

## Special Considerations and Comparisons

There are some special consideration associated with the APOS-AP2 side of play (D/A) and record (A/D) procedures. All procedures when called invoke interrupt driven data handling routines on the AP2 Array Processor. These routines are run (in the background) each time a connected XBUS device issues a request for data processing attention. Asynchronous to this the AP2 also remains available for host directed signal processing tasks. Because the interrupt routine will "cycle-steal", less time is available for foreground processing.

The following table illustrates the relative advantages and limitations of various play and record procedures:

### **play, record, fastrecord**

Simple data handlers. Good for single channel operations on a single waveform or when high throughput rates are required. These procedures can be used to handle multi-channel data, however shuffling considerations must be addressed. **play** and **record** can process up to 750,000 samples per second combined and support bi-directional sampling at up to 350 kHz. If bi-directional operations require a sample rate beyond 350 kHz, the **fastrecord** procedure must be used. Refer to the *CycleFactor* calculation to see which combination of play and/or record you must use.

### **seqplay, seqrecord, dplay, drecord, mplay, mrecord**

All of these calls invoke 'sequenced' data processing routines, which support multi-channel multi-segment play and record operations. Although these procedures are very powerful, they can process only 400,000 to 500,000 samples per second. Also, when concurrent A/D and D/A is operating, neither channel can be made to process more than 250,000 samples per second.

For example, suppose simple **play** is used in conjunction with **seqrecord**. Even if the record speed is very slow, the sample rate for the single D/A channel can not exceed 250 kHz. Use this rule in conjunction with the *CycleFactor* calculation shown below to determine the feasibility of a particular application.

### Cycles Usage Calculation

The following formula can be used to calculate the usage-factor for your application. The equation will give an approximate indication of the percentage of processing time the AP2 will spend handling D/A and A/D data. *CycleFactors* greater than 100 will not run correctly.

$$CycleFactor = \frac{N_{sequenced}}{4,000} + \frac{N_{simple}}{7,500} \%$$

Where:  $N_{sequenced}$  is the total number of samples per second being processed by a *sequenced* routine and  $N_{simple}$  is the total number of samples per second being handled by a *simple* processing routine

For example, suppose you are playing from a single DAC channel at 200 kHz using simple **play** while recording on three A/D channels at 32 kHz using **seqrecord**. The corresponding cycle factor would be calculated as follows:

$$\begin{aligned} CycleFactor &= \frac{(3 \cdot 32,000)}{4,000} + \frac{200,000}{7,500} \% \\ &= 50.67\% \end{aligned}$$

indicating that about half of the AP2's processing power will be used to handle D/A and A/D data.