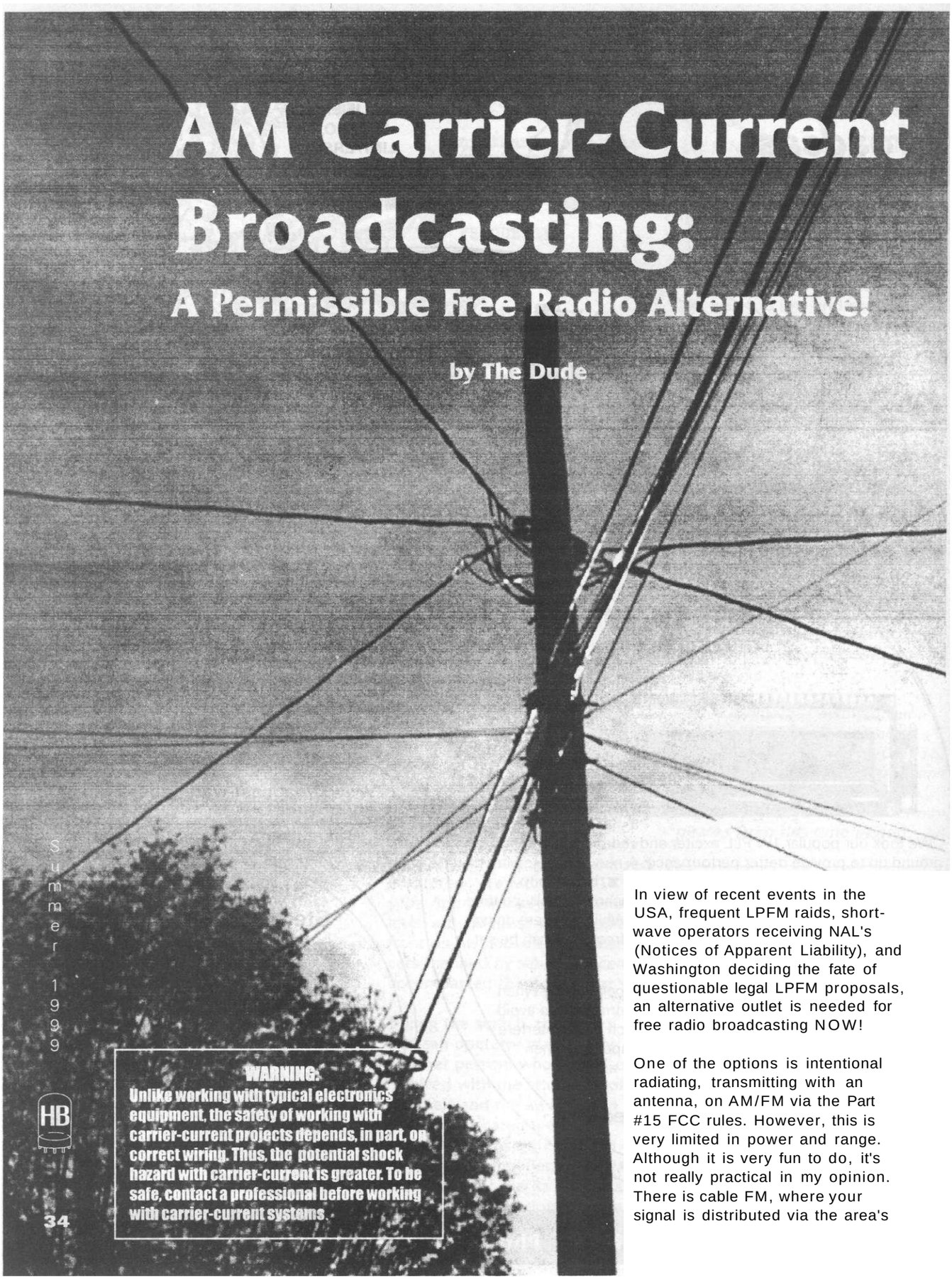
AM Carrier-Current Broadcasting:

A Permissible Free Radio Alternative!

by The Dude



WARNING:
Unlike working with typical electronics equipment, the safety of working with carrier-current projects depends, in part, on correct wiring. Thus, the potential shock hazard with carrier-current is greater. To be safe, contact a professional before working with carrier-current systems.

In view of recent events in the USA, frequent LPFM raids, short-wave operators receiving NAL's (Notices of Apparent Liability), and Washington deciding the fate of questionable legal LPFM proposals, an alternative outlet is needed for free radio broadcasting NOW!

One of the options is intentional radiating, transmitting with an antenna, on AM/FM via the Part #15 FCC rules. However, this is very limited in power and range. Although it is very fun to do, it's not really practical in my opinion. There is cable FM, where your signal is distributed via the area's

cable television provider. But to do that you have to have an agreement with the CATV provider to set up such a station on their system. Even if they said yes, they might charge you a fee to use their system. Also, a lot of CATV systems wouldn't do it, since many do not offer FM radio as part of the service. However, my hat is off to those cable FM stations that have a great working relationship with their local CATV providers, and have maintained very sucessful free radio FM stations via cable FM.

You could syndicate your programming and pay for airtime on shortwave stations like WBCQ and WWCR. But that's expensive, and you can forget about trying to reach a local audience that way. Or, you could try and borrow airtime via local college stations. But what do you do if the station doesn't allow an open multi-format that changes whenever the next DJ's shift changes? More and more college stations today have a fixed, one-type format where they allow you to air only what suits them. But what if you're many kilometers from the nearest college station, where no one local would hear your programming?

What you want is a station that you can set up yourself, that's not too expensive, that every household in the neighborhood and further can easily receive. A station where you provide programming of whatever you want, when you want to, whether it be once a week or 24 hours a day... And best of all, do it license free!!! Such a broadcast system does exist... It's a little known technique called AM Carrier-Current Broadcasting.

AM Carrier-Current, (AM C-C), in a nutshell, is a broadcasting technique where you send your signal to follow the path of the village power lines by coupling to the AC power lines. This is permissible since the signal is controlled, and limited, to where you are radiating. The simplest, and most common use of C-C is the wireless intercoms that you use to talk to someone in the basement workshop from the kitchen. When you buy a wireless intercom, you might ask yourself,"Where's the antenna?". The antenna is what you plug the intercom into, the house wiring. When you key the PTT button from the unit in the kitchen, the signal is transferred to the intercom's power cord. From there it travels down the kitchen's wiring to the circuit breaker box. From there the signal then travels up the circuit wiring to the basement, and to the power cord of the intercom in the basement.

How can a radio signal do this??? If you look at the bottom plate of your wireless intercom, or in the manual under "specifications", it might list FREQUENCY. On my intercom it lists two frequencies, 230 kHz for channel A and 260 kHz for channel B. Those are some pretty low frequencies... And low frequency radio signals tend to like, or are more resonant with, long wires. Even though these intercoms are tied to the wiring mainly for talking from one room to another, they do put out a strong enough signal that it radiates from the wiring. I've used a portable receiver that tunes down to 230 kHz, and it receives the intercoms' signals very strong anywhere in the house! In fact, at street level, I could hear the intercoms' signals over 100 meters down the street, radiating from the power lines!

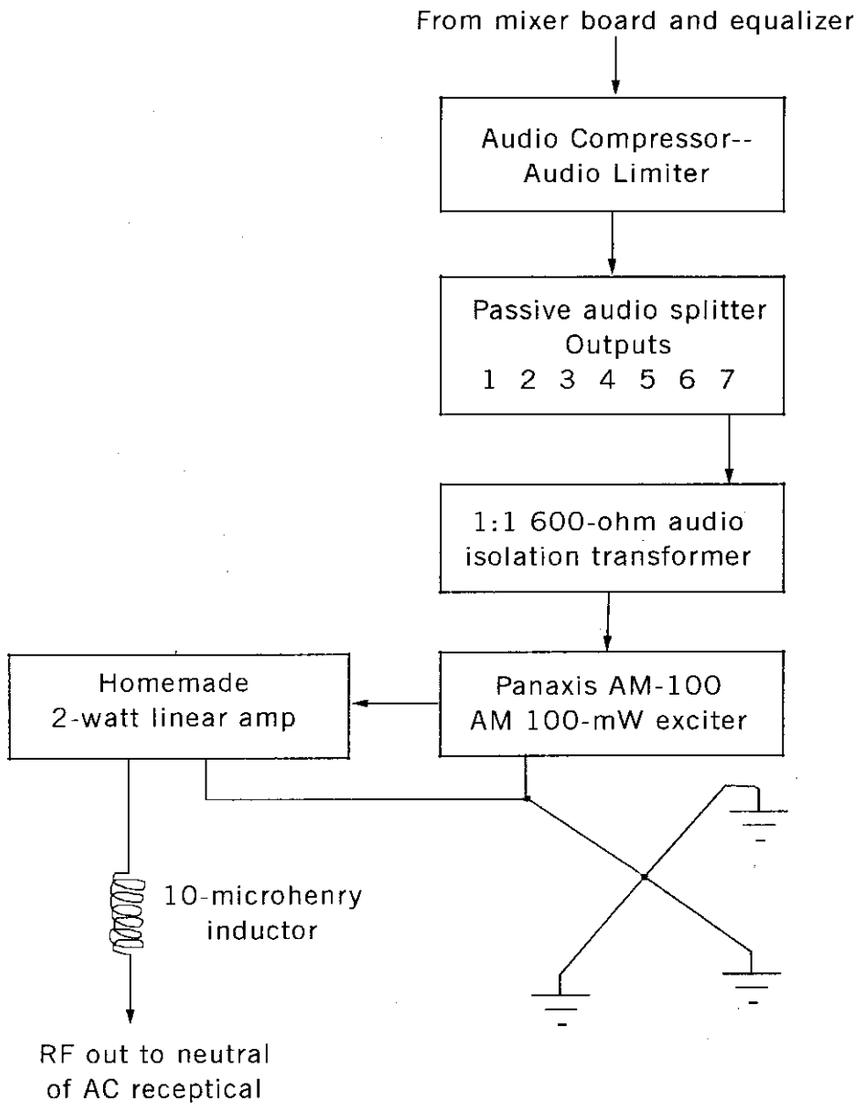
What wireless intercoms do is what we want to do on a larger scale on the medium wave, AM, broadcast band. In my opinion, doing Carrier-Current with low power AM seems more efficient than trying to radiate from a resonant antenna on the AM broadcast band. To broadcast on the AM band efficiently, you need to construct an antenna many meters in length, and most people don't have the property space to do so. And consider this... Most of the signal is wasted in space... With AM C-C you can do it anywhere you have power lines coming in at the transmitter site. Also, since the AM signal follows the path of the power lines, the signal will end up in houses and buildings, where the potential listeners are.

At this time I'd like to mention about a book that's, in my opinion, the bible of carrier-current broadcasting. The book is Carrier-Current Techiques: Wired-Wireless Broadcasting by Ernest Wilson, of Panaxis Productions. This book is the foundation of what got me into understanding and applying AM C-C broadcasting. The book I have, copyright 1979, explains what carrier-current is in layman's terms, the history of, FCC rules to C-C, selecting a frequency, home brew AM transmitters, RF coupling to the power lines, reducing interference, coaxial cables, off-air monitoring, building studio facilities, studio telephone patches, where to get commercial gear, AM C-C repeaters, viewing RF waveforms of your signal, mathmatical formulas, home brew linear amplfiers, and more.

The latest catalog I received from Panaxis Productions

listed the book at $12.50 US. You can locate Panaxis at their Website, <www.panaxis.com>; contact them by writing to P.O. Box 1 30, Paradise, California 95967, USA; or call them at (530)-534-0417 (voice) or (530)-534-9002 (fax).

By using Ernest Wilson's book, I was able to fabricate a push-pull linear amp for my AM C-C station that I still use. I still use that book as a reference guide, since I'm still learning a lot about this subject. Yes... I am really plugging Ernest's book a lot here, but I've yet to find a more complete guide at this time that has information about Carrier-Current broadcasting. I may be wrong about this, but I've yet to find information even on the Internet about it... If anyone out there does know more about information about C-C, please write in!!!



The AM 600 block diagram

In the Fall of 1998, I decided to get my AM C-C station out of storage, and back into operation. The frequency that I'm using is 600 kHz, and I call my station AM600. Figure A is a block diagram of how AM600 is currently set up at the time of this writing. The reason I've chosen 600 kHz is it's the lowest frequency that my transmitter will go down to, without modifications. Luckily it is a free frequency in the two areas where I've used AM600. Since I am using the power lines to carry my signal, 600 kHz follows long power cables more efficiently than a higher frequency of 1 MHz.

At 1 MHz, and higher, the signal doesn't carry as far on the power lines. At 2 watts, I can hear AM600 at street level during daylight hours for about 2 kilometers. At night time, at street level, the range is about 11 kilometers before AM600 is drowned out by several other stations due to mediumwave nighttime propagation. However, 600 kHz is not an allocation for those clear channel 50,000 watt stations. So I lucked out there too...

Probably the most intriguing thing about AM600 is how the station is RF coupled to the power lines. Instead of having a system where the final RF output is coupled to the AC HOT of the house wiring, AM600's final RF output is directly coupled to the AC Neutral. To my knowledge, there is no documentation that says how this can be done, or that it can be done at all. Every AM C-C station that I've heard of, or read about, is coupled to the AC HOT.

So why did I decide to couple to the Neutral? There's a story behind that... Back in early 1989 I was fooling around with an AM oscillator circuit that probably only put out microwatts of signal, and I was looking for an antenna to load it up to. At that time I had a 30-meter longwire antenna that I used for shortwave reception, so I loaded the AM circuit to it. I was only able to hear the signal for about 20 or 30 meters. Displeased, I thought about loading directly to the house wiring's AC

Neutral, just to see what would happen. At that time I had no idea what Carrier-Current was.

To my suprise I had a booming signal anywhere inside the house, but that signal radiated to only a couple meters outside the house, except where the power lines were coming in down from the power utility pole. The signal didn't stop there... With a Walkman radio, I was able to hear that signal for about 100 meters, following under the power lines on my street. Even though I couldn't hear the signal beyond 100 meters, at street level, I walked to the end of the street, about another 50 meters.

At the end of the street was a utility pole with a power transformer that had a ground cable running down the pole to a ground rod. When I got within 1 meter of that pole my AM signal just boomed right in by radiating from that pole's ground wire! I figured that this signal had to be carrying into people's homes by traveling down the power lines. Just because the signal was too weak to radiate 10 meters down to street level from the power lines, doesn't mean that the signal just stops there. I continued doing this for about a month, until my stupidity got the best of me. The easiest way to increase that AM oscillator's output was to increase the supply voltage. I ended up increasing the supply voltage to the point where that AM circuit went up into a big puff of smoke, and I faced some angry parents.

For two years I didn't do anything else with AM transmitting, until Spring 1991. At that time I'd moved into the ground floor of an apartment complex with absolutely no outdoor antennas allowed. I tried FM stereo broadcasting with indoor antennas. However, the best range was in one direction maxing out to about a couple hundred meters. In other directions I had dead spots and multipath reflections as close as 30 meters from the antennas.

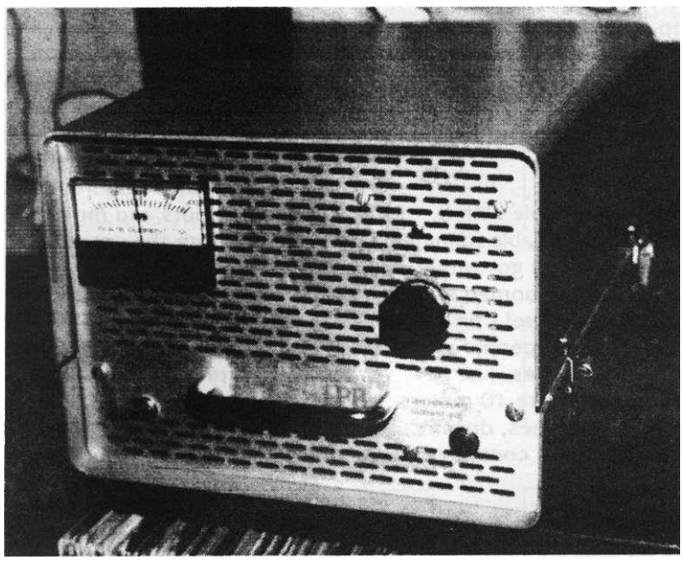
I then looked at AM broadcasting to possibly take up the slack. By that time, I'd learned what AM Carrier-Current was, and bought an AM transmitter kit. Out of cost cutting, lack of parts, or just sheer laziness, I decided to try loading up the new AM transmitter directly to the building's Neutral of the AC wiring. By doing so, I covered every building on my street, seven of them, with 100 milliwatts, mW, of signal. Out in open fields, away from the buildings and power lines, my AM signal was non-existant. I thought, "so what... The signal is going where I want it to..."

However, I did have a big problem of hearing a loud 60 Hz AC hum in my AM signal. So I grounded the transmitter's chassis to the only ground in the building, a cold water pipe of the building's plumbing. That helped reduce the humming a little, and it also increased my range a bit. What I had was a ground loop, a condition where more than one ground current is flowing on a single ground cable. Ground current from the studio equipment, mostly being induced by the step-down transformers in each piece of equipment, was traveling down the audio cables to the path of least resistance to a ground-like potential, my AM transmitter. To stop that from happening, I've added two 1:1 600-ohm isolation audio transformers between the audio outputs of the compressor / limiter and the audio inputs of the transmitter. There's two audio transformers, since there's two audio channels feeding the transmitter, one for the LEFT and the other for the RIGHT. After doing that, I had a good clean signal covering the neighborhood on 600 kHz AM.

Because the system of coupling RF directly to the Neutral seemed to work so well for me at the other locations that I've broadcasted from, I still do it today. This system is cheap, easy, and safe since I'm not worried about an electrical fire hazard so much, and for me it seems to work well. I have added a few other modifications that can be seen in Fig. A. I've added an RF linear amplifier that I've made via Ernest's book. The chassis and power supply came from a junked Realistic TRC-57 CB radio. All I did was

gut out the motherboard and build in its place Ernest's linear circuit and a seven-element Chebyshev harmonics filter that I got out of the ARRL Amateur Radio Book.

I get about 2 watts out of this amp. Tied to the chassises of the transmitter, (exciter in Fig. A), and the linear amp are cables to an independent earth ground system, that's meant only for the exciter and linear amp. Because it was Fall with crappy cold weather, and the fact that I'm limited in supplies and money, I used three separate one-meter-long brass rods, all pounded in the ground and tied together to the main cable tied to the exciter and linear amp. Temporarly, this makes AM600's grounding more efficient. I do plan to have a much better, more permanent, ground system soon.



An LPB carrier-current transmitter--fired up and ready to broadcast!

At the RF output of the linear amp, I'm running 5 meters of RG-58 coax cable to an unused electrical outlet. Another thing good about transmitting on the AM broadcast band is that you can run long lengths of cheap coax cable with little or no loss. At the AC outlet end of the transmition cable, the outer braid is not connected to anything. In this case, I figured that it didn't need to be. However, on the center conductor I've added a 10 microhenry inductor, which adds another 37 ohms of impedence to the RF circuit. When you load up to the power lines, you don't know what the exact impedence is going to be, but you can bet that it will generally be lower than 20 ohms. From the inductor, the RF is connected to the AC outlet via a polarized AC plug.

Here's where there's a potential for an AC shock hazard. When you look at a North American AC receptacle outlet, you'll see two vertical slots, and hopefully a small hole that looks like a "D" tilted forward. In the National Electric Codes, there's a system used to identify what these slotted holes should be. Of the two slots, the smaller slot is AC HOT, while the larger slot is AC Neutral, and the D-shaped hole is Ground.

With an ID system like this, you can tell what's HOT, Neutral, and Ground by just looking at the receptacle, even if it's installed upside down. Be aware of how the

receptacles might be installed in an older house, or if you know that the receptacles were installed non-professionally. I've found outlets where the HOT and Neutral were reversed! If you know how to use an AC voltmeter, I'd advise you to check the AC receptacle that you want to load your AM C-C station to, to make sure Neutral is Neutral, and HOT is HOT.

If you're unsure, then please get help from some one who's knowledgeable in residential wiring. If you're in a house that's old enough to have receptacles with only two slots that are the same size, I'd advise you to avoid even trying to use those outlets for C-C broadcasting, or for anything else for that matter. I can't stress enough the importance for you to be careful when working around 120 Vac. The 120 V wants the path of least resistance to ground. If that happens to be you, because you've touched a live 1 20 Vac HOT conductor, the current can kill you.

You could load to the Ground hole on a receptacle, since it is supposed to be tied to the Neutral at the panel box. I've done that before with no problems. So you might ask, why not just load up to the outside of the panel box? And I'll say that you most certainly could. This might sound ridiculous... But when you live with more than one person in the same household, loading to a receptacle outlet using a polarized plug looks better to most people. That in itself could make or break the existance of your station. And I have yet to see anything that says that you must load a AM C-C station my way or anyone else's. If you have developed a way to effectively couple your AM C-C RF to the power lines and out to the neighborhood, then by all means go for it... Then write back and tell us about it, since I'm still learning this.

As far as testing AM600 goes, I do not use any really extravagant equipment. Right now the equipment at my disposal consists of a boom box, digital voltmeter (DVM), a diode, a Walkman radio, a car with AM/FM stereo, an audio frequency (AF) generator, a portable 1-30 MHz shortwave receiver, a frequency counter, and my own two ears. Because I don't have a shortwave receiver or power meter that reads down to 600 kHz, and I no longer have an oscilloscope, I quickly made up a simple RF voltmeter using a diode with a DVM. On my homemade RF linear, I have two exposed SO-239 connectors that I use as RF test points. Exposed is the center conductors... One SO-239 is to measure the RF input from the exciter unit and the other SO-239 is to measure the RF output from the linear and harmonics filter.

My DVM does not measure RF voltages in the AC mode. However, with a 1N4148 diode I can rectify to a DC voltage that my DVM can measure in DC mode. If you'd like to try this, you'll need a fast switching silicon diode. It doesn't need to be a 1N4148, but that's what I had in stock. If you use a DVM, polarity will not really matter since DVM's will give the reading in + or - . However, polarity does make a difference with an analog voltmeter, and let's assume that you have one.

Looking at the diode, you've got two leads and on the body of the diode is a black marking. The lead that's the closest to that black mark is the negative, or cathode, end of the diode. The other lead is the positive, or anode, end. If you have alligator clipleads with your meter, clip the negative cliplead to the anode of the diode. Connect the positive cliplead to the independent ground of your transmitter. The cathode lead of the diode acts as our RF probe. With the transmitter on (with no audio put to it, since we want a dead carrier signal). This is assuming that you have your station set up already. Set the voltmeter to around the 10 Vdc scale, and with the diode's anode clipped onto the negative meter lead, touch the diode's cathode to the RF output of your transmitter. You should see several volts deflected on the meter.

Off my test points in my linear amp, I measure 6.5 V at the output and 0.81 V at the input. By no means is this an accurate way to measure your RF signal, but it is a very quick and easy way to see that you have a measurable signal. It can also aid in troubleshooting where you have RF voltage in a circuit, and where you don't. I didn't really want to touch on this in depth, but this diode and voltmeter trick is something that anyone can do.

This article will be continued in the Fall issue of Hobby Broadcasting

AM Carrier-Current Broadcasting

Part Two

by
The Dude

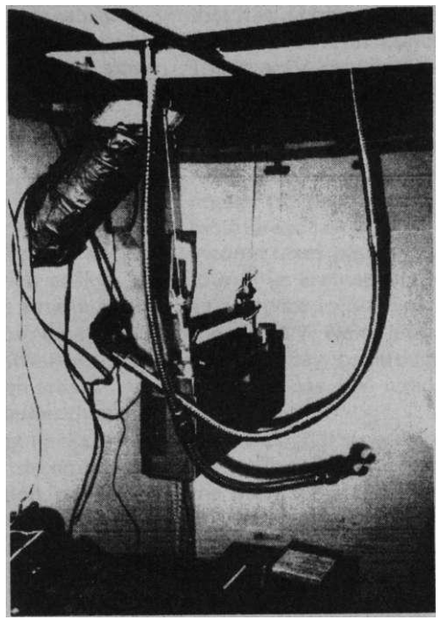
WARNING:
Unlike working with typical electronics equipment the safety of working with carrier-current projects depends, in part on correct wiring. Thus, the potential shock hazard with carrier-current is greater. To be safe, contact a professional before working with carrier-current systems.

In the last issue, longtime low-power broadcast enthusiast. The Dude, dug into the secrets of carrier-current AM radio--one of those topics that many people know something about, but very few have actually done. Specialized carrier-current equipment is intended for institutional use (deep pockets required!), so hobbyist equipment is scarce and how many hobbyists feel secure enough to start building their own transmitters and sticking the output into the 110-VAC wall socket?

Here is Part 2 of carrier-current AM broadcasting. For Part I. see the Summer issue of Hobby Broadcasting.

The best instrument to use for calibrating and monitoring the modulation of a AM C-C station is an oscilloscope. However, since I don't have one, I use an AM receiver with off-air VU meters. In this case, it's a Pioneer SK-650 boom box from 1983.

During that time period, a lot of high-end boom boxes had that added feature of analog, or LED, VU meters that were added mainly to compliment the manual record feature of the boom boxes' cassette decks. However, most of them also read the levels of AM mono and FM stereo off-air levels while just the tuner mode was selected. And yes... Many home stereo receivers from the late I970's to early 80's also had VU meters that worked in tuner mode. If you're able to get ahold of such a receiver, with working VU meters, grab it!



The old boom-box monitor hanging in the uncompleted studio (now finished]

The commercial alternative would cost a few thousand dollars. And even if the receiver you pick up has some defective parts... If it's a name brand, like Pioneer, Sony, Panasonic, Kenwood, etc., you still may be able to get parts. Even if these companies stick you with high prices for replacement parts, it's still cheaper than the commercial alternative.

The best way to set your peak level to 100% modulation, or 0 dB on a VU meter, is to run a 1000-Hz audio tone with an audio frequency generator. If you don't have one, what I used to do is wait for TV stations to end their program schedule. Before these TV stations would go off-the-air, or minutes before they officially sign-on, they will acompany the color bar pattern with a 1-kHz audio tone that I would record and later use as my audio test signal. How's that for cheap?

And... The best equipment to use to test the range of your AM C-C signal is a car stereo and your car, and do a drive around. Well... At least this is the quickest way... What I use as a strong signal listener's reference is the signal that I can receive from my station at street level during daylight hours, which makes your car's rod antenna several meters distance away from the power lines that your signal is radiating from.

Driving up and down the street, while trying to listen to your signal, you'll notice that your signal will not be constant, but will vary in strength and noise content. And if your signal drops off down to nothing immediately, check that area to see if you've come across a utility transformer, or if the power lines have veered off to a side street, across a field, or across a river.

When you come to the point where your signal gradually fades down to noise level, don't just assume that it's no longer receivable just because you can hear it any longer at street level. You should still have signal traveling into peoples' homes and buildings, where radios will either be plugged into, or close to the power lines. Now I'm not suggesting that you barge into people's homes and building to check your signal strength... But I guess it helps to have a lot of friends to tune in to help you test, in this case...

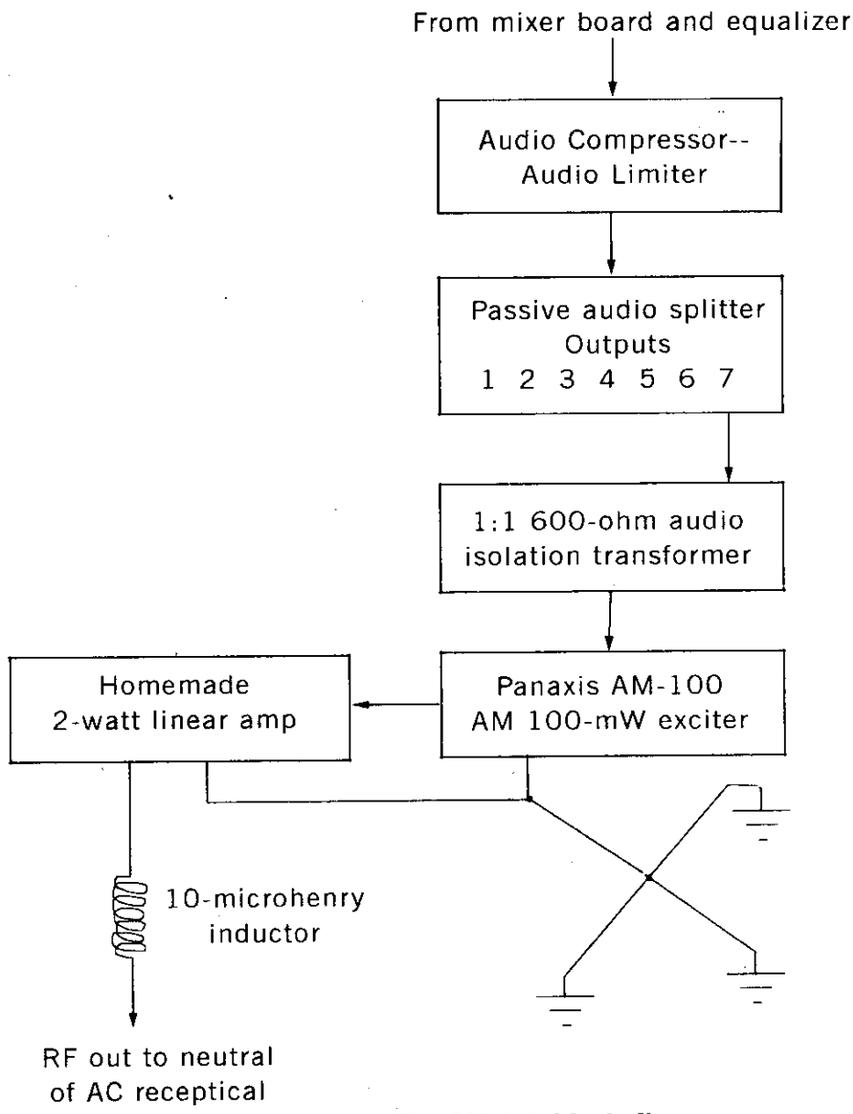
What I would do to test for my signal, after I was out of range to receive it at street level, I would drive to a utility pole that had a large ground cable running down from a transformer to the ground.

With a Walkman radio, I would walk up to these poles and hear my signal boom back in by having my signal radiate from the ground cable less than a meter away to the walkman radio. At my last location, from where I lost my signal at street level to where I heard it again at a utility pole grounding cable was half a kilometer! It might really surprise you to find out where your AM C-C can go. However, at night time, your range will probably be reduced in half due to night time propagation of distant stations coming in over your signal.

Here's something else that I've experience while AM C-C broadcasting, and I've yet to see it mentioned in any

AM C-C publications. The range will vary depending on the outside temperature. At 20 degrees C, I can hear my station, AM600, for about 2km with low noise levels at street level. However, at 0 degrees C, the noise levels are pretty high and AM600's signal will max out to about 1.5 km. At -10 degrees C, noise levels become incredibly strong and AM600's signal will only max-out to 1 km, or less.

The reasons for the noise levels and range to change with temperature is, I believe, that the power line cables expand and contract. When it's summer and warm, the power-line cables expand in diameter conductor size. Also, contact points are more electrically solid, causing little to no arcing, which reduces the noise levels. The expanded power-line cables are less resistive to AM600's signal, thus allowing AM600 to transmit farther. When it's winter and cold, the power-line cables contract, which increases resistance to AM600's signal, thus it travels not as far. Also, contact points from power line to power line are not as solid, causing micro-arcs that produce high levels of electrical buzzing noise.



The AM 600 block diagram

What programming can you can air over your AM C-C station? What ever you wish to...

On AM600 I'll air pretty much what is sent to us. I might sign-on Monday afternoon at 5:00 PM with album features or not so new under ground rock / metal picks for the first couple hours. Around 7:00 or 8:00PM, is prime time for Dale Early's Tempered Steel, a clean thrash, death, grind, black, rage metal show that I receive free. I try to air that one weekly since I get easily backlogged if I don't, in which case, I would air that show in blocks.

Around 9:00 or 10:00PM I would air new local, semi-local, and otherwise, underground rock/metal bands that normally wouldn't get aired any place else to give them exposure. In addition, I'll try to give those same bands connections to college or commercial radio air play. That seems to work out good since I get about half of my CDs and demo tapes for free; in return, artists might get other radio connections. I'm glad it works that way because I'm really cheap...

With the exception of Rowe Productions of Australia, no record company wants to send me free music. Not to get too far off track... About 1 1:00PM, I'll air programs from The Wolf Radio Network, or non-vulgar shortwave pirate shows. After midnight is when I'll air the more vulgar shows I get uncensored. I don't believe in censoring such programs sent to me because it is the programmers' right to be heard and there is an audience for it. However, I'll air such programming at a more appropriate time slot, than the prime time or daytime hours.

From 1:00 AM to 3:00 AM J.G. Tiger does the Desperate Rock'n Roll Show to the wee hours of the

morning. This would include new and old rockabilly, rhythm &. blues, blues, jump, punk, country, new wave, and even 1920s and '30s swing tunes. And yes... some of these artists are local... J.G. Tiger tries to get on several nights a week.

Within all that programming we also run, or read live, PSA's that normally wouldn't be heard on commercial, or even college, radio. One big example, hamfests... When was the last time that you've heard about a local hamfest mentioned on commercial, or even college radio? In addition, we try to give as much airtime to small rock/metal 'fests that get little or no media attention. In fact, I'll try and use those festivals to make new contacts and interviews from unknown artists. Having interviews with unknown artist, whether they're local or not, really opens doors for making new contacts. Airing interviews from bands helps to complement the music aired on our AM C-C station, not to mention that it also helps to give us good relations with different artists that help us build a decent reputation.

With all the programming that we put on AM600, it was only on-the-air when ever we had time to do it, being that it is a hobby-oriented station. This meant that AM600 was broadcasting for 20 hours a week, or less. That's not a very good way to try and keep a listening audience, especially on AM mono radio.

Lately we've found a way to keep AM600 on-the-air 24 hours a day, 7 days a week. After we are done with regular programming, we link in local N.O.A.A. weather radio broadcasts. Hey... Why not? In the USA federal income taxes pay for that service, yet maybe one out of four of us are capable of receiving such broadcasts. So, as a service to our listeners, and to keep AM600 on-the-air 24/7, we're letting the public listen to something that they pay for through their taxes on a medium that everyone has, AM radio.

Even though it's not shown on Fig. A, we're running the audio from N.O.A.A. radio via a scanner connected to the main audio boards, for now. We plan to free the boards of this by connecting an audio switch box between the output of the audio compressor /limiter and the audio isolation transformers. This will free up the boards so we can do off-air production work.

In the future, we plan to upgrade our AM mono exciter with a stereo one. However, unlike FM stereo, AM C-QUAM, (Compatible Quadrature Amplitude Modulation), is not cheap. FM stereo transmitters are very cheap using the Siemins BA1404 IC chip. To my knowledge, no such one-chip design is available for AM C-QUAM broadcasting. Not even from Motorola, the developers of C-QUAM...

Worse still, since the FCC let the market decide on the AM stereo, out of four different systems, manufacturers didn't want to gamble on which AM stereo method would finally win. That resulted in few AM stereo receivers being built--even today, with Motorola's C-QUAM system winning out.

However, those of us who have heard what a good AM stereo broadcast sounds like know that it works. The best source that I've come across to explain how AM stereo works is the AM Stereo Page from Canada on the Internet at: **http://www3.ns.sympatico.ca/lettuce/home.htm** E-mail: **lettuce@ns.sympatico.ca** This long address is well worth checking out... This site not only explains AM stereo transmitting and receiving, but also covers history of, stations in USA and Canada that are AM stereo, modifiing mono receivers to stereo capability, pros and cons, AM stereo equipment buy-sell-swap, the latest AM stereo related news, and more. They're more than happy to take your questions and comments.

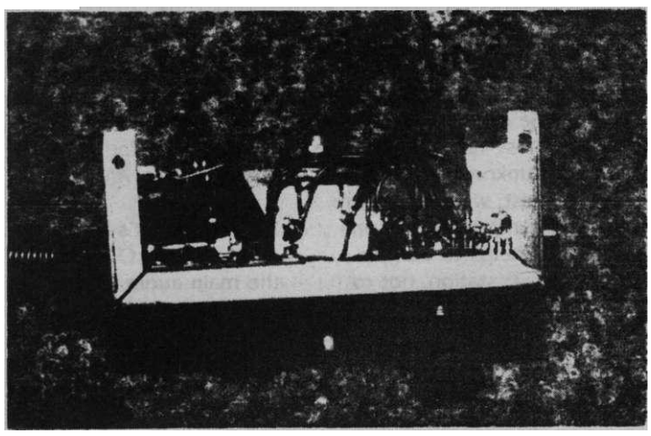
Even though there is no cheap circuit for AM stereo broadcasting available for the hobby broadcaster, yet, someone has developed a prototype AM stereo processors and exciter unit. This individual originally did this as a college fabrication project, but recently he has expanded his web site and built a working model, called The Globe 161OKHz AM Stereo. This station is trans-

mitting via Part 15 of the FCC rules with a three-meter-long antenna and 10 milliwatts of RF.

Information is available, on his web site, on how to construct this complete C-QUAM AM stereo broadcasting system. The schematics are very straight forward, and in my opinion, the hardest part about building this system is locating all the parts and components. Although a complete list of parts and where to get everything is in the works. Catch Alfredo at his very informative web site at: Web site: **http://inetarena.com/~alfredot/** E-mail Alfredo at: **alfredot@inetarena.com** I haven't yet built Alfredo's circuit, but it looks like it would be well worth trying because the costs of an available commercial AM stereo transmitter start around $5,000.00 and go up from there.

Wouldn't it be great if a bunch of AM micro broadcasters built and set up AM stereo Carrier-Current stations to the point where they outnumber the commercial AM stereo broadcasters? It can happen...

The final Web site to tell you about is one that offers new, imported, AM stereo receivers from Japan at: Web site: **http://www.stereoam.com** E-mail Chuck at: **mychucky@funport.net** I have purchased an Aiwa AM stereo digital portable through this web site with no problems in the transaction.



A home-built converter to safely and effectively couple the output of a standard transmitter to power lines.

AM stereo receivers have become a very rare, and had to find idem, now a days in North America. This web site has a selection of AM stereo receivers that would be good to use as an AM stereo station/studio monitor for your AM stereo station. Chuck, of this Web site, happens to be the owner of a C-QUAM AM stereo station in Florida.

I hope that I've been able to provide some useful information in AM Carrier-Current broadcasting. Most of the information is based on my experiences with my station AM600, which may, or may not, work for you. Even though I've been doing AM C-C since 1989, I'm still learning. And there's a heck of a lot to learn in AM C-C broadcasting, that is a permissible alternative to reaching a general public audience license free.

I welcome your questions and comments at: AM600 c/o The Dude P.O. Box 422 Wellsville, New York 14895-0422 USA Or E-mail at: **rreh917@hotmailcom**

Better yet... If you have additional information on AM Carrier-Current broadcasting, I hope that you'll share it with the rest of us by writing to *Hobby Broadcasting.* This is a broadcasting medium that gets very little attention, but it works, it's fun, and you'll be giving the listeners an alternative to listen to. And isn't that the reason for us to broadcast in the first place?

HB