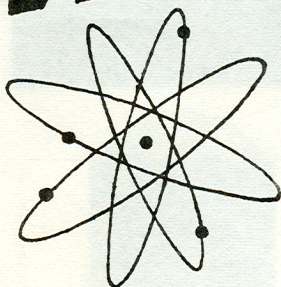


W4CA LOG



*Amateur Radio News in
The Roanoke Valley*

W4CA LOG
P.O. Box 2002
ROANOKE, VA.

U.S. POSTAGE

6c



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Route 4, Box 428 F
Salem, Va. 24153

FIRST CLASS MAIL
Address Correction
Requested

Published Monthly

SEND ARTICLES FOR LOG TO:

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5629 BRAHMA ROAD S. W.

ROANOKE, VIRGINIA 24018

PHONE 774-7726

W4CA LOG
P.O. Box 2002
ROANOKE, VA.
24009

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Some Field Day Comparisons

Year	Class	No. Contacts	Points	Standing (National)	Standing (Area)
61	4A	389	3090	65	10
62	5A	758	4308	39	5
63	5A	1199	6117	20	1
64	5A	1399	8868	5	2
65	5A	1204	7575	10	1
66	5A	1271	8363	10	2
67	5A	1503	9743	11	1

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For Sale or Trade:

Six Meter Halo, Six Meter Converter, Heathkit Mohican General Coverage portable receiver, 10 Meter Squalo.
Call Pappy, W4ZZV 343-0757

Roanoke Division Convention

The Annual ARRL Roanoke Division Convention will be held at the Statler Hilton Inn in Greensboro, N. C. on September 28-29, 1968. Registration fees will be 4.00 plus 6.00 for banquet and entertainment Saturday night.

More information will be forthcoming in a Division membership letter. Lets all plan to attend.

Technical Column.

How many of us use our transmitters and receivers everyday, but don't have the complete understanding of how our equipment operates that we should? Probably most of us fall into this category - - unfortunately.

How many of you reading this article know by number the tubes used in the final amplifier of your transmitter -- or your VFO, Modulators and so on. If you were in an emergency situation and were forced to tune up a strange transmitter, are you familiar enough with the basic tuning procedures to do so? Suppose you didn't have the instruction book, or maybe it was a home brew rig, could you get the transmitter on the air? If something other than a bad tube happened to your transmitter or receiver, would you have to send it back to the factory even after the warranty had expired? Suppose your neighbor starts complaining about TVI when you put a new rig on the air. Can you explain to your neighbor why the interference exists and what steps are necessary to prevent it, do you know, even those of you with the Extra Class? How technically qualified (or interested) are the many, many six meter Technician Class hams? oh well - off the soap box and towards better understanding. . . .

Transmitters

The simplest type of transmitter is the one used only for cw. In the simplest "one tube" cw transmitter, only two basic circuits are required. A single oscillator (probably crystal) is used. The antenna is connected to the resonant plate circuit. Nearly all conventional radio frequency oscillator or amplifier circuits have an LC tuned circuit. Usually the capacitor is variable which permits the operator to tune the circuit exactly to resonance regardless what the exact frequency may be. It is possible to have an oscillator run up to kilowatt or more in power, but this is not generally done in ham work besides the oscillator circuit there is the power supply which may use a tube, or it may be of the silicon diode variety.

The next step in more complex transmitters is one which requires two or more tubes in the RF (radio frequency) section of the transmitter. The reason for adding the second tube would probably be to increase the frequency coverage over which the transmitter could be used. The second tube probably is NOT required to increase the power output. The second tube may be operated at the second or higher multiple (harmonic) of the crystal oscillator frequency. Since most crystal controlled ham transmitters use crystals in either the 80 or 40 meter band (3.5 or 7 MHz) it would be necessary to multiply the frequency (by 2, 3, or 4) in order to have a transmitted signal in the 20, 15, or 10 meter bands in order to have an all band transmitter, one would need a three tube transmitter -- a 7 MHz oscillator, a "doubler" which increases the frequency to 14 MHz followed by another doubler (Cont on Page 2)

Technical Column (Con't from Page 1)

increasing the frequency to 28 MHz. Let us assume that we need a transmitter which has an output power of 50 watts. A tube suitable for this purpose would be a 6146 which is capable of a plate input power of 90 watts. The 6146 requires a grid drive of less than two watts. Therefore, the oscillator and first doubler can be small receiving type tubes and normally operate at very low power levels of less than five watts.

The tuning procedure for such a transmitter would follow the sequence:

1. Adjust the oscillator for maximum output voltage (tuning to resonance as indicated by a dip in plate current).
2. Adjusting the first doubler for maximum output voltage (dip).
3. Adjusting the second doubler (the final amplifier in this case) by dipping the plate and adjusting the loading control for the specified plate current. Contrary to what many people believe, operating an amplifier at loads greater than the circuit was designed for actually decreases the output powers.

Many people are concerned about where on the dial a particular tuning function operates. Many dials are numbered from zero through ten purely for reference. There is no particular reason to expect the oscillator, doubler, or final amplifier to tune a exactly the same reference points on the dial. When you turn the knob on the front panel, a variable capacitor behind the panel adjusts the capacity in a tuned circuit as you change from band to band, the amount of capacitance required changes. Therefore, a change in the position of the knob should be expected.

The next step in the sophistication of the cw transmitter is the addition of a VFO (variable frequency oscillator). The VFO generates a radio frequency which determines the output frequency of the transmitter. The VFO normally adds one more tube to the transmitter. Also, since the power level at which a VFO operates is very small, it can use a low power receiving tube.

The frequency generated by a VFO will not normally lie in the range from 3.5 - 4 MHz and 7.0 to 7.25 MHz. Transmitter operation on 20, 15, and 10 meters is achieved by using doublers and triplers just as was done with crystals. The advantage of the VFO is, of course, convenience. In order to change to a different frequency, one need only twist a knob - no plugging in or sorting through a bunch of crystals to find the desired frequency. Besides, the cost of crystals closely spaced throughout the ham bands would at least equal and probably exceed the cost of an inexpensive VFO. Also, with a VFO you can adjust your signal to exactly the same as someone else -- you would need an infinite number of crystals to be able to do the same job. One disadvantage of having a VFO is reduced frequency stability. (Con't on Page 3)

Technical Column (Con't from page 2)

However, VFO'S having excellent mechanical and electrical stability are available although they can be expensive. Heat is a major cause for frequency drift in a VFO and the proper use of solid state devices can go a long way in solving this problem.

The technically obsolete mode of AM is relatively simple to obtain in the transmitter and does not require anything more than the simplest of receivers. The above are the reasons the AM is still used in many ham applications. Economics is also a factor which keeps AM still active. Many people have AM equipment and don't have the money required to purchase SSB equipment no matter how much they want to. Many people ask why, if SSB is so good, is it not used for commercial broadcasting in the BC band. The reason, again, is economics. No one in his right mind is going to suggest that the millions of AM radios now owned by the public be made obsolete and useless by a shift to SSB for commercial broadcasting. FM radio is still struggling in an economic sense. One reason for this is that since FM receivers cost more, fewer people own them. Therefore, the advertising audience is smaller and radio stations have some difficulty selling enough FM advertising to support the cost of FM facilities.

Now back to AM. Amplitude modulation is frequently accomplished by inserting an audio voltage in series with the DC supply voltage applied to the final RF amplifier. What produces this audio voltage? The modulator of course. The modulator is just a high power audio amplifier. It differs from a public address amplifier primarily in the choice of the impedance of the output terminals (determined by the turns ratio of the audio output transformer). Thus, all that is needed to convert the cw transmitter to an AM transmitter is an audio amplifier that we can use for a modulator. If the cw transmitter has a power rating of 100watts, then the audio amplifier must be able to provide 50 watts of audio power. This amount of audio power can be obtained using only four tubes. Two high power tubes, perhaps 6146's and a couple small receiving type tubes. The required output impedance for the audio amplifier can be determined by applying Ohm's law. The impedance is equal to the final amplifier plate voltage divided by the final amplifier plate current.

The design of a SSB transmitter is quite similar in many respects to the design of a receiver. Both are considerably more complex than a cw or AM transmitter.

Receivers and SSB transmitters use a circuit called a Mixer or Converter. This circuit has two input frequencies. The output frequency of the mixer is either the sum of the two input frequencies, or the difference between the two input frequencies. Oscillator circuits are also used but these are quite similar to those in VFO's or transmitters and both variable and crystal oscillators can be found. the amplifiers used in receivers and SSB transmitters must be Linear RF amplifiers. They are normally class A. The RF amplifiers used in CW or AM transmitters are generally class C.
Con't on page 4

Technical Column (Con't from page 3)

In many SSB transmitters the SSB signal is frequently developed at a convenient frequency not in a ham band such as 455 KHz or 9 MHz. Then a mixer circuit is used to heterodyne or translate the SSB signal to the desired ham band. For instance let us assume that ssb is generated at 9 MHz and that we want to transmit on a frequency of 14.25 MHz. The mixer has two input signals and one output signal-- either the sum or difference of the two input signals. We choose either the sum or difference frequency simply by choosing the resonant frequency of the tuned circuit in the mixer output circuit. What we want is:

Output @ 14.25 MHz
input 1 @ 9.0 MHz
input 2 @ ?

If we choose as the second input, an oscillator signal at 5.25 MHz and use the sum, we obtain the desired SSB output. If we wanted SSB output on 3.9 MHz what would input 2 have to be? We can see that 9 minus or plus what will equal 3.9. The answer is of course 9 - 5.1 equals 3.9. Therefore, to get 75 meter SSB we must use an oscillator frequency of 5.1 MHz and use the difference between the two signals. Frequency multiplication is NOT generally used in SSB transmitters because it is not a linear function. In an actual transmitter, Input 1 would probably be variable from 9.0 to 9.5 MHz and be controlled by a VFO. Using this scheme, only a single crystal oscillator with appropriate crystals would be required for input 2.

(From The Tidewater by Jess, W4PQK Technical Editor)

(Note: This article will be continued in the August issue of the Log. Ed.)

Now, How About That

Electronic News reports that the recent law signed by President Johnson relative to electronic bugging equipment carried a section which virtually escaped notice and which was never debated. This clause makes it a violation to make, assemble, possess, sell, mail or carry in interstate commerce....any device with the knowledge the design rendered it primarily for the purpose of surreptitious interception of wire or oral communications. The report goes on to say that the device will not escape prohibition merely because it may have innocent uses. This brings up some interesting questions, doesn't it? Presumably some of the items normally used in connection with audio amplifiers, like stick-pin mikes, wireless mikes, etc. would fall within this category. and since these have an "innocent" use, possession of them

Con't on page 5

Now, How About That? (Con't from page 4)

bring that \$10,000 fine and/or the five years in the jug. Do tell!

Maybe you'd better look around the shack and if you find anything that could possibly be used surreptitiously, you'd better ditch it. But if you throw away that martini secret mike, we'd suggest you drink it first!

(From Auto Call July 1968)

Three Amateurs Indicted

Larry D. McCreary, K4KHE; Conrad H. Bridges, W4 EBG and Walton B. Berkley, WB4AOE on May 20 were indicted by a Federal Grand Jury in Bowling Green, Kentucky, on charges of transmitting indecent, obscene or profane language. Trials are expected to be held in Federal Court in October and November. So far as we know, this is the first such action by the Justice Department on these charges.
(From August issue of QST.)

GIRLS - REMEMBER CLUB MEETING - AUGUST 9th

Do try to attend to discuss pland for our Picnic.
See you August 9th - 8:00 P.M. at the Club House.



The Widders News

Welcome to a new member, Laurie Wright, from Blacksburg, her husband, Wayne attends the Ham Meetings and heard us laughing and carrying-on so he brought Laurie to join the fun. So glad to have you Laurie.

We are glad Robbie and Barbara Anderson were well enough to go to the beach. Robbie had a hairline fracture of the skull from an accident at school and Barbara?

Hilda Ferrell is recuperating at home after a session at the hospital. You know Hilda - she couldn't miss a meeting or the Luau. Take care of yourself Hilda.

Hope Hilda Ritter's mother is better since her heart attack.

Speaking of the Luau - we had a large crowd and the food was delicious, as usual. And the decorations get better every year. June, Bette, Nancy, Eunice, Laura, Lea and Lynn (Lea's friend) decorated. Did you see the Hula girl saying Aloah? That was compliments of Lea and Lynn.

GOSSIP - So many of our gals have been traveling and galavanting! Eunice, Eva and Hilda Ritter went to Chicago and Canada

Phoebe is always gone!

Nancy, Connie, Laura and friends went to Va. Beach and Williamsburg, understand Connie got sick with an ear infection and had to cut their trip short, but we're glad she is better and was able to come to the Luau.

Louise Martin is expecting a visit from her daughter-in-law and first grand-daughter.

Darlene and Kendall have been to Myrtle Beach and Virginia missed the Luau for the same reason.

Martha Vaughn was having a wedding in her family - her daughter was getting married.

June and Earl have been to Chicago to a convention.