TURBOchannel;

The *Performance* Interconnect

Overview

- Synchronous 32-bit protocol
- Asymmetric I/O channel
- Low latency
- Scalable

Benefits

- FAST; 90 Mbytes/sec on the DS5000/200, 87 Mbytes/sec possible DMA with software overhead
- SIMPLE: only 12 control signals, 44 signals total
- INEXPENSIVE: single PAL for a programmed I/O interface, as few as 4 PALS for DMA (22V10)
- PROVEN: this performance level has been shipping for 2 years
- OPEN: no license or restrictions to option or system vendors

Protocol	TC	SBus	NuBus	EISA	MCA	VME
Performance:						
Architectural DMA	100	100	37.5	33	40	40
Achieved DMA (Mbytes/sec)	90	36	35	30	20	33
Characteristics:						
Interface Signal Pins	44	82	51	153	136	117
Power Per Slot (watts)	26	10.7	10	45	12.6	54
Primary Board Area (sq.cm)	168	123	332	371	250	372.8
Max Physical Addr. (Gbytes)	16	0.256	4	4	4	4
Access:						
Open to options	yes	yes	yes	yes	yes	yes
Open to systems	yes	yes	yes	yes	license	yes

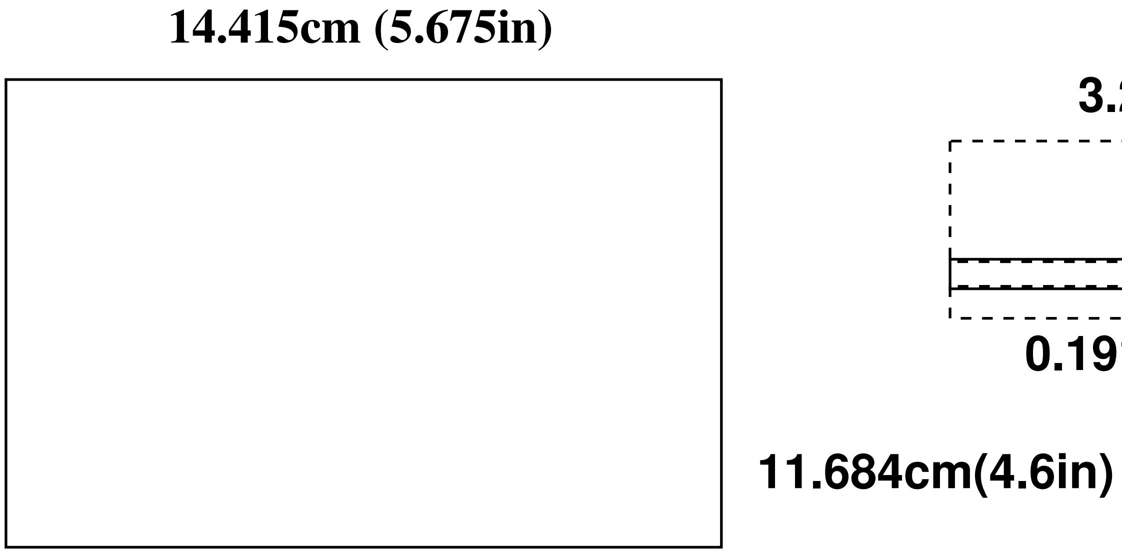
Physical Characteristics

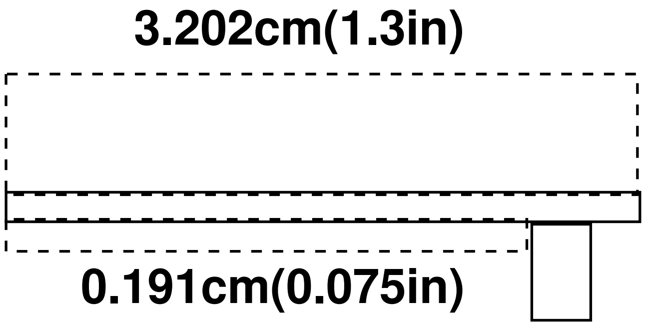
Protocol	Synchronous, 12.5 MHz to 25MHz
Data Path	32-bit multiplexed address/data
Signals/slot	44
Board Size	
Perimeter	11.684cm (4.6in) X 14.415cm (5.67in)
Area	168 sq.cm (26.1 sq. in)
Form Factors	Single, double or triple width sizes
Connector	96-pin DIN

Power rails	Single	Double	Triple
At +5V	4.0A	8.0A	12.0A
At +12V	0.5A	1.0A	1.5A

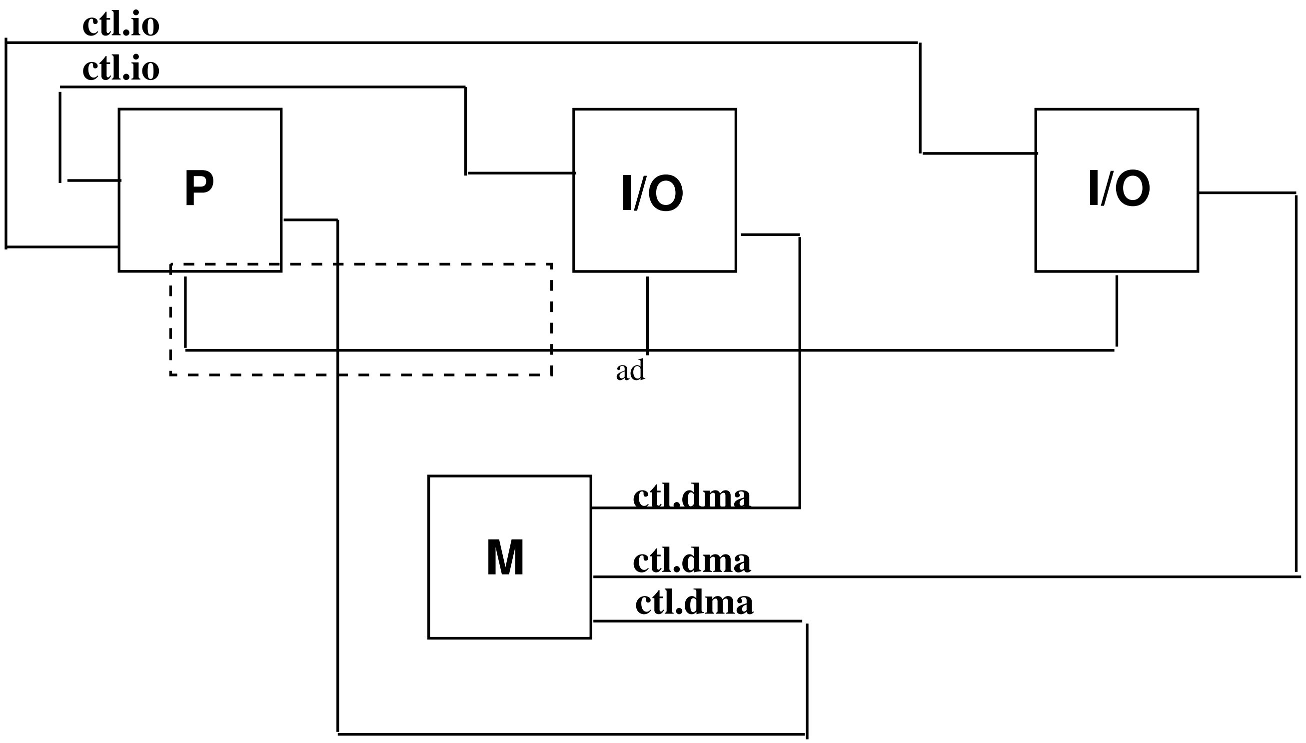
Air Flow	150 LFM (76cms)

Mechanical Features of a TURBOchannel Option

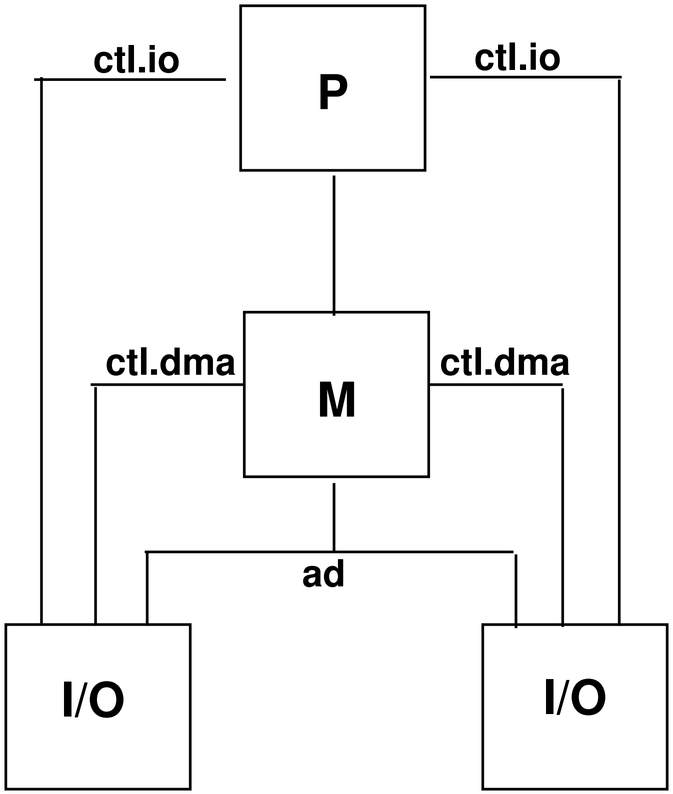




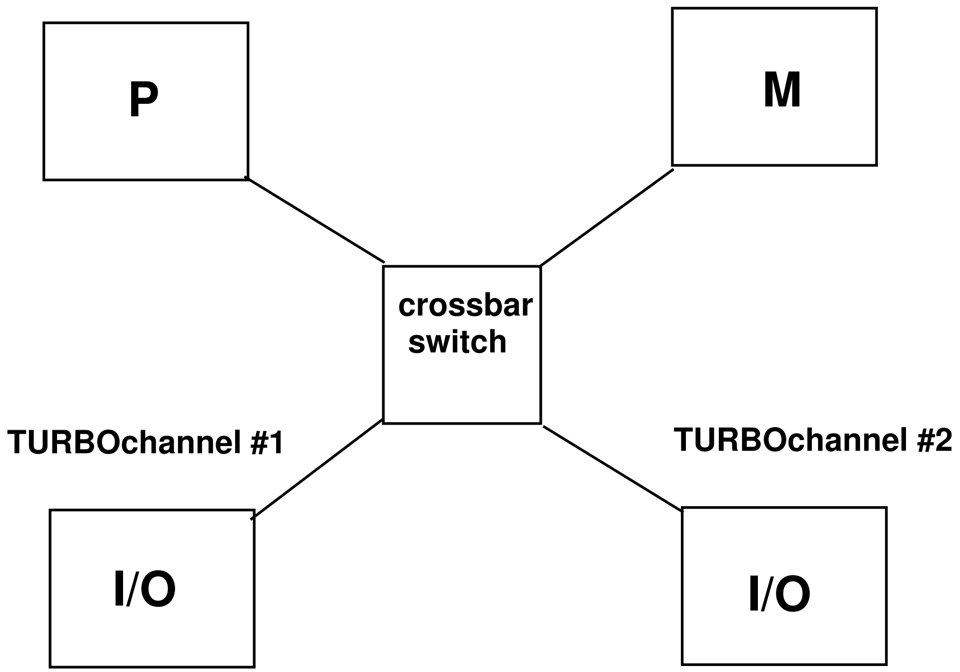
Low Cost System Implementation



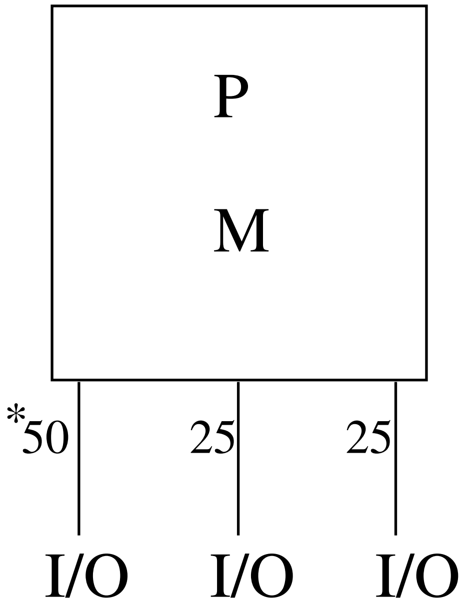
Mid Range System Implementation



High Performance Implementation

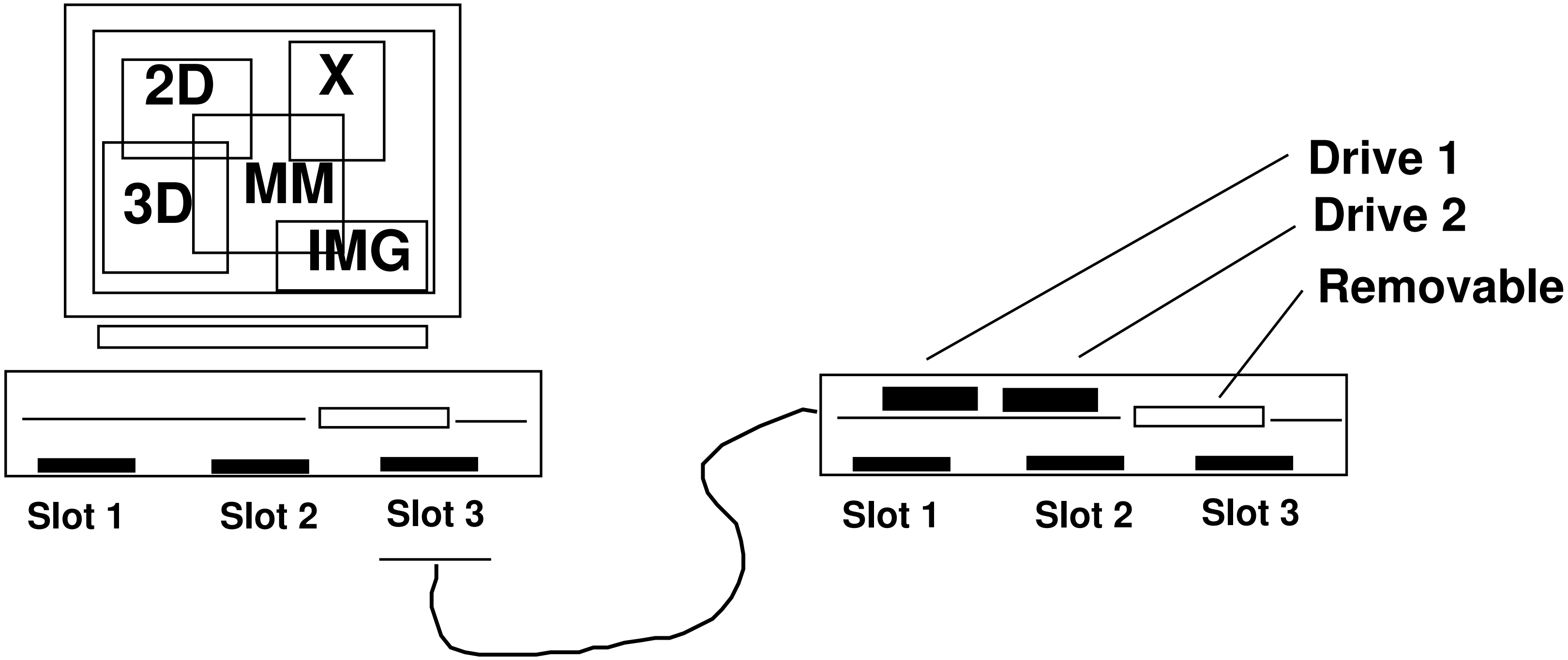


Speed Selectable TURBOchannel



* The system powers up at 25MHz and based on the option ROM can selectively turn the clock rate of that radial TURBOchannel up to 50MHz. The other options remain at 25MHz (per their ROMs) maintaining backward compatibility.

TURBOchannel Extender Box



... supports all existing options & platforms

TURBOchannel Interface ASIC (TCI) Benefits

- Lower cost interface for most aplications
- Lower power consumption
- Reduced interface component count and board real estate
- Guaranteed correct TURBOchannel interface implementation

TCI Support Features For...

DMA

- Word addressable DMA read and write pointers
- DMA read and write word counters
- Independent 16X32 bit DMA read and write FIFOs
- Scatter/gather pointers: this allows for large block transfers to cross page boundaries without taking any interrupts (and resultant latency period) once the transfer has started

PIO

- An options-side interface that can run synchronously/asynchronously to the TURBOchannel clock
- An address latch with outputs driven onto the option-side interface
- 8 read-write general purpose option outputs and 4 readable general purpose inputs that can be used to generate TURBOchannel interrupts

Common Myths about TURBOchannel

- **Only 3 slots available -**
  no, system implementation dependent
- **Limited address space -**
  no, system implementation dependent - specification provides for a maximum of 16GB!
- **Restricted to 100 megabytes** -
  no, the next generation of TURBOchannel will take the specification to 200 MB/sec with complete backward compatibility.
- **TURBOchannel is only a desktop bus -**
  no, Digital ship servers with TURBOchannel and TURBOchannel is suitable for rack mount systems
- **Restricted to 14.414cm(5.676in) by 11.684cm(4.6in) -**
  no, double sided surface mount, daughter card and/or double and triple width card designs shipping.
- **TURBOchannel is more expensive then EISA -**
  no, A 44 signal pin protocol is NOT as expensive to implement as a 153 signal pin protocol.

TURBOchannel Design Information

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ftp	gatekeeper:	16.1.0.2	pub/DEC/TriAdd pub/DEC/specs