



# HAM HUM

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March 1968

Vol. XVIII  
No. 3

## MARCH MEETING

**WHEN:** FRIDAY, MARCH 8, 1968 - 8:00 P.M.

**WHERE:** ROOM 256, ENGINEERING BUILDING -  
UNIVERSITY OF OMAHA

**PROGRAM:** Mr. Dan Fahrlander, WØLGT, and Mr. Dan Ryan, instructors at the Technical Institute of the University of Omaha, will present the manual process in fabricating printed circuit boards. This involves using resist material and chemical etching. They will also demonstrate how to make up printed circuit boards from schematic diagrams.

**PLAN TO ATTEND THE MARCH MEETING. BRING YOUR FRIENDS!**

**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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## NOTES FROM THE BOARD

By Bob Lockwood, WAØDHU

The Board of Trustees of Ak-Sar-Ben Radio Club, Inc. met at the home of Harold McClenahan, WAØDGA, on Tuesday evening, February 20th. Following is a brief rundown of business discussed.

Our goal is to make each monthly meeting a real drawing card for members and visitors. The tour on February 9th was just the beginning. We are looking months ahead in an all-out effort to achieve our goal.

The ham auction, scheduled for April, is one example. We believe it's the little things that count in the planning of such an event. That is why we decided it might be a good idea to have "Collins goodie boxes" for sale at the auction. However, the ultimate success of any ham auction is directly proportional to the participation of the general membership. Let us, therefore, turn out in full force and, oh yes, don't forget to bring along some goodies to auction.

Field Day plans for 1968 are rapidly taking shape. Many of the little things are being done now rather than to put them off until the last minute. One good example is the fact that Harold McClenahan, WAØDGA, has already prepared the Field Day logs.

The theme for the June meeting will be "What part can I play in Field Day '68." Let us have an overwhelming turnout at this meeting. It will be the kick-off for the big day.

Yes, your Board of Trustees is working for you. However, when you come right down to it, the success of any organization is dependent upon the participation of all members. Each of us, in a sense, is a member of the Board. It is the effort and ideas of all of us, pulling together, that will make our organization strong. Remember, therefore, that your Board of Trustees will welcome your ideas and comments.

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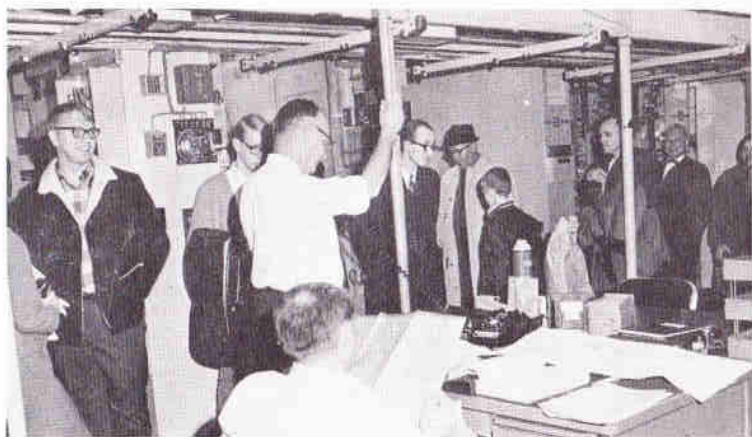


PICTURE STORY OF  
FEBRUARY 9TH  
TOUR OF  
AT&T PLANT

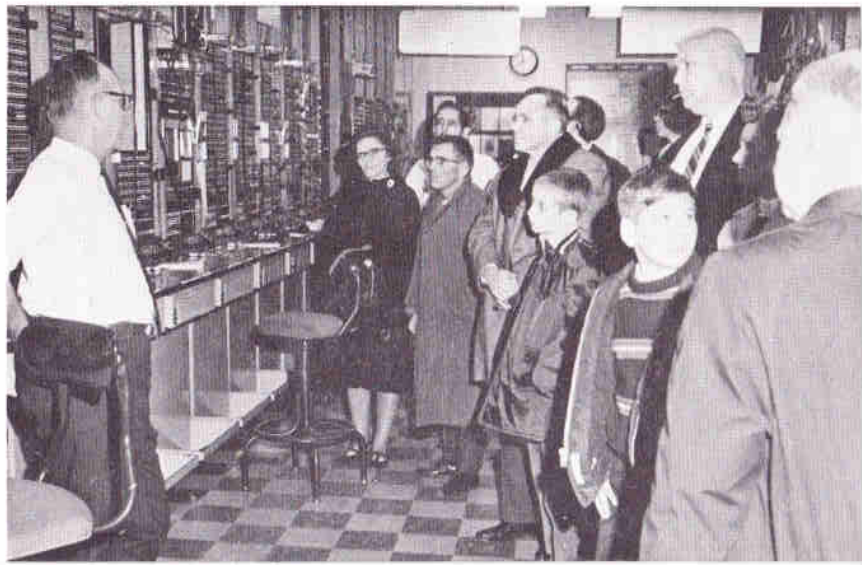
Television operating  
center which feeds net-  
work television to local  
stations.



Microwave systems  
and toll switching.



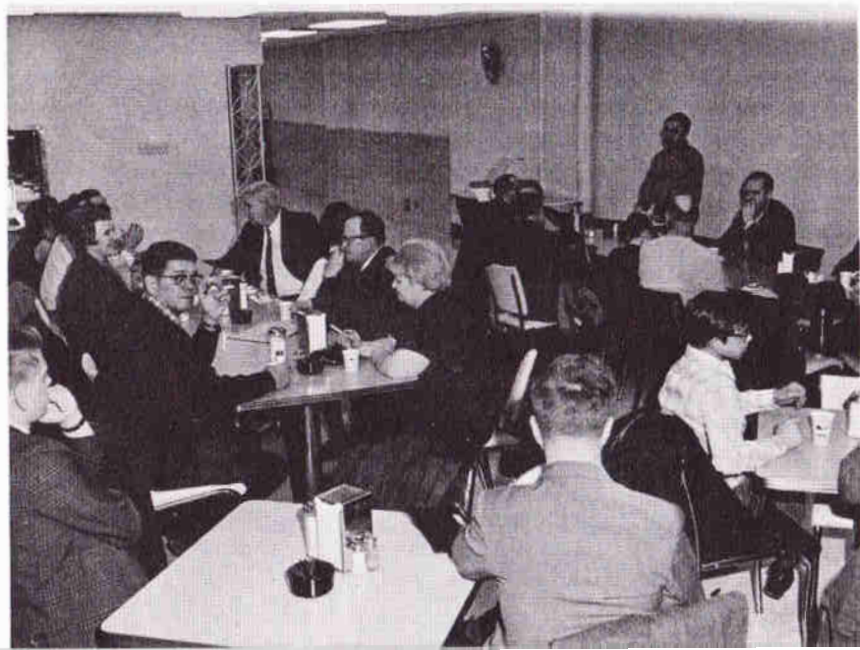
Private line board to monitor calls.





Teletype monitoring.

President Bob Lockwood, WAQDHDU, presides over short business meeting. Excellent turnout.



Presentation of  
Membership Certificates  
to three new members:



Henry Dworak, WAØQLE



Frank Velasquez, WNØQH V

Jim Anderson, KØDNE





Presentation of 5-year Membership Certificate to Harold McClenahan, WAQDGA.

Presentation of 5-year Membership Certificate to Dave Moses, WAQGED, and a big "thank you" for lining up and conducting the very informative and interesting evening tour of AT&T.



Our thanks to AT&T, to Bill White who organized the tour, and to John Conway and Sterling Chase, the guides.

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### CQ, CQ MOBILE - MAE DAY!

Headache? Tired all over? Upset feeling? If you're operating mobile, reach for the window handle--and quickly.

Those catch phrases for TV patent remedy ads are also prime symptoms for one of the most subtle hazards of driving mobile--carbon monoxide poisoning. Carbon monoxide is a colorless, odorless gas that lurks in engine exhaust and can kill you in the time it takes to make only one contact. Proper ventilation is the only sure way to eliminate the danger.

#### Silent Key

(Editor's Note: An exhaust system in good condition, properly installed, will help too.)

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### FOR SALE

32' Spire tower	\$50.00
80-40 meter Cliff Dweller -	\$80.00
TR-44 Rotator	\$35.00
TH-3 Junior Beam	\$40.00

Howard Wahlert, KØJHE  
3430 So. 130th Street  
Omaha, Nebr. 68144  
333-8176

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## OFFICIAL BULLETIN NR 153 FROM ARRL HEADQUARTERS NEWINGTON CONN FEBRUARY 1 1968 TO ALL RADIO AMATEURS BT

With the approach of the 1968 ARRL International DX Competition, the first and third weekends of February and March, UNITED STATES amateurs are cautioned that the following countries object to communications between their amateurs and those of other countries. Cambodia, Indonesia, Thailand and Vietnam forbid such radio communication. The prefixes to avoid are HS XU XV 3W8 or 8F. CANADIAN amateurs may not communicate with Cambodia, Indonesia, Laos, Thailand, Vietnam and Jordan. Prefixes to be avoided by VE/VO amateurs are HS JY XU XV XW8 3W8 and 8F AR

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## OFFICIAL BULLETIN NR 156 FROM ARRL HEADQUARTERS NEWING- TON CONN FEBRUARY 23 1968 TO ALL RADIO AMATEURS BT

DX and contest minded amateurs are reminded that one phone and one c.w. weekend still remain in the ARRL International DX Competition. The phone portion will be held March 2-3 and c.w. March 16-17. Full rules appeared in December 1967 QST. If you have run short on log sheets, note that forms are still available without charge from the ARRL Communications Department, 225 Main Street, Newington, Connecticut 06111. Please be sure to furnish your full name, call and address with zip code AR

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## USING FM IN VHF AMATEUR COMMUNICATIONS

(Part II - continued from Feb. issue)

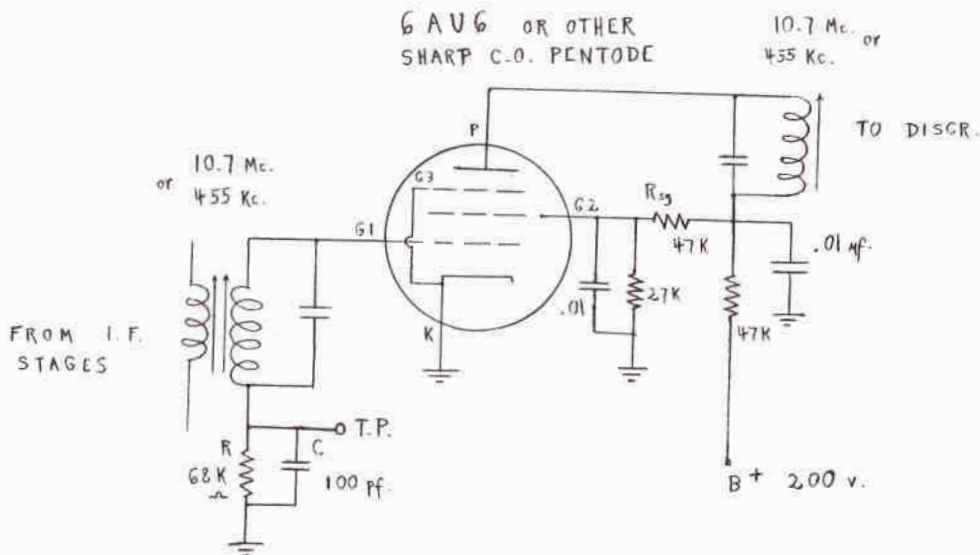
FM enters the picture: Now to get to the original subject, that is, concerning the use of FM on 50 mcs. and above.

First, a question might be raised here that since FM is supposed to be so wonderful, then why isn't it used on the HF bands like 75 or 20 meters etc.? Well, to some extent it has; however, the deviation has to be kept very low, i.e. plus or minus only 3 kcs. which would be considered as very narrow band FM. This low deviation is not a matter of personal preference but is according to FCC R. & R. on these frequencies. For all practical purposes then, there is no advantage to be gained in using FM with the limitation of such low deviation and we'd be way better off just using SSB on the HF bands. This will also help conserve precious bandwidth in these congested bands. With SSB we're hopefully using less than 3 kc. total and minus the unnecessary carrier.

Fortunately for us, in the VHF bands we're able to even use wide-band FM, which in some ways is kind of an arbitrary description; however, plus/minus 15 kc. or higher deviation would fall in the definition of wide-band FM. It might be worthwhile to note that the commercial FM services are now using plus/minus 5 kc. In order to clarify

one thing here, we are not referring to *broadcast* FM, which of course uses much higher deviation, like 150 kcs. In my own opinion, this would seem to be taking up an unrealistic amount of spectrum space; however, when the broadcast FM channels were originally set up, the experts evidently thought it was necessary in order to transmit high quality music.

One of the early objectives of Major Edwin Armstrong (a pioneer in developing FM) was to create "static free" radio reception and to a great extent FM does accomplish this. Let us take a look and see just how the FM receiver accomplishes this job. Now it so happens that most noise pickup in a radio receiver is amplitude modulated noise. This would include man-made as well as atmospheric types of noise. In an AM transmission and receiving system, the noise causes changes in amplitude of the amplitude modulated wave. Now the detector of an AM receiver must respond to amplitude changes if it is to reproduce the original audio signal, but in so doing, it detects the noise voltages which are then present in the audio output. When noise is combined with an FM signal, it also produces amplitude changes, but the FM receiver includes a key stage called a limiter,



TYPICAL  
FM LIMITER STAGE

J. D. Snyder

which clips off the noise peaks before they reach the detector.

A schematic diagram of a typical limiter circuit is shown here. You will notice that the limiter circuit is similar to the standard i-f amplifier, except for the grid-leak resistor and capacitor to provide bias. The R-C combination produces a voltage that is equal to the peak DC rectified voltage between the grid and cathode. So what we are saying is that the limiter is an overdriven amplifier and is self-biased in just the same manner as a class C amplifier, which would normally be used in a transmitter circuit. Typical values of R and C might be 68K ohms and 100 pf. The incoming i-f signal drives the control grid positive and the grid current that flows causes a voltage drop

across R. The capacitor C bypasses the RF so that there will be no RF voltage across R. The amount of voltage across R (bias) depends upon the amount of grid current that flows, and this, in turn, depends on how far the grid is driven positive. The amount that the grid is driven positive is determined by the amplitude of the incoming signal. This negative bias voltage which is developed across R is usable as an indication of i-f and r-f alignment; in other words as a test point.

The plate and screen voltages used on the limiter tube are considerably lower than if the tube were to be used as strictly an amplifier stage. Under these conditions, plate saturation occurs for only moderately positive grid voltages. With the limiter tube operating

past cutoff bias on the negative swing and past plate saturation on the positive swing, then the output signal is essentially free of amplitude variations. An excellent, low cost book covering FM is available from the U.S. Government Printing Office, Washington 25, D.C. The title is Army Technical Manual TM11-668 F-M Transmitters and Receivers. The cost is \$1.50.

Incidentally, a certain amount of amplitude limiting is used in AM receivers too, and generally is done in the audio frequency stages. This type of AF limiting can be of great benefit in minimizing impulse noise; however, if carried too far, it can also cause bad distortion of the audio signal.

(Continued next month.)

J. D. Snyder, WØWRT

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## AUCTION TO BE AT RANCH BOWL

Our annual auction on Friday, April 12th, will be held at the Ranch Bowl, 1600 South 72nd Street, Omaha. Use the north entrance. Clean out your ham shack . . . gather up your old gear . . . make plans now to attend the auction. Further details in next issue.

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## FOR SALE

Newtronics 4-BTV Trap Vertical Antenna, purchased new, used one month - \$15.00.

Art Gaeth, WØFQB

Phone: 455-3769

\*\*\*\*\*

A little girl wrote this composition on "people."

"People are composed of girls and boys, also men and women. Boys are no good at all until they grow up and get married. Men who don't get married are no good either. Boys are an awful bother. They want everything they see except soap. My mom is a woman and my dad is a man. A woman is a grown-up girl with children. My dad is such a nice man that I think he must have been a girl when he was a boy."  
(de Tennessee Ham)

de Ham Fax

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Dodging responsibility is poor exercise.

WØVLI

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## OFFICIAL BULLETIN NR 155 FROM ARRL HEADQUARTERS NEWING- TON CONN FEBRUARY 15 1968 TO ALL RADIO AMATEURS BT

All amateurs who participated in the ARRL Simulated Emergency Test on January 27 and 28 are urged to make sure that their part was included in reports submitted by their Emergency Coordinator, or Net Manager. All reports by ECs and Net Managers as well as appropriate photos must be in by March 15.

Emergency Coordinators note that there was an error in the EC annual report instructions. Item 8 through 16 should be limited by item 2 instead of item 7. Remember that March 15 is the deadline for all EC and SET reports AR

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## ANGLES and CURVES

c/o Editor, Auto-Call  
R. V. Anderson, KØNL  
528 Montana Ave., Holton, Ks 66436

This editor must confess that he is somehow unable to understand the exuberance of those possessed with the wide-band 2 meter FM bug. This "misunderstanding" (which it surely is, otherwise we'd probably be exuberant also) certainly can't stem from the type of modulation itself because it has been proven that 2 meter FM is far superior to 2 meter AM. Perhaps then it must be the system employed by the amateurs themselves.

To my knowledge, admittedly limited, very few installations have more than one frequency available short of changing crystals (which to some means a pair of long-nose pliers). A great majority of the units used are surplus and were equipped for one channel only. Occasionally there are two channels. And virtually no one has seen fit to provide a second channel on either transmit or receive. Therefore the question of which channel becomes important.

Since the entire country is on basically the one frequency, that should be available - that's for sure. And since repeaters are fairly well standardized with their transmit/receive frequencies, that should be a second channel. But let's see. The use of repeaters has become widespread. Let us call the receive frequency channel A and the transmit frequency channel B. Now, should our one channel transmitter be equipped for the repeater frequency

or not? And should the receiver be on the same frequency or on the repeater frequency? Let's presume we equip for the repeater. Now if the other mobile you are working comes within working range without the repeater, you're stuck! If you meet him coming towards you (which we did) and you are both working through a repeater and the signals are marginal (which they were) you are within 50 feet of him and still can't work him. Real hot stuff, eh? Suppose you provide a switch so your station is on the repeater receiving frequency. Then you and the other station yak away oblivious to the fact that the repeater is repeating your QSO, because you are not listening to it. So you use the transmitting frequency of the repeater for your QSO. Trouble here is that everyone else in town is trying to receive on that frequency and they can't do any business. Real hot business!! if you will analyze the situation, you will find that three channels are needed if you live in a repeater area and expect to use it now and then. Which nobody has got.

The next question is use. Back on the farm when I was bein' fetched up, we had a party telephone line. This was fine when no one else wanted to use it. But you had to keep the yak yak short because someone else just might want to use it. Now suppose a repeater has a very favorable location. This means

there are perhaps 50 to 100 potential users of the system. If anyone says more than five words he is, to the rest of the boys, loquacious. And they will remind you also. And what damn good is any communications system if you can't use it?

It should be noted that to get distance, height of antenna is necessary. So we see fellows with towers way up there. In fact you can't even get in the swim without at least a 50-foot tower, and this puts you in the kindergarten class. The peculiar point is that with the same power on 75 SSB you can get there just the same and with an antenna not over 20 feet above the ground. And you don't need a repeater. And you have all kinds of channels available. And you can move if you wish.

Now then repeaters are not without troubles to these selfsame people who use them. Or try to!! The usual procedure is to run the squelch just below breaking point. It is certainly a lovely thing to listen to when the squelch just breaks open and the signal is marginal. A lot of hogwash. Turn down the squelch a bit? It still happens on the louder signals. Turn it down more? Then you miss the station you do want to work. Now then, there is in this area a repeater which has the receiver/transmitter radio out of balance. The transmitter keeps the squelch open on all these receivers, but no one has yet been able to get into the transmitter. So the transmitter keeps the squelch open, yet these boys are denied use of the repeater because they can't break it. Will the repeater condescend to change it? Hell, no!

(He might, we understand the FCC is being approached.) In my own case I had to quit monitoring continuously because of the problems of squelch openings on marginal signals.

We fail to understand what was so stupendous about sending a signal from Montreal during the Convention way down the East Coast by using several repeaters. Engineering-wise it was perhaps useful, but when a simple station at Montreal and another simple station in Washington could have exchanged signals directly, why go to all this trouble? And look at all the people who were denied the use of these frequencies while it was being done?

So we're wondering. Where do we miss the boat?

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**OFFICIAL BULLETIN NR 154 FROM  
ARRL HEADQUARTERS NEWING-  
TON CONN FEBRUARY 8 1968  
TO ALL RADIO AMATEURS  $\overline{BT}$**

February 17 marks the 32nd anniversary of the passing of Hiram Percy Maxim. Many of you are radio amateurs today solely due to his vision and enthusiasm which led to the founding of the American Radio Relay League. The code practice and bulletin transmissions of the ARRL Headquarters Maxim Memorial Station, W1AW, are a particular tribute to the memory of this beloved first president of ARRL.  $\overline{AR}$

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## HEART FUND DRIVE

Feb. 25, 1968

It was a very busy drive. Our mobiles handled over sixty messages. Mobiles and riders were as follows:

Mobile 1 - Larry Wise, K5UYH; wife Millie, W5OVH; and son Don, home on leave.

Mobile 2 - Cecil DeWitt, W0RMB, and daughter Kathy.

Mobile 3 - Royal Enders, K0LYO.

Mobile 4 - Ed Donze, W0YEV; John Snyder, W0WRT and son Billy.

Two meter link at Heart Fund Headquarters: Lou Cutler, W0VLI; interdispatch Kurt Fischer and Bobby McClenahan.

Two meter link at Red Cross Bldg: Fred Fischer, W0EGP, and Erv Heinz, WA0EEM; interdispatch Royce Johnson, WA0KIL.

Six meter base: Harold McClenahan, WA0DGA.

I want to thank everyone who worked on this Heart Fund Drive for a job well done.

Harold McClenahan, Jr., WA0DGA  
Mobile Chairman

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Please accept the enclosed check for postage expenses for my copy of Ham Hum. Although I haven't been active in ham radio the last few years, I still enjoy reading about your activities.

Ralph B. Peterson  
53 Shady Brook Drive  
Middletown, New Jersey  
07748

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## ADDITIONS TO ROSTER

Edward F. Askew, WA0RDZ  
Box 105  
Thurman, Iowa 51654  
Phone: (712) 628-2591

Marjorie E. Askew, WA0RDY  
Box 105  
Thurman, Iowa 51654  
Phone: (712) 628-2591

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## TECHNICAL SIDE

By Robert Tanis, W8UAI  
Technical Writer

### CATHODE MATERIALS AND CONSTRUCTION:

The two major considerations determining the choice of materials composing cathodes are maximum operating temperature consistent with long life and the desirability to operate the cathode at as low a temperature as possible. The latter is based on improved efficiency and reduced element distortion resulting from thermal expansion. It should be noted that increasing the temperature results in more electrons being emitted from a solid, thus increased emission.

Pure tungsten filaments are used as cathodes in applications where the plate voltage exceeds 20,000 volts. This is because it is more resistant to damage from positive ion bombardment. Such ions are the result of cathode emitted electrons striking residual gas molecules and stripping off an electron. Now positive, they are

attracted to the cathode. Tungsten filaments operate at about 2,300° C; above this evaporation becomes appreciable. A very few transmitting tubes use tungsten filaments; however, such filaments find their widest application in high-voltage diode rectifier tubes and in X-ray tubes.

Very similar to the above are the thoriated tungsten cathodes made by adding up to 2% thorium oxide to the tungsten during manufacture. Such a filament is, in addition, carbonized by heating it in the presence of a hydrocarbon vapor. This not only reduces the oxide (removes the oxygen), but also greatly diminishes the loss of thorium atoms due to evaporation. Such a cathode operates at about 1,700° C and offers an advantage over pure tungsten in that the emission current density is greater for the same power radiated per unit area. In other words, the number of electrons emitted is higher per unit of radiating cathode surface for the same power input. Such cathodes are used in a number of moderate-voltage transmitting tubes and the tungar rectifier tube common to storage-battery chargers.

The oxide-coated cathode is the most common type in use today. Its operating temperature is only about 700° C. This type is composed of a very thin coating of a mixture of metal oxides applied to a base composed chiefly of the element nickel. Barium, strontium and calcium are the most used oxides. Since an oxide is an insulator, the cathode is initially heated to above

normal operation and this serves to drive impurities in the nickel sub-layer out into the oxide cover-layer. This "activates" the coating so that sufficient emission can be obtained. During this activation process the impurities (magnesium, aluminum, etc.) reduce i.e., give up electrons to the oxide compounds. This coating is white in color and is highly porous; it is about 0.002 inches thick.

With the oxide-type cathode eventual loss of emission results from peeling and blistering of the coating, evaporation of the coating and depletion of activating agents released by the nickel.

Most oxide-coated cathodes are indirectly heated. The cathode itself is in the form of a narrow cylinder and the heater consists of a folded or coiled tungsten wire tucked inside. To prevent short circuiting, the wire is coated with aluminum oxide. Normally, such a filament operates about 400° C higher than its companion cathode.

Hint: the next time you have the chance, carefully break apart a tube and inspect its cathode. Note the powdery white oxide material on the outer surface and the filament wire looped inside.

de Ham Fax

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## FOR SALE

Galaxy 300 . . . \$150.00  
AC Power Supply Console . . \$40.00

Glenn Flynn, WQMHV  
5504 Kansas Ave., Omaha  
Phone: 455-0193

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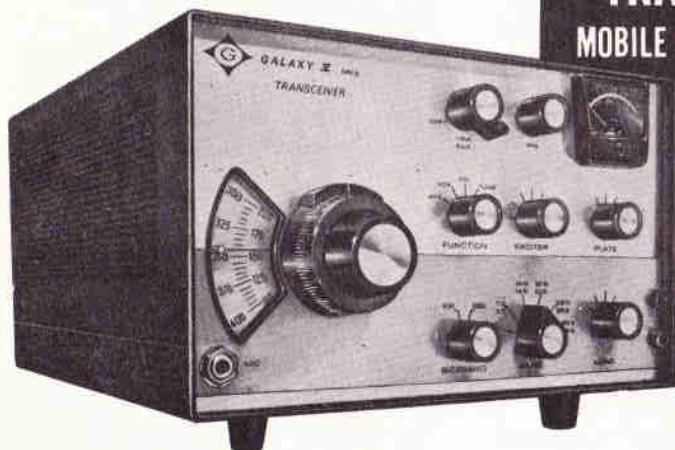
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