



# the RARRA RAG

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**ROCHESTER AMATEUR RADIO ASSOCIATION, INC.**

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NO. 6

## COMMERCIAL TELEVISION TO BE THE TOPIC FOR THE FEBRUARY MEETING

The next meeting of RaRa will be on February 2, 1990 at the 40 & 8 Club, 933 University Avenue, at 8:00 p.m. The speaker will be Dave Schwittek, NW2T, the Assistant Chief Engineer at Channel 10 (WHEC). He will enlighten us about the glories of being an engineer at a major television station, tell us about some of the recent changes at the station (such as Stereo and the change in affiliates with the major networks). Other topics will include the future of TV with the impending breakthrough in High Definition Television (HDTV), and the acquisition of a state of the art weather radar by WHEC.

So mark the date on your calendar, the new weather radar says it will be a beautiful day to attend the meeting of your local radio club. We plan on seeing you there.

## LOCAL CHAPTER OF TEN TEN INTERNATIONAL TO BE FORMED

The Ten Ten International is an organization formed with the purpose of increasing activity on ten meters and sponsors chapters to that end. William Skinner, N2JXC, is interested in starting a local chapter of Ten Ten International in the Rochester area. Membership in the chapter only requires a small new member registration fee, and a permanent Ten Ten number will be issued. The purpose of the chapter would be to further ten meter activity – one way being the issuance of a “Chapter Certificate”. There are over 200 chapters worldwide and some ten meter amateurs collect these number with great enthusiasm.

Anyone interested in finding out more about this organization, or showing support for a local chapter there in Rochester, please call Bill at 342-3664. Since the sunspot cycle is near its peak, now is the time to show your interest in a local chapter.

## FUN IN THE SNOW?

It's time to play in the snow. Saturday, February 10, 1990 is the date for the annual RaRa Winter Funfest at Mendon Ponds Park. It all starts at 12:00 noon and continues until... Hopkins Lodge has been reserved for the day.

In addition to hots, hamburgs and snacks, home made chicken soup and chili, there will be snacks (peanuts, chips, etc.) available.

The usual contest to determine the best dessert made by a YL (or OM) will be held, so gals dust off your cookbook and bring your favorite gourmet dessert. Prizes will be awarded for the tastiest entries.

Now how to get there from the west side of county, follow Clover Street (Route 65) to the center entrance to the park (first road south of Canfield Road – this entrance brings you directly to Hopkins Lodge. From the east side use Pittsford Mendon Center Road to Canfield Road, turn west and take the first road south after passing Douglas Road. If all else fails try the talk-in on 52/52 or the 88 repeater. There are signs at all park entrances directing you to the lodge.

There is a charge of \$2.00 per person with a max of \$5.00 per family. See you all there to partake of Gos's chicken soup and Dave's chili and a chance to sample the gourmet desserts entered in the contest.

Jerry, KB2DVV, we would appreciate a LITTLE snow.

(See map on back page.)

A Special Thanks to

**RF HARRIS COMMUNICATIONS**

for the use of a  
Spectrum Analyzer to help  
make the January meeting  
a great success.

# the **RaRa RAG**

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## **RaRa CODE AND THEORY CLASSES**

by Ed Gable, K2MP

In continuous operation for 33 years, RaRa is pleased to announce the formation of its Spring 1990 Code and Theory classes. This year sessions are offered for Novice, Tech/General and Advanced.

The classes begin Monday evening, February 19th, at 7:30 p.m., in the auditorium at 111 Westfall Road. The classes will meet each Monday night for approximately 13 weeks depending on which course you're taking. The instructor will have details.

At the February 19th registration, applicants will receive all materials required for the classes. No advanced registration is required, just show up! The only exception is for those interested in Advance theory. Please call Ed Gable, K2MP, at 621-6692, if interested as a head count is needed for purchase of ARRL text material.

The hard working and dedicated crew have signed up for another year. Bob O'Connell, NF2Z, is again heading up the Novice section with Joe Phillips, W2DHF, who, with great patience, gets all newcomers from zero to five words per minute – and makes it seem easy! The Technician and General Class theory is still taught as a combined class but with separate emphasis on the question pool for each element. Ed Gable, K2MP, will attempt that effort along with "guest speakers/experts" on specific topics. Bud Young, WA2UGE, continues his many years of service to the Amateur community and does the 13 WPM code practice. We welcome back our Advanced theory instructor, David Schwittek, NW2T. As people are probably aware, the Spring and Fall class sessions switch between Advanced and Extra theory training. There was very little interest shown for the Amateur Extra last Fall. The interest shown this Spring in the Advanced sessions will be an indicator to see if RaRa continues to offer regularly scheduled classes for these two license categories.

The total cost for the entire 13 week program, including membership dues, registration and all material is \$22.00 for Tech/General, \$18.00 for Advanced and \$17.00 for Novice. Subtract the cost of dues if already a member of RaRa.

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Amateur Radio News Service

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## **ROCHESTER HAMFEST**

**MAY 18, 19, 20, 1990**

## ARRL RECEIVES FEMA GRANT FOR HF MODEM DEVELOPMENT

The ARRL recently received a \$10,000 grant from the Federal Emergency Management Agency (FEMA) for HF packet-radio modem and protocol development over the next two years. The ARRL will use the grant to fund out-of-pocket costs (excluding labor or overhead) for volunteer participants in the development program. (FEMA has a special interest in effective communications between FEMA representatives and Amateur Radio operators at the onset of natural disasters.)

Existing packet-radio hardware and software operate effectively above 30 MHz. At HF (3 to 30 MHz), however, reception of packets is often poor because of fading and interference. The purpose of the FEMA grant is to encourage development of techniques to improve the reliability of HF packet-radio reception. The ARRL has identified several areas for research to improve reliability and reduce retransmissions: modems, protocol, diversity reception and network management techniques.

Designers or design teams wishing to participate in this program are invited to contact Lori Weinberg at ARRL headquarters. Mail a resume of each person in the team giving qualifications in the above areas of research and a brief description of the design approach (not to exceed three pages, double-spaced). Formal proposals are not sought at this time, but will be requested in the near future.

*Tnx The Gateway*

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## VISITING A FOREIGN COUNTRY?

If you are planning a trip to foreign country (other than Canada) and you are interested in the possibility of operating your Ham rig there, you must apply for a permit even if that country holds a reciprocal operating agreement with the United States. Remember that many countries require at least a 4 - 6 week lead time for processing permit requests and you will be required, in most cases, to pay a licensing fee. Some do offer walk-in processing. You may obtain permit requirements and other information for the country you are visiting from the Regulatory Information Department at HQ. An SASE with two units of First-Class postage is required for each country requested.

*QST, October 1989*

*(Note: Be prepared to fill out the forms in that country's language.)*

*Tnx The Mike & Key*

## RaRa FEBRUARY CALENDAR

- 2 - RaRa meeting, 8:00 p.m.  
40 & 8 Club, 933 University Avenue
  - 8 - Packet Group meeting- 111 Westfall Road
  - 10 - Winter Funfest
  - 16 - RRRRA meeting, 8:00 p.m.  
Pittsford Town Hall, Main St., Pittsford
  - 20 - RDXA meeting, 7:30 p.m., 111 Westfall
- 

## HAPPY NEW YEAR FROM RRRRA

I trust SANTA remembered to get your new rig under the tree Christmas eve: he forget my IC781.

To repeat a oft used line: from 1 simple 2 meter repeater, to a group of VHF and UHF repeaters, covering Monroe and surrounding counties.

Our first repeater 146.28/146.88.

The new station is on line at Cobbs Hill, transmitting about 25 watts from the 90 foot northeast leg. Receiving is from the top of the tower at 135 ft. The Kodak Voting receiver is on line also. Autopatch, 911, Field Strength, Mailbox, and other functions are in, up, and operating.

Our other VHF repeater is also at Cobbs Hill.

The 223.30/224.90, is working with very good coverage, thru out Monroe County.

Our 447.70/442.70, repeater is up and operating, with good portable coverage. This unit is in the PL mode full time (110.9). The controller has most all its functions locked out. This repeater is located in the southeast corner of Monroe County. The output power is 50 watts, and receiver sensitivity around .25 db. From antenna to preamp, thruout, this is new equipment, purchased with club funds, and is considered an open repeater.

The 447.80/442.80 - 222.98/223.58, linked repeater is up and working very good. The RC850 controller has many of its functions usable. This repeater is open during the day, and in PL mode at night (110.9). An open Autopatch, and other user functions make this a very popular repeater.

Trustee Bob, N2HJD, is building up a multi channel 10 meter SSB, transceiver which will be tone activated on, with either VHF or UHF inputs. This home brew linked transceiver is a thing of beauty, and will bring a tear to you old time builders of radio equipments. It will be on display at out next meeting, the 16th of February.

RRRA meets the 3rd Friday of the month, in the Pittsford Town Hall basement.

*WA2ZNC, "Len"*

## CONGRESS AGREES: NO FEES FOR AMATEUR LICENSES!

The joint House-Senate Conference Committee, reviewing both versions of the Omnibus Budget Reconciliation Act of 1989, has approved deletion of the amateur license fees from the legislation.

In its report released on November 21, the Conference Committee stated: *"Both the House bill and the Senate bill include fees on licenses in the amateur radio service. The Conference Report strikes all of the fees for amateur radio licensees. The Conference recognizes that amateur licensees do not operate for profit and play an important public safety role in times of disaster or emergency"*.

In the early morning hours of November 22, both Houses of Congress adopted the Conference version of the bill sending it to President Bush for signature.

In the current budgetary environment, avoiding fees altogether is an enormous accomplishment. ARRL congratulates all who played an active role in writing to their Senators and Representatives helping in this effort. Look for an upcoming *QST* article that will detail how amateurs won this important battle.

*Tnx ARRL Letter*

## THE RaRa RAG 20 YEARS AGO — FEBRUARY 1970

by Ed Gable, K2MP

The meeting program was announced as a rare treat for all as Mr. Linc Cundall, W2QY, presented his historical slide show, *"40 Years with Marconi"*. This Antique Wireless Association prepared show was first seen at the AWA Convention at Washington's Smithsonian Institution in October, 1968, and was narrated by Bruce Kelley, W2ICE. RaRa announced it's annual code and theory classes to be held at a new location, McCurdy's Midtown Plaza. Instructors will be Bob Jeffers, W2ALL; Fred Cupp, W2DUC; and Bob Pavlock, WA2ECD. Past instructors just completing their tenure were recognized: Roy Bloom, WA2EBX; Ed Holdsworth, WA2EKR; Bill Gaines, WB2QVB; and Joe Hood, K2YAH. A short article announced the formation of an organization of two meter FM enthusiasts called the Rochester Repeater Group, now known as RRRR. A club call, WA2UWQ, has been issued with Charlie Mills, K2LDU, as trustee. A new thing called a *"repeater"* has been set up on 28/88 in at Charlie's Victor, NY home. Fred Trode, DL8VQ/W2, has announced a Ham Exchange program promoting travel to and from Europe and temporarily living with your ham host. You could buy a 2KW 4-1000 amplifier from Rex Hartson's (W2ERO) wand ad.

### ITEMS FOR SALE:

Benrus Monitor Scope, super signal monitor for Packet \$ 75.00  
Dual Band Mag. Mtg. Antenna. "Disguise", unity gain, 146/440 w/cover and book \$ 35.00  
Bearcat, new 16 ch. BC560XLT, 10 band, programmable 10, 2, 6, 70 CM. Ham-Lo/High/UHF-T/Gov. bands \$110.00  
ICOM IC 551, 6 meters, AM-FM-CW-SSB, 10 watts, AC-PS \$400.00  
ICOM IC 471 A 430 to 450, AM-FM-SSB-CW, 25 watt base \$600.00  
Make an offer, WA2ZNC, 716-229-5470, Len.

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## JAS-1 OPERATION TERMINATED

The operation of Amateur Radio satellite JAS-1/FUJI-OSCAR 12 was terminated on November 5 because of low power generation. During the three-year operation of the satellite, its power generation has decreased with time and, at present, its average power generation is less than 3 watts.

The Japanese Amateur Radio League reported, *"It is our great pleasure to realize that we were able to provide chances of satellite communication, especially the flying BBS, and, taking this opportunity, we thank all satellite enthusiasts for having contacted the bird. Now we are preparing the next bird, JAS-1b, as the successor of FO-12, which has the same mission configuration as that of FO-12 except for its orbit. Please look forward to its launch in February 1990."*

*Tnx The Gateway*

FOR SALE OR TRADE — HW101 for TNC, Terminal, etc. Jack, KJ2P, 716-342-3476.

## ARRL DUES FROM \$2.50 TO \$25.00

by Bruce Kelley, W2ICE, ex-W8ACY  
Club Historian

Ernie Brown (K2BWK) spotted my 60-year ARRL pin on my coat lapel at a recent club meeting. What's the story?

When just a youngster, I was told by older friends (they must have been 16) that if I wanted to know about amateur radio I should join the American Radio Relay League. I was living at the time in Rochester's old 19th Ward where I had a paper route. This profitable venture called for dragging an old cart around delivering D&C newspapers from house-to-house and netted about \$2.50 per month—the exact sum for ARRL membership which I paid in August, 1929.

Being one who saved everything (look at the stuff in the AWA Museum), I kept my 1929 certificate which I sent to the League this past summer claiming 60 years of continuous membership. Result: a nice pin and a potential plaque.

I received my amateur license and call letters W8ACY in the fall of 1929. Being properly licensed eliminated the need to bootleg with other kids in the neighborhood on the old 85 meter phone band using loop modulation. That's another story.

Since the AWA library has a complete set of *QST*s, I was curious about ARRL dues. The first *QST* (December 1915) sold for 10¢ a copy or \$1 per year. The dollar dues remained in effect until 1917 when we entered the War and *QST* stopped publishing. A postwar issue of 1919 shows dues at \$1.50 which increased to \$2.00 the following year. The \$2.00 fee remained in effect until 1929, when it was increased to \$2.50.

Surprisingly, this stayed the same until July 1947, when it jumped to \$3.00 and in June 1957 increased to \$4.00. Like the 5¢ candy bar, it has progressively gone up until the yearly membership today is \$25.00.

I still feel after 60 years that *QST* is the best ham magazine and League membership a must for the active radio amateur.

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## AMATEURS INVITED TO PARTICIPATE IN USSR ARCTIC EXPEDITION

The Amateur Radio group SPART, located in Moscow, USSR, is offering an opportunity for amateurs to participate in an international radio expedition to Sredniy Island from March 1 to May 5, 1990. Sredniy is one of the northernmost

islands in the Severnaya Zemlya archipelago in the Arctic Ocean.

Expedition participants may participate for either 7 to 15 days. Transportation from Moscow to the island, accommodations at a hotel and meals will be provided. The average temperatures range from -45 degrees in March to -5 degrees C in May, so warm clothing is essential.

This radio expedition will serve as the communications base for two other expeditions occurring at the same time. It will operate from a specially equipped heated wagon with 220-volt, 50 Hz power supply.

Interested amateurs can obtain additional information and confirm their interest to participate in this radio expedition by contacting Vladimir E. Puchkin, SPART 15, Kosigin Street, Moscow, USSR, FAX no: 0959382056, telex: 411049. Please send your name, passport number, date and place of birth, home address and citizenship. Do we have any hearty takers out there?

*Tnx ARRL Letter*

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## BOLDLY GO UP-FREQUENCY

You can go-ahead and buy that gear for 450 Mhz and above – it now looks like there WON'T be retaliatory trade measures taken against UHF amateur gear imported from Japan (see August '89 QRX). The US earlier charged Japan with maintaining unfair trade barriers, particularly in the cellular phone market. Thus, the US Trade Representative office planned to impose a 100% duty on 70cm and shorter frequency band mobile communications gear from Japan. Japan, however, has now agreed to open up its cellular market to US firms, negating the purpose of the proposed tariff.

*73 Magazine Nov. '89 via The Mike & Key*

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## FCC PROPOSES HIKERS' LOCATOR IN 220 MHz

The Commission on Tuesday December 12 proposed the establishment of a Personal Emergency Locator Transmitter Service (PELTS), that would provide individuals in remote areas with a means of alerting others of an emergency situation and to help search and rescue personnel locate those in distress. The Commission pointed out that a growing numbers of persons are participating in outdoor activities resulting in an increased number of situations requiring immediate emergency assistance. For example, nine teenage climbers were caught in a severe unexpected storm on Oregon's Mt. Hood and lost their lives. Four skiers died under an avalanche at Breckenridge, Colorado. These individuals might have been saved if they had a means of signaling to rescuers.

The Commission says it has two objectives in establishing the PELTS. The first is to provide for an areawide, centrally coordinated radio communications system for use by the general public in remote areas thereby reducing response time in emergency situations. The second objective is to reduce the illegal use of Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs) as personal locating beacons. ELTs and EPIRBs are emergency radio beacons used to assist search and rescue units in locating downed aircraft and vessels in distress.

PELTS would consist of a base station and associated portable units. Only governmental agencies or private search and rescue organizations would be eligible for base station licensing, to assure that use will be limited to distress and assistance communications, but portables would not be restricted.

The FCC proposed to use 50 kHz of the reallocated 220-222 MHz band for PELTS, in five frequency pairs. To offer the public some assurance that the equipment is safe and likely to perform its intended function, the Commission proposed technical standards and design specifications for PELTS equipment. The actual text of PR Docket 89-59 has not yet been released; comment deadlines are not available at this time.

The ARRL will seek a stay of this Docket and PR Docket 89-552, FCC's proposed service rules for land mobile operation on 220-222 MHz, if the rulemaking process reaches the Report and Order stage before the US Court of Appeals for the DC Circuit has made a decision on the ARRL request for review of FCC's reallocation decision in Docket 87-14.

*Tnx ARRL Letter*

## ....THIS & THAT

□ Postal Rates are going up again possibly even before the end of 1990 and for sure by April 1991. The increase could be larger than the April 1988 increase of 15%. Expect a hike of at least a nickel on first class mail and 20% on third class mail.

□ Voice Triggered credit cards that respond only to their owner's voice have been invented by scientists at Bell Communications Research. An owner could put a card in an ATM (Automatic Teller Machine) equipped with a microphone, then speak a password instead of punching in a four character identification code. The system could also work the telephone calling cards, consumer credit cards and doors that use card locks. The system is based on the premise that like finger prints, no two voices are alike. It compares spoken words with a voice pattern stored digitally on the card. Bell Research has patented the system and plans to license it to other companies.

*Tnx The READOUT*

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## HEATH'S POCKET PACKET TNCs DONATED FOR USE IN SHUTTLE

Two representatives from the Heathkit Company recently presented three HK-21 Pocket Packet TNCs to the Johnson Space Center ARC for use in a proposed experiment on a future space shuttle flight.

The primary purpose of the presentation was for use on the proposed Shuttle Amateur Radio Experiment (SAREX) tentatively scheduled for March 1990. If the project is approved, NASA will mount one of the TNCs into the SAREX casing unit, with modifications for use in zero gravity.

*Tnx ARRL Letter*

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## WHAT IS A "10-10 NUMBER?"

Amateurs operating on 10 meters are often bewildered by requests for "10-10 numbers". 10-10 numbers are assigned by the 10-10 International Net, Inc. A number is available to any amateur who works ten 10-10 members and submits the log data to the appropriate 10-10 Call Area Manager. The purpose of 10-10 is to promote interest and activity on the 10-meter band. For further information, see related article on the front page.

*Tnx ARRL Letter*

## RDXA MEETING — FEBRUARY 20th

The story of KM2P's 90 foot tower on Westfall Road is the main topic of our next meeting at 7:30 p.m. at Westfall Road.

This should be a great meeting, Alan will explain all the secrets of his 160-10 antenna and then show a video of the tower installation.

Everyone interested in DX and contesting is invited; and don't forget to bring your list of DX stations worked to look up in our 1990 International Call Book.

For further information, contact the club secretary, Bob West, WE2T, 334-1103.

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## RFI

Palomar Engineers of Escondido California has published an "*RFI Tip Sheet*". These excerpts were taken from an article in *The Groundwave*.

### Using Ferrite Beads to Keep RF Out Of TV Sets, Telephones, VCR's, Burglar Alarms and Other Electronic Equipment

**Toroids.** When we start talking about slipping beads over coaxial cable and multi-wire cable we see that we may need beads with pretty big holes. Also, if the cable has a molded plug on the end (like some power cords, for example) the plug has to go through the hole and we may need a very big hole indeed. Fortunately a variety of ferrite toroid cores are available with holes as big as 1.4" diameter. They are not available in all the same materials as beads but in similar ones. As a guide when specifying toroids for RF suppression:

Mix 77 is the best below 40 MHz

Mix 43 can be used from 1-100Mhz and is best from 30-150 MHz

Mix 61 is the best above 200 MHz

After you put that big plug through the toroid hole you'll find that the toroid fits the cable very loosely. Don't worry. It will still work fine. If there is room to do it, loop the cable around and run it through the toroid again. Do this as many times as you can. Each turn is just like adding another toroid. And, using the big Mix 61 cores, you add an inductive choke where two turns is four times as good as one turn, three turns is nine times as good, etc.

**Split Beads.** This is a new development to solve the problem of putting beads or toroids over cables that have big plugs on the end. They are beads that have been cut in half. You put the two halves over the cable and wrap them with tape to hold them together. The mating edges are polished smooth so the two halves mate very closely.

They are available with center holes of 1/4" and 1/2" diameter. Also for flat computer cable 2 or 2 1/2" wide.

It is important that the two halves of the split beads fit exactly together. So the 1/4" hole beads cannot be used for cables larger than 1/4". It does not matter if the cable is smaller than the hole.

All split beads now available are of 43 material which is the best overall material for 1-1000 MHz interference suppression.

**Telephone Interference.** The standard telephone is highly susceptible to RFI. The telephone wiring in the house and outside on poles make a large receiving antenna. And in the telephone instrument are voltage-variable resistors that act like detector diodes so nearby radio stations are clearly heard. The solution is to keep RF out of the telephones by putting ferrite beads on the telephone cable as it enters the instrument.

The plug of modular telephones will go through F82 toroids. Or 1/4" split beads can be put over the cable.

**Burglar Alarms.** These are much like telephones in that they have extensive wiring throughout the building that acts like an antenna to pick up RF. The solution is the same: Use beads or toroids on the wires entering the electronics box to keep RF out. It also may be necessary to put beads on the 115-v AC power cord.

**VCR's.** The VCR is a real RFI problem. Ferrite beads on all wires entering the VCR can eliminate RFI from most amateur bands. But on 80 meters even this doesn't always work. W6BIP has worked on this problem; see *Ham Radio Magazine* October 1984, page 113.

We have been talking about keeping RF out of equipment. You can also use beads and toroids to keep RF in. That fish tank heater that makes all that racket on 80 meters is using its power cord and the house power wiring to radiate interference. A bead or toroid on the power cord right at the heater can keep the noise from entering the wiring. Computer power cords and connecting cables can be treated in the same manner. Sometimes RF comes out of a transceiver's power cable. A toroid can stop it. Or RF flows on the outside of the antenna cable, going right around the lowpass filter. Again, toroids to the rescue.

Each interference problem is different. You have to try this and then try that until you find a solution. Using the principles outlined here, ferrite beads and toroids can be extremely helpful.

*Palomar Engineers*  
P.O. Box 455  
Escondido, California, U.S.A.

# ALL ABOUT ELECTRICITY

by Joe Strolin, K1REC, via *The Readout*

I have been fiddlin' with electricity for 50 years! While I'm still able, I'd like to pass along some of my vast knowledge about this stuff.

1. Electricity is manufactured in power plants where it is fed into wires and wrapped around large drums that hang on poles.
2. Some electricity does not need to go through wires, like that used for lightning, for example, and portable radios. This kind of electricity is not manufactured, but just hangs around in the air, loose.
3. Electricity makes a low humming noise. This noise may be pitched differently for use in telephones, doorbells and electronic organs.
4. Electricity must be grounded before it can function, except in airplanes, which have their own arrangements.
5. Although electricity does not leak out of an empty socket, if you put your finger in the socket you can tell it's there. So, if it is not leaking out, what else is it doing?
6. Electricity is made of two ingredients, negative and positive. One ingredient travels along a wire covered with white plastic, the other black plastic. These two wires connect to a device called a plug. There the two ingredients are mixed to form electricity.
7. Electricity may be stored in boxes called batteries. Big batteries do not necessarily hold

more electricity than small ones. In big batteries, the electricity is shoved in, while in small batteries, it is packed in flat.

8. The electric switch contains a sort of vise grip that squeezes the wire very hard so the electricity can't get through. Opening (turning 'on') the switch releases the vise grip and the electricity can flow.

9. Electricity goes into a light bulb where for the first time we can see it! It is enlarged many times by the curvature of the bulb, which is made of magnifying glass.

10. Why does the light bulb blow out? Cause, as any schoolboy knows, heat converts oxygen into moisture. When all the oxygen in the bulb becomes moisture, then the water quenches the spark.

*Tnx WorldRadio*

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## FANCY QSL's

Having designed QSL cards with the information blocks on the glossy paper side, I soon discovered you can't write on that stuff. Felt-tip beads up like rain on a BMW.

Typewriter's are hopeless. Ballpoint's illegible even before it smears. Terrific!

The answer is a Sanford "Sharpie" extra fine point permanent ink marker. Five stars. Don't get it on your necktie.

*de Mid-Atlantic ARC, Villanova, PA  
via Worldradio and The Groundwave*

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