



ROUNDTABLE

PRESIDENT'S MESSAGE

By Robert White – K0RCW

Greetings,

Incredibly, ARRL Field Day 2011 is nearly upon us. In exchange for equipment space at the Hudson repeater site, the DRC agrees to spend a few hours cleaning and mowing on Friday morning, June 24th. Please join us for food, fun, and fellowship.

We encourage everyone to block off at least an hour or two to drop in, help, or bring a friend for Field Day on June 25th or 26th. There is room to camp or bring an RV – please check our web site at <http://www.w0tx.org> for details and a map.

Field Day has an interesting history dating to 1933. The June 1933 QST had a one column announcement stating that "The object of the event is to test 'portables – wherever they may be available' and to contact as many stations as possible". Today we use mobile rigs powered by emergency power sources. The DRC site will be running in category 4A site this year which includes a VHF transceiver for the first time as well as the traditional GOTA (Get On The Air) station for anyone interested in operating for a total of six transceivers.

Thanks to Bryan – KB0A for obtaining a frequency pair from the coordinator for our new repeater at St. Anthony's hospital - 447.825. Bryan and Orlen – WW0LF met with the St. Anthony staff who have now installed an antenna. Bryan and Orlen will meet and tune the new radio, which should be up and running shortly. Thank you Bryan and Orlen for your hard work on this project.

**GENERAL MEETING STARTS AT 6:30PM
SEE NOTE ON PAGE 2**

As you may know, I have been traveling in the PRC the past month. We spent a day visiting the Great Wall of China, specifically the Badaling section about a 90 minute drive northwest of Beijing. On this section of the wall, I spotted a tower structure (see photo) bedecked with numerous antennas. It turns out this tower has been sending signals for 550 years.



The Great Wall of China has many signal towers originally used to transmit military messages. In the year 1468, the Chinese military established a set of "emcomm" protocols using a "fire and smoke mode" with specific meanings. A single shot and a single fire or smoke signal implied 100 enemies, two shots and two signals warned of five hundred, three shots and three signals warned of over one thousand and so forth. This signal could "propagate" more than five hundred kilometers within a few hours. Today the tower still finds use as an anchor for all kinds of antennas.

The wall itself is an amazing set of conjoined structures dating back to the Qin Dynasty Emperor Qin Shi Huangdi of terra-cotta warrior fame. He also unified the "Warring States" to create China in 221 BCE. The structure itself is about 21 feet high on average and the complete system of walls span nearly 5,500 miles. It is a myth that the wall can be seen from space via ordinary imagery (<http://www.snopes.com>).

Until next time, 73 and great DX!

INSIDE THE ROUND TABLE

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MAY MEETING - WHAT'D I MISS

By Bill – W6OAV

There were 45 attendees at this month's meeting which included 6 visitors. Bryan, KBOA, started the meeting with introductions. After introductions, Bryan gave an overview and status of our current projects: the 147.33 voter system, the new UHF repeater at the St. Anthony Medical Center, Field Day and the annual DRC ham fest.

Jim, K0TOR, thanked the folks that participated in the Lakewood siren test. He gave an overview of the siren system and the test methods used. Several hams found sites with serious issues. Jim then read a thank you letter sent to the club by the Lakewood Communications leader.



The meeting was then turned over to our guest speaker, Nate Wolowitz, KD0DZU. Nate is a team member of Jefferson County, District 23 ARES. Some

of the topics Nate covered were:

- Who ARES is and what ARES does.
- Emergency communications is a service not an experiment.
- Who ARES serves and why.
- Levels of service.
- Served organizations.
- Notable events and assignments.
- The equipment ARES uses.
- How to get involved with ARES.

JUNE MEETING ANNOUNCEMENT

DON'T LET LIGHTNING DESTROY YOUR STATION!

Did you know that an average bolt of lightning contains 250,000 volts and 50,000 amps? Did you know that lightning can travel more than 10 miles from the clouds, through the air, to find a pathway into the earth? Then why do you think that just disconnecting your coax and your radio's electrical power will protect you against lightning?

Learn how to help protect your equipment and your house, attend the June 15th DRC meeting. Paul Resler and Bill Hester, N0LAJ, will be our guest speakers.



Paul is a retired nationally known Engineering and Sales Manager of a worldwide lightning protection company. Paul has worked with architects, engineers and building/tower owners to design and later to inspect their lightning protection systems. Not only did he work with the private sector of business but also worked with the Federal Government, local utilities and media facilities. If you go to Coors Field, you will see Paul's work mounted on each of the light bars and score board.

Bill is a licensed professional engineer (P.E.) in Colorado. He has a background in electronics, electric power systems, SCADA, telemetry, and industrial control systems. As part of his engineering work, during his 27 year career with Denver Water, he has designed and installed many lightning and power transient protection systems. If you go by any of the Denver Water facilities you will see Bill's work above the buildings.

Paul and Bill will give a Power Point presentation covering the following topics:

- Where does lightning come from?
- How to protect towers.
- The vital importance of proper grounding:
 - ◊ Soil resistance and grounding.
 - ◊ Conductor sizing.
 - ◊ Equipment bonding.
 - ◊ Equal potential grounding; i.e., using a single point ground.
- Additional ways to protect your house from lightning damage.

Note: Due to the amount of material to be presented and the expected volume of questions, the meeting will start at 6:30 PM. There will be no mentor session or technical committee meeting.

TECHNICAL COMMITTEE REPORT

By Bill – W6OAV

This report provides an overview of the items discussed during the May Technical Committee meeting.

Voter System

Goal: Design, build and test a 147.33 MHz voter system consisting of a central voter site and one remote site (Phase 1):

- KBOA has configured the relay to interface the repeater receiver to the voter controller. WA2YZT and KBOA hope to install the link receiver and the relay interface Saturday. They will then set levels. N1ETV has installed and tested the remote site.
- Project members will review the technical details via a Skype conference to be setup next week.

DRC/SATURN station

Goal: Install NVIS antenna:

- N1ETV will supply the open wire and center dipole insulator.
- N1ETV is fabricating the fence to NVIS antenna support mountings.
- WW0LF will supply antenna wire and egg insulators.
- W6OAV will make arrangements to pick up the wire and insulators from WW0LF.
- W6OAV will then setup a Skype conference to pick a date to install antenna and to work up a project check list.

St. Anthony Medical Center

Goal: Establish a UHF repeater:

- Antenna and coax are installed.
- WW0LF has tuned up the repeater.
- WW0LF will retune the duplexer that had been used when the 449.35 repeater was located downtown.
- WW0LF and KBOA hope to install the repeater next week.

Field Day

Goal: Develop plans:

- Field Day chairman was not present for a report.

ARDF – Amateur Radio Direction Finding

Goal: Find a volunteer to lead the project:

- Dan, N0PUF, will give a Foxhunt talk at the July meeting.
- Several Tech Committee members will display their DF antennas from past Foxhunts.
- If members are interested, WW0LF will produce circuit boards for a phasing type of DF antenna system. The club can make wiring the boards a club project.

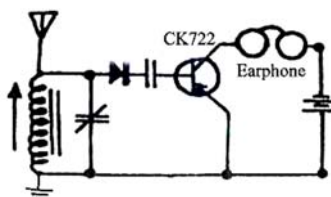
REMEMBER WHEN?

By Bill – W6OAV

In the very early 1950s transistors were very expensive which put them beyond the reach of most hams. However, Raytheon changed that in about 1953 with the introduction of the CK722 transistor. So, what was the CK722?

The CK722 was the first “low cost” germanium PNP transistor made by Raytheon in 1953 for the general public. It took the ham world by storm! Raytheon began producing hundreds of thousands of these transistors.

By today’s standards they were still expensive but somewhat affordable. In 1954, as a teenage ham, I saved my money and bought my first transistor, the CK722. It cost me around \$8, a lot of money in those days (about \$60 in today’s dollars). I built a “high tech” amplified crystal radio, demoed it at the local ham club meeting and dazzled the older “tube guys”!



The CK722 had low gain, was noisy, high leakage and a very low frequency response maxing at very high audio. Also, due to the state of manufacturing, the specifications varied from CK721 to CK722. The variations occurred because the CK722 was actually a reject. It was a transistor that did not meet Raytheon’s strict specifications as a commercial CK721. Raytheon realized that the CK722 had a market as an experimenter’s device. As the price decreased (around 10 for \$1 in 1960), the common practice was to buy several CK722s, try them all and use the one that had the best performance.



AMATEUR DIGITAL TV COMES TO DENVER

PART — 2

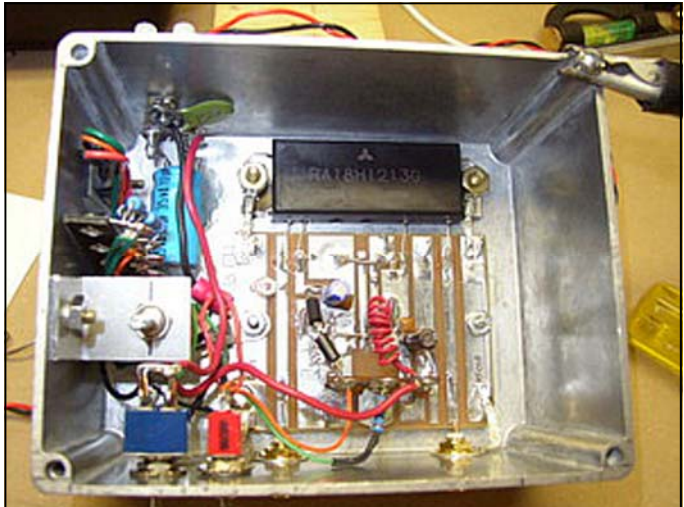
By Ed Mersich – WA6RZW

In part 1 of the amateur digital TV article I discussed the basic concept of using DVB-S modulators as the driver section of the amateur TV transmitter. Currently I have 2 modulators available in the transmitter equipment rack. The first is a computer PCI card based modulator model DTA-107 it is manufactured by Dek Tec Digital Video B.V. in Netherlands. It is intended for commercial business applications; most of this article will focus on adapting the DTA-107 for amateur TV transmissions. In addition to the DTA-107 modulator I also acquired a "Komplettsender" from [SR-Systems](#) (Stefan Reimann, DG8FAC) in Germany. The Komplettsender is an amateur DTV transmitter, taking line level video and audio inputs and producing a modulated RF output at +20dBm suitable for driving a final amplifier section in the 5-30 watt range. The Komplettsender is available in several DVB formats and bands from 70 to 6cm.

The DTA-107 modulator operates in the "L" microwave band, with a software selectable output frequency. Fortunately the output frequencies encompass the U.S. amateur radio frequency. I consulted the ARRL recommended band plan and selected 1255MHz as my desired output frequency. After installing the DVB-S modulator in the computer, and learning how to create the required TS (transport stream) formatted files I was faced with the task of increasing the signal level to a power level suitable for over the air transmissions. My target goal was about 10W RF output. Starting with the modulator power level of -30dBm (1uW) I added three pre-amplifier stages to bring the drive level to +22dBm or about 150mW. Although having been a ham for over 30 years and using various tube type and solid state radios and amplifiers over the years I had never actually operated a class "A" amplifier, let alone constructed one. Building a solid state class "A" microwave amplifier turned out to be quite educational, enlightening, and expensive. To be honest at the time I stated building the amplifier I had already ordered a completely assembled 30W amplifier from Downeast Microwave, Inc.; there was however, a four months wait time for delivery giving me ample time to be an "amateur radio man".

I decided to build the K9EK "L" band amplifier described in the ARRL Handbook since 1998. The K9EK amplifier is based on the M57762 a bipolar CMOS RF module; no longer in production (except in China of course).

I found the K9EK PCB (printed circuit board) is available from FAR Circuits in Ohio, and with very little modification, the PCB is able to be used with the Mitsubishi



Completed K9EK 1.2GHz Amplifier

RA18H1213G 30W MOSFET RF amplifier module. The key element in class "A" design is the bias circuit forcing the amplifier into conduction even without an input signal. The original K9EK design called for a 9 volt bias and the newer MOSFET module specified a gate or bias voltage of around 5 volts. I thought I would outsmart the original designers and replace the fixed bias supply with an adjustable bias source; mistake. I mounted the PCB board, RF module, and bias supply in a cast aluminum box, with the confidence that convection cooling would be adequate to prevent overheating; mistake. The FAR Circuits PCB is not a commercial grade product, while the RF input and output traces are intended to be 50 ohm stripline in reality they are not. This manufacturing anomaly would have no affect on the original M57762 RF module, however with the higher gain MOSFET device it proved to be problematic; mistake. To make matters worse, included in the original K9EK design was a small variable capacitor on the input lead intended to adjust the module drive level; mistake. Let the testing begin.

At the time I began testing of my modified design of the final amplifier I had no way to measure the output power level. I did have a [Spectran HF-4060](#) handheld analyzer, but without microwave experience it was not as helpful as it could have been.

(Continued on page 5)

(Continued from page 4)

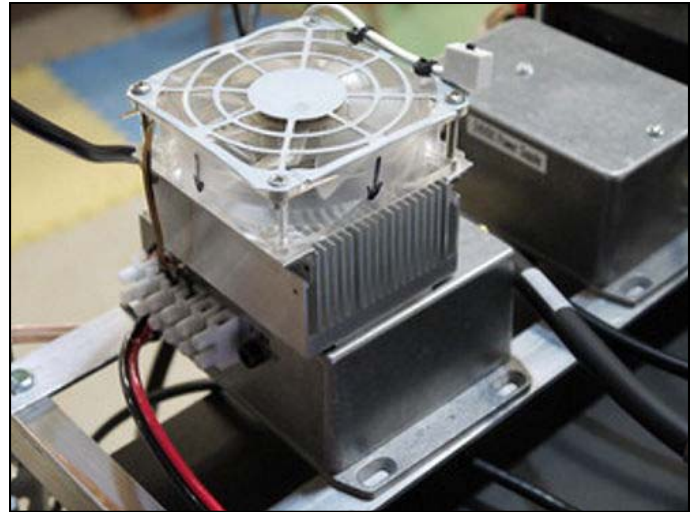
Additionally I had the pretuned FTA DVB-S receiver with its internal signal strength and quality indicators. To round out the test equipment is the DC ammeter on the 13.5 volt supply and the digital VOM connected to the adjustable bias circuit. With both the input and output connectors terminated I increased the bias voltage until the current showed 4 amps. With a little experimentation I increased the bias voltage



Testing K9EK Amplifier

until I reached an input current of about 6.5 amps, and concluded this was the “safe” bias range; wrong. Within 10 minutes of this testing the aluminum case became uncomfortable to touch and I concluded the amplifier needed fan cooling. I modified the enclosure to add a small fan (*Above Right*) which solved the heat problem. After connecting the DTV drive signal of about +10dBm I was expecting to see my test picture on the receiver, but I got no picture. The handheld analyzer seemed to show a signal resembling the DTV signal expected but was centered at the wrong frequency, and was quite unstable. I needed better test equipment, and acquired a Bird wattmeter with the correct microwave slug. I found the amplifier was oscillating and putting out over 40 watts, with no input connected. I traced the problem to the mismatched input circuit and the trimmer capacitor. Bypassing the stripline with a short length of coax brought the amplifier into stability. The damage however was done. While still usable, the module is not able to reach its rated output level, but still usable at about 8 watts RF output, with a perfect DTV signal.

Remaining to be done is full power range testing, linearity, purity, and harmonic testing. Hopefully we will actually see some real amateur DTV video miles away from the transmitter. You can see more about the K9EK amplifier construction at [WA6RZW ADTV Web Site](#).



Amplifier with Fan Modification

HF PROPAGATION MADE EASY AN ONLINE COURSE

By Bill –W6OAV

Want to learn about HF propagation? If so, go to the web site listed below and download “Introduction to HF Radio Propagation”. This document was developed by the Australian government IPS Radio and Space Services. Thanks to Lance, N1ETV, for putting us on to this document.

<http://www.ips.gov.au/Category/Educational/Other%20Topics/Radio%20Communication/Intro%20to%20HF%20Radio.pdf>

LAKWOOD SIREN TEST COMPLETE

By Jim – K0TOR

On May 11th the DRC supported the annual Lakewood siren physical inspection and verification of proper siren operation test. The Lakewood system consists of 25 sirens.

The test was supported by the following hams; KB0UQT, AC0T, N0KEX, KD0JJT, WG0N, KD0DUJ, N0QHF, K0BO, K0HTX, WB0HWP, KF0UV, KF0RW, KE0CT, AG1M, KB0A, WZ0S, N6LD, KD0JKC, KD0CXX, K0HRT, KA5DKS, WW0LF, W6OAV, WN0EHE, K0WSU, KC0WWW and K0TOR. The majority of radio communications were conducted on the 145.490 MHz repeater using the DRC radio station in the Lakewood Emergency Operations Center.

A total of 27 hams participated in this test. This represents a considerable commitment by each one. They took time from their schedule with many taking time off of work to support the siren test. Also many have supported this test over the years. This speaks highly to the willingness of hams to support public events. A big THANK YOU, to all the hams who supported this year's Lakewood siren test.

After the test, the hams that could went to the Lakewood Public Building for pizza and soda following the test.

The results of this test showed that all sirens functioned properly and the announcements were clearly understood. Siren site inspections showed one major problem and three concerns. Siren verification and evaluation ensures functionality of the sirens for emergency warning should an emergency situation occur. This is important to complete prior to severe weather season. This was another job WELL DONE.

Following the siren test I received an email from Steve Kabelis, Senior Systems Analyst for the City of Lakewood. Steve sent thanks from him and Brian Nielsen, Environmental Services Section Manager, to all the hams that supported this year's siren test. They are tremendously grateful for our help in making the City a little safer during critical events and severe weather conditions. They appreciate our support.

DRC ~ ARRL

Field Day 2011

Will be here before you know it.

June 25th & 26th

Don't forget the annual clean-up is on the 24th.

If you haven't started planning to attend now is the time.

For more information contact Dave – KOHTX
 303-880-1938 or KOHTX@comcast.net

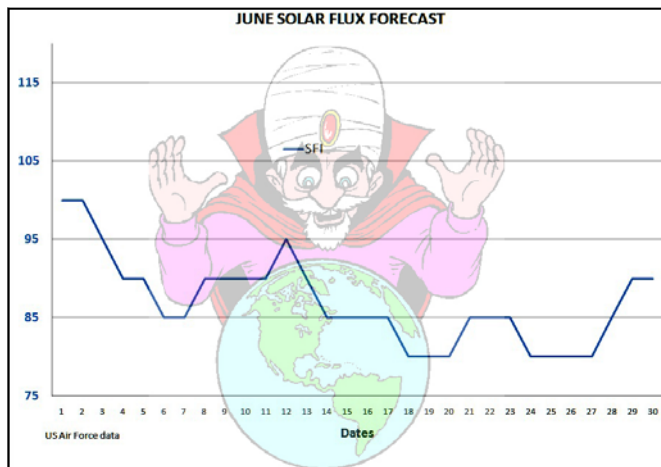
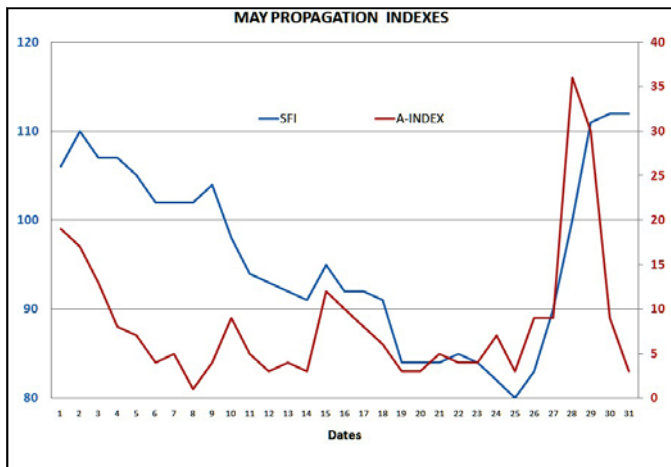
PAST & FUTURE PROPAGATION CONDITIONS

By Bill – W6OAV

This article provides two charts: the propagation conditions for last month and a forecast of next month's propagation conditions.

USING THE PROPAGATION INDEX CHART

Note two things on the chart: the trend of the SFI and A indexes and the date of largest SFI peak. The trend of the SFI shows the progress of the solar cycle during the past month. The SFI peak allows the rough forecasting of the reoccurrence of SFI peak in the next month. In order to "forecast" the next SFI peak, note the date when the SFI peak occurred and project out to about 28 days. Due to the sun's 28 day rotation, the SFI peak will often reoccur in about 28 days. The reason is because the sun spots causing the SFI peak move with the sun's rotation and face the earth every 28 days. This 28 day repetition will become more pronounced as the solar cycle improves. Refer to the September 2010 *Roundtable* for more complete information on the "SFI" and "A" indexes.



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UP COMING EVENTS

HAMfests

July 16 – PPRAA Megafest, Lewis Palmer High School, Colorado Springs

June 25-26 – DRC/ARRL Field Day Listen to the NET on Sunday night for more information.

August 5-7 – 2011 Rocky Mountain Div. Convention Taos, New Mexico

August 21 – DRC HAMfest, Jefferson County Fair Grounds

September 25 – Boulder Amateur Radio Club, BARCFest, Boulder County Fair Grounds, Longmont, CO

STEALTH ANTENNA BOOK REVIEW

By Bill – W6OAV









The other day I ordered G0KYA's "Stealth Antennas" book from the CQ Magazine web site (I've read that it should soon be available from the ARRL). As I read the book I was blown away by the wealth of material it contains. Since so many of us can't have visible outdoor antennas these days, I thought I'd recommend this book to hams in this situation.

The book covers a host of both homebrew and commercial stealth outdoor and indoor antennas. The book details how to build the various homebrew antennas. It also describes the user's experiences with both the homebrew and the commercial antennas. Examples of some of the homebrew antennas discussed are flagpoles, birdhouses, stealth verticals, magnetic loops, Grasswire, metal foil, EH, Microverts, DCTL and dipoles with various types of loading. Examples of some of the commercial antennas covered are Isotron, I-Pole vertical dipole, TAK, Par End Fed dipoles, Miracle Whip, and several vendor magnetic loops.

Lastly, there is a lot of information on RF safety, minimizing RFI etc. The book is definitely worth the cost.



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JUNE 2011							<i>DRC Net Sunday 8:30pm Local</i>
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	
		<i>Atlantic Hurricane Season Begins</i>	1 <i>Learning Net 7pm</i>	2	3 	4	
5	6	7	8 <i>Learning Net 7pm</i>	9	10 	11 <i>ARRL VHF QSO Party Starts 1800U</i>	
12 <i>ARRL VHF QSO Party</i>	13 <i>ARRL VHF QSO Party Ends 0300U</i>	14 	15 <i>DRC Meeting No Elmer Session General 6:30pm</i>	16	17 	18 <i>ARRL Kid's Day 1800U to 2400U</i>	
19 <i>Father's Day</i> 	20	21 <i>Summer Begins 17:16U</i>	22 <i>Learning Net 7pm</i>	23 	24 <i>Field Day Site Clean up</i>	ARRL Field Day 2011 	
ARRL Field Day 2011 	27	28	29 <i>Learning Net 7pm</i>	30			

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DRC REPEATERS

BAND	Freq / Shift / PL Tone	Additional Information
10m	29.620mHz (-100kHz) FM	Not In Service
6m	53.090mHz (-1mHz)	
Packet	145.05mHz<>14.105mHz	
2m	145.490mHz (-) 100Hz PL	Linked to the 70cm - 448.625mHz machine.
2m	147.330mHz (-) 100Hz PL	Local Area, Members Auto-Patch Does Not TX a PL!
2m	147.330mHz (-) 131.8Hz PL	NE Area Remote Does Not TX a PL!
1.25m	224.380mHz (-) 100Hz PL	
70cm	448.625mHz (-) 100Hz PL	Linked to the 2m - 145.490mHz machine.
70cm	449.350mHz (-) 100Hz PL	Wide area coverage with Echolink Node # 4140.

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DRC members - this is your newsletter. If there is something which is club or amateur radio related that you'd like to see as a regular feature, email suggestions to the editor. Members are the heart and sole of The Denver Radio Club, if you have an expertise or an interest in a particular segment of ham radio that you'd like to write about, you may email your submissions to AG0S@arrl.net. Submission deadline is the 25th of the Month. **Editor**