

Frequency Domain Synchronous Averaging (FDSA)

The 2900B with version 5.18 or greater firmware has the capability to perform a patent pending method of synchronous averaging. Previously, synchronous averaging has always been done in the time domain and triggered from a third trigger signal or a voltage slope state in the original signal. There are occasions when this is not possible because of poor signal conditions or inaccessible triggers. To solve these problems and to provide a simple means to synchronously average intensity signals, **FDSA** can be used.

Benefits of FDSA

- Does not require an external trigger (or 3rd channel).
- Works even if the trigger signal is “weak”.
- Can be used for synchronous averaging of sound intensity data.

How FDSA Works

The trigger signal is generated by the spectrum itself:

- A reference frequency is selected where the phase is set to zero.
- Time and phase are related in the frequency domain by the following relationship.

$$\text{Phase} = e^{j\omega T}$$

- A phase transform is applied to the spectrum which relocates (in time) the spectrum.
- After the transform spectra may be summed to perform the analysis.

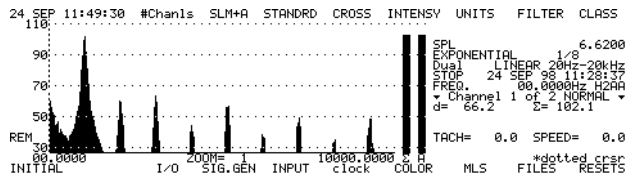
It is also possible to add multiple conditions. A second reference can be chosen so that its phase is also coherent. With two trigger conditions, various signals can be used as triggers to improve signal to noise ratios. Two triggers are usually required when ZOOM is active and not based at zero.

Selecting FDSA

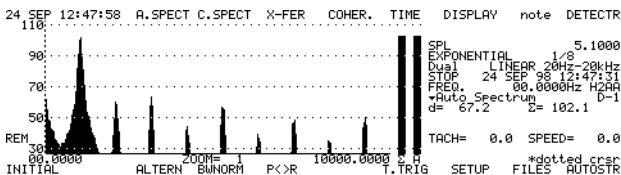
The FDSA feature is accessed through the Cross Analysis menu or the Intensity Analysis menu. To access the FDSA function:

Step 1 Put the 2900 into FFT analysis mode.

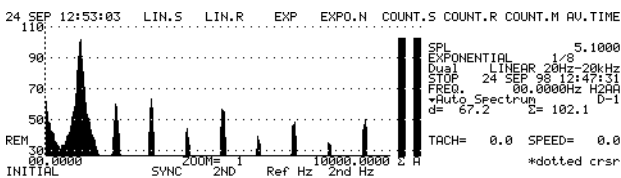
Step 2 From the system menu select **CROSS [D]** or **INTENSITY [E]**.



Step 3 Press the EXIT hardkey and the CROSS channel analysis menu will appear.

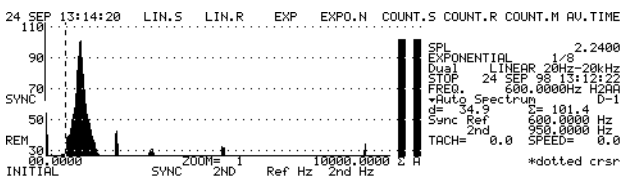


Step 4 Press the DETECTOR [H] key to access the FDSA functions.



The Detector menu provides the following options for FDSA:

Key Name	Key Function
SYNC [I]	toggling this key turns the averaging (FDSA) on and off.
2ND [J]	Turns the second reference on or off.
Ref Hz [K]	Sets the frequency of the reference to the current cursor position.
2ND Hz [L]	Sets the frequency of the second reference to the current cursor position.



While in the DETECTOR menu the current status of the averaging is shown. The averaging runs to a maximum of 32,767 counts from the time of reset.

After it reaches the count of 32,767 the data sum will not change. A reset should be performed prior to each measurement.

