When I Think Back...

by Neville Williams

Ross Hull (1902-1938): 'Mainspring' of a revolution in amateur radio

Described in *QST* magazine in 1938 as 'the most brilliant and ingenious and indefatigable amateur we have ever known', Australian technical writer and editor Ross Hull was more at home in the USA than in his own country. Tragically, his career was cut short when he ignored the 'safety first' warning that he had personally penned for fellow amateurs around the world.

When I first joined the staff of *Radio & Hobbies* (now *Electronics Australia*) in December 1941, I was reminded by the then advertising manager P.A.Morse that I was occupying the chair that, some years previously, had belonged to a remarkable young technical journalist, the late Ross Hull.

The strange thing was that, apart from 'Pop' Morse and Editor John Moyle, who by then had joined the RAAF, very few of those by then still involved in the magazine seemed to know much at all about Ross Hull, the man. They had heard about him, but that's about as far as it went; there was no personal file in the office, not even a picture.

I was puzzled but, in the wartime conditions, the efforts of available staff had to be directed towards coping with the present, rather than delving back into the past.

Now, 50-odd years later, I've been able to piece together the story of an undoubtedly outstanding architect, musician, artist, photographer, writer, amateur astronomer and radio amateur, who opted out of the Australian radio scene but who still contributed to it from half-way around the world.

Ross Hull was born in Melbourne in 1902 and, had he followed the course mapped out for him, would have become an architect – full stop! But, like quite a few others in that era, he was well and truly bitten by the wireless bug. By 1922, at age 20, he had become an active amateur and a member of the select group which, before the commencement of official broadcasting, provided speech and music signals for a growing number of equally enthusiastic listeners.

1923 – a busy year

August 1922 had seen the launch of *Wireless Weekly*, which later gave birth to *Radio & Hobbies* (1939) and ultimately to *Electronics Australia* (1965). A second and rival magazine *Australasian Wireless Review* appeared in January 1923 and, ironically, it was from its pages that I have been able to document some of the early activities of Ross Hull.

A picture of Ross Hull taken in 1929, when he returned to Australia to work on Wireless Weekly. (Courtesy ARRL)

The Feb.'23 issue of the *Review* carried details of Trans-Pacific tests, open to amateurs and experimenters Australia-wide. To be held in May, the purpose of the tests was hopefully to receive and identify as many signals as possible from American amateur stations across 8000 miles (12,800km) of ocean. This was at 200 metres (1500kHz) and using a maximum transmitter power of 1kW.

In Dec.'21, when similar Trans-Atlantic tests appeared to have failed, a listener in Scotland had intercepted and identified similar signals from amateurs on the American east coast. The question now was whether American amateurs centred at Long Beach on the American west coast could bridge the gap to Australia.

The challenge must really have gripped the 21-year old Ross Hull because, two months later, the April issue of the same journal contained a brief description and a picture of a protoype 'breadboard' receiver that Melbourne amateurs R.A.Hull and G.Hiam had designed and produced especially for the tests.

After trying out the Armstrong super-regenerative and superheterodyne circuits, said the article, the authors had settled for a 6-valve line-up of tuned

Introducing a new column

This article launches a new regular column by our former Editor-in-Chief, Neville Williams. In the column he'll be dealing with personalities, situations, trends and developments in the history of electronics – often drawing on his extensive personal experience, although ideas and material from readers will be welcome.

radio frequency stages, followed by a detector and two audio stages. This was at a time when most listeners were using a simple regenerative detector, and when they were being implored not to use their receivers during the tests for fear that radiation from oscillating detectors would block out the weak incoming signals.

Speech, music, records

But that was not all. In the same issue, an editorial representative tells of a recent visit to Melbourne, during which he had learned of a group of amateurs who were arranging a nightly schedule of voice transmissions, plus live and recorded music on 440 metres (680kHz) – in the present AM broadcast band.

Active in the group, and responsible for a demonstration broadcast concert was Ross Hull, 3JU, who provided piano solos and accompaniment for a violinist friend, O.H.Narkoi.

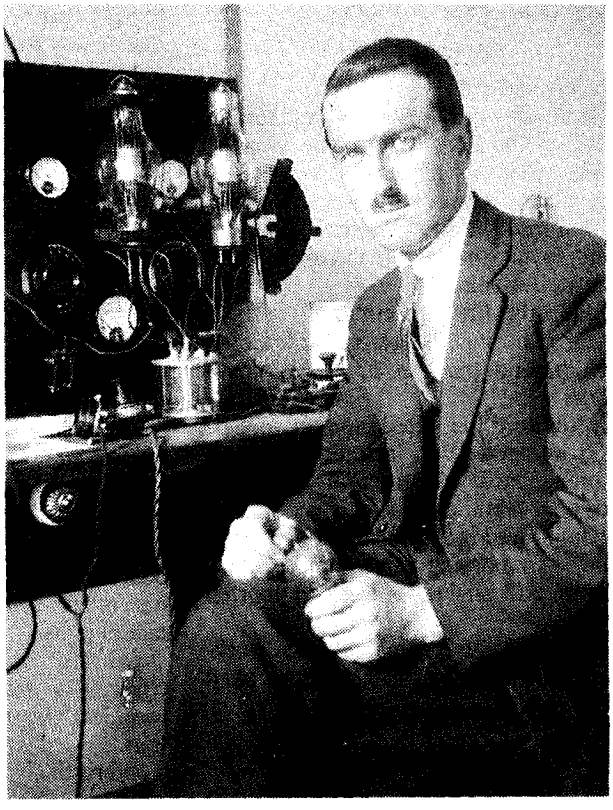
The public broadcasts were suspended for the duration of the Trans-Pacific tests, which proved to be both successful and rewarding, as reported in the July and August issues of the *Review*.

Ross Hull was credited with having verified the first of many trans-Pacific contacts, but a follow-up note in the September issue states that a belated confirmation, received through the post from an American amateur, had indicated that the distinction really belonged to Charles Maclurcan (2CM) of Strathfield, Sydney NSW.

That aside, Max Howden, Ross Hull and C.Hiam were considered to be the most successful participants. The November issue of the *Review* indicated that, on one occasion, Ross managed to log 26 American amateurs within the space of one hour.

Another separate news item noted that his station 3JU was the source of a most enjoyable 2-1/2 hour concert provided by the Beaver Club of Essendon. This was some 3 months before 3AR, Melbourne's first broadcast station, opened in January 1924.

One month later, he was reported to have been involved in a series of low-power night-time transmissions from Charles Maclurcan in Sydney, to his own station at St Kilda, Melbourne. Supervised by an independent engineer, the input power to the final stage of 2CM's transmitter was reduced in steps from 7.8W to 0.078W, with all transmissions being copied, on the first (and best) night. A busy man, indeed!



Ross Hull pictured in his amateur radio 'shack' in Melbourne, about 1924. He was then honorary Federal Secretary of the WIA and had the callsign 3JU. (Courtesy ARRL)

From WIA to ARRL

About this time, Nov/Dec '23, public broadcasting stations began to appear on air, leaving amateur stations to concentrate on the techniques and technology of two-way communication, both local and overseas.

Active at first in the Victorian Division of the WIA (Wireless Institute of Australia), Ross Hull later became Honorary Federal Secretary of the organisation and, in that position, developed a mounting interest in amateur activities worldwide.

It was in that frame of mind that he met up with the ARRL (American Radio Relay League) Traffic Manager, Fred Schnell, during the visit to Sydney, in 1925, of the American Battle fleet. At the time, the US Navy had been seeking to evaluate short-wave technology for future communication purposes and, by arrangement, the League's Traffic Manager was in complete control of experimental high-frequency equipment on board the USS Seattle.

There and then, Ross Hull made up his mind that he had to visit the USA and view for himself the American radio scene, particularly in relation to amateur radio and its emerging public service activities. So it was that, in the following year, 1926, he knocked on the door of the ARRL headquarters at West Hartford, Connecticut.

As it happened, the organisation had been looking for someone to fill a junior position in the editorial department handling technical information. Ross Hull sought and was given the position which seemed, at the time, to offer an admirable vantage point from which to view the American scene.

Such were his skills that he was soon re-classified as an assistant editor, and then as Associate Technical Editor of QST magazine. Amongst other tasks, he is credited with having virtually rewritten the fourth edition of the ARRL Handbook, published in Dec.'28.

Earlier in that same year, the ARRL Board of Directors had authorised a virtual 'crash' program to devise technology and equipment that amateurs would need to move to the higher frequencies nominated by the Washington Convention. Ross Hull was appointed as director of the new team.

In that position, he quickly set in motion and, to a large degree, personally 'engineered' a virtual revolution in amateur band technology. Ten years later, in November 1938, the ARRL's own magazine *QST* summarised his contributions in the following terms. He had, they said:

- Popularised band-spread for amateur

receivers.

- Been responsible for the first serious use of the superheterodyne in amateur circles as the logical type of receiver for 'phone stations.
- Produced the first practical apparatus employing the high-C circuit for self-excited oscillators.
- Made the first presentations in amateur radio for the use of 100% modulation and the use of linear amplifiers.
- Introduced the signal monitor.
- Encouraged the abandonment of 'breadboard' construction in favour of bent-metal chassis.
- Popularised with amateurs the practice of mounting valves upside down or at odd angles in order to shorten leads.
- Promoted by example good workmanship in home-built amateur band equipment.

Back to Australia

In 1929, after about 2-1/2 years at the ARRL headquarters, the Australian 'visitor' was found to have 'reached the end of his stay' in the USA, making it necessary for him to return to Australia.

Farewelling Ross Hull on the occasion, K.B.Warner, then ARRL Editor and Business Manager emphasised the urgency of the re-equipment program, the "unbelievable number of hours of (personal) effort", and the fact that Ross Hull's "program" articles had been highlights of QST over the past year. "His labours", said KBW, "have answered our difficulties and his articles have set the new 1929 standard in the literature of our hobby".

The ARRL's loss became a potential plus for our own ancestor *Wireless Weekly* when they announced on June 14, 1929, that they had secured the services of Ross A. Hull as Technical Editor – "fresh from America, with new ideas for Australian readers".

His first article in the following issue, 'A Brilliant Future for Australian Broadcasting?' was predictable for someone who had returned from a high-pressure all-amateur situation, to a weekly magazine which was as much concerned with programs and personalities as with technical matters. More than that, to a technical fraternity more interested in broadcast wireless/radio than in calling CQ.

Compared with American broadcasts, he said, Australian radio seemed to be somewhat 'tame and amateurish', although such a reaction ignored the fact that it was for a different community in a different country. By contrast, Australian radio was comparatively free from the interference and confusion of too many stations trying to share a limited band space and be-devilled by intolerable interference and static.

Listeners could be thankful, he said, that they could enjoy the programs with much less pretentious receivers. Experimenters were fortunate, too, in having access to components from the UK, Europe and America, as well as those produced locally.

But a plug-line on the cover of that same issue would not have been unwelcome to the new Technical Editor: 'Further notes on model plane building'. If Ross Hull's prime involvement was in technical radio, numbered high among his other wide-ranging interests was: model planes.

Articles over the next few months covered a mix of wireless 'politics', technical theory and receiver construction.

Interestingly enough, it was Ross Hull who, in Feb.'30 introduced *Wireless Weekly* readers to the time-honoured Loftin-White amplifier, using a type 24A pentode voltage amplifier, direct-coupled to a big, husky type 50 power triode. In doing so, however, he insisted that the name was a misnomer and that the concept pre-dated Loftin and White's adaptation of it.

This picture was taken in 1936, when Ross Hull's brother Galbraith (left) visited the ARRL headquarters in Connecticut.

The circuit was picked up again years later in another Australian publication and triggered a controversy that gave birth to my original 'Let's Buy An Argument' column, later to become 'Forum'.

As it turned out, Ross Hull's contribution to *Wireless Weekly* was short-lived. Within about 18 months, he had completed plans to return to Connecticut – this time officially – vacating his Sydney editorial chair in favour of his brother Galbraith (A.G. Hull).

Back in America

When he rejoined the ARRL, this time as Associate Editor of QST magazine and other League publications, he more or less took up where he had left off, assuming responsibility for production and the technical program, as well as directing his artistic and photographic skills to the presentation of the magazine.

But the laboratory remained as his first love, and his new and consuming interest was communication in the UHF (ultra-high frequency) spectrum, notably in the 56MHz (5 metre) and 112MHz (2-1/2 metre) amateur bands. In an article 'Fun on Five', he emphasised to his readers the pleasure to be gained from relaxed local contacts on UHF – as distinct from the rough-and-tumble of the crowded lower frequency bands.

(These days, that portion of the spectrum from 30-300MHz is defined as VHF – very high frequency – with UHF referring to frequencies in the range 300-3000MHz. The original terminology has been retained in this article to conform with the various references).

Thumbing through contemporary *QST* files, the Feb.'35 issue carried a timely article on stabilising UHF Transmitters. Subtitled 'Resonant short-line frequency control for 2-1/2 and 5-metre oscillators', it adapted for amateur use technology that had been described in the IRE (American Institute of Radio Engineers) *Proceedings* for Nov.'31.

In May of the same year came 'Progress in UHF Gear', introducing the then-new 'acorn' miniature valves.

A glance at the illustrations, with their once-familiar bits and pieces, their vertical metal 'Lecher' bars and the type 800 UHF power triodes, were evidence enough of what amateurs in Australia were picking up and building in the same era.

With mounting evidence that UHF transmissions were not limited to quasi-optical paths (*QST*, Jan.'35) Ross Hull also directed readers' attention to high-gain antenna arrays, which were helping to push the useful range on 56MHz (and later 112MHz) from around 15 to 100 miles or more (24-160km).

A news picture in Feb.'35 showed a 2-bay, 56MHz horizontal antenna array used by W2EKC to bridge the 90 miles (144km) from Long Island into Connecticut, with a 'walloping signal', using a single receiving type 45 power triode.

Propagation research

At about the same time, convinced that amateurs, as a body, could assemble original and meaningful information on the propagation of UHF signals, Ross Hull showed the way by initiating a research program in conjunction with groups at Harvard University and the Massachusetts Institute of Technology.

Using at first a super-regenerative receiver, then a crystal-locked superhet in conjunction with mechanised recording equipment, he was able to demonstrate a behavioural relationship between long-distance UHF signal propagation and atmospheric conditions.

Extending over several years, the work was first announced in October 1934, with a detailed progress report in June '35. Further articles followed in May and July '37. As a member of the IRE, he also delivered a number of lectures on his UHF propagation studies, including major Conventions at Washington and Chicago.

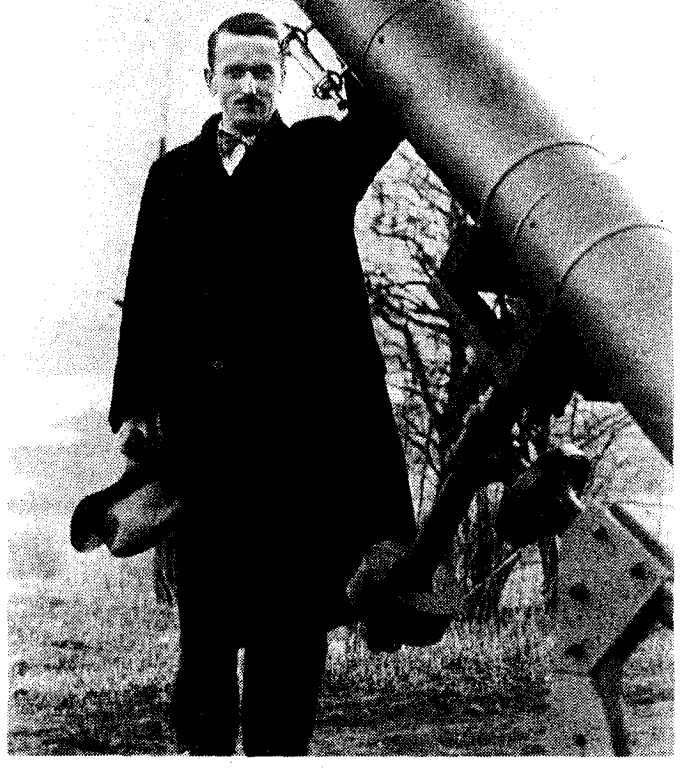
Much of this work is reflected in the 1936 edition of *The Radio Amateurs Handbook*, which I still have in my library. The foreword is signed Ross A.-Hull, Editor, West Hartford, October 1935.

Model planes, TV

Another whole area of activity had to do with radio controlled model planes, already established as an associated hobby by a group of US east-coast amateurs. With interest re-kindled by a visit to a soaring contest at Elmira, New York, Ross Hull introduced his *QST* readers to the idea in Oct.'37.

Long before the days of transistors and miniaturised components, the models had to be large enough to support the weight of valve type equipment and batteries.

Characteristically, before publishing the article, Ross had been through a complete exercise with R.B.Bourne, W1ANA as 'pilot', rebuilding – and re-crashing – a sailplane with a 13ft (3.9m) wingspan and trying out a variety of receivers and control mechanisms. Aiming for better things, they ended up with a 16ft (4.9m) sailplane, preferring the glider configuration to avoid possible interference problems from an ignition system.



Another of Ross Hull's interests was astronomy. Here he is pictured in the USA with a home-made reflecting telescope. (Courtesy Ross Hull Jr.)

But, by then, a new interest had arisen – television. From his home on a Connecticut hilltop, 1000ft (305m) above sea level, and backed by his experience with 56 and 112MHz antenna arrays, Ross was able to receive virtually noise-free signals from the experimental NBC TV transmitter in New York – much to the surprise of NBC engineers.

More than that, he built an experimental amateur television transmitter in the ARRL laboratory which worked well enough to suggest that, one day, amateurs could well become involved with two-way communication using low-cost TV equipment.

Working through all this reference material, the answer to my initial puzzlement became clearly evident. As a young man, Ross Hull's wireless/radio activities had received some publicity in local and technical publications but, having in mind the limited travel facilities of the era, his immediate contacts were mainly in Melbourne.

Upon joining the ARRL on the first occasion, he quickly began to make a name for himself in amateur circles world-wide but, this time, his friends were mainly on the US east coast.

True, he returned to Australia in 1929 but only for as long as it took him to make arrangements to resume his career with the ARRL, with a view to taking up American citizenship.

For our magazine, his 18 months at *Wireless Weekly* was a mere interlude. Then it was back to America and the ARRL, leaving behind a well deserved reputation as a man of many talents but only a limited number of Australian friends, as we became preoccupied with the '30s – the 'golden age' of broadcast radio.

A tragic accident

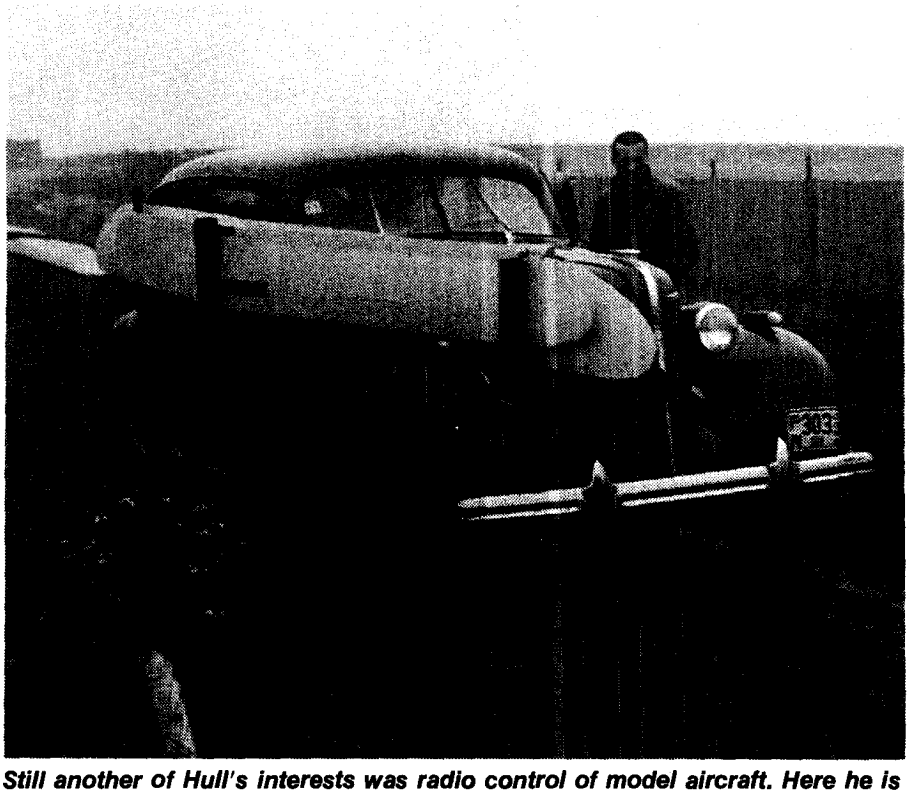
Sadly, it was Ross Hull's interest in television which ultimately cost him his life.

After the best part of 20 years experience, he was well aware of the danger posed to amateur station builders and operators by the high voltages present in their equipment. He had personally written the bold-type warning on the first page of the chapter dealing with power supply equipment in the aforementioned *1936 ARRL Handbook*: 'DANGER – HIGH VOLTAGE!' (See panel)

Years later, the message had been reinforced by a letter to the Editor from Howard A.Chin, of the engineering department of the Columbia Broadcasting System.

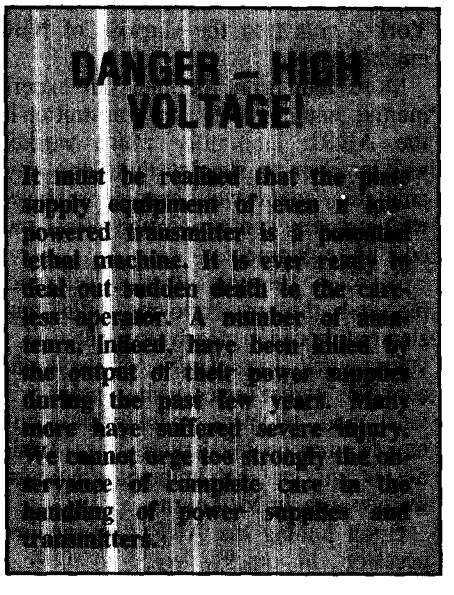
Reacting to a particular picture on the cover of the July '38 issue of *QST*, Howard Chin pointed out that professional transmitting equipment had to be fitted with protective devices and be maintained by formally licenced person-

Ross A. Hull



Still another of Hull's interests was radio control of model aircraft. Here he is pictured about to assemble a model sailplane. (Courtesy ARRL)

nel. By contrast, amateur equipment was not subject to any mandatory safety requirements. The amateur movement would be well advised to put its house in order "before an arbitrary set of rules is promulgated by a regulatory body".



The safety warning which was printed in the 1936 edition the ARRL Handbook, apparently written by Ross Hull himself.

In his reply, Ross Hull tended not to take the matter all that seriously. He had run a fair amount of material on the subject, he said, and his correspondent should perhaps ponder the actual performance of amateurs in this area – strangely inconsistent with the wording of his published warning. However, he conceded that Howard Chin did have a point and suggested that he might like to contribute an article for *QST* about the ways and means of achieving greater safety.

Ross had even worked out a provisional circuit involving a 'curtain' of light-beams which would cut the power if anything entered the hazardous area in amateur equipment. But sadly, with the paperwork still on his office table, he defied the rules in his own home.

Needing 6000V for the kinescope (picture tube) in his experimental television receiver, and bugged by surface leakage in low current EHT transformers, he had installed an EHT supply on a shelf under the bench, using a 4400V, 1-1/2kW pole transformer. It was a brutal supply to have in any hobby workshop but, while it was ostensibly tucked out of the way under bench, the mains outlet was under the same bench – on the wall immediately above and behind the transformer.

On the evening of September 13, 1938, with the idea of showing a doctor friend the NBC TV transmissions, he slipped on a pair of headphones, and reached under the bench to turn on the equipment. As he withdrew his hand, he touched the 4400V lead connecting to the rectifier top-cap, dragging it with him as he fell.

The doctor rushed to his aid, but death had been instantaneous. A brilliant technical and jounalistic career had been cut short at age 36.

Final tribute

In his final tribute in *QST* for Nov.'38, K.B.Warner said:

"For over ten years, his name has been representative of the best and newest that radio offered the amateur. Our loss is the world's loss because not every generation produces a Ross Hull, and a man of his genius and drive was certain to make even greater contributions to the world's progress, had he been spared. His memory and example must be a source of constant inspiration to amateurs in the years to come... He was a grand guy."