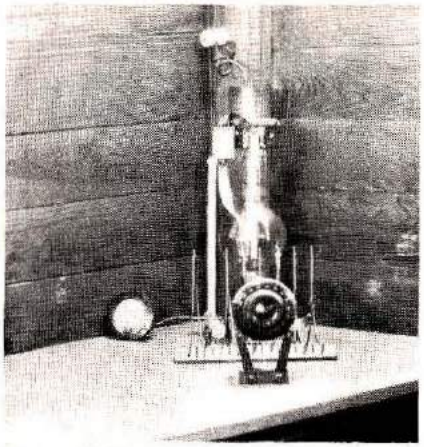
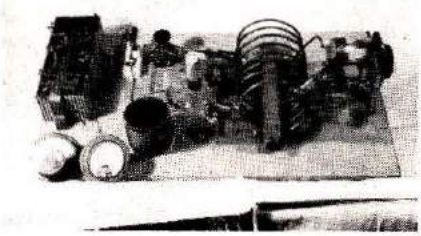
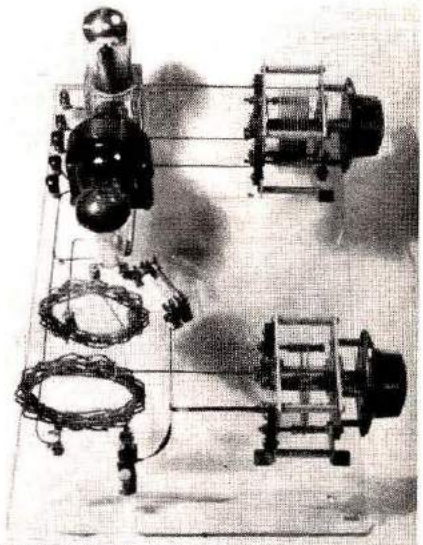


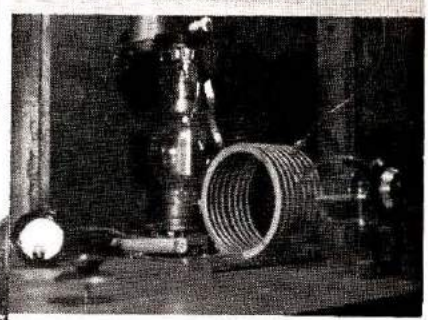


A STATION DESCRIPTION

CIRCA

1925





Receiver design, a QRP transmitter, an antenna type, and DX performance; the work of an amateur named Windom, 8GZ/8ZG

BY A. DAVID MIDDELTON, W7ZC

Historians often refer to locales where occurred some incident important to our national life or culture as "hallowed ground." Such would include Plymouth Rock, Independence Hall, Breed's Hill, and Gettysburg. Sportsmen have their hallowed grounds — Yankee Stadium, the Brick Yard at Indianapolis, Chicago's Soldiers Field, and the Rose Bowl.

Radio amateurs also have their fondly remembered historical spots. These sometimes consist of three separate items — the operator, the station equipment, and the antenna system.

Depending upon your ham-radio age, your list might include these history-making stations: Mathew's 9ZN at the Edgewater Beach Hotel in Chicago, Schnell's 1MO in Hartford, Berkner's 9AWM at Sleepy Eye, Minnesota, and Reinartz's 1QP-1XAM in Connecticut.

If you can count less than fifty ham-radio years, you would probably list W6AM's forest of rhombics at Palos Verdes, the stations of KH6UK and W6NLZ of Transpacific vhf fame, Spenceley's KV4AA at St. Thomas, and ARRL's W1AW.

Some time when twenty meters is flat, forty meters is jammed with propaganda QRM, eighty meters is too noisy, and the chatter of the repeaters on vhf is just too much — flip the OFF switch and sit back and make your own list of Hall-of-Fame type ham stations you have either visited or known about. It will be an intriguing and rewarding session.

I did this, and came up with a station from the 1920s that was both outstanding in performance and entrancing in memory. A bit of recall and some research revealed a station description that boggles the mind today. Read on and find out what it took in those days to outfit a world-wide DX station.

That is what 8GZ-8ZG of Columbus, Ohio, became in the developing days of expanding DX. Add some written and diagrammed data, a recall of many personal visits to 8GZ, and the details of that station spring to life, on paper, in these days of microprocessors, digital readout, synthesized equipment, and stacked Yagis at 150 feet.

The locale

Franklin Avenue lies in the southeastern part of Columbus. In 1925 it was a pleasant street of two-story homes and many

trees. Walking along the street and approaching number 1375, any observant person would have had his attention drawn to the slim and towering masts that reared up on the narrow city lot. A path lead around the Windom home and to the building at the rear of the lot, a two-car garage. There was an inviting door on the west section. A single-wire antenna feeder dropped down from a flat-top antenna to a glass wall-panel, thence into the shack.

Loren G. Windom, owner and operator of 8GZ-8ZG, was usually to be found in his ham station, unless he was attending law classes at Ohio State University.

A knock on the door or a whistled CQ would bring a hearty "come-in!" to visitors. Sometimes it took a couple of knocks if there were sounds of ham business from inside the shack, as there usually were.

The 1925 shack of Windy's (like so many others) had an atmosphere that was sheer magic; to be there was both exciting and challenging. To those of us who did not have these deluxe facilities, and thus had a much lower order of ham performance, 8GZ represented the ultimate.

There was no doubt about it, 8GZ-8ZG was simple, but in this simplicity it displayed an air of power and efficiency which made the station outstanding in the world.

The station

The shack was plainly furnished and without anything that did not enhance its performance. There was a long, cloth-covered operating table against the west wall. An iron Army-type cot stretched out along the other side, with a GI blanket on it. A gas space-heater and a gigantic copper-dish reflecting heater sat in a corner awaiting the cold winds and snows of the Columbus winter. Many a cozy night was spent with that parabolic heater warming the operator's back.

There were only a few decorations in sight; a station license and the U.S. flag were hung on the wooden walls of the closed-off section of the former two-car garage. There were no QSLs on the wall, although there were literally bushels of them awaiting inspection by any visitor who had time to look at them. A captain's chair sat in front of the operating table, usually occupied by either Windy or a visitor. It was seldom vacant; 8GZ was a busy station. Working a lot of DX — and handling an average of 200 pieces of traffic per month — left little peace and quiet in that shack. The station was usually filled with the clatter of relays and the whistle of fast cw coming from the Baldwin headphones cocked over the ears of the operator.

In front of the operator's position sat a fascinating device — Windy's famous "plate-glass" receiver. Beside the receiver were a straight key and a Vibroplex. At the end of the long table there was an open transmitter of strange mechanical layout that in itself said, "Here lies *real* ham power!"

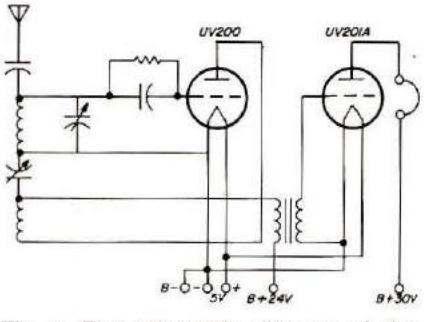


Fig. 1. The schematic diagram of the famous "plate-glass" receiver at 8GZ in 1925. It was a straight-forward regenerative detector, transformer coupled to an audio amplifier.

Plate-glass receiver

Following the classic work by Reinartz in the March, 1922, *QST*, Hassell's break-through "low-loss" article in the December, 1923, *QST*, and the Schnell design in the February, 1924, *QST*, Windom had set out to build a *zero-loss* receiver.

Laid out on a piece of plate glass which was painstakingly drilled to accept binding posts and mounting screws for the components, this receiver represented what was then the ultimate in low-loss design; it probably could not be bested today in that essential characteristic.

The receiver layout and its circuit (**Fig. 1**) was simplicity itself. Based on the well-known Schnell circuit, the unit consisted of a pair of tubes, two coils, two condensers (read capacitor if you are not an old-timer), a grid-leak and condenser, one tuning and one regeneration condenser, and an audio transformer, along with A and B batteries stowed under the table. There were also the ubiquitous Baldies (headphones — this receiver contained not one unnecessary component or frill). There was

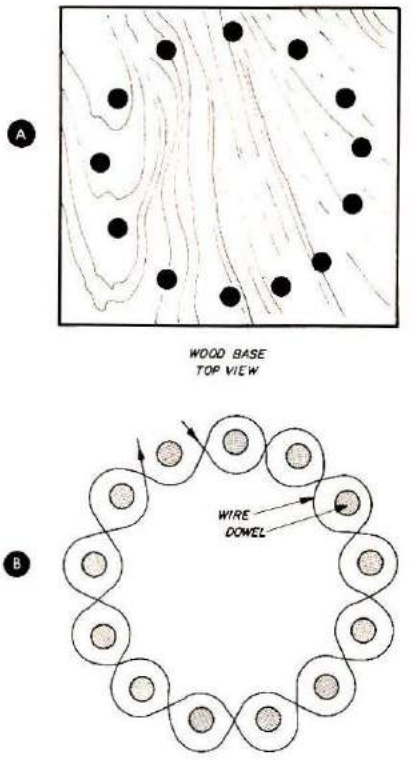


Fig. 2. The *Lorenz*-wound coils were believed by many to be the secret to good reception. Possibly the mechanical rigidity offered by the method of winding the turns had something to do with improved performance in those days of unstable detectors. The wires were wound in-and-out on a form of dowels or pegs, then the turns were tied with waxed thread in several places to keep them in place after removal from the form.

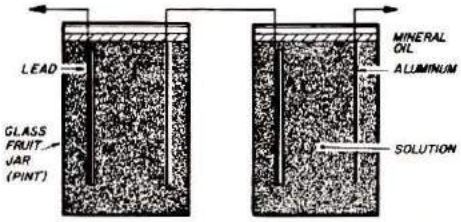


Fig. 3. The chemical rectifier was the power-supply workhorse of the era. A Borax solution served as the electrolyte, and the electrodes were lead and aluminum. The 8GZ station used 26 pint jars in each leg of a bridge rectifier. The mineral oil reduced evaporation.

no front panel (sheer heresy in 1925), and there were only the two controls: one for frequency and one to control the regeneration of the detector tube. Tuning was done by rotation of a new type of dial, a National "Velvet Vernier" (ratio 5:1) that was both smooth-running and gentle to the touch.

The receiver covered 80, 40, and 20 meters (15 was not then allotted to hams, and 10 was not exploited for several years). Grid and "tickler" coils were of the *Lorenz*-type winding, **Fig. 2**, having very low distributed capacity. Components were connected with squared-up bus or strap wiring.

The detector tube (a UV200) was operated with its base removed; its four leads ran directly to binding posts. Coils were secured by their stiff leads run through the holes in the Eby Ensign-type binding posts. The grid and plate circuits were wired with direct connections, for low-loss construction. Even the audio tube (UV201A) was mounted in a glass socket, which Windy today admits was a bit of ostentation.

The antenna was connected to a binding post attached to a bracket that made up part of the coupling condenser — two 1/2-inch-square metal plates separated by one-half inch. Calculations indicate a capacity of 0.112 pF. No wonder the receiving antenna was loose-coupled! This overcame much of the difficulty with Schnell's circuit, which was often over-coupled to the antenna. There was no ground used on the receiver. Perhaps the capacitance provided by batteries sitting on the floor furnished a sufficient ground return. Windy states that he tried a ground but it did not provide any more gain.

There was a second stage of audio amplification beneath the table. This secret weapon was not known to most of the visitors to 8GZ. After many of us had tried, unsuccessfully, to duplicate the remarkably loud signals that poured out of the Baldwin phones, I discovered this second stage. When I mentioned it, Windy calmly replied, "You never asked!"

I can give testimony as to the performance of the receiver with its 70-foot vertical antenna, having spent many happy and productive sessions either listening or pounding brass at that table during the years of 1926 through 1929. I worked plenty of DX and witnessed great accomplishments on 20 and 40 meters under a variety of conditions.

The powerhouse

At the right end of the operating table stood the self-excited cw transmitter, a three-year-old 204 in the classic Hartley circuit, running about 550 watts input. As shown in the photograph, the 204 stood upright, with its plate connection secured to a plate-glass shelf fastened to the shack wall. Another piece of glass supported the tube socket on the table. An inductor made of eight turns of flat-wound copper, 7-inches in diameter, was fitted into a slotted base of maple that had been boiled in paraffin. The radio-frequency choke (why did we make them so large?) was connected to the plate of the 204, a lead ran directly to the plate-blocking condenser, and then a copper strip ran to the tank coil. A homemade tuning condenser (with glass insulation) was clipped onto the tank coil for 80 and 40 meters. No added capacity was used on 20; I wonder how Windy tuned up on that band.

The antenna lead was directly connected to the tank coil, then through a glass panel in the wall to the 56-foot long, flat-top antenna at 70 feet. Windom states in his 1925 written comments that, while sending on 40, stations could be copied on 80 without QRM from the transmitter!

High voltage was supplied by a General Electric Company 2-kW pole-pig (service transformer), fed through a chemical rectifier consisting of 104 pint fruit jars! Details of this type of rectifier are given in **Fig. 3**. The dc filter consisted of ten 1-μF, 1750-V condensers, five on each side of a 50-henry choke in what was called a brute force filter. When desired, the condensers were cut out of the circuit by a knife switch. The high-voltage power supply components were mounted on a shelf near the ceiling of the shack. The filament transformer was a Thordarson 500-watt unit fed by a 2:1 ratio transformer from the 220-volt line. The filament voltage was adjusted by a rheostat. A time-delay relay was connected in the primary of the transformer to permit a safe warm-up time.

Antenna system

The station equipment was of superior design, good quality, and utter simplicity; it was developed after a much more complicated setup prior to 1925. The antenna system also had been given consider-

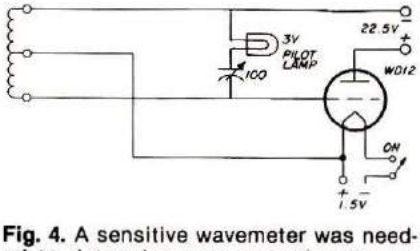


Fig. 4. A sensitive wavemeter was needed to determine your operating "wavelength" in the days before frequency became the standard term.

able thought and had been simplified through a lot of configurations. It was, like the station gear, both simple and very effective. It must be noted that the period discussed in this article was prior to the time when, at Ohio State University, experiments were conducted that resulted in the "off-center-fed, half-wave Hertz" antenna that was to become world famous.

Windom did not, at any time, refer to this or any other 8GZ antenna as a "Windom." That nomenclature first appeared in a publication of the Wireless Institute of Australia when they reprinted the substance of Windom's classic *QST* article of September, 1929, entitled "Ethereal Adornments."

The 1925 antenna was only 56 feet long (instead of the usual 67), and the feeder was connected at a slightly different place than in the now famous "Windom." Windom recalls that they were looking for an *all-band* antenna, not a *broad-band* antenna; he even tried a 1-inch copper ribbon!

The flat-top single wire was supported by two 70-foot down-spout masts. Ten-foot sections of steel down spout were soldered together after being overlapped one foot. Guy wires were broken each twenty feet with porcelain eggs. The mast near the shack was insulated from ground and served as the station *receiving* antenna. Insulation was of the highest order; at each end of the flat-top wire it was insulated from halyard by no fewer than *five* 20-inch-long x 2-inch-wide plate-glass insulators.

Windom had been a busy beaver drilling all those holes in plate glass with a twist-drill-and-turpentine rig. I wonder how much glass he broke in the process?

Windy relied upon a home-made wavemeter for proper band location. This invaluable piece of test gear is shown in **Fig. 4**. Calibrated from WWV and NKF in wavelength, it was accurate enough for those days. "Frequency" had not become part of the ham's lexicon.

The way it was

A refresher course is required to understand what was going on in 1925. The American ham bands consisted of the following:

Wavelength Meters	Frequency MHz
0.7477 - 0.7496	401 - 400
4.69 - 5.35	64 - 56
18.7 - 21.4	16 - 14
37.5 - 42.8	8 - 7
75.0 - 85.7	4 - 3.5
150 - 200.0	2 - 1.5

Radiotelephony was permitted from 3.600 to 3.500 MHz, and from 1.765 to 1.6667 MHz. Both 80- and 150-meter operation was prohibited from 8 to 10 PM local time and on Sundays during church service hours.

The classes of station licenses available in 1925 were:

Provisional — an uninspected (by radio authorities) station.

Restricted — a station within an unspecified distance from a Government station. Stations within five miles of any military or naval station [were] further restricted as to power and bands.

General — issued to a station after inspection.

Experimental — an X call was issued for special projects not possible with the use of a dummy antenna.

Special — a Z call was issued to holders of the Extra First Class license who also had a non-"Z" call.

Special — a Y call was issued to stations in educational institutions.

Amateur operator licenses were issued separate from the station privileges, and consisted of the following classes:

Amateur Second Grade — similar to the present-day Conditional.

Amateur First Grade — to operators who had passed a written examination in the presence of a Radio Inspector and passed a code-speed test of ten words per minute.

Amateur Extra First — a much more comprehensive written examination and a code speed of twenty words per minute, taken in the presence of an Inspector.

These licensing regulations are quoted from *Handy's Handbook*, First Edition, 1926. Presumably they were in force in 1925. Although no mention is made, it is my recollection that an *Amateur Extra First* was required for radiotelephony on twenty and eighty meters.

Handy also states that "interference to other services cannot be permitted, and quiet hours are prescribed when readjustments of the transmitter or alteration of a non-selective receiver will not do away with the trouble."

In 1925 there was some troublesome BCI, no TVI, and RFI pollution was all but unknown, hence the open-air transmitter at 8GZ was possible and practical.

It was then common practice to spot your transmitter on one chosen wavelength — where it remained! Seldom did an operator move about after having once established himself on a good spot. Operational procedure was to remain on

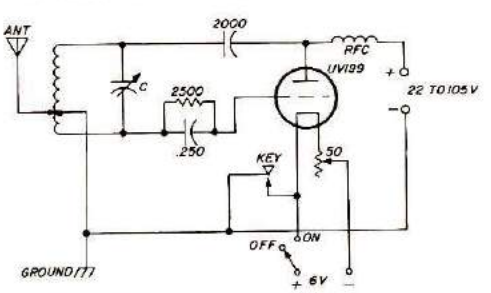


Fig. 5. The "Little Giant" low-powered transmitter was used by Windom to do some impressive DX work while using a power input of less than 1/2 watt.

that one spot and to tune the receiver over the entire band, looking for stations calling CQ or replying to your CQ. Operators looking for DX looked outside the U.S. bands for foreign stations. An operator seldom looked on his own frequency for a reply. DX stations operated for the most part outside the American bands and were thus more easily found, especially as each area chose a different segment of the spectrum outside our bands. Some areas were on the low side of the American band and others were on the high side. There was no fast rule, and DX, as now, was where you found it.

Break-in operation was a mark of a well-operated station. The straight key or a Vibroplex were standard; keyers were practically unknown. Cootie keys (side-swipers) were common; they were easy to make, hard to operate, and difficult to copy.

The "signature" of each operator (his characteristic manner of sending) made recognition easy. Often operators could be identified before they signed their call. Headphones were standard, as few hams had the new and expensive loud-speaker units. Starved-audio circuits, with low plate voltage on the output, provided some measure of audio limiting, and peaked-audio circuits were common because the use of high-ratio audio transformers usually created audio distortion.

The practice of tapping down on a coil to obtain band spread was not in common use. The now common "band-set" and "band-spread" two dial system had not come into use, although it would have been possible with the midget variables offered.

Hassell had shown in his December, 1923, *QST* article how to trim down the plates of a variable to obtain band spread. Windom had not done this. He used a standard National-type DX capacitor with plates removed, leaving only one rotor and one stator in the grid-tuning circuit.

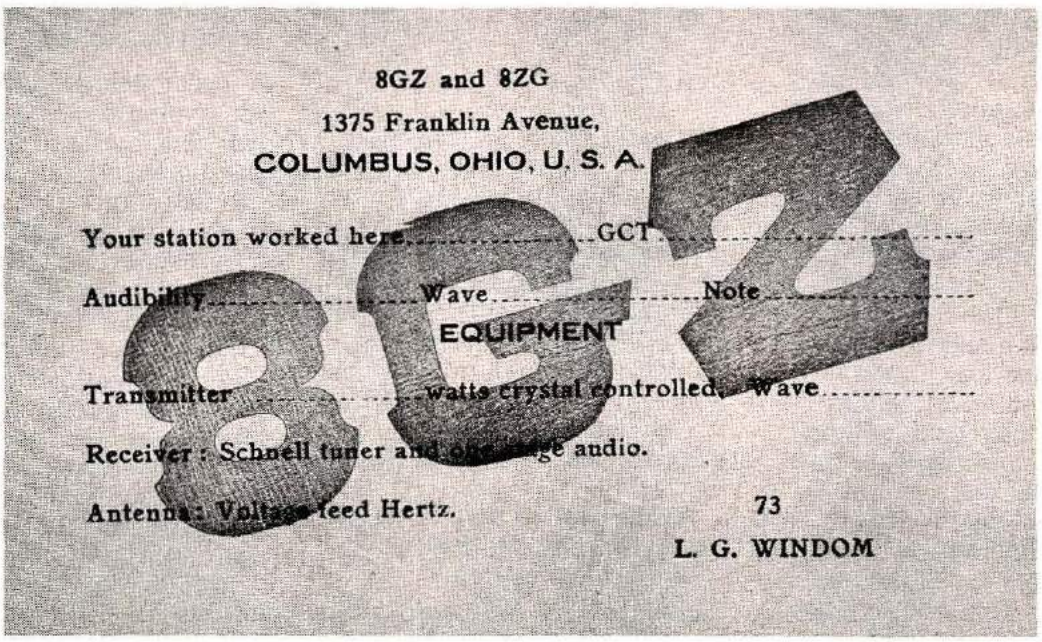
The common method of fine-tuning was to use the tip of a rubber eraser on a lead pencil. It was placed against the panel and against the round dial as a vernier. Windom chose the new and exciting National Velvet Vernier dial which was first being offered. It was a fine dial in 1925 and still is in wide use.

Low power at 8GZ

Although the 204 Hartley rig was the workhorse at 8GZ, Windom was intrigued by what is now known as QRP work. Motivated by Clayton's *QST* article of December, 1924, Windy designed and built a low-powered transmitter with the intent of breaking Canadian C9CK's low-power record.

Much of this low-power work was done in the latter part of 1925. Windy not only broke C9CK's record but also established a new record by repeatedly working DX such as Australia and New Zealand with power as low as 0.493 watts (total filament and plate input) to a receiving-type tube. Windom was awarded the Jewell Meter Company Award (a gold pocket watch) for his QRP work, an achievement detailed in the July, 1926, *QST*.

Starting in December, 1924, Windom used a 201A with 105 volts at 12 milliamps and worked much DX. A WD12 was tried, but when a borrowed



1925 QSL card of 8GZ-8ZG.

UV199 was available it was installed with about 105 volts on the plate, and 5 volts at 60 milliamps for the filament. The UV199 was finally starved down to a 75-volt plate supply! Circuit details on the 8GZ QRP rig are shown in **Fig. 5**. A photograph shows the 1925 world's-record transmitter.

The transmitter was bread-boarded on a maple base that had been boiled in paraffin. Insulation was, as normal with Windy, plate glass. A few Burgess B batteries supplied the plate power. The regular station antennas were used on the QRP work, and the plate-glass receiver brought in the replies.

Windom recalls that the UV199 was by far the better tube tested — it gave a better signal with less input. Many T9X reports (crystal-controlled signal quality) were received.

I can attest to the potency of this flea-powered rig at 8GZ, as I had the pleasure of working many DX and domestic stations with it. By the way, such performance was not considered to be earth-shattering, at that time.

Station performance

Notes made by Windom at 8GZ in 1925 state: "During the year the station worked 464 out of a possible 514 DX stations, established a world's record of 30,000 miles per watt, and handled an average of 200 bona fide messages a month." Yes, dear reader, traffic handling was routine in 1925, and was a part of any really active ham station.

It is difficult to equate station performance then to that of today. Suffice to say that 8GZ was almost half-way to becoming a member of the DXCC, had probably made WAC, and was well on his way to a WAZ. Had there been a DX Honor Roll, Windy would have been way up on the list. It must be noted that in 1925 none of these yardsticks, by which we now measure accomplishments, had been invented.

Operations at 8GZ included much trans-Atlantic work in daylight, and many long-path QSOs. A total of *forty-one* countries was worked. A list of his DX reads like a "Who's Who of DX" for those years.

Even the then-infamous five-meter band had been tried. When no reports were received from the 8GZ efforts, Windy discarded the band. Five did not lend itself to self-excited transmitters and regenerative receivers. The Rodimon-Hull historic work on that band was still six years and a "super-regen receiver" away.

A few personal notes

I first met Windom in 1924 when we both attended the National Guard Encampment at Camp Knox, Kentucky. We were noncoms; Windom with the Headquarters Company, 74th Infantry Brigade, 37th Division, (Ohio) and I with the 38th Division Signal Company from Indianapolis.

In 1926 it was my privilege to visit 8GZ and when, in 1927, my residence was Columbus, many delightfully exciting hours were spent in the shack at 8GZ. From 1926 to 1929 a lot of hours were spent pounding brass at 8GZ or sleeping on that Army cot.

Another of the memorable aspects of visiting 8GZ was the welcome received in the shack, and in the Windom home. Loren's parents, Forrest and Bertha Windom, were not only hospitable but they were encouraging to Loren and to any visitor who was a ham. Having experienced the opposite in my own home, such warmth and respect for our hobby was very welcome. The Windoms always provided appropriate snacks or beverages, regardless of the season, and meals were served to suit the operators. Such genuine hospitality made 8GZ a pleasant place to visit. The aroma of Mrs. Windom's cooking often drew us away from the key and headphones into the kitchen.

As evidence of the reception given to ham radio by the Windoms, I recall one day when Windy was grinding quartz crystals, right on the kitchen table. That's about as tolerant an attitude as you can find! I would like to offer a long-delayed tribute to Mr. and Mrs. Windom, who played such an important part in our early lives and our great hobby, and to all the long-suffering parents of hams.

Epilogue

So much for 1925. What ever became of Loren G. Windom, 8GZ-8ZG? Well, he turned out right well! He became a brilliant lawyer (twenty-five years as a Federal District Attorney at Columbus), had a distinguished career in the military (rising from Private to Major General, with many decorations), and served as an ARRL director. Continued application of effort to ham radio brought much satisfaction to his life.

Now retired, Windy lives with his wife, Dot, on several acres near Columbus. Needless to say, the land is well covered with rhombics and other high-efficiency antennas. Although he admits that his Vibroplex is a bit neglected, his melodious voice is regularly heard on ssb, and his call, now W8GZ, is widely known on the bands. His son David (in the Military, stationed at Fort Richie, Maryland) is now W8ZG and keeps regular schedules with his OM. W8GZ has moved up into the highest brackets of DX worked, having 360 countries confirmed, and is high on the Honor Roll.

The years from 1916 to 1977 form quite a span of time. Windom filled those years with yeoman service in civilian life, the military, and in high dedication to Amateur Radio.

Ham radio has been built by the efforts of such amateurs as Loren G. Windom, who represents the best of our chosen hobby.

HRH