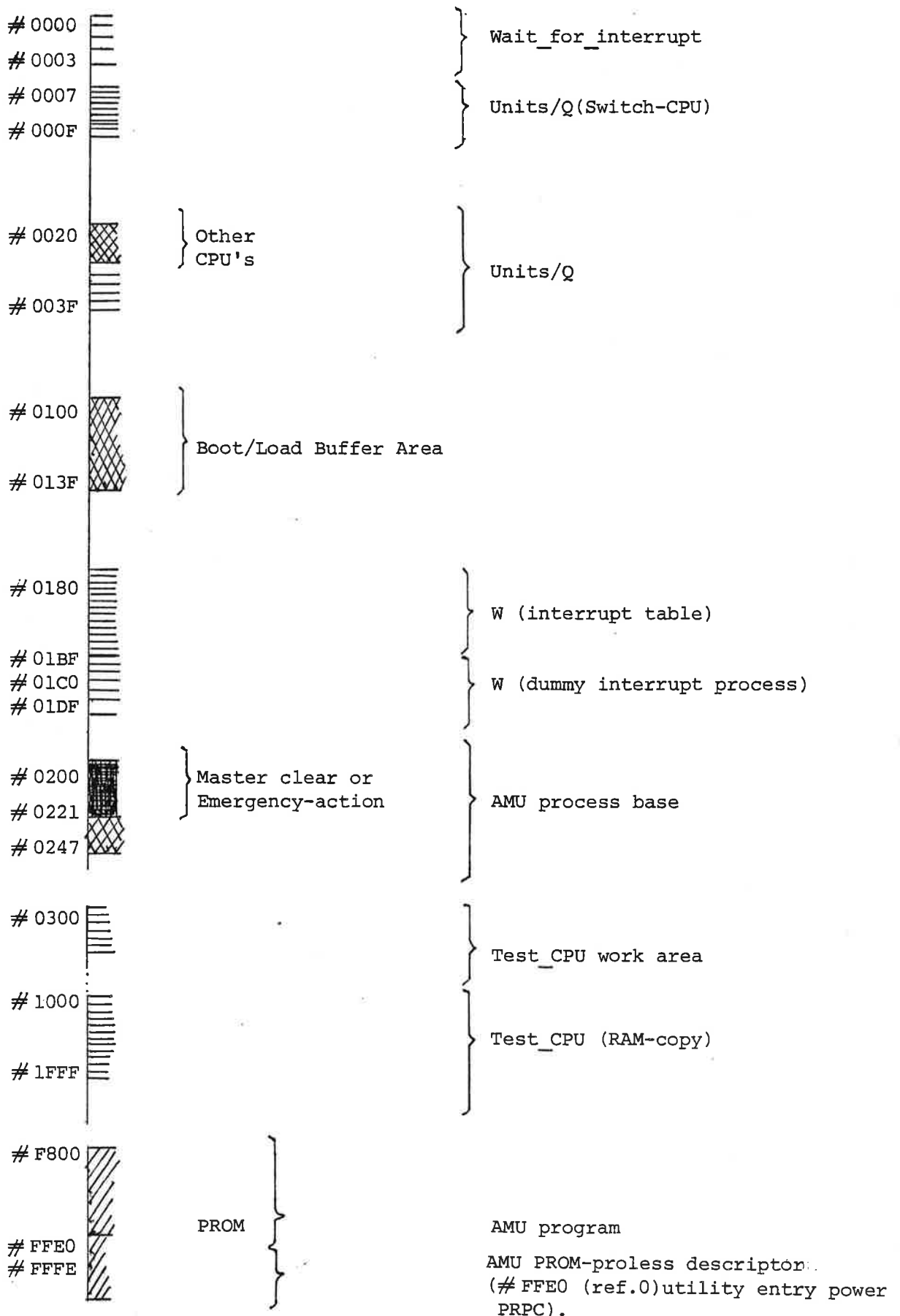# 0032 are destroyed by the first CPU interrupt.

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The AMU program assumes the following device addresses:

1 - AV24 I/F to operator's console

2 - Floppy disk I/F

7 - DMA I/F to "external" system.

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FIGURE 3-1   AMU MEMORY ALLOCATION

Address		Description
#0000		Wait_for_interrupt
#0003		
#0007		Units/Q(Switch-CPU)
#000F		
#0020	Other CPU's	Units/Q
#003F		
#0100	Boot/Load Buffer Area	
#013F		
#0180		W (interrupt table)
#01BF		
#01C0		W (dummy interrupt process)
#01DF		
#0200	Master clear or Emergency-action	AMU process base
#0221		
#0247		
#0300		Test_CPU work area
#1000		Test_CPU (RAM-copy)
#1FFF		
#F800	PROM	AMU program
#FFE0		AMU PROM-proless descriptor
#FFFE		(#FFE0 (ref.0)utility entry power PRPC).

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3.1 Boot from Floppy Disk (Load and Execute)

Description

The Boot from Floppy Disk enables the user to load a
boot file into memory either directly from the floppy
disk or indirectly via a DMA-channel.
The loaded program is activated if the load was
successfull.

Remarks

The Boot utility automatically sets the parity.

The file might start from #248 (memory section 0)
and upwards. Crossing a page boundary will result in con-
tinuation on the next page.

SYNTAX

$$B \begin{Bmatrix} F \\ X \end{Bmatrix} \begin{Bmatrix} 0 \\ 1 \\ 2 \\ 3 \end{Bmatrix}$$

the first parameter specifies
whether the load is to be direct
(F-floppy) or via the DMA
(X-external),
the second parameter specifies
which drive is to be used.

Examples

```
>BOOT FD: 1, MEM PARITY ERROR, DISK ERROR=0800
>BOOT FD: 0, BASE= 14E2


>BOOT FD: 0, MEM PARITY ERROR, BASE= 14E2
```

3.2   Copy

Description

The Copy Utility enables the user to copy one memory
area to another disrespective their respective memory
sections.

Remarks

None.

SYNTAX

$$C \begin{bmatrix} \text{<page>} \\ \underline{0} \end{bmatrix} \text{<sp> <source\_starting\_address>} \begin{bmatrix} +\text{<no-words\_to\_copy>} \\ + \quad \underline{1} \end{bmatrix}$$

$$\text{<sp> <object\_start\_address>} \begin{bmatrix} /\text{<page>} \\ / \quad \underline{0} \end{bmatrix}$$

<object_start_address>::= <hexa_address>

Examples

Create new AMU-process
    >C FFE0+20 400

    >

Copy   AMU_program to page 1

    >C F800+800 0/1
    >

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3.3   Dump

Description

The Dump Utility enables the user to dump a specified
area on the Operator's Console. Areas might be from
any memory section (page).

Remarks

The utility will allway round the starting address
downwards to an address divideable by 16.
This will not have any impact on the ending address.

The parity has to be set properly, otherwise a local
action with cause 2 will result from dumping a memory
location with parity error.

SYNTAX

$$D \begin{bmatrix} \text{<page>} \\ \underline{0} \end{bmatrix} \text{<sp> <start\_address>} \begin{bmatrix} \text{<sp><hexa\_end\_address>} \\ + \text{ <no\_words\_to\_dump>} \\ + \quad 1 \end{bmatrix} \text{<CR>}$$

<hexa_end_address>::= <hexa_number>

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Examples:

- Dump Registers

      >D 207

      0200 FDA8 0020 0000 0200 0000 FDE0 0000 0000
      >D 200.7

      0200 FDA8 0020 0000 0200 0000 FDE0 0000 0000
      >D 200+7

      0200 FDA8 0020 0000 0200 0000 FDE0 0000
      >D 200 207

      0200 FDA8 0020 0000 0200 0000 FDE0 0000 0000
      >D 200.7 207

      0200 FDA8 0020 0000 0200 0000 FDE0 0000 0000
      >

- Dump Relative

      >D F800:7E0+20

      FFE0 FDA8 0020 0000 0200 0000 FDE0 0000 0000
      FFE8 0200 0200 F800 FD7D 7FFF E000 FFE0 0030
      FFF0 0000 FFFF 0000 8000 0000 FFFF 0000 0000
      FFF8 1000 0000 0000 0000 0000 0000 F854 0000
      >

- Dump other page

      >D1 7FE0+20

      7FE0 FDA8 0020 0000 0200 0000 FDE0 0000 0000
      7FE8 0200 0200 F800 FD7D 7FFF E000 FFE0 0030
      7FF0 0000 FFFF 0000 8000 0000 FFFF 0000 0000
      7FF8 1000 0000 0000 0000 0000 0000 F854 0000
      >

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3.4   <u>IO-Utilities</u>

<u>Description</u>

The IO-Utilities allows the operator directly to
exercise any IO-module connected to the CR80-system.
All IO-commands can be issued:

- Read   R
- Write   W and V
- Sense   S
- Control   C and K   (version 01 B)

For Read and Sense the program prints the result
while the operator for all remaining IO-utilities has
to specify the data to be output to the device.

<u>Remarks</u>

It is possible to disable the print-out of Read and Sense
results by activating 'Options' prior to the IO_Utilities.
This is a usefull tool to technical personnel in test
situations.

Pressing <break> will terminate the test sequence.

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SYNTAX

I {^R_S}   <sp><modify_device_repeats><CR>

I {^W_C}   <sp><modify_device_repeats><sp><hexa_number><CR>

I {^V_K}   <sp><modify_device_repeats><sp><hexa_numbers><CR>

<modify_device_repeats>::= [(<modify_pattern>] <sp>

     <device_number> $\begin{bmatrix} + & \text{<long\_integer>} \\ + & 1 \end{bmatrix}$

<modify_pattern>::=   <hexa_number>

<device_number>::=   <hexa_number> only the
          lower 6 bits are used,
          i.e. $0 \leq$ device ≤ 63.

<long-integer>::=[<hexa_number>] <hexa_number>

Examples
```
>IO:S 1 033F
>IO:S 1+7
033F 033F 033F 033F 033F 033F 033F
>IO:W 1+2_0 30
0000000000000000000000000000000000000000000000000000000000000000(
00000000000000000000000000000000
>


   >0
PRINT-OUT  ?>N
NO OF TESTS >1
>IO:S 1+F_0

>0
PRINT-OUT  ?>Y
NO OF TESTS >1
>IO:S 1 033F
>
```

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3.5   Load from Floppy Disk

Description

The load from Floppy Disk enables the user to load a
boot file into memory either directly from the floppy
disk or indirectly via a DMA-channel.

Remarks

The load utility automatically sets the parity.

The boot_file might start from # 248 (memory section 0,)
and upwards. Crossing a page boundary will result in
continuation on the next page.

SYNTAX

$$L \begin{Bmatrix} F \\ X \end{Bmatrix} \begin{Bmatrix} 0 \\ 1 \\ 2 \\ 3 \end{Bmatrix}$$

the first parameter specifies whether
the load is to be direct (F-floppy) or via
the DMA (X-external) the second parameter
specifies which drive is to be used.

Examples

```
>LOAD FD: 0, MEM PARITY ERROR, BASE= 14E2
>

>LOAD FD: 0, BASE= 14E2
>
```

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3.6   Memory-Check

Description

The Memory Check Utility allows the operator to verify
the proper functioning of any RAM; though, only a simple
test is performed.
The utility works non-destructive.

Remarks

This utility can not be interrupted.
The verification of one memory section takes a few
minutes.

SYNTAX

$$M \begin{bmatrix} <page> \\ \underline{0} \end{bmatrix} <sp><start\_address> \begin{bmatrix} +<no\_words\_to\_check> \\ + \underline{1} \end{bmatrix}$$

$$\begin{bmatrix} <sp><test\_pattern_1> \begin{bmatrix} <sp> <test\_pattern_2> \end{bmatrix} \end{bmatrix} <CR>$$
$$\underline{5555} \qquad\qquad \underline{AAAA}$$

$<test\_pattern_1> ::= <hexa\_number>$; the pattern is in-
serted and verified in all locations
of the specified area.

$<test\_pattern_2> ::= <hexa\_number>$; the pattern is inserted
and verified in every second location
of the specified area while test pattern$_1$
is used in the rest.

Examples   >M 0+8
PARITY ERROR AT 0000
PARITY ERROR AT 0002
PARITY ERROR AT 0004
PARITY ERROR AT 0006
>Z, MEM PARITY ERROR
>M 0+1000 CCCC 3333
>M 0+1000 BEBE

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3.7   Patch

Description

The Patch Utility enables the user to patch (modify) the
content of any memory location (RAM-resident) from the
Operator's Console.
The utility includes a multipatch facility to enable
initialization of the specified area with the operator
defined pattern.

Remarks

The multipatch facility is a very convenient way of
initializing a given area with an easy to recognize
pattern. Note in this context that +0 indicates 64K,
i.e. a full memory section (page).

SYNTAX

$$P \begin{bmatrix} <page> \\ \underline{0} \end{bmatrix} <sp><start\_address>$$

$$\begin{Bmatrix} <sp>\{<hexa\_numbers>\}_0^\infty \\ +<no\_words\_to\_patch><sp><hexa\_number> \end{Bmatrix} <CR>$$

Examples

Conventional Patch
```
        >P 408 400 400 F800 FDA8
        >
```
or
```
        >P 400.8 400 400 F800 FDA8
        >
```
Multipatch: fill page 1 with # CCCC
```
        >P1 0+0 CCCC
        >
```

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3.8   Return Calling Process

Description

The Return Utility will reload any calling process
provided the link still exists. The link is main-
tained by the following utilities

        C - Copy
        D - Dump
        I - 10-Utilities
        M - Memory-Check
        O - Options
        P - Patch
        S - Search
        X - Execute
        Z - Set-Parity.

Remarks

The utilities of AMU might be envoked by generating
a process in RAM (48 words) and using the content of
register 0 (XRO) of the prom-resident master clear
process descriptor located at # FFE0 as PRPC (program
counter). It is the responsibility of the user to
keep himself to the above mentioned utilities as others
will either claim parts of memory outside the allowed
process descriptor and/or destroy the link.

SYNTAX

R

Examples

```
>R
CSS/395/01  791015
CPU O
>
```

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3.9 Search

Description

The Search Utility enables the user to search for a specified binary pattern in any memory section. All memory locations which contain the specified pattern will be printed.

Remarks

Aside from the usefulness of searching for a given pattern the utility can be used to search for parity errors; the operator in that case searches the whole page for any infrequent test pattern.

SYNTAX

$$S \begin{bmatrix} <page> \\ \underline{0} \end{bmatrix} <sp><start\_address> \begin{bmatrix} +<no\_words\_to\_search> \\ +\ \underline{1} \end{bmatrix}$$

$$<sp><hexa\_pattern> <CR>$$

Examples

Search upper 4K of page 0 for =FFE0
```
      >S F000+1000 FFE0
       MATCH AT FFEE
       >
```
Search page 1 for parity errors
```
      >S1 0+10 8642

      LOCAL INTERRUPT, CAUSE=0002
       >
```

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3.10   Test CPU

Refer to CSM/100/USM (TBD)

```
>T3 F000
CSM/100/01  791101
**************************************************
>T
**************************************************
>
```

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3.11   Unit Mapper

Description

The Unit Mapper utility maps the following units of
a CR80 configuration

  • CPU's
  • RAM/PROM   (allocation of 4K modules)
  • IO-module

Remarks

    1   existing   unit
    .   missing   unit


```
          CPU 0      page 0          page 1           page 2             page 3
          /          /               /                /                  /
>U       /          /               /                /                  /
CPU: 1.......
RAM: 11111111 11111111/11111111 11111111/........ ........./......... .......1/
IO:  111.11.. 1......./........ ........./......... ........./......... ........./
>
             |              |              |              |
         IO:0-F,        10-1F,         20-2F,         30-3F
```
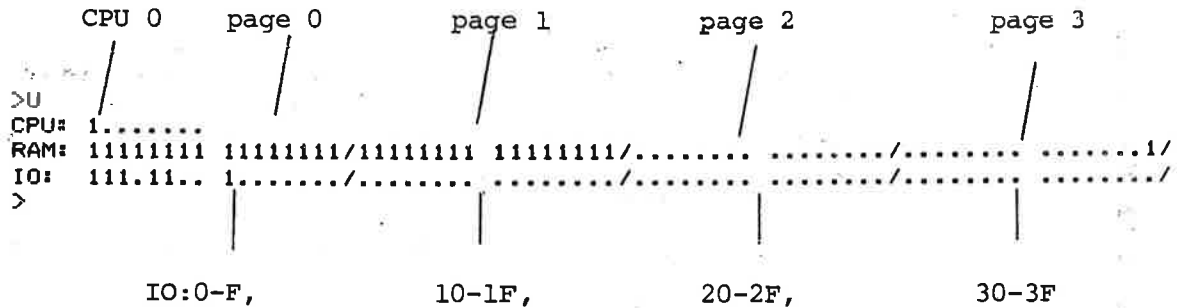

SYNTAX

        >U

3.12   Wait for Interrupt

Description

The Wait_for_Interrupt Utility enables the operator
to verify proper action of a given I/O module to any
previous IO-command.
The utility can wait for an interrupt from a specified
device or from all devices.
Return to normal mode is obtained by <break>.

Remarks

The utility is also usefull in verifying proper action by
the CPU.

SYNTAX

$$W \ <sp> \begin{bmatrix} <device\_number> \\ \underline{all} \end{bmatrix} \ <CR>$$

<device_number>::= <hexa_number>, only the lower
6 bits are used, i.e. $0 \leq device \leq 63$.

Examples

```
>W 2
IO INTERRUPT, DEV=0002 , PRIO=0
IO INTERRUPT, DEV=0002 , PRIO=0
>W
>


>W
IO INTERRUPT, DEV=0002 , PRIO=0
IO INTERRUPT, DEV=0002 , PRIO=0
>
```

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3.13 Execute

Description

The Execute Utility enables the operator to start the execution of any process.

Remarks

None.

SYNTAX

$$X \begin{bmatrix} <page> \\ \underline{0} \end{bmatrix} <sp><hexa\_address> \begin{Bmatrix} <delimiter> \\ <CR> \end{Bmatrix}$$

<hexa_address>::= <hexa_number>

base of process to be
activated by a load_process
(LDN_instruction).

Examples

```
>X 200
CSS/395/01   791015
CPU 0
>X FFE0
CSS/395/01   791015
CPU 0
>
```

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3.14   Set Parity

Description

The Set_Parity Utility resets the parity of all RAM
locations of memory. The utility works non-destructive.
If any parity error has been detected this will be stated.

Remarks

Note that the Boot and Load Utilities automatically resets
the parity when activated prior to any load from the
disk or floppy disk.

SYNTAX

Z

Examples

```
>Z, MEM PARITY ERROR
>Z
>
```

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3.15   Switch-CPU

Description

The Switch_CPU Utility enables the operator to change
from one CPU to any other provided the other runs the
CR80 standard instruction set.

Remarks

The specified CPU has to exist, as no checks what so
ever is made by the utility. The user will continue
with the new CPU waiting for the next user command.
(The user can have the identification of the CPU stated
by using X FFE0). Whether a given CPU exists or not can
be verified by the unit-mapper [U]

SYNTAX

Q <cpu-no>
   <cpu-no>::=   0|1|2|3|4|5|6|7

Examples

```
>X FFE0
CSS/395/01    791015
CPU 0
>Q0
>
```

Illegal CPU

```
>Q5
```

4. AMU REFERENCE

```
            A M O S _ M A S T E R C L E A R _ U T I L I T I E S
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
; IDENTIFICATION:    CSS/395/PGM                                        ;
; VERSION:   01                                                         ;
; DATED:     791015/FR                                                  ;
;                                                                       ;
;   THE AMOS_MASTERCLEAR_UTILITIES PROGRAM (AMU) RESIDING IN THE UPPER  ;
;2K_WORDS PROM OF MEMORY SECTION 0 WILL SERVE THE USER OF THE CR80 WITH ;
;A RANGE OF UTILITIES.  THIS AIM NOT ONLY AT PROGRAMMERS BUT ALSO AT    ;
;MAINTENANCE PERSONNEL.                                                 ;
;   ONLY MEMORY LOCATIONS:                                              ;
;                   #200-#221 INCL                                      ;
;WILL BE DESTROYED UPON EITHER MASTER CLEAR OR EMERGENCY ACTION, THOUGH ;
;ONLY AS LONG AS THE USER RESTRICT HIMSELF TO THE FOLLOWING UTILITIES:  ;
;       COPY, DUMP, IO_UTILITIES, MEMORY_CHECK, PATCH, SEARCH           ;
;       XECUTE, SET_PARITY (,AND OPTIONS).                              ;
;   HOWEVER THE AMU PROGRAM WILL NEVER CLAIM BUT THE LOWER #247 WORDS OF ;
;MEMORY EXCEPT FOR THE CPU_TEST WHICH REQUIRES AN ADDITIONAL 4K_RAM     ;
;STARTING AT #1000.                                                     ;
;THIS IMPLIES THAT FD_BOOT_FILES CAN HAVE THEIR LOADING ADDRESS (START) ;
;FROM #0248 AND UPWARDS. (CROSSING PAGE_BOUNDARIES DURING FD_LOAD WILL   ;
;RESULT IN A PAGE SHIFT AND CONTINUATION FROM #0000 THAT PAGE).         ;
;                                                                       ;
; U S E R ' S   M A N U A L                                             ;
; ------------------------------                                        ;
;                                                                       ;
;UTILITIES                                                              ;
;---------                                                              ;
;                                                                       ;
;   BOOT_LOAD:                                                          ;
;       B F/X <DRIVE_NO>          (F= FD, X= DMA)                       ;
;   COPY_MEMORY:                                                        ;
;       C* <SOURCE>[.<REL_OFFSET>][+<COUNT>]      <OBJECT>[/<PAGE>]     ;
;   DUMP:                                                               ;
;       D* <START_ADDRESS>[.<REL_OFFSET>]  <END_ADDRESS>               ;
;       D* <START_ADDRESS>[.<REL_OFFSET>][+<NO_OF_WORDS>]              ;
;   IO:                                                                 ;
;       I S  [<MOD_BY>]  <DEV_ADDRESS>[+<REPEATS>]                      ;
;       I R  [<MOD_BY>]  <DEV_ADDRESS>[+<REPEATS>]                      ;
;       I C  [<MOD_BY>]  <DEV_ADDRESS>[+<REPEATS>]     <OUTPUT_WORD>    ;
;       I B  [<MOD_BY>]  <DEV_ADDRESS>[+<REPEATS>]     <OUTPUT_WORD>,...;
;       I W  [<MOD_BY>]  <DEV_ADDRESS>[+<REPEATS>]     <OUTPUT_WORD>    ;
;       I V  [<MOD_BY>]  <DEV_ADDRESS>[+<REPEATS>]     <OUTPUT_WORD>,...;
;   LOAD_FILE:                                                          ;
;       L F/X <DRIVE_NO>          (F= FD, X= DMA)                       ;
;   MEMORY_CHECK:                                                       ;
;       M* <START_ADDRESS>[.<REL_OFFSET>][+<NO_OF_WORDS>]  [<PATTERN>]  ;
;   PATCH:                                                              ;
;       P* <START_ADDRESS>[.<REL_OFFSET>]              [<PATCH_DATA>]   ;
;   MULTI_PATCH:                                                        ;
;       P* <START_ADDRESS>[.<REL_OFFSET>][+<NO_OF_WORDS>]  <PATTERN>    ;
;   RETURN_CALLING_PROCESS:                                             ;
;       R                                                               ;
;   SEARCH:                                                             ;
;       S* <START_ADDRESS>[.<REL_OFFSET>][+<NO_OF_WORDS>]  <PATTERN>    ;
;   TEST_CPU:                                                           ;
;       T* <CPU_PROM_ADDRESS>                                           ;
;   UNIT_MAPPER:                                                        ;
;       U                                                               ;
;   WAIT_INTERRUPT:                                                     ;
;       W  [<DEVICE_ADDRESS>]                                           ;
;   XECUTE:                                                             ;
;       X* <PROCESS_BASE_ADDRESS>                                       ;
;   SET_PARITY:                                                         ;
;       Z                                                               ;
;                                                                       ;
;   SWITCH_CPU:                                                         ;
;       Q <CPU_NO>                                                      ;
;   OPTIONS:                                                            ;
;       O                                                               ;
;           PRINT_CONTROL                                               ;
;           LOOP_CONTROL (CPU TEST)                                     ;
```

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```
;
;
;
;LEGEND:
;-------
;   BREAK
;       BREAK FROM THE OPERATOR'S CONSOLE WILL IMMEDIATELY STOP ANY
;       PRINT-OUT ON THE OC AND RETURN TO THE MAIN_LINE SELECTION MODE.
;
;   MEMORY_SECTION
;       IF A PAGE OTHER THAN PAGE 0 IS DESIRED, IT MUST FOLLOW IMMEDI-
;       ATELY AFTER THE COMMAND, I.E.
;               <COMMAND><PAGE>  <....
;       ONLY COMMANDS MARKED WITH '*' CAN HAVE PAGE SELECTION.
;
;   <---> HEXADECIMAL DATA_WORD:
;       AN ENTERED HEXADECIMAL DATA WORD CAN BE ANY COMBINATION OF
;       HEXA-DECIMAL CHARACTERS, THOUGH ONLY THE LAST ENTERED FOUR ARE
;       ACCEPTED. ZEROES WILL AUTOMATICALLY BE FILLED IN IF LESS THAN
;       FOUR HEX CHARACTERS HAVE BEEN ENTERED.
;       HEX DATA_WORDS ARE SEPARATED BY ANYTHING BUT '0123456789ABCDEF'
;       AND CARRIAGE RETURN <CR>.
;       <CR> FLAGS END_OF_DATA.
;       <---><DEL> IMPLIES THAT THE ENTERED HEXADECIMAL (WORD (ONE) IS
;       REJECTED.
;       NOTE THAT *0 ALWAYS IS INTERPRETED AS 64K (ONE PAGE).
;
;   (---) OPTIONAL FIELD.
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
```

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5.   SPECIAL USE

          TBD