

Newsletter

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Experimental Broadcaster's

Where does the time go!

What can I say? Being a Chief designer/ computer operator/ mail clerk/ printer/ salesperson/ purchasing agent/ author (sort of)/ and a host of other things including custodial services keep this old man too busy! The EBN is late again - but...*SURPRISE*, a new catalog is also included with this double issue!

We've received several letters this past month. Some I'm sure were intended to be read by your editor only and not necessarily published in the EBN. However, and I hope they'll forgive me, I thought they had information that should be shared.

Some were from low-power broadcasters which are in transition to commercial broadcasting. Their experimentation and interest in broadcasting, some stemming from before they were of "employable" age, started them in a rewarding career. I wonder, did David Sarnoff (one-time leader of RCA) start off that way?

I remember as a teacher seeing little punks (7th graders) come into my "broadcasting" classes.... years later seeing them as Chief engineers, production and program managers, and live-wire DJ's in the San Francisco area's top stations (that's kind of rewarding too). Of course if they hadn't had a school facility to do their broadcasting they probably would have been low- power broadcast experimenters also.

One letter describes "simple" circuits for the broadcast experimenter. While these circuits may appear to be a quick and easy answer for some low-power broadcasters - - the builders should be VERY CAUTIOUS using them. Whether your intentions are for Carrier-Current, Cable FM, or "Pirating" you should, at the very least, strive for a "clean" signal. "Simple circuits" often create much interference, poor quality and unhappy neighbors. We'll go into the various problems of "simple circuits" in this month's Mini-Lesson.

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Our New Catalog

Our new catalog has a few changes in the low-power kit sections. For example: amplifiers as separate kits are being phased-out. Low power oscillators are still available by themselves. Higher power units will have an oscillator and amplifier combined on a single board. In most cases this results in a lower kit cost. If you have any questions about these changes just give us a call.

Would You Believe.....?

If you have a tower over a few hundred feet high watch out for falling sky-divers! The latest craze has sky-divers jumping off of tall structures such as buildings and free-standing towers (to avoid guy wires). In October two 25 year old jumpers were charged with trespassing when they tried to jump from a 830 foot TV transmitting tower.

SONY has offered to buy the CBS Records Group for a cool \$2 Billion. Europe's Thomson Co. controls RCA and GE TV receivers and "Phillips" controls Magnavox, Sylvania and Philco.

When a 5 KW FM station went off the air one warm summer day it took the chief engineer by surprise. A quick trip up the hill to the transmitter site and a close examination of things showed a circuit breaker had tripped - for no apparent reason. Two months later during a routine cleaning and using the reason was found. A 4-foot rattle snake had found its way up the shack's drain pipe and into the transmitter's power supply cabinet. The hum of the transformer probably annoyed the snake. A quick strike produced...fried snake!

Not Really So is, well, So-So.

We appreciate the letters and pictures that our readers send in for publication. It gives other readers insight into other experimental, low-power, cable, carrier-current and pirate station activity.

Unfortunately we have no way of knowing how honest some of these writers may be. I believe most submissions made to the EBN are true and a factual account of various operators and their stations. Occasionally someone might exaggerate a bit, but that in itself is no biggy.

What is concerning however is something that was just brought to my attention. Some pictures, and claims, submitted by an operator over a year ago were misleading and false. The pictures were of a commercial station - equipment which was someone else's, and the format, hours, personnel, etc. were not really as described.

This is something I suppose must be expected on occasion. For example, I've noticed that Popular Communications Magazine's "Pirates Den" often has "reports" of pirate activity which are made by the pirates themselves! For example: John Jones writes in saying "I heard KPPP on 92.1 MHz at 9 pm Saturday the 15th". Sounds like a legitimate report....however, it turns out that John Jones is the operator of KPPP and is trying to get a little publicity.

What's New With the FCC

Some info excerpted from the Society of Broadcast Engineers Newsletter issue 12/87

LICENSED STATIONS GET FINED.

KNWZ, Palm Desert, CA Notified of apparent liability for forfeiture of \$2500 for repeated violation of Section 73.1211 - broadcasting lottery information.

KPPL-AM, Denver, CO Ordered to forfeit \$200 for violation of Section 301 of the Communications act of 1934, as amended, for operating contrary to the terms of its station authorization.

WSDC, Hartsville, SC Ordered to forfeit \$2000 for violation of Section 73.1620(a) of the Commission's rules by failing to file FCC Form 302 to cover its operation of modified facilities within 10 days after commencement of operation.

"ABUSES IN "PETITIONS TO DENY" In order to determine the sincerity and ability of an individual or group applying for a radio station license the FCC has encouraged input from the public. The process, commonly called a "petition to deny", involves individuals or groups furnishing information to the FCC about the prospective applicant. As its name implies, the petition asks for denial of an application due to some unfitness of the applicant. This might range from insufficient funds, multiple station ownership to a record of criminal activity.

Unfortunately some persons are abusing this procedure for their own monetary gain. An application is suspended while the petition to deny is being evaluated. The additional delay in time can be quite costly for the applicant. Even if the petition is subsequently thrown out the applicant may be forced to withdraw the application due to the added expense.

Unscrupulous individuals and groups have submitted petitions simply to hold up the application process. Of course they will be glad to recall their petition if the applicant agrees to pay them a sum of money. Since even a short delay could halt a possible sale of an existing license, halt funding for a new station, etc., the applicant may in fact pay the extortion. Extortion is illegal of course, but it might be hard to disprove that a "petition to deny" was not "honestly" submitted.

In any case, the FCC is aware of the problem and is attempting to do something about it.

The owners of Orion Industries, Joseph Ali, his mother Inez Ali and his father, were forced to stop their distribution of "TV Genie". Joseph Ali was convicted of five counts of importation and sale of illegal devices and four counts of failure to file required customs forms.

The TV Genie is a low-power TV transmitter designed to retransmit video signals over short distances. Apparently the devices were causing interference not only to TV sets of other users but also to Public Safety Radio Services. The PSRS includes police, ambulance, fire fighter and other such radio communications.

Orion Industries was warned after the FCC received complaints about the devices. Allegedly Orion sold over 270,000 of the units after the warnings. Fines were levied based on federal law which allows an amount twice that of the gross gain from the sales of the device.

Joseph Ali was sentenced in federal court to 2 years imprisonment and to pay \$407,000 in fines. His mother was placed on five years probation and must pay a fine of \$120,500. His father was ordered to pay \$36,000 and also received five years probation.

This Month's Letters

Wherever possible the EBN tries to maintain the confidentiality of EBN subscribers and of the authors of letters which are submitted.

Names which might identify a geographic location or an individual have been edited from the text. In some cases text has been edited to shorten it or to clarify a point. Every effort however is made not to alter the meaning of what the author has to say.

Where you see ". . . ." it means more was said but was omitted for some reason. Call letters will some times be replaced with "- - -" and locations with "= = = =".

Seasons Greetings,

Thanks for returning the pirate video. It's a shame that you can't play the video on your VHS machine as it's really worth seeing. Maybe it's to do with the frame frequency. In the U.K. it's 50 Hz while in the U.S. it's 60 Hz and I think the U.K. uses a different method of transmitting.

In the U.K. we have a technical trade magazine that comes out every month called "Television" which is aimed at TV service engineers. They often have ads for 2nd hand videos very cheap (50 pounds) but guaranteed. Perhaps I could buy one, send it to you by cheapest parcel rate and you can copy with it, modify it or whatever it takes to see the tape.

It was very satisfying to see you were able to include material from "Radio is my Bomb", and also mention me - first time I've been in print, sort of - in-cognito in December EBN.

This bit of information may be of interest to you. I inquired about box numbers at the post office and found the charge to be 36 pounds annually. The information sheet had the conditions of the service: "The Post Office may inform any inquirer of your full address and telephone number. Your address will also be included in the PO postcode address file which is available for sale as a mailing list." If any official wanted to know who has a certain box all they have to do is ask!

P.G. (United Kingdom)

Editor's comments

Peter has asked if I can send a couple of contemporary rock music newspapers to him. Ones with small ads - not the glossy/glitzy/full-of-color-pictures type. *Help me out on this one somebody....*I'm primarily a technical type and can't get my hands on what he needs. Peter's address is in the "EBN Unclassifieds".

Peter brings up a very good point about PO boxes. PO Boxes are often used by pirates for "mail drops" in which they receive mail from listeners. Few people realize that to get a PO Box the applicant must have a "home" address on file. This is true in the United States as well as England, and probably Canada also.

It would appear that to protect a pirate's identity with a "mail drop", another person would have to apply for that PO box. I don't know if anyone has ever asked the question "Is the renter of the PO box a co-conspirator with the pirate?". Something to think about.....



Hi, Here is a photo of my station and a photo of a dog DJ'ing. We are on cable at 93.1 FM. Our studio setup has 2 Radio Shack mixers, 2 Kenwood KU21RB turntables, Sanyo cassette decks and Fisher Equalizer. Dan T

Hello Ernie!

Looks like work on my cable station is dead for the meanwhile. Since July I've assumed the position of chief engineer at - - - - (AM). I've been brushing up on the rules and theory for AM, as we are a daytimer with a two tower directional array. The enclosed picture is of our transmitter shack, which shows our STL receiver and a Belar STEREO Mod monitor which we use to demodulate our composite feed from the studio. The demodulated stereo audio feeds our Kahn STR-77 AM Stereo exciter. Our main transmitter is a Harris MW-1 one kilowatt AM transmitter which is 100% solid state. Our backup is the station's original transmitter from 1959 - an RCA BTA-1R 1kW transmitter with a 500 watt cutback. For one of our post sunset power levels we utilize an LPB TX2/20. The transmitters feed a transfer switch that will either select a dummy load or the phasor cabinet.

Our audio chain consists of a CRL AM-4S with dual 4 band compressors, a gated limiter, a stereo pre-processor and a stereo generator with the Orban 8000A Optimod I purchased for my cableradio project. Peak modulation is controlled with the built in clippers in the Kahn exciter. I'll be running our proof soon so I hope to clean up our sound and perhaps gain a bit in the local war for loudness.

One project that I'm really excited about is the development of an automatic transmitter logging and control system. It seems our jocks consider themselves "stars" and should not be bothered by small matters such as meter readings and power changes. I plan to fix their little red wagon.

Hope you had a good new year and I'll be looking forward to the new and improved EBN!

Sincerely,

Bill D.

Dear Ernie,

How's it going? I'm doing fine. I imagine you're pretty busy. I am now assistant engineer at - - - - here in = = = =. I will probably eventually become Chief in about a year. I'm really enjoying myself. I just returned from the Society of Broadcast Engineers convention in St. Louis. It was a very good show.

I was looking through some of my old tapes and I found some old LPBN programs. I was curious; is the LPBN still operating? Is John D. still in charge? If the answer to both questions is 'no' I would definitely be interested in starting it up again, granted there is enough interest. Please let me know about this.

I'll probably be writing to John in the near future to see what's up. I'm in the process of putting - - - - back on the air with either AOR or CHR programming. I recently purchased a Hi-Fi VCR so I'll probably use it for automation of the new - - - -. I also have access to the - - - Cable TV system, so I'll add my station on the FM side to increase the coverage area. I only live a mile from the head-end.

Well, I'll let you go now. Please send me information on subscribing to the EB Newsletter (again). Thanks a lot.

Sincerely,

Roy B.

Dear Mr. Wilson

Find enclosed a check for a two-year renewal subscription to the EXPERIMENTAL BROADCASTER'S NEWSLETTER. . . . You may be interested in knowing that I have kept every issue of the EBN since I started subscribing (just about two to three months after you started the newsletter).

How do you like my new word processor/printout? Sure does beat the "toilet- paper" printout of my Timex computer.

KMCR is still alive and well, and I am now working "professionally" at radio station ---- in = = = = (AM) on the weekends as their news and weather reporter. I must admit that the "real world" of radio broadcasting is not quite as I had expected, but I still enjoy my job. - - - - is an unusually interesting station in our area. We use an old DP-1 computer as our "DJ", and announce ourselves as "- - - - radio in = = = =, with computer-controlled programming!" Needless to say, we probably don't have as many listeners as other stations do. And to top things off, we are probably the only station in the area where you can hear Kiss, Johnny Cash and Henry Mancini in a five minute period! The station is giving me an excellent opportunity, however, and I am grateful for my job

As I said, KMCR is still alive and well, and continues to be on-the-air 7 days- a-week from 5 am to 6 PM using my auto-repeating cassette programs. My format is mostly religious and foreign programming.

The religious programmers seem anxious to get you to air their programs, and they don't seem to mind my "low power" status either. As long as I am willing to air their programs free of charge, they are willing to supply them! You may want to tell your readers about that. By the way, I am now receiving those miles and miles of free tape that you mention your "Program Sources" book! I already have about 5 large boxes full of various length cassettes, reel-reel and disc recordings. More continue to pour in daily. I took Roy B.'s idea and now relay weather information from our local NWS office in = = = =, daily from 6 PM to 5 am (our off-air hours). I no longer operate the AM Carrier-Current transmitter (technical problems), but run a 2 milliwatt FM transmitter on 103.7 FM. Combined with a 25-foot broadcast antenna, my range is about one mile in a vehicle, however it is limited to about 2 to 3 blocks (possibly less) inside buildings. Tuning of this transmitter is ac-

complished by the turning of a screw inside of a coil-like tube on the pc board. I am interested in increasing power to one full watt of power I realize that such a system is illegal, however, so far no complaints have been registered, just complements; and I feel comfortable with that. . . .

I would also like to relay to your readers that I am no longer operating the LPBN. Since I have been employed at ----, I just don't have the time any more. My own station keeps me hopping as well. I would like to extend my appreciation to all of the faithful members who stuck with LPBN through thick and thin. They WERE LPBN! Perhaps someday when I own my own 50,000 watt radio station and have 200 people working for me I'll be able to start it up again? I still receive a lot of requests for membership in the LPBN, so it is imperative that I tell readers that it no longer exists.

I understand Danny T. in Missouri is starting up some kind of low-power network, but I don't get any response from my letters. What do you know about that? Perhaps I can join his network if I knew about it.

Here's something I have discovered that you may want to pass along to your readers as well. Recently upon visiting a friend, he was showing me his newest satellite TV system. He pointed out all of the commercial-free music channels that come in on the side of the TV programs. One station played nothing but classical music; another one only country; and yet another one playing nothing but top-40 music. There were also other stations with continuous news and talk show programming. None of these services had commercials on them, and with the exception of the news and talk show channels, had very few announcements (mostly station ID's such as "cable-classical" or "Tempo easy listening"). He was also showing me the MUZAK channels which had NO announcements whatsoever! He was suggesting that I purchase a dish/receiver, and use some of that programming on my own station. My questions to you on this are: What are the purposes of these channels? How can they operate without announcements or commercials? Could they be used for such purposes as relay over my station? This may make a great subject for the EBN!

..Sincerely,

John D.

Dear Sirs,

I received the sample copy of the E.B. Newsletter in early Dec. 1987. I enjoyed talking to you on the phone back in late November. The END-OF-YEAR issue was very interesting about EUROPEAN "FREE" radio stations. I was curious about any operating in West or East Germany, didn't see anything much mentioned about that area. Your Newsletter looks very good and I'm looking forward to receiving other copies of it.

We have operated a very low power FM station in = = = = = with about 100 milliwatts, the whole system was mounted about 35 feet above ground and we ran the audio feed line from the studio location (down below) up to the transmitter-antenna (ordinary two foot whip) system. We got out about 2 miles in each direction (radius) although the last mile was weaker and spotty in places depending on the receiver used.

A good car FM radio (Panasonic KP-500 or equiv.) (G.E. Superadio 2880-B AM-FM Portable) brought in the signal with almost full quieting at 1 and a half miles radius. The name of the station is - - - -. We have operated on and off in the Eastern part of Greater = = = = = and = = = West area since 1967. First started out on AM with extremely low power then moved to FM in the late 70's and early 80's. Our FM frequency was 92.1 MHz. AM has various frequencies over the years including 670 kHz. In the late 1960's it was 1600 and finally 1360 kHz. On 1360 kHz we had our greatest success on AM bringing a reception report from a very early Monday Morning transmission that was received across the Canadian-U.S. border! It was a DXer that taped it and belonged to the same radio club as me. That was way back in 1969!

I really believe in low power and very low power broadcasting on AM and FM. I would be interesting to see what state-of-the-art reception equipment could achieve with 100 milliwatts on AM or FM. I believe that a lot more can be done with this than has so far been discovered! Perhaps using super-conductivity components in the near future some interesting noise reduction and range could be achieved on AM and FM with low-power and exotic receivers!!

On AM we do not broadcast very much anymore however it still interests us. Usually any programming happens on 92.1 MHz from = = = or = = =

= = = with about 100 milliwatts output power. We also are working on an application (updated one from the mid-70's) for a new commercial FM station in the = = = Valley. Presently this area has no local radio station of any type (except for our very low power efforts) and population is between 150,000 and 200,000 people!! It is about 35 miles east of downtown = = = = but definitely has its own identity!! So hopefully in the future we will be on-the-air with high power (3 KW or more) on FM despite all the GOVERNMENT RED TAPE AND THICK APPLICATION FILE REQUIRED BY THEM! Our application is about 1 inch thick so far - will probably be another one-half inch before it's updated and complete!

It would really be nice to get on-the-air with full power and be able to promote radio listening and transmitting from a hobby point-of-view! All aspects of radio listening, amateur radio-shortwave-AM DXing-FM DXing-hobby broadcasting, etc..... By the way our main music format and info for the application will be FREE FORM FLASHBACKS music and RECREATIONAL INFORMATION (Canoeing, hiking, boating, fishing and other outdoor wilderness pursuits).

Let me define FREE FORM FLASHBACKS: Progressive rock oldies up to 1980, ragtime music, novelty-comedy music such as Mr. Jaws by Dickie Goodman, jazz, easy listening (Frank Sinatra, Gale Storm, etc.) nostalgia, and folk music blended together in beautiful listening alternative to all other radio station in Greater = = = = =!!! We also plan special listener request hours and progressive gospel gold on weekends!! In other words our programming will offer a most definite alternative to what is being presently heard. It will be a major extension of our very low power broadcasting efforts up till now!

Well I've tried to fill you in a little about our efforts up here over the last 15 to 20 years. Perhaps I can do some specific articles in the future and submit them to the E.B. Newsletter.

Sincerely (73's), E. L.

Dear EBN, I have been reading your EBN for several months now and have been enjoying it immensely. I especially enjoyed reading the excerpts from "Radio is MY Bomb". I plan to pick up a copy this summer when I go to England. . . .

I am building a 10 watt mono FM transmitter, and I have a problem finding one part. I need a 10K ohm center-tapped audio transformer, capable of handling 10 to 15 watts at 300 volts. If anyone has one of these in their junk box, write me and tell me how much you want for it. I am including the schematic I am working from. The schematic was published in "The Complete Manual of Pirate Radio" by Zeke Teflon. Copies can be ordered through Loompanics for \$3.00 (Loompanics Unlimited, PO box 1197, Port Townsend, WA 98368. Order #58034. This book has schematics for mixer boards, two FM transmitters, and AM transmitter, and tips on making antennas. The circuits are very simple, even for beginners.

Thanks for the help;

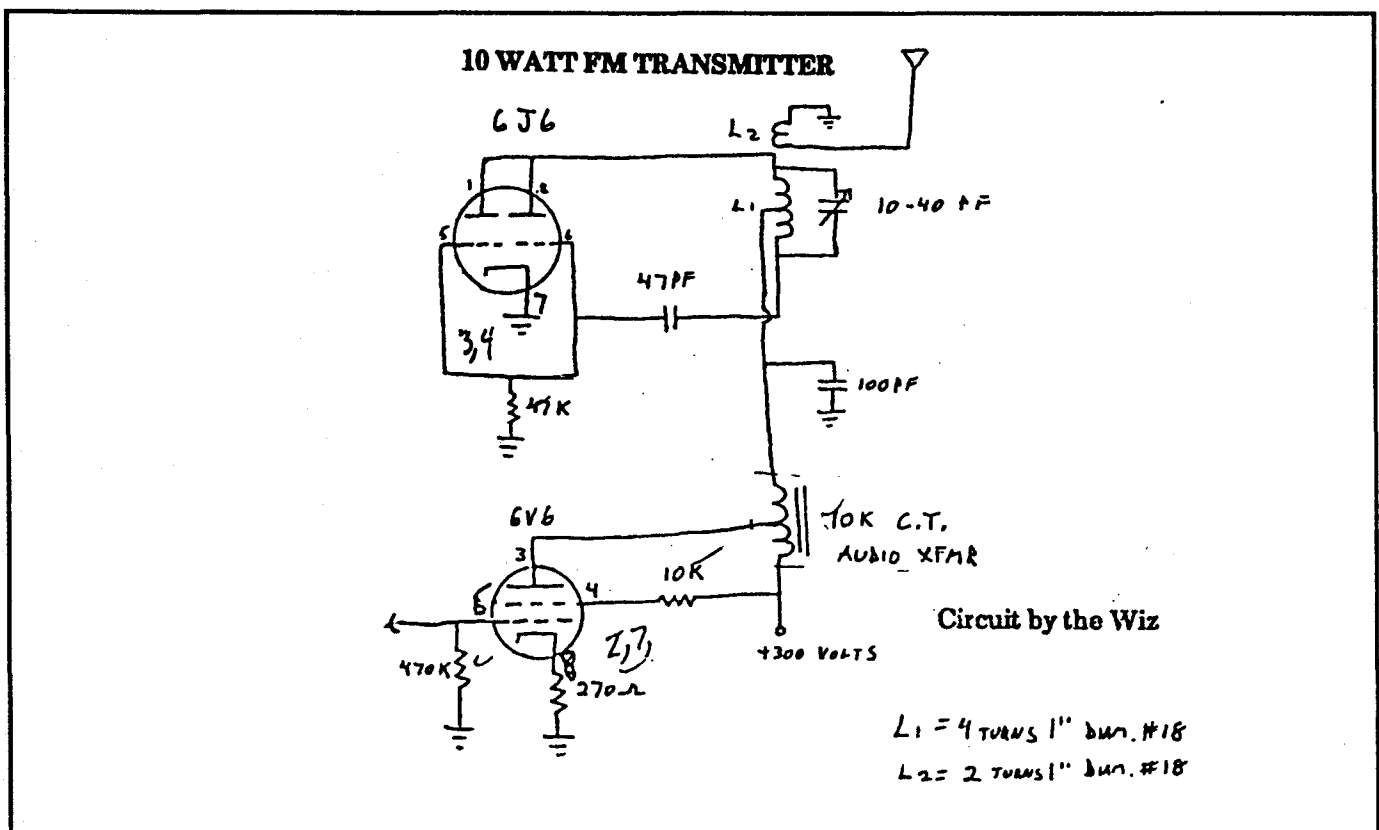
Paul D.

Introduction of Mini-Lesson

Below is a drawing submitted by Paul D. which was published in "The Complete Manual of Pirate Radio" by Zeke Teflon.

While the circuit is fairly simple to construct the builder should exercise extreme care in testing it. Circuits of this type are frowned upon by the FCC - not so much as they might be used for pirate radio but because they tend to cause interference. The reasons should become evident as discuss this Month's Mini-Lesson.

Several comments made in the following Mini-lesson will appear critical of Mr. Teflon's work. My intentions are not to "put him down" - only to show that one should thoroughly examine ANY circuit before construction and excersize caution during its operation. *Don't take any circuit at face value.*



Circuit from "The Complete Manual Of Pirate Radio" - Submitted by Paul D.

MINI-LESSON: Simple Modulated AM and FM Oscillator Circuits

In his letter, Paul D. was searching for a 10K ohm transformer with a 10 to 15 watt capability at 300 volts. The transformer was to be used in a "10 watt FM transmitter" circuit. Being an old "tube" man my head said "It simply does not compute - why an audio *power* transformer for FM?".

When I looked at the circuit - I had that same uneasy feeling again. Something did not compute. If I remembered correctly the 6J6 is a twin triode good for about:

- 2 watts maximum.
- Recommended plate voltage of 150 volts
- Primarily used as a RECEIVER oscillator/mixer

It simply was never designed for this kind of service, although radio amateurs sometimes used it as such. Why was it being used here with 300 volts and rated at 10 watts?

I also recalled that a 6V6 is a power audio tube good for about 4.5 watts output. An AMPLITUDE MODULATED transmitter, using plate modulation, would use this type of tube. *What is it doing in an FM transmitter?*

THEORY OF OPERATION:

The 6J6 has both of its triode sections connected in parallel. As such it would have an output power roughly equal to twice that of a single section. Current flowing from ground through the cathode (pin 7), the plate(s) (pins 1,2), and the top half of L1, to the +300 volts - causes a voltage to appear across L1.

At the first instant that voltage is applied to the circuit (1) The voltage polarity at the plate end of L1 is negative in respect to the coil's center-tap. (2) the other end of L1 exhibits a positive

voltage. (3) That voltage is coupled to the tube's grid(s) through the 47 pF capacitor. This in turn causes more plate current to flow. (4) Some cathode current also is received by the grid(s). This current would tend to build a negative charge on the grid(s) which would ultimately keep the tube from working. The 47 K resistor from grid(s) to ground allows this current to drain back to ground however - it's called a GRID LEAK RESISTOR. (5) Current continues to rise to the point of SATURATION (cathode cannot supply any more current). (6) a magnetic field was produced around the coil as a result of the current flowing through it. The CHANGE of current is what produced the voltage across the coil. Now that the current is no longer increasing that field begins to collapse. (7) the collapsing field produces a voltage across the coil in the OPPOSITE direction from before. The grid(s) now sees an increasing NEGATIVE voltage (8) The negative voltage tends to turn the tube "off". This continues until the cathode-plate current is completely shut off.

Side: The coil L1 and the 10-40 pF variable capacitor form what is called "a resonant tank circuit". It behaves electrically like a guitar string behaves mechanically. Pluck the guitar string and it vibrates at one frequency for a short period of time. Put a pulse of current into a tank circuit and it has a "damped oscillation" (single frequency vibration) for a short period of time.

(9) the damped oscillation within the coil again reverses the polarity of voltage across it. The grid(s) begin to see a positive voltage again and plate current rises. (10) This pulse of current re-supplies the energy lost in the tank circuit during its last cycle.

The process thus continues. The tube is first driven to "saturation" and then to "cut-off". Each time supplying a current pulse to the tank circuit to keep it in operation. The whole system is called an "oscillator". This particular oscillator circuit is called a "series/plate fed Hartley". "series" because DC current flows through it; "plate" because the current is fed to it via the plate; and "Hartley" after the name of the man the proposed this particular coil configuration.

WHAT'S WRONG WITH THE CIRCUIT?

FIRST OF ALL: The grid(s) require a specific negative voltage for operation. This is called "GRID BIAS". When used as an oscillator the grid(s) also require a specific amount of current. This is called GRID DRIVE or GRID CURRENT. These values can be found in "The Amateur Radio Handbook". The value of the grid leak resistor is derived from those figures.

Example: 6J6 tube specs from The Amateur Radio Handbook

- (both sections connected in push-pull or parallel)
- Plate voltage 150 volts (operational) 300 volts absolute max. Plate current 30 ma Grid Bias -10 volts Grid current 1.6 ma Carrier output 3.5 watts
- Grid bias/grid current = grid leak value
- $10/.0016 = 6250$ ohms

The value of 47K ohms therefore would appear to be much too high for the tube to operate as a "power oscillator". This value is more indicative of operation as an oscillator/mixer in a RECEIVER.

LET'S EXAMINE THE CIRCUIT FURTHER:

The center-tap of the coil is connected to one end of an audio transformer. The other end is connected to 300 volts. The transformer is connected as an "auto-transformer" - it "steps-up" the voltage. At maximum audio output from the 6V6 there would be about 300 volts developed across the bottom half of the transformer. The top half of the transformer would also develop 300 volts across. This yields 600 volts total across the transformer. At the peak of an audio cycle it can be +600 volts, during the opposite peak it becomes -600 volts.

The center-tap of the oscillator coil therefore sees a +600 and a -600 on a fixed +300 volt level. In other words... the voltage at the 6J6 plate(s), during an audio cycle, goes from +900 volts to -300 volts. A bit much I would say for a tube whose "maximum plate voltage" should not exceed 300 volts.

FM MODULATION?

An oscillator's frequency can be changed by changing ANY of its parameters. These include plate voltage, plate current, grid voltage, grid current, and even the temperature of the tube elements themselves. In addition the frequency may be changed by increasing or decreasing the values of tank circuit inductance (coil) or capacitance (variable or trimmer capacitor) and even the coupling capacitor. All of this is more difficult if the oscillator is crystal controlled, but very easy if it's not.

AM MODULATION?

Changing the amplitude of an oscillator's output voltage (power) is called amplitude modulation. When an oscillator's plate voltage is changed its output power is changed. To convey music by means of amplitude modulation simply means varying the plate voltage with an audio (music) signal.

When we apply the above two principles to the circuit in question we find the circuit is both AMPLITUDE AND FREQUENCY MODULATED. As the amplitude variation will be much greater than frequency variations we must conclude this is PRIMARILY an AMPLITUDE MODULATED oscillator.

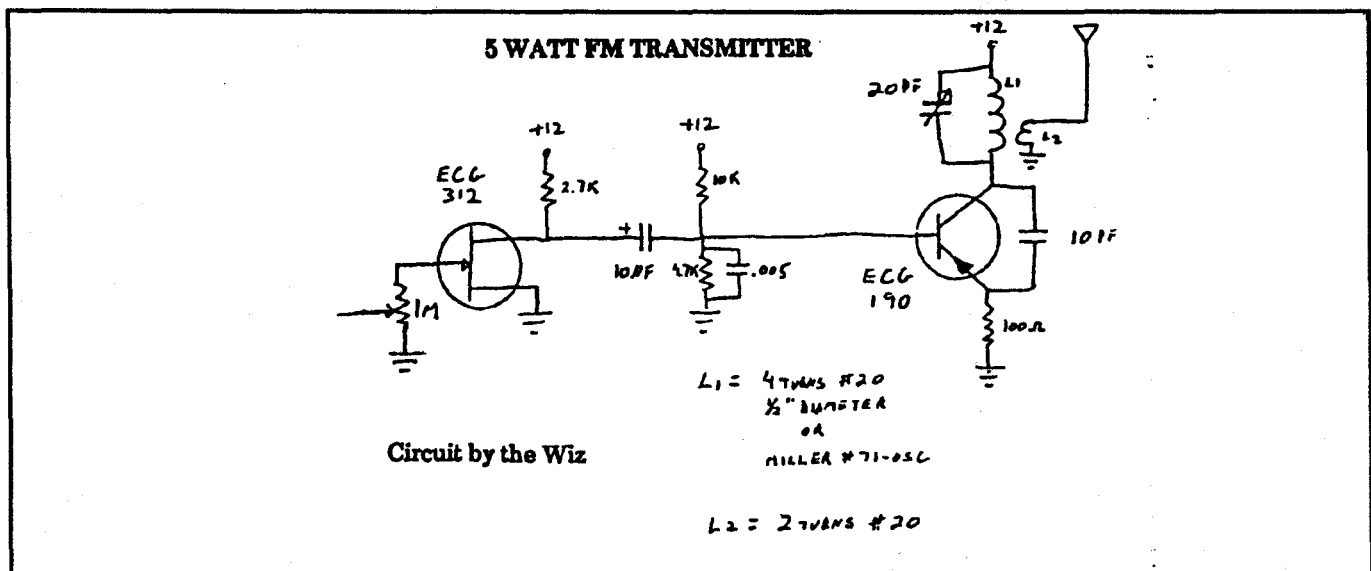
It's normally a bad practice to amplitude modulate a non-crystal controlled oscillator. Additional frequencies called "side-bands" are produced by the action of "modulation". As an example: a 100 MHz oscillator which is amplitude modulated by a 10 kHz tone would produce THREE transmitted frequencies. These would be 100,010,000 (upper side band) 100,000,000 (carrier) and 99,990,000 (lower side band).

Although any FM it produces might be receivable the AM component would tend to cause interference to that reception. In addition, the FM produced probably would not be too "linear". In this respect linear refers to the faithful reproduction of the audio fed to it - distortion would be the result.

From the above you can see why my first impression was "It simply does not compute". Audio POWER is not needed for frequency modulation in conventional FM circuits. Audio power is required in plate-modulated AM circuits.

Perhaps the circuit was mis-labeled. It appears to be closer to "A 3 WATT AM TRANSMITTER" than and "FM Transmitter"..

A much better circuit for FM appeared at the bottom of the page submitted from "The Complete Manual of Pirate Radio". Let's examine it as well:



Here we have a typical VHF oscillator. The necessary positive feedback to sustain oscillations is taken from the collector and fed to the emitter through a small value capacitor (10 pF.) Bias for the oscillator is established by the voltage divider action of the 10K and 47K resistors.

As stated earlier changing any of the operating parameters will change the frequency of operation. The collector voltage therefore should be made very stable - preferably from a regulated power supply.

Side: Every solid-state diode exhibits a bit of capacitance between its anode and cathode (base and emitter). This capacitance changes with a change of the voltage applied across the diode. This is the principle of varactor diodes (variable capacitance diodes) usually used for frequency modulation circuits.

The base-emitter junction of the oscillator transistor exhibits a small amount of capacitance. If the base voltage is varied slightly that capacitance will change slightly. That capacitance is one of the parameters which affects the frequency of the oscillator. A variation of base voltage therefore frequency modulates the oscillator. Because that capacitance is very small and changes only slightly it is difficult to obtain 100 % modulation without appreciable distortion.

Some amplitude modulation is also produced when varying the base voltage of the oscillator. It's quite small however and probably would not be too bothersome.

The audio amplifier (ECG 312) is a Field Effect Transistor (FET). Although it will amplify its output may contain some distortion. FET's usually require some source bias. This is accomplished by placing a resistor of the proper value between the "source" lead and circuit ground. The source lead of this amplifier goes directly to circuit ground.

CONCLUSION:

Examine your circuits carefully before constructing them. Follow accepted circuit theory in your designs - there are 1000's of circuits available. Check out your library and book stores. Get a copy of the Amateur Radio Relay League's book "The Amateur's Radio Handbook" - it's loaded with circuit theory.

WARNING:

If you intend to produce radio frequency signals, especially if you intend to radiate them over some distance, at least keep those signals CLEAN. Interference to other radio services will most assuredly bring trouble, either from your neighbors or the FCC or both!

More About the Kahn - Motorola Feud

It appears "politics" is slowly but surely killing the possibility of wide-spread AM stereo acceptance. A bitter fight is still going between Kahn Communications and Motorola - recent happenings not helping a bit!

Leonard Kahn, president of Kahn communications, submitted a letter to the FCC asking that a thorough study be made to determine if Motorola had "frustrated the growth of AM

stereo". Included with that letter was a letter to Sony from Motorola dated 12 September 1985. Motorola informed Sony that they owned the patents on decoding circuitry which Sony was planning on incorporating in their "multisystem" radios (receive all types of AM stereo). Motorola apparently went on to ask that Sony not market any radios in the U.S. which used those patents.

Continued on next page....

Those patents have to do with decoding independent sideband transmission (ISB). Motorola's C-QUAM is a "quadrature" system. Radios without ISB decoding circuits would not be able to receive the KAHN system transmissions. Motorola apparently has the right to block the use of its patents even though it might also push the KAHN system out of the AM stereo picture.

The FCC rejected Kahn's letter as not falling into their area of control. They suggested that Kahn was free to take his concerns of legality to the Department of Justice.

Where does this leave the public? The FCC won't make a decision of which system, C-QUAM or KAHN, should be adopted. The marketplace itself is not moving very fast in that area either, nor are the receiver manufacturers. Will AM stereo go the way that Quad-stereo went a few years ago?

A Letter from the National Radio Club

Dear Radio Enthusiasts,

It has been a while since we sent you our press releases on the National Radio Club's, DX AUDIO SERVICE. I hope that the information in this letter can be used to inform listeners and readers of your service what we are all about.

First let me explain something about the National Radio Club. The National Radio Club was founded over 50 years ago in September of 1933. The National Radio Club is a nonprofit organization devoted to broadcast band radio DX'ing and is operated solely by volunteers. Subscription costs to the National Radio Club, and the DX AUDIO SERVICE cover only the printing, postage, tapes, and operational costs of the club. The National Radio Club and the DX AUDIO SERVICE supply DX'ers with up to date information. Additionally, The National Radio Club is a charter member of A.N.A.R.C.

The Membership of the National Radio Club and the DX AUDIO SERVICE is made up of DX'ers and the radio enthusiasts who enjoy listening and DX'ing the broadcast bands. The membership of the N.R.C. exchange ideas, knowledge, and tips on stations, and areas which are good DX catches. In addition to this, many members contribute articles of interest on a wide variety of topics from souping up their radios for better reception, and building antennas, to profiles on station and radio markets.

When the DX AUDIO SERVICE was first started several of the major clubs were contacted to put together a co-operative effort to provide the blind with a quality service. The National Radio Club was the ONLY club to express any interest in publications for the blind. The National Radio Club is a club of people who enjoy the radio hobby.

The DX AUDIO SERVICE is not a typical talking publications. The DX AUDIO SERVICE is more like listening to All News or All Talk radio station which deals only with the topics of DX-ing and radio. All the announcers on the service are professional broadcasters and editors, giving their personal time to the DX AUDIO SERVICE to provide a polished feel to the service. We have a lot of hard facts, and news which you can use, but it is delivered on a one to one basis.

To make sure that the DX AUDIO SERVICE is up to date and accurate, we have computer link capabilities between the headquarters in Cambridge, Wisconsin, and the studios for the DX AUDIO SERVICE in Lima, Ohio. Many of the editors for the DX AUDIO SERVICE also send in their column via computer link so the information is up to date from locations around the U.S., and the World, however, in some cases we have linked material to the service via domestic radio satellite. We try to get information to the DX'er fast and accurate, which is the goal of any news gathering service.

At the beginning of our tape we feature the Front Page of DX NEWS, the magazine of the National Radio Club. This is where the members hear about what's happening around the Nation Radio Club Headquarters and News and Notes from DX circles.

Next up is Jerry Starr's "AM SWITCH" Column. In the "AM SWITCH" column you'll hear about call letter changes, applications for new stations, grants for new stations, applications from existing stations, grants from existing stations, and more. Jerry also comments on special items. The "AM SWITCH" column is the best source of information on what radio stations and the F.C.C. are doing.

Phil Wayne provides "MARKET SCOPE". On "MARKET SCOPE" Phil will provide the members of DX AUDIO SERVICE with a guided tour of market and profiles stations. Phil will also give you some news and commentary of those stations which you will find interesting

John Bowker provides you with the "TRAVEL LOG". On the "TRAVEL LOG" you get to hear ID's from stations which you may or may not have heard, as well as some interesting facts and comments on those stations. From time to time John also has a trivia question for you to ponder.

I do the "CPC TESTS" column. With "CPC TESTS" we will tell you about upcoming dates and times when stations will perform tests at night solely for the membership to try to hear. This often gives you the chance to hear that illusive daytime station which you may never have had a chance to hear before.

On the DX AUDIO SERVICE we also feature discussions, interviews, and comments from well known

people and DX enthusiasts. Bob Walker is now presenting a series on the 1987 A.N.A.R.C convention, recorded in Montreal. We also encourage the membership of the DX AUDIO SERVICE to send in programs, comments, and features dealing with DX'ing and radio to share with the membership.

The membership to the DX AUDIO SERVICE has two different rates, depending on the member. If a member wished to keep their monthly cassette tape the U.S. & Canada rate is \$25.00 per year. If the member wishes to return their cassette each month the rate is \$12.00 per year under agreement. The cassettes are high quality C-90 tapes. From experience, we recommend that the "keep the tape" subscription is the best.

Additional information about the DX AUDIO SERVICE is available by sending a S.A.S.E. or if you like to hear exactly what the service is about send \$3.00 for a sample cassette. Checks should be made payable to the NATIONAL RADIO CLUB, INC.

If you have any further questions please contact Mike Knitter, Editor for DX NEWS MAGAZINE, or myself. Attached are some scripts for your audience.

**Fred Vobbe - NRC's DX AUDIO SERVICE 706
MacKenzie Avenue Lima, OH 45805-1835**

**Mike Knitter - NATIONAL RADIO CLUB, INC.
POBox 24, Cambridge, WI 53523-0024**

National Radio Club and DX Audio Service announcement scripts, both 30-second and 60-second lengths, are also available through Fred Vobbe.

Unclassified, Barter, Trade, Bulletins

BULLETIN: P. G. of England (see letter this issue) is a singer and songwriter. Likes West Coast county/Rock. Plays pedal steel guitar, blues harmonica, electric piano, bass guitar, lead guitar, rhythm guitar, slide guitar and drum machines. Writes and arranges his own songs. Hasn't had any records out but his work on tape. P.G. would like to know if there are any stations who might like to play his songs - he promises if one day he becomes rich and famous he'll return the favor. Like maybe... P. G.'s songs were played on radio station W-P- D-Q and produced and engineered by ---(you)---. Please..only serious operators should make contact with P. G., not merely the curious.

Contact: Peter G. , c/o 4 Marlborough Rd, Wootton Bassett, Wilts, SN4-7EJ, United Kingdom.

WANTED: Radio maintenance engineer, RF systems engineer, Television maintenance engineer (3 openings). Contact Maria Parrott, Christian Science Publishing Society, Boston MA. Phone (617) 842-0836

WANTED: Director of engineering. Contact Human Resources Dept, 4802 5th Ave, Pittsburgh, PA 15213

WANTED: Technical operator for duplication processing and teleport. Contact Linda Mogianesi (617) 329-4080

WANTED: Transmitter engineer. Familiar with AM & FM Stereo Transmitter to serve as broadcast engineer on off shore radio station "The Voice of Peace" off the coast of Israel. For information please write to Abe Nathan, Voice of Peace Radio, PO Box 4399, Tel Aviv, Israel.

On-Air Training: For TV reporters (beginners, veterans, corss-overs from print.) Polish your delivery, apperance, writing. Practice with teleprompter. Learn from former ABC Network News correspondent and New York local reporter. Make demo tape. Call (212) 921-0774. Eckhert Special Productions, Inc.

Instant Cash: Highest prices. We buy TV transmitters and studio equipment. \$1,000 reward fro information leading to our purchase of a good UHF transmitter. Quality Media. (303) 665-3767

FOR SALE: Rek-O-Kut B-12-GH 3 speed, good condition, in base w/extra Shure tonearm, \$100.00 or best offer. Contact E Hudson, WIYD, 900 River St Palatka FL 32077, (904) 325-4556

FOR SALE: Wegener 1691 cable FM transmitter cards, Wegener 1693 stereo synthesizer cards, set \$475.00. Contact T Trott, (305) 323-0472

FOR SALE: FM Class A / AM daytimer, fully automated combo, 3 bedroom, office, 2800 sq feet, 750 sq foot transmitter building all on 3 acres of land - retiring, \$350,000. Contact J P Robillard, 1803 N First East, Haynesville, LA 71038 (318) 624-0105