

K9YA Telegraph

Robert F. Heytow Memorial Radio Club

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We Like Ike

Amateur Radio and the Race for Space

Philip Cala-Lazar, K9PL

An examination of President Eisenhower's second term soon reveals amateur radio's intimate association with the early days of space exploration. October 4, 2007 marks the 50th anniversary of the Soviet Union's launch of the *Sputnik I* satellite. Part

of the International Geophysical Year (July 1, 1957-December 31, 1958), this first successful orbiting of an artificial satellite followed two failed U.S. Project Vanguard launches and impelled the "Space Race." The United States eventually countered by successfully lobbing Explorer I (January 31, 1958) and Vanguard TV3 (March 17, 1958) into orbit.

America's love affair with ham radio, a bit marred by fits of TVI and some rash accusations, cruised on. Praise from military brass, public service during emergencies, MARS, communications support of scientific endeavors and human-interest stories flowed unabated from the nation's periodicals. All was not gold, however, as amateur radio was blamed for the loss of an Atlas missile and targeted by a practical joke with international implications.

Here are snapshots from the age of chrome and fins gathered from the pages of the Chicago Daily Tribune and other contemporary sources. (Spelling and grammar as in the original source.)

1957

January 13: HAM OPERATOR REACHES WORLD VIA AIR WAVES

Amateur radio luminary, Fred H. Schnell, W9UZ, (See: *K9YA Telegraph*, November 2005, pg. 7 and July

2006, pg. 7), now retired from Motorola, discussed his historic radio career. Some highlights: he received the first telegraph message between Italy and the U.S. during WWI on January 20, 1918; copied the peace acceptance message from Nauen, Germany on November 10, 1918; and after working 168,000 calls he stopped counting.

May 30: INDIVIDUAL CAN HELP SELF IN H-BOMB BLAST

Amateur radio is included amongst entities serving the nation's civil defense effort. "Thru the state civil defense agency, 850 instructors and 9,000 radiological defense monitors have been trained in radiological detection in 25 colleges and universities. An amateur radio network is set up to assist civil defense."

August 31: CAN'T FIGHT 'EM, SO WOMEN JOIN HAMS by Frank

Hughes, W9KJ

The Young Ladies' Radio League met at the ninth convention of the American Radio Relay League in Chicago. According to past YLRL president, Cris Bowlin, W9LOY, "About 75 per cent of the girls who got interested in amateur radio and worked hard enough at

"...marred by fits of TVI..."

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Two Meters the Hard Way

Adam Farson, VA7OJ/AB4OJ



BC-625 RCVR
Front and Top Views

Nowadays, radio amateurs wishing to operate on 2m have it easy. For basic FM operation, one need only purchase a handheld or mobile, program it on local repeaters and a few simplex channels, and get on the air. The more technically inclined can still pick up a surplus LMR (land-mobile radio) unit and reprogram or convert it.

In the early 1960's, when I was first licensed as ZS1ZG,

access to the 2m band was a much more daunting proposition. Virtually all amateur 2m operation was still AM, and the usual station consisted of a crystal-controlled transmitter and a down-converter supplying a 28 MHz IF to the HF station receiver. Very little commercially-manufactured 2m gear was available to ZS hams; the Heathkit "Twoer" (a.k.a. "Lunchbox"), with a crystal-controlled transmitter and super-regenerative receiver, was reasonably priced and quite popular.

LMR equipment was all FM, and was extremely expensive; there was no land-mobile surplus to speak of in South Africa. U.S. and British WW2 military surplus VHF airborne sets were on sale at surplus stores; these were quite well-designed, used top-quality components and lent themselves well to conversion.

The USAAF SCR-522 VHF AM transmitter/receiver covered 100-156 MHz. Large numbers of these sets were installed in USAAF and RAF aircraft, and were released on the surplus market at war's end.

In its original form, the SCR-522 was not very suitable for amateur use. The 8W transmitter had poor modulation quality, and the receiver was very noisy. The crystal-controlled receiver was another obstacle to amateur use.

In 1963, I purchased a 522 in good condition for the equivalent of \$5, and decided on two major conversions: increase the transmitter output to 35W, and make the receiver continuously tunable.

Transmitter (BC-625):

The original TX PA and tripler/driver used 832 double-tetrodes. These were quite rare by the 1960s, and were invariably "soft." So I redesigned the PA around a 5894, which would deliver 30W with ease.

As part of the retrofit, I replaced the tank coil and coupling link and reworked the tank capacitor. The new tank coil was a big hairpin of 5mm OD copper tubing. With 500V B+ at 100mA plate current, power out was 35W into 50Ω and grid current was 2mA.

The tripler/driver circuit was re-tubed with a new 832A—a great improvement over the "stock" 832. Coupling to the PA grids was adjusted for a bit more drive to the 5894. In addition, the multiplier chain was redesigned for higher drive. An 8.055 MHz FT-243 crystal put the transmitter on 145 MHz.

The modulator was totally gutted, and a new one designed and installed. This circuit was a true example of "living on the edge!" It utilized the original modulation transformer and a pair of 6V6GTs in a special high-μ triode connection.

Drive was applied to the screens, with each screen tied to its corresponding grid via a 6.8KΩ resistor. The modulator stage was zero-bias Class B. With 500V B+ (ouch!) the standing current was 5mA. Audio output for 90% modulation was 28W into a 5KΩ load. As the modulation-transformer ratio was 1:(1+1), obtaining 90% modulation was no problem.

It was essential to use glass 6V6GT's; metal 6V6's tended to flash over. "Soft" tubes did not do very well in this circuit either! The modulator tubes withstood 500V without distress, and the SCR-522 modulation transformer took the higher power without any heating or saturation. The earlier stages of the modulator were a 12AX7 speech amplifier and a 6V6GT driver. A dynamic microphone with a transistor preamplifier was used.

*"With 500V
B+ (ouch!)"*



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New T/R and control relays were installed, as well as a netting (spotting) switch. The original autotune mechanism and crystal switch were removed, and knobs fitted to the tuning shafts. The original metering circuitry and meter switch were retained, with an added “Mod Plate” position. This facility served as an excellent tuning aid, with a VOM plugged into the meter socket.

Tuning was rather critical, but fairly straightforward; the highest meter reading always indicated the correct harmonic.

Receiver (BC-624):

The receiver was not modified as extensively as the transmitter. The original crystal oscillator, autotune mechanism and crystal switch were removed, but the squelch circuit (using a 12J5) was retained. The original 9002 harmonic amplifier was converted into a VHF Colpitts VFO. This tunable local oscillator was remarkably stable; over a period of one hour, a test signal did not drift by more than a few kHz. I found that high- and low-side LO injection worked equally well.

6AG5's were substituted for the 9003's in the RF amplifier and mixer, resulting in a marked improvement in noise figure. The 12 MHz IF strip was realigned. The audio chain was re-worked; a 12A6 replaced the original 12J5 output stage, to achieve higher audio output.

Tuning was extremely critical; about 10° of shaft rotation covered the entire 144-146 MHz band! As a result, vernier drives were fitted to the tuning shafts.

The receiver was tested on a vertical dipole; while no amateur signals were heard, copy was excellent with FM LMR signals on 138 and 152 MHz, by using slope detection.

“Tuning was rather critical...”

Power requirements were 500V/200mA for the PA and modulator, 250V/100mA for early TX stages and RX, 6.3V/0.45A and 12.6V/2.5A for heaters and 24V/0.5A for relays. Heaters were AC-fed.

Later on, the fruit of all this effort was a 2m AM QSO with a friend of mine 5 km away. He was using a Heath-kit “Twoer,” also feeding a vertical dipole.

Although the re-worked SCR-522 did not see much actual on-air operation, I felt that the design and construction effort that went into it, and the accompanying learning process, fully justified this project. It awakened my interest in VHF and UHF; this led to FM and repeater conversion and building projects in later years.

Acknowledgements:

I should like to thank Ian O’Toole, VK2ZIO, curator of the Kurralong Radio Museum, for graciously permitting me to use the BC-624 and BC-625 photos from his museum Web site.

Links:

- First Steps in Amateur Radio
- Kurralong Radio Museum (BC-624, BC-625)

Based on Adam’s article, WORK TWO METRES WITH SURPLUS GEAR SCR-522, *Radio ZS*, April 1964 ■



BC-624 XMTR
Front and Side Views

Meet the K9YA Telegraph Staff—On-the-Air

Every Wednesday evening, 2400 UTC, members of the *K9YA Telegraph* staff can be found at 7.121 MHz (plus or minus QRM).

Since its inception, the Robert F. Heytow Memorial Radio Club has been conducting code practice nets. The first Wednesday of the month is our fast net and the remaining Wednesdays are slow nets (we QRS to the slowest op).



The purpose of the nets is to practice our Morse skills and to have fun. We don’t use net pro-signs or complicated procedures—you can’t mess up!

So, whether you’re a hi-speed, lo-speed or somewhere in between speed op, stop by and say hello.

We’re fluent in most dialects—straight key, bug, cootie, iambic and banana boat swing. It would be our pleasure. ■



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Early Radio Detectors

Joe Medsker, K8LKC



There are two basic ways to increase radio communication range. The transmitted power can be raised to very high levels or the sensitivity of the receiver can be increased. The highest hurdle has always been receiver sensitivity. If you think we now consider 50 microvolts is a strong signal, the early radio pioneers had their hands full trying to improve the receiving detectors without the use of amplification.

Marconi was unable to use a basic coherer because of heavy static levels and so used the Castelli coherer for his trans-Atlantic tests.

Magnetic Detector

The magnetic detector works by RF causing a weakly magnetized wire rope to demagnetize. The wire rope is first passed by a permanent magnet imparting magnetism. It then passes through a set of transformer coils. The primary of a small number of turns is connected to the antenna system. The secondary of a large number of turns is connected to headphones. When RF is picked up, the magnetic domains of the wire rope suddenly return to their neutral state. This quickly changing magnetic field induces a signal into the secondary and is heard in the headphones. This detector proved to be very reliable and was the type of receiver used aboard the Titanic when she went down in 1912. It also made possible full break-in operation.

Electrolytic Detector

Another detector of note is the electrolytic detector. This used a very fine wire with the end just in contact with an acid solution. A bias battery voltage is applied across the detector. When the bias is set just right, the action of this detector is much like a crystal diode and creates a rectifying action. Reginald Fessenden used this detector.

When correctly set, it works well and I used one replacing the crystal diode in a crystal set. It has quite good sensitivity.

Fleming's Valve Detector

John A. Fleming invented the Fleming Valve Detector while working for the Marconi Wireless Company in England. Fleming started with Edison's "plate in a light bulb." Edison was trying to prolong the life of the light bulb and found current would flow from the filament to the plate, but not backwards. It did not help with the light bulb and was set aside by Edison. Fleming took it up and made an RF diode detector.

These are but a few of the most common very early detectors. ■

Coherer Detector

The first detector generally used was the coherer detector. This consisted of a small glass tube with metal end plugs. Between the metal plugs was a small amount of iron filings. This device exhibits a peculiar effect. When RF is picked up, the filings stick together or cohere causing the DC resistance to drop to a very low value that could carry a small current to operate a relay.

The relay, in turn, operated a device that tapped on the glass tube to separate the filings and make ready for the next incoming signal. This detector type was used for the first five years or so of wireless. It is a fickle device and hard to keep in adjustment.

The Castelli

Marconi used a Castelli coherer presented to him when he embarked on his mission to span the Atlantic Ocean. This detector uses carbon and iron plugs in the ends of the glass tube. Between the plug ends a small glob of mercury completed the path. This detector cannot operate a relay as the first type, but was self-restoring and did not need a tapper. A sensitive earphone with a battery placed across it made the Castelli a bit more sensitive than the standard coherer.

"It is a fickle device..."

Coherer Detector



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Aim Your Beamers at Shangri-LaLa

Cousin Ernst Gets Even

Rod Newkirk, VA3ZBB/W9BRD

My distant European relative had never missed so many 30-meter skeds in a row. Telephone calls were unanswered. I was about to have authorities check on his wellbeing when an e-mail appeared in my in-box—on hospital stationery. Ernst's prose is somewhat less intelligible than his CW, but I'll quote:

Rodnik, OM, mein loudenboomer ist kaput und der beamer geplunkt. Alles junk geflatten. Neu naber Gottfried auf TVI vas gripen und bitchen. Back auf der sender QRO und klutz still barken und shrieken. Sender shrinken to QRP und komen lauder howlen und yowlen. QRPP und even QRPPP, Gottfried still upjumpen and downjumpen. Mein nerves geschot, I lower der beamer und vacation to Bavaria. Drei weekers komen back, kookoo Gottfried still roaren und pounden door mit ballbat. Was hunkereren in cellar sippen lager und pondereren problem. Den komen black sky mit awful zooperboomer, donder und blitzen. Gottfried got fried mit haus geblazen und blamen mein QRT sender. Dumkopf vas skorcht, gesizzlen und singe-in in der rain. But -- achh! -- der dam ballbat vas still OK. --

You might say that Ernst's lederhosen *vas geshredded*. He must be typing with his toes. I'd better translate

the rest. While his fractures are mending, the neighbor from hell just checked out of the burns recovery unit down the hall.

Ernst heard Gottfried on the phone selling the remnants of his toasted property and making arrangements for a move to Shangri-LaLa, a remote atoll in the south seas. He intends to open a bed-and-breakfast there, strictly for himself. He's also paying a fortune for his own exclusive dedicated satellite TV feed. Gottfried *loves* reality shows.

It's quite well hidden but, thanks to Google, Ernst's radio club finally pinpointed Shangri-LaLa. The island is a cinch for DXCC status now with its new permanent population of one. The whole gang soon heads for the place with several complete stations including QRO microwave.

Ernst won't accompany the DXpedition because there's no room for his casts, canes, crutches, walker and wheelchair. But that's okay. His new VA3ZBB microloop, Der Sportsmeister, gets out great from sick bay, and he's been promised the very first QSO with Shangri-LaLa. ■



Ham Quips

DICK SYLVAN, W9CBT



OTTO, OUR BEST TRAFFIC HANDLER

MFJ Marks 35th Anniversary

This October the *K9YA Telegraph* staff joins the worldwide amateur radio community in congratulating Martin F. Jue, K5FLU, as he celebrates the 35th anniversary of MFJ Enterprises, Inc.

Happy anniversary Martin, and we look forward to your next 35 years of providing hams everywhere with a comprehensive range of useful gear.

MFJ is throwing a party: <http://www.mfjenterprises.com/dayinthepark2007.php>



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it to get a federal communications license got it thru a man." She added, "We are the ones who decided 'if you can't fight it you'd better join it.'" (See: *K9YA Telegraph*, December 2005, pg. 1)

Also in attendance were columnists Eleanor Wilson, W1QON, who wrote "YL News and Views" for *QST* and Louisa Sando, W5RZJ, who penned *CQ* magazine's YL column.

This was one of many articles by Tribune reporter/amateur radio operator Frank Hughes, whose byline included his callsign, W9KJ.

September 1: ADMIRAL HAILS 'HAMS' FOR AID IN THE RADIO FIELD by Frank Hughes, W9KJ

Rear Admiral Henry C. Bruton, director of naval communications, speaking at the ARRL convention said: "When new and fantastically advanced means of communications are developed for both military and civilian use, a radio amateur, or 'ham' probably will be 'at least partially responsible.'"

September 2: GEN. GRISWOLD TELLS WHY HE IS A RADIO 'HAM' by Frank Hughes, W9KJ

Lt. General Francis H. Griswold, vice commander in chief of the Strategic Air Command, is a ham, KØWDC. Speaking at the ARRL convention he told attendees he "...makes time for 'ham' activities by taking along amateur radio equipment to the far corners of the earth." He stressed S.A.C. "...is indebted to 'ham' know-how and inventiveness for developing the



Lt. General Francis H. Griswold

single side-band method of radio transmission..." and "When B52s flew around the world we were never out of communication with them. Single-sideband [sic] made it possible."

October 9: ASK HAMS TO MONITOR SATELLITE'S SIGNALS

The more ears the better. Robert M. Woodward, Illinois Civil Defense director, requested the state's 8,000 hams monitor *Sputnik's* signals and send the information gathered to the Vanguard control center at Naval Research Laboratories, Washington, D.C.

October 20: HAMS CONTACT 100 COUNTRIES BY SHORT WAVE

I'm still amazed items like this appeared in a big city newspaper, but they did.

Sam Lupo, W9GGO, and Adolph Jelen, W9WHY, were awarded membership in the DX Century Club for confirming contacts with 100 of the then 200 DXCC entities.

October 20: CHICAGO AIRMAN LISTENS TO 'MOON' FROM TRIPOLI

Airman Arthur K. Peters, 19, and a ham since age 13, was a television engineer at Wheelus Air Force base, Tripoli, Libya. Peters learned of the launch (*Sputnik I*) during a QSO to the Isle of Man. Tuning to 20.005 megacycles he "...picked up the unmistakable 'beep, beep, beep.'" The airman frequently operates from Wheelus "...contacting numerous foreign countries and making new radio friends."

November 4: RUSSIAN SPILLS 'MOON' DATA TO HIGHLAND PARK 'HAM,' 16

High school junior Fred Asher got the *Sputnik II* scoop from a Russian operator just a few hours after its launch. During the 40-minute QSO Asher learned "the satellite's radio signal over Moscow are 'CW' signals, equivalent to Morse code." Also divulged: satellite's height, 937 miles; orbit time, 102 minutes; and that it carried a dog (Laika) aloft. There was no response to the young operator's query as to the fate of former Russian defense minister Marshal Zhukov.

November 23: AIR FORCE PUTS SODIUM CLOUD 80 MILES IN SKY

Launched from Alamogordo, New Mexico, an Aerobee Hi-Hi rocket discharged a cloud of sodium vapor. Part of "Operation Puff," the exercise aimed to bounce radio signals off ionized clouds. "Scientists theorize sunlight



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has an effect on the ionosphere, an electrically charged layer beginning about 25 miles above the earth.” Hams were asked to take part in the experiment and point their signals at the sodium vapor “Puff.”

1958

February 2: CHICAGOANS FAIL TO TRACK ‘MOON’

Unlike Russia’s two *Sputniks* transmitting with “1 watt” in the “20 megacycle band,” it was tough for hams and SWLs to hear Explorer I. The satellite, weighing 30.8 pounds, transmitted on the “108 and 108.3 megacycle channels” with only “0.6 watt,” frequencies for which, according to an “electronic engineering consultant,” there was “practically no commercial radio equipment” available.

February 9: DID HAM RADIO KNOCK ATLAS OUT OF SKIES?

Did an errant amateur radio signal activate the missile’s self-destruct mechanism? No one knows for sure, but it’s one possibility posited by space agency authorities. The Convair Atlas ICBM was only a few seconds above its Cape Canaveral launch pad when it exploded.

February 14: HAM RADIOS AND MISSILES

Defending ham radio, Joseph H. Heuer, chairman, television interference committee, Midwest V.H.F. Club wrote, “Certainly the scientists who designed the missile were aware of the radio frequency assignments

and should have designed their destruction trigger on a frequency not apt to be jammed. It is just possible that a saboteur could have deliberately triggered the destruction equipment.”

February 16: CLUB DEFENDS RADIO ‘HAMS’ IN MISSILE PROBE

The Chicago Amateur Radio Club Council stepped up to say: “Speculation that the destruction of the Atlas intercontinental ballistic missile may have been caused by interference from ‘ham’ radio signals is almost beyond the realm of possibility.” Their statement continued, “...of about 1,200,000 radio transmitters, less than one-tenth are amateur stations. Interference may also be caused by industrial and medical devices, garage door openers and defective TV sets and diathermy machines.”

April 12: U.S. ACCUSES 3 OF JAMMING SPUTNIK SIGNAL

Three electronics engineers at Hughes Aircraft Company were accused of transmitting hoaxed *Sputnik* signals. Using a transmitter located in the Angeles National Forest, “...signals resembling those of the Russian earth satellite were emitted periodically.” An FCC spokesman said, “...their purpose evidently was to play a prank on amateur radio operators” and that a conviction could result in one year in prison and a \$10,000 fine.

May 15: OAK PARK MAN FINDS 79 BELOW WARM AT POLE

Meteorologist Deewit Brownfield was stationed at an International Geophysical Year research base at the South Pole. His monthly phone-patches, spanning 9,000 miles, to his mother in Oak Park, Illinois came courtesy of Marvin Eichorst, W9RUK. Considering mail was not passed during the long Antarctic winter Deewitt says, “The talks help to make the days go faster.”

May 27: 80 IN. BULLET CIRCLES EARTH EVERY 121 MIN.

Explorer III, America’s third earth satellite, was lofted into orbit aboard a Jupiter C launch vehicle from Cape Canaveral. Its mission, using instruments supplied by Dr. James A. Van Allen of the University of Iowa, was to collect “cosmic ray data.” Hams could monitor Explorer III’s cosmic ray data signal on 108.3 megacycles. A second, 10-milliwatt, transmitter on 108 megacycles transmitted “continuous information on temperature, micrometeorites, and cosmic ray counts.”



Convair Atlas ICBM Launch



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September 14 & 16: "Dick Tracy"

Two British hams helped Sam Ketchum locate Chester Gould's craggy-chinned crime fighter stranded on an island of solid granite!

December 20: MISSILE SENDS IKE'S VOICE

The President's Christmas message carried on the Score (Signal Communications Orbit Relay Experiment) satellite boosted into orbit aboard an Atlas missile on December 18 was broadcast on "132.906 megacycles and 107.77 megacycles." Stored on audiotape, his message was:

This is the President of the United States speaking. Through the marvels of scientific advance, my voice is coming to you from a satellite circling in outer space. Through this unique means, I convey to you and to all mankind America's wish for peace on earth and good will toward men everywhere.

About Project Score the President commented, "That's one of the astounding things again in this age of invention. Maybe the next thing they'll do is televise pictures."

A Signal Corps space communications expert stated "it would be possible for ham radio operators to pick up the... broadcasts direct, but... they would have to be in the right place and have powerful receivers."

(See: *K9YA Telegraph*, March 2004, pg. 1 and listen to President Eisenhower's message from the Hallicrafters recording, *The Amazing World of Shortwave Listening*: <http://www181.pair.com/otsw/Hallicrafters.html> and <http://www.lakeerieba.com/files/HalliTape.htm>)

December 21: VOICE AND CODE RADIOED UP AND SENT BACK

President Eisenhower's Christmas message, in "teletypewriter code" was transmitted to the Score satellite, recorded on audiotape and retransmitted to earth where stations in Texas and other southern states converted the RTTY signals back to text. Next, a voice message was sent to the onboard tape recorder and retransmitted when "interrogated" by the station at Fort Sam Houston. Predictions of global TV signals via satellite are forecast.

"Ham radio operators (equipped with "powerful receivers") can receive the tracking signals only when the satellite is above the horizon and a ground station is interrogating Atlas."

1959

July 9: 5th ARMY STATION TESTS RADIO SKILLS

Field Day through the decades: the gear and personnel change, but not the pesky mascots. Fifth Army MARS

group, using callsign W9USA/9, participated in FD. Situated in a barn, one operator complained, "The only thing that bothered us was the bugs last night. We put rags around the lights. We could barely see."

1960

March 7: TEENAGE HAMS BEAT EXPERTS

Two teenage hams, Raphael Soifer and Perry Klein accomplished "...what may be the first successful two-way radio communication aided by artificial satellites." The moment came when they bounced their signals off Explorer VII (*Sputnik III* was nearby on the same pass) then in low orbit and passing some 150 miles east of Atlantic City, New Jersey. Using a prearranged code on "21.011 megacycles with a power of about 300 watts" Soifer (N.Y.C.) detected Klein's (Bethesda, Md.) signal on their 35th attempt. "I noted the characteristic flutter and some slight Doppler shift (change of pitch), indicating that the signal was being bounced from a moving target, Soifert [sic] said."

May 9: HAM TO SET UP RADIO STATION ON BARE ISLE

Frank Kashinski, 28, of Delevan, Wisconsin, planned a five-day DXpedition to Malpelo Island, HKØ. This was the first amateur radio operation on the uninhabited island located 250 miles off the coast of Colombia. The Swanee Radio Club, headquartered in Harvard, Illinois, sponsored the endeavor.

May 24: LEARNING TO TRACK SATELLITES

Chicago's Adler Planetarium planned to assemble a team of 50 volunteers for a "satellite observers group." The volunteers, comprised of "Chicagoans with electronic or ham radio experience," will track American and Soviet space satellites using "complicated electronic equipment; a National HRO-60 is depicted in the photograph accompanying the original article.



July 3: ELECTRONICS FIRM SLATES SHARE ISSUE

Hallicrafters, for only the second time in its history issued shares, this time 300,000 shares of common stock. ■