## Application Note: TimeView 3™

pendulum

# Frequency Measurements in MDA Mode for HP53310A Users

### Introduction

The new TimeView 3 Control and Analysis software when used with Spectracom's Pendulum CNT-91 Frequency Analyzer builds on TimeView 2's ability to convert the CNT-91 into a high performance Modulation Domain Analyzer.

The TimeView 3 software is intended to make measurements easy for the current user of the HP 53310A Modulation Domain Analyzer. The added MDA mode is designed to emulate the parameters of the HP 53310A making the transition to the TimeView 3 solution seamless (see figure 1).

Capital I parameters		14.14	تو ترونان و فارده	and the second s	فحصابك أستعم	a Tanak	و أنشونا في الت
II Blain							
Rendered	Property PR	10000	abellie mittentie tit	10.000.000	A REPORT OF A R	101010-001	2010/00/01/01
and a second			constraints for				
Tanakar	address/doi:	100	Looken the Locker				manipul (
Festilizeran	lingle						
- and the second					1.1		
June sange	ús.						
1 m	10,000,00%						11
15-	100004464			- 1	€ 1.D.D		. I Lis it
1 autor	100505-0810		1.6.54	6 I I I	THE R. LEWIS	1.1.4	to trial to be
liput.	101110		b. Ib. filler at l.	1.48.11	TERE 1111	1.1.1	LTE ANNE AND
Fer al-states	34 Hz		Reference and a second	10.000		hall de	120,0004-000
to Based Ac			July Children	and the second	化氯化化物 化化物	HAT I DE	11111
anywhere .	10000		100230-004	124 3	790 <b>7 1</b> 10 10 10	1811-11	영 (11년 - 15년)
Coupling	44		P. 14 1. 144.		יזין קאי דאן ז	711 01	of an fill of the
× byot I		20.300000					
V. Annahing					L	161	11 Mar. 18.
Arrestory and a second	10.1		ففوا والأله	اللوادياء	તે માટે છે. તે છે	ė kin	فقرن كالأولى
Andrea Andrea	ana M		alita aist	اللا ارتباء		ù É i t	結構如的
la Rentera Antonio Renter Renter	anya Ge Pusha		110.07	ind		N II	相關和自
M Anning Kenum Annen Dept Deter Seren	iner Alf Periter	1	<b>Happ</b>	的權		N.	情報的
U Arraing Annual Income Trape Trape Trape Trape	mur del Positor Po	1	<b>Hing</b>	膷		MĄ	r Ang
le Anning Annun Annun Fran Nein Son Magar Kalar tigger musik	anve del Positor Po	1	ili in the second s	槲			
10 Anning Annun Barra Dolor Imm Char Higger Volar Higger	ance Off Protoco Try Dry	1		m	mm		11/11/1
1/ Andrey Annum Bearer Trop Trop Trop Trop Trop Trop	Hove Off Postar Postar Postar Postar	1		nn)			
12 Annual Annua Annua Done Done Done Dagar Mara Higger made With Higger Prom Biogram	mur Of Posta To Posta Posta Posta Tot						
Kontesy Kontesy Kontesy Kontesy Frage Prope Pro	mun Gi Peritan La Sector Peritan La Sector S			n M			
1) Annung Annun Annun Inun Nite Imper Nite Imper Nite Imper I Nite Imper I Nite Imper I Nite Imper I Nite Imper I Nite Imper	mov di Posta Po Posta Posta ret			n M			
11 America Antonio Antonio Dege Dege Vice regger Solar regger Solar regger Solar regger Solar regger Solar regger Solar regger Solar neger Hearthouse Hearthouse Hearthouse	mov Gr Polite Do Do Do Do Do Do Do Do Do Do Do Do Do						
11 Annua Annua Isana Prin Prin 12 Anggar Ang Anggar Ang Anggar Anggar Anggar Anggar Ang Anggar Ang Anggar Anggar Anggar Anggar Anggar Anggar Anggar Anggar Anggar Anggar Anggar Anggar Anggar Anggar Anggar Anggar Ang Ang Anggar	Mor Of Polita Polita Polita Polita Int Int Int Int Int Int Int Int Int Int	1.1000000		nn i			
V America America America Net in the Marchine Marchiger Marchiger That Higher Nationapa Marchiger Marchige	May Delta Polita Polita Polita Polita IN Adar Adar						
V Keening Keening Keening Terris Mara Sagar Kalan Kegar Keening Keenin	Mart Of Politic 1: Politic Politic Politic Politic Politic Politic						
U Norma Manue Dana Dana Man Jana Man Tagar Man Tagar Man Tagar Managar	Mary Off Postan Post Post PostAn Idents						
V Norma Baser Direct Marca Marca Magar Marca Ma	Autor						
la Norma Manun Sanar Diar Diar Spar mak Mar Mar Spar mak Mar Mar Spar mak Mar Spar mak Mar Spar mak Mar Spar	def Portes Po Portes Po	1,000000 1,000000 1,000000 1,000000 1,0000000 1,00000000	A CONTRACTOR OF				
Kenning Kennin Kennin Kennin Para Para Para Para Maranga Hardinenan Kenningan Hardinenan Kenning	dar Darber Da Darber Da Darber Darber darber darber darber darber darber darber darber darber darber darber Da Darber Da Da Da Da Da Da Da Da Da Da Da Da Da	1.000000					

#### Figure 1. MDA display mode with panorama window on top.

This application note details the procedure for making a measurement in MDA mode in terms that are familiar to any HP53310A user.

#### **Instrument Setup**

When TimeView 3 is opened it will automatically detect the CNT-91 connected

to either via USB or GPIB. From the menu choose make new measurement and select MDA mode from the list of options (see figure 2). Select which input the measurement is to be performed on and set the input impedance for that channel.

To have TimeView setup the measurement for you press the Auto button from the tool bar at the top of the screen. Pressing this button one time is like choosing the Auto Scale button on the HP53310A. Double clicking the button is like choosing the preset button on the HP53310A (see figure 2), and will load the default settings for the CNT-91 and TimeView 3. Both the Auto set and Set defaults options are also available from the Acquire menu. Table 1 describes the default settings.

From the Capture parameters panel on the left set the Timebase. The Timebase operates the same as in the HP53310A, defining the sweep time. In TimeView 3 the sampling interval is set at a value based on the Timebase. The value is set at the fastest interval possible in the CNT-91. The HP53310A was limited by its 8k internal memory size. If you wanted a longer sweep time, you had to choose a greater sample interval. The CNT-91 has 3.75M internal memory and can transfer 15k samples per second to the PC so the fastest possible sample rate is used and is not user configurable.

Parameter	Default
Timebase	1 ms/div
Persistence	Single
Auto range	On
Coupling A/B	AC
Arm On Value trigger mode	Block Auto center
Slope	Positive
HF Reject	Off
Reference Osc	Auto
Min Frequency	100 Hz
Interpolators	On

Table 1. Default settings

The trigger parameters on the left capture parameters options are designed to emulate the options available in the trigger menu of the HP53310A. This value arming feature allows you to set the frequency (along with the slope) to start the data acquisition. The default is auto center which sets the value trigger to the average of minimal and maximal frequency.

### **Making a Measurement**

To start the measurement in TimeView 3 you press the green triangle from the tool bar at the top of the screen. This action captures and displays a single shot acquisition and then displays it on the PC screen. Changing the persistence setting from the left menu to infinite will enable continuous

TimeView III - [MDA 2011-02-22 09-29-50]	
File View Instrument Acquire Calcu	ilate Graph Window Help - 🖻 🗙
🗋 🗅 🚅 🖬 🎒 👗 🛍 🛍 🕅 MDA	- AUTO - 🗞 🔟 FFT - 🔍 🔍 - 😵
Capture parameters Single Shot	الم محمد والقارط فتقار تحديم والتر محدثه فالمدرات فالمدائد ومحاف فلم فالدفات فمات بمراصل فالد عامل والمقار عاط مرود والمار معارفة فالمدرات والتلفظ ومدير والمناف
Main Repetitive san Waysform	որինը՝ առաջում է արելու արելու արելու է հետ են է են երկրություն, են երկրություն, հետ երկրություն,
Function Fre Burst	المسالية حصائية لصيعها ليجمع مصابحة البراغان أعلايات المعاطية الفتا والمعاطية الفيا والمالية والمعادية والمالية والمحادية ومحده والعلا
Input A FM	





USA | 1565 Jefferson Road, Suite 460 | Rochester, NY 14623 | +1.585.321.5800 | sales@spectracomcorp.com FRANCE | 3 Avenue du Canada | 91974 Les Ulis, Cedex | +33 (0)1 64 53 39 80 | sales@spectracom.fr UK | 6A Beechwood | Chineham Park | Basingstoke, Hants, RG24 8WA | +44 (0)1256 303630 | info@spectracom.co.uk mode, enabling repetitive measurements with the last 15 measurements shown on the PC screen. All measurements are taken and displayed in a frequency versus time graph. The histogram option available in the HP53310A is available as a post processing option, along with Smoothing and Fast Fourier Transform (FFT) calculations.

#### **Post Processing Options**

To view the collected data as a histogram, choose the histogram option in the Calculate menu. A new window will open displaying the histogram of the frequency vs. time graph. To change the number of bins in the histogram choose Options in the Calculate menu (see figure 3). There are settings

Smooth					
Number of average	10				
Histogram	Histogram				
Number of bins	55				
Bin units	Samples/bin				
FFT	FFT				
FFT auto size	On				
FFT size	512				
Window function	Rectangular				
TDEV, ADEV, MADEV					
Exact calculation limit	20000				
Step density	10				
Set defaults	Cancel				

Figure 3. Optional settings for post-processing functions.

for all post processing data views in this menu. When you change the number of bins for the histogram it is necessary to go back to the original measurement data and calculate the histogram again. This time it will appear with the new number of bins. This setting will remain for all future histograms until changed or defaults are reset in the Calculate > Options menu. The default is 55 bins.



#### Figure 4. Distribution histogram.

Smoothing displays a waveform based on the averaging of a user definable number of coincident points (see figure 4). To set the number of coincident points to use when finding the average value for a particular point, open the Calculate > Options dialog and change the Number of Average setting. The default is 10. This will affect the total number of points displayed on the graph. For example with 100 samples a "Number of Average" = 50 would reduce the total number of points on the graph to 50.

	*				086 nartpie
	×				
	*				
	*				
	•				
	•				
- 0 0					
	*				
o o o	*				
0 0	*				
0 0					
0 0					
o 0	*				
•	×				
•	*				
•	*				
•	×				
•	T				
and a second second					
		1.1			
10000		HO LENGTH			
	A				
	All and a second				
	the local de la construction de	41	6		
		12. 1	فغرافة أوتكم الكرادة	والفقاصات فتشر بدغنا	1044
0					
	100	Sec. 1	104	414	
		1.00	to a	100 200 and	Loo 20 10 est

#### Figure 5. FFT reveals modulation.

FFT displays the data in its frequency spectrum (see figure 5). The options for the FFT are also in the Calculate > Options menu. The FFT auto size option, when on, allows the application to make the decision of the ideal number of points to compute the FFT. Alternatively a fixed number can be set in the FFT size field. The window function for FFT can be set to Rectangular, Hamming, or Hanning.

These additional functions along with the familiar histogram allows for an even greater detail of measurements than the HP53310A.