TRILITHIC **Application Note**

860 DSPi CSO/CTB

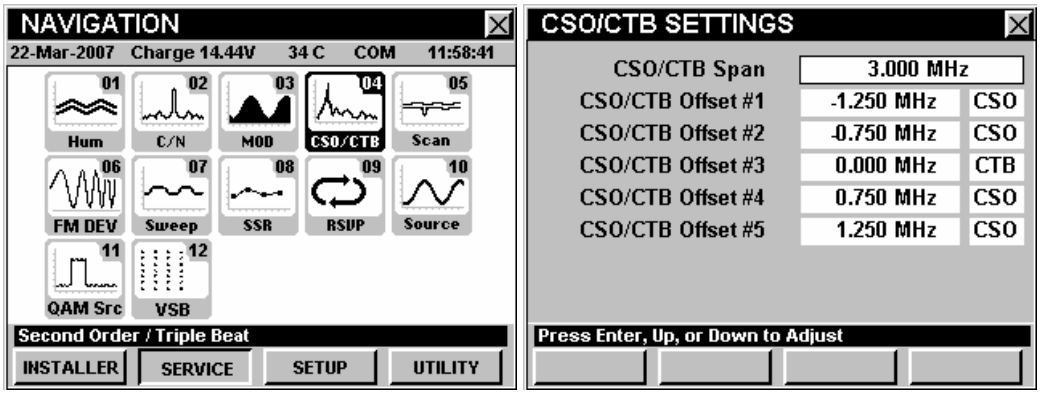
Definition of CSO/CTB

A Discrete Second Order (DSO) value is an individual, second order inter-modulation product produced when one or two carriers pass through a non-linear component and mix. The Composite Second Order (CSO) value is the sum of all DSO products that happen to fall at the same nominal frequency in a multi-tone system. CSO is defined as the difference, in dB, between the RMS voltage of the carrier measured at its peak and the RMS voltage of this sum.

A Discrete Third Order (DTO) value is an individual, third order inter-modulation product produced when one, two or three carriers pass through a non-linear component and mix. The Composite Triple Beat (CTB) value is the sum of all DTO products that happen to fall at the same nominal frequency in a multi-tone system. CTB is defined as the difference, in dB, between the RMS voltage of the carrier measured at its peak and the RMS voltage of this sum.

The 860 DSP and 860 DSPi can perform CSO / CTB calculations using either of the following methods. The first method (Method #1) involves taking a reference measurement with the video carrier present, turning off the video carrier, and looking at the spectrum beneath the channel. The second method (Method #2) involves using a zero carrier line and looking at the spectrum beneath the channel during the period this line is active.

The actual math used to determine the possible CSO and CTB frequencies is quite complex since any two or three carriers on your system can mix. The setup menu allows you to select these points manually and have the meter display the results at these points. The important thing to keep in mind about Coherent Disturbance tests is that it includes more than CSO and CTB. Automated CSO/CTB measurements are fine for some things but don't quite meet proof of performance test requirements. The reason is that automated routines perform measurements only at the common CSO/CTB frequencies (that's at the visual carrier, +/- 750 kHz, and +/- 1.25 MHz for the standard channel plan in the US). So, you must look at the entire spectrum when evaluating the performance of the channel.



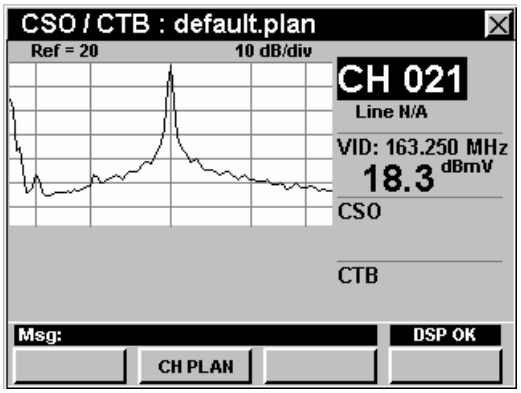
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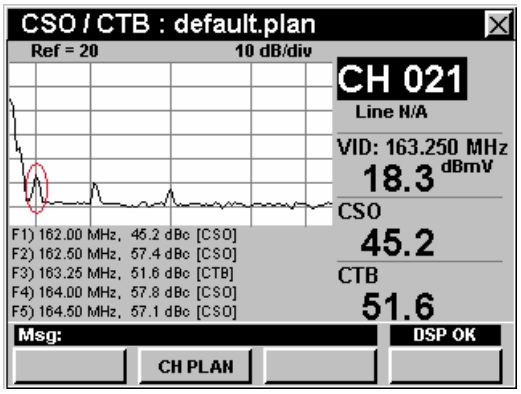
Method #1

This method requires turning off the video carrier for a short period of time. This should be done under strict conditions as to not affect the cable subscribers; however, the process is simple. Select the desired channel and measure the peak video level using the CSO / CTB menu. You should see the following:

> **Note**: If your meter is not equipped with the Advanced CSO / CTB option, the line number will not be displayed at all. If your meter is equipped with the Advanced CSO / CTB option, you must set the line number to zero (Line N/A will be displayed) in order to use Method #1.



Next, turn off the carrier and the 860 DSPi will measure CSO/CTB at your chosen frequencies. You can still view the entire spectrum under the carrier in case the disturbances do not occur at your chosen frequencies.

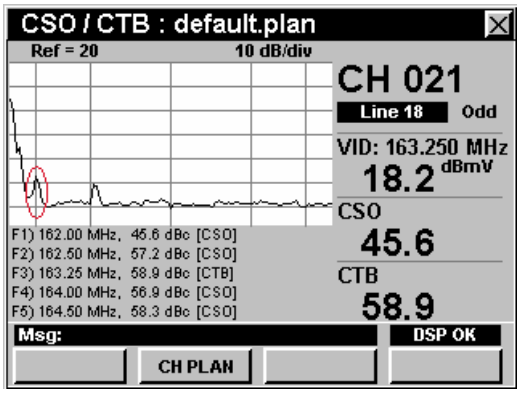


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Method #2

This method requires the use of a zero carrier line. Once you have installed your line blanker* (with IF gate or zero carrier line) and chosen a line number to blank, select the Line field and choose your line number and either the Even or Odd Field. After that, the meter automatically looks during the zero carrier line for CSO and CTB carriers.

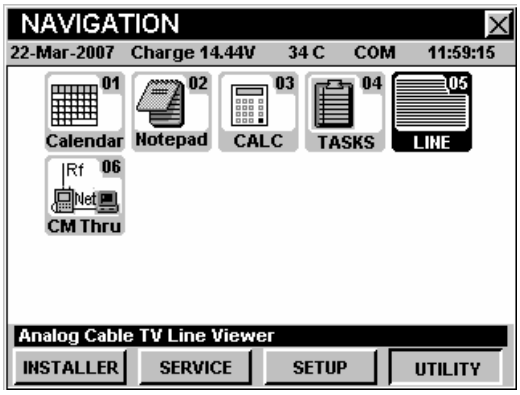


As you can see, both methods will display the interference at 162.00 MHz, but the second method does not require turning off the video carrier.

How Can I See if My Line Blanker is Working?

The easiest method to check your line blanker* (or line inserter) is to use a utility called “Analog Cable TV Line Viewer” located on the utility tab and is accessed via the “LINE” icon.

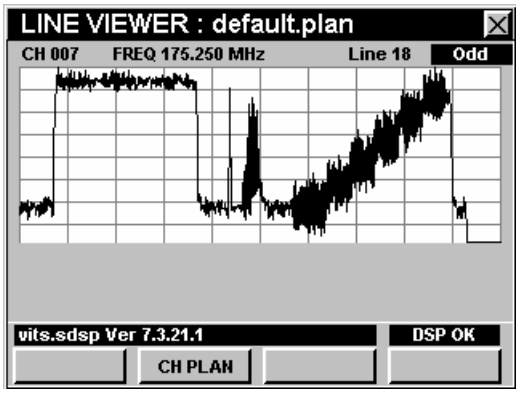
> **Note:** The line blanker must have an IF gate or provide a method for generating a zero carrier line. For proper operation of the line blanker, please refer to your line blanker manual.



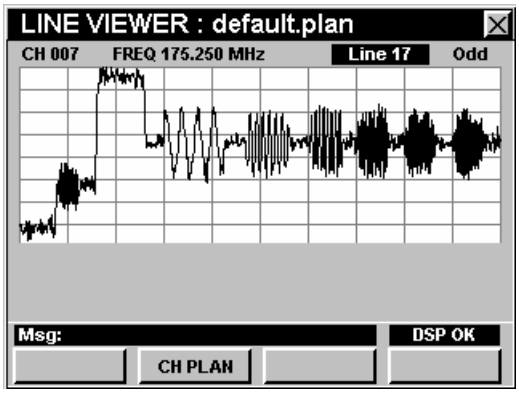
* Trilithic recommends the TVMS Model 4200 In-Service Test Processor, which can be found at http://www.tvms.net/Products/Info_4200.htm.

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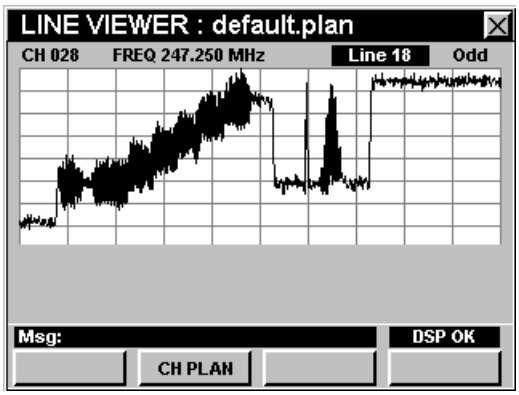
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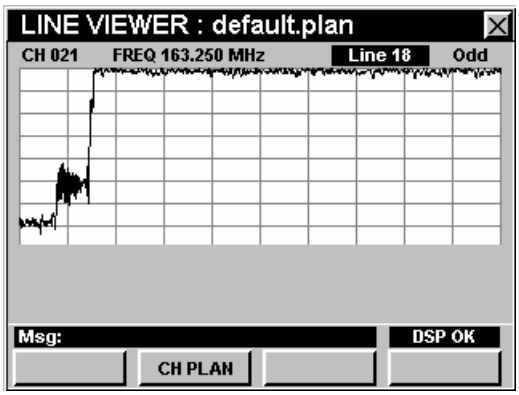
NTC7 Composite Test Signal



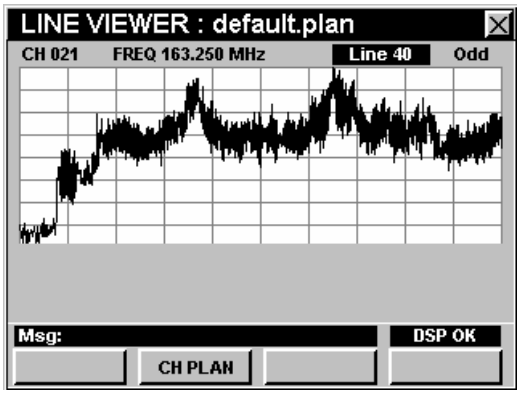
Multiburst Test Signal



FCC Composite Test Signal



Zero Carrier Line



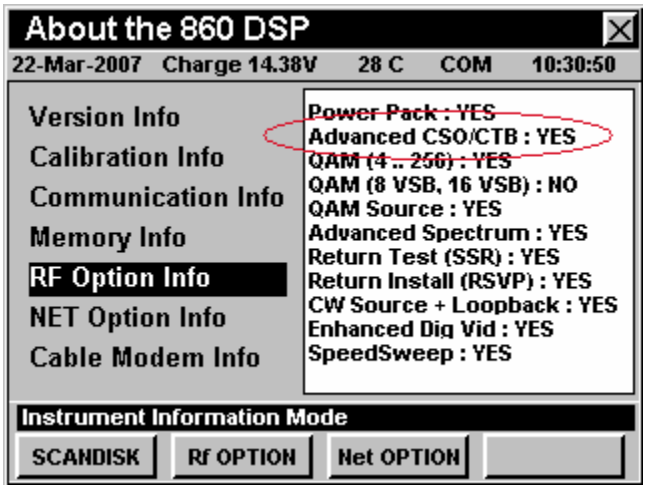
Regular NTSC Video Line

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How Can I See if My 860 DSPi Supports Advanced CSO/CTB?

The easiest method to see if your 860 DSPi supports Advanced CSO/CTB is to go to the Information Menu on the Setup TAB. Examine the Rf Option Information List and see if you have the option. If you do not, you can call the factory and purchase the Power Pack Option for any 860 meter that has ever shipped.



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