

Meetings: Fr 26 Apr & Fr 24 May

Apr/May  
2013

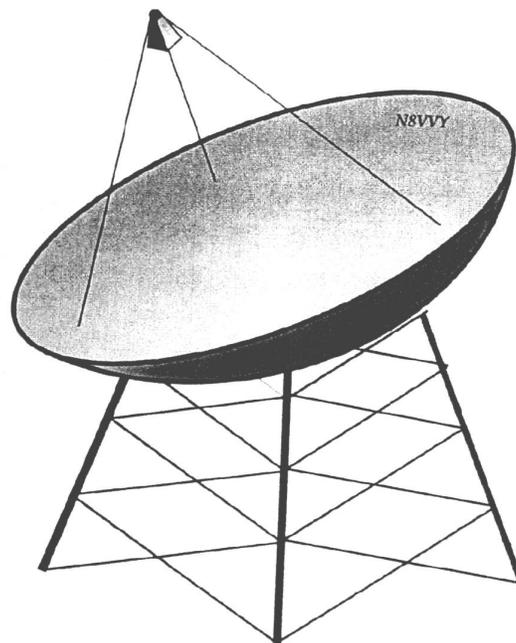
# ANOMALOUS PROPAGATION

Newsletter: *The Midwest VHF/UHF Society*

## Editors:

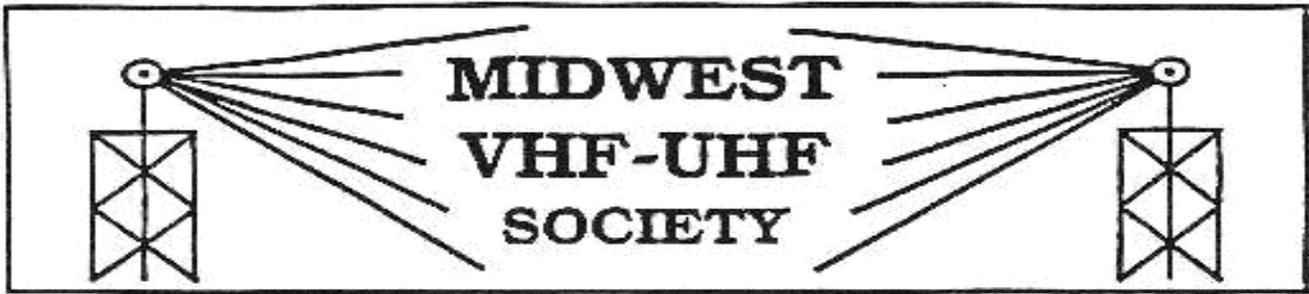
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Annual Society membership is \$ 12.00. Please  
make checks payable to Gerd Schrick



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Beacon: 1296.079 W8KSE EM79ur Dayton, OH---- 2W to Big Wheel at 800' AGL.

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### ***Hamvention 2013\*\*\****

**17/18/19 May**

***MVUS Booth # 332***

The Midwest VHF/UHF Society has **noise sources** available in two frequency ranges: 50 MHz to 3 GHz, and 3 GHz to 11 GHz. Both versions are fully assembled and tested with ENR data provided. The lower frequency version is currently in stock at \$50 including shipping in the USA. The 11 GHz version is \$95, but delivery is about 8 weeks ARO. Contact N8ZM at [n8zm@mvus.org](mailto:n8zm@mvus.org) for more details.

***\*\*\* Make sure to read Tom's column on the next page for details!!***

**Please**, check your expiration date. Although we are quite liberal in not dropping members like hot potatoes, we might run short in funds. Life is not getting cheaper. The price of copying just went up 33% and another penny was added to the postage!

### **MVUS Officers**

- Pres. Tom Holmes, N8ZM
- Vice Pres. Bob Mathews, K8TKQ
- Secretary, Steve Coy, K8UD
- Treasurer, Gerd Schrick, WB8IFM

## DE N8ZM (4-13)

I am getting a late start on this column for a number of reasons which would all sound like lame excuses if I were to list them, so I will spare you that litany. And Gerd is naturally getting after me about it once he has a deadline to meet. The monthly MVUS meeting is just a few days from now (Friday, the 26<sup>th</sup>!) and he needs to get Anom Prop in the mail so those folks who do not get it electronically will see this before Friday.

Getting Anom Prop via email is really a great convenience for you and MVUS! Now we do understand that there are folks who can't deal with an electronic publication due to vision issues, so we will continue to provide a paper version, even though printing and postage costs continue to rise. Either way, I hope you all agree that Anom Prop is worth reading, at least after you get past the lead editorial. Gerd does a remarkable job each month of assembling a lot of interesting articles on a wide range of radio related topics, and we are fortunate to have many talented folks who contribute articles.

On the subject of articles, please feel free to contribute articles about what you have been doing to Anom Prop. You don't have to be a Hemingway to write for us; just look at what I get away with each month! Simply string a few words together in something resembling a coherent thought (which would put you ahead of my demonstrated skills) and you'll be a published author. Talk about something you have built, or your latest DX catch, or how you solved a troublesome problem. Even an interesting incident from your ham radio past, like QRMing a well known radio astronomy observatory from your jet fighter. OK, that one is almost too much to believe, but it is a funny anecdote ;-). You guys have all lead interesting lives related to your radio obsession and Anom Prop is a great place to share those stories. Just write them up and send them to Gerd, please!

Gee, I got four paragraphs into this before mentioning **Hamvention**. MVUS will again be in **booth SA332**, and we hope you will stop by to see your MVUS friends, or make new ones. A reminder that on Friday of the big show we will have video from **the balloon launch** camera in the booth. Also, we can always use a couple of folks to help with crowd control at the launch site, so let me know if you can help. **W8PKO will have beacons there on 144.015 and 432.045 MHz. And our 1296.080 MHz beacon will also be on the air** from TV channel 16's tower southwest of town. If all the pieces fall into place over the next three weeks, we will have some of the **3 GHz Noise Sources available in the booth for \$45**, and will take orders for the 10 GHz versions.

One last note. Due to bad planning and a failure to look at the calendar, I have to be out of town for this month's meeting, so Bob or Gerd or Steve will be running the show. So expect less chaos than normal.

The May MVUS meeting is on the 24<sup>th</sup>, and I will probably not make that one either as we are leaving on vacation early the following morning. And don't forget that the June VHF contest is the weekend of the 8<sup>th</sup> and 9<sup>th</sup> and the MVUS meeting will be on the 28<sup>th</sup>.

**See you all at Hamvention! Tom, N8ZM.**

## This and That 4-13

**Sunlight Composition.** 50% is infra red (extending to radio waves), 38% is visible, and 12% is ultra violet (extending to gamma rays).

**What a Difference.** There are medium size eggs! Normally, all you see are large eggs. I weighed them both and a large egg was 2 oz while a medium one came in at 1.9 oz. That is a whopping .1oz , or 5% difference.

[Gerd]

**Pope Mania.** Washington – White smoke poured from the Capitol today and crowds of onlookers broke into shouts of jubilation, crying: "We have a budget!"

[Gail Collins]

**DocX.** This relatively new file type really makes a difference. It cuts older "doc" files almost in half. [Gerd]

**Nickel and Dime.** With the "help" of the computer even the bureaucrats are now adding items to their bills that make those hard to understand but on the surface seems reasonable, when in fact it is extremely difficult to figure out what something costs and the rule seems to be: charge as much as they let you get away with.

**Nature.** Human beings need nature. --- Nature doesn't need humans.

[ Harrison Ford ]

**About writing** To paraphrase what Mark Twain said: If I had more time, I would have written a shorter letter. The best reports, meetings and articles are those that are succinct, clear and don't go on and on.

[Matthew Dowd]

**The Good Old Days.** Long gone are the days when hooking up a TV was a three-step process: plug it in... turn it on...watch it.

[D.L. Stewart]

**Big Ears.** I have an i Pod with my favorite songs on them, but I seldom hear them because the buds keep falling out of my ears.

[D.L. Stewart]

**Black Box.** If black boxes survive air crashes, why don't they make the whole plane out of that stuff?

[George Carlin]

**Meant to Fly?** If God had really intended men to fly, he'd have made it easier to get to the airport.

[George Winters]

**NASA Science News** for March 27, 2013...A comet is heading for Mars, and there is a chance that it might hit the Red Planet in October 2014. An impact wouldn't necessarily mean the end of NASA's Mars program, but it would transform the program along with Mars itself.

FULL STORY: [http://science.nasa.gov/science-news/science-at-nasa/2013/26mar\\_marscomet/](http://science.nasa.gov/science-news/science-at-nasa/2013/26mar_marscomet/)

**Role Model.** Let us say that tomorrow nobody in the United States jumped high and slam-dunked a basketball. So what? Would it affect your life? Of course not. But if nobody in the United States picked up the garbage, we would really have a stinking mess, with flies and rodents and pestilence and all sorts of unpleasantness.

[Mike Royko]

**Repeats.** Why does history keep repeating itself? Because we weren't listening the first time.

[On the Lighter Side]

**Traveling on the "Graf Zeppelin".** We have a million cub feet of gas but no heat.

[Grace Drummond-Hay --- 1929, Round the World Flight over Siberia]

**Observation.** All men work more zealously against their enemies than they cooperate with their friends.

[Cleopatra]

**Connection.** "When we try to pick out anything by itself, we find it hitched to everything else in the Universe."

[John Muir]

## The Transistor

The Date: May 1, 1952. I remember how our math teacher informed us about the transistor and he showed us a newspaper article entitled: "Crystal Splinter Replaces Radio Tube." When I got home I got our newspaper and saved the page with this article, placing it in a large envelope, which I recently (2012) rediscovered. Below is a translation of the abstract preceding the full article:

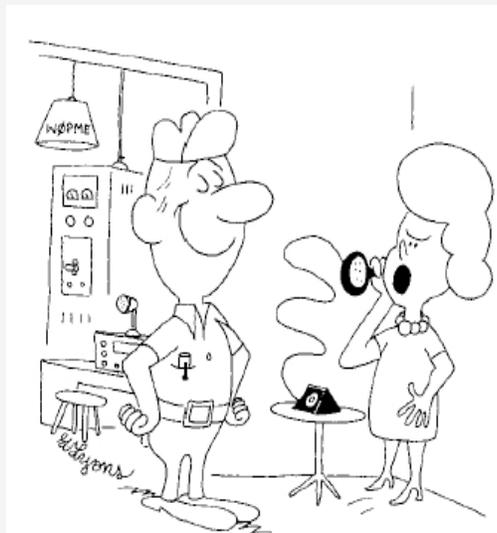
*Radio, television, radar, and many more magical electronic devices are not possible without the electron tube. Millions and millions of these sensitive glass envelopes are still in use today. But now a new invention has been developed to the point that it can compete with the radio tube. This is the "transistor", a quite uncomplicated amplifier, durable, economical and smaller than a coffee bean. After three years of intense work in the labs of the Bell Telephone Company, mass production is soon to begin. Today there are already 20,000 transistors produced per month! The transistor will make many futuristic dreams to reality, such as a high quality pocket radio and a television camera the size of a Leica.*

[Gerd, WB8IFM]

### Maybe an April Fools Piece!

Microchip's BodyCom technology makes implementing an intuitive, simple, and safe wireless communication solution between two electronically compatible devices easy. It provides designers with the world's first framework for using the human body as a secure communication channel. Because no RF antennas are required, BodyCom technology allows for simpler circuit-level designs and a lower bill of materials (BOM).

I read this twice, still could not get anything out of it! I guess you could call this communicating nonsense! [Gerd, WB8IFM]



"Right now he's out of this world . . .  
He just bounced a signal off of the moon!"

## Curse of the Wall Wart

And why I like the “Luesterklemme” and switch power supplies!

By Gerd, WB8IFM.

With the invention of the transistor all electronic apparatus got smaller and more efficient also the voltages got smaller. Previously power supplies were about of equal size as the apparatus and separate. The separate power supply was retained and morphed into the infamous wall wart. With the advent of the PC with its numerous servants: monitors, printers, scanners, faxes and so on, the the wall wart begatted the power strip with four, five or six outlets. The outlets soon were filled with warts of different size and shape and volts and amps were all; over the place. Combine this with the fact that countries do have different primary voltages, and required different plugs, more or less confusion ranged. Seemed like the designers never heard of standardization and compatibility.

The first I would have done is include a low voltage maybe 4 conductor cable providing 5, 12 and 24 V , powered by a central supply and available at every high voltage outlet by a 4 lead receptacle. So all your low voltage equipment would have the same 4 pin plug. But like they say: that would be too simple (consumer friendly)!

Instead we got gobs of wall warts with all kinds of different voltages, ampere ratings, plugs and polarity! I have a whole drawer with those things and even if I occasionally find something that could be used, at a minimum, I have to do some work with the plug. Change the plug itself or reverse the wires.

A method (from the old country) is what I really like. That is using a “Luesterklemme” (luster terminal). These are small metal barrels encased in plastic where you stick in the wires from your project and fasten them with screws. The screws go into the barrel sideways to hold the wire. A picture is best to show what I mean. These “clamps” come in different sizes and ofyrn as a strip of 12. You cut off as many for your project as you need (usually 2 or 3). There are also mounting holes between the “barrels”. Radio Shack carries them. (or used to).

The heaviest and bulkiest part of those power supplies is the transformer, and it has been known for a long time, that for higher than the usual 50 orr 60 Hz powergrid frequencies, these transformers get smaller. So the military has been using for a long time 400 Hz for their power supplies. However, with the advent of semiconductors even higer frequencies are used, in the tens of kHz. That makes the power supply components ridiculously small. A switch supply for the typical 100W transceiver reqiring 12V= at 25A weighs only 4 lbs and costs less than \$100. Another advantage is the wide range of input voltages that can be accomodated, typically from 100 to 240 V~, there by all you have to do in another country with different Voltages is to change the powerplug. This is where another Luesterklemme comes in handy and a pigtail with the other country's plug!

Approx. 1:1



# Rubidium Frequency Standards

By John Ackermann, N8UR

Work in nuclear physics led scientists to realize after World War II that it was possible to detect the natural resonance frequency of certain types of quantum transitions in atoms, and that these resonances should be very stable and could make excellent frequency standards. After experimenting with a lot of isotopes of chemical elements, they found that Cesium and Rubidium (both alkali metals) were the best choices to build practical standards. (Hydrogen masers are also used to create even more stable frequencies, but they have never gone into mass production, and other elements are used in new experimental standards.)

A Rubidium standard uses an optical system to lock to the atomic resonance frequency. It uses light from a lamp filled with Rubidium gas, sent through a filter that passes only a specific wavelength, and then passed into a cell filled with ionized Rubidium that is in an RF field at about 6.8 GHz that comes from a crystal oscillator and multiplier chain. Finally, the light emerges from the cell and hits a photocell.

When the RF frequency matches the atomic resonance frequency of the Rb ions in the cell, a bit more light is absorbed and the output of the photocell drops by about 0.1 percent. That response controls a phase locked loop that keeps the crystal oscillator tuned to the frequency that maximizes the dip in output. And thus the crystal is disciplined to the atomic reference and a frequency standard is borne.

It turns out that it is possible to make the "physics package" of light source, filter, cell, and detector very compact, and it can be done at relatively low cost. Digital communication systems, including mobile phones, require stable and accurate reference frequency sources, and as a result tens of thousands of small Rb standards have been installed in cell phone base systems, and thousands of those have gone into surplus. You can buy them for well under \$100.

Are these small Rb standards useful for hams? Absolutely:

\* They are more than accurate enough for ham use. Even

without trimming, a properly operating Rb standard will be accurate to at least 1 part per billion (10e9) which is a 10 Hertz error at 10 GHz.

\* They are small -- the commonly available units are less than 6 inches square.

\* They warm up quickly. Typically, they lock up and are usable within 15 minutes after power on.

But there are also some things to watch for:

\* They typically require 18 to 24 volts, not 12.

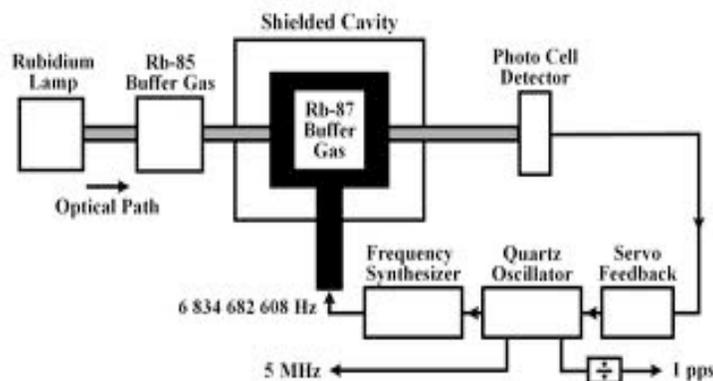
\* They take a fair amount of power, and require heatsinking for long life.

\* Perhaps the biggest issue for hams is that they have more phase noise and spurs than a crystal oscillator, and some models will make a pretty horrible sounding carrier when multiplied to microwaves. Here are the results of some tests I did showing how three popular models perform:

<http://www.febo.com/pages/oscillators/rubes/>

There are several brands/models of small Rubidium standards available on eBay. The most common are the Efratom FRS, the Frequency Electronics FE-5680, and the Datum/Symmetricom LPro-101. The LPros are probably the best in terms of phase noise and spurs, and the FE-5680s are definitely the worst. In addition, the FE-5680s come in many varieties, not all of which have useful output frequencies (the cheapest are generally the ones with the odd outputs).

I think the LPro is the best choice for ham VHF/UHF/microwave use, followed by the Efratom. I'd stay away from the FE-5680, even though they can be cheaper.



## Transfer of Electrical Power through a Magnetic Field from the Road to a Vehicle over it. KAIST (Korean Advanced Institute of Science and Technology)

The OLEV (On Line Electric Vehicle) does not need to be parked at a charging station to have a fully powered battery. It gets charged while running, idling, and parking, enabling a reduction in size of the reserve battery down to one-fifth of the battery on board a regular electric car. The initial models of OLEV, a bus and a tram, receive 100 kW of power at 20 kHz with an 85% transmission efficiency rate while maintaining a 20cm air gap between the underbody of vehicle and the road surface. OLEV complies with the national and international standards of 62.5 mG, a safety net for electromagnetic fields. In July 2013, for the first time since its development, OLEV will run on a regular road, an inner city route in the city of Gumi (S Korea), requiring 40 minutes of driving each way.

### KAIST OLEV (On-Line Electric Vehicle) to begin operation!

2013-01-22

An On-Line Electric Vehicle (OLEV) that can charge during travel will be put into service for the first time in the world on normal roads.

From July of this year 2 OLEV buses will undergo trial operations in the city of Gumi.

The trial route spans 24 km from Gumi station and the region of In-Dong and the establishment of the route is expected to be of a 4.8 billion Won scale. The start of the infrastructure construction will start on February and operation will start in July.

KAIST had held sessions in October of last year to local governments and had a follow up OLEV suitability evaluation to those local governments expressing interest.

The city of Gumi was elected due to its good electrical infrastructure and an administrative willingness to match.

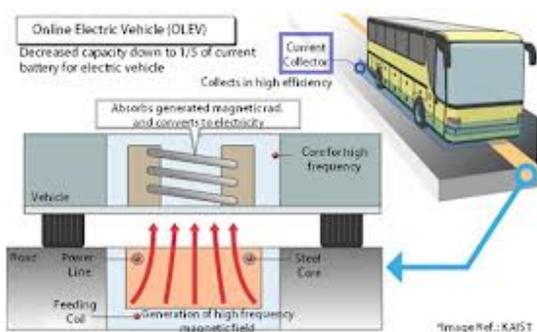
The OLEV developed by KAIST is an environmentally friendly vehicle that allows the transfer of electrical power using magnetic fields imbedded in the roads.

Ordinary electric vehicles require frequent visits to replenish their power which gives the OLEV a comparative advantage as it can charge while on the road. The ability to charge whilst on the road means that the OLEV requires a smaller battery than the ordinary electrical vehicle resulting in lower prices and weight.

The OLEV development commenced at KAIST in 2009 and in 2010 most of the core technologies required to realize the OLEV was developed and verified. Finally in 2012 steps were taken that will allow the commercialization of the OLEV.

And in October of last year KAIST OLEV accomplished 75% power transfer efficiency that allowed a system that can be commercialized.

### The KAIST OLEV was named a top 50 inventions in 2010 by Time Magazine.



## Report from the April ARRL FMT

By Mike, W8RKO

The April run of the ARRL frequency measuring test is now history. Once again I was the transmit station for W8KSE.

For this FMT we changed the format a little. Rather than transmit a single carrier we transmitted two carriers spaced less than 2 KHz apart. The frequency of one carrier was published as a reference frequency. The second carrier was the unknown. Using the known reference participants were to calculate the unknown. Since the reference carrier was known the effect of Doppler could be determined.

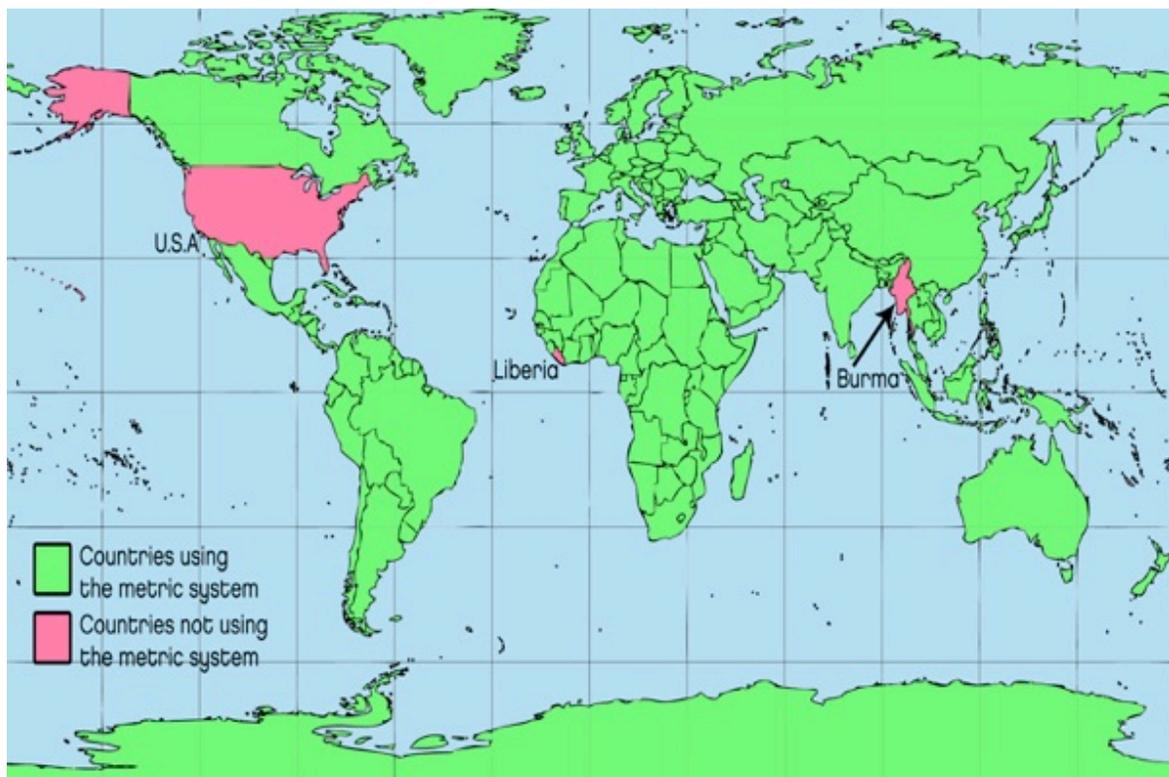
I was concerned about intermodulation resulting from transmitting both carriers. Looking on the spectrum analyzer the nearest IMD products were only 10 DB down. So I backed off the power about 25% and was able to keep them at least 20 DB down.

Unfortunately I did the adjustment connected to a dummy load rather than the actual antennas. So my resulting power was much lower than I had anticipated. I may have been running 25 watts rather than 75. Many did report my signal on 80 and 20 meters was weak but there were still plenty of reports for W8KSE.

Assuming we keep the current schedule **the next FMT will be in November**. The format for November has not been decided. The results for the FMT can be found on this site:

<http://www.b4h.net/fmt/fmtresults201304.php>

### The USA, Liberia and Burma are NOT using the Metric System



## Some interesting comments on Lightning

LWTG\* April 2013

I remember reading in a FEMA handbook, many years ago, the frequency of dangerous thunderstorms:

- \* Boulder Colorado, 70 days per year
- \* Houston, Texas, 70 days per year
- \* Miami, Florida, 70 days per year
- \* Florida keys, 100 days per year

I lived in Boulder County, Colorado before I moved here. Can confirm the frequency and ferocity of lightning. A youth softball coach was killed by a bolt from a clear, blue sky, a couple hundred yards from our house.

Longs Peak hosted a serious lightning storm every day at noon. That electrified air mass descends Boulder Canyon and regularly lights up the Boulder Valley, below.

--Jim Dalley, KB8BV

One can find heavy duty thunderstorms in all sorts of places. I remember a motorcycle trip I took thirty years ago. I started in Portland, OR and just rode east. Along the way I spent a night in Bighorn National Forest in Wyoming. Being the idiot that I am, I didn't **\*bother\*** taking a tent because it's just extra weight and space. So I had a supply of beer, but no tent, and waited through an all-night thunderstorm with no place to get out of the rain. I was quite wet and cold by morning. Well, I was young and stupid then. I'm just older now.

- Bruce Raymond, ND8i

And from Martin Gulseth 4-21-13

I'm a former work colleague/friend of Daun's, N8ASB  
I used to live in AZ. During the summer monsoon season, typically July/August, there would be some major thunderstorms with serious lightning on a regular basis. I recall camping up on the Mogollon Rim NE of Phoenix once and a large ponderosa pine about 100 yds from where we were camped took a direct hit one night right after we had turned in. Not much left the next AM.

\*) Lunch with the Geeks Bulletin Board