

# Ross Hull & the Selden Hill Gang

Charles Dubé, W1LCD



In 1930s rural Connecticut, driven by the spirit of art deco, this indomitable Australian led a technology incubator that spawned seminal principles in VHF circuitry and propagation



**T**HE HOUSE still stands, though I'll wager few of its neighbours have any more than a dim awareness of the commotion that was once contained within its old walls. Some may recall that a group of 'hams' once occupied the place, overrun it – if you believe the accounts. For in the mid-1930s, a small team of experimenters traded their work and leisure hours to explore the nature of newly available radio frequencies.

They did some spectacular work for the day. Radio in this period was still an experimenter's sandbox; experimenters were striving for higher and higher frequencies that would one day be used in broadcast radio and television, commercial, military and municipal radio systems.

## The new frontier

In the early decades of the 20th century during the upsurge of the radio industry, an understanding of the effects of the atmosphere on radio signals was in its infancy. The convention was that signals on frequencies now considered shortwave – wavelengths shorter than 200 metres (or about 1500 kHz on up on your AM dial) – were useless for most purposes. The lower the frequency (longer wavelengths), the more valuable it was to commercial and naval interests.

The Radio Act of 1912 (USA)



*Ross Hull was a VHF frontiersman, exploring the technologies and techniques necessary to exploit the new frequency bands allocated to amateurs.*

forbade any private stations from operating on wavelengths longer than 200 metres and prior to 1923, amateur radio operators could only get a license for 200 metres, with a few obtaining a second license for 175 metres [1]. It was a recipe for an enormous amount of interference, with signals clustered on the same slice of turf.

Transmitters were primitive and unruly, lacking stability and economy of bandwidth. Long distance communication on 'shortwaves' was thought impossible because of

the presumed inefficiency of the components and antennas at those frequencies. Engineers calculated that an exorbitant amount of energy had to be generated for any real communication to occur. So, these frequencies were disregarded by industry and the military as useless.

The challenge was to design and build transmitters and receivers capable not only of operating in the new territory, but also ones that would possess real stability. Engineers and hobbyists alike battled to push the state of the art, operating on higher frequencies, over time innovating circuit designs and making contacts at greater geographical distances.

The 1920s saw a flurry of activity with communication between points around the country becoming common. By 1923, a new band was created for amateur radio operation between 150 and 220 metres (roughly 1400 kHz up to about 2 MHz on your AM dial). The Atlantic Ocean, already conquered at the longer wavelengths, was the next great hurdle.

In November of 1923, this barrier was breached, and astonishingly, at the 'useless' wavelength of 100 metres, with contact between stations in West Hartford, CT (USA) and London, England. Over time, as the number of international contacts grew, engineers and the regulators

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began to recognize that these shorter wavelengths had merit and new bands were opened up for amateur radio experimenters to come up with circuits that could use them.

The value of 'amateur' technical development didn't exactly go unnoticed, however; the military, along with commercial interests, sought out skilled operators and designers for their own purposes. This created something of a symbiotic and competitive relationship between interest groups.

During the First World War, many radio operators came from the pool of radio amateurs. Later, some of the first AM broadcast stations started out as experimental amateur radio stations [2]. The now 100-year old WWJ in Detroit started out as amateur radio station, 8MK.

By the end of the decade, investigation into wavelengths as low as 10 metres, unthinkable just a few short years before, created new excitement in the amateur

radio community. Using new crystal oscillators and other precision components allowed for smaller and smaller wavelengths by the early 1930s.

While the technology race was happening in the US, it was also happening elsewhere in the world, from Europe to the distant beaches of New Zealand and Australia. It was in Australia that a young architecture student by the name of Ross A. Hull set aside his studies to pursue a passion for wireless. Hull, already an Honorary Secretary to the Wireless Institute of Australia, was the first of his fellow citizens to hear the distant rhythms of American signals, amongst others.

In 1925, a chance meeting with an American, American Radio Relay League (message) Traffic Manager Fred Schnell – credited as being the American half of the first transcontinental amateur radio contact – convinced Hull that a trip to the United States was in order [3]. In 1926, Hull booked his passage

for America, soon finding himself at the doorsteps of the American Radio Relay League (ARRL,) the predominant American amateur radio organization. In a fortunate turn of events, they had a position open.

## The Gang and the bootlegger down on the farm

Located in a bucolic setting in West Hartford called Buena Vista, with an at-one-time panoramic view of Hartford, sits Selden Hill. Here rests a mid-19th century farmhouse on property settled by the original Selden family in 1785. By the 1920s, the house was occupied by Mr Henry Selden, his wife Sarah, and their seven children. Together, they operated the dairy farm and a mill constructed by Henry, complete with horse-drawn lathe, repair and blacksmith shop.

The property seemed to be the ideal environment for the tinkerer



Photo 1: Selden Hill House (from QST, August 1944).



and the entrepreneur. In addition to the farm, around the turn of the century, Henry and his sister-in-law owned the Selden Ice Cream Parlor at the intersection of LaSalle Road and Farmington Avenue in West Hartford Center. It was a short-lived venture.

Years later, in 1931, the American Radio Relay League would build its new headquarters just down the road at 38 LaSalle Road, long after the parlor shut its doors. Henry had long since focused his efforts on the farm and his family [4].

Ross Hull decided to extend his stay in Connecticut honing his technical skills, and eventually took the helm of the ARRL's newly formed Technical Development Program. With his team, the Program improved on circuit design and construction practices, and improved stability, and came up with new ideas for frequency measurement, antennas, monitoring devices, and other advancements of the radio art.

During this time, Hull is credited with rewriting the League's 1928 ARRL Handbook, the authoritative reference book for radio construction, theory and operation. Hull remained in the United States for almost three years, departing after the conclusion of the Technical Development Program in 1929 (and perhaps because of an expiring work visa). He returned home to become the technical editor of Australia's *Wireless Weekly* [5].

Connecticut's allure eventually proved insatiable and in about 18 months, Ross Hull was once again headed back to the United States aboard the *MS Ward* in August of 1930, to accept the position of Associate Editor at *QST* magazine – the ARRL's monthly publication.

In the early months of 1931, the League established its new headquarters in West Hartford and several of its staff members went looking for adequate boarding nearby, preferably somewhere with a height advantage, trees and yard space for the construction of antennas.

While exploring the town, Hull, VK3JU and *QST* managing editor Clark Rodimon, W1SZ spotted a 'Rooms For Tourists' sign at the foot of the hill. The two wasted little time in convincing the matron of the house that tourists would no longer be necessary as they could happily fill the vacancy for a good duration.

Rodimon, or 'Roddy' as he was called, thought the site preferable because of his interest in contesting, where operators compete to accumulate the most contacts in specific categories [6]. Hull found the farmhouse's high location favourable for UHF. The frequencies then used are today referred to as VHF; and even shorter wavelengths took the label of UHF in later years as technology progressed.

By July, Hull published his first article detailing his accomplishments

in UHF receiver evolution, in *QST*. Rodimon soon left the bachelor life at Selden Hill, leaving to marry. The results of his work along with that of Hull's and the others boarded there, established something of a reputation in the amateur radio community regarding Selden Hill, and the occupants became known as "The Selden Hill Gang".

In 1932, regular testing of UHF receivers, transmitters, and antennas was in full swing. A parade of amateur radio operators rotated through Selden Hill and within a few years, the site hit its stride with Hull's ground-breaking UHF contact between West Hartford and Boston on the 56 MHz (or 5 metre) band (note the ever-shrinking wavelengths).

During a visit to Provincetown, Hull and company examined New



*Photo 2: Hull's 56 MHz directional antenna of wire and wood was used in his seminal work on demonstrating tropospheric refraction propagation.*

England Telephone's radio link across Cape Cod Bay to Brant Rock, which inspired The Gang's construction of sophisticated antennas with gain. Hull's version allowed for an effective but not consistent 100-mile signal path to Boston. The Boston stations at first refused to believe that Hull was in Connecticut, exclaiming how they were going to 'unmask that bootlegger' [7].

Months later, Hull recreated that accomplishment on the higher frequency of 112 MHz using his newly-designed receiver and directional antenna; what Henry's daughter, Rilla Selden called the "big contraption" [8]. The revolutionary beam antenna design was shared in the October 1934 issue of QST, encouraging others to jump into the game.

At the Selden home, another radio enthusiast would soon join The Gang. In 1935, Byron 'By' Goodman, W1JPE, left San Francisco and a gig at the radio manufacturer Remler to venture east to become the assistant secretary to ARRL Secretary, Kenneth B. Warner. In California, Goodman was an early explorer of 29 MHz (now part of the 10 metre band), later furthering single-sideband technology that would eventually become a key method of analogue communications in amateur, military, marine, and other high frequency (shortwave) applications [9].

## Wave bending and sky riding

The pace established in the early days of UHF exploration continued at Selden Hill throughout the mid-1930s. After his historic connection with Boston, Hull oversaw a round-the-clock cycle of operators to continue making contacts using a 200 W oscillator on the 5 metre band and charted the results.

The data culled from these experiments was compared with weather data, temperature, barometric pressure and lunar cycles



*Photo 3: One of the "contraptions", a beam antenna used by the Selden Hill Gang.*

in order to answer the question of why successful contacts on these frequencies were highly inconsistent. The idea that radio waves are 'bent' under particular atmospheric conditions, that they become trapped and 'ducted' long distances between cold and warm air masses, came from these efforts [10].

An important project was performed in conjunction with Harvard's Blue Hills Observatory using a signal strength recorder of Hull's own design that employed ingenious and complex photographic techniques to record received signals from Boston on a regular schedule [11]. Some contemporary newspaper accounts indicate that experiments in predicting severe weather might have been part of this experiment.

Being something of a Renaissance Man, Hull took pleasure in entertaining the residents of Selden Hill with his talents at the piano, quiet moments painting and

sketching (the August 1944 issue of QST features his linoleum block cut of the Selden Hill House), astronomy, photography, literature, and experimenting with another passion – model aircraft, for which he had developed quite another formidable reputation. In the summer and fall (autumn) of 1937, for example, he made over 100 experimental flights [12].

Hull's model aircraft experiments led to his developments, along with fellow amateur Roland B. Bourne, W1ANA, in radio-controlled 'sailplanes' – the precursor to what we now know as drones [8]. In the age preceding transistors and integrated circuits, it was no easy feat to construct a successful flying device carrying a payload of tubes and the batteries to power them.

The steep slope of Selden Hill allowed for many weeks of joyful experimenting. QST and radio controlled modeler magazines of the time, both in the US and Australia,





Photo 4: "That day was counted that did not see a new antenna raised", said Cyrus Read in his book, *The Legend of Selden Hill* [6].

featured articles on these designs and tales of successful flights. In 1938, Bourne's and Hull's radio-controlled model aircraft, called *The Skyrider 1*, flew at the National Soaring Contest at Elmira, NY. The presentation contained a number of features, including reversible DC motors and the piping of the pilot's (Bourne's) chatter into the public address system [13]. All of this was done in addition to Hull's regular work at the League as QST Associate Editor, which began to include work in early television circuits.

Technology continued to move at a rapid pace and the buzz around television was in the air. RCA engineers, along with NBC, had established an experimental television station, W2XBS, at the Empire State Building in New York City (NYC), some 100 miles-plus distant from the rolling hills of the Hartford suburbs.

Hull, who eventually built his own amateur television transmitter at the ARRL laboratory to explore its potential for amateur use, was at first put off by what he saw as false promises from the industry. However, by 1937 his interest in television was stirred and he set out to construct a superior receiver using RCA's new cathode ray tube. He surprised RCA engineers with his claims of receiving W2XBS's transmissions from NYC, proving once again that UHF signals could indeed reach in excess of a presumed 50 mile limit.

### Echoes of a conspicuous era

After almost a full decade of innovations and development in the radio arts, in June of 1938, Ross Hull finally left Selden Hill to the others, the vacuum soon filled by those keen on the advantages of the property for contesting, research into single-

sideband transmission, and other technical advances.

Selden Hill remained a home to hams for a while longer – unofficially the ARRL's 'annex' laboratory. Hull moved to take up residence in the quiet suburbs of Vernon, CT where he continued his experiments in television that were to envelop the last six months of his life.

September 13, 1938 proved to be the most fateful of days. After hosting a small dinner party, Hull offered his guests a demonstration of his television receiver; the NBC experimental transmissions were about to begin. Dismissing himself from the table, he slipped off to his garage laboratory to prepare his equipment.

Placing a set of headphones on to listen for the audio component of the signal from NYC, he reached under the bench to plug in the power supply. With the supply now energized he pulled his hand back from under the bench, but in doing so came into contact with a 6000 V lead of the supply's transformer. The headphones completed the circuit to ground and Hull was instantly electrocuted.

One of the dinner guests was a doctor and he made an immediate attempt to resuscitate Hull. Soon, medical assistance arrived at the residence to administer adrenaline, but all efforts failed [14]. Hull was just 36 years old. A few feet away, in scattered papers on his workbench, was an unfinished article he was working on for QST. The topic – the dangers of working around high voltages.

Through the end of the 1930s up to the war years, work continued at Selden Hill by others from the ARRL Headquarters staff. Experiments were done for articles to be published in QST. And for many years, visitors came from around the world to experience the lab along with the Selden Hill hospitality.

Although I have driven by the neighbourhood scores of times in my travels throughout West Hartford, it

wasn't until recently that I reflected upon the historicity of this once quiet haven for tourists. I cannot help but wonder if any reminders still exist: an insulator fastened to a corner of the house, a nail stuck in one of the trees that once helped to cast signals hundreds of miles, perhaps initials carved into a door frame.

It's intriguing to learn that a place that seems so modestly 'New England' was the site of such bustle in a different era. In preparing this little narrative, it was a pleasure to become acquainted with a man who packed so much life and legacy into his few but kinetic years as the sage of the Selden Hill Gang, along with the others who, in their unique ways, contributed to make radio what it is today.

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