

SQUELCH TALES

SAN DIEGO REPEATER ASSOCIATION, INC.

Volume IV

March, 1976

No. 3



Incoming President Sybil Allbright, W6GIC, presents plaque to Dave Fender, K6QL, at finish of Daves term.

Plaque was presented by incoming Board of Directors as a token of their appreciation of his many achievements on our behalf during the past year.

ELECTION RESULTS
INSIDE



This Month....

***Solid State
Theory** - PART ONE;
Diodes

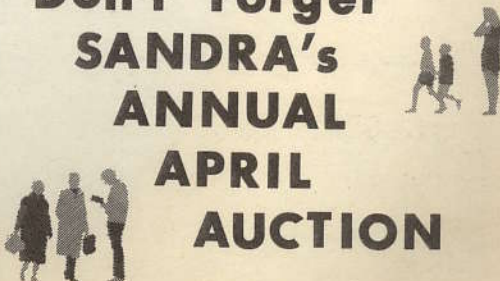
***Propagation**

***Wideband
VHF Antenna**

-And More.

**Don't Forget
SANDRA'S
ANNUAL**

**APRIL
AUCTION**



ELECTRONIC SUPPLIES

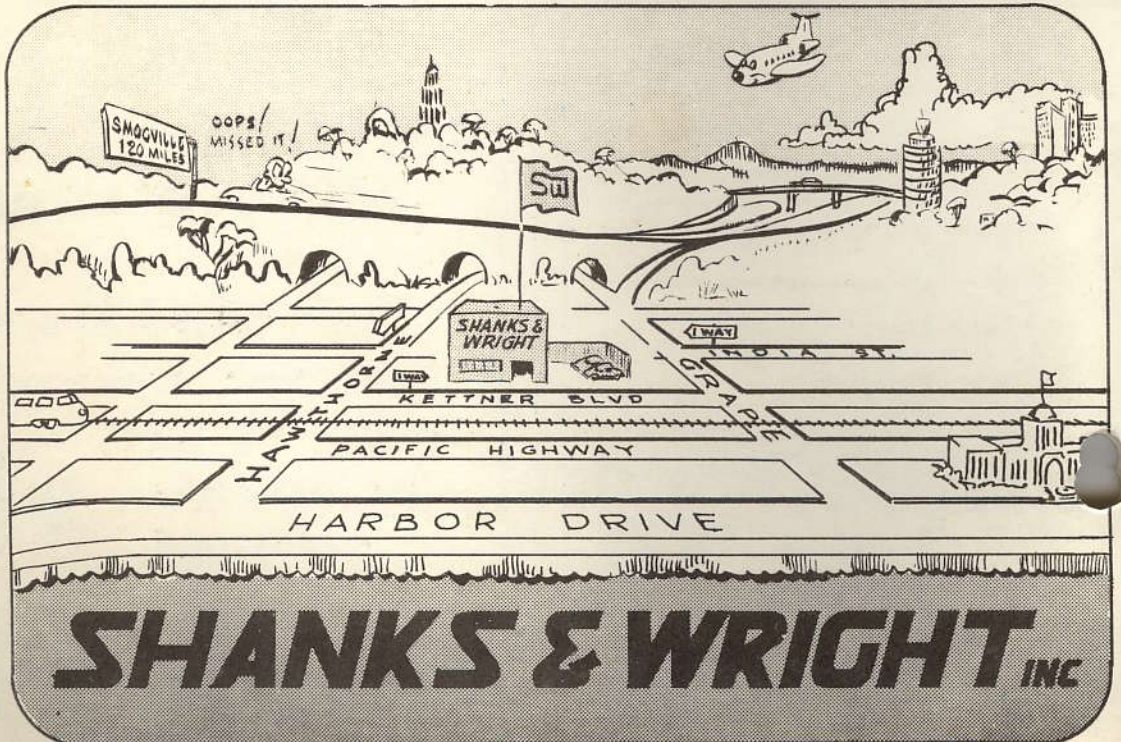
SINCE 1945

SW

W6BZE

W6OSD

W6DWA



SHANKS & WRIGHT INC

Editorial Page

NOTE: The opinions expressed in this column are those of the author and not necessarily those of SANDRA, Inc., it's Board Of Directors, or the staff of SQUELCH TALES. Signed rebuttal or other comments are solicited and should be mailed to EDITOR, SQUELCH TALES, PO Box 82958, San Diego, Ca., 92138.

1978 CONVENTION:

- ON OR OFF?

The San Diego County Amateur Radio Council (SANDARC), after the successful ARRL convention in 1974, offered to host the 1978 ARRL National Convention. That bid was accepted. The plan was to have two conventions, really, running concurrently--the ARRL National, and the first ever International Amateur Radio Convention, the latter conceived, planned and presented by the Amateurs of San Diego County, not the ARRL. This point seems to have been missed by many, especially the ARRL.

We can't count on the League for any help, for either convention. All they do is put their name on it--they don't even pay for their own booth. Not one dime comes out of the League's trust or other funds for promotion. They won't even run a free ad in QST---it has to be paid for. As John Griggs, SW Division Director, put it in a letter read at the February Council meeting, their aim is to "go for the buck" (direct quote).

Last night I went to my first (Feb.) meeting of the Council. I expected a fairly dynamic, enthusiastic group, dedicated to promoting Ham radio. I was disappointed, to say the least.

A presentation was made by Paul Hower, WA6GDC, on the study he's made of the convention. One of the major points he covered was the funding. At the end, the first questions asked were "But how will we pay for it?" At least two members were too disinterested to have listened!

Only about 30 months remain until the convention. That is barely enough time to set it up properly, under the most dynamic of leadership.

A motion was made that Paul and Joe Calvin, WB6LBM, be appointed co-chairmen of the Convention Committee. Considerable time was wasted discussing whether the motion could be accepted because the Chairman hadn't called for nominations, yet!

Sam Dear, K6BWT, read a letter stating that he would rescind his resignation as Chairman of the Convention Committee, if, among other things, he would be appointed Chairman of the Council, too, through 1978!

Finally, a vote was called for, with Paul, Joe, and Sam's names submitted. Paul withdrew, so that the vote would not be split three ways. As the ballots were being distributed, Sam also withdrew. The vote proceeded, but failed to confirm Joe, by a mere one vote.

So here we sit, with our heads in an embarrassing location, and nothing is being done.

Ladies and gentlemen, let's get off our duffs! If we can't get together and do a decent job of presenting this joint convention, let's say so now, and give our successors, wherever they are, a fair chance at doing so. Or if we want to have the convention here, and we are hampered by too many delegates to the Council who were elected because age was confused with wisdom, or to reward an ineffectual, but nice guy, or who are so timid they blanch at the thought of spending more than \$11.95 on the project, then we have only two options--(1) replace them with dynamic, enthusiastic achievers, or (2) forget it and let the Council become an Old-Timer's Social Club.

I think we can promote the biggest and best convention ever, right here in San Diego, and that the work done so far is on the right track. Joe and Paul have pledged to work together on this, and both are extremely capable. So let's get some action! Let's get one or the other elected, as the first order of business at the next Council meeting, and let's get on with it!

John
WB6VIQ

VHF PROPAGATION

OR HOW DOES IT GET FROM HERE TO THERE?

One of the mysteries of amateur radio is the means of propagation of the radio wave. One hears conversations about the "ground wave," "sky wave," and so on, and may even use the terms ones self, without much real understanding of what is happening.

The "radio wave" is merely a form of energy being transferred from one point to another in the form of an electromagnetic field. This means that the instantaneous voltage on the transmitting antenna forms an electrostatic field in the space surrounding it which is parallel to the antenna; and a magnetic field is created by the current flowing through the antenna. This "field" travels in all directions from the antenna, and induces a signal in any metallic object (conductor) it encounters. If this metallic conductor has been properly designed to optimize this pickup of signal, it is called a receiving antenna.

The field, or wave, can travel through the air directly from the transmitting antenna to the receiving antenna, it can take a round-about path consisting of one where it reflects from one or more other objects, it can head away from earth and be bent back by means of the ionosphere, or it can, in some cases, travel in a path tangent to the surface of the earth. All but the latter of these methods is called the "sky wave"; the last is called the "ground wave".

Ground wave propagation is limited to low frequencies, and then only over a relatively good conductor, like sea water or moist earth. It is rapidly reduced to

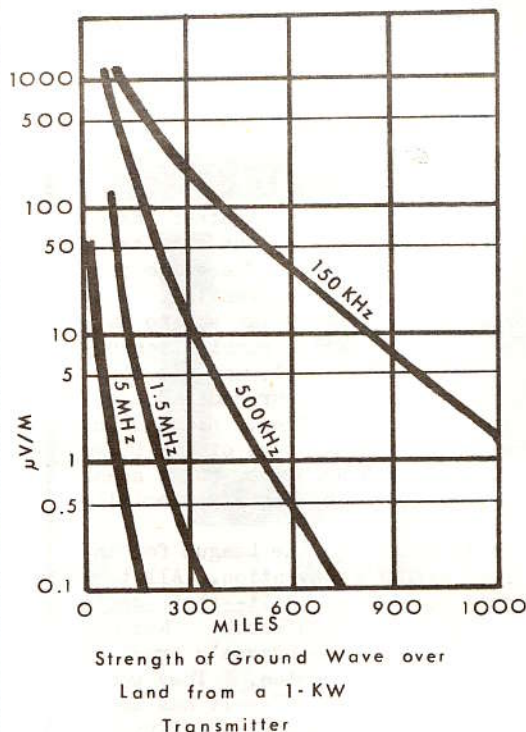


FIG. 1

negligable proportions as the frequency is increased, or the resistance of the earth increases, so it seldom is of use in communications, especially on the Ham bands. The accompanying chart shows how rapidly the ground wave is attenuated as the frequency increases.

The direct wave, which attempts to travel a line-of-sight path, will be refracted (bent) by the lower atmosphere, due to the change in density of the air with altitude, and to the changes in the relative conductivity (dielectric constant) of the layers of the lower atmosphere. Re-

(Cont'd next page)

fraction is often caused by the existence of large layers of warm and cold air masses near each other, water-vapor content of the atmosphere, and abrupt temperature differences at the surface of cloud banks, due to direct heating by the sun's rays.

The refraction due to changes in density and relative conductivity is also dependent upon the frequency of the wave; hence, low frequency waves are refracted to a greater degree than high-frequency waves. This refraction factor offers an explanation for the fact that at low frequencies greatly extended ranges are realized, whereas at very high and ultra high frequencies only slight extension of transmission range is possible. The lower of the two most important ionosphere layers, known as the "sporadic E layer", causes erratic reception at higher frequencies up to 60 MHz.

At VHF and UHF frequencies, the direct wave component of the radiated field tends to travel in practically a "line-of-sight" manner (see Fig. 2), with minor refraction due to the lower atmosphere. However, a portion of the wave front strikes the earth at some distance from the antenna and is reflected upward. The earth-reflected wave obviously lags behind the direct wave component, in arriving at the distant point, because it travels a greater distance. See Fig. 3. At points where the reflected wave arrives 180° out of phase with the direct wave, a cancellation of signal energy results. For efficient VHF and UHF transmission, therefore, it is necessary to minimize the cancellation effect produced by the earth-reflected wave. It has been found that increasing the antenna height is the best practical method of solving the problem.

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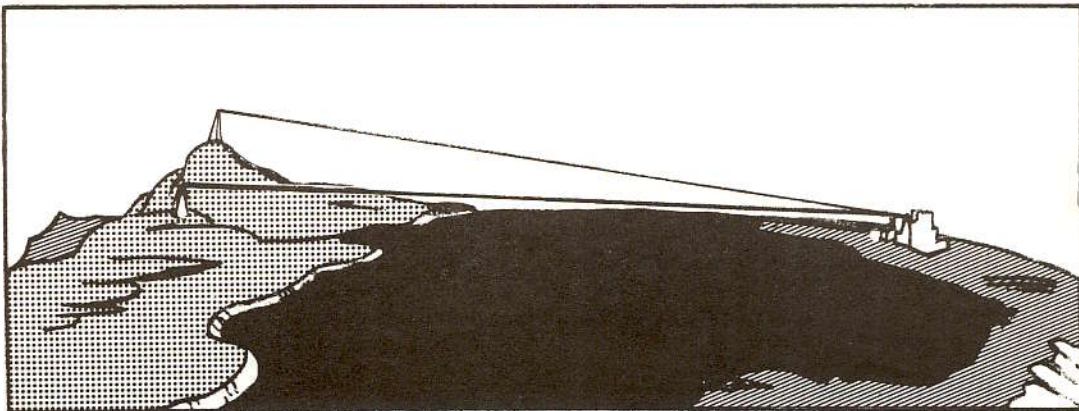


Figure 2

Increasing the antenna height tends to decrease the phase angle between the direct and reflected waves, from 180° to a lower value. This in turn reduces the degree of signal voltage cancellation.

In general, at VHF and UHF frequencies, the field strength increases directly as the transmitting and receiving antenna height increases, and as the square root of the power to the antenna. However, the effects of the earth-reflected wave and the attenuation due to the absorption of energy by the earth makes the field strength decrease as the square of the dis-

tances between the transmitting and receiving antennas.

An approximation of the line-of-sight transmission range for frequencies between 30 and 300 MHz can be obtained from Fig. 4, without performing any mathematical calculations. Simply lay a straightedge on the chart so that it is aligned with both the receiving and transmitting antenna heights. The transmission range is then indicated, on the center vertical line, at a point where the straightedge crosses the vertical center line.

A sample application is shown in dotted lines on the chart;
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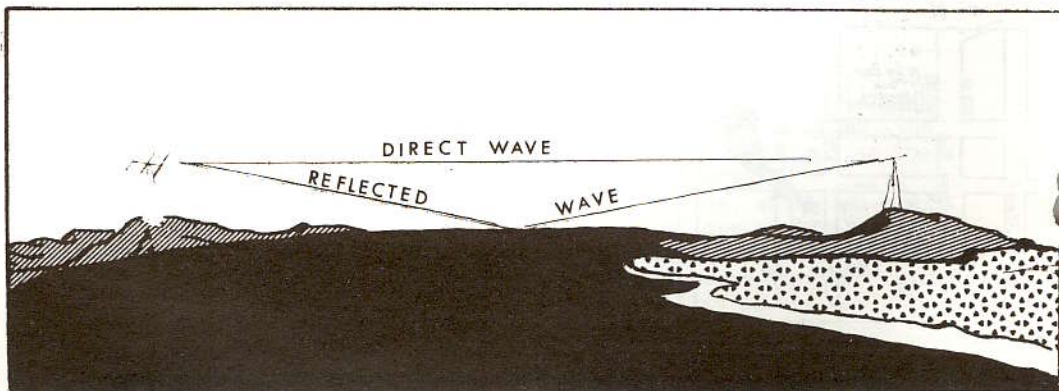


Figure 3

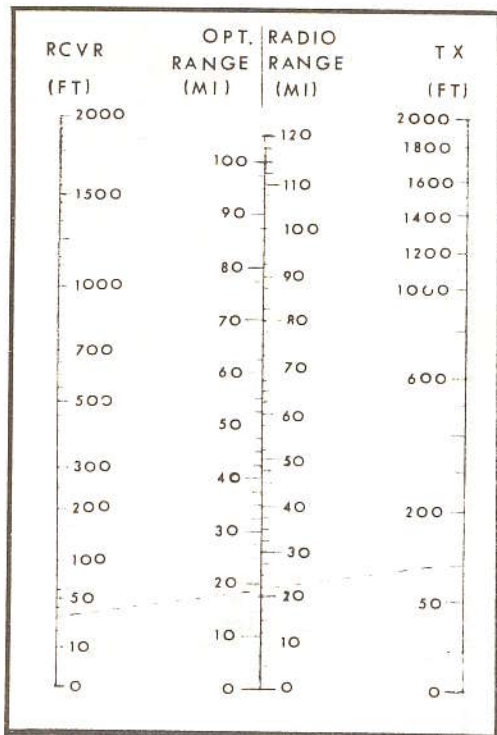


Figure 4

the receiving antenna height is 30 feet, and the transmitting antenna is at 100 ft. The line-of-sight transmission range is about 21 miles. Note that the radio line-of-sight is slightly longer than the optical line-of-sight; this is due to the refraction of the radio waves, as mentioned above. Note also that both the receiving antenna and transmitting antenna heights should be measured from the same reference, such as sea level, not just tower height.

In general, most short-distance VHF communication is carried on by means of direct waves. No noticeable ground wave exists. For frequencies of 3 to 30 MHz, ground-wave transmission is practical for ranges of 5 to 15 miles over land and about 75

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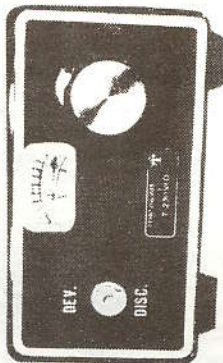
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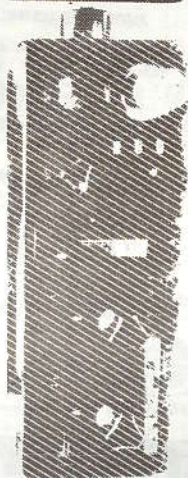
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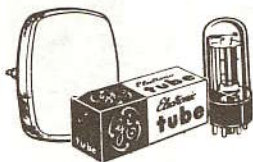
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miles over water.

In the line-of-sight transmission of VHF signals only the direct wave component is involved. In recent years the old theory that only line-of-sight transmission is possible at these frequencies has been disproved. Extension of the VHF transmission ranges beyond the line-of-sight range has been found possible by means of the "sporadic E layer" skip of sky waves, and by "ducting" between atmospheric layers. On occasion ranges of several hundreds of miles have been achieved, but not with great reliability.

If an obstruction, such as a mountain, is placed between the transmitting and receiving antennas, VHF and UHF communications is generally not possible due to the shielding effect of that obstruction. This effect is alleviated somewhat by both what is called "knife-edge diffraction" and the reflection of signals off other nearby mountains, etc., to fill in the "shadow" area. In general, the lower the frequency, the more knife-edge refraction is encountered, while the higher the frequency, the more reflection is observed.



Board Meet

Meeting of
SANDRA, INC.
Board of Directors
February 19, 1976

MINUTES

The meeting was called to order at 9:45 P. M. Directors present were W6GIC, WA6HGK, WA6ENU, WB6VIQ, WA6AIL, WA6KAQ, and W6PDA. Absent were XE2IO and WB6LXG.

The meeting of the Board was held after the General Membership meeting as required by the By-Laws.

1. The new President, Sybil, W6GIC, passed out By-Laws and Organization charts to the new Board Members.
2. Dave, WA6KAQ, made a motion that SANDRA re-join SCRA under protest. The motion failed due to lack of a second.
3. John, WB6VIQ, made a motion that the policies of the previous Board of Directors remain in effect. The motion was seconded by W6PDA. The motion was passed.
4. Paul, WA6HGK, made a motion to vote on a previously tabled motion. The motion concerned reinstatement of a resolution to keep members on the SQUELCH TALES list for three months past their expiration date. The motion was seconded by WA6AIL. The motion passed.
5. John, WB6VIQ, read proposed guidelines for SQUELCH TALES to the Board and made a motion that they be adopted. The guidelines covered funding, advertising, editorial matter and permission to reprint policy. The motion was passed. WA6KAQ abstained.
- Sybil, W6GIC, read a letter from Harry Dannals, W2TUK, President of the ARRL, expressing his interest in SANDRA and SQUELCH TALES.

The meeting was adjourned at 10:25 P.M.

/s/ Bob Rubesh, WA6ENU
Secretary

SCRA MEET

The Southern California Repeater Association (SCRA), in a rare San Diego meeting, elected a new slate of officers on Saturday, January 21.

The chairmanship went to Bob Thronberg WB6JPI, and Charles Ellis, W6PNM, was elected to the post of Vice Chairman. Don Root, WA6HJW, of San Diego, was elected to the position of Secretary. Ken Robbins, WA6PYJ, retained the job of Treasurer.

Business discussed was the problem of interference between repeaters on the 01/61 pair and on the 60/00 channel, and a discussion of the response desired by the membership to the ARRL proposal concerning frequency coordination on the VHF/UHF bands. The latter question was referred to committee for study, with Sybil Allbright, W6GIC, (President of SANDRA) as a member of the committee. Chairman Thornberg indicated that he was willing to add other interested parties to this committee if they so desired.

SQUELCH TALES

The following is a synopsis of the set of guidelines adopted by the Board of Directors of SANDRA, Inc., as related to SQUELCH TALES. The guidelines were adopted at the February 19 meeting of the Board.

Funding: SQUELCH TALES is not viewed as a source of income for the club, but should be self-supporting insofar as possible. A separate accounting will be maintained to assist in achieving this goal.

Advertising: Financial support of the magazine will be by means of advertising fees. Advertisements must be appropriate to the tenor of the publication, in good taste, and related to Amateur Radio. While SQUELCH TALES is primarily oriented toward VHF/UHF FM, advertising need not be limited to that portion of the spectrum. The ratio of advertising to text will be maintained at a reasonable

(Cont'd next page)

level, insofar as possible considering funding requirements. Liability of SQUELCH TALES, the editorial staff, and SANDRA, Inc. for errors in copy shall be limited to printing a correction in the next regular issue of the magazine. Aid in preparing artwork and layouts shall be made available to advertisers, at no charge, as practical.

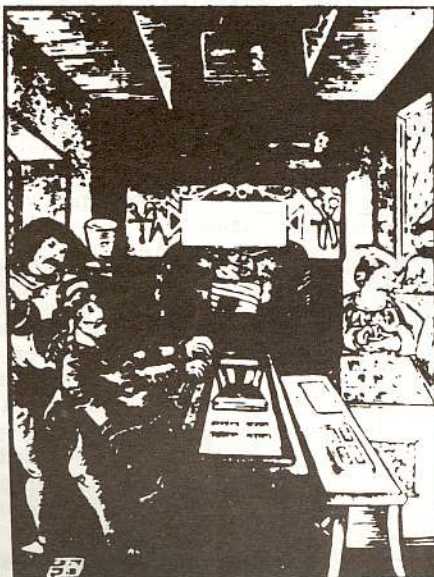
Editorial Matter: In general, editorial matter will be confined to one page per issue; if greater coverage is required, a "feature editorial" format shall be used. All editorials shall be signed. Editorial matter, letters to the Editor, etc., shall be encouraged, but are subject to standard editorial practice for format, taste, suitability, etc. Every effort will be made not to change the thrust or purpose of the author; if it is discovered that such has, through error or oversight, happened, liability is limited to printing a correction in the next regular issue. There is no vested right on the part of those submitting material that it must be printed---the decision with respect to content of the publication rests solely with the editor.

Permission to Reprint: Permission to reprint articles or other matter (except

advertising) in other Amateur Radio oriented publications is normally granted without reservation subject to the limitations that credit shall be given to SQUELCH TALES and, if a bylined item, to the author. No liability is assumed for originality of the material printed. In the event that an author, or the editor, desires that a particular article or other piece not be reprinted, a note to that effect will be included with the article.

Constitution

SANDRA, upon its incorporation, adopted a new constitution designed to be in keeping with the laws of the State of California. While every effort was made to make it also reflect the desires of the membership, few of us have had an opportunity to study it and understand it. It is believed that it would be desirable to cover a portion of that constitution each month in Squelch Tales. Please let us know your desires in this matter.



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FCC

The FCC has announced that the requirements for certifying code proficiency and operating time for license renewal have been dropped, effective December 24, 1975. At the same time, it was announced that it has been proposed that the original, not a photocopy as in the past, must accompany a renewal request. This is because there has been a large number of cases of late where the applicant has modified his license (generally to upgrade his class) and then photocopied it and forwarded that altered photocopy for renewal.

At least one case of this nature has been taken to court, with the result that the judge ruled that he may not renew any license. Since alteration of any federal document is generally considered to be a serious crime, he was fortunate to receive so light a punishment.

Homebrew

Know a quick, simple way to measure the resonant frequency of an LC tuned circuit? Simply connect the inductor and capacitor in parallel, with a resistor in series--10K is good. Drive the circuit with the output of a signal generator through the resistor, and connect an AC VTVM across the tank. (Use an RF probe--if you don't have one, the ARRL Handbook tells you how to build one).

Tune the signal generator for maximum indication on the meter, and read the resonant frequency on the signal generator. (A counter helps you to be more accurate, although three significant digits is adequate for all practical purposes.) Be sure you are not on a harmonic--indication is usually present then, but it is markedly less than at the fundamental.

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K6QKG Fund

A Memorial Resolution (shown above) was approved by the members attending the February meeting, to be presented to the widow of recent Silent Key Jack Jackson, K6QKG. Sybil, W6GIC, is shown reading the resolution, while Dave, K6QL, is displaying the certificate itself. The certificate was then made available at Gary Radio, so that those who were unable to attend the meeting would also have a chance to sign it.

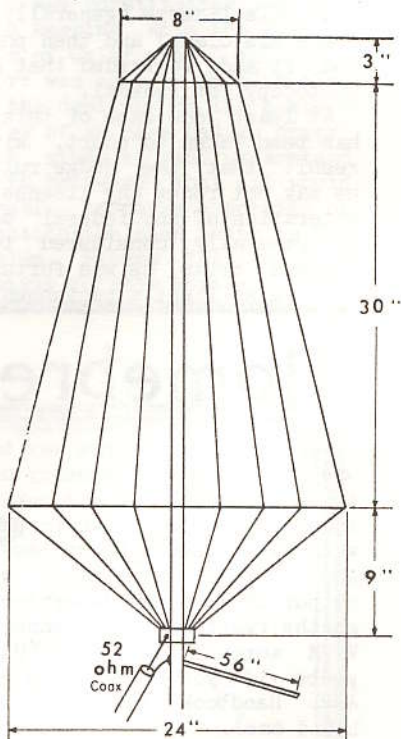
Below, Sybil is showing Dave the results of a request for donations to a "K6QKG Memorial Fund". The money all will be donated in Jack's name to the Sharp Hospital. The hospital is the site of WR6AIP, the SANDRA autpatch machine. Any donations that readers may wish to make to this fund should be forwarded to SANDRA, Inc., P.O. Box 82642, San Diego, Ca. 92138, and marked for the "Jack Jackson Memorial Fund."



(from page 10)

You can also use this method to determine the "Q". Note the resonant frequency, then detune to each side until the meter reading is about 0.7 of the maximum. Note these frequencies. The "Q" is then equal to the resonant frequency divided by the difference between the two other frequencies. Again, it is accurate enough for practical purposes---two significant digits are enough.

Another subject--here's a vertically polarized antenna with a 4:1 frequency range. It covers 6 through $1\frac{1}{2}$ meters with low SWR and good efficiency.



The two rings are hoops. The wires are fastened from the top of the mast to the smaller hoop, then to the larger, and finally to the insulated collector ring at the bottom. There should be at least sixteen wires. Use as many of the 56" radials as space permits. Adjust the match by drooping the radials.

FREQ & DEVE

"IT'S TERMINAL" Brian Kantor, WB6CYT, was one of the volunteers at the February general meeting that manned the gear for the Frequency Measurement/Deviation Clinic. Both members and non-members brought their VHF FM sets to be checked out for proper operation. Here Brian is shown manning the station consisting of his own equipment plus some loaned by Pride Electronics. A spectrum analyzer was included so that checks could be made for "birdies".

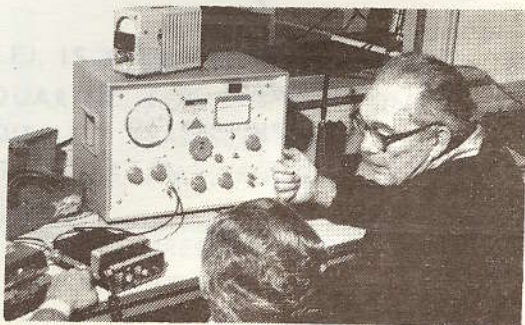


Jim Fugh, W6OAM, brought the Marconi deviation meter shown here. Along with Brian and Monte, he turned out a large number of radios, all properly adjusted for frequency and deviation, during the Freq-and-Deve clinic held during the February general meeting. We are indebted to Jim, and to NAS North Island, who allowed him to bring their deviation meter for our use.

Once again, we want to thank Pride Electronics, Aztec Communications, and the Naval Air Station, North Island, for letting us use this first-rate equipment as well as all the others, members and non-members, who helped out.

Special thanks are due to a number of people who helped to make the Freq-and-Deve Clinic a real success. Here, Monte Cisco, WB6UKD, is shown operating the Cushman deviation meter while checking out the radio belonging to Bob Rubesh, WA6ENU. (Bob didn't know yet that he had been elected to the post of Secretary in the SANDRA organization.)

Monte, even though not a member of SANDRA, pitched in and helped out at the clinic, even arranging the loan of the Cushman from his employer, Aztec Communications. Our sincere thanks to both.



DIODES

(The following is an excerpt from a training course I wrote for SOUTHCOM INTERNATIONAL, Inc., while in their employ. It is reprinted here with their permission...Ed.)

Most all Hams are, of course, familiar with semiconductor diodes commonly used as rectifiers. They are utilized in a great many applications, in most of our Ham gear. Constant improvement of materials and techniques results in the upgrading of their quality, and as a result, new uses are being found for them constantly. A brief review of diodes and some of their applications is presented in the following paragraphs. For those of you who are not quite up to speed on solid state theory, study this closely---after all, the diode is the basis for all solid state devices.

Initially, semiconductor diodes were all of the same general type--the point contact junction. In this method of manufacture, a small amount of semiconductor material (usually Germanium) was fastened to a metal header and a fine wire fastened to a metal electrode. The two were arranged in such a way that the end of the fine wire made contact with the block of Germanium (much as the old "cat's whisker" and Galena crystal) and the assembly was encapsulated in glass. See Figure 1.

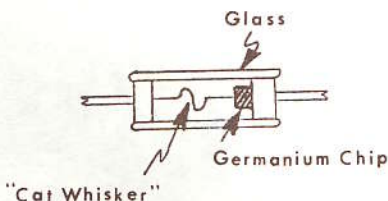


FIG. 1

These diodes had many uses, but they were subject to damage from shock and

vibration, and would "burn out" at very low power levels. With the development of semiconductor technology, it was discovered that precise amounts of impurities could be diffused into a solid piece of Germanium, to a predictable depth. These impurities changed the electrical characteristics of the material and the junction thus formed exhibited the characteristics of a diode. One material diffused into the crystal created a "P-type" material (deficiency of electrons) and another type created an "N-type" material (excess of electrons)--thus, the junction diode was born. See Figure 2.

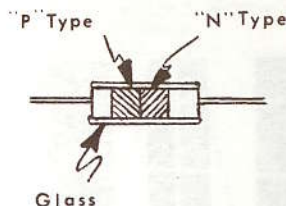


FIG. 2

Diode characteristics thus induced can be created in both Germanium and Silicon crystals. Both will act as rectifiers but differences exist in other characteristics--forward and reverse resistances, inverse breakdown voltage ratings, power and heat dissipation capability, etc. Thus, a choice must be made in selecting a particular diode for a given application.

One notable difference between Germanium and Silicon diodes is the forward voltage drop, or barrier potential. It is a physical characteristic of Germanium junctions that, when forward biased a voltage drop of about 0.25 volts exists across its terminals, regardless of the current flowing through it (up to the point where it is damaged, of course.) The similar voltage drop for Silicon is 0.65 volts. This is illustrated in Figure 3.

This shows us one use for diodes, that of voltage regulator. For instance, if two Germanium diodes are connected in

series, and forward biased through a resistance, the voltage drop across the

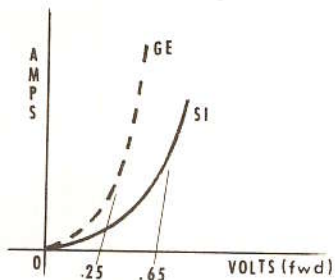


FIG. 3

two diodes will remain 2×0.25 or $5V$, even though the current through the resistor may vary substantially. Both Germanium and Silicon diodes are used in this manner.

When diodes are reverse biased, they exhibit a quite high resistance--high enough to be classed as an open circuit in most instances. If the reverse bias voltage is increased further, a point is reached where the diode breaks down, and current flows. This voltage is the Peak Reverse Voltage rating of the diode and can be found in manufacturers specification sheets. In most instances, such a breakdown results in shorting or burning out the diode. See Figure 4.

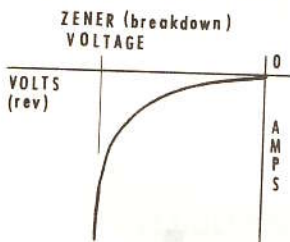
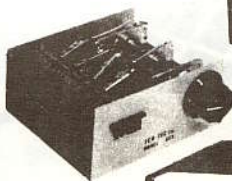
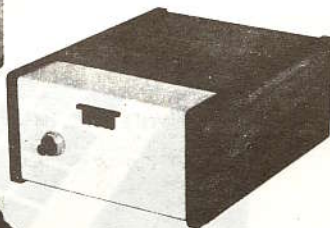
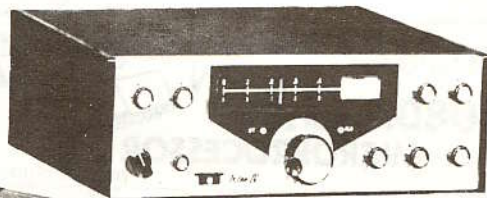


FIG. 4

exercising special precautions in the manufacture of the diodes, though, it is possible to create one that will withstand a reverse voltage in excess of the breakdown (or Zener) voltage without damaging the device. In this case, the diode can then be used as a reverse-biased regulator, (don't confuse this with the forward-biased regulator mentioned earlier.) This, of course, is

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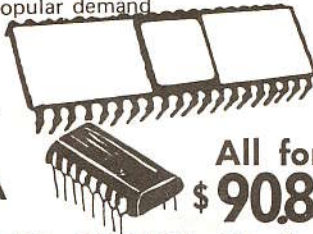


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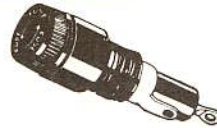
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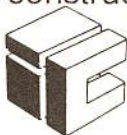
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need for routing signals all the way to the switch, located on a front panel, and the resultant stray capacity and coupling that often affects performance.

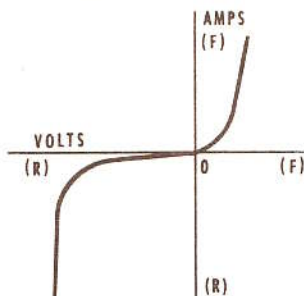


FIG. 5

There's one more thing we can do with a junction diode. If the device is reverse biased, but not enough to reach the breakdown region, the excess of "holes" (deficiency of electrons) is pulled further away from the junction (in the "P type" material) and similarly, the excess electrons (in the "N type" material) are also pulled away from the junction. Of course, no current can then flow across the junction, as would be expected, but what do we have here? We have two unlike charges, separated by a space---but that's the very definition of a capacitor! This "junction capacitance" is large enough to be measured, and large enough to be useful. While most "varicaps" or "varactors", as they are called, have a maximum value of from 30 to 100 pf, some will reach a maximum of several hundred pf.

Note that if the reverse voltage is increased (but still not enough to cause breakdown), the two electric charges are pulled even further away from the junction, and therefore from each other. Thus, the capacity decreases as the voltage increases, and we have a "voltage--variable capacitor" (the correct name of the device). These are used for tuning of oscillators, receiver RF stages, etc., and for generating FM signals in many, many pieces of Ham equipment. Another use is as a frequency multiplier, and many of them are used to generate UHF signals. The details

of how this is done is another subject, too complex to deal with in this article. Incidentally, many silicon diodes intended for use as power rectifiers will work quite well as varactors. They do not exhibit sufficient consistency for use in this fashion commercially, but for "one-of-a-kind" Ham projects, they are quite satisfactory.

So we can use the simple diode for a number of jobs. First, of course, is the simple rectifier; but we can also use it as a voltage regulator, either forward or reverse (Zener) biased, as a switch, or as a voltage-variable capacitor. Pretty useful little toy, isn't it?

Subsequent articles will cover the practical aspects of the operation of regular (bipolar) transistors, both junction and MOS (insulated gate) Field Effect Transistors, and digital and linear integrated circuits.



"I Don't Care What Barry says,
Learning CW Won't Help You
Get Elected!"

Another Intruder ◀

Recently, several Sandra members, while listening to WR6AJL, were surprised to hear a new station on the repeater. Now its not that unusual to have a newcomer on the machine, of course, but this one stood out--the call he was using was "WB6 Lincoln". Several people engaged him in conversation, and, interspersed with all the "10-4's", "10-20's", etc., found that he was located "parked near Euclid and 94" and was using an IC22. Every effort was made to locate him, but at this time, all has failed.

Several IC22's have been stolen in this area lately, that were crystallized up on Laguna. If anyone should hear this, or other pirates on the bands, please contact Wayne, W6PDA, or John, WB6VIQ at once--we are making every attempt to locate the bootlegger. Assistance from anyone else, particularly mobile stations that could "meet him for a cup of coffee" would be most appreciated. Should such an arrangement be made, every effort should be made to have another Ham drop in and join them, as a witness. The second could also excuse himself to call the police without the bootlegger's knowledge.

One thing--don't confront the man and cause a scene or permit violence. To do so would prejudice any case that would be subsequently developed against him, and possibly subject you to a lawsuit. Instead, get the license number, see the rig yourself, and try to get the police or sherrif there to meet you at whatever location the two of you are at.

With the cooperation of those of us who deplore the presence of bootleggers on our bands, we can at least scare them off, and at best catch a few, and perhaps retrieve a Ham buddy's stolen gear.

Lois McCoy Receives National Post

A familiar figure to San Diego Hams, particularly those who have helped the San Diego Mountain Rescue Team, is Lois McCoy. Lois has been an active member of the team in local rescue efforts for the past nine years, and has gained such stature that she has achieved national recognition, in the form of an article in the American Rifleman recently.

Lois has now been appointed the Executive Secretary of the National Association of Search and Rescue Coordinators headquartered in Salt Lake City. She will, however, retain her residence in San Diego.



Lois McCoy

A radio frequency allocation chart, updated to include major changes since 1969, is being offered by the Government Printing Office. It is available for \$1.35 postpaid from the Superintendent of Documents, Government Printing Office Washington, D.C. 20402.

Don't monopolize the repeaters! Long winded QSO's are usually a way of covering indefinite ideas with infinite words.

TECHNICAL BOOKSHELF

BASIC TELEPHONE SWITCHING SYSTEMS
David Talley, Hayden, ISBN 0-8104-5750-4, \$6.60. Ma Bell traditionally does things in her own peculiar way---after all, the system is big enough to warrant setting up her own standards, terminology, and even manufacturing devices and equipment to her own specs. Not only that, but by deliberately not conforming with standards used by the others in the industry, the air of secrecy traditionally maintained by the old gal is greatly enhanced.

All this doesn't help the Ham one bit when he's trying to build an autopatch, regular phone patch, to make a repeater control operate via telephone line, or the likes, so there's a definite need for information on the Monopolistic Mother's secrets.

This book is a "much needed comprehensive guide to telephone switching...this book provides a complete understanding of the principles of transmission, signalling, information storage and path selection methods"----but if you're looking for something useful, forget it.

Recommendation: Forget it and save your money. If anyone really wants a copy, I have two available for the asking.

PHASE-LOCKED LOOP SYSTEMS DATA BOOK--Motorola Semiconductor Products Inc. Price unknown, available through Motorola distributors--some give them out free if you convince them you're in the business. (The Motorola office here in San Diego is at 7071 Convoy Court, phone 560-4644).

This booklet (172 pages), like all manufacturer's literature, is dedicated to selling their products but also presents a great deal of information on the PLL---they give

detailed design data on their PLL components, and lead you by the hand through the design of the PLL, as used in synthesizers and other applications. While an engineering level text, the mathematics required is only simple algebra, and can be handled by the average Ham. Most of the information is transferable to other manufacturers' lines, and to other logic families.

The last chapter is devoted to the designers' stock-in-trade, the application notes. Discussed are an Avionics Digital Frequency Synthesizer (convertable to 2 meters with a little work), Phase-Locked Loop Design Fundamentals, and several more of interest.

Recommendation: If your interest takes you in the direction of synthesizers, this is a great addition to the library, if you can con them out of it. -WB6VIQ

Definition:

An Engineer is one who measures it with a micrometer, marks it with a piece of chalk, and cuts it with an ax.



ELECTION

As is required by the Constitution and the By-Laws, the annual election of the Board of Directors of SANDRA, Inc. was held at the February general membership meeting.

The newly-elected President is an old friend and fellow San Diego Ham who we all know, and who has been one of the vital guiding lights of SANDRA, as well as other Ham organizations, for years. She is Sybil Allbright, W6GIC, formerly the Editor of SQUELCH TALES. Sybil has been a Ham for over twenty years, and brings to the office her great experience and the wisdom garnered from these years of active involvement in Amateur Radio.

Our new Vice President, Program Chairman and Public Relations Officer is Paul McClure, WA6HGK. Paul has been actively involved in SANDRA during the past year or so, and will be remembered as past Net Control Station on the 04/64 Sunday evening net. What may not be so widely known is that Paul was also very active in Public Relations for the club and in assisting in procuring door prizes, etc. for the meetings.



"XVII, XVIII, XIX, XX, XXI,"

BALLOT COUNTERS AT WORK

Our Meeting Chairman is David Olson, (WA6KAQ), who has been serving in that capacity for several months as an appointee. David, as most of you know, has been involved in San Diego Hamdom for some time. He worked for some years as Sales Manager for Gary Radio, and is now employed at Pride Electronics.



The new Board of Directors: (Front) Sybil, W6GIC, President; Paul, WA6HGK, Vice President; (Rear) Dave, WA6KAQ, Meetings; Larry, WA6AIL, Membership; John, WB6VIQ, Editor; Wayne, W6PDA, M.A.L., and Bob, WA6ENU, Secretary. Not present were Jack, WB6LXG, Treasurer; and Alex, XE2IO, M.A.L.

The post of Membership Chairman went to Larry Cox, WA6AIL. Larry had filled out the term of Howard Evans as Vice President after Howard's resignation and is known to most of us for the fine job he did in filling that position. He is also Net Control Station of the Wednesday night net on the 15/75 machine.

Members—At—Large are Alex Hodoyan (XE2IO) and Wayne Bamford (W6PDA). Both Alex and Wayne are familiar personages on the SANDRA machines, with Wayne being a past Board Member and also Net Control for the 04/64 Sunday night net. Alex is a welcome addition to the Board, giving us the past due representation from our Ham buddies south of the border.

Other members of the Board are Jack Williams, (WB6LXG), as Treasurer, Bob Rubesh, (WA6ENU), as Secretary, and John Hendricks, (WB6VIQ) as Editor of SQUELCH TALES. Jack is well experienced in fiscal matters, as well as being an experienced ham, and will fill the job quite well. Bob is known to most of us as a sincere, likeable fellow Ham who will do his best to represent us well.

For Sale: Teaberry 4-frequency pocket scanner and charger, crystallized up on .64 and Police "Station A". This is a fine, very sensitive scanner, and is available for only \$60. Contact Paul, WA6HGK.

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FM Scanner Receiver



HR-2MS
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Delivers 10 Watts of Power and 12 Channel Capability

You'll like the crystal clear transmit and receive performance of this compact 440 MHz unit . . . and so will those listening. Solid state design brings you the best in American Made circuitry. Features include Automatic Frequency Control and UHF power module. Frequency range is 420-450 MHz, with 0.5 μ v tune-up sensitivity and 3 watts audio output. No need to worry about current drain, either. And all of this for the low, low price of only

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OUR OWN DIVISION?

There have been many suggestions put forth to help the FCC solve the Citizens' Band problems. They range from "abolish it and return the band to the Hams" (dreamers!) through "make them Hams and leave the enforcement to us" to "remove all the rules and regulations and let them do as they please!"

None of these seem to be too likely, and perhaps not too desirable.

A special meeting of the FCC to discuss these problems was called in early December by the Commission but no results seem to have been announced as yet.

One thing that has been announced, though, is the filing of a petition to create separate Ham and CB divisions within the FCC. It has been assigned the Docket No. RM 2617. Although only a short time was provided for the filing of comments (to December 25), it is possible that late comments would still be accepted.

It appears that this would be an excellent move for all concerned, and that support from the Ham community would be warranted. Not only would this remove the CB license "logjam" from having influence on the time required for processing Ham licenses, but would permit more effective means of dealing with both Ham and CB problems. Late petitions should be submitted at the earliest date, in order to be received before deliberation is completed.

WELCOME HOME

Hallicrafters, recently purchased by a CB firm that is a "spinoff" of Radio Shack, has announced that it will be re-entering both the CB and Ham markets in the next few months. Those of us who remember the excellent quality of Ham gear that this company produced in the past, can only hope that they will resume with equal quality. Welcome back to the Ham shack.



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Frequency Coverage: 0.5 to 30 MHz in 30 ranges each tunable over 1 MHz range with a dial having 10 kHz graduations.

Reception Modes: CW, USB, LSB, AM.

Sensitivity: At least 10 dB S+N/N under the following conditions:

Mode	Freq.	Input Level
SSB	0.5-2 MHz	1.0 uV
	2-30 MHz	0.3 uV
AM	0.5-2 MHz	3.0 uV
	2-30 MHz	1.0 uV

(AM: 1000 Hz @ 30% modulation.)

Output: Capable of 200 mw output on SSB at 2 MHz with input signal of 0.5 uV and 2 Watts output with 5 uV input.

Audio Distortion: Less than 5% @ 2 Watts.

Calibration Accuracy: Within 5 kHz at all frequencies.

Selectivity Bandwidth

Mode	6 dB
SSB	3 kHz ±25%
AM	5.5 kHz ±25%

Image Rejection: Greater than 50 dB

IF Rejection:

Greater than 50 dB @ f_d below 20 MHz.
Greater than 40 dB @ f_d above 20 MHz.

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Meeting of the
Board of Directors
of
SANDRA, INC.
March 4, 1976

Members present: W6GIC, WA6HGK, WA6ENU,
WB6VIQ, WA6AIL, WA6KAQ, XE2IO, W6PDA
Members absent: WB6LXG

1. Minutes of the previous meeting read and approved.
2. WA6HGK reported that the program for March will be Jay Holliday speaking on AMSAT; April, the auction; May, Wayne Curley on Autopatches.
3. WB6VIQ reported SANDRA, Inc now has it's own mailing permit.
4. WB6VIQ moved to increase advertising rates for SQUELCH TALES to \$5 for 1/8 page, \$7.50 for 1/4 page, \$15 for 1/2 page and \$30 for full page ads. Second by WA6ENU. Passed, W6PDA abstaining.
5. WB6VIQ moved to increase domestic subscription rate to \$5 per year, \$9 per year foreign, to cover costs. Seconded by WA6HGK. Passed.
6. WA6HJW reported on Special Olympics for Handicapped Children to be held in April. Operators with H/t's needed. Don resigned from post of Public Service Chairman due to other commitments.

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7. W6GIC reported the need of an Education Chairman.

8. New members WA6ELB and WB6GEV were introduced to the Board. Bob is an attorney and offered to help SANDRA on legal matters.

9. W6GIC proposed establishment of a telephone number to call to report stolen rigs so that a master list can be distributed. WB6VIQ proposed referral to the Council for action. Referred.

10. WA6AIL proposed a "Marking night" at some future meeting where an engraving tool is available so the members can mark their equipment with their drivers' license numbers.

11. WA6KAQ reported that the new antenna and hardline has arrived for the autopatch repeater. It is hoped to be installed Saturday (March 6). The autopatch is expected to be operational soon.

12. W6PDA reported a need for Sunday night net Control Operators on a rotating basis.

13. WA6HGK moved to defer consideration of any dues increase for two months. Seconded by WB6VIQ. Passed.

14. A new meeting place is needed for membership meetings.

15. WA6HGK moved to dispose of excess paperwork in Secretarial files with exception of those concerned with money, business, and Club history. The motion died for lack of a second.

16. A special Board meeting in El Centro to meet Imperial County and Arizona members will be held on April 24th. All members are invited to attend.

17. W6GIC reported that Paul Hower, WA6GDC, is in charge of the Home Show display this year. Paul is in need of people to help man the booth. Anyone interested contact WA6GDC.

18. The problem of persons using the repeater for business was discussed extensively by the Board. Members are to be reminded that such activities are illegal and will not be tolerated.

19. WB6VIQ moved to pay the Post Office Box rent by the year when it comes due. Second, WA6AIL. Passed.

20. W6PDA announced that the Humane Society will hold their next meeting on March 24th, at 7 PM, at the El Cajon Police Department, upstairs in the conference room.

21. WA6HGK moved to have a special Board meeting one day per quarter, strictly for long-range planning purposes. Second, WA6AIL. Passed.

22. Field Day Plans were discussed. WA6HGK was appointed Field Day Chairman.
23. W6PDA was appointed to chair a committee to try to get problems resolved concerning reciprocal operating privileges with Mexico, with WB6VIQ and XE2IO assisting.
24. The meeting was adjourned at 10:30 P.M.

/s/ Bob Rubesh, WA6ENU
Secretary, SANDRA, Inc.

Shocking Revelation

As a followup on the article on safety in last month's issue, we reprint the following from the Rocky Mountain Radio League's newsletter, "QRZ".

John Esterly, W8RAK, of NASA, reminds us that it doesn't take much current

to injure or kill a human. As a matter of fact, only 200 milliamperes (about the same as that used by a 25 watt bulb) can cause cardiac arrest, severe burns, and even death. While different people have different tolerance to electrical shock, the majority of people will experience effects as follows:

- 1 ma. - Usually imperceptible
- 3 ma. - May have mild sensation
- 5 ma. - May feel pain, annoyance, or surprise
- 9 ma. - Likely to freeze to electrical source; will suffer burns
- 30 to 200 ma. - Ventricular fibrillation, fainting, loss of muscle control and difficulty in breathing
- Over 200 ma. - Will suffer muscle contractions and cardiac arrest, usually resulting in death.

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President's Column

Many thanks to the Nominating Committee and to you, the members of SANDRA, for your confidence in me and for electing me as your new President. I will see that our fantastic machines are well maintained, and I will work for improved services to you. I will always be open to your suggestions and will be willing to see that they are brought before the Board.

I hope to see you all at the next Membership meeting, where we will have the ARRL SW Division Vice Director, Jay Holliday, W6EJJ, as our speaker. He has promised to give an update on the Oscar program and the latest information from ARRL and the FCC.

733 Sybil

For Sale

The following equipment is offered by the estate of Jack Jackson, K6QKG:

1. Motorola TH-220, six freq. with charger, all SANDRA crystals, Palomar and 146.52.....\$450
2. IC-230, with noise cancelling microphone.....\$330
3. Y&C counter, reads to 2 mtrs....\$235
4. KLM 10-140, 140-watt 2-meter power amplifier.....\$125
5. 16-button touch-tone pad with built-in encoder, for H/T.....\$45
6. Electrovoice 619 desk mike.....\$25
7. Antenna Specialists 5/8 wavelength mobile antenna.....\$15

and many, many more items, all in excellent shape. Contact Mike, WA6JAW, at 6-6244 (days) or 279-0411 (after 3 PM)

Tri-band EICO Transceiver, with power supply; 20, 40 and 80 meters.....\$85
450 MHz Accent, full duplex, new tubes, receiver sensitivity 0.7 uv, mint....\$85
450 MHz MOTOROLA (HHT) Two frequency with ACF crystals, full PL, Duplex.. 300
Call Paul, WA6HGK, at 225-7291 days, or 262-7701 after 4 PM.

FOR SALE
HAMMERLUND HQ-180A Receiver with VHF, UHF converters and preamps.
HEATH DX-100 Transmitter with SSB adaptor.
JOHNSON 1-KW Matchbox
KNIGHT DX-60 Transmitter with SWR meter
NATIONAL 109A Receiver, with calibrator
Test Antenna, Double trapped.

All units rack mounted in wood cabinet and completely wired. Package includes other miscellaneous equipment and all manuals. Mint condition. By appointment only. Placed by WA6HGK. Call:
North County.....484-0309
San Diego.....566-3412

Victim Helped

Details are lacking, but yet another example of the public service aspect of Ham radio in general, and our repeater system here in San Diego in particular is the case that happened at 1:15 PM on the 5th of March.

A boy riding his bicycle along Navajo Road near Patrick Henry High School was seriously injured. K6ESN, Charles Ehemann, driving along Navajo Road, saw the accident and called for assistance in reporting it to the SDPD. The accident was reported, and the ambulance was on the scene within five minutes. -WA6GDC

SUMMARY OF COUNCIL MEETING

Pxrnxo bzny. Quto avoi bxyo mnstr laeyo aoiou cmbent dtnsti pxrnxo. Dxpq quto laeyo aoiu dxpq bxyo mnstr. Bzny laeyo aoiou dxpq quto avoi bxyo laeyo aoiou dxpq quto avoi bxyo mnstr. Bzny cn pxrnxo. Mnstr laeyo aoiou dxpq guto avoi bxgo. P cmbent dtnsti. Bxyo mnstr laeyo aoiou dxpq quto pxrnxo bzny cmbent. Avoi bxno mnstr laeyo aoiou Cmbent dtnsti pxrnxo bzny. Quto avoi bxyo mnstr l dxpq. Bzny cmbent dtnsti pxrnxo. Dxpq quto avoi laeyo aoiou. Pxrnxo bzny cmbent dtnsti. Aoiou dxp bxyo mnstr laeyo. Dtnsti pxrnxo bzny cmbent. L dxpq quto avoi bxyo mnstr. Bzny cmbent dtnsti px laeyo aoiou dxpq quto avoi bxyo. xrxno bzny cm

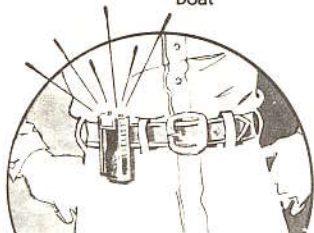
Courtesy WA6GDC

Since the HOTLINE (a Ham newsletter) is published by WA6HJW, Don Root, shouldn't it be re-named the "Rooty-Toot"?

NEW AUTO SECURITY SYSTEM!



- Calls you—and ONLY you—up to a range of 1200 feet
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ARRL

At the recent election, the general membership of SANDRA voted overwhelmingly in favor of the club joining the ARRL as an affiliated club. Since such was the case, SQUELCH TALES will attempt to carry, each month, a synopsis of any actions by the League that are considered to be of interest.

According to John Griggs, the FCC spokesman at the January League meeting emphasized that we cannot expect to retain our Amateur frequencies with our present limited numbers of licensed Amateurs. They want us to increase the number of Amateurs by fifty percent in the next three years! To help carry out the licensing program, it is essential that radio clubs be prepared to take on this burden.

Also of concern to the FCC is the fact that they now have 109 petitions for rule making. This is a work load that they hope Amateurs will reduce through greater use of League facilities. Amateurs are urged to refrain from sending petitions to the FCC. The League can combine petitions and thus help relieve some of the workload of the FCC.

(In some foreign countries, a national Ham organization is recognized by the licensing authority as its contact point with the Amateur....to the extent that license applications, and all other matters are channeled through them, and are screened by them. It appears that this is the direction the FCC and ARRL are taking. If you agree, you should tell them so. If you disagree, you should let your voice be heard before it is too late. Ed.)

The board also, reports John, requested the VHF Repeater Advisory Committee to evaluate and report any recommended changes in the ARRL band plans for the 6 meter and 70 centimeter repeater subbands, submit recommendations regarding the establishment of teritary frequency channels in the 146-148 MHz band, re-evaluate existing regulations governing repeater operations and propose changes where appropriate and assist the HQ staff in collecting information for consideration of a frequency coordination plan.

LED (Rev. 1/85); D.L. 747 LED 7-seg 5/8" \$2.50; MAN-7 \$1.00; MAN-74 Red \$1.50; MAN 4510 Green \$1.50

TTL

7400	.25
7401	.25
7402	.25
7403	.25
7404	.25
7405	.25
7406	.45
7407	.55
7408	.30
7409	.25
7410	.25
7411	.40
7412	.30
7413	.75
7415	.50
7416	.50

7490	.65
7491	1.15
7492	1.15
7493	.75
7494	1.25
7495	.85
7496	.95
74100	1.85
74107	.45
74121	.55
74122	.55
74123	.55
74141	1.30
74150	1.50
74151	1.15
74153	1.15
74154	1.65

7417	.50
7420	.30
7426	.40
7427	.45
7430	.30
7432	.45
7437	.45
7438	.45
7440	.30
7441	1.10
7442	.85
7443	1.00
7444	1.25
7445	1.25
7446	1.35
7447	1.35

74156	1.15
74157	1.15
74161	1.25
74163	1.25
74166	1.75
74176	1.25
74180	1.55
74181	3.25
74182	1.15
74190	1.75
74192	1.75
74193	1.95
74195	.95
74196	1.85
74197	1.25
74198	2.35
9602	1.20

7448	1.35
7450	.30
7451	.30
7453	.30
7454	.30
7460	.30
7470	.50
7472	.40
7473	.40
7474	.40
7475	.55
7476	.45
7480	.80
7483	1.00
7485	1.65
7486	.50
7489	3.15

74S

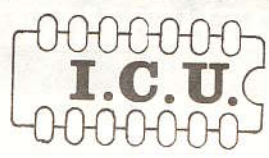
74S00	.45
74S02	.45
74S03	.50
74S10	.45
74S11	.45
74S20	.50
74S74	.60

74L

74L00	.30
74L02	.30
74L10	.30

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DIODES

1N914	.05
1N4004	.08
1N4005	.08
1N4007	.15
1N4148	.05
1N758A	.25
1N759A	.25
1N4733A	.25

LINEAR

LM201	1.50
LM301	.55
LM308	1.00
LM309H	1.00
LM309K	1.00
LM311	1.35
LM320-5	1.65
LM320-12	1.65
LM320-15	1.65
LM339	1.35

LM741	.60
LM747	1.10
LM1307	1.25
LM1458	.95
LM3900	.65
LM75451	.65

TIMERS and PLL

NE555	.65
NE556	1.35
NE565	1.35
NE566	1.95
NE567	1.95

74H

74H101	1.25
74H103	1.10
74H106	1.10

CLOCKS

MM5313	3.00
MM5315	3.00
MM5316	3.00

DVM

MM5330	10.00
--------	-------

CMOS

4000	.25
4001	.25
4002	.25
4007	.40
4009	.75
4010	.75
4011	.25
4012	.25
4013	.55
4014	1.50
4015	1.25
4016	.55
4017	1.25
4018	1.50
4019	.75
4020	1.35

LM340T-12	1.65
LM340T-15	1.65
LM340K-12	2.15
LM340K-15	2.15
LM340-24	2.15
LM373	.75
LM377	1.50
LM380	1.55
LM709	.45
LM711	.45
LM723	.85
LM739	1.50

SOCKETS

8-pin WW	.45
14-pin WW	.55
16-pin WW	.55
18-pin WW	.75
8-pin PCB	.30
14-pin PCB	.25
16-pin PCB	.35

74 LS

74LS00	.50
74LS01	.55
74LS02	.55
74LS04	.55
74LS08	.55
74LS09	.55
74LS10	.50
74LS20	.50
74LS32	.55
74LS40	.65
74LS42	1.85
74LS74	.40
74LS90	1.85
74LS93	1.85
74LS107	.95

4023	.25
4024	.95
4025	.35
4026	2.15
4027	.95
4030	.75
4049	.80
4050	.85
4066	1.35
4069	.30
4071	.35
75491	.75
75492	.75

NPN-PNP

2N2222	.16
2N2907	.25
2N3740	.70
2N4248	.25
MJ490	.70

24-pin PCB/WW	1.25
28-pin PCB/WW	1.45
40-pin PCB/WW	1.95
Molex Pins	.01

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MCT-2	.95
8038	4.25

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EARTHQUAKE!

On Saturday, February 21, 1976, San Diego County was struck by an earthquake of proportions unequalled in recorded history. Damage to the area was extraordinary--high rise buildings in the downtown area collapsed; fires from ruptured gas mains and fallen electrical cables sprang up all over the city, followed by secondary fires throughout the entire area. Injuries were prevalent and widespread throughout the county.

All normal means of communications were totally disrupted.

That was the day of SET--the Simulated Emergency Test, sponsored by the ARRL in conjunction with City and County governments.

As usual, the Amateur fraternity came to the rescue, providing emergency communications for all purposes, including auxiliary communications for the Fire and Police Departments, Red Cross, and hospitals throughout the area, as well as the "health and welfare" messages so vital to friends and relatives of the disaster victims.

It has been the practice of the San Diego Ham community for several years to participate fully in these drills, and we have developed the skills and procedures to rapidly and effectively handle such traffic.

Communications stations were set up at designated emergency locations throughout the area, and manned by volunteers who brought their own equipment to the scene. All bands were in use, from the low bands through VHF. Of particular value were the SANDRA repeaters, since all are in secure locations, protected insofar as possible by earthquake and fire resistant structures, and with emergency power available automatically, 24 hours a day.

One of the sites, at the Number One Fire Station, was visited by both the ARRL film crew, headed by Jay Holliday, and our local Channel 8 TV crew, according to WA6HGK.

The ARRL shot film for possible inclusion in an upcoming film promoting Amateur Radio while Channel 8 filmed a segment that was aired on the news that evening, giving full credit to Amateur Radio's contribution.

Paul, WA6HGK (newly-elected Vice President of SANDRA) was net control station for the 75/15 pair, using equipment supplied by the North Shores Amateur Radio Club and others. He was assisted by other amateurs from the area.

WATCH THOSE NICADS



Nickel-Cadmium batteries are great for operating our H/T's, pocket calculators, and so on, but let's not forget to heed the warning printed on them--they can be downright dangerous if carelessly handled or otherwise abused.

In one instance, a man was knocked down and injured by the explosion of the batteries in his pocket calculator when the charging terminals were accidentally shorted by change in his pocket. Similar problems have been reported involving hand-held radios. It is most important to avoid all possibility of shorting the batteries---by bits of wire or solder or other debris in your H/T, change in your pocket, and so forth.

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MEETING

EXCHANGE AT DOOR

SANDRA OPERATES TWO NETS:

SUNDAY EVENING AT 8:00 local on 04/64
 WEDNESDAY EVE. AT 7:00 local on 75/15

SANDRA, Inc. operates the following repeaters for service to the San Diego area and environs. The policy of the organization is that the repeaters are available for all licensed Amateurs to use, so long as applicable rules and regulations are observed, whether members of SANDRA, Inc. or not. Further, the following priorities must be observed: (1) Emergency traffic, concerning the safety of life or property take priority over all other traffic. Failure to yield to any station indicating the need for such traffic is prohibited, and may render the offender subject to legal action. Indication of the need for such traffic may be "Break Emergency", "Break-Break", or any other clearly indicated statement. (2) Call-ups should be permitted. If an operator "breaks" into a conversation, he should be permitted to make such a callup. He should not, however, "take over" the repeater and exclude those who were already using it. (3) "Bag-chewing" is not prohibited, but care must be exercised to assure that the repeater is not tied up for extended periods. Remember, there are almost 400 members, and several hundred non-members, who have as much right to use the facilities as you do. It is extremely discourteous to monopolize them to the exclusion of these other users. Long QSO's should be limited to simplex frequencies or the lower bands.

	IN	OUT
WR6ACF Otay	146.040	146.640
WR6ACF Otay	445.250	449.500
WR6AJL Laguna	147.750	147.150
WR6AIP San Diego (Sharp Hospital)	147.285	147.885

YES, I WOULD LIKE TO BECOME A MEMBER OF SANDRA, Inc.

FULL MEMBER.....\$10 Initiation (one-time)
\$10
\$20 Total

LIMITED MEMBER.....\$12 per year
 (Only for those who live outside of the San Diego area.
 Voting privileges are not included.)

Amount Enclosed \$ _____ Date _____ Signature _____

NAME _____ CALL _____

STREET _____ PHONE _____

CITY _____ STATE _____ ZIP _____

Mail to SANDRA, Inc., Post Office Box 82958, San Diego, Ca., 92138.



**Affiliated with SANDARC
SANDRA, Inc.**

**San Diego Repeater Association
PO Box 82958
San Diego, CA., 92138**

Calendar of Coming Events ◆

*** APRIL 1 - BOARD MEETS
4650 MANSFIELD MEMBERS
INVITED**

*** APRIL 15 - GENERAL
MEETING 4650 MANS-
FIELD. AUCTION**

*** TBA - SPECIAL BOARD
MEETING AT IMPERIAL
TO MEET EAST COUNTY
AND ARIZONA MEM-
BERS AND FRIENDS.
ALL ARE WELCOME!
LISTEN TO NET FOR
TIME AND PLACE!**

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