**Don Lancaster's**

# Tech Musings

**June, 1997**

The folks at IBM have added a new patent repository to the web. With a free searchable master file for all patents in all fields newer than 1971. Plus a $3 per patent hard copy fax service. You can access this site from the *Patent Avoidance Library Shelf* page of my *www.tinaja.com* Or reach it directly at *http://patent.womplex.ibm.com*

This new service certainly is fast, convenient, and scads of fun to play with. Text and complete figures are included. As are "forward looking" cross references. The site is not yet in *Adobe Acrobat*, so the figures remain somewhat grubby looking. And I feel their search engine seems to be a tad on the weak side.

But do note that not one patent in 200 ever shows any net positive cash flow. Less than one patent in 1000 is ever "new" enough or "non-obvious" enough that it cannot get busted with a thorough enough search for prior art in obscure enough places.

Thus, *any* patent repository might *overwhelmingly* end up providing a mind-numbing stash of incompetent failures and total losers. An amazing number of patents just plain *do not work*. Your effort is infinitely better spent studying the trade journals and all of the web sites where the winners consistently appear.

Ferinstance, I was two for two on my first visit here. I looked into two patents and now have a pair of superb new candidates for my patent horror story collection. I first searched on "ac phase control" to find out where it would end up leading me.

The first patent from 1992 looked vaguely familiar. Sure enough, I had published the *exact* same waveforms back in the September 1969 *Popular Electronics*. On page 30.

While studiously ignoring obvious high profile public domain prior art, they did, of course, manage to make their design far more complex and way more expensive than necessary.

The second patentocity was more recent. And even sadder. They started with a 1938 construction project you

can locate in *Radio News* that talked about what was then referred to as a *Thyratron half wave proportional ac power control*.

A fine subject that later became a mainstay chapter in most industrial electronics books of the 1940's. As further claims, they then added some wishful thinking which was not even wrong. Wishful thinking that *every* intro circuit theory book warns you about. In bold print. Sigh.

More on patent horror stories in PATNTHOR.PDF. A reality checklist of the scant few times when a patent *might* be appropriate can be found in WHEN2PAT.PDF. Tested and proven

alternatives to patents and patenting are provided in my *The Case Against Patents* package from *Synergetics*.

### A Superb New Printer

I've long been searching for a cost effective way to do high quality, full color covers for my *Book-on-demand* publishing. There is now this utterly amazing new MD-2010 printer from *Alps* that fills the bill beautifully. At a street price as low as $390.

This is a letter to legal size dye sub printer. Their *micro-dry* inks arrive on ribbons. Usually in photo realistic black, cyan, magenta, and a yellow. But optionally in *metallic foil* gold,
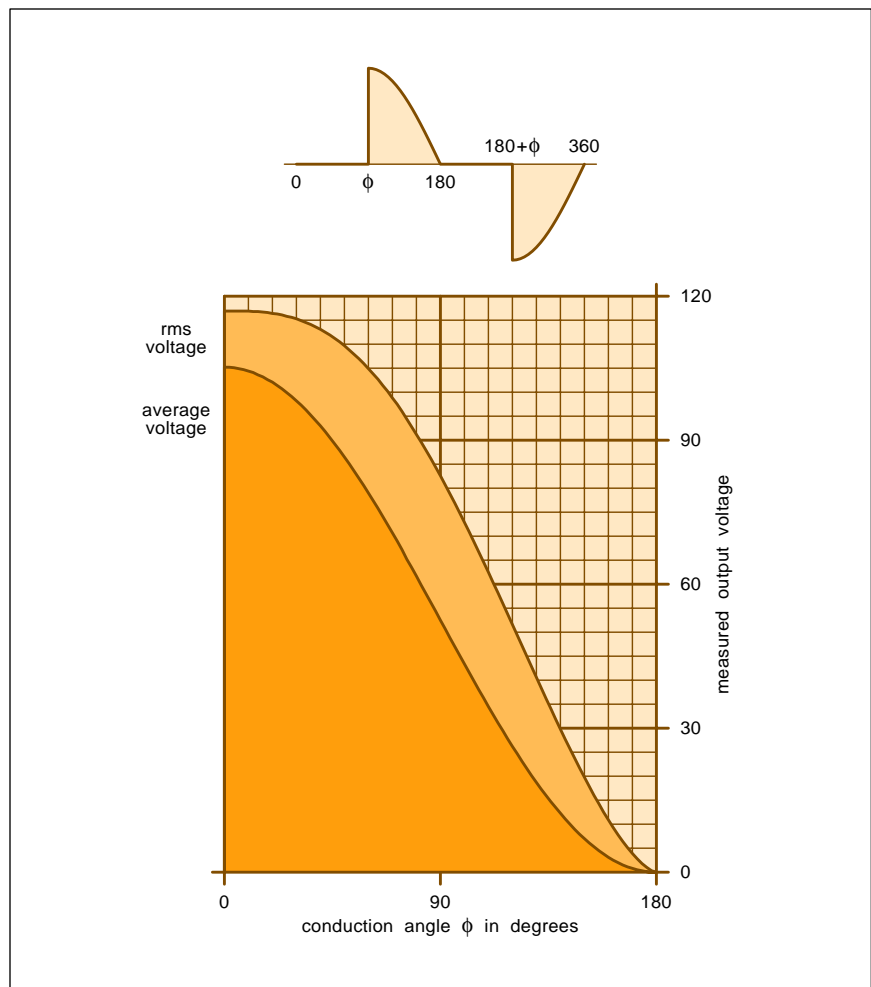


Fig. 1 – HOW THE RMS AND AVERAGE voltages for a line operated full wave triac phase control vary with conduction angle.
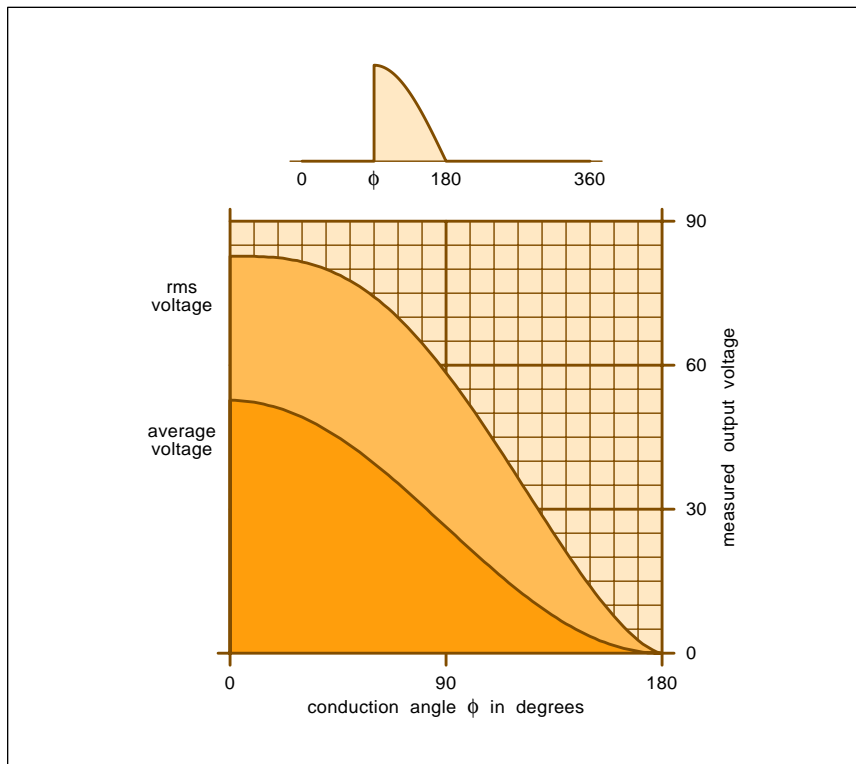
Fig. 2 – THE RMS AND AVERAGE voltages for an ac line operated half wave thyratron phase control. This circuit is obsolete and should no longer be used. Because it trys to draw direct current from the ac power line.

silver, and cyan. Along with a regular black. Thus, you can easily do *Kroy Color* and hot-stamp effects with this machine. The output quality has to be seen to be believed. Final prints are water resistant. Optional materials let you handle T-shirt, mug, and printed circuit transfers. By use of iron-on transfers and back print stocks.

Their back print stock gives you a way to produce glossy "photos". You auto print reversed left-to-right on to this transfer sheet. And then iron the stock onto your final page.

The carrier sheet then gets peeled away, leaving you a protected glossy photo effect.

Your typical setup is an 8 Meg or higher Windows 95 host with a high speed bidirectional parallel port. A fancy and custom menu-driven print driver software is included.

This Alps MD2010 is rather well suited to point-of-purchase messages, greeting cards, table tents, badges, and high quality business cards. And plenty of full color fill-a-local-need specialty items. Stuff you can easily make a buck on.

The printer does not directly speak

PostScript. At least not yet. But you can easily print PostScript files with the MD-2010. Either with *GhostScript* host shareware or by using the .PDF format of *Adobe Acrobat*. A while back, I wrote a COLORIZ2.PS routine which converts older B/W PostScript grays into color tints for web display. Amazingly, this same routine works well on the MD-2010. It invisibly and automatically takes care of the color separations for you!

A stripped down CD version of *Adobe PhotoShop* they named *Photo Deluxe* is included with the printer.

Their printer works on a multiple pass basis, grabbing one ribbon at a time. It sure is fun watching those color separations getting built up into a final print. Because the ribbons are bar coded, any ribbon can go in any slot. But do make sure they are right side up. And be certain to verify the anti-curling bar is completely to the left when you close the lid.

Alps claims a 14 cent per page cost for ribbons. This assumes a "normal" business letter and letterhead with a scant five percent coverage of each color. This price per page is based on

$6 ribbons. Costs should drop when third party bulk ribbons and greatly improved prices appear in *Recharger* magazine and similar sources.

Because of denser coverage, any typical book cover ribbon cost might price out more like 40 cents or more. Worst case, a full page and full color print could exceed several dollars a copy. Plus scrap and testing.

The Alps machine can print up to a 8 x 13.5 inch active area on most any 8.5 x 14 legal sheet. This translates to a book cover that can be over eight inches high and nearly seven inches wide. Minus bleeds and trims.

My *Active Filter Cookbook* is 5-1/2 inches wide by 8-1/2 high.

There is a "cardboard" mode that handles papers up to ten mils thick. But a better alternative is to print up your cover on a high quality thinner paper and thicken it by using a white self-stick label backing. Giving you a heavy weight and the "duplex stock" effect of a fully professional cover.

Either back print stock or optional lamination can be used for extra scuff resistance. I personally prefer the low gloss and "lay flat" materials.

More on all these binding topics in EMERGOP5.PDF.

As a tradeoff for their low cost and high print quality, their speed here is best described as "not quite glacial". For instance, last month's six page column of MUSE112.PDF will print in B/W at 360 copies per hour on my 5SiMx. In color with host PostScript, the MD2010 just barely manages 3 or so copies per hour.

Speed should improve when their internal PostScript upgrade is added. At present, this printer is clearly *not* suitable for online network printing. And probably is not your best choice as your first and only printer.

The print quality on a light beige is outstanding. But I found a very slight patterning on a blue-green tint. Thus, certain light shades often print better than others. I also found their greens wandering off somewhat too far into the blue. For BOD covers, you might want to adjust the colors to suit what the printer does best.

My MUSE112.PDF makes a fairly useful PostScript printer demo. I've also uploaded a new sample test BOD cover as ACTIVCOV.PDF. More on BODsecrets in my *Book-on-demand*

*Resource Kit* and on the BOD library shelf of *www.tinaja.com*

You'll also find a MD-4000 version that includes a built-in scanner. The Alps website is *www.alps.com*

### PostScript as Language

I have always felt that PostScript is an absolutely outstanding and general purpose computer language. One that I use for nearly all of my design and development work.

I have recently used PostScript for everything from my magic sinewave synthesis to web site hit analysis to Smith Chart rf generators to printed circuit layouts to robotics controllers to stock market tracking.

Some exciting things have recently happened that make PostScript even more attractive and easier to use.

Ferinstance, *Adobe Acrobat* is now fully web friendly. An *Adobe Access* opens up resources for the disabled. GhostScript shareware gives you one powerful and flexible host located equivalent to display PostScript. The *Videonics* folks now have PostScript *video* apps. And my *Flutterwumper* techniques extend PostScript to cost effective robotics.

But the really neat new trick is that the Distiller in Adobe Acrobat is also a fast and easy way to do host based PostScript computing! Their Distiller produces printable output files, reads or writes disk data files, or returns recordable data to its log file. Making it fast and fun to explore PostScript as language. Without even needing a PostScript printer.

If you are using Adobe Distiller as a PostScript-as-language computer, note that the results are written to the .LOG file, rather than your .PDF file. You will often throw away the baby and drink the washwater instead.

More info on PostScript in the "red book" *PostScript Reference Manual* and "blue book" *PostScript Tutorial*.

Additional info on the PostScript library page of *www.tinaja.com*

### Finding RMS Currents

A typical example of what you can do when using PostScript as language appears in Listing one. This lets you find the rms and average values for any waveform. It accepts an array of amplitudes as an input. These values can be mathematically determined or

```
% POSTSCRIPT RMS VALUE FINDER
% ==================================================================
% Copyright c 1997 by Don Lancaster and Synergetics, Box 809,
% Thatcher AZ, 85552. (520) 428-4073 www.tinaja.com  don@tinaja.com
% All commercial rights and all electronic media rights are
% *fully* reserved. Linking welcome. Reposting expressly forbidden.
% ==================================================================

% Consulting services available on concepts shown.
% Two-way recordable comm is **REQUIRED** for these utilities.

% Routines excerpted from FINDRMS.PS on www.tinaja.com...

/scaleamp  117 2 sqrt mul def    % use a 117 volt ac cycle
/startang 0 def                  % set limits
/stopang 180 def                 %
/endang  180 def                 %
/res 0.1 def                     % step resolution in degrees

% Assume a ONE OHM load. Make a normalized array holding the desired
% waveform values. This routine optimizes for ac phase control.
% Any values array normalized to peak = 1 can be substituted...

/makewaveform {/waveform mark 0 res endang {/ang exch store ang
startang gt ang stopang lt and {ang sin} {0} ifelse} for] def } def

% do the rms and average calculations on the waveform array...

/findrms1 { 0 waveform {add } forall  waveform length div
/normaverage exch store 0 waveform {dup mul add} forall waveform
length div sqrt /normrms exch store normrms normaverage dup 0 eq
{pop 0.000001} if div /normratio exch store} def

% report the results...

/crlf true def                   % IBM or sanity?
/return {(r) print crlf {(n) print} if} def

/reportrms {return return (The average normalized waveform value is
) print normaverage 20 string cvs print return return

(The rms normalized waveform value is ) print normrms 20 string cvs
print (.) print  return

(The ratio of rms to average is ) print normratio 20 string cvs
print (.) print  return return

(The average scaled waveform value is ) print normaverage scaleamp
mul 20 string cvs print (.) print return return

(The rms scaled waveform value is ) print normrms scaleamp mul 20
string cvs print (.) print return return return} def

/findrms {findrms1 reportrms} def % convenience linker

% ==========  demo - remove or alter before reuse.  ==========

%  (A) Plot the rms voltage versus phase angle for a triac that
%      conducts only a portion of each ac half cycle

/res 0.1 def                     % 0.1 degree accuracy
/startang 0 def                  % start at turnon angle
/stopang 180 def                 % go to the end of half cycle
/endang 180 def                  % stop at one half ac cycle
/scaleamp  117 2 sqrt mul def    % use a 117 volt ac cycle

0 10 180 { /startang exch store (The phase angle is ) print startang
20 string cvs print ( degrees.) print return makewaveform findrms}
for flush

% should return these edited results...

     %%   The phase angle is 0 degrees.
     %%   The rms voltage is 117.0.
     %%   The ratio of rms to average is 1.11072.

     %%   The phase angle is 10 degrees.
     %%   The rms voltage is 116.936.
     %%   The ratio of rms to average is 1.11852.

              << more stuff here >>

     %%   The phase angle is 170 degrees.
     %%   The rms voltage is 3.94639.
     %%   The ratio of rms to average is 4.88476.

     %%   The phase angle is 180 degrees.
     %%   The rms voltage is 0.0.
     %%   The ratio of rms to average is undefined.
```

Listing 1 – RMS AND AVERAGE voltages or currents for any waveform can be easily found using this powerful PostScript-as-language routine.

### PAGER VIBRATOR RESOURCES

**Cellular Business**
9800 Metcalf
Overland Park KS 66212
(913) 341-1300

**Endicott Coil**
24 Charlotte Street
Binghamton NY 13905
(607) 797-1263

**The Mart**
899 Presidential #110
Richardson TX 75081
(800) 864-1155

**Micro Mo Electronics**
14881 Evergreen Avenue
Clearwater FL 34622
(813) 572-0131

**Mobile Radio Technology**
9800 Metcalf
Overland Park KS 66212
(913) 341-1300

**Mondo-tronics**
524 San Anselmo Ave #107
San Anselmo CA 94960
(800) 374-5764

**Motorola Comm Prods**
1301 E Algonquin Road
Schaumburg IL 60196
(800) 668-6752

**Namiki**
201 W Passaic Street
Rochelle Park NJ 07662
(201) 368-0123

**Pageco**
2400 E Comm Blvd #630
Ft Lauderdale FL 33308
(954) 776-0031

**Robotics Digest**
966 Elm Street
Rocky Ford CO 81067
(719) 254-4558

**Surplus Traders**
PO Box 276
Alburg VT 05440
(514) 739-9328

**Telecom**
1020 Church St
Evanston IL 60201
(847) 475-1900

experimentally lab measured.

This specific use example finds the rms and average voltage values of a full wave triac phase controller for various firing angles.

The data array gets normalized to unity peak amplitude. Every array value first gets squared and summed. Your result then gets divided by the number of samples to find your rms voltage or current. Although any reasonable number of array values can be used, a hundred to a thousand data points often gives you accurate results. And does so fairly quickly.

You could edit and send this code to any PostScript printer having two way recordable comm. Or route it to GhostScript. But best of all, feed it to Acrobat Distiller 3.0 for convenient and fast host-based computing.

The full wave results are shown in figure one. As we've seen before, the output rms voltage is nonlinear with phase angle. Caused by there being very little energy in the "ears" of a half sinewave.

As historical interest, I've included the old half wave "Thyratron" phase control response in figure two. This circuit became obsolete in the early sixties as full wave triacs and other solutions became practical.

Why? because of its limited range and its big no-no of drawing direct current out of the ac power line. As of July 1997, this circuit is illegal in Europe. Per EN60555. In the US, a similar IEEE 519 is pending.

The half wave circuit can conduct only on the positive cycles, so it can deliver only *one half* of the available power. Note that half power is 0.707 voltage on a sinewave, so your max

half wave rms voltage on a 117 volt line is 83 volts or so.

Also note how badly any average responding meter *under*-reports your system power. Most especially at low levels and late conduction angles. For instance, we see that at an angle of 125 degrees, the true rms voltage is 32, while a typical average meter will report 12 volts. An error of 267%.

Listing 1 and additional examples are available ready-to-use as my file FINDRMS.PS, while your actual code used to generate figures one and two can be extracted from MUSE113.PSL.

### Pager Vibrators

This one sure hit me from way out in left field. There have been some recent helpline requests for more info on *pager vibrators*. Also called *pager motors*. Apparently there's a few new robotics or personal warning device possibilities for these.

My personal fire pager is older and lacks one of these, so I did not have a clue where to begin.

Some possibilities were *Mobile Radio Technology*, *Telecom* and *The Mart* magazines. A company called

### NEED HELP?

Phone or write all your US Tech Musings questions to:

Don Lancaster
Synergetics
Box 809-EN
Thatcher, AZ, 85552
(520) 428-4073

US email: *don@tinaja.com*
Web page: *www.tinaja.com*

*Endicott Coil* used to make keyboard clickers, but I have not checked into them recently. To attack the robotics angle, there is *Mondo-tronics* for the parts and *Robotics Digest* magazine for ads and tech info.

All of which seem somewhat short of the mark. These days, to pick up instant answers, you *always* go to the web. Start with the "search all sites" top button on my *Web Related Utility Links* page. Punch on down into *Alta Vista*, and then enter "pager vibrator" or "pager motor".

Presto. Instant results.

We find that *Namiki* is the leading manufacturer. A typical model is their 6CV-1501WL-00. This gem is six millimeters in diameter and only fifteen long. The 1.3 volt motor runs at 7000 rpm. Which translates to 116 whumps per second. A companion tungsten counterweight is included.

*Motorola* apparently uses Namiki pagers internally as their part number 5950-46803. A second pager vibrator supplier is *Micro-Mo*.

The net also tells us that these are a tad pricey, being something like $17 in singles. One smaller quantity reseller is *PageCo*. *Surplus Traders* has these in huge quantities. But only on a when and as available basis.

A few of these useful pager motor contacts are shown in this month's resource sidebar. Be sure to tell me about any new uses you can come up with for these. Or if you find a super cheap source for them.

### Names & Numbers

From *Maxim*, a new *Product Data Sheets* CD. *TriTech Microelectronics* has data sheets on several intriguing

## NAMES AND NUMBERS

**Adobe Acrobat**
1585 Charleston Rd
Mountain View CA 94039
(800) 833-6687

**Alps Electric**
3553 North First Street
San Jose CA 95134
(408) 432-6000

**Antique Power**
Box 838
Yellow Springs OH 45387
(937) 767-1433

**Cryptosystems Journal**
485 Middle Holland Rd
Holland PA 18966
(215) 579-9888

**Damark**
Box 29900
Minneapolis MN 55429
(800) 729-9000

**Machinery Dlrs Natl Assn**
1110 Spring Street
Silver Spring MD 20910
(301) 585-9494

**Magnetic Research**
122 Bellevue Ave
Butler NJ 07405
(201) 838-6348

**Maxim**
120 San Gabriel Dr
Sunnyvale CA 94086
(800) 998-8800

**Metal Buyers Mart**
N15 W22218 Watertown Rd #3
Waukesha WI 53186
(800) 657-0721

**Ragtime**
4218 Jessup #AB
Ceres CA 95307
(209) 668-0366

**Recharger**
4218 W Charleston Blvd
Las Vegas NV 89102
(702) 438-5557

**Synergetics**
Box 809
Thatcher AZ 85552
(520) 428-4073

**TelCom Semiconductor**
1300 Terra Bella Avenue
Mountain View CA 94043
(415) 968-9241

**TriTech Micro**
1440 McCandless Drive
Milpitas CA 95035
(800) 253-8900

**Videogame Advisor**
64 Danbury Road Ste 500
Wilton CT 06897
(203) 761-6150

**Vision Systems Design**
10 Tara Blvd  5th Floor
Nashua NH 03062
(603) 891-0123

new chips. Such as a TR88801CS pen input conditioner, a 89101 Caller ID interface, and their TR83100CF voice storage processor.

From *TelCom Semiconductor*, a *Thermal Management Guide*. On all of their electronic thermostats and temperature sensors.

Wireless remote game controllers are being distressed out by *Damark* at $50 each. These would appear to offer all sorts of unusual short range data comm possibilities.

Player pianos are now fully MIDI compatible. For full details, you can contact the folks at *Ragtime*.

The great *Magnetic Measurements Handbook* has been newly revised by Jack Janicke of *Magnetic Research*. Plenty of fluxgate information here. Tony Patti has released his fourth volume of his ongoing self-published *CryptoSystems Journal*.

From *MDNA*, the *Used Machinery Buyers Guide*. For largish pieces of metal in smaller quantities, check out the *Metal Buyers Mart*.

New trade journals for this month include *Vision Systems Design* and a *Videogame Advisor*.

If you are *really* into hardware, do look into *Antique Power* magazine. Mostly on restoring steam tractors.

Or their sister publication with the subtle name of *Old Truck*. There sure is some amazing stuff in both mags.

For the insider secrets of starting up your own technical venture, check my *Incredible Secret Money Machine II*. As per my nearby *Synergetics* ad. Also visit my *Guru's Lair* web site at *www.tinaja.com* I have just added a mass teleportation update here as file RESBN63.PDF. Plus font conversion tools PFA2PFB.PS and PFB2PFA.PS.

Most items mentioned appear in the *Names & Numbers* or the *Pager Vibrator Resources* sidebars. Be sure to check here first before calling our no charge US technical helpline I've shown in the box.

Let's hear from you. ❖