Synchronizing Two Scopes
Synchronizing Multiple WaveMaster Scopes

If you have a requirement for more than 4 oscilloscope input channels it is possible to synchronize two (or more) scopes to obtain up to 8 input channels. The process is relatively simple but requires attention to detail to insure correct timing. A block diagram of the basic configuration is illustrated in Figure 1.

Two digital oscilloscopes can be synchronized by locking their timebases together and using a common trigger. In the WaveMaster series oscilloscopes, timebase synchronization is achieved by applying the same 100 MHz external reference signal to the rear panel external reference inputs. The signal source used for this should have a frequency stability equal to or better than the scope's 1 ppm internal timebase. Short term jitter of the timebase should be better than 0.5 ps rms in order to maintain the scope's 1 ps jitter noise floor.

Note that the external reference input requires a signal level of 0 to 3 dBm. Since the reference input signal is transmitted through a splitter, the generator must be adjusted to compensate for insertion loss which in this example was 6 dB. The signal paths from the splitter to the scopes should be equal in length and connected with the same type of cable.
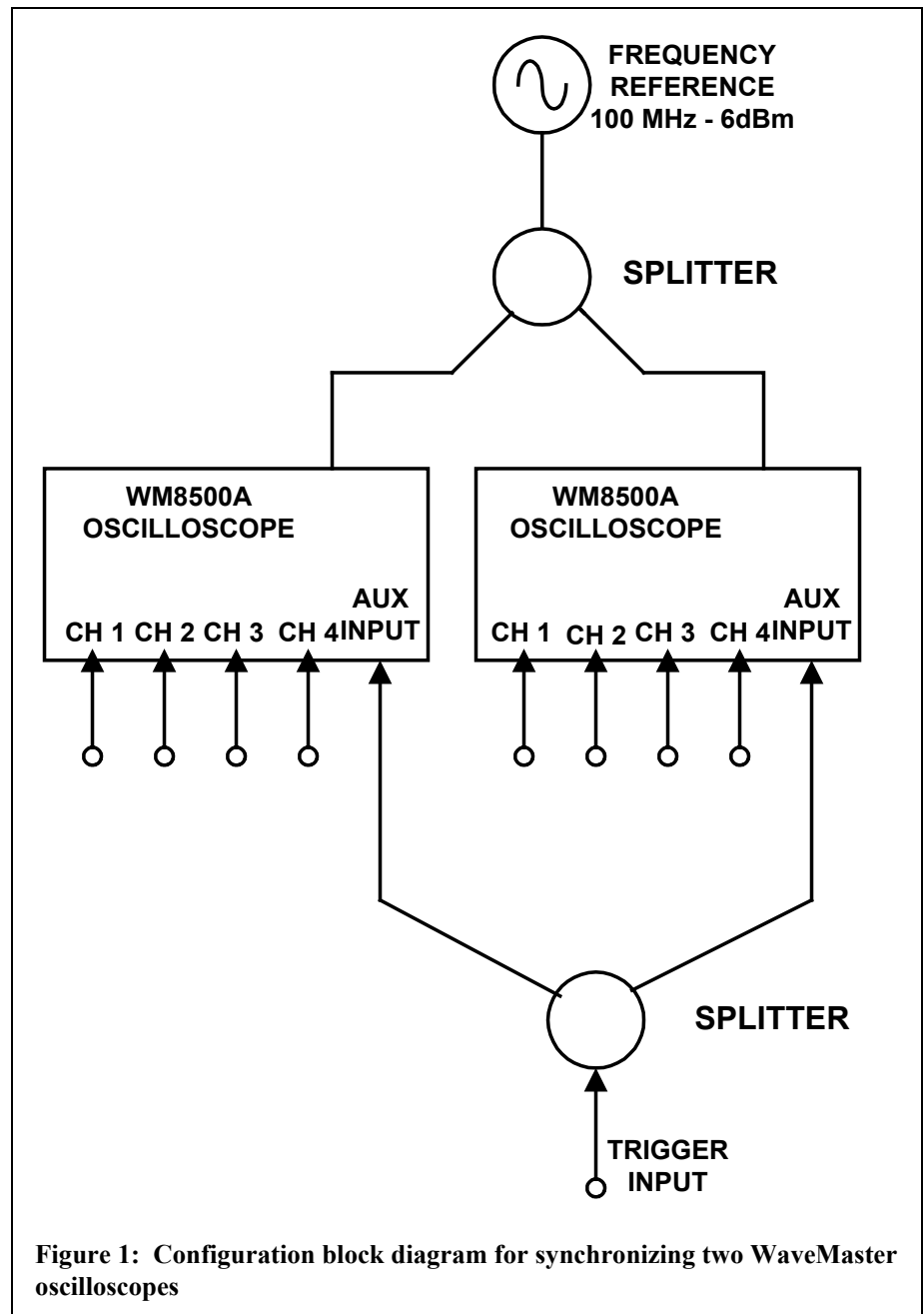

Figure 1: Configuration block diagram for synchronizing two WaveMaster oscilloscopes

In a similar manner the trigger signal is split and connected to each scope with identical length cables of the same type.

Once the scopes are connected, select "External Reference Clock" from the Clock Source tab in the Timebase Horizontal Setup menu (Figure 2) and select "Trigger on Ext" in the Trigger

Setup Menu on both scopes. Trigger levels should also be inspected and adjusted if needed so that both scopes have the same trigger level setting.

Next, deskew the inputs by applying the same signal to each input and use the deskew function in the Vertical Channel Setup menu to monitor the average value of the automatic parameter measurement "delay". "Delay" measures the time difference between the trigger point and the (50% amplitude) leading edge of the waveform, verifying time alignment. For best results the input waveform should have a fast, well defined edge. Each input channel should be adjusted for the same vertical sensitivity (Volts/Div) range that will be used in the actual measurement.

If an external trigger signal is not available then one of the input waveforms can be used as a trigger signal. In this case the signal must be split and sent to both scopes. The common trigger signal can be displayed (at the cost of losing an input channel) and used for visual as well as parametric alignment.
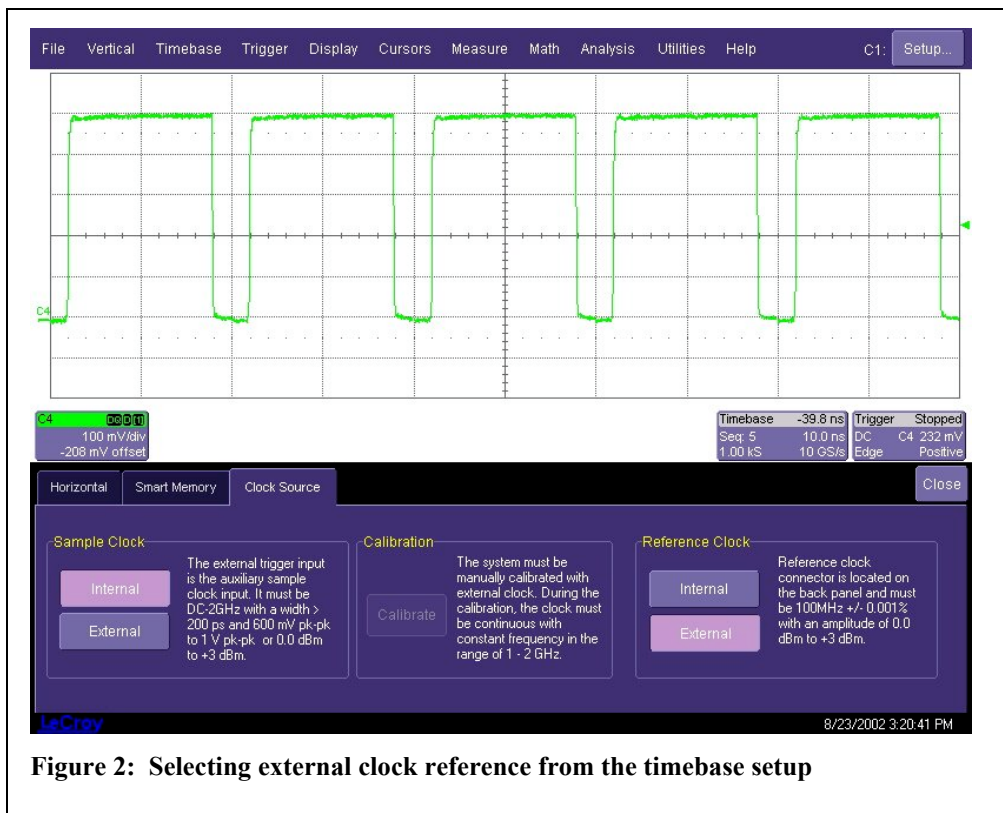

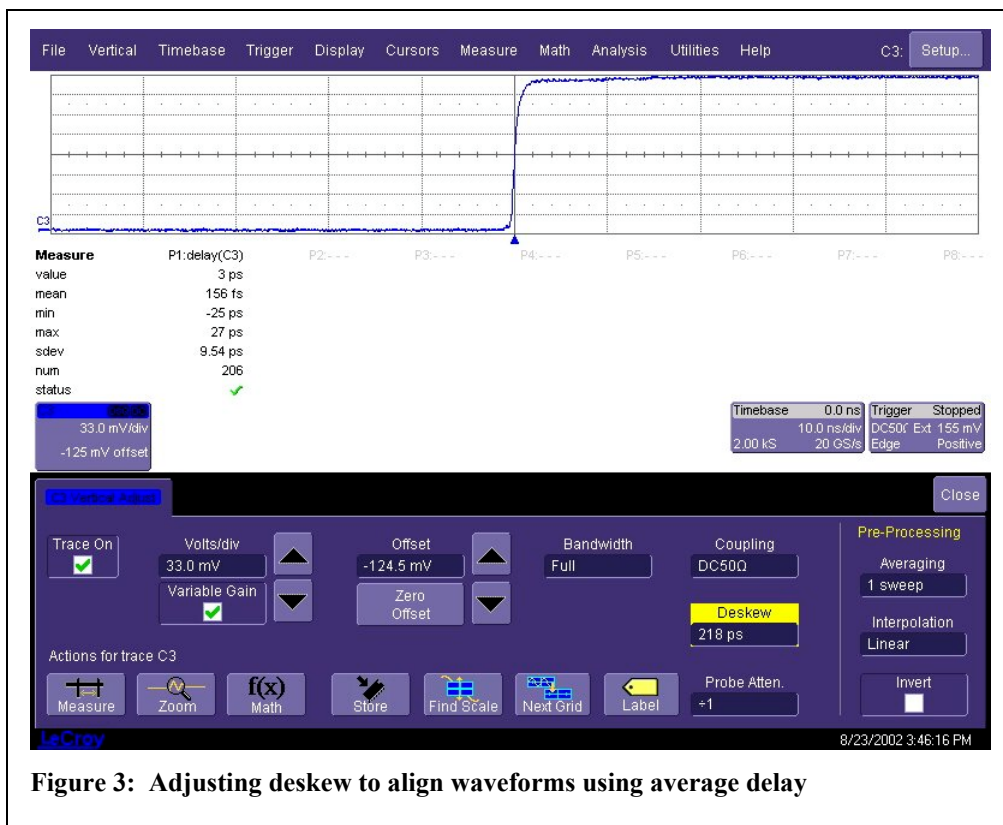**Figure 2: Selecting external clock reference from the timebase setup**

Figure 3: Adjusting deskew to align waveforms using average delay

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