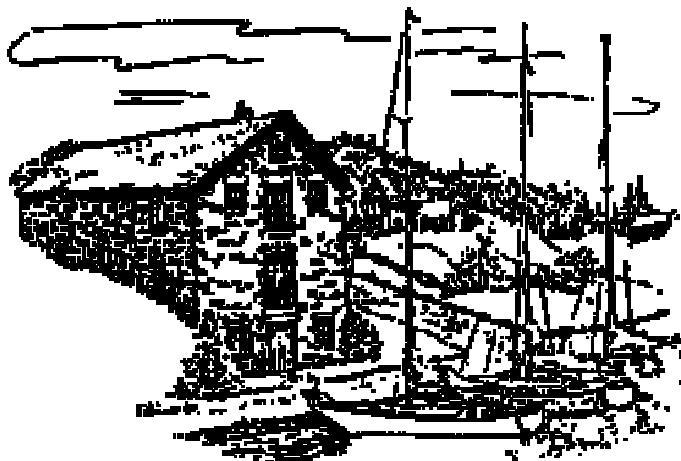


Hot Bananas

Oakville Amateur Radio Club VE3HB

September 2000



Message from the President

Welcome to a New Year

Hubert Heath
VE3HLD

As the new President of the Oakville Amateur Radio Club for the year 2000 -2001, I would like to introduce myself. My name is Hubert (Shot) Heath, age 71. I was born and raised in Oakville and have been a member of the Radio Club for approximately 10 years.

I have had an interest in amateur radio since I was a teenager when I was first introduced to it while visiting George Very, a founder of the Club, in the Very's

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RAC Asks Industry Canada To Discontinue the 12 W.P.M. Morse Code Test

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During the past year, RAC has consulted with the Canadian amateur community in various ways including web site surveys, message boards, analysis of e-mail and postal correspondence, letters to the editor of The Canadian Amateur magazine and as well as on-the-air discussions and fora. The RAC Board of Directors has concluded that a majority of Canadian Amateurs are supportive of dropping the 12 W.P.M. Morse test although many are against such a change.

"Morse Code" - Page 5

CALENDAR OF CLUB EVENTS

CLUB MEETING

OAKVILLE RED CROSS BUILDING
SEPTEMBER 11, 2000, 7:30PM
First club meeting of the season.

CLUB MEETING

OAKVILLE RED CROSS BUILDING
OCTOBER 16, 2000, 7:30PM
Regular Club Meeting.

CLUB MEETING

OAKVILLE RED CROSS BUILDING
NOVEMBER 13, 2000, 7:30PM
Regular Club Meeting.

ANNUAL CHRISTMAS DINNER

PLACE: TBD
TIME: TDB
Annual Christmas Dinner.

CLUB MEETING

OAKVILLE RED CROSS BUILDING
DECEMBER 11, 2000, 7:30PM
REGULAR CLUB MEETING.

Just the Facts

About the OARC...

Meetings

Meetings are held on the Second Monday of each month from September to June at the Red Cross Building, 167 Navy Street, Oakville. Meetings begin at 7:30pm and all are welcome. An informal Saturday breakfast is held at 7:00am, at the Pic-A-Deli restaurant on Fourth Line at Speers Road, Oakville.

The OARC is a RAC affiliated club.

Repeater

VE3OAK 147.015 +.600 (131.8Hz CTCSS)

VE3OAK 444.325 +5.00

Digipeater

VE3OAK 145.750

Net

Mondays at 7:30pm (except meeting nights/holidays)

Phone Patch Access

Code & Tel No (do not pause while dialing)

Web Site

<http://www.mvw.net/oarc/index.html>

Mailing Address

Oakville Amateur Radio Club

PO Box 69615

109 Thomas Street

Oakville ON L6J 7R4

Email Address

oarc@mvw.net

Hot Bananas is published 10 times per year from September to June and is distributed to all members of the OARC. Articles may be reproduced without additional permission provided credit is given to Hot Bananas and the Oakville Amateur Radio Club.

Submit story ideas, feedback, comments, articles or artwork to VA3AFA@RAC.CA or mail to Hot Bananas, PO Box 69615 109 Thomas St, Oakville ON L6J 7R4. Fax is available, address to John Clarke at (416) 982-8471. Electronic format is preferred, however we can accommodate any media, including handwritten stories, audio recordings or in-person interviews! Ω

WHO'S WHO

YOUR ACCESS POINT TO THE MOVERS AND SHAKERS OF OARC

EXECUTIVE

President	Hubert Heath, VE3HLD
Vice President	Jack Livingstone, VE3ITM
Membership Director	Russ Schwandt, VE3JUJ
Director at Large	Doug Smith, VE3RG
Secretary	John Clarke, VA3AFA
Finance	Jim Fitzpatrick, VE3ITT

COORDINATORS

Emergency Coordinator	Greg Foster, VA3GGF
Regional Emergency Liaison	Phil Thompson, VE3RD
VHF Net Activities	Vacant
Repeater Programming	Graham Chatfield, VA3GPC
Repeater Maintenance	Gary Hetherington, VE3TGH Harry Kosterman, VE3HKC
Packet BBS	Phil Thompson, VE3RD
Special Event Catering	Carvell Pelkey, VE3CPQ
Training-Basic & Advanced	Jack Livingstone, VE3ITM
Examiner	Jack Livingstone, VE3ITM
Internet Web Site	Michael Willems, VA3MVV
Public Relations	Doug Smith, VE3RG
Equipment/Shack	Jack Livingstone, VE3ITM
QSL Manager	Ron O'Reilly, VE3FII
DX Interest Group	Ron O'Reilly, VE3FII
Library	TBD

CLUB BULLETIN

Editor	John Clarke, VA3AFA
Production	Richard Davis Jr
Distribution	Duncan Smith, VE3HFG

Flowers greenhouse at the corner of Kerr and Bond Streets.

During my 36 years as a Police Officer, I had occasion a few times to attend with Norm Busk (another of the founders) at Riverside Lodge to eject the odd drunk.

When I was 'phoned one night in June, I was told that if no one ran for director of the Club that it would possibly fold. I therefore let my name stand as a Director. At the Director's Meeting I met the

There are many members of this Club who are skilled in amateur radio and I am requesting that they step forward

other Directors: Jim Fitzpatrick, Treasurer; Jack Livingstone, Vice President; John Clarke, Secretary; Russ Schwandt, Membership and Doug Smith, Director. I quickly learned that with these men, the position of President would be fairly easy and the Oakville Amateur Radio Club would continue to function and to grow. There are many members of this Club who are skilled in amateur radio and I am requesting that they step forward for the good of the Club and to assist newcomers so that the Club will progress.

I hope that each of you has had a pleasant summer (in spite of all the rain) and that you will continue to support your Club. You can support your Club by attending the meetings and by participating in planned activities. If you know anyone who is interested in our hobby, invite them to a meeting.

Our first meeting of the 2000 - 2001 year is on September 11th, 7:30 p.m. at the Red Cross building on Navy Street. Hope to see you there! Ω

AMSAT P3D Project

It's for the Birds

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www.amsat.org

Phase 3-D is the term now being used to identify Amateur Radio's next major satellite effort. It will be the largest, most complex, and most expensive Amateur Radio satellite ever built. An international team of volunteers, from over a dozen countries on five continents, has been assembled and are now laboring diligently to complete the new satellite in time for a launch aboard an Ariane launch vehicle of the European Space Agency, hopefully sometime in 2000.

The very first Amateur Radio satellites launched in the early 1960s made up the "Phase 1" group and were typified by OSCARs 1 and 2. These satellites carried only low power beacons designed to last just a few weeks. The "OSCAR" designation, (short for *Orbiting Satellite Carrying Amateur Radio*) is only given to Amateur Radio satellites that successfully achieve orbit.

Later AMSAT spacecraft such as OSCARs 6, 7 and 8, carried the "Phase 2" designation. These satellites were built to last for a period of a year or more. Several Phase 2 satellites have since been built and launched, including a number of digital packet radio satellites. These satellites (often called "PACSATS") are designed to receive non-commercial computer messages uploaded by Amateur Radio Operators for storage and later downloading by operators in other parts of the world. A distinguishing characteristic of the Phase 2 satellites, however, is their relatively low Earth orbit, allowing amateurs only limited satellite access time and greatly restricted real-time communications distance capabilities.

The "Phase 3" part of the Phase 3-D identifier puts it in the largest and latest class of Amateur Radio satellites. The Phase 3 program was begun in the mid-1970s to partially alleviate many of the orbital limitations of previous satellites. These satellites typically yield real-time, worldwide voice coverage for their users by employing a highly elliptical, *Molniya*-style orbit first pioneered by the Soviet Union. Phase

3 satellites appear to "park" over one spot on the Earth for up to several hours at a time. This orbital configuration virtually eliminates the "hurry up" style of satellite operation one needed to use the earlier Amateur Radio satellites.

The first Phase 3 satellite, Phase 3-A, was lost on launch due to a booster failure. Both Phase 3-B and Phase 3-C satellites were successfully launched and became OSCARs 10 and 13 respectively. Phase 3-D, however, will be much more than a mere replacement for OSCARs 10 and 13, both of which are now rapidly nearing the end of their useful lifetimes.

Phase 3-D will feature a combination of higher power transmitters as well as higher gain receivers and antennas. Also, unlike current Phase 3 satellites (and if all goes as planned) Phase 3-D's antennas will always point Earthward. This means significantly stronger signals will come from the satellite, and lower transmit power and simpler antennas will be needed to get a usable signal to the satellite. These improvements are specifically aimed at bringing satellite operation easily within the reach of *every* Amateur Radio Operator on Earth.



Phase 3-D will contain receivers and transmitters for all Amateur Radio satellite frequency bands from 21 MHz to 24 GHz that are currently authorized for use by the International Telecommunications Union. Thus, Phase 3-D will help perpetuate the amateur's proven ability for both pioneering and perfecting new communications modes at ever-higher frequencies.

Many of the communication technologies that are taken for granted today by the average consumer, such as AM and FM broadcasting, broadcast television, international shortwave and satellite communications, as well as cellular telephone services, can all trace their technical roots to experiments first done by Amateur Radio Operators. What's more, the birth of dependable

"AMSAT" - Continued on page 9

CALENDAR OF HAM RADIO EVENTS

FLEA MARKET

OARC 4th Annual Hamfest

The Ottawa Amateur Radio Club, Inc.

Saturday, September 2, 2000.

Carp ON.

FLEA MARKET

Barrie Hamfest

Barrie Amateur Radio Club

Saturday, September 9, 2000.

Barrie ON

FLEA MARKET

LARC Hamfest 2000

London Amateur Radio Club Inc.

Sunday, September 24, 2000.

London ON.

FLEA MARKET

York Region 24h Annual Hamfest

York Region Amateur Radio Club

Saturday, October 28, 2000.

Markham ON

SPECIAL EVENT

Halton Radial Railway Museum Special Event Station

Mississauga Amateur Radio Club

Saturday, September 23, 2000

Milton ON

SYMPOSIUM/CONFERENCE

18th Space Symposium/AMSAT-NA Annual Meeting

October 27 - 29, 2000

Portland, Maine

In a recent letter to Industry Canada, RAC President Kenneth Oelke, VE6AFO recommended that full HF operating privileges be granted to amateurs who have passed a 5 W.P.M. Morse test.

At the same time, Mr. Oelke requested that the department consider the augmentation of written tests to strengthen and expand the requirements for operator knowledge and skills in the areas of station set-up and operation, on-air procedures and operating practices and to include more questions on modern modes of communication employed by Radio Amateurs.

This proposal would give Canadian radio amateurs operating privileges similar to those currently accorded to United States amateurs who successfully pass a 5 W.P.M Morse test. Industry Canada is aware that a review of the international regulations governing the Amateur Services will take place at the next World Radio Conference currently scheduled for 2003. One aspect of such a review would be the testing requirements for access to frequencies below 30 MHz. The proposed review is supported by the International Amateur Radio Union, which has consulted with its member organizations in over 180 countries during the past four years.

Independent of the review of the International Regulations, many countries including The United Kingdom, Australia, South Africa, and many European countries are either considering or have already decided to decrease their Morse testing requirements. A decision by Canada to drop the 12 W.P.M. test would be in harmony with what is happening in other parts of the world and would simplify the negotiation and implementation of reciprocal operating agreements. Ω

Next Month in Hot Bananas

- OARC 2000-01 Membership List
- APRS Feature
- Local Broadcast Antenna Site
- Submission Deadline for October issue is Sept 25!

Call To Order

Minutes of the Oakville Amateur Radio Club Meeting of June 12, 2000

John Clarke, Secretary
VA3AFA



OAKVILLE AMATEUR RADIO CLUB ANNUAL MEETING

Date: June 12, 2000

Attendees: 22 (including 2 guests)

Jack VE3ITM:

- Opened the meeting at 1935 hours. Welcomed the group and commented on the light turnout. He recognized our two guests, Charles VA3WCP and Kathleen Pereira of T.B.R.C. Advised the evening would be an information meeting, election of new Officers for the next term and awards presentation.
- Moved for adoption of the May meeting minutes. This was seconded by Greg VA3GGF and was carried.
- Asked for information on the Repeater, Packet and Emergency Services. Greg VA3GGF offered the following:
 - Repeater from Petro Canada has been restarted and requires the ID chip. Will also require programming and the cost for this is estimated at about \$100.00. We possibly also will require a duplexer. New repeater will have tone to operate.
 - Packet. No update. Link out of Oakville still a problem.
 - Emergency Services. Advised he would be attending a meeting with local groups on June 22. VE3FOX is the District E.C.

Jim VE3ITT presented the Treasurer's report. We are looking better and are in good shape. We have \$2578 in the bank which is expected to shrink to about \$2055 for this budget year. We are \$153 better than what we had budgeted for. Last year we ended up with \$2169 in the bank. Our membership is down by 10 compared to last year. Jim asked for a motion to accept the report. Moved by Doug VE3RG, seconded by Jim VE3JIC and carried. Jim advised he had a Treasure Report copy, given to him by Ron VE3FII. It was for the 1987 year, carefully written by hand, and by contrast to this year \$520 more was spent than what was taken in but even at that ended up with \$331 in the Bank. He advised he would like to get the books audited and advised Bob VA3PRW did this last year. He moved that Bob be appointed to do the audit this year. This was seconded by Greg VA3GGF and carried.

Russ VE3JUJ advised there was no change in the membership since last month. Currently the count stands at 58 regular and 2 honorary life members. He also requested members to let him know of any revisions required to the membership list.

Doug VE3RG informed the group that Charles VA3WCP wished to become a member of OARC. He requested that the dues be applied against the 2000-2001 year. Jack acknowledged the request.

Jack VE3ITM advised there would be no Field Day under OARC this year as Mike had lost his help. Greg VA3GGF stated, if we wanted to, we could set up at the Club Shack and operate from there. Peter VA3PRS asked if Burlington would be having a Field Day. Doug VE3RG said he would check with Norm of the Burlington Club and if they were we could co-operate with them. Jack VE3ITM asked if anyone knew who the president for the Burlington Club was. Advised it was Mary VA3QLF. Charles

"Call to Order" - Continued on Page 7

VA3WCP stated that Burlington's Honda generator has not been returned from being loaned during the Ice Storm. Peter VA3PRS stated he had heard that 35% of the generators loaned to Quebec have not been returned. Jack asked the group if there was any further business to discuss. Since there wasn't he advised that the meeting would continue with the presentation of awards. Following that the meeting would be turned over to Jim VE3ITT who would conduct the selection of new officers for the Club. Jack presented awards to the following individuals (a brief recap of recognition follows the name):

- Greg Foster VA3GGF – EC, shack and equipment, Repeater operations, help with antennas, Net Manager and local events.
- Carvell Pelkey VE3CPQ – 50/50 draw, coffee/cookies, antenna help, making of certificates, creating labels and special event catering.
- Michael Willems VA3MVW – took over the Web page, gives us talk on the Internet and keeps interest in our Toys high.
- Duncan Smith VE3HFG – local events and Bulletin distribution.
- Jim Fitzpatrick – kept the Club going, searched out Directors and keeps the books in order.
- Net Controllers: Greg Foster VA3GGF, Gord Appleton VE3RRT, Harry Kosterman VE3HKC and Ed Samborski VE3TAS.
- SPECIAL Past and Present Award presented to Robert Warkentin VA3PRW for helping to sell Lions Club tickets (sold the most), always helped out when asked, handled the supply and cooking at Field Day, preparation of certificates (past and present). Never had made an award for him self so a Special Recognition is being made NOW.
- DIZZY IZY: For the sub-category (\$50.00 cash award) to Gren Schrader VE3GLS (10 contacts, 4 on 10M, 2 on 15M, 1 on 20M, 2 on 30M, 1 on 40M. For the official plaque award to Mike Brown VA3GRL who had 632 contacts with a count of 219 total prefixes.
- Amateur of the Year to Ed Samborski VE3TAS for handling the co-editor/editor, secretary, organizer, preparing the bulletin (launching it in electronic form), certificate frames and redoing the DIZZY IZY Plaque.

Jim VE3ITT advised the present executive had requested him to contact members to ask them if they would permit their name to be submitted for Club Officer election. He called 38 individuals. Of these 6 did not return his call, 29 stated they were too busy and 3 (Mike VA3GRL, John VA3AFA and Hubert VE3HLD) said they would stand. Ron VE3FII asked if we were still required to advise the Province of Directors positions. If so that means that the Secretary and Treasurer do not necessarily need to be Directors. Ed VE3TAS advised that as an Incorporated Club we are required to advise the Province of our status and we do so. Jim advised there were more than 5 names submitted for election and a ballot selection for 5 individuals would have to be conducted. He went on to say that since the Treasurer is not required to be a Director he would be happy to stay on as Treasurer, but not as a Director, and therefore his name is to be ignored on the ballot (the group applauded him for this). Those standing for election are: Doug VE3RG, Hubert VE3HLD, Jack VE3ITM, John VA3AFA, Mike VA3GRL and Russ VE3JUZ. During the balloting the 50/50 draw was conducted – Duncan VE3HFG was the winner. After return of all the ballots our visiting dignitaries, Kathleen Pereira and Charles VA3WCP performed the counting of the ballots. Jim VE3ITT identified the new Director group. These are DOUG VE3RG, HUBERT VE3HLD, JACK VE3ITM, JOHN VA3AFA, and RUSS VE3JUZ. Jim VE3ITT is staying on as Treasurer. Ed VE3TAS motioned to have the ballots destroyed. This was seconded by Carvell VE3CPQ and carried.

Jack VE3ITM asked for a motion at 2045 hours to adjourn the meeting. Motioned by Dave VE3DPD, seconded by Doug VE3RG and carried.

Scribed by Ed VE3TAS.

Radio Amateurs of Canada News



UPCOMING OPERATING EVENTS

CONTEST

SEPT 2-3

All Asian DX Contest, SSB

CONTEST

SEPT 2-3

IARU Region 1 Field Day, SSB

CONTEST

SEPT 3

PANAMA ANNIVERSARY CONTEST

CONTEST

SEPT 4-5

MI QRP Club Labor Day CW Sprint Panama Anniversary Contest

OPERATING EVENT

JULY-DEC 2000

VE0NWP on board the CCGS Simon Fraser escorting the St-Roch II through the North-West Passage and the Canadian Arctic. 14.300 mHz from 0300 to 0500 UTC daily. QSL via VE7KW or the VE7 QSL bureau.Ω

Louis Varney, G5RV, SK

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Louis Varney, G5RV, who invented the world-famous G5RV antenna, died June 28. He was 89.

The G5RV multiband wire antenna for HF is among the most popular of all antenna designs. Varney first described the G5RV in the November 1966 issue of the RSGB Bulletin. He employed a full-size and a double-size G5RV, both fed with open-wire feeders, at his own station. Varney remained an active radio amateur until very recently and kept regular on-the-air schedules. He was an RSGB member for 74 years and served as life president of the Mid-Sussex Amateur Radio Society. His wife Nelida is among his survivors. Services were held on July 4 in Brighton. Enland. Ω

IC authorizes Family Radio Service in Canada

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Industry Canada has just released a policy paper governing the use of Licence-Exempt Family Radio Devices in the Land Mobile Frequency Sub-bands 462 - 467 MHz. This band is used by commercial mobile operators as well as public safety services.

The Family Radio Service (which has become very popular in the USA as a new, UHF "Citizens Band") will use unlicensed transmitters operating at low power, on the understanding that they will not cause interference to the licensed services.

Since the upper limit of the Canadian 70cm Amateur band is 450 MHz, it is not likely that the FRS will interfere with Amateur operations.

Full details can be found in the policy paper available on the Industry Canada web site at:

<http://strategis.ic.gc.ca/SSG/sf02120e.html>

FCC TELLS HAMS TO "WALK THE WALK"

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The FCC's Dale Hatfield, W0IFO, predicts a bright future for Amateur Radio. But Hatfield said hams should actually engage in experimentation to advance the state-of-the-art, provide communication and train operators for emergencies, encourage international cooperation and good will, and offer an important technical educational outlet. "Or, to use a bit of slang, it will be even more important for all segments of the amateur community to 'walk the walk' not just 'talk the talk!'" Ω

Activity Coordinator Update

Monthly Round-up of Activity Group News...

In the upcoming months we will be featuring the fine work being by the various activity groups who are working hard to support the club. We will be inviting each of the activity coordinators to let us know a bit about the group they are leading and to also let us know what plans they have in mind for this year.

If you would like to become involved in an activity group or have an idea for a new group, please refer to page 3 for details on who to contact. Ω

"AMSAT" - Continued from page 4

international geosynchronous satellite communications as well as the work now being done by commercial companies experimenting with low-Earth, "PACSAT-style" communication technologies, can be *directly* linked to the pioneering work first done by AMSAT's volunteers.

But, anything as capable as Phase 3-D doesn't come cheaply. Even with most of the labor donated by unpaid volunteers, present estimates place the final cost of building and launching the satellite at between four and five million US dollars. Worldwide efforts to raise contributions from Amateur Radio Operators have proceeded quite well. However, accumulating the necessary resources needed to complete and launch Phase 3-D has required significant funding from sources outside of Amateur Radio.

AMSAT is very proud of its tradition of excellence and the contributions it has made to the advancement of space communications, space education and the space sciences. Phase 3-D will be Amateur Radio's premier vehicle to continue a quest that began with the very birth of radio...a search for new communications technologies for generations yet unborn.

For more information about AMSAT, visit their web site www.amsat.org. Ω

Profiles

This month's Amateur of Distinction is...

It Could Be You!

Each month we plan to introduce you to a club member via our Profiles feature. You will be surprised at the varied and dynamic backgrounds of your fellow club members. Members are involved in interesting careers, volunteer work, hobbies and activities aside from our shared passion for Ham Radio. We hope to bring some of these stories to the readers of Hot Bananas throughout the year.

So, don't be surprised if we ask you to be our "Amateur of Distinction" for an upcoming monthly feature! Ω

Calling All Authors

Here is your chance to be notable, distinctive, trusty, and newsworthy! We are looking for stories to feature in an upcoming newsletter on the following topic:

First Contact

Remember back to the first time you took the key or mic in hand and prepared to make your first on-air contact? Do you remember the anticipation of waiting for your license to arrive in the mail? The work involved in setting up a functional station? The actual day (or night!) of your contact? All preparations complete, now for the leap of faith to call CQ! Alas, someone answered your call! Who was it? What happened next?

Relive your first contact all over again and share it with the readers of Hot Bananas. See page 2 for details on reaching us.Ω

How Things Work

A look Inside the Covers

How and Why Batteries Work

A battery is a device that produces electricity by means of chemical action. It consists of one or more units called *electric cells*, each of which has all the chemicals and parts needed to produce an electric current. The word *battery* actually means a group of connected cells, but the term generally refers to single cells, such as those that power flashlights and electric toys.

Kinds of Batteries

Manufacturers produce a wide variety of batteries, which may be classified according to their basic design. The design of a battery determines the amount of electricity provided. Some batteries, called *primary batteries*, stop working and must be discarded after one of their chemicals has been used up. Other batteries can be recharged and used again after they have discharged their electric energy; these are called *secondary*, or *storage*, batteries.

Batteries also can be classified according to the general makeup of their *electrolyte*, the chemical substance that conducts electric current inside a cell. Most primary batteries have a jelly-like or paste-like electrolyte. Batteries that contain such non-spillable material are known as *dry cells*. Some primary batteries, called *wet cells*, contain liquid chemicals. Most secondary batteries have a liquid electrolyte.

Batteries come in a wide range of sizes as well, from the tiny batteries that power hearing aids and watches, to the huge, one-ton batteries that power submarines. However, manufacturers produce most batteries in certain standard sizes, meaning that batteries made by different manufacturers can be used in the same clock, radio, flashlight, or other device.

Batteries also differ in voltage. A primary cell of the type used in a standard flashlight has 1½ volts. Most secondary batteries for automobiles consist of six 2-volt cells connected in a series.

How Dry Primary Batteries Work

Dry cell batteries are the most widely used type of primary cell. Such batteries differ in various ways, but all have certain basic parts. Every dry primary battery has two structures called *electrodes*. Each electrode consists of a different kind of chemically active material. An electrolyte between the electrodes causes one of them, called an *anode*, to become negatively charged and the other, called a *cathode*, to become positively charged. The electrolyte helps promote the chemical reactions that occur at the electrodes.

The major types of dry primary batteries are (1) carbon-zinc cells, (2) alkaline cells, and (3) mercury cells.

Carbon-Zinc Cells are the general-purpose batteries used in flashlights, toys, cameras, etc. Also called *Leclanché dry cells*, these cells are contained within a zinc "can," which serves both as a container for the parts of the cell and as the anode. A carbon rod in the center of the cell functions as the *cathode current-collector*. The actual cathode material, however, is a mixture of manganese dioxide and carbon powder packed around the rod. The electrolyte is a paste composed of ammonium chloride, zinc chloride, and water.

The *separator* is a sheet of porous material, such as paper or cardboard, soaked with electrolyte that prevents the electrode materials from mixing together and reacting when a battery is not being used. Without a separator the zinc anode could wear away prematurely and reduce the life of the battery.

The chemical process that produces electricity inside a carbon-zinc cell begins when the zinc atoms at the surface of the anode *oxidize* (give up their oxygen electrons). The zinc atom then becomes an *ion* (electrically charged atom) with a positive charge. The zinc ions move away from the anode, leaving their electrons behind on the anode's surface. The anode thus gains an excess of electrons and becomes more negatively charged than the cathode.

If the cell is connected to an external circuit, the zinc anode's excess electrons flow through the circuit to the

"Batteries" Continued on page 11

carbon rod. This movement of electrons forms an electric current. As the electrons enter the cell through the rod, they combine with molecules of manganese dioxide and molecules of water. As these substances are *reduced* (gain electrons) and react with one another, they produce manganese oxide and negative hydroxide ions. This reaction makes up the second half of the cell's discharge process. It is accompanied by a secondary reaction, in which the negative hydroxide ions combine with positive ammonium ions that form when ammonium chloride, producing molecules of ammonia and molecules of water.

The chemical reactions that produce electricity inside a carbon-zinc cell continue until the manganese dioxide wears away. Once this cathode material has been "used up," the cell can no longer provide useful energy and is "dead."

A carbon-zinc cell cannot be recharged efficiently, but a *battery charger* can extend the life of a cell for a short time. The charger partially restores the cell's ability to produce electricity by passing a current through the cell in a direction opposite to that of the flow of electricity during discharge.

Alkaline Cells resemble carbon-zinc cells, and undergo similar chemical reactions. But the two types differ in several important ways.

An alkaline cell has a highly porous zinc anode that oxidizes more readily than that of a carbon-zinc cell. Its electrolyte is a strong alkali solution called *potassium hydroxide*. This compound conducts electricity inside the cell better than does the solution of ammonium chloride and zinc chloride in a carbon-zinc cell. Such features enable an alkaline cell to deliver sustained high currents more efficiently than a carbon-zinc cell.

Alkaline cells serve as an excellent power source for electric shavers, portable TVs, walkie talkies, and portable radios. In electric toys that require much current, they are more economical than zinc-carbon cells because they last from five to eight times as long.

Mercury Cells have an anode of zinc, a cathode of mercuric oxide, and an electrolyte of potassium hydroxide. During discharge, the zinc changes to zinc oxide and the mercuric oxide becomes mercury. The

potassium hydroxide remains unchanged.

Mercury cells have certain advantages over carbon-zinc and alkaline cells. For example, the voltage of a mercury cell remains constant, but that of the other primary cells drops during use. This feature makes mercury cells suitable for sensitive devices, such as hearing aids and scientific instruments.

How Secondary Batteries Work

Secondary batteries are made so that their chemical reactions can be reversed. This feature enables them to be recharged efficiently after they have delivered their electric energy. The most common types of secondary batteries are (1) lead-acid storage batteries and (2) nickel-cadmium batteries.

Lead-Acid Storage Batteries consist of a plastic or hard-rubber container that holds three or six cells, each of which has two sets of lattice-like electrodes or plates. The frames of these structures, called *grids*, are made of a lead-antimony alloy. The *meshes* (open spaces) of the negative electrode are filled with a mass of pure lead in spongy form. The meshes of the positive electrode contain lead dioxide, a compound of lead and oxygen. An electrolyte of sulfuric acid and water surrounds the electrodes.

During the discharge process, chemical reactions take place between the electrode materials and the electrolyte. At the negative electrode, atoms of pure lead react with negative sulfate ions of the electrolyte. The negative sulfate ions, along with positive hydrogen ions, form when sulfuric acid dissolves in water. As the lead atoms combine with the sulfate ions, each lead atom loses two electrons and becomes a molecule of lead sulfate. The electrons lost by the lead atoms flow from the negative electrode to the positive electrode through a device using the electric current. At the positive electrode, they are captured by molecules of lead dioxide, which in turn combine with the hydrogen and sulfate ions of the electrolyte. This reaction produces lead sulfate and water.

The current-producing process decreases and dilutes the electrolyte of sulfuric acid by using up sulfate ions

and by adding water molecules to the solution. The battery becomes discharged when so little sulfuric acid remains that the necessary chemical reactions can no longer occur.

A lead-acid battery can be recharged by means of a battery charger, which forces electrons through the battery in a direction opposite to that of the discharge process. This action reverses the chemical reactions that occur at the electrodes when a battery discharges. The reversed reactions of the charging process restore the electrode materials to their original form. They also increase the amount of sulfuric acid in the electrolyte to a satisfactory level. Once recharged, a lead-acid battery can again produce electricity.

Lead-acid storage batteries produce energy for the electrical systems of automobiles. They also power submarines and provide emergency electricity for hospitals, sanitation plants, etc.

Nickel-Cadmium Storage Batteries operate on the same general principles as lead-acid batteries but use different chemical substances. In a nickel-cadmium battery, the negative electrode is made of cadmium and the positive electrode of nickel oxide. A solution of potassium hydroxide serves as the electrolyte.

The chemical composition of a nickel-cadmium battery allows the battery container to be sealed airtight, which prevents the corrosive electrolyte from leaking. Because of this advantage, nickel-cadmium batteries are used in most portable tools, cellular phones, etc. Most space satellites also use these batteries. Ω

Note From the Editor

The preparation of an interesting and informative newsletter on a monthly is the result of a great deal of teamwork by members of the club. There is a constant and ongoing demand for news articles and feature stories.

You have seen several articles and columns in this month's newsletter. Each one of them could use a column editor to research and submit articles on a regular basis. The Calendar of Ham Radio Events, RAC News, Operating Events, Activity Coordinator Updates, or Profiles are all available and waiting for eager owners! Perhaps you have a column idea that does not yet appear in Hot Bananas. We could use a local public service column. Or, how about new equipment reviews? What about a "tour" of members stations? Or a "How To" column dealing with new modes or operating techniques? Is there a need for a Swap Shop for members?

If you don't have the time commitment for a regular column, all is not lost! Feature stories are a great way to submit articles on an infrequent basis.

If you have an hour or two to spare next month, please seek me out at the club meetings. I will be looking for you and your stories!

-- John, VA3AFA -- Ω

OUTGOING SECRETARY/EDITOR MESSAGE

Three years has passed quickly. During this time quite a few of you have helped me in many ways, both personally and in affairs involving the Club. I thank all of your concerns, words of encouragement, assistance and kindness.

The new Executive has many challenges to face. I am certain that with the continuing support of Club members those challenges will quickly be overcome.

May good health continue with all of you. May your continuing in this Hobby be rewarding, happy and memorable. May it also create new friendships and alliances. 73 Ed VE3TAS Ω

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