Magic Sinewaves

**Cheap, clean, and efficient low-harmonic PWM replacements
for induction motor speed controls, electric automobiles,
solar inverters, and home energy efficiency improvers.**

**A proposal and background tutorial
by Don Lancaster and Synergetics.**

Introduction

Magic Sinewaves are a newly developed class of mathematical synthesis tools having outstanding energy efficiency potential. They directly generate sinusoidal power output waveforms through use of a very simple single "H-bridge" switching process. The output sine waveforms have finely controllable amplitudes along with amazingly low harmonic distortions.

Key features of Magic Sinewaves are high efficiency, low distortion, and simple design. Unique to the method is that **any chosen number of low harmonics can be forced arbitrarily close to zero. While using the absolute fewest possible number of switching events** (and thus the best possible efficiency) when doing so.

Magic Sinewave waveforms are simple to produce by a direct table lookup within any low end microcontroller. As few as **seven** stored bytes per amplitude may be needed. Important emerging uses for these new Magic Sinewaves include…

- **Induction motor speed controls**

- **Electric automobile & robotic drives**

- **Solar panel to power grid conversion**

- **Home energy efficiency improvers**

- **UPS power quality systems**

- **Battery to 110 vac power inverters**

- **Specialized utility, aerospace, and telco apps**

Compared to traditional PWM (Pulse Width Modulation) techniques, these Magic Sinewaves offer much greater efficiency through far fewer switching events. There is vastly less high frequency energy involved. There is no carrier, no modulation or demodulation, and no load integration. Only minimal (and often inherent) filtering is required.

Output switching devices can often be significantly smaller and lower in cost. Heatsinking needs can often be greatly reduced. Bias, offset, noise, nonlinearity, and hysteresis problems common to PWM are eliminated. Needed firmware is far more friendly to generic microcontrollers. EMI can be significantly reduced.

Specially selected three phase Magic Sinewaves can offer delta-friendly driving from three half H-bridges. Doing so to stock unmodified loads.

Through original and sole-source research, Don Lancaster and **Synergetics** have independently developed the needed research tools, software, sourcecode, and design techniques required to effectively explore and profit from magic sinewaves.

A wide variety of these new tools and services can now be made available to you.

Where to Start

Extensive support of Magic Sinewaves appears in the resource library you will find at **http://www.tinaja.com/magsn01.asp**.

Included are tutorials, detailed catalogs, interactive JavaScript calculators, plus a long history of prior art IP archival material.

After viewing this proposal, the following files are recommended in this order…

MSINTRO1.PDF	**An introduction to Magic Sinewaves.**
DELTAMS1.PDF	**Three phase Magic Sinewaves.**
MSCHIPS.PDF	**Evaluation chip data & app notes.**
IDES01.PDF	**A quick first look at waveshapes.**
STEPSYNT.PDF	**Introductory tutorial and examples.**
STALAC.PDF	**Magic Sinewave Historic Timeline.**
VISMAGSN.PDF	**Magic Sinewave Visualizations.**
MSQUANT.PDF	**Magic Sinewave Quantizatrions.**
MSD28A.ASM	**PIC Magic Sinewave Sourcecode.**
MSCAL28Q.ASP	**Calculator for the "best" magic sinewaves.**
MSCAL156Q.ASP	**Calculator for extreme harmonic rejection.**
DPAT28.PDF	**Delta friendly coding example waveforms.**
DPAT28.PSL	**Delta friendly coding derivation and tutorial.**
WAYWERE.PDF	**Backgrounder on developer.**

Performance characteristics

type of magic sinewave	pulses per quadrant n	pulses per cycle	events per cycle	low harms rejected	storage words	delta friendly?
Best Efficiency	1, 2, 3…	4n	8n	4n	2n+1	no
Normal	1, 2, 3…	4n	8n	4n-2	2n+1	no
Bridged Best Eff.	1.5, 2.5, 3.5…	4n	8n	4n	2n+1	no
Bridged Normal	1.5, 2.5, 3.5…	4n	8n	4n-2	2n+1	no
Delta Friendly	3, 7, 11, 15, 19 …	4n	8n	3n+1	n+1	yes

Available Services

Don Lancaster and **Synergetics** are currently offering leading edge and sole source expertise in **Magic Sinewave** design and development. Many thousands of hours of research have culminated in published results, uniquely effective design tools, and fully working source code. Hardware reference designs are in process.

Magic sinewaves potentially represent a billion dollar opportunity. At present, the following **Synergetics** development services are offered to you…

- Many dozens of supporting files and intermediate research results are now online at Don Lancaster s **http://www.tinaja.com** site.

- Custom Magic Sinewave consulting services are offered at $89 per hour.

- Magic Sinewave evaluation & test chips are immediately **available**.

- "Burn your own" sourcecode licensing is offered at attractive bulk rates.

- A Don Lancaster personal training seminar is offered giving you all the very latest key tools and insider secrets needed for your own Magic Sinewave design and development. The price is $3900 per day plus expenses if held in your facility. Or $2300 per day if held at the **Black Range Lodge**, an outstanding Southwestern New Mexico wilderness lodge and retreat. The seminar may be videotaped. Up to eight students may attend.

- One-on-one virtual training is also available at a negotiated rate.

- A research associate program is offered. You are provided with all of the Magic Sinewave info to date, new updates and developments as they occur, and 70 hours of ongoing consulting for an annual fee of $5900.

- PIC and other software sourcecode development, beta testing, and related reference design tasks are available on a negotiated basis.

- Your indirect support and participation is available through either of our **Infopack** cash-and-carry consulting or **Banner Advertising** programs.

In addition to the costs of these research services, any commercial user of Synergetics Magic Sinewave concepts is required to pay an ongoing royalty of 0.5 percent of actual sales. Should Synergetics contribute substantially to a specific product development, an additional negotiable royalty of 4.5 percent is required.

Don Lancaster and Synergetics consider themselves to be primarily offering **risk reduction** services. We can provide you with successful Magic Sinewave products at significantly lower costs, much faster, and at far lower risks than can possibly be done starting from scratch with an in-house development program.

CLICK HERE FOR FURTHER PROGRAM DETAILS.

About Don Lancaster

Microcomputer guru and pioneer Don Lancaster is the author of 35 technical books that include two million sellers. He has also published two videos, a CD ROM, a patent, and 1800+ technical articles.

Long a prolific author in the technical press, Don's current ezine columns include **Blatant Opportunist** and his **GuruGrams**. He authored the immensely popular **Ask the Guru** series in Computer Shopper, the **Resource Bin** series in Nuts & Volts, and the **Hardware Hacker** and **Tech Musings** columns in Electronics Now. Although predominately an ezine publisher at present, Don makes **ongoing contributions** to such magazines as Circuit Cellar and Whole Earth Review.

Don is considered by some to be one of the fathers of the personal computer. For his outstanding early work in video display development. His **T.V.Typewriter** and other legendary early products are on permanent exhibition at the Boston Computer Museum.

Don has been called the patron saint of the Walter Mitties of the world for his unique ability to make complex technology simple and understandable.

His **TTL Cookbook**, **CMOS Cookbook**, and **Active Filter Cookbook** are industry classics. His **Incredible Secret Money Machine** is an alternate underground bible on small scale technical startups. Additional book info is **found here**.

Don is the webmaster of his Guru's Lair at **www.tinaja.com** This well received site has consistently gotten accolades for outstandingly unique tech content.

Don has been an Apple developer and seeder, an Adobe developer, a Hewlett Packard developer, and a Western Design Center developer. Don has done consulting work for QMS, Motorola, and many major firms. He is recognized as a leading independent **PostScript** and **Acrobat** authority.

Don has a BSEE degree from Lafayette College in 1961,and a MSEE from Arizona State University in 1967. He has done postgraduate work at Carnegie Mellon and has additional formal training in fields as diverse as anthropology, photography, business law, technical illustraton, and fire science. He has fifteen years of industrial electronic engineering experience. He has taught microcomputer fundamentals and desktop publishing at the community college level for 16 years.

Don owns and operates **Synergetics** and Synergetics Press, new age media, consulting, and publishing firms. His avocations include firefighting, spelunking, cycling, and **tinaja questing**.

CLICK HERE FOR ADDITIONAL BACKGROUND.

CLICK HERE TO BEGIN YOUR MAGIC SINEWAVE VENTURE.