

DMA Software Guidelines

- **General DMA Programming Philosophy**
- **Registers**
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- **Gotcha's & Features**

General DMA Programming Philosophy

*****The DMA Fifo is the mechanism for transferring both disk IOCBs and disk data*****

- **Initialize the mode control for the AM2942**

FOR EACH TRANSFER

- **Setup AM2942 word count register (1-256)**
- **Setup AM2942 address registers (A8-A1)
[This is the offset within a page]**
- **Setup Page Pointer register (A23-A9)**
- **Setup Direction Bit**
- **Once everything is established:
StartDMA
AllowRDC (with appropriate caveats)**
- **After DMA Interrupt, verify status**

Registers

- **DMA Command Register (0210h)**
Direction bit 1 = Memory to Disk
0 = Disk to Memory

- **DMA Status Register Bits (0210h)**
Error bit (1 = error, 0 = no error)
DMA StateMachine (1 = running, 0 = not running)
EndOfTransfer (1 = not done, 0 = done)
Dependant direction ← FifoOutOfBounds (1 = ok, 0 = full or empty)
FifoEmpty (1 = not empty, 0 = empty)
FifoFull (1 = not full, 0 = full)
"A1" Diagnostic & Fifo Half-full Bit
Direction bit returned

- **RDC Control & Status register (0214h)**
[meaning to be determined by 8x305 to IOP186 protocol]
- **AM2942 Control Register (0200h)**
Always programmed to 06h

Registers (continued)

- **Page pointer (write 021Ah)**
Data bits 14-0 are used as Address bits 23-09,
Data bit 15 is used as Address bit 0
Data bit 15 should always be 0 for word transfers!
- **Page offset (write 020Ah, read 0206h)**
Data bits 8-1 are used as Address bits 8-1
- **Word count (write 020Ch, read 0204h)**
Data is expressed in bits 8-1
2's complement of number of words

Value	Words To Transfer
00h	256d (100h)
FFh	001d (001h)
01h	255d (0FFh)

- **Writing to the Page pointer register re-initializes the Page offset and Word count registers to the last value written**

Commands

- **StartDMA**
Resets the "extra count" flipflop automatically.
Starts the DMA state machine running.
Only execute this command once per DMA operation.
- **AllowRDC**
Tells the arbitor to let the DMA have cycles
Must be reasserted whenever IOP runs and transfer has not completed (remember yesterday's caveats)

Gotcha's & Features

- If an "extra" AllowRDC has occurred the DMA may start running immediately after the StartDMA command is issued
- Bits are shifted left by 1 in Word count and address registers (byte count?)
- StartDMA Clears the "Extra count" bit
- Software must make sure that DMA operations run to completion
- Page pointer re-initializes the word count and offset register