HeartBeat Interrupt Handler

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Revision History.....

00.00	12/19/85	Initial release
00.10	1/2/86	Changes in task header information and task maintainance of vbl counter.

The HeartBeat Interrupt Handler is installed by the event manager, and is called in response to vertical blanking interrupts which occur sixty times a second. The HeartBeat interrupt handler is responsible for maintaining the Tick Counter, and managing tasks associated with vertical blanking time. Tasks may be installed into or removed from the HeartBeat queue using the miscellaneous tool set. Each task that is installed must be preceded with an 8 byte header. The header consists of;

1.   A long word pointer which is maintianed by the miscellaneous tool set, and used by the HeartBeat interrupt handler to link each task in the queue to the next task.

2.   A word value initialized by the application when a task is installed into the queue. This word value indicates the number of VBL occurances remaining before a dispatch to the task will occur. The HeartBeat interrupt handler will decrement this count each VBL time. When the count reaches zero, the interrupt handler will dispatch to the task. The task has the responsiblility of reseting the count back to the original value. If the task does not reset the count value to a non-zero value, the HeartBeat interrupt handler will not decrement the count value, and thus will not dispatch to the task.

3.   A signature word used by the miscellaneous tool set at task installation time to verify that the task header exists. This word must be set to $A55A by the application prior to installing the task into the HeartBeat queue.

The task code immediately follows the header. Dispatches to the task code occur in native mode with 8 bit m/x. A task must return to the HeartBeat interrupt handler with an RTL instruction. An example of a task that increments a memory location every tenth VBL is shown below;

```
TASK1       DW      0                       ; SPACE FOR QUEUE LINK
            DW      0
TASK1CNT    DW      10                      ; SERVICE TASK EVERY 10TH VBL
            DW      $A55A                   ; TASK HEADER SIGNATURE
            REP     #$20                    ; 16 BIT 'm'
            LDA     #10                     ; RESET TASK COUNTER
            STA     TASK1CNT
            SEP     #$20                    ; 8 BIT 'm'
            LDA     >COUNTER10              ; INCREMENT EVERY 15TH VBL
            INC     A
            STA     >COUNTER10
            RTL
```

There is no restriction on the number of tasks that may be installed into the HeartBeat queue. Tasks longer than one-sixtieth of a second could affect other VBL interrupt driven parts of the Cortland such as Tick counting. Cumulative time for multiple tasks occuring on the same VBL phase could also have the same adverse affects as a single task executing longer than a single VBL time.

HeartBeat Queue

```
                                                                              RTL
                                                                               ▲
                                                                               |
                                                               RTL           code
                                                                ▲        +7  SIGNATURE(msb)
                                                                |        +6  SIGNATURE(lsb)
                                                RTL           code       +5  CNTR (msb)
                                                 ▲        +7  SIGNATURE(msb)  +4  CNTR (lsb)
                                                 |        +6  SIGNATURE(lsb)  +3  LINK = $00
                                   RTL         code       +5  CNTR (msb)  +2  LINK = $00
                                    ▲      +7  SIGNATURE(msb)  +4  CNTR (lsb)  +1  LINK = $00
                                    |      +6  SIGNATURE(lsb)  +3  LINK (msb)      LINK = $00
                      code      +5  CNTR (msb)  +2  LINK (bank)          Last Link in Chain
          +7  SIGNATURE(msb)  +4  CNTR (lsb)  +1  LINK (adrh)
          +6  SIGNATURE(lsb)  +3  LINK (msb)      LINK (adrl)
          +5  CNTR (msb)  +2  LINK (bank)
          +4  CNTR (lsb)  +1  LINK (adrh)
          +3  LINK (msb)      LINK (adrl)
          +2  LINK (bank)
          +1  LINK (adrh)
HBptr (msb)      LINK (adrl)
HBptr (bank)
HBptr (adrh)
HBptr (adrl)
```