Welcome to Stable32

- **Introduction**

Stable32 is a 32-bit PC program for the analysis of frequency stability. It allows the entry and editing of phase and frequency data, the calculation of stability statistics, and the plotting and printing of phase, frequency and stability data. Stable32 runs under Microsoft Windows 95/NT or higher, and requires a 200 MHz Pentium-class computer with a CD drive, 32MB of RAM and a XGA color monitor. A graphics printer is needed for text and graphics printouts. General help information is available via the F1 key, or by accessing the Help menu or toolbutton, while context-sensitive help is available by pressing the Help button within a particular function. Complete information about the Stable32 program is available in its User Manual.

- **License**

A license is hereby granted to the purchaser for the use of this program. This program has been extensively tested, but it is never possible to declare a program completely bug-free. No warranty is made, nor is any liability assumed, in connection with the use of the program.

- **Installation**

Stable32 is distributed with a standard Windows installation program called SETUP.EXE, which should start automatically when the CD is inserted into the drive. It works with a 64-bit version of Windows. To install Stable32 manually, use the Add/Remove Programs applet in Control Panel under Start/Settings, or simply execute D:\SETUP from Start/Run (where D is the drive letter of your CD drive). By default, this will create a folder called STABLE32 in a C:\Program Files\Hamilton Technical Services directory on your hard disk, and will copy and decompress all the Stable32 files to it. No changes will be made to the Windows Registry, WIN.INI or any other system files except to register the program and its file extensions and create a Stable32 program group containing an icon for Stable32. About 15 MB of disk space is required. Use the included uninstall program to remove the Stable32 program files (any user-generated files must be removed manually).

- **Examples**

A startup dialog box is included to help the new Stable32 user, and a step-by-step example of the use of the Stable32 program is given in the User Manual. It uses the included SAMPLE.DAT data file.

- **Updates**

Updates for Stable32 are posted on the IEEE UFFC web site, which may be accessed via the "UFFC on the Web" item under the Stable32 Help menu.

- **Support**

No support is provided for the Stable32 program except for its Help file and included documentation.

IMPORTANT

Make sure you have full read/write privileges for the folder where Stable32 is installed.

NOTICE

The Stable32 installation CD-ROM includes a copy of the Microsoft Visual C++ 2005 Redistributable Package (x86) called vcredist_x86.exe. This package installs the runtime components required to run applications developed with Microsoft Visual C++.

To avoid a problem involving access to these run time libraries, it is recommended that you also install that package when prompted to do so after the main Stable32 installation. It is also recommended that you perform that installation with Administrator privileges and with any anti-virus or anti-spyware programs disabled that might prevent the necessary Registry changes from being made.

If you prefer not to make any changes to your operating system, you can choose not to run vcredist_x86.exe, and in most cases Stable32 will run. If, however, the following or a similar error message appears:

Stable32.exe application error.
The application failed to initialize properly (0xc015002).

when opening the Stable32 program, you will need to repeat the Stable32 installation with vcredist_x86.exe, or run it directly from the Stable32 folder.

As an alternative, you should be able to get vcredist_x86.exe at:

http://www.microsoft.com/Downloads/details.aspx?FamilyID=32bc1bee-a3f9-4c13-9c99-220b62a191ee&displaylang=en

or by a Google search on: vcredist_x86.exe.

Also, please make sure that you have read and write permission for the folder in which the Stable32 program is launched. That is necessary for the GraphiC plotting functions.

Please be sure to contact me about this or any other problem you may have installing or using Stable32, or if you have any suggestions or comments about it.

Stable32 on Linux with Wine

Stable32 installs and runs nicely on a Linux (e.g., Ubuntu) computer with Wine. Simply install Wine (using all its defaults), insert the Stable32 installation CD-ROM, click on setup.exe, follow the normal installation procedure (using all its defaults), and launch Stable32 from its desktop icon. All Stable32 functions work properly and at normal speed.

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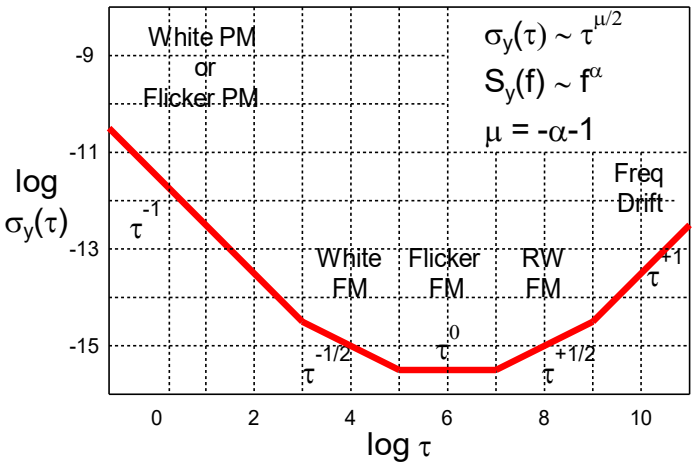
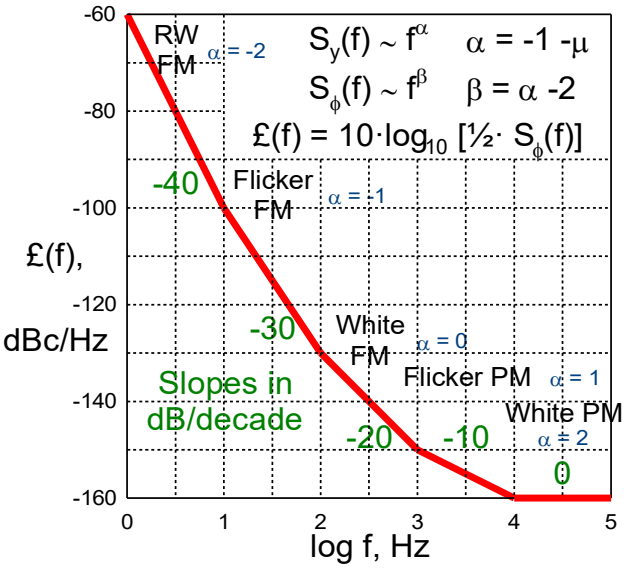
Chart of Frequency Stability Analysis

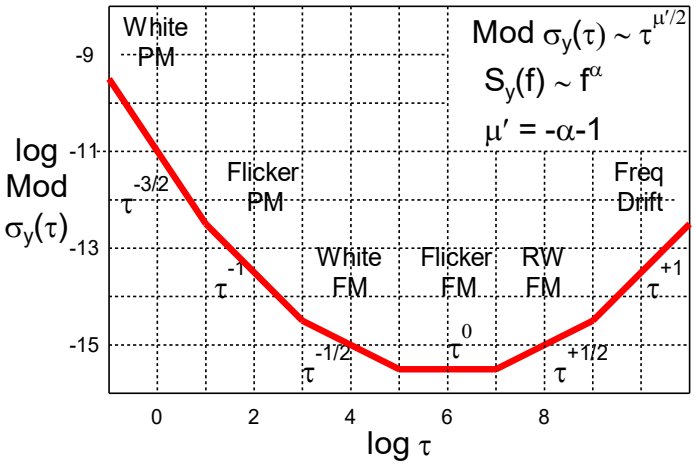
Sigma Tau Diagram



SSB Phase Noise Diagram



Mod Sigma Tau Diagram



Power Spectral Densities

$$S_y(f) = \left(\frac{f}{\nu_0}\right)^2 S_\phi(f) = h_\alpha f^\alpha$$

$$S_\phi(f) = \nu_0^2 h_\alpha f^{\alpha-2} = \nu^2 h_\alpha f^\beta$$

$$S_x(f) = \frac{1}{4\pi^2} \cdot h_\alpha f^{\alpha-2} = \frac{1}{4\pi^2} \cdot h_\alpha f^\beta$$

$$\pounds(f) = 10 \log_{10}\left[\frac{1}{2} \cdot S_\phi(f)\right]$$

Power Law Noise Type	Slope of log-log plot				
	Frequency Domain		Time Domain		
	$S_y(f)$	$S_\phi(f)$ or $S_x(f)$	$\sigma_y^2(\tau)$	$\sigma_y(\tau)$	Mod $\sigma_y(\tau)$
	α	β	μ	$\mu/2$	$\mu'/2$
RW FM	-2	-4	1	1/2	1/2
F FM	-1	-3	0	0	0
W FM	0	-2	-1	-1/2	-1/2
F PM	1	-1	-2	-1	-1
W PM	2	0	-2	-1	-3/2

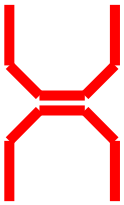
Power Law Noise Type	α	Domain Conversion Parameters $A=2\pi^2/3$ $B=2\ln 2$ $C=1/2$ $D=[1.038+3\ln(2\pi f_h \tau)]/4\pi^2$ $E=3f_h/4\pi^2$		
		Frequency Domain		Time Domain
		$S_y(f)$	$S_\phi(f)$	$\sigma_y^2(\tau)$
RW FM	-2	$h_{-2}f^{-2}$	$h_{-2}\nu^2 f^{-4}$	$Ah_{-2}\tau^{1}$
F FM	-1	$h_{-1}f^{-1}$	$h_{-1}\nu^2 f^{-3}$	$Bh_{-1}\tau^{0}$
W FM	0	$h_0 f^0$	$h_0\nu^2 f^{-2}$	$Ch_0\tau^{-1}$
F PM	1	$h_1 f^1$	$h_1\nu^2 f^{-1}$	$Dh_1\tau^{-2}$
W PM	2	$h_2 f^2$	$h_2\nu^2 f^0$	$Eh_2\tau^{-2}$

Overlapping Allan and Hadamard Variances

$$\sigma_y^2(\tau) = \frac{1}{2(N-2m)\tau^2} \sum_{i=1}^{N-2m} \left[x_{i+2m} - 2x_{i+m} + x_i\right]^2$$

$$H\sigma_y^2(\tau) = \frac{1}{6(N-3m)\tau^2} \sum_{i=1}^{N-3m} \left[x_{i+3m} - 3x_{i+2m} + 3x_{i+m} - x_i\right]^2$$

Software for Frequency Stability Analysis



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Stable32 Toolbar Functions and Function Keys

Icon	Function	Description
	Autocorrelation	Perform an autocorrelation analysis
	Add	Add phase or frequency data file
	Auto#	Execute automatic analysis script (#=1-3)
	Average	Combine data into longer averages
	Calendar	Display MJD calendar
	Check	Check frequency data for outliers
	Clear	Clear phase or frequency data
	Comm	Launch the 5110Comm utility program
	Configure	Configure Stable32 program options
	Convert	Convert between phase and frequency data
	Database	Read data from a TSC MMS database
	DAVAR	Perform a dynamic stability analysis
	Domain	Perform time-freq domain conversions
	Drift	Calculate and remove frequency drift
	Edit	Edit phase or frequency data
	File	Set filenames
	Fill	Fill gaps in phase or frequency data
	Filter	Filter phase or frequency data
	Help	Obtain help for the Stable32 program
	Histogram	Plot a histogram for phase or freq data
	Noise	Generate simulated power law noise
	Normalize	Remove mean value from data
	Open	Open phase or frequency data file
	Pad	Open the Notepad test editor program
	Part	Remove part of the phase or freq data
	Play	Launch the GraphiC Play program
	Plot	Plot phase or frequency data
	Power	Plot power spectrum of phase or freq data
	Print	Print phase or frequency data
	Read	Read a table of stability data
	Regularize	Remove gaps in phase or frequency data
	Run	Run an automatic stability analysis
	Save	Save phase or frequency data file
	Scale	Scale phase or frequency data
	Sigma	Calculate sigma for phase or freq data
	Statistics	Calc basic statistics and show data plot
	Step	Remove step(s) from phase data
	Tab	Save current data in new data tab
	Timetags	Insert timetags into phase or freq data
	Vibra	Calculate vibrational and FM sidebands

Key	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12
Normal	Help	File #1	File #2	File #3	Conv	Edit	Plot	Stats	Run	Power	ACF	Select
Shift	Manual	Handbook										