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Technical Note TN-164 **Version 2.4**

DAPL Command Benchmarks

Benchmarks are valuable tools for evaluating the maximum sampling speed of certain types of applications and for comparing the performance of different Data Acquisition Processors™. Simple applications were written with a selected set of DAPL commands to provide performance benchmarks. These benchmarks can be helpful when deciding which Data Acquisition Processor is best for an application.

Following is an overview of the benchmark procedures, the hardware and software configuration used during testing, and a benchmark summary. A table presents benchmark results for various Data Acquisition Processors.

Test Procedures

Each DAPL application used to benchmark a command consisted of an input procedure sampling one channel. A 100 Hz square wave was applied to the inputs.

The benchmarks were run by setting the `TIME` command in the input procedures as low as possible without causing input channel pipe overflow. The DAPL command `DISPLAY MEM` was used to check memory use on the Data Acquisition Processor. Stable memory use indicated that the processing procedure could keep up with the input procedure sample rate. There were some normal fluctuations in memory use as the Data Acquisition Processor filled and emptied buffers. However, the maximum memory use reported by `DISPLAY MEM` did not increase over time.

Most applications transfer data to the PC. PC transfer tasks were replaced with `PCOUNT` tasks during the benchmark tests. This enables comparisons between Data Acquisition Processors without generating large volumes of data output. Since data values are not sent to the PC, the benchmarks are independent of computer performance.

Test Accuracy

The results of the benchmark tests are accurate to within five percent. `TIME` commands greater than 20 μs were changed in 1.0 μs increments. `TIME` commands less than 20 μs were changed by the smallest increment permitted by each Data Acquisition Processor (0.1 μs for DAP 4200a/526; 0.05 μs for DAP 4000a, DAP 840/103, DAP 5000a/526, DAP 5016a/527, and DAP 5200a/626; and 0.02 μs for DAP 5400a).

Description	4000a & 840/103	4200a/526	5000a/526 & 5016a/527	5200a/626	5400a/627
AVERAGE 100	1111 *	**1667 ***	**1667 ***	**1667 ***	7547
AVERAGE 10	833 *	**1667 ***	**1667 ***	**1667 ***	6667
LIMIT & WAIT	1000 *	**1667 ***	**1667 ***	**1667 ***	7143
INTEGRATE	189	500	**1667 ***	**1667 ***	3478
RMS (100)	526	1250 *	**1667 ***	**1667 ***	5940
SCALE	204	526	**1428 ***	**1667 ***	2963
FIRFILTER 21 taps decm. 5	476	1000 *	**1667 ***	**1667 ***	4706
FIRFILTER 101 taps decm. 5	179	357	909 *	**1667** *	2667
FIRFILTER 21 taps	132	286	769 **	**1667** *	2000
FIRFILTER 101 taps	40.3	80.0	208	869 *	740
FFT 1024 pts.	90.9	213	1052 *	**1667** *	2222
FFT 16384 pts.	68.9	178	556 **	1428 *	1081
THERMO	66.7	163	909 *	1052 *	1739
PID	42.6	188	555 **	1000 *	941

NOTE: Numbers that appear in **BOLD** represent the maximum DAP sample rate. For the DAP 5400a, the sample rates are obtained by performing the same command on each of the eight simultaneously sampled channel.

* Digital input used to achieve minimum TIME.

** Digital input used for 5016a