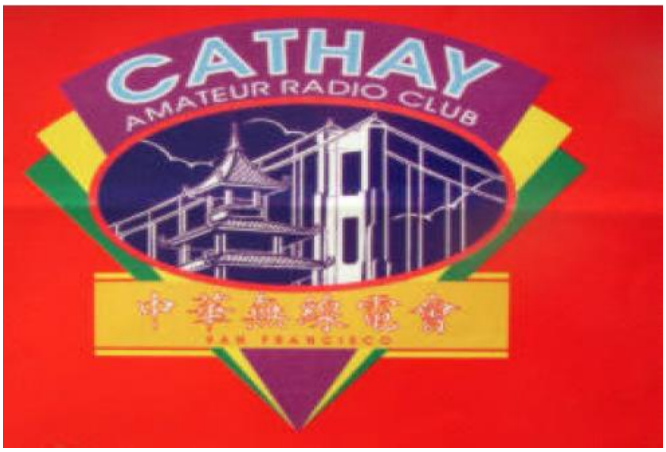

Cathay May 2017

www.cathayradio.org

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Mission: The Cathay Amateur Radio Club is basically an active social club of Ham Radio Operators and their spouses. We support local community requests for HAM emergency communications. Several of us are trained in CPR/ First Aid and are involved with community disaster preparedness.

Monday Night Net Time: 9 PM Local Time/PST, Frequencies: 146.67MHz -600KHz PL85.4 and 442.70 +5MHz PL 173.8. The repeaters are linked only during the CARC Monday night net.

Update: Link to repeater 442.70 is currently not active until further notice.

The CARC Monday night net is the best way to find out the latest club news.

All check-ins are welcome.

Message from the President: George Chong, *W6BUR*

Hello CARC Members and Friends;

It has been noted by our Cathay Amateur Radio Club members that our local Bay Area Toy Store: the Ham Radio Outlet (HRO) Store in Sunnyvale, CA has closed its doors on Wednesday March 22, 2017.

Located right in the heart of Silicon Valley, for 26 years the HRO Sunnyvale store serviced the local HAM Community and was a very popular destination for folks attending the Electronics Swap Market at De AnzaCollege in Cupertino (see http://www.electronicsfleamarket.com)

For information on HRO Sunnyvale store closing see the following write up in link: http://www.eham.net/articles/38926.

Not all is lost to us HAMs, the HRO Oakland branch store will continue to serve the Bay Area Ham community (2210 Livingston St. Oakland, CA2210 Livingston St. Oakland, CA 94606). From my prior visits to the Oakland branch, the store has been always very well stocked with the latest radio equipment and a top notch staff.

On another topic: **Reminder to Save the Date**: 2017 ARRL Field Day is June 24-25

Tech Article Introduction:

For this month Tech Article is going to consist of the first of a series of articles about a topic that is all on our minds: “What is going on with all those rechargeable lithium-ion battery fires.”

It seems like we are seeing in the daily news stories occurrences of electronic devices catching on fire some of which includes: Laptops, Smart Phones, Hover boards, Commercial Jet Aircraft, and electric passenger automobiles.

Most of the causes for the fires can be directly traced to the power source: Lithium-ion batteries suffering a condition known as Thermal Runaway. The tech article will discuss Thermal Runaway and it causes with Lithium-ion batteries. So please read and enjoy the article.

CARC Final Wrap-up News

In the public service announcement section, please read “**2 M CW NET**” Mike Kelly’s request for folks to join his CW net.

I wish to thank our CARC members that set aside their valuable time to participate in our Monday night’s nets.

Chat sub s'em to all you CARC members! - George W6BUR.

Public Service Announcements

HAM CRAM / HAM Licensing

For upcoming HAM Licensing locations please refer to:
http://www.arrl.org/find-an-amateur-radio-license-exam-session

2 M CW NET

We are looking for new members to join our CW Net. If you enjoy CW and want to improve or maintain your skill level then we want you!

Our CW net runs daily except Sunday on 144.455 MHz at 5 PM [if we experience too much interference, please – move up or down 5 kc]

We start on FM on voice to check in and then go to CW then come back to FM to finish up and sign off. The net runs for 15 minutes to a half hour depending on the radio traffic.

Originally, we had five members and subsequently three members have dropped out for various reasons. We would like to get back to 5 +/- members to join us. If this interest you or do you know someone that might be interested then please contact me at (aa6mk1@gmail.com) for further information or join us on the air.

73,

Mike Kelly AA6MK
Aa6mk1@gmail.com

Auxiliary Communications Service (ACS)

The Auxiliary Communications Service (ACS) was organized by the San Francisco Office of Emergency Services (OES) following the 1989 Loma Prieta Earthquake to support the communications needs of the City and County of San Francisco when responding to emergencies and special events.

The Auxiliary Communications Service holds General Meetings on the third Tuesday of each month at the San Francisco Emergency Operations Center, 1011 Turk Street (between Gough Street and Laguna Street), from 1900 hours to 2100 hours local time.

All interested persons are welcome to attend.

The ACS Net begins at 1930 hours (7:30 p.m.) local time each Thursday evening, on the WA6GG repeater at 442.050 MHz, positive offset, tone 127.3 Hz. The purpose of this net is to practice Net Control skills, practice checking in with deployment status in a formal net, and to share information regarding upcoming ACS events. Guests are welcome to check in. ACS Members should perform Net Control duty on a regular basis. On the second Thursday of each month, the net will be conducted on the output frequency of the WA6GG repeater, 442.050 MHz no offset, tone 127.3 Hz, simplex.

For more information, please attend an ACS meeting or check in on a net, or call 415-558-2717.

Upcoming meetings: Tuesday 7pm, May 16, 2017
Tuesday 7pm, June 20, 2017
…….Tuesday 7pm, July 18, 2017

Gilbert Gin (KJ6HKD)

Free Disaster Preparedness Classes In Oakland:
http://www.oaklandnet.com/fire/core/index2.html

CORE is a free training program for individuals, neighborhood groups and community-based organizations in Oakland. The underlying premise is that a major disaster will overwhelm first responders, leaving many citizens on their own for the first 72 hours or longer after the emergency.

If you have questions about the recertification process, you may contact the CORE Coordinator at 510-238-6351 or core@oaklandnet.com.

Free Disaster Preparedness Classes In San Francisco – NERT Taught by San Francisco Fire Department (SFFD).

http://sf-fire.org/calendar-special-events

Upcoming events

May 2017

3 NERT Quarterly Meeting, Register

11 Medical Reserve Corps/NERT Responder Psychological First Aid Training Register

13 NERT Quarterly Meeting, Register

17 NERT Incident siz-up and message writing. Register

20 NCT**101/201: Introduction to amateur communications/Hands on Buttons, Knobs & Antennas ERT Incident siz-up and message writing. Register

23 NCT**301: Hands on message passing and scribbing Register

24 NCT**401 NET Control for NERT Staging Register

RSVP to sffdnert@sfgov.org or call 415-970-2024 to register.

Visit ***www.sfgov.org/sffdnert*** to learn more about the training, other locations, and register on line. Upcoming Special NERT Events.

San Francisco Police Department: Auxiliary Law Enforcement Response Team (ALERT)

The Auxiliary Law Enforcement Response Team (ALERT) is a citizen disaster preparedness program designed. The ALERT program is for volunteers 16 years of age or older, who live, work, or attend high school in San Francisco.

Graduates of the San Francisco Police Activities League (P.A.L) Law Enforcement Cadet Academy are also eligible to join.

ALERT volunteers will first complete the Fire Department's Neighborhood Emergency Response Team (NERT) (www.sfgov.org/sfnert) training and then graduate into an 8 hour Police Department course specifically designed for ALERT team members.

ALERT members will work closely with full-time and/or Reserve Police Officers in the event they are deployed after a disaster. The Basic ALERT volunteer will have no law enforcement powers other than those available to all citizens.

SFPD ALERT Training

The next SFPD ALERT training class has been scheduled for Saturday, June 3rd 2017. The class will be held at the San Francisco Police Academy, in the parking lot bungalow, from 8am-5pm (one hour lunch break).

IMPORTANT- All participants must complete the background interview process in order to be eligible to attend the ALERT training class.

Eligible ALERT participants may register for a training class by contacting the ALERT

Program Coordinator, Mark Hernandez, at sfpdalert@sfgov.org, or by telephone at 415-401-4615.

SFPD ALERT Practice/Training Drill

All active/trained ALERT members are asked to join us for our next training drill, scheduled for 9:00 am – 1:00 pm Saturday July 29, 2017. Details will be emailed to active ALERT members, prior to the date of the exercise. Participation is not required, but strongly encouraged.

For more information on the San Francisco Police Department ALERT Program, email us at sfpdalert@sfgov.org, or call Sergeant Mark Hernandez (SFPD, Ret.), SFPD ALERT Program Coordinator, at (415) 401-4615.

For additional information on the web please refer to:
http://sf-police.org/index.aspx?page=4019

Tech Article Section.

Lithium-ion Safety Concerns

Permission for reprint granted by Battery University, many thanks to their generosity!

http://batteryuniversity.com/learn/archive/lithium_ion_safety_concerns

When Sony introduced the first lithium-ion battery in 1991, they knew of the potential safety risks. A recall of the previously released rechargeable metallic lithium battery was a bleak reminder of the discipline one must exercise when dealing with this high energy-dense battery system.

Pioneering work for the lithium battery began in 1912, but is was not until the early 1970's when the first non-rechargeable lithium batteries became commercially available. Attempts to develop rechargeable lithium batteries followed in the eighties. These early models were based on metallic lithium and offered very high energy density. However, inherent instabilities of lithium metal, especially during charging, put a damper on the development.

The cell had the potential of a thermal run-away. The temperature would quickly rise to the melting point of the metallic lithium and cause a violent reaction. A large quantity of rechargeable lithium batteries had to be recalled in 1991 after the pack in a cellular phone released hot gases and inflicted burns to a man's face.

Because of the inherent instability of lithium metal, research shifted to a non-metallic lithium battery using lithium ions. Although slightly lower in energy density, the lithium-ion system is safe, providing certain precautions are met when charging and discharging. Today, lithium-ion is one of the most successful and safe battery chemistries available. Two billion cells are produced every year.

Lithium-ion cells with cobalt cathodes hold twice the energy of a nickel-based battery and four-times that of lead acid. Lithium-ion is a low maintenance system, an advantage that most other chemistries cannot claim. There is no memory and the battery does not require scheduled cycling to prolong its life. Nor does lithium-ion have the sulfation problem of lead acid that occurs when the battery is stored without periodic topping charge. Lithium-ion has a low self-discharge and is environmentally friendly. Disposal causes minimal harm.

Long battery runtimes have always been the wish of many consumers. Battery manufacturers responded by packing more active material into a cell and making the electrodes and separator thinner. This enabled a doubling of energy density since lithium-ion was introduced in 1991.

The high energy density comes at a price. Manufacturing methods become more critical the denser the cells become. With a separator thickness of only 20-25µm, any small intrusion of metallic dust particles can have devastating consequences. Appropriate measures will be needed to achieve the mandated safety standard set forth by UL 1642.

Whereas a nail penetration test could be tolerated on the older 18650 cell with a capacity of 1.35Ah, today's high-density 2.4Ah cell would become a bomb when performing the same test. UL 1642 does not require nail penetration.

Lithium-ion batteries are nearing their theoretical energy density limit and battery manufacturers are beginning to focus on improving manufacturing methods and increasing safety.

Recall of lithium-ion batteries

With the high usage of lithium-ion in cell phones, digital cameras and laptops, there are bound to be issues. A one-in-200,000 failure rate triggered a recall of almost six million lithium-ion packs used in laptops manufactured by Dell and Apple. Heat related battery failures are taken very seriously and manufacturers chose a conservative approach. The decision to replace the batteries puts the consumer at ease and lawyers at bay. Let's now take a look at what's behind the recall.

Sony Energy Devices (Sony), the maker of the lithium-ion cells in question, says that on rare occasions microscopic metal particles may come into contact with other parts of the battery cell, leading to a short circuit within the cell. Although battery manufacturers strive to minimize the presence of metallic particles, complex assembly techniques make the elimination of all metallic dust nearly impossible.

Figure 1: Lithium-ion battery damages a laptop.

Safety issues are enticing battery manufacturers to change the manufacturing process. According to Sony, contamination of Cu, Al, Fe and Ni particles during the manufacturing process may cause an internal short circuit.

A mild short will only cause an elevated self-discharge. Little heat is generated because the discharging energy is very low. If, however, enough microscopic metal particles converge on one spot, a major electrical short can develop and a sizable current will flow between the positive and negative plates. This causes the temperature to rise, leading to a thermal runaway, also referred to 'venting with flame.'

Lithium-ion cells with cobalt cathodes (same as the recalled laptop batteries) should never rise above 130°C (265°F). At 150°C (302°F) the cell becomes thermally unstable, a condition that can lead to a thermal runaway in which flaming gases are vented.

During a thermal runaway, the high heat of the failing cell can propagate to the next cell, causing it to become thermally unstable as well. In some cases, a chain reaction occurs in which each cell disintegrates at its own timetable.

A pack can get destroyed within a few short seconds or linger on for several hours as each cell is consumed one-by-one. To increase safety, packs are fitted with dividers to protect the failing cell from spreading to neighboring cells.

Safety level of lithium-ion systems

There are two basic types of lithium-ion chemistries: cobalt and manganese (spinel). To achieve maximum runtime, cell phones, digital cameras and laptops use cobalt-based lithium-ion. Manganese is the newer of the two chemistries and offers superior thermal stability. It can sustain temperatures of up to 250°C (482°F) before becoming unstable.

In addition, manganese has a very low internal resistance and can deliver high current on demand. Increasingly, these batteries are used for power tools and medical devices. Hybrid and electric vehicles will be next.

The drawback of spinel is lower energy density. Typically, a cell made of a pure manganese cathode provides only about half the capacity of cobalt. Cell phone and laptop users would not be happy if their batteries quit halfway through the expected runtime.

To find a workable compromise between high energy density, operational safety and good current delivery, manufacturers of lithium-ion batteries can mix the metals. Typical cathode materials are cobalt, nickel, manganese and iron phosphate.

Let me assure the reader that lithium-ion batteries are safe and heat related failures are rare. The battery manufacturers achieve this high reliability by adding three layers of protection. They are: [1] limiting the amount of active material to achieve a workable equilibrium of energy density and safety; [2] inclusion of various safety mechanisms within the cell; and [3] the addition of an electronic protection circuit in the battery pack.

These protection devices work in the following ways: The PTC device built into the cell acts as a protection to inhibit high current surges; the circuit interrupt device (CID) opens the electrical path if an excessively high charge voltage raises the internal cell

pressure to 10 Bar (150 psi); and the safety vent allows a controlled release of gas in the event of a rapid increase in cell pressure.

In addition to the mechanical safeguards, the electronic protection circuit external to the cells opens a solid-state switch if the charge voltage of any cell reaches 4.30V. A fuse cuts the current flow if the skin temperature of the cell approaches 90°C (194°F). To prevent the battery from over-discharging, the control circuit cuts off the current path at about 2.50V/cell. In some applications, the higher inherent safety of the spinel system permits the exclusion of the electric circuit. In such a case, the battery relies wholly on the protection devices that are built into the cell.

We need to keep in mind that these safety precautions are only effective if the mode of operation comes from the outside, such as with an electrical short or a faulty charger.

Under normal circumstances, a lithium-ion battery will simply power down when a short circuit occurs. If, however, a defect is inherent to the electrochemical cell, such as in contamination caused by microscopic metal particles, this anomaly will go undetected. Nor can the safety circuit stop the disintegration once the cell is in thermal runaway mode. Nothing can stop it once triggered.

What every battery user should know

A major concern arises if static electricity or a faulty charger has destroyed the battery's protection circuit. Such damage can permanently fuse the solid-state switches in an ON position without the user knowing. A battery with a faulty protection circuit may function normally but does not provide protection against abuse.

Another safety issue is cold temperature charging. Consumer grade lithium-ion batteries cannot be charged below 0°C (32°F). Although the packs appear to be charging normally, plating of metallic lithium occurs on the anode while on a sub-freezing charge.

The plating is permanent and cannot be removed. If done repeatedly, such damage can compromise the safety of the pack. The battery will become more vulnerable to failure if subjected to impact, crush or high rate charging.

Asia produces many non-brand replacement batteries that are popular with cell phone users because of low price. Many of these batteries don't provide the same high safety standard as the main brand equivalent.

A wise shopper spends a little more and replaces the battery with an approved model. Figure 1 shows a cell phone that was destroyed while charging in a car. The owner believes that a no-name pack caused the destruction.

***Figure 2**: A cell phone with a no-brand battery that vented with flame while charging in the back of a car*

To prevent the infiltration of unsafe packs on the market, most manufacturers sell lithium-ion cells only to approved battery pack assemblers. The inclusion of an approved safety circuit is part of the purchasing requirement. This makes it difficult for a hobbyist to purchase single lithium-ion cells off-the-shelf in a store. The hobbyist will have no other choice than to revert to nickel-based batteries. I would caution against using an unidentified lithium-ion battery from an Asian source, if such cells is available.

The safety precaution is especially critical on larger batteries, such as laptop packs. The hazard is so much greater than on a small cell phone battery if something goes wrong. For this reason, many laptop manufacturers secure their batteries with a secret code that only the matching computer can access. This prevents non-brand-name batteries from flooding the market. The drawback is a higher price for the replacement battery.

Readers of www.BatteryUniversity.com often ask me for a source of cheap laptop batteries. I have to disappoint the shoppers by directing them to the original vendor for a brand name pack.

Considering the number of lithium-ion batteries used on the market, this energy storage system has caused little harm in terms of damage and personal injury. In spite of the good record, its safety is a hot topic that gets high media attention, even on a minor mishap. This caution is good for the consumer because we will be assured that this popular energy storage device is safe. After the recall of Dell and Apple laptop batteries, cell manufacturers will not only try packing more energy into the pack but will attempt to make it more bulletproof.