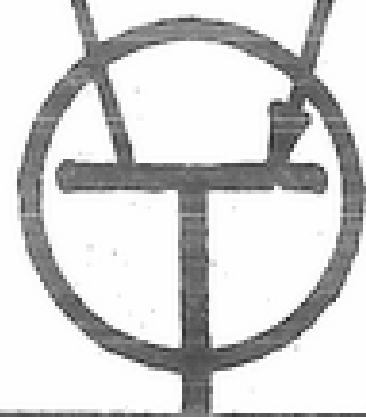


Central Oklahoma Radio Amateurs

COLLECTOR

EMITTER

AND



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JANUARY 1977

VOL 2 No 24

AN INFORMATIVE MAGAZINE
PUBLISHED MONTHLY BY AND
FOR OKLAHOMA RADIO
AMATEURS

AND ANYONE INTERESTED IN
LEARNING ABOUT IT



GUY, K5GL, INSISTED ON HOLDING THE ITEM HE WAS AUCTIONING OFF IN FRONT OF HIS FACE. PROBABLY WAS ASHAMED OF TALKING PEOPLE INTO BIDDING TOO MUCH. REALLY THERE WERE SOME GOOD BARGAINS AT THE AUCTION HELD IN CONJUNCTION WITH THE AUTOPATCH CLUB MEETING HELD 14 DECEMBER AT THE OKLAHOMA MILITARY ACADEMY. THE CLUB ADDED A FEW BUCKS TO THE TREASURY AT THE SAME TIME AND A GOOD TIME WAS HAD BY ALL.

Central Oklahoma Radio Amateurs

COLLECTOR AND EMITTER



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Managing Editor Joe Harding, WA5ZNF 737-1044

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Meets: 7:30 PM 3rd Tuesday, Bi-Monthly

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WR5ACB 22/82 147.81/21

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UNION Rm 161. W5TC WR5AFW 146.28/88

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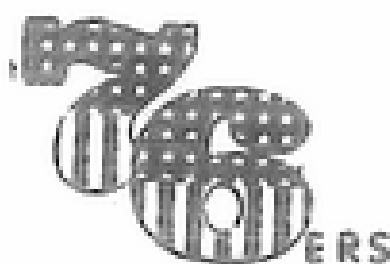
BICENTENNIAL AMATEUR RADIO CLUB

Meets: 3rd Tuesday each month 7 PM Air

National Guard, Will Rogers Airport

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V-P	John Oltmans	WB5PZG	525-6066
Sec	Jim Townsend	WB5VCB	632-5445
Treas	C Y Chandler	WB5TKG	232-9005





THE BICENTENNIAL
AMATEUR RADIO CLUB



FROM THE PRESIDENT

By the time this gets printed and into the hands of Radio amateurs just about every where, this year will be about gone. Special call signs and Bicentennial celebration contests will be history.

But 1976 will be remembered by many as a great year. To those new amateurs licensed in '76, we extend warm welcomes. The FCC changed some outdated rules and let many others that were restricted to VHF operate on the HF band. This along with other changes have helped many. As time passes, we look for other needed changes.

Also, by the time this gets to print, The '76ers will be one year old. To us it was an extremely rewarding year. Through the hard working efforts of the members that taught in the license classes, many were licensed that thought surely it would be impossible to ever get a chance to operate.

Another feat that will not be forgotten, is Field Day 1976. For us, it was a weekend of fun and operating, not to mention the contest. This was a good example of what can be done when everyone works together.

So much for last year and things in the past. Now we must look to the future. We have more license classes to think about. Field Day '77 is up coming as well as Ham Holiday. Looks as though we have our work cut out for us.

So here is looking to the future and inviting everyone to feel free to help us, or stop by and visit our Club when they can. We would be glad to have you.

So from The '76ers to all, a Happy and Prosperous New Year.

73's and good DX
Ken, WB5PYN
Pres.

Your "House" is on Fire.

Yes it is! and you better call the Fire department NOW.

Anyone who listens a lot on amateur frequencies must admit that the abuses are too numerous. Also some violations are so flagrant that other services may cite such misuse as one of the reasons that they should be assigned part of these frequencies that now are our "House".

But that is not all--Page 62 of the December 1976 QST magazine points out that just because some people who are not amateurs have illegally used frequencies that are not even amateur frequencies. The result may be that regulations designed to alleviate the problem may work to the disadvantage of the amateur who operates in a very proper manner.

I have heard too many amateurs say, "I don't care what those criminal banders do as long as they stay off our frequencies". That is just like saying, I don't care if my neighbor across the street steals from his next door neighbor as long as he doesn't get on my side of the street.

If you don't report and make every effort to see that every illegal act (Radio or Otherwise) is properly prosecuted and punished, eventually, one way or another, you will also be a victim.

If you report every transgression of mine and I report every transgression of yours, it won't be long before neither of us will transgress.

An honorable man has enough self discipline to do what is right without being forced. Self discipline is also one of the identifying characteristics of maturity, and it is high time every one of us starts to show more of it. So don't blame the Fire Department for letting your "house" burn down if you don't report the Fire.

73 "c.y" AB5TKG

EXPLORERS:

The Seventy Sixers and the Air National Guard Base are co-sponsoring an Explorer group which will be meeting the 1st Thursday each month as well as the 3rd Tuesday with the Amateur Radio Club. They have as their objectives; studies in electronics, amateur radio and television broadcasting. Their 1st project is to be an amateur radio television station. If you have an interest in working with high school aged young people and in the above subjects, we would like to have your help. If you know of any young people that would be interested in joining this group send them our way. The next meeting will be January 6th at 7 p.m. on the Will Rogers ANG Base, entering east from 59th and South MacArthur.

NEW CALLS: Bill, K5OCX and his brother Lee are now K5EA and K5II, respectively.

Coy, K5LMG

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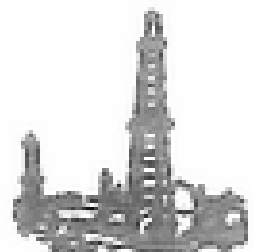
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MID-OKLAHOMA REPEATER INC.

PERSONAL SKETCHES

CHET HAZELWOOD - W5GDL

Chet is active in several organizations and hobbies. Let's look at each one in no special order of importance. He is the treasurer and member of the field trip committee of the Oklahoma Mineral and Gem Society. There are many things a rockhound can do, but Chet limits his work to cutting, polishing and jewelry making. He has several thousand slices ready to make into jewelry. He has been making pen bases of Brazilian agate using the cutting and polishing technique. This brings out the beauty of the mineral. Chet finds some of his rocks and minerals on camping trips. He picked up 150 pounds of jade in Wyoming, and in Big Bend Texas he found some agate. When the camping or Society field trips do not yield the mineral he wants, Chet buys it at a rockhound shop.

The Sooner Dreamer Camper Club, Inc. is one of the oldest camper clubs in Oklahoma - over 10 years. Chet is a member and two-time past president.

An organization that fosters cooperation between industry and the military is the Armed Forces Communications Electronics Association, Tinker-Oklahoma City Chapter. Chet is on the board of directors. The activities are not so technical, and include family members.

Chet is the newly-elected president and past vice president of MORI.

Other organizations of which Chet is a member are: Autopatch Society, A. F. Mars, and the Tinker Society of Professional Engineers and Scientists.

Chet is retired from the military where he served for 22 years. He was Communications Officer most of that time. He is now in Civil Service at Tinker Field in Productivity Enhancement since last March.. He says he has a computer to work with and that the job is most interesting.

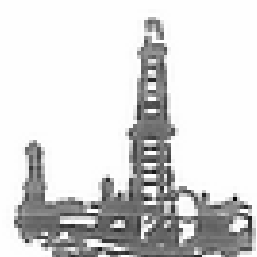
There is more. Chet's been busy. He got his license around '50 or '51, and experimented and built stuff many years before that. His major effort is in construction of equipment, not so heavy on the operating. The camping and rockhound trips sees H. F. operation of an Atlas and 2 meter operation. He mentioned one other rig. This is a neat combination of hobbies. Chet can go camping to look for rocks and minerals and operate his mobile rigs along the way. Needless to say, his work shop is a busy one. Add welding to the list.

Chet admits he may be overdoing it a bit with all the clubs and hobbies. He is the "busy man" in the saying, "If you want to get something done, ask a busy man!" With all this going on, you can add another one: being grandfather to four kids.

Chet comments that he will really have to get with it if he is even going to match the performance of the past president, H. O. Townsend, WA5MLT. Chet surely has one thing going for him - experience. He says he will try.

- - - From a tape recorded interview by WA5RAQ.

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MID-OKLAHOMA REPEATER INC.

UHF

THE UHF REPEATER IS MUCH IMPROVED!

Last month a Motorola HT-200 walkie talkie receiver was installed in the MORI UHF repeater. A band pass filter was necessary. Presently the repeater is operating on two separate antennas. The spectrum is very clean. Good walkie talkie coverage out to Norman and Edmond is reported. Those in the recent technical crew: RON, WA5EAI, RICH, WB6FYL and JOE, WA5TRS.

TRY UHF

Report from JOE, WA5TRS

=====

1976 C & E INDEX. There were many articles of broad interest or lasting appeal published in the eleven issues of C & E magazine in 1976. These articles are listed in the 1976 C & E INDEX found elsewhere in this issue. We omitted club business and other items that were limited in interest, or were not readily indexable.

Browse through the 1976 C & E INDEX. Read again articles that are of interest to you. Look for answers to your problems. Find something you would like to build and get started.

If you took the C & E lightly upon receiving each one last year, you might profit by taking a closer look. You might cast it off by saying the C & E is just seven club papers stapled together. Remember some of the individual club papers before CORA? A typical club paper was often a single sheet with club business that you couldn't read because the purple hectograph duplicator was drying out. There were almost no technical articles such as those listed in the 1976 C & E INDEX. Of course, the original C & E magazine put out by the Aeronautical Center Amateur Radio Club was an exceptionally good publication, so the CORA C & E received an excellent start.

Let's see what C & E is now and look at ways to make it even better. The 1976 Collector & Emitter Index lists 78 articles under 17 broad categories. Many of them were comprehensive and, I think many were of professional caliber. We have an average of seven articles per issue in the 1976 C & E INDEX. This is one article per club, but because of our joint efforts in CORA each participating club gets an average of seven articles with each issue, in addition to all the organizational news, CORA roster, and activities calender that helps to make our joint CORA effort function so well.

Let's see how we can make C & E even better in 1977. As I prepared the index, I tried to think of what would help. Here is what I have come up with:

MORE input from different members. We have several hundred in the CORA roster and only a few contributors.

MORE hints and suggestions of the short variety that members have used to solve problems.

MORE personal experiences, what you are doing, what you do in Ham Radio that would interest others.

MORE articles on the immediate pressing problems on such subjects as theft prevention and direction finding equipment and techniques.

USE YOUR C & E + + + + + CONTRIBUTE TO IT.

++++Bill, WA5RAQ----

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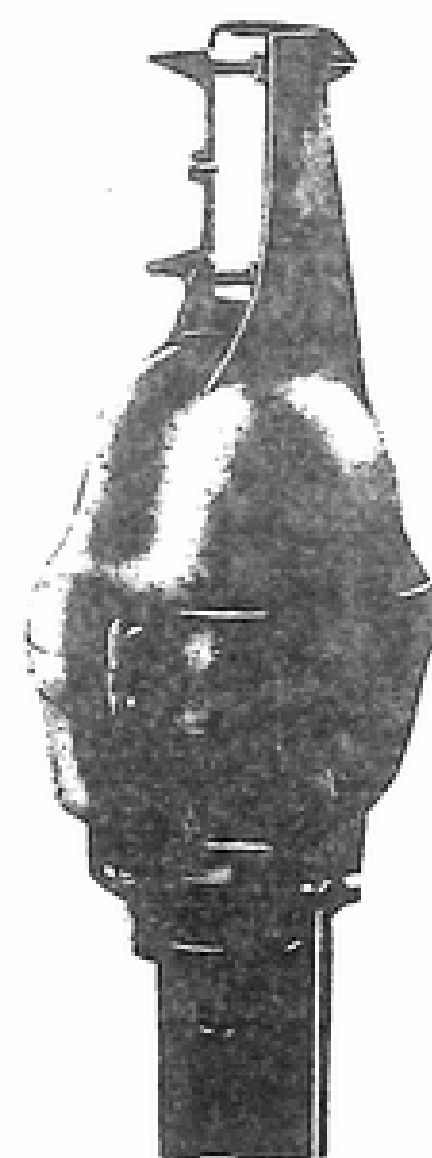
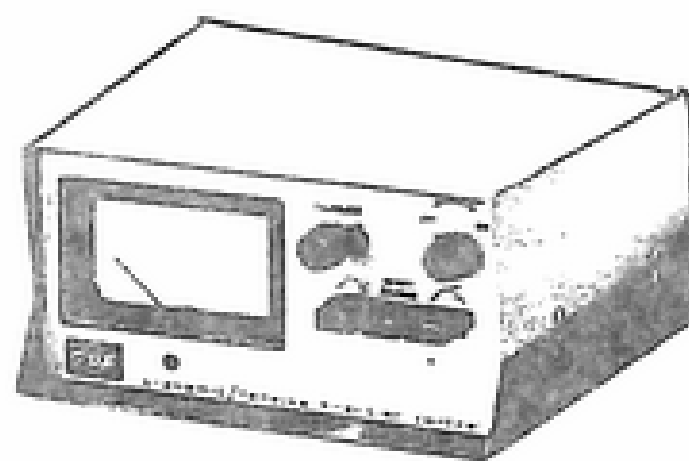
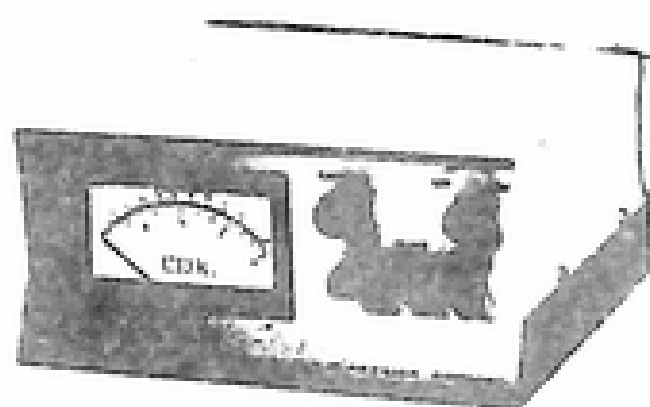
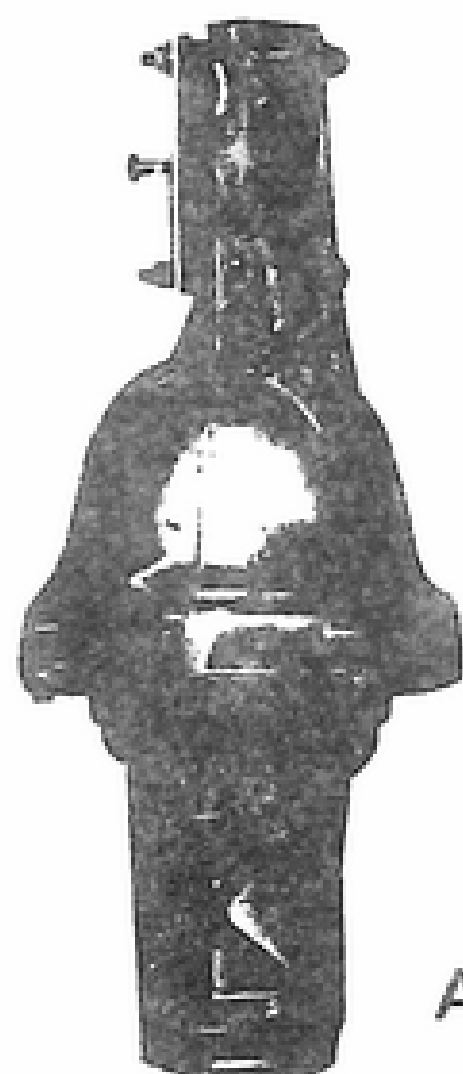
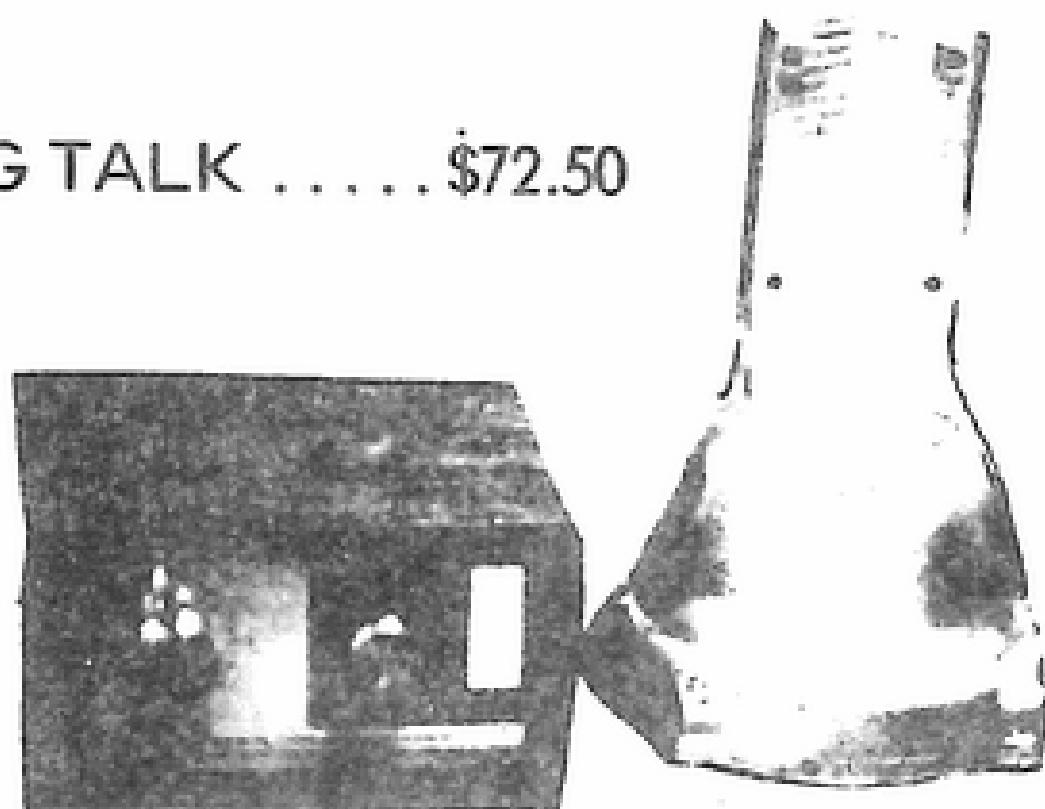
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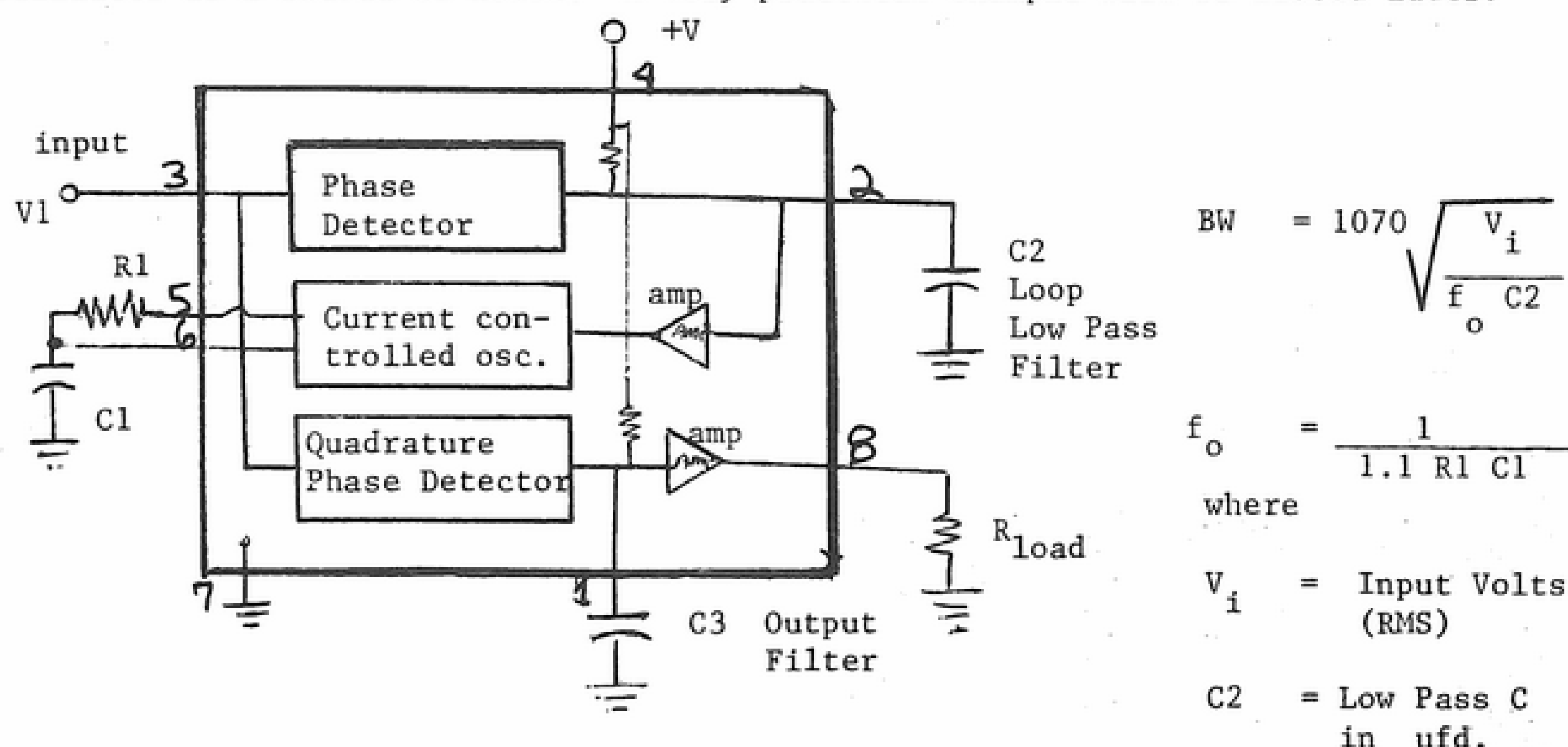
"Getting a project all Locked Up"

© 1976 Salem

The increase of interest in remote control by AC Signalling seemed to coincide with the appearance of Phase Lock Loop tone decoders back in 1970. Now, amateurs and other enthusiasts are using these ubiquitous devices to detect tones to turn on everything from coffeepots to repeaters. Perhaps the most popular use of the garden variety PLL such as the SE567, NE567, XR567, etc. is control of autopatches and other functions in repeaters. In addition, articles have appeared in various magazines about using PLL decoders in Selective Calling devices that keep your receiver quiet until someone trying to contact you plays the proper three digits in an amateur radio version of the "touch tone follies." PLL's are also seeing some use as remote control tone sensors for carrier current control over power lines at frequencies far above the normal 60 Hz.

As mentioned, the most popular PLL is the 567 and judging from the number of times articles concerning it have appeared in publication, it could be said that it is the workhorse of the tone decoder trade. A perusal of the Signetics data sheet will show a tone and frequency decoder which uses a phase locked loop with synchronous AM lock detection and power output circuitry. When a sustained frequency within the detection bandwidth is present at the input, the circuitry turns on an open collector transistor. By juggling four external components, you can establish various parameters for bandwidth, center frequency, and output delay. The loop operates over a frequency range of .01 hz to 500 khz and the bandwidth is adjustable from 0 to 14%. The output circuitry can sink 100 ma. And yet, even with all these remarkable characteristics, the 567 has sent this author muttering and cursing in the night along with legions of other experimenters. Yet with care and some slow reading of the Ap Notes, the 567 can be made to work for you. I intend to present a few problems that I have encountered while working with the 567 and the solutions that occurred after some experimentation.

A block diagram for the 567 is shown below. The audio incoming signal feeds a phase detector (incidentally, called a doubly-balanced multiplier or mixer) which compares that incoming signal with an on chip oscillator at or near the desired frequency to be detected. The local oscillator has a frequency which is determined by the R1-C1 combination. Many persons trying to determine why a particular PLL circuit in a particular layout doesn't work frequently overlook this oscillator as a source of noise. A very practical example will be listed later.



The phase detector produces an output voltage which is dependent upon the difference in frequency (read phase) between the incoming signal and the local oscillator. This voltage is filtered through a low pass filter to remove high frequency components and slow the response of the loop to incoming signals. In operation, the effect of the low pass filter is to attenuate the high frequency error components and enhance the interference rejection characteristics. Additionally, it provides a short-term memory for the PLL and ensures a rapid recapture if the system is

thrown out of lock due to a noise transient. By preventing the error voltage from changing instantaneously, it also slows the response of PLL and prevents overshoot of the frequency searching operation.

The phase detector feed an amplifier which then drives a current controlled oscillator. This oscillator has a natural frequency (f_o) which is established by R_1C_1 . However, that frequency can be changed by the output of the phase detector. The net effect is a search by the PLL to find the input signal. The maximum frequency change that the loop will accomplish in order to "find" the incoming signal is set at the bandwidth. As can be seen, bandwidth is a function of the input voltage and C_2 . Note that Bandwidth increases as the square root of the input voltage.

The on chip oscillator and the incoming signal are compared by the quadrature phase detector which determines whether the two frequencies have phase locked together. The quadrature phase detector operates 90 degrees out of phase with the loop phase detector. This detector drives a power output stage in the form of an open collector transistor which can sink up to 100 ma. Why is a separate phase detector used to detect when the two signals are in lock? Well, the answer is that the first phase detector is constantly changing in time with the incoming signal and producing an error voltage. This error voltage is constantly lagging the input frequency change and therefore using the error voltage to drive the output state would cause erratic operation as this voltage changed. The output filter agains provide some filtering for the difference voltage between the incoming signal and the on chip oscillator and operates in much the same way as the loop low pass filter.

When I first began to experiment with PLL's for touch tone decoders, I found that they had a curious habit of doing what they were not suppose to. I encountered problems of oscillator drift, erratic operation, and excessive lockup time and output chatter. One by one these problems were overcome and a solution worked up that provided some relief. The difficulties began when I made a single printed circuit card with eight Pll's on it for detecting all of the Dual Tone Multi-Frequency (DTMF) touchtones.

The first problem was oscillator drift. I found that the repeatability of the oscillators was not very good. The board was subject to mechanical shock and vibration. This problem centered on nothing other than the quality of the components and their selection. Nothing less than mylar capacitors are called for here when selection C_1 . (The typical value for DTMF is .1 ufd, The Ap Notes suggest picking a capacitor which allows you to use resistor values for R_1 between 2K and 20K) If you can obtain and afford Polystyrene or polycarbonate capacitors, you would improve your chance of survival in the long run. R_1 is another component to which special care must be given. Having once tried a 20k ten turn pot, I found that mechanical vibration alone could vary the natural loop frequency by a considerable amount. I later changed my layout for the following configuration:

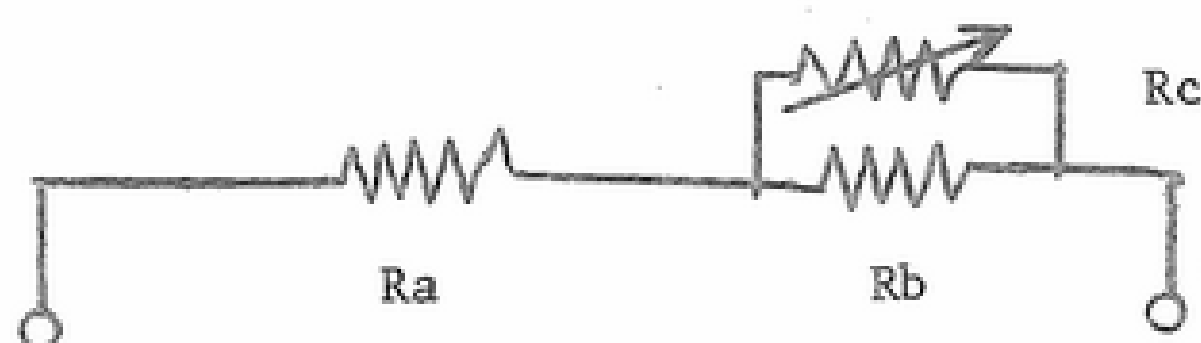


Figure 2. Suggested configuration for R_1 to increase sensitivity and tuning.

A ten turn pot for R_c is suggested. You could eliminate R_b by using a 2K pot for R_c and just use the series resistor R_a . I only had 5K pots, so I tacked on R_b (about 2.5K) to bring the effective tuning range down around 2K or so. (However, I should point out that the tuning is not linear because it will follow the formula for parallel resistors). Another problem that should be mentioned is that tiny trim pots have a tendency to demonstrate "backlash" or "play." This means that if you tune through the f_o and then try to back up to the proper frequency, you may find that the pot may turn somewhat before the frequency begins to change again. I suggest carefully tuning the pot from one side of the center frequency, tune slightly through the frequency, then tune back carefully to the proper frequency and leave it.

I used 1% precision resistors for R_a and R_b . These have excellent temperature coefficients and stability. You should be able to get by with 5% resistors, but you may find that aging will cause the frequency to drift slightly upward with time

January 1977

as the value changes. I find that PLL's used as such must be retuned about once every two months or so depending upon the environment in which they are kept.

Tuning is best accomplished by connecting a frequency counter to pin 5 of the 567. A triangular wave is present at pin 6, but this usually will give some counters fits. If the counter has sufficient input impedance, you will not load the circuit enough to alter the oscillator. After connecting the counter, tune the R1C1 combo for the natural loop frequency you wish to detect. Of course, it is not necessary for the loop frequency to be absolutely on frequency in order to properly detect since the PLL will follow the incoming frequency up to where it is. But it will slow the detection time.

When building up a board full of PLL's, install and tune the PLL's one at a time. This way you can be aware of any interaction between the loops. This can be a considerable problem. The on chip oscillators can produce a considerable amount of hash and noise which can get back into the input of the other loops. The other loops will try to lock onto this noise and sit there wildly running up and down the band chasing these spurious frequencies. This noise is generally present on the power line. To show you how much trouble it can be, we had designed an AGC and bandpass filter to go in front of our PLL in the AF5AFW touchtone decoder. When it was installed in the same rack as the PLL board, I found that the output was a mish mash of noise and hash. I increased the filtering on the board, but the noise was still present. Isolating the sources, I found that removing the PLL board eliminated the problem. It also eliminated the decoding. There had to be another way. The power supply was a 12 volt line to the AGC-Prefilter card then a LM309 to provide 5 volts to the PLL's. The noise and hash was so severe that it was backing up through the LM309 into the AGC, getting amplified and fed to the loops. Needless to say they were sitting there chattering away. The solution finally came by installing a 1000 ufd capacitor across the 12 Volt line and filtering it with a choke. I would suggest a better solution would be to use a separate supply for the PLL's and any type of AGC-Prefilter you might have.

When tuning the PLL's, ground the input and then measure the F_o frequency. This is prevent any input frequency from pulling the oscillator and providing an erroneous reading.

The output of the PLL is digital and the input is analog. It is necessary in some instances to process various parts of the PLL both digitally and analog to improve its operating characteristics. I will first discuss the output processing. The 567 has a tendency to chatter in the output depending upon the size of the output capacitor and the size of C2. The Ap Notes discuss the requirements to eliminate chatter by changing these values until chatter can be eliminated. However, I find that messing with these values can compromise the operation of the Loop. Signetics discusses trading off various parameters in their PLL Applications Book and these factors can be significant. The best solution to improving the reliability digitally without compromising the loop operation is to use missing pulse detectors on the output. The operation of the missing pulse detector is simple. If a signal is present, the NE555 begins to time. If the output from the PLL goes away at any time during the timing cycle, the capacitor discharges and the timing cycle (minus the voltage drop across the diode and transistor) starts again. The output from the PLL must be present during the entire cycle before the MPD outputs to the logic gates. This circuit is set for about 100--200 milliseconds depending upon the desired reliability. This circuit can be very effective in chatter prevention.

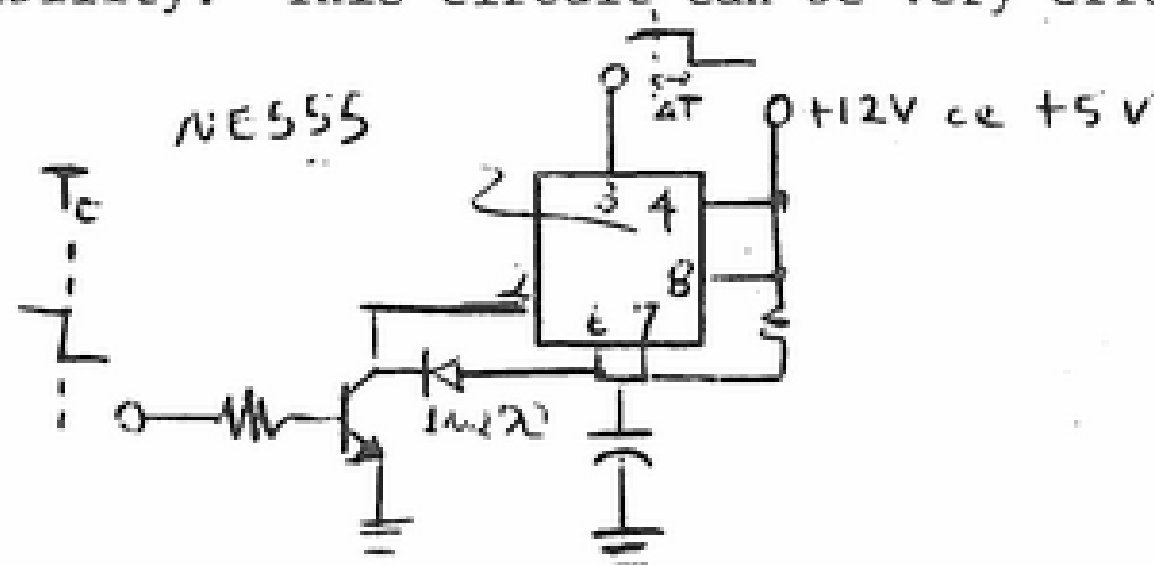


Figure 3. Missing Pulse Detector. This circuit does not appear in any Ap Note, but was designed to meet the particular output from the 567. I have since seen it used by other companies in a very similiar application.

Processing the incoming signal can also be very important. The usual input circuit for the 567 is a couple of Germanium diodes back to back across the input. This is

very unsatisfactory given the ability of the PLL to respond to harmonics and subharmonics. When the 567 is operated above 200 mv (high input level mode) the input is now limiting. Out of band signals or high noise levels can cause an apparent bandwidth reduction as the in band signal is suppressed. Since most germanium diodes have a forward voltage drop of about .34 volts, you can already see that operation with this technique is already high level. In addition, the limiting action can create in-band components from sub-harmonic signals so the 567 will become sensitive to signals at $f_o / 3$, $f_o / 5$, $f_o / 7$, etc. In addition, the 567 will also lock onto signals near $(2n+1)f_o$, and will give an output for signals near $(4n+1)f_o$ where $n = 0, 1, 2, 3$, etc. This difficulty with sub and super harmonics is another factor that must be analyzed and provided for.

The solution is to prevent limiting and keep any input circuitry linear or kept from clipping. The 567 should be presented with a sine wave in order to prevent sub and superharmonic chatter. In addition, the normal output of a 2 meter or 450 mhz receiver shows some disparity between high and low tones. I found that high tones (even though transmitted flat) appear attenuated at the output of a receiver. PLL's have an innate ability to dig down 6 db into the noise to lock onto a signal. That is, the minimum input signal to wideband noise ratio is -6 db. This results from using the PLL technique for detection. However, if the high tone you wish to detect is more than 6 db less than the low tone, you will have some difficulty detecting that signal in the presence of the low tone. In addition, various repeaters seem to demand different tone levels to make them operate. I wanted to make ours relatively independent of tone level. The only solution is to AGC the input and then bandsplit into the high tone group and low tone group. The general relationship is shown below.

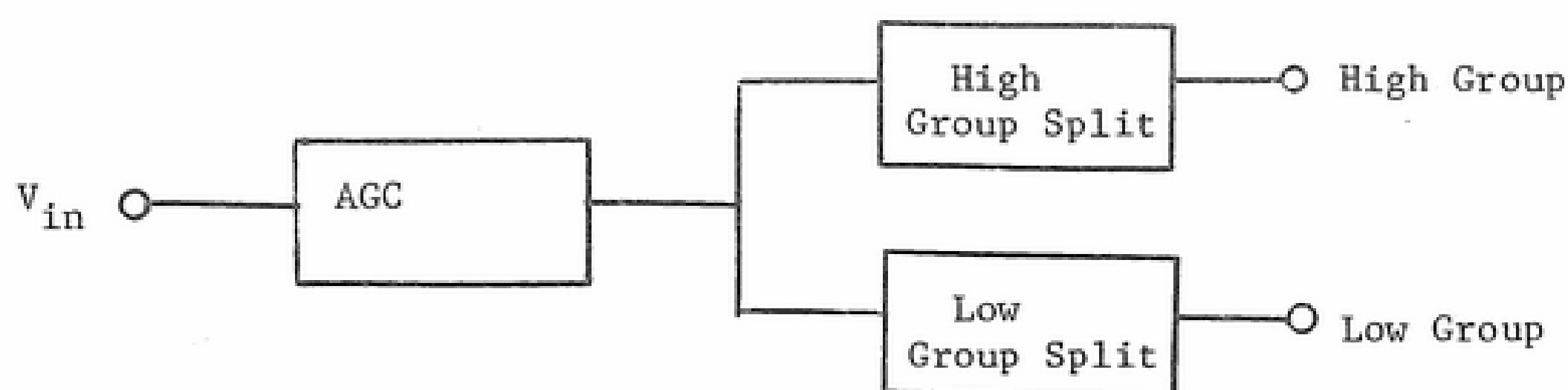


Figure 4. Automatic Gain Control. The AGC provides constant output over a range from 10 mv to 3 volts. The Bandpass filters are two pole Biquad filters which will be shown. These filters are easily tuned. and provide some separation between the two tone groups. A variable output allows the output to be set to the proper voltage to trip the PLL's.

I gave some consideration to filtering the signal and the using two AGC circuits to set the output from each bandpass filter, but felt that this overly complicated the circuit. In addition, the AGC would be feeding the filters with bandpass noise that could cause some falsing. It would also degrade the band edges of the filters for each group. Band splitting has been described before for touchtone decoding. Bell uses it in their decoders and even modern digital filters suggest prefiltering before detecting.

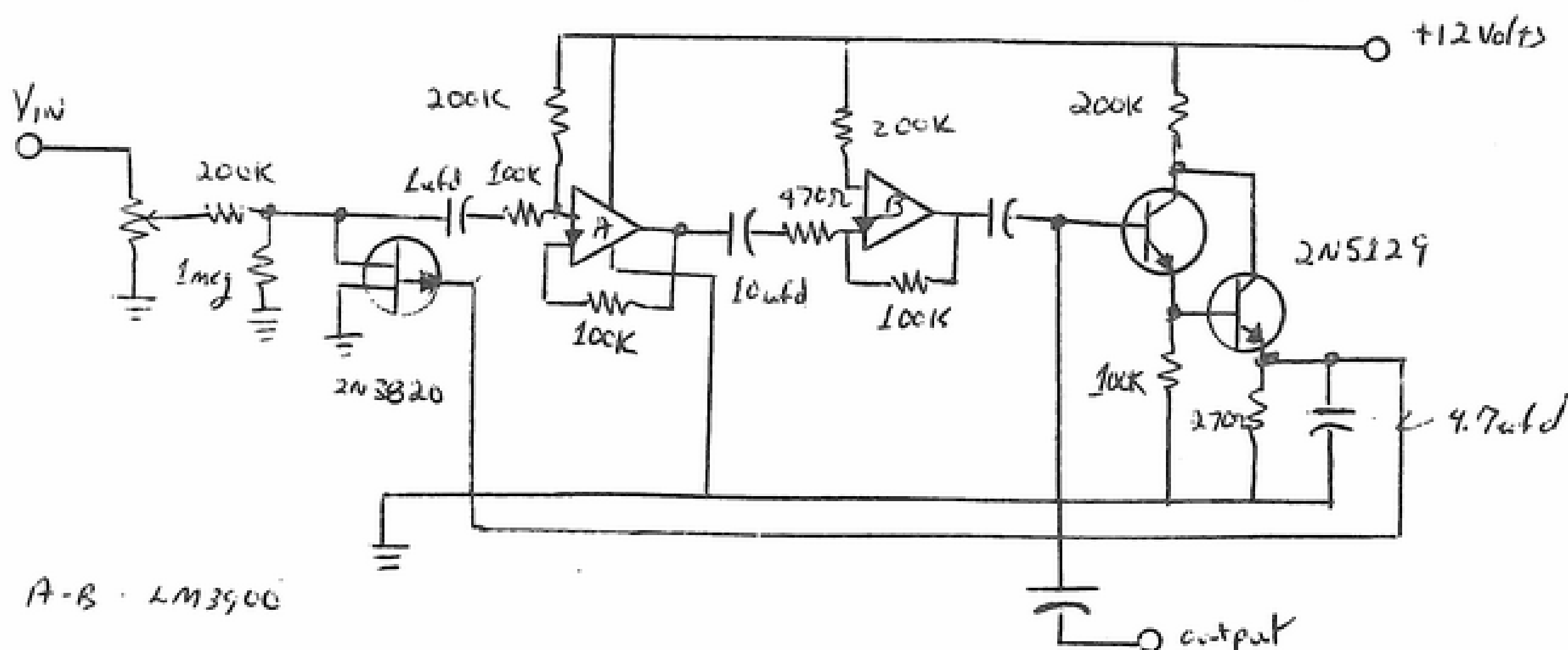


Figure 5. AGC input circuitry. This circuit can provide over 20 db of compression and expansion. It was shamelessly stolen from an unnamed source.

The AGC circuit is shown in Figure 5. It is a single supply circuit that uses half of an LM3900 Norton amplifier. The 2N3820 is a P-channel FET that, depending upon the control voltage applied to it, shunts the incoming signal to ground. It is possible to change the response characteristics by changing the 4.7 ufd capacitor. I have used a value as low as 1 ufd. Make sure that the +12V supply is well filtered to prevent chatter and noise from the 567's from getting into it. The second amplifier in the circuit has a gain of over 200. This circuit is not good for high fidelity unless you cut down the compression considerably. You can purchase the entire circuit from Data Signal including a PC board for a nominal sum. This circuit is so sensitive that it enables us to control the patch of the AF5AFW repeater with a signal so low it can barely be heard. Touch tone control from the phone line to turn the patch off is also possible. It might take some parts juggling to get it to operate properly if you change any parts values.

After the AGC, the signal is fed to two separate Bandpass Filters. One filter is shown below. This is a single two pole filter using three op amps in a BiQuad configuration. It is possible to get a single two pole filter using only one Op Amp, but the transfer equations make it a bear to tune. This circuit is quite simple to tune because of the simplified equations. The Op Amps are 5558 minidips which contain two Op Amps in each package. They are operated single ended by lifting the + input to the Op Amp to +6Volts and filtering.

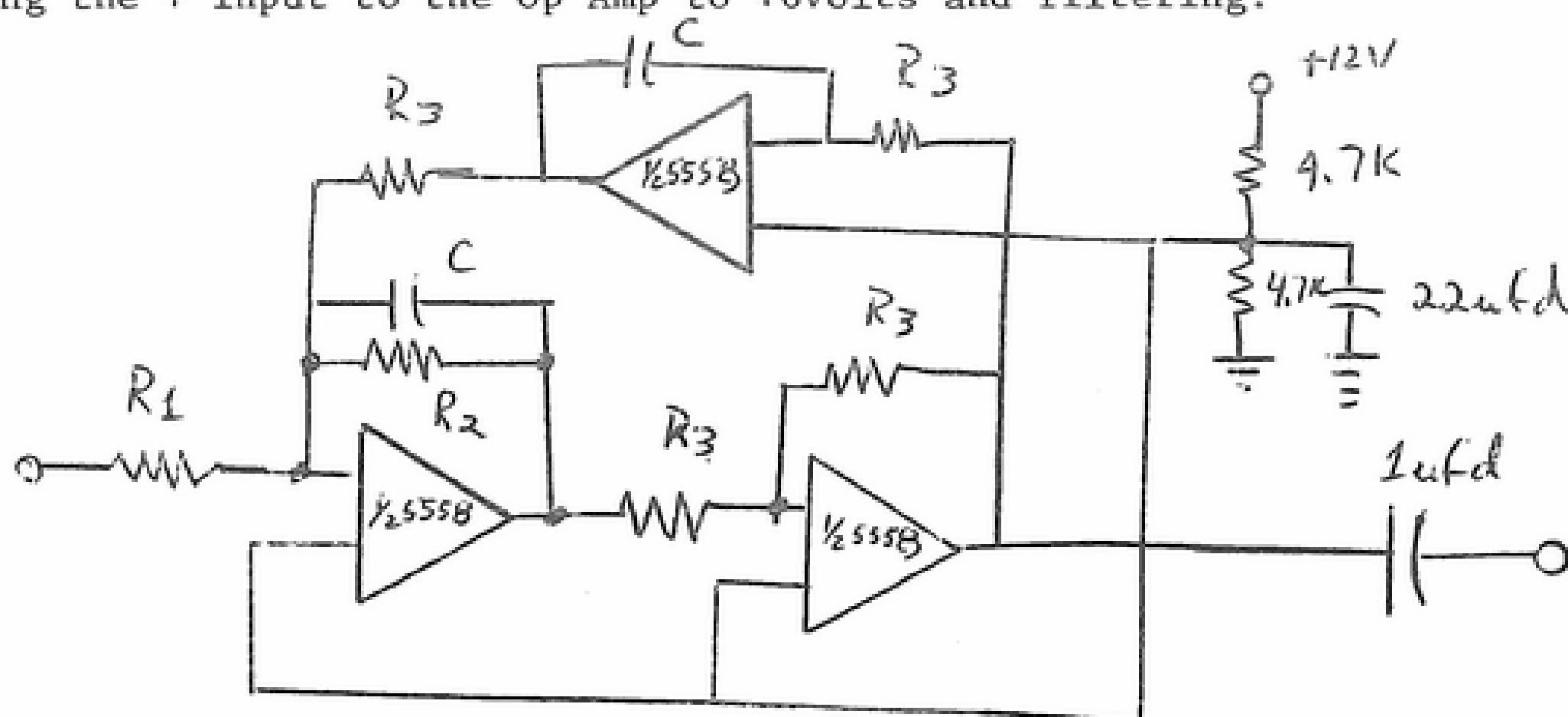


Figure 6. BiQuad Bandpass Filter. As can be seen, there are only three resistor values and one capacitor. This is a two pole filter. The 5558 is a dual 741. Design equations and other parameters are available from the author.

The output of the Filter is fed to a variable resistor which is then adjusted to provide approximately 200 mv to the PLL's. The input is then adjusted for the maximum signal which is expected from the various audio sources. It should be noted that if you are experiencing rolloff in the receiver that this can be compensated for by setting the High group slightly higher.

A complete tone decoder circuit consists of four boards in the AF5AFW setup. The first card is a AGC-Prefilter card. The second card is the PLL's which contains separate high and low group input plus eight tone levels out. The PLL's feed the Missing Pulse Detectors (again, there are eight circuits on a card) which are on another board. The output of the missing pulse card then feeds the various logic gates which also contains a LM309 to supply 5 volts to the 567's. The logic card has a full complement of all 16 digits out.

How does the circuit work? Pretty well. I haven't garbaged up the basic function of decoding by adding all of the extraneous matter. In fact, the extra circuitry can be quite helpful. For example, when the output from the on-chip oscillators was getting back into the AGC - Prefilter Card, the PLL's were locking onto the outputs from the filter. The Missing Pulse Detectors kept the logic from triggering outputs to the control circuitry. The loops were going in and out of lock at a very fast rate, yet still did not false. A previous problem between high and low group levels because audio was being rolled off on the high end. By properly adjusting the high and low group levels, any rolloff in phone lines or receiver was eliminated. A previous circuit board that had been built up had to be re-adjusted every other month or so. This circuit was first tuned up over six months ago and was retuned only slightly when installed because I had dithered with the adjustments once. Others that hadn't been adjusted were still right on frequency.

Yet, with all the advantages offered by PLL's for touchtone decoding, they are not

the present ultimate in signalling. The rise of Large Scale Integration chips for microprocessors has also brought about the manufacture of certain special purpose chips. Tones can also be detected digitally and this is precisely what Collins Radio and General Instruments have done by both introducing single chip digital touchtone decoders. These circuits work in a similiar fashion to the MC14410 chip touchtone encoder by first generating a signal using a crystal. After dividing the signal down, the signals are used to measure the zero crossings of the incoming signal. The basic circuit operates by watching the input signal and beginning a timing cycle at a zero crossing. The timer keeps counting until the circuit says we should be seeing another zero crossing if this is a touchtone frequency. It then opens the zero crossing detector for a certain period of time. If a zero crossing is present, the chip then considers the possibility that a valid tone is present. If this happens too many times, the chip outputs a logic signal. Both the General chip and the Collins chip use prefilters. The General chip has BCD output plus tone logic out. The counters to check the frequencies are all preset and part of the chip hardware. The bandwidth of this circuit can be extremely narrow since it is dependent upon the period of time that you open the second window. If it is only open for a short time then the bandwidth will be very narrow. If it is open longer, the bandwidth increases. The Collins chip uses a standard 3.58 Mhz TV Color burst crystal and has been priced at \$29.00 in hundred lot quantities. If I can obtain data sheets this month, I will try to have a brief summary of both of these chips.

The new digital filters should offer the ultimate in touchtone decoding while reducing parts count considerably. The Collins chip is currently^{LY} available from stock while General Instruments expects to start providing quantities from stock in January. You can be sure that I will be one of the first in line along with K5HMD and WA5JXX to experiment with these new devices.

Micheal Salem AA5EPK

NEW GOLD MINE DISCOVERED IN NORMAN -- Pure nuggets, folks. It is not everybody who has a real electronics store open down the street from his house, but incredibly, this has happened to me. The occassion for this good news is a new Burstein-Applebee Associate Store opening in the Colonial Estates Shopping Center at 1337 East Lindsey in Norman. The manager is Roger Heiter and ole Rog has promised to stock not just the usual stuff, but about 80% of the stock in the BA Catalog. Yes folks, real honest to God parts bins. The store features a wide selection of parts and the full HEP line and vacuum tubes (Yes, bless them, I still remember vacuum tubes). Roger will also be featuring various stereo lines and also has a new Sony Betamax Color VTR Cassette Recorder. The store is impressive and besides the normal stock (which Roger promises to sell at catalog price), the store also features the Callectro line and plans to provide surplus sales of equipment and other goodies as he picks them up.

The store is brand new and stock is going up on the shelves daily. I broused through the store the other day and find that the stock is high quality and complete. A rare 3PDT switch that I have been looking for was hanging on the shelf. A battery power TV needed for an emergency Christmas gift was available just a phone call away to the Kansas City warehouse and shipped in on a bus within 4 days. There is a complete set of printed circuit materials, hardware, and chassis. Not the el cheapo radio shack cabinets, but the best offered by Bud and Ten Tec. The blister pack racks are loaded with all sorts of goodies including switches and the RCA Experimenter line. Roger will have an Argonaut and other Amateur gear on display and sale. He has already stocked 2 meter antennas. Its great to find another source for parts and other goodies especially in Norman. I hope that you will take advantage of this opportunity. The store is aimed at the experimenter, but will stock a good line of consumer good also.

Micheal Salem AA5EPK

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Bill
WA5RAQ



Club NEWS

W5LOW
The Elmer Goshler Memorial
Station

MINUTES OF DECEMBER MEETING

MEETING WAS CALLED TO ORDER AT APPROXIMATELY 8 PM BY PRESIDENT TOM, W5OZE WITH TEN MEMBERS AND GUESTS PRESENT. SELF INTRODUCTIONS FOLLOWED: WA5ZNF IS BUYING A COMPUTER AND GETTING RAZZLE DAZZLE FROM IBM AFTER HIS BOSS SAID NO TO "HOME-BREW." K5VRL HAS A TOWER PROJECT ON THE BOOKS IF THE WX WILL HOLD. W5KE WAS LAST SEEN COLLECTING CLUB-NEWS. HE SAID THE XYL HAD LEFT HIM . . . TO TAKE CARE OF THE NEW GRANDBABY. W5TQG'S GRANDKIDS ARE VISITING FROM TOKYO. WA5JGU WAS LAST SEEN TRYING TO PASS A CHECK FOR HIS ANNUAL DUES. W5JJ IS PROUD NEW OWNER OF YAESU FRG7, GENERAL COVERAGE RECEIVER BUT IT IS NOT YET OUT OF THE WRAPPER: GOES FROM $\frac{1}{2}$ MHZ TO 30 MHZ. WB5KCU LET A POWER SUPPLY GET CARRIED AWAY WITH ITSELF, TAKING A RECEIVER WITH IT. CHARLIE CAME TO THE RESCUE WITH A RIG FOR SALE FROM HIS ABUNDANT SUPPLY. W5HXL HAS SOME NEW UHF TUBES TO PLAY WITH . . . AND SOME OTHER GOODIES. WB5KHU IS HOPING FOR A 76 TAX DEDUCTION BUT THE BABY IS NOT DUE UNTIL JANUARY. HELEN (YL-K5VRL) ANNOUNCED A NEW GRANDBABY BUT NOBODY BELIEVED SHE IS OLD ENOUGH FOR SUCH AN ANNOUNCEMENT.

A NOMINATING COMMITTEE CONSISTING OF WA5JGU, WB5KHU, W5JJ AND K5VRL WAS APPOINTED TO FIND POTENTIAL OFFICERS FOR NEXT YEAR.

MOTION WAS PASSED THAT BOB ASHBY AND STEVE STEVENS BE COMMENDED FOR THEIR DEDICATED SERVICES TO THE CLUB NETS AND THAT THE NETS CONTINUE AT THEIR DISCRETIONS.

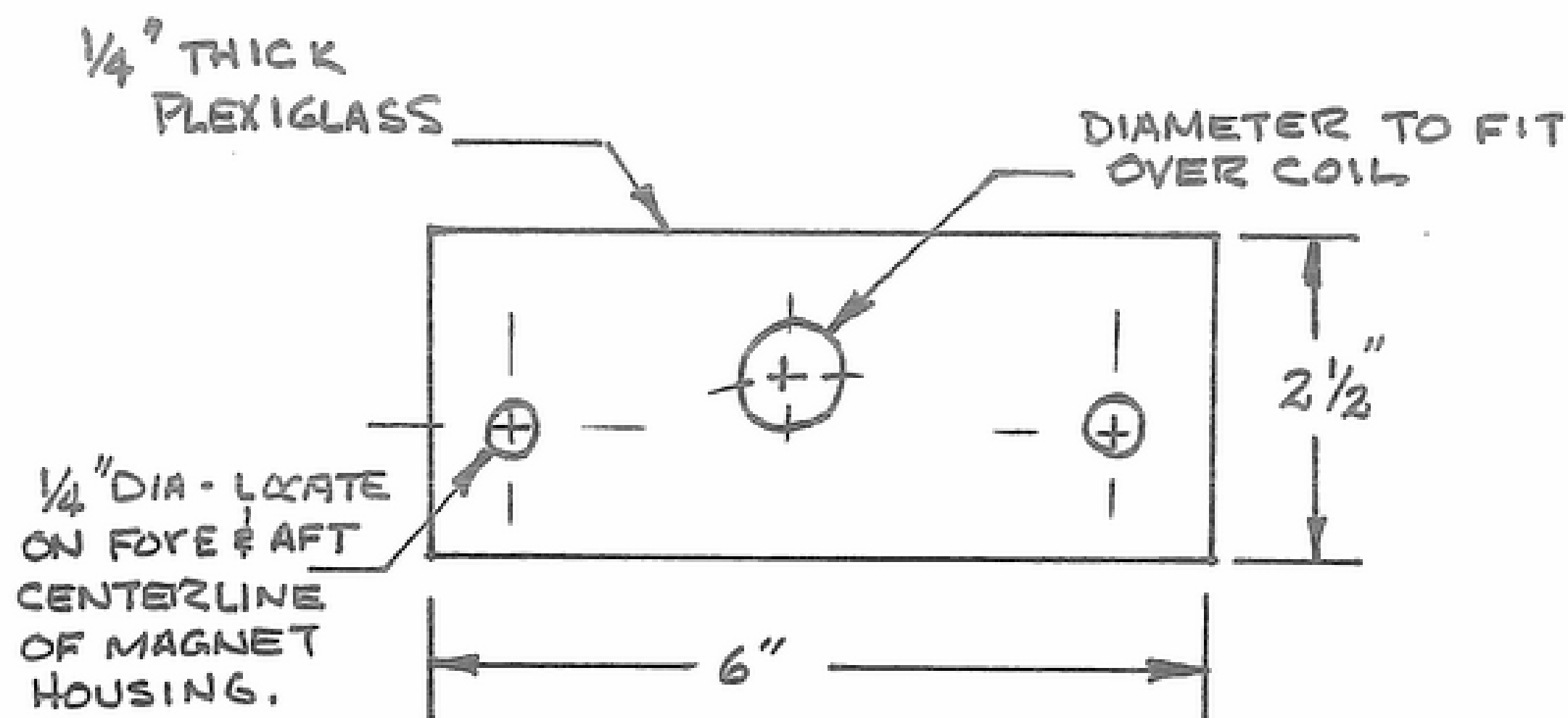
THERE WAS NO FORMAL PROGRAM SO AN OPEN DISCUSSION FOLLOWED ON WHAT THE CLUB SHOULD DO NEXT YEAR FOR THE GOOD OF AMATEUR RADIO AND REJUVINATION OF INTEREST IN CLUB MEETINGS. IT WAS DECIDED TO DEVELOP A SET OF PROGRAMS OF GENERAL INTEREST AND PARTICULARLY DESIGNED TO INFORM THE NEWER AMATEUR AND HELP HIM SET UP HIS STATION. VARIOUS ASPECTS OF AMATEUR RADIO WERE IDENTIFIED AND SOME PRELIMINARY PLANNING WAS STARTED. CLUB BUSINESS MEETINGS WILL BE KEPT VERY BRIEF TO ALLOW MAXIMUM TIME FOR THE PROGRAMS. DETAILS AND SCHEDULE WILL BE PUBLISHED IN FEBRUARY C & E. THE MEETING WAS ADJOURNED FOR COFFEE AND DONUTS IN THE CLUB STATION. THESE MINUTES WERE TAKEN BY KEN WB5KHU. JOE, WA5TRS, SEC'Y.

SOLID STATE VHF AMPLIFIER TUNE-UP

MOST OF US ARE AWARE OF POSSIBLE GENERATION OF PARASITICS CAUSED BY IMPROPER TUNING OF VHF TRANSMITTERS. BECAUSE OF THIS, IT IS IMPORTANT THAT MANUFACTURER'S RECOMMENDED PROCEDURES SHOULD BE STRICTLY FOLLOWED RATHER THAN TUNING FOR "MAXIMUM SMOKE." SOMETIMES, MANUFACTURER'S RECOMMENDATIONS ARE SPARSE OR NON-EXISTENT AND IT IS NECESSARY TO DO THE BEST YOU CAN WITH EQUIPMENT AVAILABLE. SINCE SPECTRUM ANALYZERS ARE RATHER SCARCE AND WAVE METERS ARE DIFFICULT TO USE ON VHF, AN IDEA FROM CHARLIE, WA5JGU BEARS DISSEMINATING. HE HAS BEEN SUCCESSFUL USING A TELEVISION RECEIVER AS A DETECTOR OF PROBLEMS. ARRANGING A NEARBY TELEVISION SO THAT IT IS ON AN INDOOR ANTENNA AND RECEIVING A WEAK SIGNAL, HE HAS BEEN ABLE TO TUNE-UP WITH ONE EYEBALL ON THE WATTMETER AND ONE ON THE TV LOOKING FOR INTERFERENCE. HE SAYS THAT ONE MAY HAVE TO REDUCE POWER OUTPUT BY ONLY A TINY FRACTION TO ELIMINATE INTERFERENCE PATTERNS ON THE SCREEN. CHANCES ARE PRETTY GOOD THAT IF THERE IS MINIMUM INTERFERENCE ON ANY CHANNELS (EACH BEING 6 MHZ WIDE) THE SPECTRUM FROM THE TRANSMITTER IS PRETTY CLEAN ELSEWHERE. THIS MAY NOT BE AN ELOQUENT METHOD BUT IT SURE BEATS HAVING NO INDICATOR AT ALL. IT WOULD HAVE WORKED ON A FEW DIRTY SIGNALS I HAVE SEEN ON SPECTRUM ANALYZERS. HOW ABOUT SOMEONE COMING UP WITH A CIRCUIT FOR A SWEEPING RECEIVER THAT COULD BE USED WITH A SCOPE TO SIMULATE THE PERFORMANCE OF A SPECTRUM ANALYZER? JOE, WA5TRS

GOT THE "MAGNET WON'T STICK TO VINYL" BLUES?

EVER HAVE TROUBLE KEEPING A MAGNETIC MOUNTED ANTENNA ON A VINYL COVERED ROOF? GLEN FRANKLIN, WB5PEC CONSTRUCTED THE DEVICE SHOWN TO HELP KEEP A LARSEN MOUNT IN PLACE. HE SAID THE MOUNT WORKED ON MOST VINYL ROOFS BUT FOR SOME REASON WOULDN'T STICK GOOD ENOUGH ON ONE CAR. HE CONSTRUCTED THE GADGET FROM PLEXIGLASS BUT SAID ALMOST ANY MATERIAL HAVING GOOD DIELECTRIC AND MECHANICAL PROPERTIES WOULD DO.

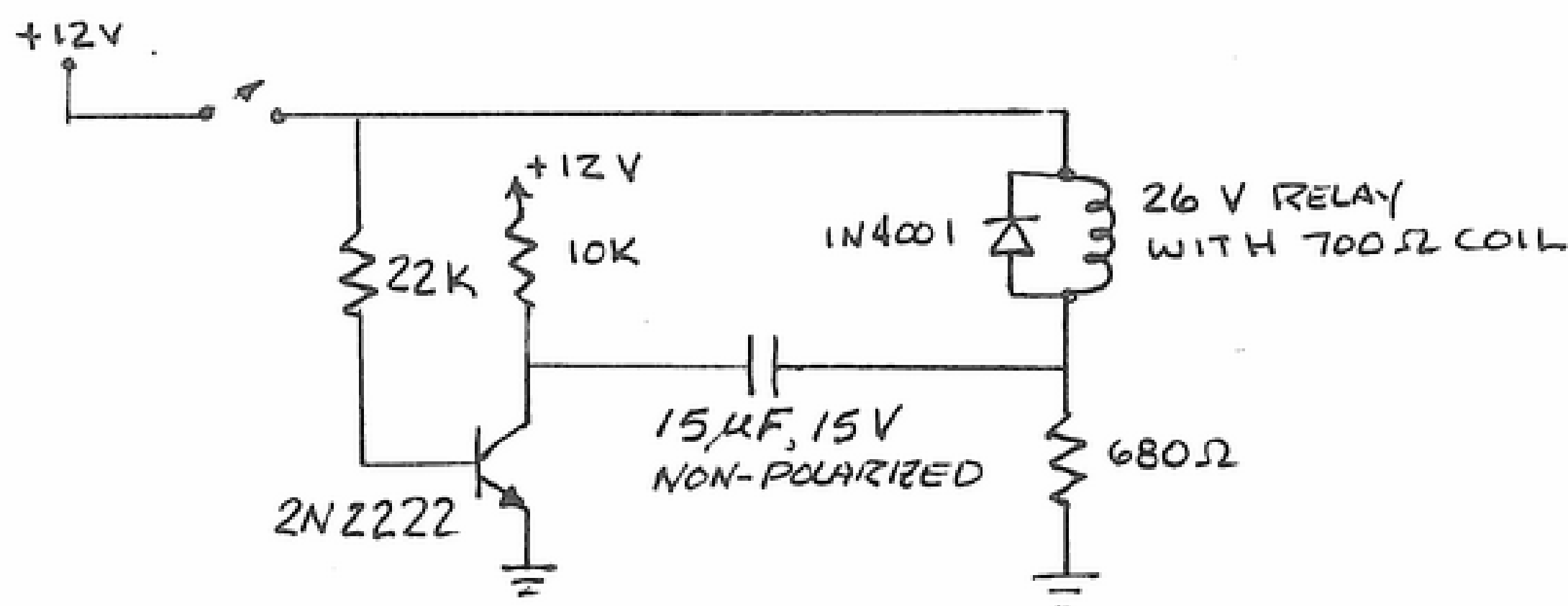


MAGNET MOUNT ASSIST

TWO ELASTIC CARGO TIE-DOWNS (BUNGEE CORDS), USED ON MOTORCYCLES, ARE HOOKED INTO THE $\frac{1}{4}$ INCH HOLES AND THE OTHER ENDS HOOKED OVER TOPS OF THE DOOR JAMS. HE SAID THE TIE-DOWNS ARE AVAILABLE IN VARIETY STORES AND CAN BE SHORTENED IF NECESSARY BY REWORKING ONE END OF EACH CORD. THE HOOKS ON THE TIE-DOWNS ARE RUBBER COVERED AND THERE SHOULD BE NO PROBLEM WITH SCRATCHING OF THE CAR FINISH. JOE, WA5TRS

HOW TO MISUSE A RELAY (OR, HOW TO FIT A MISFIT)

AT LAST, A GOOD WAY TO USE THOSE 24 VOLT RELAYS! THE DECEMBER 9 ISSUE OF ELECTRONICS CONTAINS A CIRCUIT SUBMITTED BY JOHN R. NELSON, MOTOROLA, INC., WHICH KICKS A 24 VOLT RELAY WITH ENOUGH CURRENT FOR PULL-IN AND THEN HOLDS IT IN WITH CURRENT FROM A 12 VOLT SUPPLY.



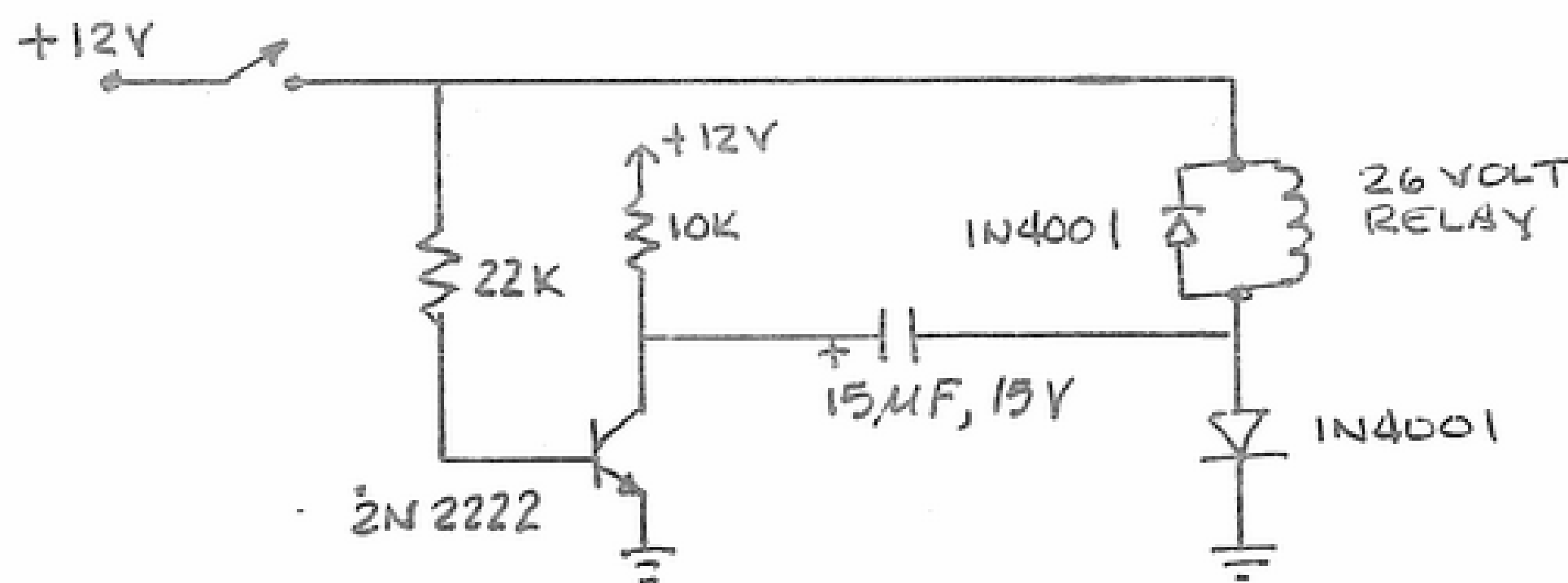
ORIGINAL JOHN NELSON CIRCUIT

THE COMPONENTS HE USED ARE SHOWN IN THE SCHEMATIC. WHEN THE SWITCH IS OPEN, THE TRANSISTOR IS NON-CONDUCTING AND THE 15 UF CAPACITOR IS CHARGED TO THE SUPPLY VOLTAGE. UPON CLOSING OF THE SWITCH, +12 VOLTS IS APPLIED TO THE TOP OF THE RELAY COIL AND THE TRANSISTOR IS DRIVEN INTO CONDUCTION. WHEN THE TRANSISTOR COLLECTOR DROPS TO NEARLY ZERO VOLTS, THE RIGHT SIDE OF THE CAPACITOR DROPS TO NEARLY -12 VOLTS. THE COIL AT THIS INSTANT HAS 24 VOLTS ACROSS IT AND THE RELAY IS ENERGIZED. WHEN THE CAPACITOR IS FULLY DISCHARGED IT BEGINS TO CHARGE IN THE REVERSE DIRECTION, THE RIGHT SIDE HAVING ABOUT +5 VOLTS ON IT. FOR THIS REASON THE CAPACITOR NEEDS TO BE NON-POLARIZED. THE DIODE ACROSS THE RELAY COIL IS TO SOAK UP TURN-OFF TRANSIENTS.

WELL, NOT HAVING A SINGLE NON-POLARIZED CAPACITOR TO MY NAME, ESPECIALLY ONE AS LARGE AS 15 UF, I SHRUGGED OFF THE CIRCUIT AT FIRST. (YEAH, I KNOW PUT TWO ELECTROLYTICS BACK TO BACK . . . NEVER TRUSTED 'EM).

BUT WAIT! WHAT IF THE 680 OHM RESISTOR WAS REPLACED WITH A DIODE WHICH WOULD ALLOW THE CAPACITOR TO CHARGE WHILE THE SWITCH IS OPEN AND KEEP THE RIGHT SIDE OF THE

CAPACITOR FROM GOING POSITIVE (WELL, TOO POSITIVE . . .) WHEN THE SWITCH IS CLOSED. THE CIRCUIT WOULD LOOK LIKE THIS:

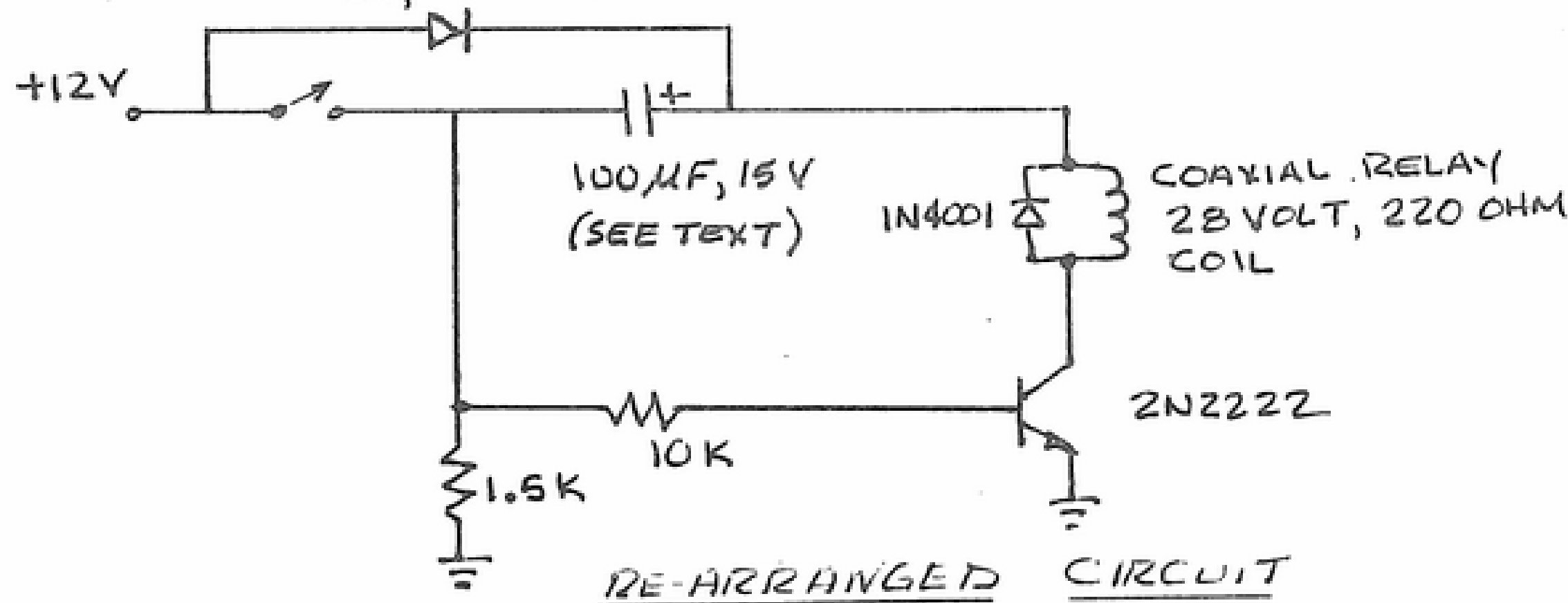


MODIFIED CIRCUIT WITH DIODE

NOW DURING SWITCH CLOSURE THE RIGHT SIDE OF THE CAPACITOR STILL GOES NEGATIVE BUT AFTER PULL IN, IT WILL ONLY SEE +0.7 VOLTS. THE + SIDE WILL SEE A SIMILAR VOLTAGE.

IN EITHER ONE OF THESE CIRCUITS, THE SWITCH MUST BE OPENED AND RECLOSED TO ENERGIZE THE RELAY IF THERE IS A POWER INTERRUPTION. (DOES THIS SUGGEST SOME KIND OF EXOTIC POWER FAILURE INDICATOR? PERHAPS ONE THAT WILL WORK ON SINGLE POLE RELAYS AND DOES NOT MIX SUPPLY VOLTAGE WITH CIRCUITS SWITCHED BY THE RELAY).

IN A SPECIFIC APPLICATION, I HAVE A FINE COAXIAL RELAY MANUFACTURED FOR COLLINS BY TELEX. THE COIL HAS A RESISTANCE OF 220 OHMS AND IS INTENDED FOR 28 VDC OPERATION. THE RELAY WOULD ACTUATE, WEAKLY, SOMETIMES, ON 12 VOLTS. I WASN'T SURE ENOUGH BASE DRIVE WOULD BE SUPPLIED TO THE TRANSISTOR IN THE CIRCUIT ABOVE BECAUSE IT IS CONDUCTING ONLY A SHORT PULSE AND WOULD BE HARD TO MEASURE. I REARRANGED THE CIRCUIT AS FOLLOWS: D_1 , IN4001



WITH THE SWITCH OPEN, THE CAPACITOR CHARGES WITH CURRENT FLOWING THROUGH D_1 AND THE 1.5 K RESISTOR. (ALSO THROUGH THE 10K RESISTOR AND TRANSISTOR BASE-EMITTER JUNCTION. THIS CAUSES A BIT OF TURN-OFF DELAY BUT, OH WELL). WHEN THE SWITCH CLOSES, 12 VOLTS HITS THE MINUS SIDE OF THE CAPACITOR AND THE PLUS SIDE JUMPS TO +24 VOLTS. THE BOTTOM OF THE COIL IS SHORTED TO GROUND BY THE TRANSISTOR.

WITH 100 UF, THE RELAY PULLS IN SOLID WITH 10 VOLTS FROM THE SUPPLY. WITH 25 UF, THERE IS LITTLE EFFECT FROM ALL THE CIRCUIT SOPHISTICATION. IT TAKES 12 VOLTS TO ACTUATE THE THING WHICH IS NO BETTER THAN STRAIGHT-OPERATION OF THE RELAY.

THIS RELAY IS A PARTICULARLY DIFFICULT ONE TO USE AT LOW VOLTAGE BECAUSE OF LONG THROW ON THE ARMATURE. I SUSPECT THAT WHEN ONLY 25 UF CAPACITOR IS USED, IT DISCHARGES BEFORE THE ARMATURE CAN MOVE ENOUGH FOR THE MAGNETIC FIELD AT THE LOWER VOLTAGE TO CATCH IT. IF INSTALLED ON A TOWER WITH A LONG CONTROL LINE, I WOULDN'T SKIMP ON THE VALUE OF THE CAPACITOR BECAUSE THE PEAK VOLTAGE PULSE AVAILABLE WOULD BE SEVERELY LIMITED BY THE INDUCTANCE OF THE LINE. WITH 100 UF, THE RC TIME CONSTANT IS ONLY 22 MILLISECONDS. WITH A SMALLER RELAY, THIS MIGHT BE QUITE SATISFACTORY BUT INTUITION TELLS ME THAT IT SHOULD BE GREATER BY AN ORDER OF MAGNITUDE SO WHEN I INSTALL THE THING I WILL PROBABLY USE ABOUT 1000 UF.

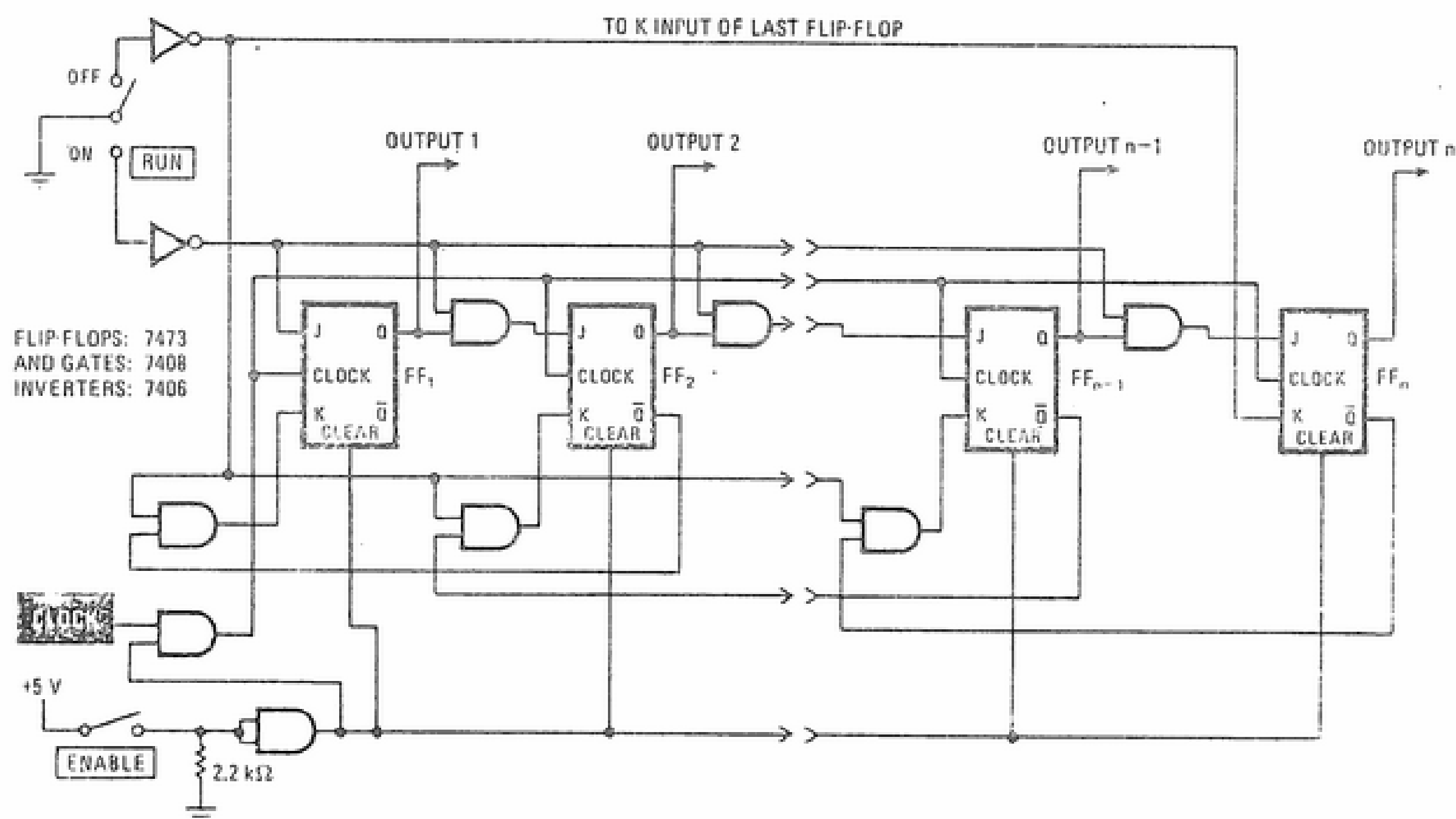
IF AC IS AVAILABLE, REFER TO THE VOLTAGE MULTIPLIER CIRCUIT IN THE HOLIDAY 76 ISSUE OF 73 MAGAZINE. PAGE 197. IT WAS WRITTEN BY OUR OWN CARL, W5JJ.

INCIDENTALLY, IF YOU ARE BUILDING THE POWER AMPLIFIER CIRCUIT DESIGNED BY CARL AND FOUND ELSEWHERE IN THAT SAME ISSUE, MOVE THE DC BLOCKING CAPACITOR DOWNSTREAM FROM THE CHOKE. SOME DRAFTSMEN ARE NOT TOO TECHNICALLY INCLINED THESE DAYS, RIGHT CARL?

JOE, WASTRS

ANOTHER STOLEN IDEA - AN UP/DOWN LATCHING SEQUENCER

THE FOLLOWING IS LIFTED IN ITS ENTIRETY FROM DESIGNERS CASEBOOK, A FEATURE OF ELECTRONICS MAGAZINE. THE DESIGN BY MARK D. WILLIAMS, STANDARD TELEPHONE CO., CORNELIA, GA, IS APPLICABLE TO BREAK-IN TRANSCIEVER SYSTEMS AND SOPHISTICATED SYSTEMS LIKE THE LOOK-SEE CIRCUIT OF A SINGLE FREQUENCY AUTOPATCH OR REMOTE CONTROLLED SECONDARY STATION.



CIRCUITS SOMETIMES NEED ENERGIZING IN A PRESCRIBED ORDER AND DE-ENERGIZING IN THE REVERSE ORDER, ON A FIRST-ON, LAST-OFF BASIS. AT A HIGH-POWER RADIO STATION, FOR INSTANCE, THE ANTENNAS ARE SWITCHED FOR TRANSMITTING AND RECEIVING, AND THE LINEAR AMPLIFIER MUST BE TURNED OFF BEFORE THE SWITCHING AND ON AFTERWARDS IF ITS OUTPUT SECTION IS NOT TO BE DESTROYED. A SEQUENCER THAT PERFORMS THIS TASK CAN BE BUILT WITH TRANSISTOR-TRANSISTOR-LOGIC CIRCUITS, HAVING A SEQUENCE RATE CONTROLLED BY AN EXTERNAL TTL CLOCK AND A COMPLETELY EXPANDABLE NUMBER OF OUTPUTS.

THE CIRCUIT USES AND GATING AND INHIBITING INPUTS ON THE CONTROL FLIP-FLOPS TO EXECUTE THE PROPER SEQUENCE. AS SHOWN IN THE SCHEMATIC, CLOSING THE ENABLE SWITCH ALLOWS CLOCK PULSES TO PASS TO THE FLIP-FLOPS, WHICH ARE INHIBITED BY THE LOW LEVEL AT THEIR J INPUTS. TURNING ON THE RUN SWITCH ALLOWS THE FIRST FLIP-FLOP, FF₁, TO TOGGLE UPON RECEIPT OF THE NEXT CLOCK PULSE, AND THE Q OUTPUT OF FF₁ ENABLES FF₂ TO TOGGLE WITH THE FOLLOWING CLOCK PULSE. THE Q OUTPUT OF FF₂ INHIBITS FF₁, WHILE THE Q OUTPUT OF FF₂ ALLOWS FF₃ TO TOGGLE, AND SO ON DOWN THE LINE TO THE LAST FLIP-FLOP, FF_n, AS LONG AS THE RUN SWITCH REMAINS ON. THE CIRCUIT NOW IS STABLE WITH ALL THE Q OUTPUTS HIGH.

TURNING THE RUN SWITCH OFF STARTS THE UNLATCH SEQUENCE BY ENABLING FF_n TO RETURN TO ITS OFF STATE DUE TO THE HIGH K AND LOW J INPUT LEVELS. THE Q OUTPUT OF FF_n ENABLES THE PRECEDING FLIP FLOP FF_{n-1} TO RETURN TO ITS LOW STATE, AND SO ON BACK TO FF₁. OPENING THE ENABLE SWITCH SIMULTANEOUSLY RESETS ALL THE FLIP-FLOPS AND PREVENTS FURTHER TOGGING.

A THREE-STAGE SEQUENCER WILL REQUIRE FIVE TTL PACKAGES, EXCLUDING THE CLOCK CIRCUIT. DRIVING DISPLAYS OR RELAYS REQUIRES BUFFERING OF THE Q OUTPUTS ON THE FLIP-FLOPS.

ALTHOUGH THE SEQUENCING MAY BE EXTENDED TO MANY STAGES, THE INVERTERS MAY HAVE TO BE BUFFERED TO DRIVE THE AND GATES FOR MANY STAGES.

JOE, WASTRS

C O R A C O M M E N T S

It's too late to wish you a Merry Christmas this year, so I'll get a jump on next year. On second thought, I'll wait for a while. Happy New Year!

Even though it's over with, let's keep the spirit of Christmas alive. Anyone have any old Amateur related literature that they could part with? Please read the P.S. received from Woody Welling W7KMQ.

"The club could do me a big favor. If anyone has any old amateur handbooks or other literature pertaining to amateur radio that is no longer being used, it could be collected. Let me know how much it is and I will send a check, U.S. funds, to cover shipping. They would be treasured by some of the people here. Thank you. Woodrow J. Welling, W. B. Electronic Consultant, Central Mindanao University, Musuan Bukidnon 8213, Philippines.

If anyone has anything they would like to donate, give me a call and I'll make arrangements to gather them together and get them to Woody. Of course, if you are acquainted with Woody, you can send them direct to him.

This brings to mind something that could be done by individuals or groups; to provide a local library with amateur publications. Who knows where the potential Amateur will be, when he gets exposed.

While on the subject of exposing people to amateur radio, there is a need for slides that depict amateur activity. All kinds, with maybe some exceptions. Cooled 807's do not necessarily a transmitter make. Anyway, if you have some slides that may fill the bill, get them to either your CORA representative or Hobe Burgan, WB5MLN. Be sure your name and address are on the slides so they can be returned. These slides will be used to make a presentation to non-Amateur radio groups.

Overheard on 2 meters. Directions to a Ham's house while discussing the expensive and sophisticated equipment located at friend Ham's shack.
RIP OFF? HOPE NOT! 'NUFF SAID?

Attention TR-2200A owners:

If your mike keeps slipping out of bracket, glue pencil eraser behind spring.

73

Gene. WB5QC

FOR SALE OR TRADE: BOLT ACTION RIFLE, REMINGTON MODEL 244 (CAL .244) WITH 4X LYMAN
SCOPE ON WEAVER MOUNTS. MOSTLY INTERESTED IN TRADE FOR 2-METER HAND HELD TALKIE.
CHARLIE, WA5JGU, 943-5631.

FOR SALE: SWAN 500 CX WITH 177XC POWER SUPPLY AND 14 C DC MODULE FOR MOBILE OPERATION. JOE CHRISTIAN, K5HMD, 360-2128.

Collector & Emitter Ad:

SWEDISH AMATEURS need Eimac SK-600, or similar, sockets (new or used) for 4CX250B tubes. Make offer to SM6CKU, Box 257, Kungsbacka, Sweden.
Note: Airmail postage to Sweden is 31¢ per ½ oz. W5KE has had satisfactory transactions with SM6CKU.

SAM, W5HAZ

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January 1977

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CORA Collector & Emitter



The OU Amateur Radio Club is alive and well and living on campus! Contrary to popular belief (since no article was turned in last issue) we're still alive and kicking, pounding the brass, squeezing the PTT buttons, mis-tuning the final and blowing the power supplies.

Let me introduce myself: I'm Kim Elmore (an OM, not a YL) call WB5CLC. My home is Tulsa and I've been an amateur for about 7 years. My favorite mode is CW and I also enjoy RTTY. I don't yet own a 2m FM rig but I'm working on it. Age here is 20 and my major is meteorology. This is my first year at OU as I transferred from the University of Tulsa as a Junior from engineering physics. I have aspirations towards a first class radiotelephone and a second class radiotelegraph. That way when I get out of school I'll be able to find a job.....

The story of how I became president of this meritorious (sic) organization is humorous to say the least. I had a sked with my dad so was forced to leave the meeting early by about 30 minutes or so. Well, that was election night and I should have known better. I recieved a telephone call from Paul, WB5EEY, that Friday evening telling me the process of how to set up the meeting, etc. After I made it clear that I hadn't the foggiest why I was being told this he seemed quite surprized. "Don't you know?" "Know what?!" I was then told the story of my election. The university railroad carries another victim to his Fate! In all seriousness, I'm quite proud to be serving as president and shall do my best for the club. I feel very strongly dedicated to ham radio and was very involved with the tower issue in Tulsa last summer. I would very much like to see a larger membership here in this club and shall do all I can to spur interest. Membership now stands at about 17 or 18 maybe even 20 or so and they're still trickling in, but many more would sure be nice.

Latest news from the W5TC shack is that the dear old HW-102 has developed an appetite for fuses. The power supply fuse is going before the dial lights even have a chance to glow. Since Christmas is not far off, I've volunteered to carry it home over the holidays and fix the problem. Sufficient equipment at my home QTH is available to tackle it successfully and it will be working in good shape by the beginning of the spring semester. There also seems to be a problem in the keying circuitry. I'm told by reliable sources in Tulsa that it's a little slow to key most of the time. I understand that this used to be a problem only when it was cold, but it seems to have become a permanent problem. Deck the iron with boughs of solder.....

Engineering open house has come and gone (thank goodness) and things were, as usual I'm told, a mess. Things did go well though and we evidently did impress the judges. Abe Crook (sorry Abe, can't remember your call!) showed up with his fantastic SSTV set up and did an excellent job. At this point I'm very ashamed to admit that I remember no calls or names but we were supplied with a 2KW (a very easy 2KW!) amplifier along with an ST-5 demodulator from two very generous hams. We also obtained some live on the air tapes of OSCAR QSO's that, unfortunately weren't used in the display but were, at least for myself, quite educational and impressive. The set up at the man's house was quite something to see. To all of you, who's names my little pea brain can't recall, my most heartfelt thanks for the use of your equipment, but more importantly, your donation of time. Sorry the TV crews didn't show Abe....

A meeting has evidently been missed in the shuffle of thanksgiving break and the resumption of classes but I'm not sure when it was. In any event, a station will be set up near Furr's cafeteria at 24th N.W. street and Main here in Norman on Dec. 17 through the 19th for the purposes of taking holiday traffic. Kenny Hutchison will do the actual sending of it into the NTS.

The antenna system on the roof is due some work, I'm told but the club will soon gain access to an antenna tuner (so goes the scuttlebutt) so we can probably defer that until some warmer months (never do today

what you can put off 'till tommorrow). We're still in dire need of know-ge of the whereabouts of the club's tower, rotator and R-360 receiver. Anyone that knows where they are or were recently, is asked to contact Paul or myself. That reminds me... Happy birthday Paul! He's no longer a teenager, folks, over the hill at 20 (hi hi).

To close this first of hopefully many columns to follow, I leave you with a few of Edsel Murphy's Laws.

General Engineering

- 1) The more innocuous a design change appears, the further its influence will extend.
- 2) All warranties and guarantees become void upon payment of invoice.
- 3) The necessity of making a major design change increases as the fabrication of the system approaches completion.
- 4) Firmness of delivery dates is inversely proportional to tightness of schedual.
- 5) An important Instruction Manual or Operating Manual will have been discarded.
- 6) Origanal drawings will be mangled by the copying machine.
- 7) Dimensions will always be expressed in the least usable term. Velocity, for example, will be in furlongs per fortnight.

Mathematics

- 1) In any given miscalculation the figure that is most obviously correct will be the source of error.
- 2) Any error that can creep in, will. It will be in the direction that will do the most damage to the calculation.
- 3) All constants are variables.
- 4) A decimal will always be misplaced.
- 5) In a complex calculation, one factor from the denominator will always move into the numerator.

Prototyping and Production

- 1) Any wire cut to length will be too short.
- 2) Tolerances will accumulate unidirectionally toward maximum difficulty of assembly.
- 3) The availabilty of a component will be inversely proportional to the need for that component.
- 4) If a project needs n components, there will be n-1 units in stock.
- 5) If a particular resistance is needed, that value will not be available. Further, it cannot be fabricated from any available series or parallel combination.
- 6) A dropped tool will fall where it will do the most damage. (Also known as the Law of Selective Gravitation.)
- 7) A motor will rotate in the wrong direction.
- 8) Interchangeable parts won't.
- 9) Components that cannot and must not be assembled improperly will be.
- 10) A dc meter will be used on an overly sensitive scale and be wired in backwards.
- 11) The delicate component will be dropped.
- 12) If a circuit cannot fail, it will.
- 13) A failsafe circuit will destroy others.
- 14) An instantaneous power supply crowbar circuit will operate too late.
- 15) A transistor protected by a fast-acting fuse will protect the fuse by blowing first.
- 16) A self starting oscillator won't.
- 17) A crystal oscillator will oscilate on the wrong frequency-if it oscillates.
- 18) A PNP transistor will be an NPN.
- 19) If an obviously defective component is replaced in a piece of equipment with an intermittent fault, the fault will reappear after the equipment is returned to service.

There's more, but I'll wait for another time...A MERRY CHRISTMAS TO ALL AND THE HAPPIEST OF NEW YEARS!!!!

- - - - -

Jim WBSCLC



W5PAA

THE PRESIDENT'S CORNER

The December dinner meeting was well attended, even though some members chose to attend the other dinner, which unfortunately was scheduled for the same date. I hope this situation can be avoided in the future, as many of us would like to attend both dinners.

After dinner, it was necessary to hold a short business meeting to select representatives to CORA for the Oklahoma Ham Holiday. CORA President, Gene, WB5SQC, made his pitch and after a few suggestions we obtained four volunteers. They are Rob, W5JES, Programs; Ivan, W5HFU, Prizes; George, W5NTL, Registration and Publicity, and Rosy (YF of Gene) Ladies Programs.

The program was presented by Bob, W5HXL, which consisted of many color slides covering a vast area from Oklahoma to California. Some were from eastern Oklahoma near Mel's, K5VWQ, mountain near Heavener. Daisy and I visited during the Thanksgiving holiday with Mel and Margaret, giving our new travel trailer a trial run. It did turn cold and about 1½ inches of snow fell one night without any wind, which made a beautiful, picturesque sight among the tall pine trees.

Despite the cold and snow, the warm reception extended to us by the Hood family made us feel welcome. Margaret prepared a delicious Thanksgiving dinner, in addition to other dinners, which we spread on a table in the new building that Mel has almost completed, and enjoyed the warmth of the wood fire. We extend our sincere gratitude to Mel, Margaret, Melanie and Paul for a lovely week high in the mountains among the tall pines.

The pad for the trailer hook-up is claimed first by Charles, WA5JGU, and second by Bob, W5HXL, and myself as the third occupant. Now it is going to be a hot race to see who arrives first to lay claim to this vacation spot made available by the Hood family. We will look forward to a return visit soon.

In the meantime, we are planning a trip to south Texas early in the coming year and after the holidays. Then later, we can join some of the local groups, which seems to be growing in numbers, for get-togethers in the state parks of Oklahoma. We are expecting some enjoyable trips in our new travel trailer.

I would like to thank all the club officers and members, who have made the past year most enjoyable. It has been a real pleasure to serve the club in the great bicentennial year of 1976. I would also like to extend the best to the new club officers.

A very Merry Christmas and a Happy New Year to all.

73

A1 WB5KCU

Joe, WB5RAG is cleaning out his shack and offers the following for sale, or will trade all for an IC-230 w/ pwr sup or equivalent:

HW-22A (40 meter SSB) & HW-32 A (20 meter SSB) and pwr sup- \$160.
 SW-140 (Swan 40 meter SSB) Works beautifully w/pwr sup & speaker.
 Have exactly \$104.60 in it.
 HW-202 w/AC pwr sup, crystals for 94 xmit, 34/94, 07/67, 16/76,
 22/82, 28/88, 52/52, 147.81/21, 147.60/00, \$293 value for \$240.
 * * * * *

Heath GD-19 (Remote Control System) with 4 servos, 3 engines (2 still in box) 4 or more airplanes assembled & kit, fuel, control like equipment, 2 carry cases, many more extras, (wheels, balsa, hinges, spruce, etc.) See to appreciate. Approximate value \$500.
 SACRIFICE for \$175. Joe Satterwhite, WB5RAG, phone 672-0409.

TECHNICAL REVIEW
W5JJ

ELECTRONIC PRODUCTS, Nov, centers on communication by light, fiber optics.

CQ, which combined Oct and Nov, announces a new policy, one appealing to beginning radio amateurs. Could this be that long-missing magazine that could act as an interface between the casual electronic hobbyist and the amateur? For this month it describes the building of an HF linear PA, what it really takes to learn International Morse Code, sloping dipole antenna one-and-a-half wavelengths long, several other antennas (W6SAI), and has the usual good Novice Section.

AMATEUR RADIO, Oct, describes an unusual quad for 7 and 14 MHz; it's made of 300-ohm TV feedline. It digs up the very ancient idea of canceling powerline noise by use of a second antenna; I believe Roy A. Weagant patented this well before World War I! It's still a good idea. Another article concerns fixed beams made of wires; the fed element is a folded dipole. Still another is on an unusual antenna matching device.

SHORT WAVE MAGAZINE, Nov, in addition to its excellent "Communications and DX News" (the best published!), digs out an oldie for a crystal oscillator using the 807 tube.

73, "Holiday Issue", deals up a flock of articles (even two of mine!) on a variety of subjects. How about a grounded-grid linear amplifier using tubes in push-pull? Or a design for a dummy? Or using the 555 as an AF freqmeter? Or parallel-feeding your tower for 1.8 MHz? There are a couple that'll bear close watching, intruding into the realm of light fiction under the guise of fact.

HAM RADIO, Dec, discusses the design of a high-quality high-frequency receiver, also the design of 3.5 and 1.8 MHz loop receiving antennas. There's an introduction to the high-power FET (high price, too!). For bipolar transistor xmtrs, there's a design of one for 7 MHz. Repair of old receivers is treated ably. Add to these several other useful items and you have a typical issue, well worth your careful reading.

POPULAR ELECTRONICS, Jan, has a thorough debunking of the more popular fictions regarding VSWR. I wonder how the author got it past the editor, who is a firm devotee of the VSWR mythology! It also has info on test meters and an AF signal generator.

ELECTRONIC TECHNICIAN/DEALER, Nov, courtesy of W5KE, is remarkable for a press release from CB antenna firm. Here it is. See if you can find one truthful contention in the whole claim! "Manufacturer says the Astro-Loop reduces static to a minimum, allows greater selectivity for the squelch control, helps control over-modulation and distortion between CB transceivers at close range, and noticeably reduces excessive noise without interfering with signal output."

IEEE VTG NEWSLETTER, Nov, courtesy of W5KE, has the real word on the care of NiCad cells!

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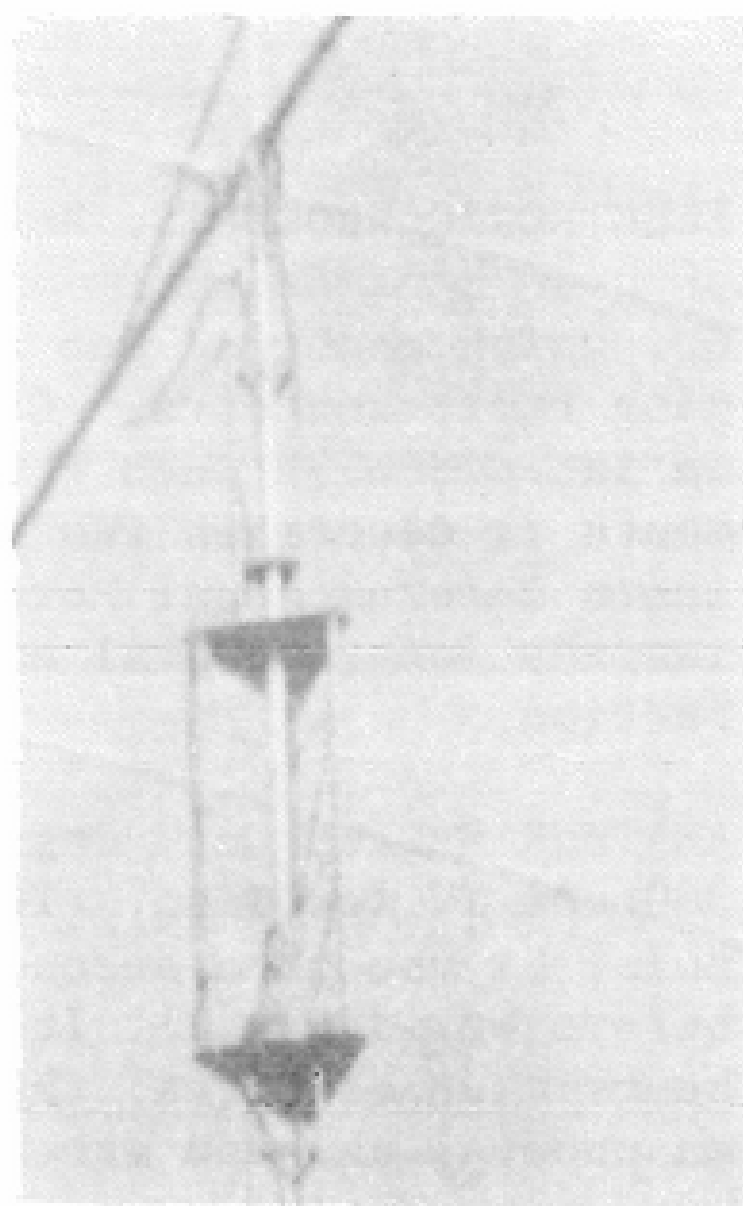
T A K E I T O F F !

If you don't like your tower, saw the top off, that's exactly what I did! My tower being a two section, 50 foot, crank-up type, was too small at the upper section to accomodate a Ham-M-II rotor. This required the rotor to be mounted above the tower, and with the beams above that, you know what it would do for a rotor in the local winds we have.

With the tower cranked down to the lower level, I took a hacksaw and sawed the top section in two above the first section, here a short section of Rohn tower large enough to accomodate the rotor could be added by making up two plates with pins welded on top and bottom which could be fitted inti the top section. Then, also, the small section of tower that was removed earlier could be installed on the top plate and pinned in place.

This makes a "fat" section that will allow the rotor to be supported inside the tower, but can also be taken apart for servicing the rotor when necessary.

If you don't understand all of this be assured that after careful alignment it works very well. What I am trying to say is almost impossible, so here is a picture of a tower with a "fat" section installed that also protects the rotor and can still be raised and lowered.



Al, WB5KCU

(You must be nuts! Ed)

CORA ROSTER CHANGES AND ADDITIONS. Changes are underlined.

WB5CLC	Kim Elmore	1141 W Walker Twr	Norman OK	325-6217
WB5EVO	Paul Adams	3212 Kelsey Dr	Edmond OK	
W5FPN	Gordon Jones	Box 18	Norman OK	
WA5FVW	Gary Stokes	8800 Bob White Rd	Yukon OK	
WB5GZU	Charlie Sowers	<u>2313 Markwell Pl</u>	<u>Okla City OK</u>	
WB5KHC	Tom Owens	8508 S Kentucky	Okla City OK	
WA5LBK	Robert Greene	<u>2711 Jewell Dr</u>	<u>Arlington TX</u>	
<u>W5NT</u>	Bill Hulse	447 E Carson Ln	Mustang OK	
<u>K5OK</u>	Cecil Shelton	1212 SW 92	Okla City OK	'691-3632
WB5SKE	Charles Guschke	5320 NW 114	Okla City OK	
W5VCL	Neal Myers	707 S 3rd St	Yukon OK	
WB5WBJ	Thelma Wood	4740 Elm View Dr	Del City OK	
WB5WVD	Elizabeth Donnelly	<u>7228 S Land</u>	<u>Okla City OK</u>	
WB5YHG	Edie Day	2321 SW 92	Okla City OK	691-1194
K5HAK	Eugene Crosby	5805 Sterling Drive	Okla City OK	

NEW YEARS RESOLUTION - - Today is a good day to make your New Years

Resolutions. One might be - "I will participate in SET this year". Then mark your calendar and clear out conflicting activities on the afternoon of Sunday 30 January. Everyone should get in on the training and fun. If you don't know what SET is read the new QST or next months CORA C & E for details.

* * * * *

OKLAHOMA CENTRAL ~~VHF~~ AMATEUR RADIO CLUB - - A new name, a new look and a new program for an old club. As denoted by the headline above the VHF has been "Xed" out of the name since the club is interested and active on all bands and several modes. They have a unique series of PROGRAM/MEETINGS lined up starting with the February meeting. It sounds intriguing and interesting so think about making the meeting on the third Friday in February. Details next month.

* * * * *

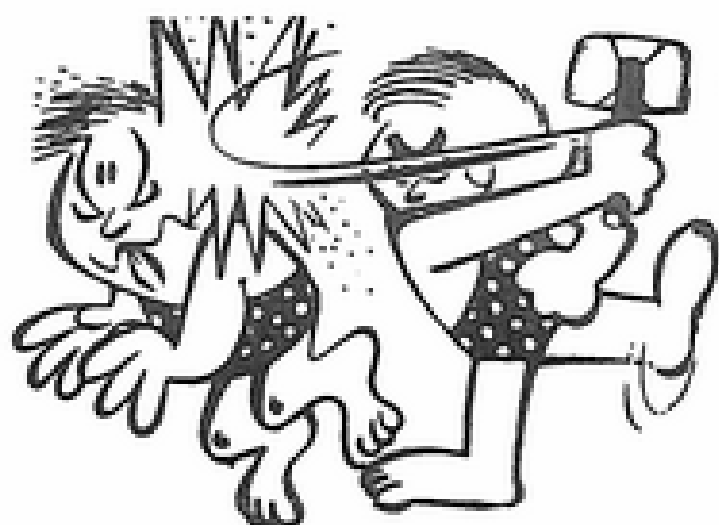
SLIDES - SHOW 'EM - SLIDES - - A CORA project headed by Hobe Burgan, WB5MLN, aims at having a locally produced and oriented program of the ARRL film "Moving Up To Amateur Radio" and local color, or black & white of older activities, slides. It will be shown to CB clubs, civic clubs, schools and anywhere they will invite us or let us in when we invite ourselves. It won't be to entertain active hams but to show "everybody else" what amateur radio really is.

Here is what Hobe needs:

35mm slides covering the many facets of amateur radio activities taking place in Oklahoma. Such as:- Public Service Activities, Storms, Floods, Disasters, Nets & Message Handling, Net Organization Charts, Red Cross, Etc. Field day Activities. Training of new operators. Classes. Hobbying. RTTY. SSTV. Microcomputers. OSCAR. Station layouts. Shacks. OLD equipment. Beams & Antenna Systems. DX Ragchewing. HF. VHF. Etc. There are probably other interests that I have forgotten to mention. If you don't have a slide get one, you will enjoy doing business with CORA. If you have an idea and no camera to get the slides with call Joe, WA5ZNF at 737-1044 and he will probably be available to take them for you. All slides should have owner's call & address on them so they can be copied and the original returned. All other slide not selected will be returned to the owner.

Hobe hopes to have the film on a fairly permanent loan basis starting Jan 16, 1977 so it is time to start getting your slides to him. He needs quality slides about hamming rather than mountains of those covering the same subject, such as field day. Look in your files and at least let him look at what you have. Send them to:

Hobe Burgan, 2504 NW 119th St, Okla City OK 73120 or call him at 751-8388 and arrange to get together.



REMINDER!

A B I G RED "X" HERE WARNS THAT ACCORDING TO RECORDS FURNISHED BY YOUR CLUB SECRETARY YOU ARE DELINQUENT IN CLUB DUES. NEXT MONTHS CORA COLLECTOR/EMITTER MAY BE THE LAST UNLESS YOU CONTACT THE CLUB INDICATED ON PAGE TWO AND RENEW OR CORRECT THE RECORDS.

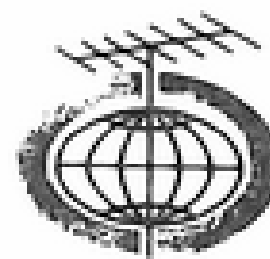
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Oklahoma City OK 73115

JANUARY HAM HAPPENINGS						
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY HAPPY NEW YEAR!
2	EARS 3	MORI 4	5	6	ACARC 7	8
9	10	11	12	13	14	15
16	17	76 <u>ers</u> 18	19	20	OCARC 21	22
23 30 SET	EDIT CFE 24 31	25	26	OUARC MAILS CFE 27	CORA 28	29

See page 2 and/or individual club sections for details

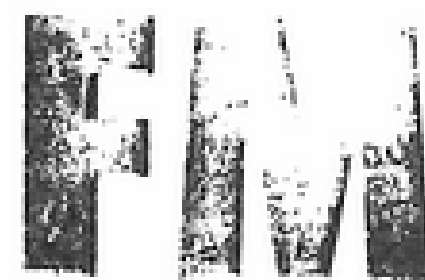
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amateur radio
HEADQUARTERS

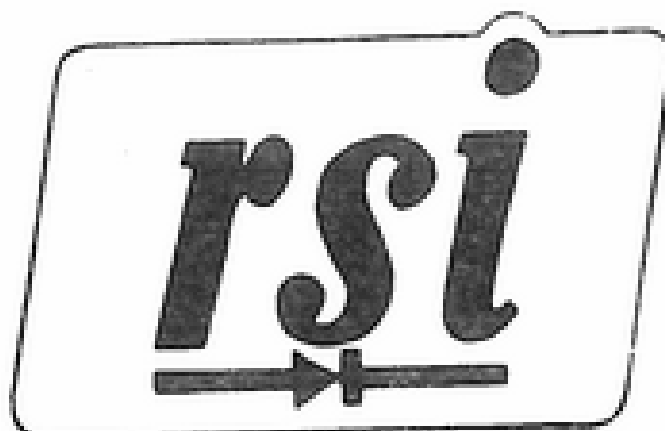


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