

Approved Version

Houston Echo Society Meeting American Red Cross Building February 13, 2006

Officers & Chairs

√_ President	Marty Blaise, AG5T
√_ Vice President,	Kent Marshall, W5TXV
√_ Treasurer	Richard Banks, WC5O
√_ Correspondence Secretary	Mike Nault, W5OFT
√_ Recording Secretary	Lee Gaspard, WA5QXE
√_ Parliamentarian	Phil Swartztrauber, W5GCT
√_ Web master	Michael Urich, KA5CVH
___ Membership Chair	B. Frank Secor, Jr., KB5VSY
___ Newsletter Editor	_____ OPEN _____

K5NAV – Section Communications Manager

Members and Visitors Present

Name	Call Sign	ARRL Member?
Richard Banks	WC5O	No
Cynthia Beniretto	N5TGS	No
Jeff Beniretto	N5TGR	No
Charles Birkhead	AD5VQ	YES
Marty Blaise	AG5T	YES
Charles “Frosty” Frost	K5LBU	YES
Lee Gaspard	WA5QXE	YES
Mike Hardwick	N5ECX	
Bill Hardy		
Alan Isaachsen	KB2WF	Yes
Joe Judah	New Member	
Franz Laugermann	K3FL	YES
Larry Lawson	KK5KE	Yes
Kent Marshall	W5TXV	YES
Charlie Matthew	N0XFD	Yes
Jeff Mc Millin	K5BRC	No
John Moore	KK5NU	No
Mike Nault	W5OFT	YES
Frank Robichaux	N5EJX	YES
Paul Rubin	N8NOV	YES
Bill Skipper	KB5BS	
Phil Swartztrauber	W5GCT	
Mark Tyler	K5GQ	YES
Michael Urich	KA5CVH	YES

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The meeting was called to order approximately 7:30pm.

Agenda

- Welcome & Introductions
- Reading & Approval of Minutes
- Treasurer's Report
- Nomination of ECHO officers (nominate officers for March election)
- Presentation - "Emergency Electrical Power" - by Charles Birkhead, AD5VQ
- Field Day Coordinator – Volunteer ?
- Old Business (Shortened or dispensed)
 - Announcements
 - Correspondence
 - Status of Repeaters
 - Web site and Newsletter
 - Treasurer's Report
 - Discussion of Field Day results

- New Business
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 - Other business
- Projects/ Demonstrations
- Adjourn

Marty opened the meeting at 7:30 pm.

Welcome

We went around the room and everyone introduced himself or herself.

Nomination of Officers

Phil Swartztrauber, W5GCT, stepped in to run the meeting during the nomination process in lieu of Marty. The following officers were nominated for the election to be held on March 13, 2006 meeting. Their term of office will run from April 1, 2006 through March 31, 2007.

__ President	Marty Blaise, AG5T
__ Vice President	Paul Rubin, N8NOV
__ Treasurer	Richard Banks, WC5O
__ Correspondence Secretary	Mike Nault, W5OFT
__ Recording Secretary	Lee Gaspard, WA5QXE
__ Parliamentarian	Phil Swartztrauber, W5GCT
__ Web master	Michael Urich, KA5CVH
__ Membership Chair	B. Frank Secor, Jr., KB5VSY
__ Newsletter Editor	Frank Robichaux, N5EJX
__ Field Day Coordinator	Charlie Matthew, N0XFD (<i>nominated later in meeting</i>)

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After the nominations, Phil Swartztrauber made a motion that all the proposed candidates be elected by acclamation. The motion was seconded by Kent Marshall and passed unanimously.

Presentation

Charles Birkhead, AD5VQ, gave us a presentation on Emergency Electrical Power.

Charles started his presentation on the premise:

- Electrical power blackouts are becoming more prevalent. Blackouts or complete loss of electrical power, tend to occur during extreme weather conditions when electrical power is especially needed. When that happens, Charles wants to have a system to provide emergency electrical power since almost nothing we do now can be done without power.
- Charles has previous experience with generating power, having worked as a Nuclear Engineer in the Navy and for several power companies.
- Charles personally owns and operates several electrical motor vehicles, and is actively pursuing solar and alternative forms of electrical power generation at the multi-kilowatt generation levels.
- The views expressed were his own and the methodology presented represented a mix of his research and his own learning's from experimentation.
- Charles approach to power systems is to stay within National Electric Code.

Charles next took us through a series of definitions about power:

- Charles examined the concept of supply and demand for average and instantaneous load and the need for equilibrium between the supply and demand on the electrical grid (even if it is an emergency grid).
- Charles walked us through battery discharge rates, depth of discharge, and tied-to-the-grid system versus isolated from the grid systems.
- As Amateur Radio operators, we cannot have sustained operation without a source of power generation.
- Fossil fuel generators, battery, solar, and wind are the most common forms of emergency generation.
 - The fossil fuel (gasoline, diesel, propane, natural gas) engine consumes fuel and turns a generator. This approach is relatively inexpensive to set-up, is relatively small in size, and manages instantaneous load versus demand up to the generator's capacity. However, it consumes about 1 gallon of fuel for every 5 kWh that is generated. Fuel storage and exhaust ventilation are issues.
 - Batteries offer short term power through a variety of chemistry types (lead acid, nickel-cadmium, nickel-metal hydride, and lithium-ion). Batteries provide reliable power and can source instantaneous current up to it's short-circuit capacity. While newer batteries are relatively smaller, batteries still have a weight/ output disadvantage. Many battery chemistries require special handling for disposition.
 - Solar energy converts sunlight into electricity. The "fuel" is free and there are no emissions to worry about. Panel costs, however, is currently about \$5 per watt. Atmospheric conditions affect the amount of power available. Solar panels are relatively fragile. Charles estimated the amount of energy that can be generated per watt of (fixed) panel capacity in the table below:

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Tilt (deg)	Jan (Wh/W)	Feb (Wh/W)	Mar (Wh/W)	Apr (Wh/W)	May (Wh/W)	Jun (Wh/W)	Jul (Wh/W)	Aug (Wh/W)	Sep (Wh/W)	Oct (Wh/W)	Nov (Wh/W)	Dec (Wh/W)
23	101	103	135	135	146	148	148	147	139	137	112	91
30	106	106	135	132	141	142	143	144	140	140	117	95
45	112	107	132	122	124	122	125	132	135	142	123	101

- Charles noted that wind power generates power roughly equivalent to the cube of the wind speed. While the “fuel” is free, many challenges exist with wind generation including the variability of wind speed, uncertainty that available power generation can meet demand, moving blades can be hazardous, need unrestricted access to wind, and excessive power must be dissipated to keep supply and demand equal.

Charles next took us through the concept of load sizing – how to assess both instantaneous loads and average daily loads. Using Amateur Radio equipment as the example, Charles demonstrated that a 20 watt transceiver operating on a 20% duty used for an ARES emergency would require about 1.0 Amp battery draw per hour from a 12 volt battery. Typically lead-acid batteries provide 1.25 Amp-hour per pound.

Charles covered the concept of over-demand protection (fuses, circuit breakers, etc) and the capacity of the various power generating types to supply that power. Even the interconnection wiring affects the total power available under load.

- Starting currents – especially motors can be 4 – 6 times the average running current
- Switching power supplies can draw 4 – 8 times the average power
- Some power sources generate RFI and other noise, especially common inverters
- Different batteries have different load to discharge percent ratings. A deep cycle battery is typically what is required for Amateur Radio use.
- The battery charging voltages and time to recharge can be summarized as follows:

13.2 volts

- Minimum to fully charge
- Takes many days to fully charge
- Can be left on for years
- Lose capacity from lack of equalization

13.5 volts

- Typical ‘float’ voltage
- Takes few days to fully charge
- Leaving this voltage on for years shortens battery life to 2-3 years

13.8 volts

- Highest voltage for long-term
- Takes over 24 hours to fully charge
- Leaving this voltage on for a few months seriously shortens battery life

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14.2 volts

- Takes 8-16 hours to go from 80% to 100% charge
- Leaving this on for weeks causing water loss and venting, destroying the battery

14.7 volts

- Takes 2-4 hours to go from 80% to 100% charge
- Typical ending voltage for automatic chargers
- Leaving this on for days causes water loss, venting, and temperature rise, destroying the battery

>15 volts

- Takes less than 2 hours to go from 80% to 100% charge
- Typical voltage for equalizing charge or balancing the charge in each cell
- Leaving this voltage on for more than a few hours destroys the battery

- The typical deep cycle battery is discharged when the cell voltage reached 1.75 volts/ cell. Some batteries may be 1.67 volts/ cell. The most common discharge rate is “C/20” or rated battery capacity divided by 20 hours. Hence, it is assumed by the manufacture that no demand will exceed 1/20 of the battery capacity on average. Discharging the battery less than the maximum rate will extend the life of the battery and typically allow it to be recharged more often.
- Charles walked us through solar panel power generating facts. The maximum power point on a solar panel is usually not 12 volts DC. A dc-dc power converter operates the solar panel at maximum efficiency and charges the battery properly.
- Charles ended the presentation by describing his set-up
 - Solar panel source
 - Current: 160 w (2 panels @ 80w)
 - Future: 1.2 kw (16 panels @ 80w)
 - Battery backup (sealed)
 - Current: 12vdc @ 65 ah
 - Future: 12vdc @ 200 ah
 - DC-AC sine wave inverter: 1.8 kw
 - DC-DC converters (futures)
 - In: 9-18 vdc
 - Out: 12 vdc
 - DC charge controller
 - Dc-dc battery charging
 - Dc voltage regulation
 - Protective fusing
 - 32 vdc automotive fuses
 - Cabling
 - Auxiliary AC battery charger
 - Solar panel mounts
 - Steel strut on-site assembly

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- Hand truck
 - Storage/transport of inverter/batteries/electronics
- The estimated cost of a set-up similar to Charles

Item	Qty	Cost (each)	Cost (total)
Inverter	1	\$1,200	\$1,200
Charge controller	4	\$ 140	\$ 560
Fuse holders	lot	\$ 50	\$ 50
Fuses	lot	\$ 50	\$ 50
Solar panels	16	\$ 400	\$6,400
Solar mounts	16	\$ 50	\$ 800
Hand truck	1	\$ 40	\$ 40
Miscellaneous	lot	\$ 100	\$ 100
Storage cases	16	\$ 100	\$1,600

Announcements:

- Paper clip in Post Office Box – Frank Robichaux translated that the paper clip is the Post Office's short hand note for you need to pay your box fee!

Old Business

- Treasurer's report: \$3,002.86 in the Bank
- Repeaters Reports: 147.08 being repaired, 224.26, 147.32 all working

New Business

- Charlie Matthew accepted the position of Field Day Coordinator

The meeting adjourned about 9:18 pm