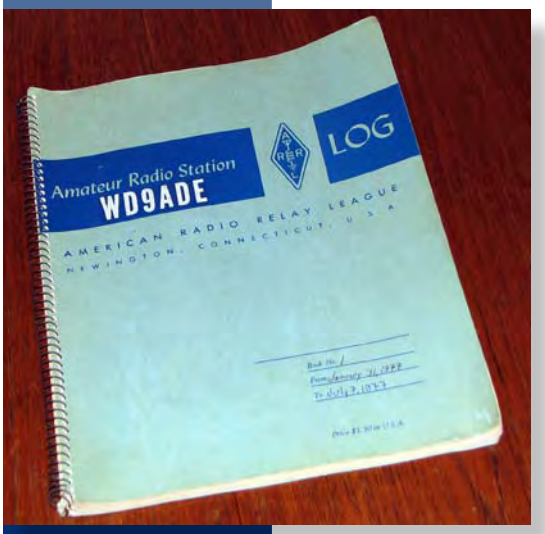
K9YA Telegraph

Robert F. Heytow Memorial Radio Club

Volume 9, Issue 5, May 2012



1977

First Year in the Life

Philip Cala-Lazar, K9PL

This January as the old year tipped in to the new, it set me thinking about my 35th anniversary as an amateur radio operator. In December 1976 I passed my General class exam at the FCC's office in Chicago's Kluczynski Federal Building. The license, bearing call sign WD9ADE, did not arrive until late January 1977.

What follows are what the local and national press were saying about amateur radio in the year 1977. Those news excerpts are followed by a selection of amateur radio station WD9ADE log extracts for that day. My rig at the time was the now venerable Ten Tec Argonaut 509 QRP transceiver energizing a 40-foot long random wire antenna. The antenna comprised several second-story storm windows jumpered together and matched with a simple L/C tuner. All QSOs recorded below were on 15-meters, simply because that band worked best for me at that QTH during that most excellent solar cycle. In time I migrated to other bands 80- through 10-meters. (*K9YA Telegraph*, QRP, May 2005)

"Copywriter-Heathkit"

March 6

Chicago Tribune

Display ad: **Copywriter-Heathkit**

Copywriter … a specialist in catalog mail order, print, product publicity for Amateur Radio equipment and electronic instruments.

Knowledge of an interest [sic] *in electronics plus amateur radio and electronic instrument background essential. Minimum of 2-5 years experience in solid copywriting for these products in agency or corp. advertising department required.*

Log

WB9WBO, Carl, Chicago, 21.230 MHz. My good ham radio friend and neighbor, only a couple of city blocks away.

March 9

CB break: Call for ban on linear amplifiers

CB break by Mike Wendland, K8ZRH, was a weekly column in the Tribune. This week's article discussed the failure of the CB industry to self-police the sale of high-power amplifiers to CB operators. In February the FCC proposed a ban on the "… manufacture and sale of linear amplifiers which can operate in the 11-meter CB band." Noting complaints from amateurs on this proposal, "The FCC says it will work to smooth out any differences, since of all radio groups, amateurs require the least enforcement."

Aside from a few friends with CBs in their cars, I did not have much personal experience with CB radio during its days of prominence. However, I do have a few memories relating to that craze. In the time before I had my amateur license and accompanying a friend to a CB shop, actually more of a wooden shack behind a strip mall, I noted a gentleman carrying a rather

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Inside This Issue...

Philip Cala-Lazar, K9PL
Editor

Mike Dinelli, N9BOR
Layout

Dick Sylvan, W9CBT
Staff Cartoonist

Rod Newkirk, VA3ZBB
Contributing Editor

Robert F. Heytow
Memorial Radio Club

www.k9ya.org
telegraph@k9ya.org

Orbital Mechanics for the Rest of Us

Paul W. Ross, W3FIS

Many years ago, when I was a student in electrical engineering, I had just gotten my Novice license (KN2VZY). I had also joined our university amateur radio club. The Soviets had just put Sputnik in orbit. This was October of 1957. I had long before decided on electrical engineering as a career, and this settled the matter for me. Among other experiences, I made the acquaintance of people who were headed into radio astronomy. One of them was involved later with the SETI (Search for Extraterrestrial Intelligence) project. He is still listening…

Part of the curriculum for engineers was a good solid two-semester sophomore course in physics. With the interest in space at that time, I recall spending a substantial part of the course in the basics of orbital mechanics, with calculations for everything from geosynchronous orbits to the amount of energy needed to loft a payload into orbit (a lot!). We also derived "Kepler's Laws of Planetary Motion." Little did I know that over a half century later, I would need to refresh my understanding of these concepts when I started messing around with Low Earth Orbit satellite communications.

"Search for Extraterrestrial Intelligence"

The basic idea back of understanding an orbiting object is the balance between gravitation (pull of the "primary," earth, in this case) and the outward centrifugal force of the satellite. In the simple case, we would have a circular orbit above the earth's equator. Life is not simple:

- The earth is not round - it is lumpy, and somewhat pear shaped.
- The atmosphere causes drag–even if the satellite is quite high. Eventually, they crash and go boom.
- The orbits are more liable to be ellipses (ovals) rather than circles, with the center of the earth as one focus of the ellipse.
- The orbits are not just around the equator (equatorial orbits), but are likely tilted at some funny angle. They can even go over the poles (polar orbits).
- The earth revolves, so our satellite seems to pass over different places at different times. Think of the orbit "fixed" in space, but moving with the earth, and the earth rotating under it. A series of orbits will appear to precess from east to west on successive passes as the earth rotates.

Where do we know where and when to look? Fortunately, the calculational issues are solved with readily available software, which processes the "Kepler elements" that describe the satellite's orbit into tracking information for us ordinary mortals.

It is useful to have a feel for just what the Kepler elements are, and realize that they may vary with time–atmospheric drag and other perturbations cause these factors to change. For instance, when the International Space Station raised its orbit, this caused a change in the Kepler elements. You must know these new values if you wish to track the location of space the station. The current Kepler elements for any satellites of interest can be downloaded from a variety of sources. Most tracking software will "call home" for the most up-to-date values.

Now, what are the major Kepler elements, and what do they mean? Most terms make sense, but some are mired in ancient history and astronomical jargon. Let's run through them, and present some quick explanations.

Epoch: Orbital elements are at a "snapshot" in time. Each Kepler element is valid at this instance. We can use them to predict new positions of the satellite at any time in the future. The mathematics are simple trigonometric calculations based on the various Kepler elements. Since the Kepler elements do change with time, you need to update them periodically.

Orbital Inclination: The orbit ellipse lies in a plane known as the orbital plane. The orbital plane always goes through the center of the earth, but may be tilted any angle relative to the equator. Inclination is the angle between the orbital plane and the equatorial

Robert F. Heytow
Memorial Radio Club

www.k9ya.org
telegraph@k9ya.org

plane. This defines the difference between equatorial orbits versus polar orbits, and anything in between. The intersection of the equatorial plane of the earth and the orbital plane of the satellite is a line, which is called the line of nodes.

Right Ascension of Ascending Node: This is likely the most badly named orbital element. Two numbers orient the orbital plane in space. The first number was the Orbital Inclination. Right Ascension of the Ascending Node is the second necessary number. After we've specified inclination, there are still an infinite number of orbital planes possible. The line of nodes, which we just mentioned, can poke out the anywhere along the equator. If we specify where along the equator the line of nodes pokes out, we will have the orbital plane fully specified. This is the Right Ascension of the Ascending note. Its relationship to a point in space is independent of the earth's rotation.

Argument of Perigee: Argument is another word for angle. Now that we've oriented the orbital plane in space, we need to orient the orbit ellipse in the orbital plane. We do this by specifying a single angle known as argument of perigee. We are defining the angle of the major axis of the ellipse in respect to the orbital plane. Remember, most orbits are ellipses.

Eccentricity: This one is simple. In the Keplerian orbit model, the satellite orbit is an ellipse. A circle is a special case of an ellipse. Eccentricity tells us the "shape" of the ellipse. When e=0, the ellipse is a circle. When e is very near 1, the ellipse is very long and skinny. A value of 1 would have us zipping right through the earth. Won't happen more than once…

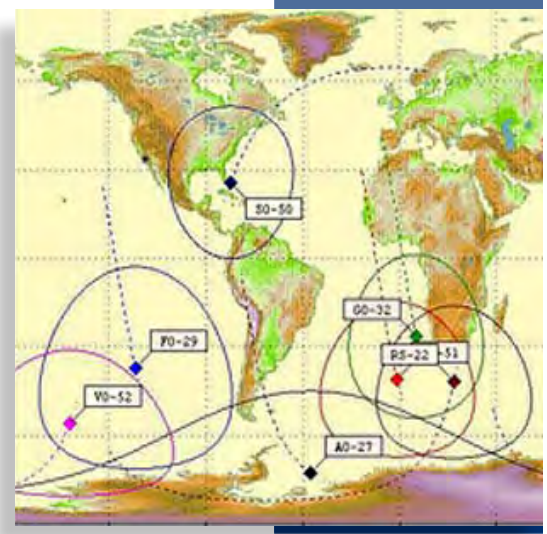
"Update your Keps!"

Mean Motion: So far we've defined the orientation of the orbital plane, the orientation of the orbit ellipse in the orbital plane, and the shape of the orbit ellipse. Now we need to know the "size" of the orbit ellipse. In other words, how far away is the satellite?

Kepler's third law of orbital motion gives us a precise relationship between the speed of the satellite and its distance from the earth. Satellites that are close to the earth orbit very quickly. Satellites far away orbit slowly.

Satellites in circular orbits travel at a constant speed. We just specify that speed. Satellites in non-circular (i.e., eccentricity > 0) orbits move faster when they are closer to the earth, and slower when they are farther away. The common practice is to average the speed. Astronomers call it the "Mean Motion." Mean Motion is usually given in units of revolutions per day. A revolution, or period, is defined as the time from one perigee to the next. This is the time between when you "see" the satellite, and the next time you "see" it. Typically, this is on the order of a few hours or less for the common amateur low-earth-orbit satellites.

Mean Anomaly: Now that we have the size, shape, and orientation of the orbit determined, the only thing left to do is specify where exactly the satellite is on this orbit ellipse at some particular time. The first orbital element (Epoch) specified a particular time for the elements to be valid, so all we need to do now is specify where, on the ellipse, our satellite was exactly at the Epoch time.



Ham Radio Deluxe Satellite Tracker

Mean anomaly is an angle that goes uniformly in time from 0 to 360 degrees during one revolution. It is defined to be 0 degrees at perigee (closest), and is 180 degrees at apogee (farthest away).

With a satellite in a circular orbit (therefore moving at constant speed) and you stood in the center of the earth and measured this angle from perigee, you would point directly at the satellite.

If you want more information on satellite tracking, look up the following links:

The Ham Radio Deluxe suite has an excellent tracker program. . This is my favorite program, as I use HRD/DM780 for digital modes to control my Yaesu FT-817ND. It has nice graphical displays. The tracker program can be run as a "stand alone," if you wish, without a radio.

For my Motorola 'Droid "smart phone," I use a free app called "HamSatDroid." There is a similar app for the iPhone. However, it is not free like the 'Droid app.

"Heavens Above" is useful for satellites in general, and astronomy information.

For more general information, AmSat. This has predictor software for all the amateur satellites. Just plug in your location and have the calculations done.

For specific satellites, do a Google search for the home pages devoted to the satellites. Also, there is a very useful news/user group on amateur satellites on Yahoo.com.

Where is the aspirin for my headache? Update your "Keps!" ■

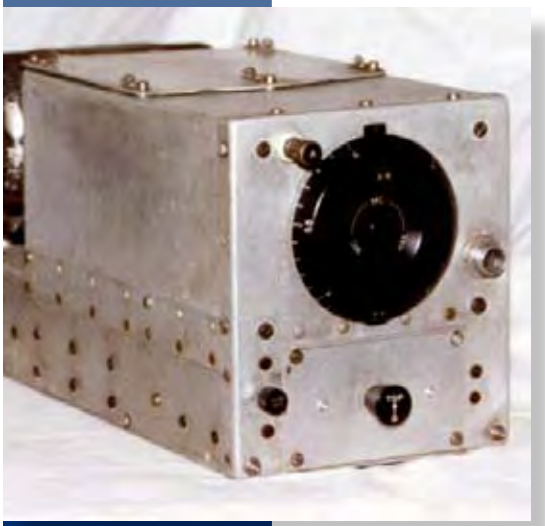
Robert F. Heytow
Memorial Radio Club

www.k9ya.org
telegraph@k9ya.org

Genesis

Part II of III

Garey Barrell, K4OAH



ARC-5 (BC-454)

I made about a dozen contacts over the next couple of weeks, and one day went to visit a friend and see his station. He had a Hallicrafters S-40B, which was a dream receiver to me, and more importantly he had a Q-multiplier(!) on it. After about five minutes, I was HOOKED. I had to have one of those. Several lawn-mowing jobs later, I had enough to order the Heathkit QF-1, and after an interminable wait (about a week) it showed up. I built it that afternoon, and was ecstatic with the result.

This euphoria lasted about two weeks, when I made the mistake of visiting yet another friend, this one happened to have a WWII ARC-5 aircraft receiver, also known as a BC-454. The entire Novice band was about 1/8" wide on the dial, but the reduction drive converted that into two or three rotations, about the same as the AR-3's bandspread knob. The biggest difference though was that when you tuned in a station, it STAYED tuned in. I couldn't believe that receiver's stability compared to the AR-3, even if you walked across the room with it on a station.

"I LOVED CW"

Things got messy from here on out. I loved the stability, but I missed my Q-multiplier terribly. Hmmm. The BC-454 had an IF frequency of 1,415 kc, the better to support its 30 kc wide IF! While it was convenient to hear almost the entire Novice band without touching the tuning dial, a little more selectivity would be nice. Aha! I happened to be the proud owner of an AC-DC clock radio that could tune to 1,415 kc and had a 455 kc IF. The next day, and three house wiring fuses later, I had a wire wrapped around the antenna coil of the clock radio with the other end stuck down into the third IF can of the BC-454, *and* the Q-multiplier connected to and powered from the clock radio! This gave me a dual conversion receiver, with passband tuning (sounds familiar), *and* a Q-multiplier.

I had found the Holy Grail! I developed a safecracker's touch on the tuning knob of the BC-454, and decent filters between my ears, and made many contacts, including DX such as Texas and even California! Somewhere in this period, I also had a "Signals Heard" QSL from Grand Island, Nebraska, home of the FCC monitoring station located there. Interestingly enough, they heard me on 7,420 kc with my 80-m transmitter. That happened to be my best DX at the time, but one I could have done without. Back then, the FCC expected a written answer containing any excuses you wanted to try, *and* what you intended to do about it to ensure you were not heard there again! YIKES! By this time a little more lawn-mowing (and some radio repair) income had accumulated, which was used to order a WRL (Thanks Leo) Globe Chief 90.

Not too long after that, with the help of my Dad, (I explained about the FCC notice, etc!) I acquired a used HQ-129X, transferred my beloved Q-multiplier, and was in ham heaven. Meantime, my General class license had arrived, a Heathkit VF-1 was added to the collection, and I was on my way to a life in ham radio.

Life was good. I came home from school and got on the air. There were quite a few teen-age locals in town, and two active radio clubs, so there was plenty of fodder. There was a brief fling with AM, using a single-tube cathode modulator on the Globe Chief to talk to the several mobile stations that were on in the afternoon: a TV repairman, a two-way radio repairman, etc., who although older, were very tolerant and even helpful to the "kids." But I discovered that I LOVED CW, and soon was spending after school and evening time checking into CW traffic nets. KYN, driven by W4BAZ, 9RN, CAN and TCC schedules took up a lot of time, but really boosted my code speed beyond my wildest dreams.

I outran my Vibroplex, and built a newfangled electronic keyer. I think the design came from an old *QST* article, and used a 2D21 thyratron tube as the timing

Robert F. Heytow
Memorial Radio Club

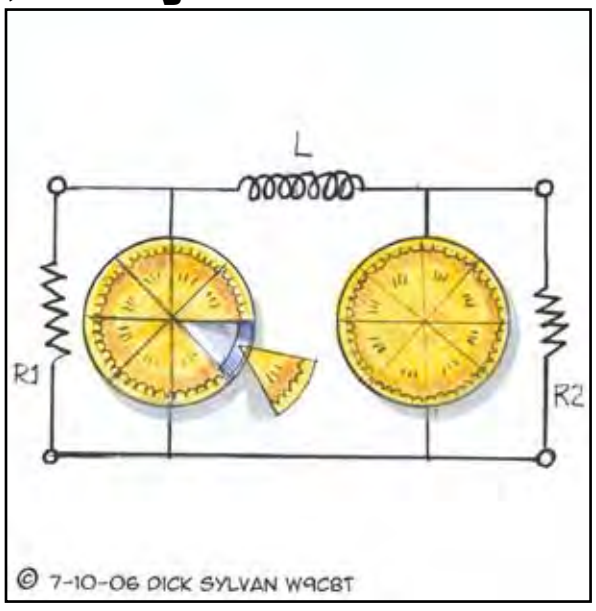
www.k9ya.org
telegraph@k9ya.org

device. It also had a 12AT7 and a 0B2 regulator with a small power supply. My paddles were two J-38 keys bolted "bottom to bottom" around an L-bracket. This arrangement worked pretty well, although my ham shack was in my bedroom just above the kitchen. Everything went along fine for a while, then my Mom got an electric skillet for Christmas. Of course she would be fixing supper at the same time I was trying to meet a couple of traffic nets. The kitchen and my bedroom were on the same fuse and that &!%$! skillet would drop the line voltage enough to cause my keyer to send only very short dits. I'd reach up and adjust the weight control for decent CW, and a couple of minutes later the skillet would turn off and I would be sending one long dash! That skillet almost ended my ham career right there.

Just before things like school, girls, cars, college and marriage destroyed what was left of my life, I acquired a Drake 1-A receiver. This was literally a revolution for ham radio. Yeah, Collins had their S-Line, but only the wealthiest among us could even consider owning one of those. Perhaps if I had been able to convince my Dad that he needed to sell the family car we could have scraped up enough to start, anyway. I got the 1-A at a *very* good price, as the original owner was an AM guy and he went back to his Hammarlund HQ-150, as it sounded SO much better than that silly little "mailbox" receiver. I used it for about six months before the above named circumstances began to interfere, severely crimping my ham radio time. The radios were sold off, and that was it for a few years. ■

Ham Lingo

DICK SYLVAN, W9CBT

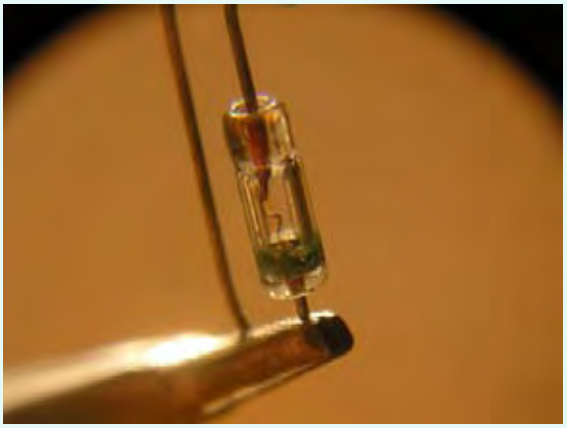


PIE NETWORK

Don't Shock That Diode…

It's the Cat's Meow

Duke Wahl, Jr., WA9WJB



I'd been having problems with my Bird wattmeter. John, K9KEU, has repaired a bunch of bad slugs, presumably DROPPED and mistreated. He claims bad diodes are usually to blame. I was unaware how fragile diodes are.

Looking up information on the Web, I ran across a very interesting site dealing with the care and feeding of diodes, particularly germanium types with a "cat's whisker" junction. The overriding caution they claimed was physical shock.

The site cautioned that after the diode was installed; you could then CUT the lead. BUT, if you form the leads freehand and cut the leads to size before installation, DO NOT use DIKE type cutters, use SHEAR type cutters.

Dike type cutters make that sharp CLICK noise and send the excess wire lead flying across the room to land in your computer printer, coffee cup, or carpet where you will find the errant lead the hard way with your foot. The sharp CLICK noise represents physical shock to the wire lead and whatever else the wire is connected to. If it happens to be a diode, you run the risk of changing the diode characteristics or ruining the diode altogether with the physical shock transferred by wire to the junction.

Perhaps this explains why John had so many bad diodes in the Bird wattmeter slugs– from klutzy butterfingered techs. Those diodes are held very rigidly in a machined slug with no protection from physical shock.

In my photo of a 1N34 diode you can clearly see the "cat's whisker" contact point. It's easy to see why the diodes would be at risk during rough handling. (It took me 20 minutes to setup for this shot.) ■

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Robert F. Heytow
Memorial Radio Club

www.k9ya.org
telegraph@k9ya.org

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large gray radio through the parking lot. He was toting the radio by its built-in handle; curious I approached for a closer view only to be met by a scowl and the radio twisted away in attempt to obscure its identity, but time enough for me to get a good glance. Later, after getting my license and becoming familiar with ham gear, I realized that big gray radio was a Yaesu FT-101, a rig popular with those who wanted a "bit" more power on the CB channels.

Ten Tec Argonaut
QRP Station

Two more memories: "Kickers," linear amplifiers, were a popular accessory for many mobile CBers. Often, in mid-QSO, the Argonaut's front-end overloaded as a mobile CB radio on steroids passed my QTH and pushed snippets of CB lingo through my headphones. And, who could forget, vehicle window stickers informing would-be mobile gear thieves: "NOT CB."

Log

WB9VTF, Lake Zurich, Ill., Gene, 21.184 (QSO 8 March)

March 14

AT&T experiment here an attempt to cut CB craze

AT&T "has been looking with envy at the skyrocketing number of car owners using their CB rigs to call home or talk to their friends or any other 'good buddies.'" Ma Bell via the Illinois Bell Telephone Co. was moving ahead with plans for a "limited test of a new mobile telephone service in the Chicago area–the first such test."

"CB radio on steroids"

The term "cell" was used in the new system's description: *When a user makes or receives a call, after the transmitter is turned on, a sophisticated electronic system will track the signal as the vehicle moves from one place, or "cell," to another.*

How much: $90.25 [Consumer Price Index equivalent to $325 in 2010 dollars] a month for rotary-dial phone after an installation charge of $117 [$421]. Touch-tone service at $97.25 [$350] per month plus $122 [$439] installation fee. Included was a $10 [$36] monthly calling allowance, or 30 minutes, and additional minutes at 30 cents [$1.08].

Log

WB5VNQ, John, Grand Prairie, Texas, 21.161
WB9MVC, Jim, Chicago, 21.165, Northwest Amateur Radio Club Net (NARC)
WA6VUT, Ernie, Pomona, Ca., 21.100

April 5

Starry-eyed gazers are spaced out on a heavenly hobby that's universal

Discussion of diverse interests in amateur astronomy: "There's a band of amateur radio astronomers, often ham radio enthusiasts, who pick up radio energy signals from objects in space."

Log

WD9AWZ, Cordy, Brookfield, Ill., 21.370
NARC Net
WB9WNN, Paula, Park Ridge, Ill., 21.370

April 13 log entry: "rig desensitizing." Returned T/R board under warranty to Ten Tec for "field repair." New, revised, T/R board, with pin diodes replacing reed relay, received and replaced on May 25.

May 11

CB break: Hams happily 'skip' into summer cycle

First of three columns featuring amateur radio and CB, "…two separate radio services which are attracting the interest of America's growing group of personal radio hobbiests [sic]." Hams can take advantage of "'Sporadic E skip,'" but CBers can't, "It is illegal for a CBer to talk to a station more than 150 miles away."

May 18

CB break: Breaking into ham radio is the next logical step

A look at the four steps some CBers take leading to an amateur radio license and related the story of two such "CB recruits." "It's estimated 7,000 CBers are becoming hams each month." That number is excessive; in 1977 the amateur service grew about 11%, i.e., from 293,655 at year's start to 327,000 by year's end. That is a total growth of 33,345 for the year or 2,779 (rounded-off) per month.

May 25

CB break: Big beef on hams

CBers demanded more radio spectrum. Fomented by newspaper columnist Jack Anderson's claim of

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Robert F. Heytow
Memorial Radio Club

www.k9ya.org
telegraph@k9ya.org

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"an inherent conflict of interest within the Federal Communications Commission because several influential commissioners were radio amateurs." Based on the numbers "in relation to the millions of CBers, the nation's hams held an unproportionate [sic] share of airwave room." Earlier in the year the FCC increased the number of CB channels from 23 to 40.

Also mentioned was the FCC's study for a proposed "Communicator Class" license "that would blend some of the advantages of CB and amateur radio." The examination for such a license would include questions on radio law and theory, however, "the Morse code requirements may be dropped."

Log

Despite newly repaired rig much calling and answering yielded no replies.

June 7

Chief FCC engineer warns CBers not to use add-on linear amplifiers

At the Consumer Electronics show in Chicago FCC chief engineer, Raymond Spence cautioned that the makers and users of CB radios were "'not doing themselves a favor' by tolerating the use of add-on amplifiers to boost transmitting power." Further he said, "There is no chance of getting the power rules changed" and "… there is no plan for expansion or changes in CB band frequencies for some time."

"proposed 'Communicator Class' license"

Though manufactured linear amplifiers may legally be used by amateur operators, "many find their way into illegal CB use, FCC and industry officials say."

Log

WDØCTZ, Dave, Minneapolis, Minn., 21.101
VE3IVU, Grant, Stirling, Ont., 21.099

June 23

Shortwave freedom

Law of Unintended Consequences: DuPage County SWL pens his concern about a proposed antenna structure ordinance aimed at hams and CBers, that also negatively impacted shortwave listeners. "In a country known for its many freedoms, such a limitation on the free flow of international news and views is out of place."

Log

WB5LCZ, Grady, Big Sandy, Texas, 21.037
Guest operators in shack: Peter, WB9PLI, and Bob, WB9VLV.

July 4

Do it yourself, company says

A look at the Heathkit Company founded by Edward Bayard Heath. His first kit was the "'Parasol,' a high-wing monoplane introduced in 1926." In 1977 the firm, headed by company president, David Nurse, W8GCD, planned to "…expand its horizons and offer a home computer in a kit…." Heath was then a division of multinational firm Schlumberger, Ltd and employed "1,400 persons in a plant in Benton Harbor-St. Joseph, Mich."

Log

K1CZD, Charles, Central Falls, R.I., 21.080
WBØUTT, Sam, Lawrence, Kans., 21.226

July 6

Column 1: Schoolboys track Soviet spacecraft

Class deciphers codes, listens to cosmonauts

At the Kettering Boys' School in Kettering, UK students and teachers monitor Russian space flights and satellites with simple radio gear and basic antennas. Not only are they often first in hearing the USSR's space endeavors' radio signals, but they've had some success in reading their "bleep-bleep code." "In manned flights, some of them [bleeps] represent the heartbeats of the cosmonaut. Other satellites use the bleeps to relay information back to earth."

Log

WB5WJX, Dale, Wichita Falls, Texas, 21.116
WBØGZQ, Evan, Columbia, Mo., 21.086

July 18

'Just fooling around,' he saves crew

In Atlanta, a German exchange student, Christopher Janker, 17, was "just 'playing around' at a college amateur radio station… when he heard a ship captain's call

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and sent help to 11 men trapped on a sinking fishing boat." The 92-foot Panamanian vessel had sprung a leak 220 miles south of Jamaica. Janker, who frequently used the amateur station at Georgia Tech "talking to other ham radio operators," alerted the FCC who in turn alerted the Miami Coast Guard. The 11 crewmen scrambled into two rafts dropped by an Air Force C-130 and awaited boats dispatched to rescue them.

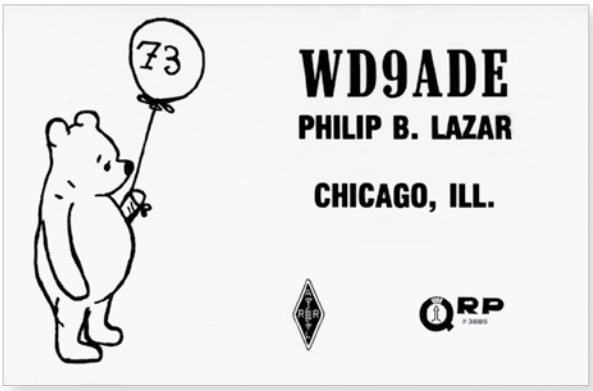
Log

WA2FXQ, Don, Syracuse, N.Y., 21.432 (Sideband QRP QSO! 59 reports!)

July 22

Johnstown's water, mud yield 47 dead; hunt more

In this, Johnstown's third flood disaster in 88 years, the Pennsylvania city's death toll stood at 47 and was expected to rise as rescue crews moved through the city. The disaster's cause was an estimated 50 million gallons of water escaping from the breached earthen Laurel Run Dam.



A spokesman at the Central Area Council of Civil Defense in Selinsgrove stated, "Our only communications is by way of amateur radio operators and that isn't very good." He added that more information was needed from the stricken area so that aid could be directed most expeditiously.

Log

W4MM, John, Albany, Ga., 21.165, club station

August 30

Tempo Topics: Are echoes from space signals from other life?

A lengthy overview of long delayed echoes. Reports of LDEs in 1927 by A.H. Taylor and L.C. Young were followed by the experiments of Norwegians Stormer and Hals in 1928. In 1960 Bracewell suggested they originated from orbiting alien probes positioned near the moon and conflated LDEs with the appearance of UFOs in the late 1940s.

Log

W6INF/MM, Bill, 1,100 miles north of N.Y.C., 21.083 (September 2)

Working maritime mobile stations was a pretty frequent occurrence, not so much today.

October 15

3 Yanks reported safe on seized yacht

Vietnamese gunboats in the South China Sea seized three Americans, a woman and two men, aboard the 39-foot yacht *Brillig* en route to North Borneo. A Thai amateur monitoring the yacht's progress heard the American crew's transmission declaring they had been captured and were under tow, but were safe.

In December American and Vietnamese negotiators announced the captives would be released before year's end.

Log

LA8ON, Rolf, Frederikstad, 21.070
JG1GNE, Uchi, Kanagawa, 21.047
DX was very doable with fewer than five watts and a make-do antenna when propagation was favorable. From this time on I worked numbers of JA stations on 15-meters every evening at sunset in the Midwest.

December 29

Microwaves may aid cancer victims

An Indiana team of medical researchers claimed that "microwaves operating at 433.92 Megahertz, the same frequency assigned to amateur radio use" could relieve "the symptoms of cancer patients." The treatments were administered within the confines of a Faraday cage ("copper-wire mesh enclosure") "to prevent interference with radio signals."

Log

WB9YLS, Bill, Wilmette, Ill., 21.125
WA4CLU, Sereno, Islamorada, Fla., 21.068
VE6PD, Joe, Lethbridge, Alta., 21.056

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Robert F. Heytow Memorial Radio Club

www.k9ya.org
telegraph@k9ya.org