HAM HUM

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No. 6

NEXT MEETING

Next meeting of the Ak-Sar-Ben Radio Club, Inc. will be held at 8:00 P.M. on July 8th at the 4-H Building, Ak-Sar-Ben Field.

Program will consist of several Telephone Company films.

HAM HUM is the official organ of the Ak-Sar-Ben Radio Club, Inc., of Omaha, Nebraska, mailed monthly to all members and to others upon request.

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June 13, 1966

Dear Dick:

Surely do enjoy Ham Hum and glad to see your use of Florida Skip excerpts. Was fortunate in getting my call changed from WA4RYG to W4GDK. Perhaps you could change your mailing slip.

Item: Many have trouble tinning a soldering iron. I've found out how to do it. File the iron shining clean. Then plug it in and as soon as it will melt solder, turn the iron off and plate the iron with solder. In this way the iron's excess heat will not run the solder right off. As soon as the coating is complete you can turn the iron on and go to work. Come and see us again, Dick.

73,
Jim Wilson, W4GDK
Ft. Lauderdale, Fla.

****

NEWS ITEM

Pat Nolan, Boys Town Counselor, received his novice license. His call is WNØPCD.

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June 14, 1966

Hi Gang:

Received my Ham Hum today and sure glad it came. I've moved my QTH to 2734 North Washington, El Monte, California 91733. Will let you know what my 6 call is as soon as I receive it. If any of the Omaha or Council Bluffs gang hear me would sure be glad to chew the fat with them. Worked Art, WØFQB and Ray, KØCVA and Al, KØTUS. The old set-up is working fine. Got hold of an E-Z Way crank-up, tilt-over tower for a song. Hi!

73
Orin W. Miller,
WØSEE/6

****

AD

Have some more pre-1956 issues of Radio Electronics and other publications. These contain a wealth of technical data. They are gratis and first come, first served. Call me at 556-1538 or 551-0669, ext. 518.

John, WØWRT

****

CANOE RACE

The South District Explorer Canoe Race was held on 4 June 1966. This was a 58½ mile race on the Platte River from Camp Eagle to the 73-75 Highway bridge.

Fifteen canoes started the race - 12 finished. Relays were made at Two Rivers, Linoma Beach and Highway 50.

The river was very low which slowed the race from the previous year. The fastest canoe made the run in 11 hours 28 minutes and the slowest in 14 hours 15 minutes. Troop #95 of Bellevue manned the winning canoe. Only 10 minutes separated the first five canoes.

Mr. Larry Steen, in charge of this year's race, expresses his thanks to the AK-SAR-BEN Radio Club for the help given on the race.

The canoes were observed and reported from 10 points. The following people participated:

Dick Eilers	WØYZV
Fred Fischer	WØEGP
Kurt Fischer	
Hugh Tinley	KØGHK
Royal Enders	KØLYO
Ed Donze	WØYEV
Joe Roberts	KØKEO
Lou Cutler	WØVLI
Harold McClenahan	WAØDGA
& Evie XYL	
Byron Smith	WAØICK
Don Evans	WAØLMA
Jim Knudsen	WAØMHF
Jan McAleer	WAØLLQ

Royce E. Johnson, WAØKIL
Race Committee Chairman

****

Owensboro, Ky.--General Electric Company has introduced a new experimenter kit--ETR-4288--for electronic service technicians and hobbyists.

The kit, which sells for less than $1, can be used to quickly assemble and wire many different simple electronic circuits described in popular electronic hobby manuals, as well as in the newly revised G-E Hobby Manual.

The kit consists of a 3½ by 4½ inch terminal board, rubber mounting feet, and more than a dozen push-in terminals. Component wires can be attached to the terminals with or without soldering.

The terminal board provided was sized to fit many small metal boxes in which the circuits will eventually be housed. This board can be easily cut to fit smaller housings, or two or more boards can be fastened together.

The Experimenter Hobbyists Kit is now available at most General Electric electronic components distributors.

****

FREE!!

A 2000 ohm headphone set (Suprex Sensiphone) free with purchase of Four Dollar Plug

or/and

An Allied Code course with ten lessons on 33-1/3 RPM record free with a purchase of a Six Dollar ten lesson instruction book.

Call 393-0564
Bill Fries, WNØMNO
(Mighty Nervous Operator)

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THE FATAL CURRENT

Strange as it may seem, most fatal electric shocks happen to people who should know better. Here are some electro-medical facts that should make you think before taking that last chance.

IT'S THE CURRENT THAT KILLS

Offhand, it would seem, that a shock of 10,000 volts would be more deadly than 100 volts. But this is not so! Individuals have been electrocuted by appliances using ordinary house currents of 110 volts and by electrical apparatus in industry using as little as 42 volts direct current. The real measure of shock's intensity lies in the amount of current (amperes) forced through the body, and not the voltage. Any electrical device used on a house wiring circuit can, under certain circumstances, transmit a fatal current.

While any amount of current over 10 milliamps (0.010 amp.) is capable of producing painful to severe shock, currents between 100 and 200 ma (0.1 to 0.2 amp.) are lethal.

Currents above 200 milliamps (0.2 amp.), while producing severe burns and unconsciousness, do not usually cause death if the victim is given immediate attention. Resuscitation, consisting of artificial respiration, will usually revive the victim.

From a practical viewpoint, after a person is knocked out by an electrical shock it is impossible to tell how much current passed through the vital organs of his body. Artificial respiration must be applied immediately if breathing has stopped.

THE PHYSIOLOGICAL EFFECT OF ELECTRIC SHOCK

Chart 1 shows the physiological effect of various current densities. Note that voltage is not a consideration. Although it takes a voltage to make the current flow, the amount of shock current will vary, depending on the body resistance between points of contact.

As shown in the chart, shock is relatively more severe as the current rises. At values as low as 20 milliamps, breathing becomes labored, finally ceases completely even at values below 75 milliamps.

As the current approaches 100 milliamps, ventricular fibrillation of the heart occurs - an uncontrolled twitching of the walls of the heart's ventricles.

Above 200 milliamps, the muscular contractions are so severe that the heart is forcibly clamped during the shock. This clamping protects the heart from going into ventricular fibrillation, and the victim's chances of survival are good.

DANGER - LOW VOLTAGE!

It is common knowledge that victims of high-voltage shock usually respond to artificial respiration more readily than the victims of low-voltage shock. The reason may be the merciful clamping of the heart, owing to the high current densities

associated with high voltages. However, lest these details be misinterpreted, the only reasonable conclusion that can be drawn is that 75 volts is just as lethal as 750 volts.

The actual resistance of the body varies depending upon the points of contact and the skin condition (moist or dry). Between the ears, for example, the internal resistance (less than skin resistance) is only 100 ohms, while from hand to foot it is closer to 500 ohms. The skin resistance may vary from 1000 ohms for wet skin to over 500,000 ohms for dry skin.

When working around electrical equipment, move slowly. Make sure your feet are firmly placed for good balance. Don't lunge after falling tools. Kill all power and ground all high-voltage points before touching wiring. Make sure power cannot be accidentally restored. Do not work on underground equipment.

Don't examine live equipment when mentally or physically fatigued. Keep one hand in the pocket while investigating live electrical equipment.

Above all, do not touch electrical equipment while standing on metal floors, damp concrete or other well grounded surfaces. Do not handle electrical equipment while wearing damp clothing (particularly wet shoes) or while skin surfaces are damp.

Do not work alone! Remember, the more you know about electrical equipment, the more heedless you're apt to become. Don't take unnecessary risks.

PHYSIOLOGICAL EFFECTS OF ELECTRICAL CURRENT

WHAT TO DO FOR VICTIMS——

Cut voltage and/or remove victim from contact as quickly as possible - but without endangering your own safety. Use a length of dry wood, rope, blanket, etc., to pry or pull the victim loose. Don't waste valuable time looking for the power switch. The resistance of the victim's contact decreases with time. The fatal 100 to 200 milliampere level may be reached if action is delayed.

If the victim is unconscious and has stopped breathing, start artificial respiration at once. Do not stop resuscitation until medical authority pronounces the victim beyond help. It may take as long as eight hours to revive the patient. There may be no pulse and a condition similar to rigor mortis may be present; however these are the manifestations of shock and are not an indication the victim has succumbed.

TEKTRONIX SERVICE SCOPE
de ARNS Bulletin

****

FOR SALE

Homebrew 7 element 6 meter beam $25.00.

This beam, with only 50 watts, was used to work 48 states, VP7CX, and H18XHL.

Call Paul N. Kriebs, WAØEIM
556-8029

****

FOR SALE

Complete station ready to go on the air. (Like new - used very little.)

Galaxy III and AC Power Supply
Deluxe Accessory Console
SB-44 Mike
18-HT Hy-Tower Antenna
All cables and odds and ends
Teleprinter and Terminal Unit.

First $500.00 takes all!!!!

Peter C. Trapolino,
WØJHU
1513 So. 98th St.
Omaha, Nebraska 68124
Phone: 391-4762

****

The National Bureau of Standards radio station WWV will be removed from Greenbelt, Md. to Fort Collins, Colorado during 1966. This is part of a long-range program to bring together all major time and frequency broadcast facilities into a central complex near the NBS Radio Laboratories in Boulder. Plans call for construction of 8 Transmitters for the new station. These will include four designed for 20 kw at 5, 10 and 15 MH_Z with one standby transmitter and four designed for 5 kw at 2.5, 20 and 25 MH_Z with one standby transmitter. Normal transmissions will be at one-half the designed pow

(de OOB)
de Splatter
Yellowstone A.R.C.

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PART I

ABOUT ANTENNAE

written for CROSSTALK by
Jim Peck W2LVW

It should be obvious to every amateur that the antenna system is about the most important part of his radio system. Without it the radio system won't work, and without a proper antenna system, the radio system will not work at peak performance.

It should be equally obvious to every amateur that the antenna system is common to both his transmitter and his receiver; any change made to the antenna will effect both his transmission and his reception. Which brings me to one of my pet topics: the economics of the radio system. We can help our talk range (the normal distance of operation) by raising or doubling our transmitter power. This is expensive and effects only our transmission; it does not effect our reception. On the other hand, we can change the antenna so that it will effectively double our transmitting power while at the same time almost double the amount of signal that will be received. (Later on, it will be seen how this is accomplished) Therefore by changing our antenna system, we help both the transmission and the reception of signals. Generally speaking, it costs a lot less to install a good antenna than to raise the power of a transmitter.

What is an antenna? Well, that sounds like a really stupid question...but we will still devote a bit of space to it here. The antenna is the portion of the antenna system found at the top of your tower which is supposed to radiate energy out into space and also collect energy from space. It may be a simple dipole, or it may be a complex multi-element array. It takes radio energy from the transmission line and radiates it into space, and also collects radio energy from space and feeds it down the transmission line to your receiver. This is all that any antenna is supposed to do, is designed to do, and can do!

We can see that the antenna changes radio energy contained in the transmission line into radiated energy and vice versa. What is remarkable about this is how efficiently it does this. Whereas a light bulb commonly used around the house is only about 20 per cent efficient in changing electrical energy into light energy, the antenna system is almost 100 per cent efficient. The only losses are the so-called copper losses. (There are others,

but too technical for the purposes of this article) Other losses come from such things as skin effect, insulator diaelectric, eddy currents, etc. But, the antenna is a pretty efficient device compared to most things which we find in amateur radio. Take it for granted that the antenna radiates better than 95 per cent of the watts which reach it from the transmission line. (This should show some of you the importance of "matching" the line to the antenna.)

Well, already it has become quite obvious that unless the antenna is properly matched, then it cannot accomplish the job it should. In our automobile we know that the gears must match if we are to transmit the maximum power to the wheels. The same thing is true of matching the transmitter, the transmission line, and the antenna. We match the output of the transmitter to the coaxial line or whatever line we are using by adjusting or tuning the output circuits. Since the standard in amateur radio seems to be around 50 ohms, we will use this figure here. Let's connect a 50 ohm coax to our transmitter and put a 50 ohm dummy load at the other end of the line. (Everyone should have a 50 ohm dummy load) By use of a wattmeter we can read the power at the output of the transmitter and also at the end of the transmission line. The power difference is the loss in the cable; and we can do nothing about this; so, don't even worry about it. If the dummy load perfectly matches the line, all the power that reaches the dummy load will be dissipated. No power will be returned (reflected) back to the transmitter because it is all consumed...either in the line or the dummy load. This is what a good antenna will do for you. Now, let us assume that the load has changed to say 25 ohms. It becomes like a gear in our car which has half its teeth missing and can't accept all the power from our transmission line. The part that it cannot accept is rejected by the antenna and is sent back and forth down the line to the transmitter. This sets up a fixed wave pattern along the line which we can measure, and which is called the standing wave ratio (SWR) or the voltage standing wave ratio (VSWR). This ratio expresses the degree of match between the line and the load, whether that load is a dummy or an antenna. When the VSWR is 1 to 1 (1:1), we have a perfect match. When the VSWR is 1.5 to 1, the per cent reflected power is only 4 per cent; or, in other words, 96 per cent of the power reaching the antenna is being radiated.

Before we can explain a few more things further on, we will just review some basic terms which we normally use almost daily...wavelength, frequency, and velocity. We know that a radio wave travels at the same speed as light, around 186,000 miles per second--or nearly a billion feet per second. This is its speed or velocity. We also know

that this radio wave oscillates or alternates from a plus to a minus back to a plus, etc. This variation from plus to minus to plus we call a cycle, since like a wheel it keeps repeating itself. Now the number of cycles it goes through in one second we call frequency. If we know the frequency (which we can measure), we can then find out how far the wave travels in one cycle by dividing the speed by the frequency. We call this distance the wavelength; and we generally express it in feet or inches. Half of this distance or the distance between a plus and a minus change in the wave is called the wavelength. The following rundown will give most of you a mental image of the relative sizes of antennas involved at the different frequencies (bands):

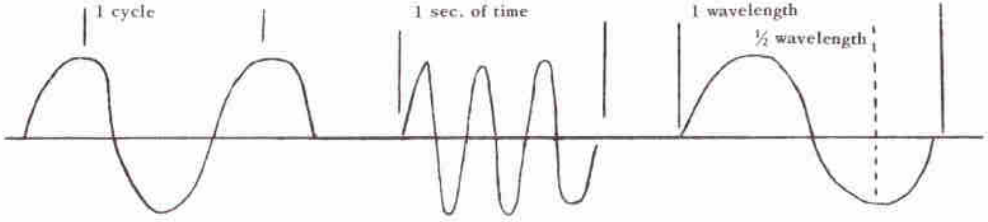
On the 75 meter band, the approximate size of a half-wave dipole will be 130 feet.

On the 40 meter band, the approximate size of a half-wave dipole will be 65 feet.

On the 10 meter band, the approximate size of a half-wave dipole will be 16 feet.

On the 6 meter band, the approximate size of a half-wave dipole will be 9.8 feet.

On the 2 meter band, the approximate size of a half-wave dipole will be 3.35 feet.



A cycle completes itself in going from a plus through a minus back to a plus.

The number of cycles in one second gives us the frequency.

If we divide the speed by the frequency, we find the distance the wave travels in one cycle. This we call the wavelength.

THE HALF-WAVE DIPOLE: This is the antenna which is used as the standard for all antenna reference tests. All gain references given by all manufacturers are in relationship to the half-wave dipole. This is the most basic antenna used by amateurs. The half-wave dipole is simply a straight conductor of wire, rod, or tubing that is electrically one-half wavelength long and is generally "fed" in the middle. It radiates at maximum intensity in the middle of the dipole at right angles to its length, and at a minimum intensity at its

ends. The dipole antenna is generally cut or adjusted in length to the desired frequency because it radiates best when it is resonant at the frequency you wish to operate at most efficiently. Furthermore, the electrical half-wavelength is generally a few per cent shorter than the physical half-wavelength in order to allow for what is called "end effect" of the conductor. A rule of thumb for the length of a half-wave dipole antenna is:

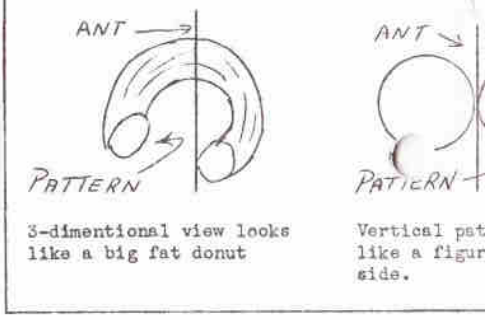
$$\text{Length (in feet)} = \frac{492}{\text{freq. in mc's}}.$$

This formula says...a half-wave dipole at 3.5 mc's is around 130 feet long, while at 145 mc's, it is about a foot long. It is a good idea to keep these lengths in your mind when you start talking about stacking antennas on towers, etc. More will be mentioned about this later.

ANTENNA POLARITY: Antenna polarity simply refers to how the antenna is positioned or oriented. If the horizontal element is vertical, then the antenna has a vertical polarization; if horizontal, it has horizontal polarization. The thing to keep in mind here is that there is a great loss when one fellow uses one method and the fellow he is trying to work is using the other method of polarization. You both should be using the same polarization for maximum results.

ANTENNA RADIATION PATTERNS: All antennas have a given three-dimensional radiation pattern. If the radiation were equal in all directions, the pattern would be that of a ball or sphere. If we cut the ball or sphere vertically, we would have the vertical pattern and it would be a circle. If we cut the sphere horizontally, we would have the horizontal pattern; and it would also be a circle. At this point, we could make the statement that the vertical pattern was omni-directional, and that the horizontal pattern was omni-directional, and that the two were equal.

This new word used above could bear a little explaining. Omni comes from the Latin word "omnis" which means all. It is the combining form meaning all. So, in our case, we mean that the antenna has a pattern in ALL directions. Now with a theoretical explanation, this is always possible; but in actual practice, there is no such animal as an omni-directional antenna. Our dipole mounted vertically has a three-directional pattern as shown in the drawing and has all the earmarks of a large fat donut. Looking at it horizontally, it appears like a figure 8 on its side.



3-dimentional view looks like a big fat donut

Vertical pat like a figur side.

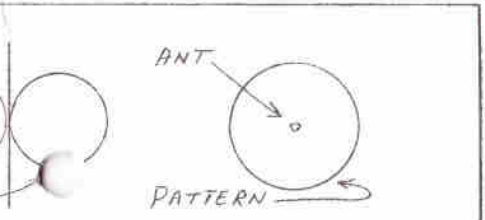
Every amateur who ever worked DX has heard about vertical-patterned antennas and the inherent low angle of radiation. This works out really fine on the lower bands where you are interested in the greater distances involved. On the upper bands, this is no longer a factor and other things become more important.

ANTENNA GAIN AND PATTERN: Antenna gain and pattern shape are tied together and you can't change one without changing the other to some extent. Since gain is a relative thing, we must have something to compare it to. As stated a bit earlier, this is the good old half-wave dipole again. The half-wave dipole has become the standard reference antenna. The gain of a half-wave dipole antenna is stated as a gain of one or unity, or zero db (0 db.)

Here we go again with Daisy Belle. A lot of fellows would quit right here and say that this is too technical for me and no use of reading any more. Well, just stick around a bit more. This is not supposed to be a technical article. The decibel (db) is used to compare one power level with another. For example, say we have an antenna that has twice the power gain of a half-wave dipole. Here is a small chart in which all of the math work has already been done for us and all we have to do is use it. Looking at this chart we see that if an antenna had a power gain of two, it is 3 db better than the reference antenna. So, the next time you run across a figure of 3 db, it means that this antenna has a power gain over a half-wave dipole of 2. The rest of the chart now seems to be a little bit simpler.

POWER RATIO	=	DB
0.10		-10
0.20		-7
0.40		-4
0.50		-3
1.00		0
2.00		3
2.50		4
4.00		6
5.00		7
8.00		9
10.00		10

DB	=	POWER RATIO
-10		0.10
-7		0.20
-4		0.40
-3		0.50
0		1.00
3		2.00
4		2.50
6		4.00
7		5.00
9		8.00
10		10.00



attern looks
ure 8 on its

Horizontal view looks like (and is) a perfect circle from the antenna.

The references used here below 0 db are just in order to try and show how this ratio can be used for low power or high power. For instance, the next step in the plus direction would be 100 for a power level which would become 20 db. So this can be used by someone who never even heard of logs and antilogs.

de Crosstalk

PART II - a discussion of antenna gain; an explanation of phase relationship; shorted and open lines; reactance and resistance - will appear in the next issue of Ham Hum.

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OFFICIAL BULLETIN NR 65 FROM ARRL HEADQUARTERS NEWINGTON CONN JUNE 16 1966 TO ALL RADIO AMATEURS BT

A reciprocal operating agreement becomes effective immediately between Israel and the United States. Amateurs of one country visiting or residing in the other may obtain permission to operate their own amateur stations there. The United States has previously reached reciprocal agreements with Australia, Belgium, Bolivia, Canada, Colombia, Costa Rica, the Dominican Republic, Ecuador, France, Luxembourg, Paraguay, Peru, Portugal, Sierra Leone and the United Kingdom. Many others are being negotiated and successes will be announced as they occur AR

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ARRL Directors and Vice Directors

With all the complaints bantered about in reference to Directors of A.R.R.L. being rubber stamps, there still remains lack of cooperation among the membership. I don't think any Director of A.R.R.L. has sufficiently developed his extra sensory perception to the extent that he knows what is in your mind to attempt to confront the other directors with it at headquarters. Neither do I think he is a mind reader, in spite of the fact he is probably dedicated to Ham Radio and A.R.R.L. by reason of his election to this wholly thankless job.

What can you do? Sit down and bombard him with ideas by mail. How the heck can he represent you if he don't know what you want? This kind of representation is by innuendo and even by that they probably haven't been too far off base. Most of the soap box drivel via the microphone is just so much hogwash.

Each of us want the best available for Ham Radio, but what are we contributing toward that goal remains the good question. Lay it in the hands of A.R.R.L. via your Director or direct to headquarters. You did vote the Director into office. What for but representation from your district? There are many possible changes that could be made in our field to the betterment of Radio as a whole, maybe you are one of the dyed in the wool segment of Radio that don't believe in another form of enjoyment except that form. Well, speak up for that portion but this is not to detract from the other man's particular segment. Be a constituent with co-

operation and I'LL bet A.R.R.L. will be too. Remember they are protecting you, their organization and their job.

de Signal Report, Fla.

****

FOR SALE

Lafayette HE-45A 6 meter transceiver with crystals. Good condition. Call Red Timmerman, 339-3584

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Collins 75S-1 and 32S-1 with New 6146Bs.

Damon B. Nuckols, WØUIO
393-3923 or 344-2349

****

OFFICIAL BULLETIN NR 66 FROM ARRL HEADQUARTERS NEWINGTON CONN JUNE 23 1966 TO ALL RADIOS AMATEURS BT

At the conclusion of the 1966 Field Day, June 25 and 26, clubs and individuals are urged to promptly report their results to ARRL. Page 53 of June QST gives the proper form for a Field Day summary. This must be accompanied by Field Day logs and postmarked no later than July 26. Photos of your setups and comments on your activity are welcomed. Please mail by July 26 to ARRL, 225 Main Street, Newington, Connecticut 06111 AR

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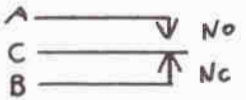
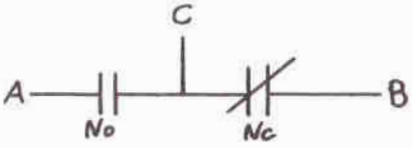
SHORT CIRCUIT LINES

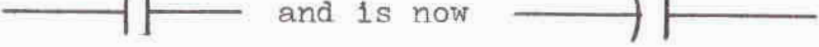
Here we go again with more changes (not improvements?). The schematic symbols for relays have been changed from:



to



Actually these symbols have been in use for some years by the military and are just beginning to find their way into commercial schematics. Think you will confuse these with capacitor symbols? Nope. The small capacitor symbol has been changed also. It used to be:



the same as the larger capacitors. The curved plate indicates the outside foil on the larger types and, in the case of polarized units, the negative lead.

de Ground Wave

****

My Pet Peeve - "Air Pollution"
by Ward Jensen, WØTLE, of Electronic Center, Inc.

A big controversy exists between AM and SSB operators as to which creates the most QRM on the bands. In spite of much argument to the contrary, I am inclined to feel that both are equally guilty. Since I am most interested in perpetuating SSB, I am aiming my remarks in their direction.

Much of the splatter and other poor signals I hear are due to lack of understanding, which, in turn, is partly due to statements made in equipment instruction manuals regarding tune-up and mike gain settings, etc. For instance, many of the manuals tell the operator to tune-up and load for a given plate load, switch off the carrier, and then advance the mike gain until the meter averages 1/2 to 2/3 the tune-up reading. In many cases, this is too much. If the rig does not have "ALC," it will splatter badly. If it does have ALC, it may not splatter but will not sound good because so much mike gain is being used that room noises, breath noises, and general background noises are transmitted, and the signal in general will not have a good "peak-to-average-ratio," and will sound mushy.

What is "ALC" anyway? The term was originally meant to define Automatic Load Control. However, this is somewhat nebulous and the term load controlled, or grid current controlled gain might be more explanatory. At any rate, most of the present systems make use of small pulses of grid current from the grid return circuit of the final stage which are rectified and applied to the driver stage or stages to reduce or hold down their gain. Since most exciters, transceivers, and many linears show maximum output at the point wh[illegible] grid current just starts to flow, t[illegible] use of these grid current pulses will begin to reduce the drive gain at this point. This then limits the exciter or linear's output to its own maximum output - strange paradox! Actually, if the drive were not limited at this point, the output would "flat-top" due to excessive drive at saturation for the output tubes. Whatever the system used to generate the voltage to control driver gain, the system can do much to reduce splatter and has other advantages which will be apparent later.

I will also use the term "peak envelope power" (PEP). PEP means the maximum power in the envelope of a two tone signal but is equal, usually, to the rated CW power of the rig. It can be higher than this though, which might be explained by saying that advantage is taken of the relatively short duty cycle of SSB energy as compared to the 50% or more duty cycle of CW. The energy storage ability of the capacitor in the power supply can account for this. Now, let's get on with our gripe:

Giving credit to a Collins Radio bulletin. "What's Watt," of Jan, 20, 1960, they say that the Bell labs and the U.S. Signal Corps, af[illegible] thousands of measurements, came u[illegible] with some peak-to-average power ratios for the human voice, namely 13.8 to 15 db. They further state that with some form of compression or

good ALC, this ratio can be reduced to 10 db. The ratio can also be reduced by clipping, which must be followed by filtering to prevent the harmonics which are produced from radiating. It can also be reduced by "it-topping" which seems to be a very accepted practice by SSB and AMers alike! All forms of compression, including ALC, are forms of distortion. Like limited frequency response, also a form of distortion, it is simply a matter of how much our hearing will tolerate and still let us think it sounds good! In broadcasting, compression of about 3 db is all that is accepted. However, as amateurs, we can stand a bit more - say 5 or 6 db. If we use more than this, most of us will feel the signal is distorted. These latter two forms of distortion, though, are not too apt to create splatter.

Now let's consider a rig having about 100 watts output and which does not include ALC or any other compression. Such exciters will show maximum output on CW of just about 100 watts when properly tuned up and loaded. In most cases, this figure also represents the maximum output of which the rig is capable. When we switch off the carrier then, the weak power output is limited to 100 watts. Exceptions to this case have been explained above. Now, in order to operate with minimum distortion, we must prevent driving the rig into the condition known as flat-ping and since we expect the equipment to reproduce our voice inflections accurately, it will have to amplify all voice amplitudes and frequencies accurately within the limits of its filter. Since the average power in our voices is at least 13.8 db down from this 100 watts peak power, we cannot expect an output wattmeter of the type most of us use, to read more than 4.2 watts! This may come as a surprise to many of us who have been running 40 and 50 watts under these conditions - it is hardly any wonder the bands are so full of splatter!

If good ALC is used in the same rig, the ratio of peak-to-average power can be reduced to 10 db as a practical limit. Under these conditions, the same wattmeter can be expected to read a bit more. In fact, it can read 10 watts safely where before, without ALC, we are not permitted more than 4.2 watts! If we advance the mike gain control some more, we can probably get higher readings but will do so at the expense of readability and sacrifice of quality. We will also have brought up the background noise and objectionable breath noises to where the signal is very objectionable.

If we take the case of a 2KW linear, under the conditions above, we can assume a full output efficiency of about 60% and expect the peak power output to be about 1200 watts. Remember, the wattmeter will not show this much except if fully driven on CW. It is just incapable of following voice peaks of such short duration. It is attempting to read average power and will more reasonably show about 120 watts if the linear also has ALC and IF IT IS FED BACK INTO THE EXCITER TO OVERIDE THE ALC IN IT! If it does not, you had better hold down the output power on voice to 42 watts! It ought to be quite apparent that

ALC offers quite a bit of gain in average talk power - all the way from 42 watts up to 120 watts! It takes a 2KW rig to provide only 120 watts output. Rather surprising, isn't it?

If you don't have a wattmeter, you can read your plate current meter because it is an average reading instrument. Let's go back to our 100 watt rig, which, when tuned up and loaded, will run at about 180 watts input on CW. This is also its PEP input. The idling current of this rig is probably about 50 mils. The big question is what we can reasonably talk it up to without fear of flat-topping and causing splatter. Assuming a plate voltage of 800, the loaded current will be about 225 mils. If this rig has ALC and we are to limit the average power to 10 db down from here because of our speech characteristics, we would expect to put in only 18 watts which would show up as only 22.5 mils; somewhat less than our idling current. There is a catch, of course, and it is due to the variable efficiency of our linear amplifier which is the final stage in the rig. This efficiency varies between approximately 60% at full or peak power all the way down to nothing at the idling current! Since 180 watts input represents 100 watts output, 10 db down from 100 watts is 10 watts and at this output, our efficiency is down somewhere around 20%, which would require an input of 50 watts represented by an input plate current of 62 mils. This is considerably less than half scale current recommended in the instruction manual! It looks to me that the plate current cannot be allowed to kick up more than about 25% of the loaded current with ALC and probably not more than 20% without ALC!

Having gotten the above reasoning pretty well absorbed, I tried several transceivers and other low power exciters on the bench at [illegible]. The oscilloscope and wattmeter verified everything into a dummy load right under my nose! I was actually amazed to find how easy it was to flat-top these small exciters which were not equipped with ALC. Knowing that they would surely splatter and badly the way they were, I was appalled by the thought of what they would do when attached to almost any linear to say nothing of a 2KW PEP one!

WELL, FELLOWS, HOW ABOUT IT? In the interest of splatterless signals on the air, let's cut back the gain. Let's stop this horrible pollution of the bands and that's what it is - POLLUTION!

Ward Jensen, WØTLE
de Splatter, Minn.

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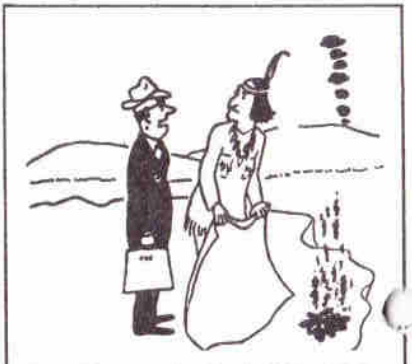


"I'm making a spot check for the FCC and I'd like copies of the last ten messages you sent . . . in triplicate, typed double-spaced."

FROM AUTO CALL

DIODES
Their Ratings and What They Mean

The P.I.V. rating on a diode refers to the peak inverse voltage that the rectifier is capable of withstanding. Just what does this mean? In simple terms it can be stated as the maximum reverse voltage that a diode is capable of having applied across its terminals before it breaks down.

HOW DO WE CHOOSE THE PROPER DIODE FOR THE JOB? Usually there will be two ratings on a silicon diode that will be of interest to us.

THE FULL WAVE POWER SUPPLY shown in figure #1 (with filter eliminated) will help with the explanation. Transformer T's secondary delivers 500 volts each side of its center tap; therefore the voltage between points A and C is 1000 volts. At any given point on the AC cycle, only one of the two diodes will be conducting. This means that each diode must be capable of handling the entire current drawn by lead R. Looking at the diagram, we see that D1 and D2 are connected back to back across the secondary of transformer T, or across the entire 1000 volts. With one diode conducting, this puts the entire reverse voltage of 1000 volts across the other diode. Even though the output voltage of the supply will be approx. 500 volts, D1 and D2 should have a P.I.V. rating of at least 1000 volts.

THE FULL WAVE BRIDGE POWER SUPPLY shown in figure #2 presents a little different situation. At any given moment on the AC cycle here we have two of the four diodes conducting; either D1 and D4 or D2 and D3. Careful analysis of the circuit will show that both of the conducting diodes are in series with load R; therefore each must be capable of handling the entire current drawn by R. Here again we have two diodes back to

FIGURE #1

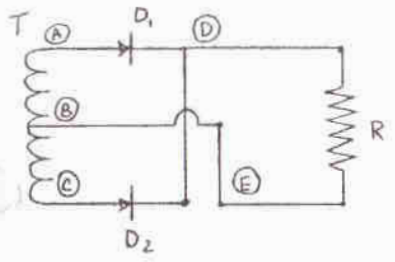
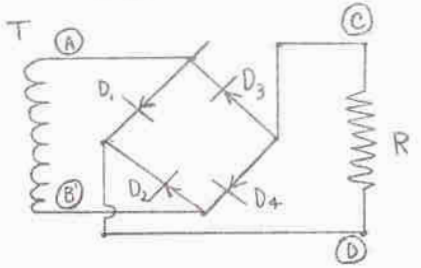


FIGURE #2



back across the secondary of T, and the same rule applies here as it did in the full wave supply in so far as the P.I.V. rating is concerned. In the bridge supply the DC output will be near 1000 volts but must remember not to exceed the primary rating of the transformer in use. Normally this will mean that only ½ the current should be drawn from the secondary; however in the case of a transformer with several windings (filament, bias, etc.) where these windings are not being used, the primary is usually rugged enough to withstand the extra current being passed through it.

de Crosstalk

****

DEAR GLADYS

Guess what, Clyde has a shack! I think the brick rig did it. After he saw it, he said what he needed was a room all of his own, so I wouldn't worry so much about making his rig pretty.

It's easy to build a shack, Gladys. All they need is a Florida room or a carport, two weeks' vacation, and an F.H.A. home improvement loan for a $1,000. And two neighbors to help and six to stand around and give advice, and one wife as a sort of trotting day laborer.

And a case of beer at frequent intervals and a massage unit, and Blue Cross. And a well-rounded vocabulary of swear words and neighbors with a large variety of power tools.

And a friend who can get things for you wholesale. . .but of course he tells you after you've bought whatever it was at list price, and a keg of nails, some to use, some to scatter around, and half to keep in the utility room to rust in the keg.

When he had finished it, he said he saved about $500 by doing it himself. I had to pull him up out of chairs for two weeks and I believe he's reading truss ads.

He's still looking for the dog whose feet fit the paw prints in the new cement.

Love,
Mabel

P.S. Why don't you and Homer come down the weekend of the 15th? You can see the new shack and then we can all go to the Orange Bowl for the Chinch Bug Festival.

de Florida Skip

****

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OFFICIAL BULLETIN NR 63 FROM ARRL HEADQUARTERS NEWINGTON CONN JUNE 2 1966 TO ALL RADIO AMATEURS BT

As a result of studies and recommendations by the Amateur Radio Service Subcommittee of the National Industry Advisory Committee, FCC on May 26 issued public notice approving all outstanding RACES

plans as interim plans for the Amateur Radio Service. To that end, state and local civil defense directors should submit two copies of present RACES plans to their region- director, Office of Civil Defense, later than Aug 1, 1966, for transmittal to NIAC. Others are also requested to submit requirements for amateur emergency communications services to the Executive Secretary, NIAC, FCC, Washington, D.C. by Aug 1, 1966. July QST ARPSC will have full details AR

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The Old Grouch

Anonymous Unknown
c/o Editor, Auto-Call
2509 - 32nd St., S.E.,
Washington, D.C. 20020

Last October, in this column, I broached a subject which should, in my opinion, receive considerable attention AND ACTION. It is the increasing prevalence of unauthorized intruders or interlopers on some of our amateur frequencies.

Some evening when you don't have a schedule to keep and want to do something different, take a couple of hours to listen, - yes, just listen, to the 3.5 to 4.0 and 7.0 to 7.3 MHz bands. Start at one end and tune slowly all the way across the entire band and log the non-amateur signals you hear. There are commercial CW stations, jamming stations, teletype signals and foreign propoganda stations on both bands, plus a lot of very peculiar kinds of signals which defy description. If you can t an identity, take time to list the ations and then write to the ARRL giving the League staff a basis for reports to the FCC and the Department of State for action looking towards ridding our bands of these interlopers.

As mentioned in my column last October, we can really complain only on stations located in Region II, but if we don't complain, there is no basis for a governmental action to get the interlopers off our frequencies.

There is a loophole which we we may be able to plug by concentrated effort in reporting on these intruders. The Geneva regulations allow an administration to assign frequencies in violation of the Table of Allocations provided no harmful interference is caused to stations operating in accordance with the Table. Thus, if we do not complain, there is no basis for our government to request correction of the condition; in fact the number of intruders would probably increase because they found they could operate there unopposed.

The Old Grouch
Auto-Call

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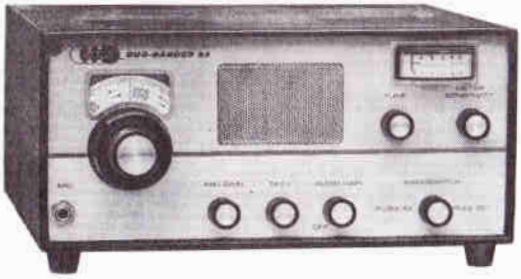

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