PCARA Update

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Fresh start

I hope that everyone had an enjoyable and relaxing Summer. Over the break there were several regional Hamfests, including the Sussex County Amateur Radio Club Hamfest and the Ramapo Mountain Amateur Radio Club Hamfest. If you didn't have a chance to attend any or all of the 'fests, *PCARA Update* Editor and tireless photographer Malcolm, NM9J has included photos from those events in this month's edition of the newsletter.

As mentioned in the July 2016 edition of the *PCARA Update*, the 448.725 MHz (-) Yaesu System Fusion repeater is on the air with AMS (Automatic Mode Select), fixed FM transmit and the latest firmware installed. If you get a chance, give it a try and send a report on what you found.

Some of you may have noticed that on our home page (http://www.pcara.org) the PCARA logo has been **freshened up** a bit. It is still the same basic design and theme — the lettering has been updated — the PCARA arch is a bit broader, and the design is more vertically compact. The original logo has been in use since December 2000, when the winning design submitted by Clint, KB2ZRJ was chosen by committee.

Our next major public service event is coming up on October 16, 2016 when PCARA will be providing communications support for the 36th Annual Harry Chapin Memorial **Run Against Hunger** at Croton-Harmon High School in Croton-on-Hudson, NY. We will need quite a few members to provide coverage for the scheduled events. We will be discussing the logistics for the Run at the September and October meetings. If you are interested in participating, please let us know at mail'at'pcara.org. Thanks.

Here are some upcoming regional Hamfests:

- Mount Beacon Amateur Radio Club Fallfest, Saturday October 1, 2016, Fishkill, NY. Details at http://www.arrl.org/hamfests/mbarc-fall-fest-1.
- Bergen Amateur Radio Association Hamfest , Saturday October 8, 2016, The Township of Washington, Bergen County, NJ. Details at http://www.bara.org/hamfest/.

Greg KB2CQE (right) and co-worker Tony KD2CCY enjoy the warm weather at Sussex County ARC Hamfest on July 17.

Please remember that our next scheduled meeting will be **Sunday September 11, 2016** (skipping the Labor Day weekend) at 3:00 pm at New York-Presbyterian / Hudson Valley Hospital in Cortlandt Manor, NY. I look forward to seeing each of you there.

- 73 de Greg, KB2CQE

PCARA Officers

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Net night

Peekskill/Cortlandt Amateur Radio Association holds a weekly net on the 146.67 MHz W2NYW repeater on Thursdays at 8:00 p.m. Join net control Karl, N2KZ for news and neighborly information.

Adventures in DXing

-N2KZ

Hello New Friend

It's not easy to separate me from a piece of equipment. I certainly have the ham radio instinct of repairing and retaining my gear until it just completely wears out or is beyond obsolescence. I'll probably still find a use for it somehow. I bet you know the feeling!

Back in 2001, I purchased an Icom IC-T7H dual band 5 watt HT. I originally used it as my sole vehicle for 2 meters and 70cm at home and in my car. I squeaked every ounce of power out of it and tried desperately to mold it into a serviceable mobile rig. It went everywhere with me. It endured plenty of use and plenty of abuse!

Three items from Karl's chronicle of hand-held amateur radio devices. On the left is a Realistic PRO-38 scanner which Karl first listened with. In the center is the Icom IC-T7H dual band handi-talkie which gave many years of service. On the right is the latest acquisition — a Yaesu FT-60 HT.

Recently, I decided my IC-T7H needed a rest. Simply put, I wore it out. Its one flaw was the reason I purchased it in the first place. The IC-T7H featured a BNC connector allowing me to easily attach a big external antenna to extend its range and flexibility. After 15 years of constant removing and replacing antennas and repairing internal antenna connections, it became difficult to keep the rig in good order. What a shame!

Choosing a replacement was easy. I browsed the offerings of the big three (Icom, Kenwood and Yaesu) looking for a basic and trusty 2m / 70cm HT without expensive digital transmit capabilities. All I wanted was a basic hand-held that might last a lifetime! I chose the least complicated model, Yaesu's well-known FT-60.

I am extremely pleased with its straightforward operation and performance. In many respects, the FT-60 mirrors the superior features and quality of my Yaesu FT-1900 mobile transceiver. Already understanding the programming and capabilities of the FT-1900 made it very easy to launch my new FT-60 HT.

Yaesu's FT-60 can be customized to your personality and needs. After quickly reading the manual, written in perfect and completely understandable English, my new HT was programmed and ready to go in no time. Entering repeater pairs, PL tones and even alpha-numeric labels for each memory entry was effortless. The backlit keyboard and easy-to-read display glows Yaesu's signature warm orange color when active. The case is made of rugged die-cast metal willing to endure tough handling and many years of wear.

Close-up of Karl's Yaesu FT-60 dual-band FM handi-talkie.

I especially enjoy the extended coverage receive capabilities on this rig. You can travel all the way from 108 MHz to 520 MHz and 800 MHz to 1 GHz! There is a one-button hot key to access a pre-loaded memory bank of weather radio frequencies. You can hear police, fire, marine, broadcast auxiliary and public service frequencies along with the 220 MHz ham band. The FT-60 even picks up aircraft communications in AM mode.

I created memory banks to cover marine communications on Long Island Sound and the Hudson River, Westchester County Airport correspondence and all the useful amateur radio repeater pairs nearby my home QTH and my vacation QTH in Michigan. If you are lazy or inquisitive, the FT-60 can automatically build memory lists by recording active frequencies while you scan. I dare you to fill its 1000+ slot memory bank! The FT-60 is a terrific HT combined with an advanced and fast acting scanner. It is hard to beat!

The Yaesu FT-60 is also very efficient in power usage. I often use my HT while I am in 'dog portable' mode walking around my neighborhood with leash in hand. I have had very lengthy QSOs at full transmit power without any degradation of power or performance. The batteries seem to last forever. Charging the supplied nickel-metal hydride cell is easy. Just seat the HT in a charging cradle. A gentle full charge takes about a couple of hours. I haven't needed to charge it yet!

This HT is really smart. If you wish, the unit can

switch automatically to lower transmit power when it senses incoming signals are strong. You can also manually choose between 5 watts, 2 watts or 500 milliwatts. Lack of activity can switch the receiver into low battery drain sleep mode or turn the rig off entirely. This is only the beginning! Fascinating features abound! For full details, download the complete FT-60 operators manual at: https://www.yaesu.com.

Yaesu desktop rapid charger.

If you are looking for a full-featured, beautifully designed and rugged HT, I highly recommend the Yaesu FT-60. It is simple enough for beginner hams to enjoy and it is filled with features and capabilities that the most advanced ham can appreciate. Yaesu first introduced this model line in 2004 and it is obvious that they have learned from their experience. Solid, simple and special at a very reasonable price. Bravo!

Yaesu FT-60R brochure from the product introduction in 2004.

Goodbye Old Friend

Bob Duncanson, WD8RJL, passed away on Tuesday, August 23. We met back in the year 2000 when I discovered the daily Old Goats Net on the Bad Axe, Michigan repeater. As time went by, I was welcomed into the ham radio community in Huron County. Bob and I became good friends.

Besides being an advanced class ham, Bob was an expert farmer. Outside of his enlistment in the Air Force, he was dedicated to working on his family's farm. Bob also picked up outside work driving trucks and helping out with neighborhood farms and their harvests. He taught me all about farming life and all its complexities. Above everything, Bob was always a wonderful person to know.

I admired his inquisitive nature and his ability to always be very polite and understated. Bob was a smart man and had experienced many decades of life that only added to his endearing nature. This was no average soul. Bob's warm personality inspired everyone he met to follow in his positive spirit of life. I always wanted to do whatever I could to help him out. I was blessed to know him.

Karl N2KZ (left) in Michigan with Bob WD8RJL (right) and Gomer.

The Michigan Old Goats have lost a familiar friend. I hope we always remember his smile and his inspirational kindness. His voice is now gone from the air but a little bit of Bob can be found in all of us. I send my sincerest condolences and prayers to all of his family. May he rest in peace. See you again soon, Bob. Dit dit.

Until next month, 73 de N2KZ - The Old Goat.

Summer show

Here is another picture from PCARA's summer break of 2016.

Bob N2CBH checks out a GE vacuum tube on sale at the August 20th Ramapo Mountain ARC Hamfest, located at a new site in Ringwood, NJ.

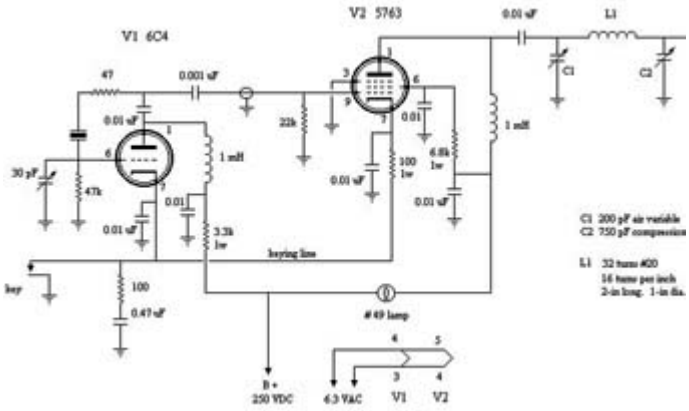
T-R Time Machine – N2HTT

[This article is republished, with permission, from the "73, de N2HTT" blog site, https://n2htt.net/]

Novice era nostalgia

This past January, I became aware of a new event celebrating the vintage rigs popular in the 50's, 60's and 70's, the **Novice Rig Roundup** (http://novicerigroundup.com/). I love the tube rigs from that era, and absolutely had to put together a station and join in.

I already had on hand a few transmitters capable of the job: two QRP two-tube rigs based on a classic MOPA circuit (you can find links to several on this page - http://www.af4k.com/boatanchors_directory/homebrew.htm) and a Knight T-60 kit-built transmitter — http://www.eham.net/reviews/detail/5970.



*Schematic of a two-tube **M**aster **O**scillator/**P**ower **A**mplifier (MOPA) transmitter by WD8DAS. (See QST, Jan 2003, p 39.)*

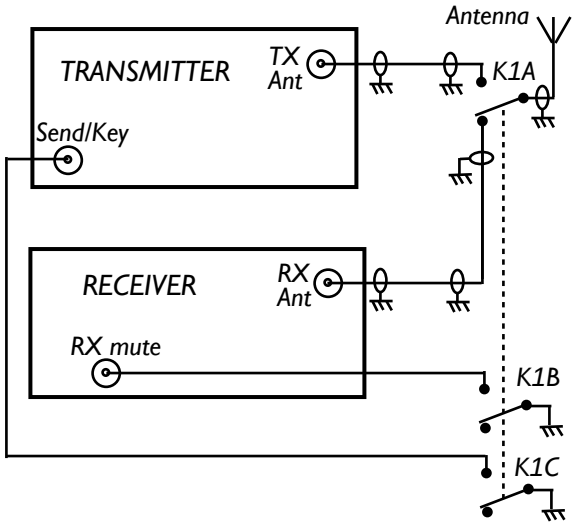
The T-60 was particularly appropriate, as it was designed to operate at less than 75 watts input, making it the perfect Novice transmitter. I operated all of these transmitters under crystal control, and after a week of trying to make contacts, gained real respect for those operators that learned the ropes that way. For someone who was licensed well after solid state transceivers were the norm, operating a separate transmitter and receiver, constrained to a single frequency, was a real challenge.

Knight-Kit T-60 crystal-controlled Novice transmitter could run 60 watts input on 80 to 6 meters, using CW/AM.

Back in the day, operators would call on their crystal frequency, and then listen up and down the band for a reply. In the modern world of automatic zero-beating and narrow passband filters, being stuck on one frequency just doesn't work all that well. After a week of not too much success, I was determined to add a Variable Frequency Oscillator to my vintage station. Operating with a separate VFO, in addition to a transmitter and receiver, does complicate things a bit.

Separate ways

Separate transmitter/receiver stations always involve some kind of switching arrangement if a single antenna is used for both components. These can range from a simple toggle switch connecting the antenna to either TX or RX — to automatic RF-sensed switching which allows for full break-in operation. (Full break-in, the ability to hear the receiver between the elements of the Morse code characters, is what we are used to in modern transceivers, and there are a number of commercial, kit, and homebrew solutions to provide this kind of switching for separates.)



Stations with separate transmitter and receiver require a T-R switching arrangement to transfer the antenna, mute the receiver and key the transmitter. In this example K1A, K1B and K1C are contacts of a multi-pole switch or relay.

Typical switching devices, called **T-R** (transmit-receive) **switches**, usually provide the following functions, in the correct sequence:

On key down:
- mute receiver
- switch antenna to transmitter
- key the transmitter
- provide sidetone (optional, but handy)

On key up:
- un-key the transmitter
- switch antenna to receiver
- un-mute receiver

Adding the VFO to this mix increases the complexity a bit, because of some of the characteristics of VFO

operation. Unlike a crystal oscillator, which does not provide a signal until the transmitter is keyed, a separate VFO can run and be keyed independently of the transmitter. The VFO can run continuously, or be keyed on and off in synchronization with the transmitter. Both methods offer advantages and disadvantages.

Beware the back wave

Allowing the VFO to run continuously, and just keying the transmitter, will undoubtedly produce the most stable oscillation. The VFO will drift less, and show no start-up instability on each keyed Morse element. However, there is an odd side-effect to this mode of operation: something that was known as **back wave,** back in the day. Suppose you hear a signal in your receiver and want to reply, by tuning your transmit frequency match exactly (this is called "zero-beating" the signal.) With the VFO running, you will hear your oscillator in your receiver (if it is not muted) and the tone, the back wave, will blot out his signal. You won't hear him.

Also, if you are relying on listening for your transmitter in the receiver while keying as a way of providing sidetone, the back wave will either obliterate your keying, or make it sound weird. So all in all, the "let it run all the time" approach is not too desirable.

*If your VFO runs continuously, the **back wave** can swamp your receiver during the pauses between keying.*

The alternate approach, of keying the VFO in synch with the transmitter, is the one that was most often used. In this scenario, the VFO runs only during the times you are actually transmitting a Morse element – sounds ideal, right? Except there is an issue that arises in this case: **chirp**. The VFO, when transitioning from off to stable running can exhibit slewing of the frequency. This "bird-whistle" effect is called *chirp*, and is the hallmark of a poorly run station.

Operators would attach a "**C**" to your RST signal report to indicate there was chirp on your signal, and if it was really bad and you were noticed by an Official Observer (OO) station, you could be the recipient of a dreaded "pink slip" notification to clean up your act.

Chirp on your signal is to be avoided at all costs. I've had some direct experience with this phenomenon. I had a Heathkit HW-16 transceiver coupled with a HG-10 VFO. The thing chirped like a cage of finches. It was one of the reasons I finally sold the rig.

There are a few things that can be done to minimize or eliminate chirp with synchronized keying. One is to run the VFO on its own power supply. Another is to allow the VFO to stabilize before keying the transmitter, and to un-key the transmitter before the VFO. Some tricky timing is required. This approach was first explored in tube circuits in the 1950s, and paved the way for modern transceivers with internal T-R switching.

Living in the 21st century and having access to cheap and efficient microcomputers, it is easy to shift the keying into the future, by introducing delays between keying the VFO and the transmitter. This is the idea behind my VFO-friendly switching system, the T-R Time Machine.

T-R Time Machine front panel. [N2HTT pics.]

How it works

The external event of closing the Morse code key drives a chain of events that put the signal on the air, lagging the keying by a few milliseconds, but always keying the transmitter only when the VFO is in stable oscillation.

The sequencing works slightly differently depending on whether you want to be able to hear signals between the elements of your sending. This mode, called **QSK** (one of those Morse code Q-code signals — meaning "I can hear you if you interrupt"), will wind up transitioning between transmitting and receiving several times a second as you send. **Non-QSK mode** (for want of a better term) flips the antenna and keys up the VFO, then leaves you in that state while you send. The station remains in transmit mode for a fixed "hang time" after the last Morse element sent, before

flipping back to receiving. The T-R Time Machine can manage either mode.

In non-QSK mode, the T-R Time Machine starts the VFO, delays a couple of milliseconds, and then starts keying the transmitter in time with the external keying. The VFO runs continuously, but the receiver is muted so you do not hear the back wave. After the hang time has elapsed since the last keyed Morse element, the station is sequenced back to receiving. The hang time is set to be just a bit longer than the typical pause between phrases, to minimize the amount of switching.

The first Morse element is robbed of a millisecond or so of duration, but at 25 WPM that amounts to about 3% shorter, and only the first transmitted element is affected. It is completely unnoticeable on the air.

QSK mode time-shifts your keying by a couple of milliseconds, so the keying of the transmitter lags the keying input. On key up, the VFO runs for a millisecond or so past the unkeying of the transmitter. The effect is to slow the output keying very slightly, but again it is unnoticeable on the air.

Writing code to send code

My Arduino sketch re-uses some code I had written for the **Digital Fist Recorder** project (see https://n2htt.net/2015/11/28/a-key-repair/ and *QST*, Nov 2015, p.38), but adds a new concept to control the keying: a coding device called a **Finite State Machine**. Using this approach, you model the process as a series of states. Each state performs some logic on entry, and based on current conditions, decides how to transition to the next state. Organizing the code this way makes it very easy to maintain. The switching tasks, things like key down, VFO start, transmitter start, etc. lend themselves nicely to representation in the code as discrete states, and the resulting code is quite clear to follow.

I have not yet posted the code to GitHub, but intend to do so, and will post an update when it is available. As always I am releasing this code as open source under a GPL License.

Construction time

Building the T-R Time Machine naturally divided into two phases: the easy part and the hard part. The easy part was building the boards containing the Arduino and switching components. The T-R Time Machine consists of several pre-assembled units:

- An Arduino: I used a standard Uno R3 board, but also had implementations running on a Pro Micro clone (the sketch for TRTM is small, and will run on just about any Arduino board)
- An Arduino 5V dual relay board
- Two Keyall HV kits (see http://wb9kzy.com/keyallhv.htm).

Interior view of the T-R Time Machine. The Arduino microcontroller board sits below the Keyall HV board (top left) and the Arduino two-relay module (top right).

In addition, there are two voltage regulators which I built using integrated circuits and Manhattan style assembly. One regulator drops the input voltage to a regulated 9V DC to run the Arduino. The second provides a regulated 5V DC to run the relay board and the Keyall modules. In early prototypes of the T-R Time Machine I ran into difficulties sourcing enough current from the Arduino to run the outboard switching components; this version sidesteps the issue.

The hard part for this project was fitting all the components, and the large number of external connections into an enclosure. I went through three iterations before settling on the version shown here. The project required:

- three antenna jacks,
- four phono jacks,
- external power pole mounting,
- four indicator LEDs,
- a speaker (the speaker is mounted in a hole on the bottom of the enclosure, under the main board and fires down),
- a panel-mounted potentiometer for sidetone volume,
- two switches, one for power and one to select QSK mode are also on the front panel,
- two input jacks for a key. The two jacks are wired in parallel, and provide either ¼" mono or ⅛" stereo plug inputs, since I have keys wired both ways.

Drilling all those holes in the right place proved challenging (you can see the extra holes in the boards, and on the bottom of the enclosure where I had to move things around.)

An additional feature in the latest enclosure is the complete isolation of the switching circuit from the Arduino, to avoid RF feeding back into the computer

and causing issues. I accomplished this by mounting all of the switching connections (the antenna and phono jacks) on a panel made of polycarbonate plastic. This material is inexpensive, and easily machined with ordinary hand tools.

The plastic plate is mounted on the back panel of the aluminum enclosure through oversized holes, so the switched grounds are completely isolated from the enclosure ground. Actual switching isolation is provided by the use of relays, and the Keyall units which are opto-isolated from the control circuits.

Back panel of the T-R Time Machine. Jacks are mounted on a plastic panel behind the aluminum enclosure from LMB Heeger, http://lmbheeger.com/interlockingseries.aspx .

This project was difficult to complete. In addition to all of this drilling and screwing was the difficulty I had getting the LEDs to work. Yes, I was not able to light an LED using an Arduino…

It plagued me for weeks, until I finally sat down and carefully stepped through the code to discover that I had never initialized the digital pins used for the LEDs as output pins in my sketch. Silly code bug, but it really drove me nuts.

T-R Time Machine is pictured with the front-panel LED indicators now operating correctly.

So I finally have a very nice, working, VFO - enabled T-R sequencer ready to go. Unfortunately, I still haven't gotten a VFO to work properly with my Knight T-60, but that will be a story for another day. Until then

"I gotta go back to the future."

– 73 de N2HTT

Gaining gold

If you can, cast your mind back to **summer 1966**. The *Batman* TV series had debuted on U.S. and U.K. television. Steed and Emma were starring in *The Avengers*. The miniskirt was the height of female fashion. The Beatles had released their *Revolver* album on crackly vinyl. And the England soccer team had defeated West Germany in the World Cup Final at London's Wembley Stadium.

Radio room of 50 years ago.

In the December 2015 issue of *PCARA Update*, I described how the Radio Society of Great Britain (RSGB) marked my **50 years** of continuous membership with a mention in their November 2015 issue of *RadCom* and by sending me a 50 year call sign badge (pin).

The previous article '**Going for gold**' explained how I had joined Ainsdale Radio Club in the late summer of 1965. After several months' study I sat the City & Guilds Radio Amateur's Examination in May 1966 at Southport Technical College. With a pass in the "RAE", I made an appointment for the the Post Office Morse Test for Radio Amateurs. On August 3rd I traveled by electric train to the Radio Surveyor's office in the Liver Building, Liverpool to take the test. (See *PCARA Update* March 2007, p. 6 for more about this visit.)

City & Guilds RAE pass slip (top) and Post Office Morse Test certificate below.

Could I send and receive at 12 words per minute? My P.O. Certificate confirmed that I could, so on August 5th I sent off my application for an "Amateur (Sound) Licence A" to Post Office Headquarters in St. Martin's-le-Grand, London. Once my application had been accepted by the GPO, I sent the required £2 fee by mail on August 12.

And that's the point where my previous article left off. I promised to take up the story on the anniversary of my first Amateur Radio License, which was issued shortly after sending off that £2 fee.

Life in 1966

At the start of the New Year I had left Grammar School and began a temporary job at a Southport company that made vitamin supplements for cats and dogs. My days were spent collecting samples from the production building then testing raw materials and finished products in the chemistry lab to make sure they met the necessary standards. There were a few items of electronic equipment in the lab such as a pH meter and colorimeter, but this was several years before electronic calculators became common. Launch of the first IBM Personal Computer was 15 years away – Aug 12, 1981.

For a glistening coat and a cold, wet nose...

I had constructed a tiny portable radio from a Sinclair Radionics "Micro-6" kit. During lunch break, I could listen to the pirate station Radio Caroline, 70 miles away across the Irish Sea. Radio Caroline North was anchored off the Isle of Man in Ramsey Bay and was transmitting with 10 kilowatts AM on "259 metres", 1187 kHz. Its signal came in loud and clear in Southport — and across most of northwest England.

Sinclair Micro-6 AM receiver — from Clive Sinclair who later brought out the Sinclair ZX81/ Timex TS1000 microcomputer.

Waiting on the post

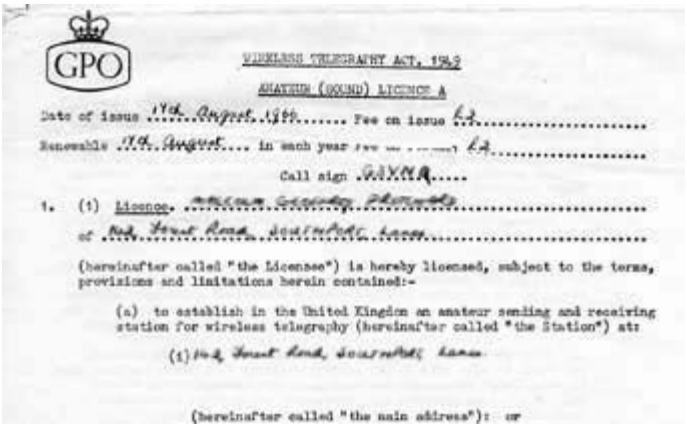
In the United Kingdom, the minimum age to drive a motor vehicle was **17**, and I had had not yet passed the driving test. My main mode of transport at the time was a Raleigh bicycle, which I pedaled 1¼ miles to work each morning.

Raleigh bicycle with saddlebag.

Ever since sending off the £2 license fee on August 12, I had been on tenterhooks. When would my license arrive? What would my UK call sign be? I knew that recent applicants had received calls in the G3V - - sequence, but I wanted to know exactly when my call letters would be arriving and what they would be.

The first mail delivery of the day took place in the early morning, but it usually arrived shortly *after* I had left the house. So, for several days I had a ritual of looking out for the postman (mailman) while I was cycling to work, then asking him if there was any mail for my address. The answer was… no, no, no — but then a few days later a slim envelope arrived and I was overjoyed! A letter was within from the GPO Radio Services Department: "Dear Mr. Pritchard, I have pleasure in sending you the enclosed Amateur (Sound) Licence A. The call sign allocated to your station is **G3VNQ**." And there was my UK License, issued on 17th August 1966, with my name, address and call sign written in. Now I could go on the air!

Welcome letter from the GPO Radio Services Department.



*First page of UK Amateur Licence. (That's Licence with a **'c'**)*

Building time

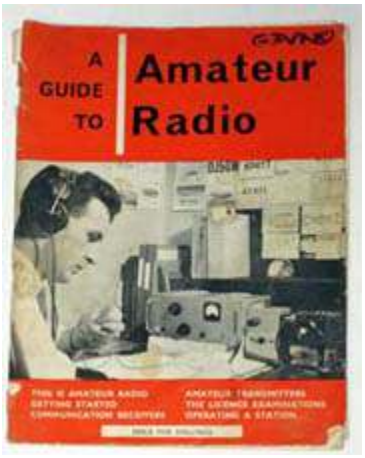
As mentioned in the earlier article, my temporary job had already helped to pay for an HF radio. This was an ex-Royal Air Force **R1155L** communications receiver, as fitted to World War II Lancaster Bombers and other large aircraft. The set covered a frequency range of 200 kHz to 18.5 MHz.

Ex-RAF communications receiver R1155L, used at the opening of station G3VNQ.

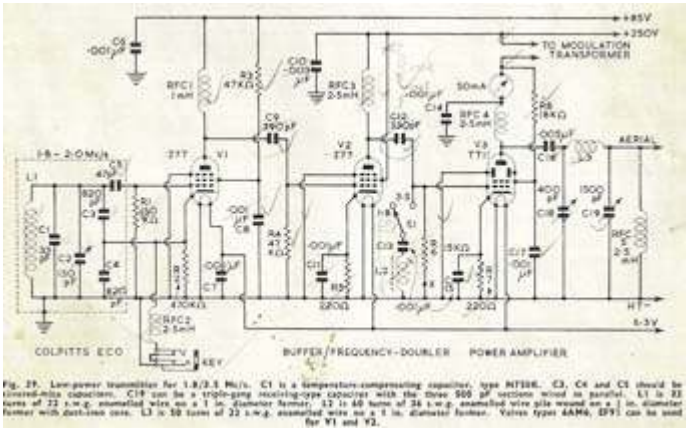
But I still did not have any transmitting equipment. From visits to other club members, I knew it was common practice to purchase a commercial or govern-

ment-surplus communications receiver then match it with a home-built transmitter. Some of those home brew set-ups were quite complex, with rack-mount variable frequency oscillator, power amplifier, modulator and power supply all bolted into a large 19" rack.

Top Band TX



I needed something far less ambitious. In the USA, beginners might start out with a transmitter for the Novice Bands. But in the UK many newcomers would choose an AM/CW transmitter for **160 meters**. I selected a design from the RSGB's *Guide to Amateur Radio*, which also appears in the 1961 *Amateur Radio Handbook*. The transmitter design by G3JKA featured a three-stage VFO–buffer amplifier–power amplifier line-up, with a TT11 tube in the final stage. The TT11 was an octal-based beam tetrode with anode (plate) connection brought out to the top cap. It was just right for the 10 watt maximum power input allowed on 160 meters by the UK amateur license.

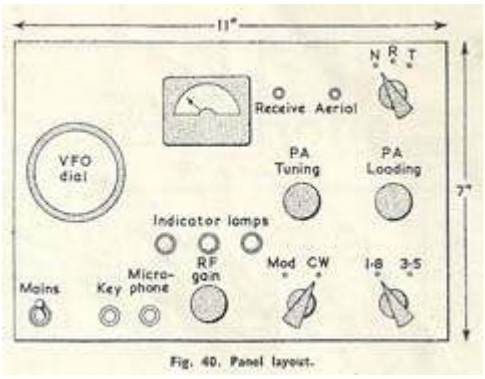


Schematic of transmitter section for "Low power transmitter for 1.8/3.5 Mc/s" from RSGB's "A Guide to Amateur Radio". The pencil checkmarks and annotations were mine.

The transmitter design included a high-level AM modulator using a nine-pin 12AX7 preamp and seven-pin N78 pentode for audio output. The high tension power supply featured an octal-based 5V4 rectifier along with an 85A2 neon regulator to feed the VFO.

There was also a suggested layout for the 11" × 7" chassis which incorporated mains transformer, smoothing choke and modulation transformer.

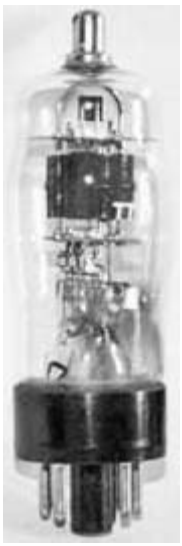
I had some previous experience with building tube equipment and knew that creating all those different sized holes in an aluminum chassis with limited tools was a 'mug's game' — it would involve much drilling, filing and sometimes bandaging of scraped fingers. I sought advice from club members and found that neat holes could be cut in no time if you had the right set of **chassis punches** — or if you knew somebody who did. Visits to club members involved a bicycle ride, with the metal chassis carried in my saddle bag. The same transport method was used for multiple visits to Southport's surplus electronics emporium, D.M. Rogers in Nelson Street, where I purchased many of the component parts.



Front panel layout for the low power 160 meter transmitter.

Problems, problems

After much advice, chassis bashing and soldering, I was ready to test my brand new transmitter. I had a dummy load consisting of two 12V lamp bulbs ready to absorb the RF power output. I warmed up the heaters, calibrated the VFO against my 100 kHz crystal standard then switched from receive to transmit.



TT11 tube as used in power amplifier (PA).

Oh no — there was a problem. As soon as the high tension (B+ supply) was applied, there was far too much plate current — as indicated by the PA meter — for the TT11 output tube. With a 250 volt HT (B+) supply, I was supposed to restrict current to 40 mA for the maximum allowed input of 10 watts. The measured current was far beyond that, with a danger of damaging the TT11 PA tube. My first log entry, dated August 24, 1966, includes the remark "TVI test – satisfactory but poor tuning up."

I sought advice wherever I could, but it proved difficult to diagnose over the phone. In desperation I took my problem over to **Fred, G3OEI** who lived just outside Southport in nearby Scarisbrick. Fred noted that there was insufficient drive to the grid of the power amplifier. With no negative bias applied to the grid, there would be excessive PA current. Fred also advised that keying of the VFO was inadvisable because of chirp and lack of drive with the key up. He recommended keying the cathode of the PA instead. (Does this remind you of another article in *this* newsletter, courtesy of N2HTT?)

On the air!

With the drive problem solved, I now had RF output and could connect an antenna to the transmitter. My antenna for 160 meters consisted of 120 feet of wire draped around the back yard with an adjustable inductor in series to achieve resonance.

Early wire antennas were strung between the chimney and support poles in the back yard. Note the wires and feeders passing through the open shack window, far left.

My second log entry is dated August 28, 1966, with the comment "TVI test satisfactory, good tuning." This was followed by my very first contact, which was with Morse Code tutor **Harold G3LWQ**, using AM phone followed by CW on 160 meters. I worked a couple more stations that Sunday evening; the following day was **Bank Holiday Monday**, so I could be on the air from early morning to late evening.

I made sixteen new contacts that day, mostly in the local area but also extending out across the Irish Sea to the North Wales coast resorts and northward along the Fylde coast to Lytham and Blackpool. One memorable contact was with **Chris, G3VBL**, located near Preston and due to return to University in a month's time — the same place I was headed for.


AMATEUR RADIO STATION LOG.

Page one of the G3VNQ station log book shows nineteen 160 meter contacts during the period August 28-31, 1966.

Ordnance Survey quarter inch map of North Wales and Lancashire, showing locations mentioned in the article.

Fun, Fun, Fun!

With college approaching, it was time for a vacation. I left my gap-year temporary job and spent several weeks on the air. My logbook shows nine pages of contacts during this period. I was getting a good feel for propagation on 160 meters, with its abrupt change from daylight to night-time conditions. I was also learning who was active. The weekday occupants of 160 meters were an odd mix of people — students like myself, plus retirees and mobile operators driving to and from work. 160 meter mobile operation was popular in the 1960s, with ground-wave coverage up to 30 miles over open country.

One reason that U.K. amateurs were only allowed 10 watts input on 1.8 – 2.0 MHz was because the band was shared with the Maritime Mobile Service. Southport was 15 miles north of the Port of Liverpool, where ships were constantly arriving and departing. Traffic for vessels crossing the Irish Sea was handled by **Anglesey Radio, GLV**. One of Anglesey's transmit channels was on 1925 kHz — so this was one spot to avoid.

Post Office Radio Station 'Anglesey Radio' was in an excellent location overlooking the Irish Sea, near Amlwch on the island of Anglesey.

There was another service sharing 160 meters and that was the Decca Hi-Fix beacon. Hi-Fix was a high-accuracy hyperbolic navigation system for positioning vessels to within a few feet, decades before GPS came along. One of the

slave stations for Liverpool Bay was located at nearby Formby Point. I still remember the beacon's di – dah – dah – dah signals on 1900 kHz.

While operating on 160 meters, I had a few reports of poor modulation — this was caused by simultaneous AM and FM in my homebrew transmitter. I had not taken sufficient care with shielding of the VFO stage and modulated RF from the power amplifier was feeding-back into the oscillator, where it "pulled" the frequency back and forth with the modulation. Later, I was advised that running the VFO and PA on the *same* frequency was a poor design choice and it would have been better to build the VFO for **half** the output frequency (0.9 – 1.0 MHz), followed by a doubler stage ahead of the PA.

I might have had some early struggles with constructing my first transmitter, but it was a great learning experience — and I discovered that radio amateurs are a friendly bunch, always ready to help a beginner with advice and practical assistance.

Necessities

One of the points emphasized in my welcome letter from GPO Radio Services was the following license requirement: "...equipment for frequency measurement shall be provided capable of verifying that the sending apparatus comprised in the station is operating with emissions within the authorized frequency bands." In those days of free-running oscillators, the bare minimum of test equipment was an absorption wavemeter and a quartz crystal calibrator.

I purchased an Eagle Products RF-40 "RF Field Indicator" to serve as my absorption wavemeter. This unit covered a range of 1 – 250 MHz in five bands and was one of the first items "Made in Japan" incorporated into my station. (In the mid-1960s, the best quality radio equipment generally came from the **USA**, rather than Far East.)

Eagle RF-40 RF Field Indicator dates from 1966.

The crystal calibrator was a different matter. In order to mark the band edges, I needed an oscillator producing harmonics of **1 Mc/s** and **100 kc/s** (as we called the frequency units in those pre-Hertz days). In contrast with my traditional vacuum tube transmitter, I constructed an **all-transistor** calibrator, using a surplus 100/1000 kHz combined crystal. The 1 MHz oscillator had a trimmer capacitor across the crystal, for zero-beating with UK standard frequency station **MSF**. In a similar fashion to WWV, the MSF transmitters at Rugby radiated accurate signals on exactly 2.5, 5.0 and 10.0 MHz.

I added a 10 kHz multivibrator to the calibrator to act as an interpolation oscillator, but it did not work very well. Construction of the calibrator was on a phenolic tag strip, housed in a clear plastic storage box. It wasn't pretty, but it did work.

Crystal calibrator was not pretty but it did produce harmonics of 1 MHz and 100 kHz. Note 'kc/s' on the embossed Dymo labels.

The GPO was not joking when it insisted on adequate frequency measuring equipment. To make sure that newly-licensed radio amateurs were sticking to the rules, there was the dreaded visit from the Post Office Inspector. Fortunately, our local Inspector for southwest Lancashire was a radio amateur himself, who operated 160 meter mobile from his Post Office Van. I first worked **John, G3DBY/M** on September 12 1966 then had my station inspected — and the log signed by John — in January 1967.

Another item of equipment that I built myself was an SWR bridge. I used a steel-cased water conductivity meter that was being thrown out from work.

Pse QSL

One more necessity for a new radio amateur was the sending and receiving of QSL cards. Having cards professionally designed and printed was a burden for a student budget. Fortunately Southport County Borough Council provided **free** cards for town residents, with a blank space for the call sign. These cards included a photo of the 'seafront' promenade on the front side and publicity material about the town on the reverse side...

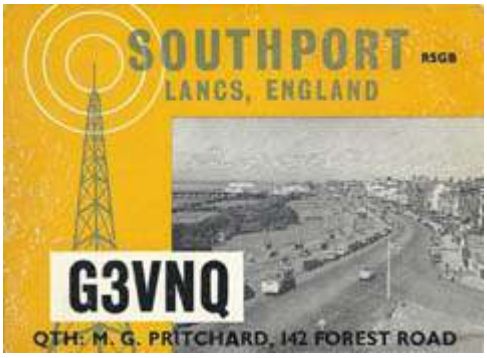
"Southport, a popular resort on the N.W. coast of England, caters for many thousands of visitors from all over the world every year. The Town provides these visitors with many varied attractions, ranging from the long stretches of golden sands on the foreshore, to the delightful lawns and gardens that make Lord Street one of the finest shopping centres in Britain."

Reverse side of a Southport QSL card.

The theory was that when these cards were sent out to other amateurs across the country and around

the world, they would attract additional visitors to the town. This was good for business and for the municipal coffers.

I took a batch of blank cards to a local printer who was familiar with the requirements and had the design overprinted with my own address and call sign. Ainsdale Radio Club secretary **Norman, G2CUZ** subsequently acquired a small printing press that could also apply the RSGB diamond logo.



Overprinted Southport QSL card.

Opening the gate

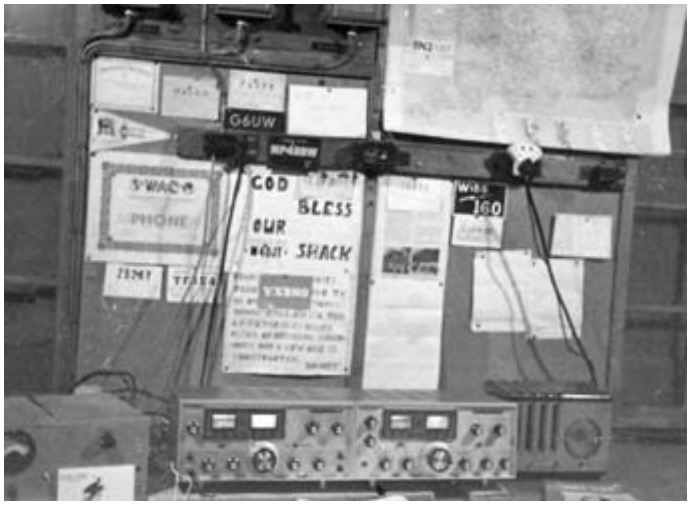
Amateur Radio had opened one door for me into the fascinating world of radio technology and its friendly enthusiasts. But it was time for a much wider door to open as **Michaelmas Term** was about to begin at my new University. I made my last contact of summer from the home station then set off across country by rail. The route took me *via* Wigan, southward past the tall towers of Rugby Radio Station to **Bletchley** — a rail junction far less famous than it is today. Leaving the main line at Bletchley, the journey continued eastward *via* Bedford, past the Sandy transmitter of the Independent Television Authority, then on to Cambridge. Parts of that line were **single track**, and the section beyond Bedford doesn't even exist today.

Undergraduates were not allowed to have motor vehicles at University, so my Raleigh bicycle followed by rail freight. As people returned from vacation, the streets became full of students flying around town on bicycles, especially during the periods between lectures.

CUWS' QSL card featured a flying student cyclist, complete with cap and gown.

At the beginning of term, I went along to the **Societies' Fair** in the Corn Exchange, where the University Wireless Society had a booth, showing off an SSB transceiver with its antenna strung from the rafters. I joined up without hesitation.

The University Wireless Society held the vintage call **G6UW,** with club station located in a wooden hut named 'Woop-Woop', out by the Rugby Ground. This building had been used by the Cavendish Laboratory for work on whistlers — swooping VLF signals generated by lightning strikes on the far side of the world.

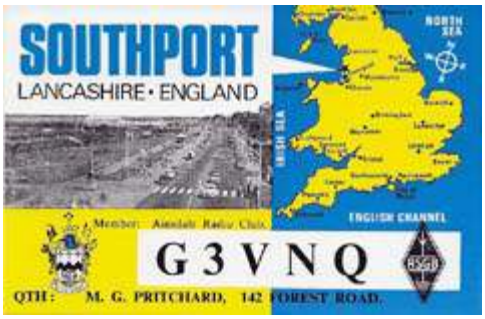


Inside 'Woop-Woop' the G6UW shack off Grange Road, Cambridge. [Pic - CUWS Newsletter]

I had arranged a weekly schedule on 80 meters to keep in touch with home. Operating from 'Woop-Woop' I was able to complete the 'sked' with **Harold, G3LWK**, located in Banks, near Southport. It was Harold who had originally introduced me to Ainsdale Radio Club

In the Wireless Society, I found another group of enthusiastic radio amateurs. Some were relative newcomers to the hobby like myself, while others had been licensed for several years and were well versed in HF DX, CW, VHF and UHF techniques. Members were about my age and from a variety of backgrounds across the UK. I had my eyes opened to all sorts of possibilities on the amateur bands. And in between all this radio activity, there was plenty of course work in the lecture rooms, science laboratories and tutorial groups to fit in. This would keep me busy until the end of term in December, when it was time to return to family, friends and radios at Southport for the Christmas break.

I resumed activity on "Top Band", enjoying myself immensely. There would be plenty of developments to come in the New Year, including a DXpedition to the Isle of Man, moving up from 160 meters to HF-SSB and construction of my first VHF transmitter. In those days, building equipment for yourself was fun, educational and a necessity — especially while commercial gear was still too expensive for an impecunious student.



Newer-style Southport QSL card.

-Malcolm, G3VNQ, NM9J.

Peekskill / Cortlandt Amateur Radio Association

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Web site: http://www.pcara.org
***PCARA Update* Editor:** Malcolm Pritchard, NM9J
E-mail: NM9J 'at' arrl.net
Newsletter contributions are always very welcome!
Archive: http://home.lanline.com/~pcara/newslett.htm

PCARA Information

PCARA is a **Non-Profit Community Service Organization**. PCARA meetings take place the first Sunday of each month* at 3:00 p.m. in Dining Room B of NewYork-Presbyterian/Hudson Valley Hospital, Rt. 202, Cortlandt Manor, NY 10567. Drive round behind the main hospital building and enter from the rear (look for the oxygen tanks). Talk-in is available on the 146.67 repeater. *Apart from holidays and July/August break.

PCARA Repeaters

W2NYW: 146.67 MHz -0.6, PL 156.7Hz
KB2CQE: 449.925MHz -5.0, PL 179.9Hz
N2CBH: 448.725MHz -5.0, PL 107.2Hz

PCARA Calendar

Sun Sept 11: PCARA Meeting, Hudson Valley Hospital, 3:00 p.m.
Sun Oct 16: 36th Annual Harry Chapin Run Against Hunger, Croton-on-Hudson, NY.

Hamfests

Sun Aug 28: Candlewood ARA Western CT Hamfest, Edmond Town Hall, 45 Main St., Newtown CT. 8:00 a.m.
Sun Sept 18: Garden State ARA Fall Hamfest, MOESC Building, 100 Tornillo Way, Tinton Falls, NJ. 8:00 a.m.
Sun Sept 25: Ocean Monmouth ARC Tailgate Hamfest, Infoage Learning Cntr, 2300 Marconi Rd, Wall Twnshp, NJ.
Sat Oct 1: Mt. Beacon ARC Fall Hamfest, Employee Recreation Center, 83 Red Schoolhouse Rd., Fishkill, NY 8:00 a.m.
Sat Oct 8: Bergen ARA Fall Hamfest, Westwood Regional HS, 701 Ridgewood Rd,, Twnship of Washington, NJ. 8:00 a.m.
Sun Oct 9: Hall of Science ARC Hamfest, NY Hall of Science, 47-01 111th St., Flushing Meadows, Queens NY. 9:00 a.m.

VE Test Sessions

Sept 3, 10, 17, 24: Westchester ARC Radio Barn, 4 Ledgewood Pl, Armonk, NY. 12:00. Pre-reg M. Rapp, (914) 907-6482.
Sept 8: WECA, Westchester Co Fire Trg Cen, 4 Dana Rd., Valhalla, NY. 7:00 p.m. S. Rothman, (914) 949-1463.
Sept 11: Yonkers ARC, Will Library, 1500 Central Ave, Yonkers, NY. 1:00 p.m. Pre-reg John, WB2AUL, 914-969-6548.
Sept 16: Orange County ARC, Munger Cottage, 183 Main Street, Cornwall NY. 6:00 p.m. Joseph DeLorenzo (845) 534-3146.
Sept 19: Columbia Univ ARC, 531 Studebaker Bldg, 622 W 132nd St, New York. 6:30 pm, Alan Crosswell (212) 854-3754.

Peekskill / Cortlandt Amateur Radio Association Inc.
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