

Crosstalk is published monthly by the
GLOUCESTER COUNTY AMATEUR RADIO CLUB

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CLUB NETS

6 M AREC	50.9----Sundays, 8 PM Local Time
10 M Rag Chew	28.8----Friday, 9:30 PM Local Time
Novice	21.115--Monday, 8:30 PM Local Time
Friendship	7.265---Every 3rd Sunday of every 3rd month, time and date subject to change with notice.

JANUARY MEETING: WEDNESDAY JANUARY 8th BEGINNING AT 8 PM. PROGRAM:
W2FBF PRESENTS THE CLUB PROJECT--See page 1 for details.

**DEADLINE FOR SUBMISSIONS FOR THE FEBRUARY ISSUE IS SUNDAY, JANUARY
19, 1975. PLEASE MAIL ANY CONTRIBUTIONS TO: MARK WILSON, WB2OSQ,

!!!!!! MEETING DATE CHANGED !!!!!

THE JANUARY MEETING WILL NOT BE HELD ON THE FIRST WEDNESDAY! THE DATE HAS BEEN CHANGE TO JANUARY 8th. Due to the fact that the first Wednesday of the month is January 1st, the meeting date has been moved one week, to the second Wednesday of January. Many people have the 1st off and are still recovering from the night before. Don't worry, you won't have to drag yourself away from guests and good cheer. Sit hime and relax on the first. But you better be sure to come out to the first meeting of 1975 on Wednesday, January 8th !!!

JANUARY PROGRAM TO FEATURE CLUB PROJECT

The program for the January meeting, January 8th, 1975, will be a presentation of the club project by Ken Newman, W2FBF. This seems like a good way to start the new year off!

After much waiting by the membership, the club project, a 50.9 monitor-receiver is ready to be unveiled. Ken has put in a lot of time and effort on our behalf, so let's have a good turnout to show our appreciation.

73 de Rich, WB2OCR

DOUG GEHRING, WA2NPD ELECTED PRESIDENT

The club officers for 1975 elected at the December meeting are:

- President: Doug Gehring, WA2NPD
- Vice Pres: Rich Netherby, WB2OCR
- Rec. Sec.: Harry McCormick, WA2SEA
- Corr. Sec: Della Parker, W2AFZ
- Treasurer: Rose Ellen Bills, WA2FGS
- 4 yr Trus: Bill Bachman, WA2VEE
- 2 yr Trust: Bud Snyder, WB2TKN
- 3 yr Dir.: Jack White, WA2MEM
- 3 yr Dir.: Steven Asay, WA2AXJ
- 1 yr Dir.: Mark Wilson, WB2OSQ

Congratulations to all elected. I hope they do as well as the club leaders did in 1974.

PRESIDENT'S COMMENTS

Initially, let me thank all of you for expressing confidence (via the ballot box) that I might effectively serve as GCARC President for 1975. Indeed, the honor is twofold--that I am your President for next year--and that a long-standing club tradition of no two-term President's has been broken. I suspect (as was Babe Ruth's record) that records are made to be broken and I am humbled by the election results that have transpired here. I promise to serve as best I am able--in my usual gregarious, abandoned fashion, and I will be grateful for the support (I know you will) of each member during 1975.

Let us thank Jack, WA2MEM, for a really first class job as President during 1974. It would consume too much space here to list the accomplishments and improvements, but one important indicator is Club membership. We have grown from 62 to about 74 members during 1974. Without effective programming, leadership, activities, etc. a membership growth will not take place; hence it becomes obvious

President's Comments (Cont'd)

that, under WA2MEM's guidance, our club has continued to prosper. Thanks Jack, you left your mark and also an enviable act to follow.

For 1975, I trust we can arrange a club banquet (XYL's invoted too) among our usual agenda of activities. Also, I will appoint others to serve together with the Chairmen of the various operating committees--in effect we will have committees--not just chairmen, and I am grateful you have elected a top-rate slate of Club Officers and Directors--and please give them all the support you can muster. I plan to keep you informed from time to time via our excellent club paper and have even promised our energetic (but very capable) editor my future articles will be submitted by press deadline.

Thanks you and will see all of you on the 8th.

de WA2NPD

NEW REFRESHMENT CHAIRMAN

The December club meeting was the last to be catered by GCARC's John Kull, WB2GKH who has graced our bellies with coffee and donuts for the past five years. John is the one responsible for the refreshments that the attending members consume during the meeting break.

John decided to give up the job, and he wanted to give another member a chance to do something for the club. Last month, and the month before, an ad asking for volunteers was run. The topic was brought up at the club meetings. It seems very said that it is so hard to get a volunteer to do an easy but important job such as this.

At the December meeting, someone actually volunteered! Mark Anthony, WN2WQD has offered to do the job. Mark is one of the newest members of the club and hails from Pedricktown. It really takes dedication to come all that distance to bring the donuts for every meeting. Many thanks Mark!

DECEMBER DX PROGRAM

At the December meeting, in addition to the annual club elections, Wayne Wood, W2SUA, spoke on DX operating. Wayne gave a multitude of tips on equipment, frequencies, times, dates, how to work them. Wayne himself has about 280 countries confirmed. He stated that anyone may work DX, it doesn't take a super station.

The most important aspect of DX operating is listening. A good set of ears and a good receiver helps. A good antenna system is also a help.

Anyone who listened to Shorty should be prepared for some serious DX operating.

NEW PUBLICITY CHAIRMAN

Steve Asay, WA2AXJ has volunteered to serve as publicity chairman. He has done some interesting work so far. The meeting notice was appearing in Shoppportunity Good News, a local saturation paper for the last few months.

Anyone with any good ideas may contact Steve At the rate he is going, we may have publicity for Field Day this year.

DUES TIME

It is that time of year again. Time to lay out the money to ensure your membership in the GCARC. Remember that you can save a buck and a half if you pay during the months of January, February, or March. At today's prices, every dollar counts.

Membership dues can be paid at the meetings or sent to the club treasurer, WA2FGS.

Dues are \$7.50 during the first three months of 1975. Send them to: Rose Ellen Bills, WA2FGS, After March, dues are \$9.00. Hurry!

S.E.T. COMING

On January 25th and 26th, the annual A.R.R.L. Simulated Emergency Test will take place.

As usual the Gloucester County A.R.E.C. net will participate in the National S.E.T.

At the early writing of this article, plans have not been finalized for our part of this operating event. With the early deadline for Crosstalk, it is hard to plan so far ahead for this event.

As usual all amateurs are encouraged to participate in this, the second biggest operating event of the year. Field Day is first.

More details of our net's participation in the S.E.T. will be available at a later date.

I strongly urge all who are capable to plan on taking part in the S.E.T.

De

Harry McCormick, WA2SEA
E.C. for Gloucester County.

CONTEST CORNER

1974 November Sweepstakes Results

Congratulations to Mark, WB2OSQ, for his record setting performance in unseating 4-time winner Doug, WA2NPD in the SS. Mark's score is a new club record, beating WA2NPD's previous high in 1973 by more than 20K.

Murphy struck at the Gehring shack this year in the form of a giant puff of smoke which appeared above the transmitter as it was being warmed up for the fray. He comes in all shapes and sizes.

It would appear that Murphy's help might not have been necessary this year with Mark's fine performance. He will receive the prize of his choice (repair parts for NPD's rig perhaps?).

WA2OMY, Gary had a fine score as well and nearly took phone honors from Mark. It was also very good to see Herb, K2HPV with a good effort in his first attempt at club honors. Bob, WA2AIH once again battled the wall of QR, with his 60 watter using crystal control. Though Bob did very well, he has vowed to add VFO for next year. (Ed. note: After seeing the growing number of components rated at 1200 KVA in Bob's workshop, I think that a little more than a VFO is in store!) If you think it is tough going with your 200 watt transceiver, try swapping rigs with Bob next time. That's patience!

SCORES:

Call:	QSO's	Score	QSO's	Score	Total
**WB2OSQ	376	44,368	395	52,140	96,508
*WA2OMY	352	42,994	81	4,212	47,156
*K2HPV	186	16,740	21	588	17,328
WA2AIH			55	3,080	<u>3,080</u>

**Prize winner

Club total 164,072

VHF SWEEPSTAKES JAN. 4--5

As usual, the top scorer will receive a prize of his choice, with certificates awarded to those scoring 100 or more contacts. Consult December QST for rules. Logs will be available from ARRL or W2FBF. The contest will be over by the January meeting, so get your logs now. Mail your entry to ARRL Before Feb. 4th, and report your score to Ken, W2FBF for the club listing in QST.

ARRL DX COMPETITION

Phone: Feb. 1--2, March 1--2

CW : Feb. 15--16, March 15--16

The W2SUA Cup is awarded to the top combined phone/cw scorer. Logs will be available at the January meeting. See December QST for new rule changes.

73, Ken W2FBF

SWAP SHOPPE

FOR SALE: Hammarlund HQ110, \$90, Heath DX-35, \$25. Contact:
Art Salin, WA2JRD,

FOR SALE: SG-2A Signal Generator, 333 Mhz--16 tubes and 20 crystals
\$20 Government surplus--A1 condition.
Contact: Jim Klupar, WB2OER.

FOR SALE: Heath DX-60B with VF-1 VFO. \$50 takes all.
Contact: Darrell Neron, WB2BVV

FOR SALE: HA-750 with DC power supply and Halo antenna. \$65. (6 meter)
Contact: Bill Frambes WB2FJE

FOR SALE: Heath HW-16, \$80; Heath DX-60A, \$40; both good CW or
Novice rigs. Contact: Mark Wilson, WB2OSQ

WANTED : Commercially built tansmatch. Must be in good condition.
Contact: Bill Cardis, WB2IYB,

FOR SALE: HW-132A Complete \$130; without power supply and xtal
calibrator \$100. DX-100 \$60. Heathkit Tener \$25.
Hammarlund HQ100A--good condition \$85. Link 2M FM station;
includes separate receiver and transmitter, crystallized
controlled on any frequency 143-152 Mhz. Schematic and
handset also included. Contact: Steve Blaski, W2TDS

FOR SALE: RCA (commercial) plate transformer. Pri. 220V--Sec.
3000V @ 1 amp. Also matching filter choke. Hallicrafters
HA-6 six meter SSB transverter with power supply. Like new
condition. RME DB 23 preselector, 80-10 meters. FB con-
dition. Make offers on any of the above. Contact: Phil
Catona, W2JAV

If anyone has anything to buy, sell or trade, Crosstalk is
the place to advertise. There is no charge. Call Mark Wilson

CLUB JACKETS

We still need 4 more orders to get club jackets. The minimum order is 12 and only 8 members have ordered. Everyone should have one! Each jacket has the member's call on the front and GCARC on the back. Contact Rich Netherby, WB2OCR to place an order or for further details.

FOR SALE: 75' self supporting tower (tilt Removal) TR44 rotator and all cables, Prop-pitch motor, D-104 mic, Collins KWM-1, KWM speaker and power supply, Henry "VI" 2000 W. PEP linear amplifier, Mosley /TR6 all band antenna, all connecting cables and coax, monitor scope (brand new). Entire station in A-1 condition. Original price: \$3,425. Asking \$2000. Contact Fred E. Newmann, W2EUX

RIG THEFT

Many of us have rigs in our cars, and the increasing popularity of 2M FM is adding to the number of ham mobile units. A word of caution is in order here. Since mobile units are generally small and lightweight, they are easily stolen! This fact was brought home to me very hard in the past year. In Feb. my TR-22C was stolen from my car while it was parked in front of my home. In Oct. my other 2M FM rig was stolen from the same car and the same place, and this time the car was locked! The second rig was a G.E. "pre-prog." (pre-1950 vintage) which weighs more than 30 pounds. So age and size make little difference to a really dedicated thief.

So, be careful when you leave your car anywhere with a rig in it. Your antenna is a dead giveaway that there is a rig in the car.

I personally believe that the majority of ham rigs that are stolen, are mistaken for C.B. sets by the thief, because he doesn't know the difference. So beware, lock your car whenever you leave it, which is a good habit to get into anyway.

One final thought. Ham rigs are not covered by your auto theft insurance. They are covered by your homeowner's insurance. So, if you do not have a homeowner's policy, or a tenant's policy if you rent like me, CONSIDER GETTING ONE.

De WB2OCR, Rich

HOW TO PROPAGE A RADIO SIGNAL--PART I

by Steve Asay, WA2AXJ

By understanding what can happen to a radio signal between the time it leaves your transmitting antenna and when it reaches the receiving antenna, be it across town or across the globe, you can utilize your equipment to the fullest. It is not always what you have, but how well you use it.

When a signal leaves the transmitting antenna it is in the form of electro-magnetic waves called radio waves. These waves are subject to the same physical laws governing visible light waves. They can be reflected, refracted, diffracted, or absorbed. A wave can strike an object, or dense atmosphere level, and bounce off in another direction. This is reflection. Although the ionosphere is the usual cause of reflection in the atmosphere, radio waves may also be reflected by clouds, rain, or even sharply defined boundary surfaces between air masses; when such surfaces are close to being parallel to the earth's surface, radio waves may travel much further

How to Propagate (Cont'd.)

than normal. Reflection is probably the most important property of interest to amateurs.

When signals pass between air masses of different densities, the path is altered, or refracted. Pressure and temperature differences are the major causes of refraction in the atmosphere. Refraction occurs at all frequencies below 30 Mhz. but its effect is negligible when compared with diffraction and absorption.

If an obstacle is non-reflective, the signal can bend around it. This is known as diffraction. This causes a shadow behind the object. However, some signal does enter this shadow area at a greatly reduced power. At lower frequencies more of the signal enters this shadow area. Therefore, the effect presents a much greater problem at VHF than at 80 meters.

The signal can also be completely or partly absorbed by an obstacle. Energy from a radio wave is absorbed greatly by the earth's surface, but, over the oceans there is very little absorption, making ground communication possible over great distances across the oceans.

There are two main layers of the atmosphere of interest to the amateur. The Troposphere, occurring at about seven miles above the earth's surface, and the ionosphere, occurring from about 30 miles to about 300 miles above the earth's surface. The ionosphere is the layer of main concern to amateurs operating on frequencies below 30 Mhz.

Long distance radio communication on or near the surface of earth can be caused at low and medium frequencies by ground waves if the transmitting power is high enough and the antenna designed for that purpose. Ground waves leave the antenna and travel in a path on or near the surface of the earth. These waves are easily reflected by natural and man-made objects. They can also be easily refracted into the earth or into the troposphere and so are absorbed and lost.

Ionosphere waves are those waves which are reflected by the upper part of the atmosphere, the ionosphere. The ionosphere is composed of ionized layers of air. The ionizing process is the result of the molecules compressing the air at this level being bombarded by radiation in the form of particles emitted by the sun and ultra-violet light and soft x-rays.

The ion density of this area is not uniform, varying without respect to height. The various layers of the ionosphere vary in height with respect to time of day, season and natural fluctuations. These layers overlap each other to form a continuous area of ionization. Within this area there are four layers of high intensity of particular interest to the amateur. They are the D, E, F, and F2 layers. On the high-frequency bands (80 through 10, and sometimes 6) signals are propagated over long distances by using the reflective properties of these layers. Next month these layers will be discussed in detail.

A.R.C.E.C. NET TO EXPAND

On Sunday, December 8th, the A.R.C.E.C. net started working on a plan to expand the 6 meter net to include crossband operations on 2 FM. Initially our crossband operation was between 50.9 Mhz. on 6 meters and 146.58 Mhz. on 2 meters.

Through our tests we have definitely decided to work both 6 meter A.M. and 2 meter P.M. into our regular Sunday evening net.

At the time this article is being written there are still many unresolved problems to be worked out. In order for this writing to appear in the January issue of Crosstalk, I must state that even though we have problems, I feel confident that this soon to be operation will work, and I expect to be operation by January 5th.

AREC Net (Cont'd.)

Our first experiment was on 146.58 on 2 meters, but by January 5th. we expect to move to the now unused 2 meter CD frequency of 147.24 Mhz. Incidentally it has been suggested that the club adopt 147.24 Mhz. as the Club's 2 meter frequency.

The reason for operating the net on 147.24 Mhz. was to give the fellows that still have old CD 2 meter equipment in their possession a chance to get some use out of it.

Also included in our long range plans for the Gloucester County AREC net are included operating through the new 2 meter repeater that is soon to become operational in our area. The sponsors of the new 2 meter repeater have offered use of the repeater for AREC functions.

De

Harry McCormick, WA2SEA
E.C. for Gloucester County.

LES BELLES

Have you ever noticed how your windows become cloudy in damp or foggy weather? If you wear glasses, a steamy kitchen will have the same effect on your lenses. You can prevent these annoying conditions by rubbing a little glycerine over freshly cleaned windows or lenses. You'll be able to see clearly no matter what the weather.

With the start of a new year and schoolbells ringing and the youngsters are once again on the move after the holidays, it is time to think about a variety in the preparations and packing of the lunches. If your family belongs to the brown bag set and each member has different tastes, it can mean preparing several different lunches each day. Below you will find two of the more common sandwich makings and if Dad takes his lunch he may even be surprised.

SUBMARINE SANDWICH

Hard or French roll
Butter or margarine
Lettuce leaves
Salami or liver,
Sausage--sliced
Muenster or Brick
Cheese--sliced
Tomato slice
Onion slice
Cucumber slice

Split roll horizontally and spread with butter or margarine. Place lettuce on bottom half of roll. Place meat on lettuce and top with cheese slices, then tomatoes, onions and cucumbers.

CHUNKY CHICKEN SALAD

1 cup California Dip*
2 cups cut-up cooked
chicken
1 cup sliced clery
1/2 cup sliced sweet gherkins
1/2 cup sliced pitted ripe olives

In large bowl, toss California Dip with chicken, celery, gherkins, and olives. Makes about 6 services. (Use with slices of broiled or baked ham)
*California Dip: Blend 1 envelope onion soap mix with 1 pint dairy sour cream.

73's Rose Ellen
WA2FGS

QRP OPERATION (Part 2)

by Bob Doak, WA2AII

For the beginner going into QRP operating, my advice is to start out at a power level of about 10 watts. After you have gained experience at that power level, you can work your way down. Operating tips will appear in part 3.

A must for the beginner is a VFO for the QRP rig. Without one, the ability to establish QSO's is almost nil. Also, the cost of five crystals today is enough to buy the parts for a little VFO. VXO's (variable crystal oscillators) are becoming more popular on the market today. Depending on the circuitry, they can vary the frequency almost 5 KHz.

Most QRP projects and commercially built products are for the CW mode. This, of course, is due to the fact that a QRP signal will travel farther than an SSB signal of the same power. The CW signal is at a constant power level. Trying to use QRP SSB will only result in frustration as most of the sideband boys run at least 180 watts and will just step all over your signal.

I have found the most interesting factor in CW work to be antenna systems. As mentioned in part 1, I have worked Colorado and Puerto Rico with 2.5 watts into an inverted vee 7 feet high in the center and 2.5 feet high on the ends! Although I have accomplished these feats, it is best to have an efficient antenna system. I believe that the following will make the most difference in efficiency.

1. Keep feedlines short, especially at frequencies above 40 meters. Feedline attenuation begins to play an important role at higher frequencies and this is important at QRP power levels. If possible, keep the feedline less than 50 feet. Also, try to use 300 Ohm ladder line or 300 ohm TV twin lead because they have a considerable less amount of attenuation per foot than coax and are relatively inexpensive.

2. Keep all indicating instruments out of the feedline, i.e. SWR meters, power meters, etc. Each connection to an instruments represents some RF power loss.

3. Make sure that the antenna is installed as high as possible and radiating in the direction of the area with which you wish to talk.

4. Try to avoid antenna matching devices because they usually cause a 10% power loss due to skin effect, stray bypassing, etc. The time to worry about matching is when the rig won't load. This is usually due to the reactive component of the antenna rather than its resistive component. The reactance is greater than the output coupling network can compensate for. To bring it back into the range that can be compensated for, you simply use the opposite reactance. If the antenna system has too much capacitive reactance, place an inductor in series with the feedline and this will cancel some of it. If it has too much inductive reactance, place a capacitor in series with the feedline. If you can't load because of the resistive component in the antenna system, a simple "L" network may be employed--don't use fancy matchboxes with roller inductors and five variable capacitors, they're expensive and lossy.

5. Try using longwires which are about 200 feet long without matching devices. Longwires are very efficient antennas as they have no power loss. The whole system is a radiator. At frequencies above 40 meters, the longwire becomes directional. Also, when above 40 meters, use directional antennas such as beams, quads, phased arrays, etc. If you have a tower for your beam, or what have you, use it for a radiator on 40 and 80 meters. A good wire antenna for portable QRP multiband operation is the window. More on this antenna can be found in books and magazines.

Next month, the author will present some QRP operating tips.

THE 2-METER REVOLUTION

The F.M. repeater on 2-meters has revolutionized one aspect of amateur radio operation. 2-meter F.M. is the only area in amateur radio where by agreement stations operate on channels assigned and co-ordinated by mutual consent. 2-meter F.M. fills a need for consistent, reliable, long distance mobile communications. It has grown to the degree it has now in part because of the large quantity of surplus commercial gear which is available at very nominal cost and is extremely easy to convert to amateur use. The compact, extreme portability, and small power-requirements of commercially made equipment, most of which operate directly from 12-volt power sources, is an asset. The one essential part of 2-meter F.M. that brings together long range and reliable communications is the repeater, commonly known as "the machine." There are a variety of machines serving different purposes now on the air in this area. They include open machines (accessible to anyone at anytime), closed machines (accessible to a limited number of people), and tone and code accessed machines (open to anyone aware of the code).

THE BARNSBORO REPEATER

A group of amateurs in the Gloucester County area feel there is a need for an open repeater that will cover the South Jersey area and be in operation 24 hours a day, seven days a week, to serve amateurs under routine as well as emergency situations. Our prime goal is to have a dependable machine. After we achieve this goal, we would like to add features which will make the machine more valuable to the amateurs who use it (auto-patch, time-signals).

At present we have a Motorola base station which consists of an exciter with a 5894 in the output stage which will deliver 90 watts. This drives the final amplifier having two 2021's in the output stage, and which will deliver between 250 and 300 watts output. The receiver is a crystal-controlled, dual conversion type, having the front end tuned using seven cavities. The transmitter, receiver and power supplies are of the commercial service type, with ratings intended for use on a 24-hour a day basis. The control circuitry and timing circuitry consists of a time-out timer to shut the transmitter down if held in continuous operation for more than 3-minutes. An identification time initiates the CW identifier once every five minutes. A two-second hang timer holds the transmitter on after the receiver has dropped. All control circuitry timers are NE555 integrated circuit timers. The CS identifier is a programmable, random access memory. The timing and control circuits also contain all of the audio mixers and level controls, including the CW speed and tone controls. The transmitter, its power supplies, and all the control circuitry are housed in a six-foot enclosed rack with all of the critical voltages and currents metered. The receiver and its power supply are located at a remote site at the base of a sixty foot telephone pole. On top of the pole is a four-pole antenna with all of the poles facing in the due-east direction to give a cardioid pattern from Barnsboro, east.

The receiver's output is fed via telephone lines to the transmitter site. Superimposed on the telephone lines is the bi-directional output voltage from the COR which operates a polar relay in

Repeater (Cont'd.)

the transmitter's control circuitry. When a signal is received and opens the squelch at the receiver site, the polarity of the DC voltage on the telephone lines is reversed, causing the control circuitry to turn the transmitter on and transmit the audio coming from the receiver. The receiver site is approximately one mile from the transmitter location. As the repeater operates, receiving and transmitting simultaneously, with the transmit frequency being displaced from the receiver by only 600 Khz, this distance is required in order to isolate the receiver from the transmitter. The transmitting antenna is identical to the receiving antenna and is set up to give the same area of coverage.

The Barnsboro Repeater has six monitoring control stations. One or more of these will be monitoring the machine 24 hours a day, seven days a week. In case of difficulties they are allcapable of shutting the machine off until repairs can be made.

From preliminary tests conducted from the transmitter site, it appears that this machine will be able to cover to Wilmington, Delaware in the south, Burlington in the north, and somewhere between Hammonton and Atlantic City to the east.

We are now in the process of finishing the control circuitry and erecting the receiving antenna. We believe that we should have the license from the FCC by the first of the year. The machine should be on the air by the second week in January. We have offered the use of the Barnsboro machine to the Gloucester County A.R.E.C. to operate weekly nets and hold emergency drills. The repeater will always be open to emergency traffic when necessary. By summer, 1975, the transmitter and receiver locations will be able to operate during power failures with the use of auxiliary generators now under construction.

The group sponsoring the Barnsboro Repeater feels that this machine is necessary in order to fill the communications gap in Southern New Jersey. We feel that it will provide good day-to-day communications as well as emergency communications when needed. We also believe that it helps to fulfill the goals of amateur radio and help build good will among the amateurs in South Jersey.

Chic Naylor

WA2USI

TRANSISTORS ARE A GIRL'S BEST FRIEND

ARNS Roulette Contribution by WALFBE from the Mt. Tom Amateur Repeater Association's INTERMOD.

Diamonds are, as you probably know, the hardest material known to man. Five times harder than corundum, in fact. And the hardest synthetic substance we've yet learned to manufacture (cubic boron nitride) is only about half as hard as diamond.

What you may not know is that diamond is also the best conductor of heat--much better than silver or copper, which are the best metallic conductors. That is assuming you're dealing with a perfect single crystal of diamond. Which tends to be a trifle expensive.

Most conductors of heat are also good conductors of electricity. But not diamonds. Diamond is an electrical insulator.

Now what possible use can you think of for a substance that is an excellent conductor of heat, but a lousy conductor of electricity? A heat sink for semi-conductors--right? Give the gentleman a prize. And that is indeed what seems to be ahead for semi-conductor technology, at least according to Scientific American for August 1974. Not only diamond as a heat-sink or sub-strate for mounting semi-conductor devices. But semi/conductors fabricated from diamond itself.

Transistors Are (Cont'd.)

Theoretically there's nothing complicated about it. In its natural state, diamond is an insulator. But by "doping" it with impurities, just as we do with silicon and with germanium, we can make it into a semi-conductor. And a transistor made in this way would operate at much higher temperatures than ones made from silicon and germanium because diamond is such a good conductor of heat.

There's just one small snag. You have to start with a perfect diamond crystal. And we don't know how to grow them yet. But don't hold your breath--technology marches on.

Who knows, one of these days in the near future, the best wedding anniversary gift for the YF may be one of your junked transistors. And unmarried amateurs may prove to be even more attractive to the opposite sex than they are now.

So--save those transistors. One of them may be a diamond.

Just a little line to
remind you that the
meeting is January 8th!
not the 1st

P.S. I am sorry Bob Dook about last
month not giving you a by-line.
B.F.

Extract From Recent FCC Proposal

(Draft, January QST editorial)

Establishment of two new classes of amateur license, plus sweeping changes in licensing procedures — as well as frequency, power and emission privileges — are encompassed in the long-expected "restructuring" proposal released by the Federal Communications Commission early in December. The new architecture of Docket 20282 responds to some 35 rule-making petitions which have accumulated in the past several years, and generally reflects specific items mentioned by FCC personnel in appearances before amateur groups the past year or so.

As anticipated, FCC says we should have two routes of incentive licensing. One would be the present basic hf ladder of Novice to General to Advanced (and Extra). It is termed Series A, or the "short-wave" domain, defined as below 29 MHz. The second would be an expanded vhf-uhf progression with a new "Communicator Class" as the entry point to feed Technician ranks, and, beyond it, an "Experimenter Class" — a sort of "super-tech," paralleling the Advanced level. An amateur would thus have to hold two types of license authorization to operate both below and above 29 MHz. The Extra Class would remain the top objective; the holder of both the Advanced and the Experimenter grades would need only the 20 wpm code test as a final hurdle.

For the Novice there are two significant changes proposed — a five-year license, and 250 watts plate input! His vhf counterpart, the new Communicator, would be permitted identical power, but limited to F3 emission where permitted on all bands above 144 MHz. All exams would normally be by the volunteer examiner system for both classes (see later comment on new procedures).

Proposed Changes in Privileges

The General Class would have all present frequency privileges below 29 MHz, but FCC would impose a limitation to A1, A3, and F3 emissions only — no more SSTV, RTTY or other less-usual modes. Power for this and higher classes would henceforth be measured in output, 500 watts PEP for Generals. The Technician would be permitted the same three modes of emission on frequencies where authorized above 50 MHz, with the same power limitation. The Conditional would disappear as a separate name, and become a special "C" endorsement on General licenses, while a "D" endorsement would indicate a mail exam passed by a handicapped individual. In such cases the licenses are termed "conditionally issued."

The Advanced Class makes out well — 2000 watts PEP output, with all modes of emission available below 29 MHz; he gains the voice subbands formerly limited to Extras, and is excluded only from the low-end cw segments. The parallel Experimenter similarly has all privileges, but above 29 MHz, and identical power. Both exams may be taken by mail if physical handicaps or distance from an exam point are judged by FCC to be a sufficient travel hardship.

The Extra Class (the prefix "Amateur" is dropped) would still be king of the hill, of course, though with some changes: he gets the increase to 2 kW output — plus a lifetime operator (but not station) license! — but will have to share his formerly exclusive phone segments with Advanced licensees.

Conversion Equivalents

"Grandfathering" procedures are fairly liberal, but a few privileges still will be lost in addition to the Advanced-Extra switch just mentioned. On application the Advanced can pick up an Experimenter Class "for free" so as to retain all frequencies previously available. The General (and Conditional) will obtain the corresponding Technician grades without extra exams, but will lose 29.0-29.7 MHz — and the right to use slow-scan, radioteletype and any other emissions not falling into the A1, A3 or F3 categories unless he tackles the Experimenter or Advanced Class. Also, his 500-watt output limitation won't quite equal the present kW input measurement. The top section of 10 meters obviously is being held out as a carrot for Techs to upgrade to Experimenter. Present Techs will be grandfathered (upon application) with Novice privileges, however; only new ones after adoption of the proposal will be limited to above-50 MHz.

Examination Procedures

Present Elements 2 (basics of law and theory) and 3 (general practices and regulations) would be split into A and B parts, and expanded as necessary to cover the techniques applying to each of the two spectrum divisions.

New procedures on exams by mail would require two volunteer examiners, neither related to the applicant, both 21 years or older, and at least one licensed at a higher level in the same track. Generals could no longer be principal examiners; an Extra could give any exam, but (broadly speaking) an Advanced would be required to give Novice and General (C) exams, and an Experimenter for Technician (C) exams. Any of the three top grades could proctor a Communicator exam. Licenses obtained by mail exam procedures with (C) endorsement are "conditionally issued" and would be good for one five-year term only; no renewals except in the case of the handicapped, where reaffirmation of physical condition is necessary. Novice and Communicator grades, however, will be renewable upon affirmation that the holder still meets all the rules requirements and standards for the license held.

Writing these QST pages more than two weeks past normal deadline has not permitted time for thorough analysis nor space for many miscellaneous details. We have noted several other items in the proposal — for example that station licenses other than the basic "primary" and "second" classes would be issued only to certain operator grades; a club station would require an Advanced or Experimenter, depending on which portion of the spectrum operation was intended, and repeater, link and space stations would require an Experimenter licensee.

Copies of the complete text of the FCC proposal are being sent to League officials and to all affiliated radio clubs. The Commission has allowed six months for study and comment, so there is time to make a careful and rational appraisal before formulating conclusions. The annual meeting of the ARRL Board of Directors will undoubtedly make this docket a main subject of discussion, but it is unlikely that a final position will be adopted so early in the available comment period.

More details next month.