ANDEX INTERNATIONAL

Volume 22, No. 3
May-June 1995

INSIDE:

Overnight ... at 13,000 feet

by Eddie Lent

Matt Hobbes, Ken Baker and I--all HCJB working visitors--set out early that Saturday morning for a day hike up Pichincha, the mountain that "lords" over Quito. Having been Boy Scouts, we were longing for some exciting hikes during our short time in Ecuador. We spent the morning walking the 11-mile (18-kilometer) winding road up to HCJB's transmitters and around noon were afforded an awesome view of Quito. The entire city of 1.5 million was spread before us.

Deciding to push on a bit further before we stopped and ate lunch, we hiked for almost another two hours, stopping every once in awhile to take "mom-scaring" photos.

It was the first day of the rainy season, and we enjoyed walking through the silent fog and the tall whispering páramo *grass. It reminded me of the haunting, lonely sound of the Andean flute.*

HCJB's crew raises an AM tower on Mt. Pichincha.

We were almost at 13,000 feet (4,000 meters) when the rain turned into hail squalls. Over the ridge there were some interesting rock formations, and we took a side trip to have lunch and investigate. Enjoying our sandwiches, water and the silent mountain fog, about 2 o'clock in the afternoon we finished and decided to retrace our steps for the long walk home.

"Hey, you!" a short Ecuadorian, with a mask, called out above us. He was coming toward us carrying a gun! My first thought was that we had ended up on his property and he wanted us to move. He was saying something in Spanish that I couldn't understand, but as he came closer I got a feeling that his intentions were not friendly.

"Umm, guys, I think we're being robbed," I stated matter-of-factly. The man walked towards us brandishing a small revolver and a sawed-off shotgun. He made it known what he had come to do by aiming the shotgun and ordering us to lie on the ground. Thirty minutes later he left with all our survival gear, including our coats,

(cont. on p. 3)

DXer of the Month

Congratulations to **Keith Hammond** (ANDEX # 8883), **Dxer of the month!**

"I am 29 years old," Keith writes, "and have been DXing on SW for about three years. I work as a chef three days a week and try to do possum hunting for pelts the rest of the time, for extra income.

"I use a Sangean ATS 803A radio with a longwire antenna. One thing I enjoy about SW listening is that it is an easy way to learn about different countries.

One of my CB radios *(see photo)* I use for SSB and the other for listening to boat traffic. With both, I can listen to two channels at once. Below, to the left *(see photo)* is a cassette recorder. I don't seem to get to listen much in the summer as there is too much work to do outside, so, hopefully, as winter makes its way, I may be able to do more DXing."

If you'd like to contact Keith, his address is: Keith Hammond, 42 Thatcher St., Wanganui 5001, New Zealand.

Keith Hammond, with his daughter, Kelly.
His Sangean radio is in the middle of the two CBs.

My Favourite QSL

***Tarun Sethi** (ANDEX # 6874), describes his favorite QSL:*

"The South American continent has always attracted me, and this attraction has been in every field ... from my studies to radio listening. Frankly, I feel if HCJB hadn't been on the bands, I would have been totally cut off from South America and wonderful Ecuador!

"One lucky day I heard about *Ecos del Torbes* on a DX program via Radio Sweden. I tried for 10 weeks but couldn't log it. But on Nov. 3, 1988, around 0515 (local time), I picked up a weak signal, which turned into a bit stronger one after a few minutes. I was using an analog CROWN CSC-955 RX Receiver and recorded all details.

"But getting through to this station was difficult as no address was announced, and a copy of WRTH was not available in India then.

"Therefore, I contacted the Venezuelan Embassy in New Delhi, and they helped me out. Thus, I received my verification letter.

"This is my favorite QSL because first, it is from a South American country. Secondly, picking up a signal from such a station is very difficult." In addition, Sethi feels he is one of a small number in the Asian region who has this verification letter.

"I am using a SIEMENS RP-647 Digital Rx for DXing," he adds.

Overnight *(cont. from p. 1)*

indicating that we were to return to Quito by way of a steep ravine.

Boy, were we relieved when we started our journey down! All I could do was laugh to relieve the stress. It is not often I look down the business end of a shotgun from 15 feet (5 meters) away! We stopped and thanked God for our release, asking for a safe return to Quito, and walked down the ravine until we came to an impassable waterfall. We tried several different other routes and each time came to a dead end. By this time night was coming on, the fog was extremely thick, and we were all shaking badly from the cold. Jeans and a shirt don't provide much protection at 13,000 feet (4,000 meters)!

The city of Quito, approximately 3,000 feet below HCJB's AM and FM.

Eddie Lent

Deciding to try to retrace our steps entirely, we started back up the ravine, stumbling blindly in the dark, splashing through waterfalls and the stream that followed the gulch, retracing what took us only two hours in the daylight. Exhausted, we made it to a spot where we guessed we had met our unfriendly Ecuadorian earlier that afternoon. Deciding to try to find a place to spend the night, we felt around, encountering a small depression in the cliff ... almost big enough to accommodate the three of us side-by-side. The sparse Andean grass provided some insulation and a bit of padding. We spent the night huddled together, trying to extract as much warmth as we could from each other and doing jumping jacks to try to stop our shaking.

During the night the clouds finally parted, offering an awesome view of the stars. We were away from the pollution of Quito, and the high altitude made the stars stark and bright.

As soon as it was light, we began walking toward HCJB's AM transmitters. The sun was such a welcome sight and so warm! The Andean highlands are beautiful in the morning. Quito was far below us under the clouds, and we could see three other famous mountains--Cotopaxi, Antisana and Cayambe--in the distance. The world was clean and wet. As if in a fairy tale, a black horse appeared out of the fog and then disappeared again. Not long after we reached the transmitter, a rescue party from HCJB showed up, bringing much-needed sandwiches and juice, and, most importantly, a ride home!

"Two are better than one, because they have good return for their work: If one falls down, his friend can help him up. But pity the man who falls and has no one to help him up! Also, if two lie down together, they will keep warm. But how can one keep warm alone? Though one may be overpowered, two can defend themselves. A cord of three strands is not quickly broken" (Ecclesiastes 4:9-12).

Eddie Lent is a working visitor with HCJB's information systems department.

A unique "radio" rug

by Mary McVicar

When he was a young boy, Richard was always excited when he received QSL cards, so I decided to hook him a "radio rug." How was I to go about getting all those wonderful pictures and symbols together? I remembered that in a Woman's Day magazine (May 1971) there was a picture of a rug in the Beauport Museum in Massachusetts (U.S.A.). The rug contained a collection of signal flags and Indian and other signs that might have been of interest to inhabitants of a New England fishing village.

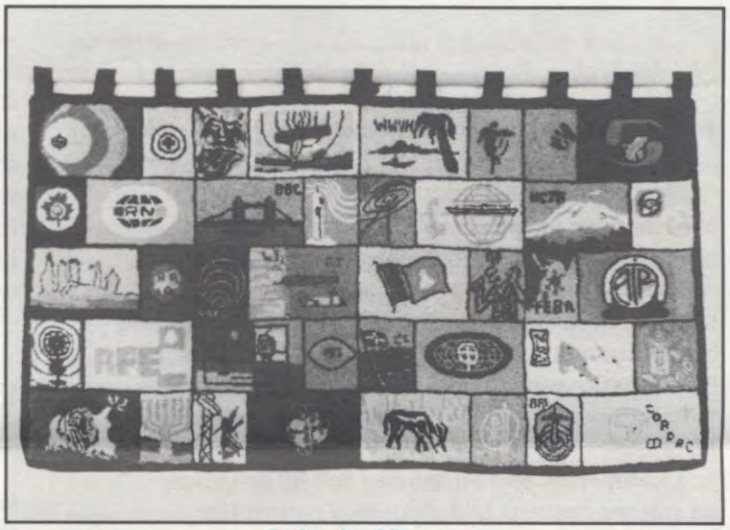
Mary McVicar

Using this idea, I drew out, in pencil and on burlap, a rectangle 42" wide x 22½ " high. This I divided into 40 rectangles:

20 rectangles - 4½" high x 7" wide

20 rectangles - 4½" high x 3½" wide

In the large rectangles, I copied some of Richard's favorite QSL cards. The smaller rectangles contained parts of cards, letterhead symbols, insignia, etc. Some were so tiny (e.g. letterhead of All India Radio) that they were enlarged many times. Since Richard insisted on using authentic colors of the cards, using my woolen scraps and dyeing more wool I was able to complete the rug in 1978.



Richard's QSL rug.
The old art of rug hooking uses a hook to pull woolen strips up through burlap or other woven foundation and loops are formed on the surface.

Richard's mother, Mary McVicar, has been hooking rugs since 1970 and is a member of the Ontario Hooking Craft Guild, the Rug Hooking Guild of Nova Scotia and the Association of Traditional Hooking Artists. She earned her Ham Radio License (VE3SYP) in April 1991.

If you would like to write to Mary, her address is: Mrs. Mary McVicar, P.O. Box 1048, Prescott, Ontario, KOE 1TO Canada.

Person to Person

Quito is surrounded by glacier-covered mountain peaks which glisten in the bright equatorial sun. Cotopaxi, the second highest peak in Ecuador, rises from its location about 30 miles (50 km) south of the city. Under the full October moon, I joined a party of six men to face the challenge of climbing the peak. We arrived at the national park at sunset and ascended to the mountain refuge during the early evening.

Sleep did not come easily at an altitude of 16,000 ft., but fortified with some rest we left the refuge at 1 a.m., reaching the glacier within an hour. Donning our ice crampons and roping ourselves together, we continued the breathtaking ascent, plodding up the precariously steep slope of the snow-covered glacier. Our courage was challenged when we crossed an ice bridge spanning a deep crevice. As we climbed through the night we looked down on the lighted city of Quito in the distance. At daybreak we marveled at the beauty of the rising sun reflected from the surrounding glacier-covered peaks.

Bruce Rydbeck, engineer

Several of our group experienced altitude sickness, and our water bottles froze. One of our partners, in his early 20s, became quite ill, but determined to make it to the top, he left his pack behind and almost crawled up. My feet were rubbed raw from the rented boots I wore.

At the top of Mt. Cotopaxi!

By 10 a.m. we finally reached the summit. The exhilaration of that spectacular view at 19,347 ft. above sea level and conquering that difficult climb are etched in my memory forever. I am glad for the unique opportunity to make the ascent, and I am more than ever impressed with the immensity of God's creation.

- Bruce Rydbeck

Antenna "notebook"

by John Beck

There have been many advances in the field of electronics throughout the past 10 years, not to mention the past 50! But, interestingly enough, there haven't been that many dramatic advances in the field of antennas. If we were to compare an antenna text of 20 years ago with one today, we wouldn't find many differences. There would be new materials to use and new twists on old designs, but the basics would remain the same. Yet, one of the most misunderstood area of electronics is *antenna theory.*

Exactly what does an antenna do? By definition, an antenna converts high frequency current into electromagnetic waves during transmission, and vice-versa for reception. Whenever a circuit is intentionally designed so that some of the energy escapes in the form of electromagnetic waves, we have an antenna.

There are three main elements of an antenna system: the transmission line, the antenna itself, and the transmission path.

EMF Wave Fundamentals

An electromagnetic wave consists of an electric field traveling at right angles to a magnetic field. In order to help you see this, you might want to draw a sine wave (which looks like an "S" lying on its side) on a piece of paper. That represents one cycle of the electric field. If you were able to draw in the third dimension--another sine wave at right angles to the first--the second wave would represent the magnetic field. That diagram would represent a vertically polarized electromagnetic wave. These waves spread out like ripples in a pond after a pebble is thrown in.

There are at least two ways to view these waves. One method is described as a *time domain* representation. This is the type of display we just described and the same type you would see on an oscilloscope. The vertical or x-axis represents the amplitude or strength of the wave. The horizontal or y-axis represents the passage of time. A calibrated oscilloscope will have both of these axes marked off (usually in centimeters), with each vertical division representing so many volts or parts of a volt and the horizontal scale representing so many parts of a second per division.

Another way of representing an electromagnetic wave is called *frequency domain*--the type of display a spectrum analyzer uses. The vertical scale still represents the amplitude of the signal, but the horizontal axis represents various frequencies. A pure sine wave will show up as one straight vertical line. A pure square wave will show up as a strong vertical line at the fundamental frequency, with correspondingly weaker (or shorter) lines visible at each odd harmonic. A sawtooth wave would have both odd and even harmonics.

Frequency and Wavelength

The radio wave that we described has certain characteristics. We know that in free space this wave travels at the speed of light (i.e. 300,000 km or 186,000 miles/sec.). That means it will travel 300 meters in just 1 *us (*or microsecond). This wave will have a certain frequency, expressed in cycles per second (or *hertz,* named after the German physicist Henrich Hertz). That means so many cycles will pass a given point in one second. Each cycle will have a certain length. Usually this wavelength is measured in meters. Therefore, we refer to the 80 or 20 meter bands. The full length of the wave at those frequencies is 80 or 20 meters in length. There is a mathematical relationship between these characteristics. The wavelength of this particular electromagnetic radiation is equal to 300,000 divided by the frequency in kHz. (Wavelength is often referred to by the Greek letter *lambda* while frequency is abbreviated *"f.")*

We can also determine the frequency by measuring the time it takes for the cycle to pass a given point. In this case, frequency equals 1 divided by the time in seconds. If we know that a given radio wave passes a given point in 28 tenths of a second, then the frequency is around 3.571 MHz. Another wave passing a given point in 48 hundredths of a second must have a frequency of approximately 21 MHz.

The nice thing about these formulas is that you can rearrange them quite easily. If you know the wavelength you can determine the frequency by swapping the two. Likewise, if you know the frequency you can determine the time it takes for the wave to pass by a given point by swapping the two and dividing 1 by the frequency in MHz (if you want your answer in seconds).

One other note about wavelength. You'll often hear hams talk about a half wavelength or one-quarter wavelength. This is because in antenna applications we often work with submultiples of wavelength.

(cont. on p. 6)

Antenna "Notebook" *(cont. from p. 4)*

Radio Bands

The frequencies we've been chatting about range from 3,000 hertz (or 3 kHz) to several thousand million hertz and even higher. Imagine with me a very long measuring stick. Instead of being marked off in meters or inches, this measuring stick is marked off in hertz. We call this the *frequency spectrum*. Most of us are familiar with the AM, FM and TV bands which are used mostly for local broadcasting. These are actually just small sections of the entire radio frequency (or simply RF) spectrum. In a similar manner, the RF spectrum is just a small band in the entire electromagnetic spectrum which includes even light and heat waves. The main difference between all of these waves is their wavelength of frequency.

The eight bands of frequencies which concern radio and television start with the VLF or very low frequency band. This includes everything between 3 and 30 kHz. (Remember that *kilo* means thousand, so 3 kHz equals 3,000 hertz or cycles per second.) Within this band are located transmissions dealing with radio navigation for the maritime and aeronautical services. There are three bands below this, including the VF (Voice Frequency) and ELF (Extremely Low Frequency bands), but these are usually not considered RF bands. The 30 to 300 kHz band is called the LF or Low Frequency band. Next comes the MF or Medium Frequency band of 300 to 3,000 kHz. Standard AM broadcasting takes place within this band. Most shortwave broadcasting takes place within the HF or High Frequency band of 3,000 to 30,000 kHz. At this point, since numbers get so large, we start speaking of *megahertz* (or millions of hertz). The VHF (Very High Frequency) band extends from 30 to 300 MHz. A lot of fixed and mobile services share this portion of the spectrum. UHF extends from 300 to 3,000 MHz. Television broadcasting shares this space with other services. Again, to keep the numbers manageable, we switch from MHz to *gigahertz* (billions of Hertz or 1 thousand million hertz). The SHF band ranges from 3 to 30 GHz, where much satellite communication takes place.

Finally, the EHF band extends from 30 to 300 GHz where radio astronomy is allocated. Just beyond this radiospectrum lies the infrared spectrum which extends even further up in frequency. Since the numbers are very large, most scientists measure this area above the EHF band in terms of wavelength. (As a carryover from early days of radio, sometimes portions of the HF spectrum are referred to as the 80 or 20 meter bands.) Beyond the infrared lie visible light waves, and still higher are the ultraviolet waves, X-rays, Gamma rays, and even farther, cosmic waves, which come from outer space.)

Ham Band Allocations

Although the frequency spectrum is divided up into the various bands we described earlier, we still can't just turn on a transmitter and operate "merrily away." The result would be chaos. Instead, the International Telecommunications Union (ITU, a branch of the United Nations), has assigned blocks of frequencies to various types of users. Aeronautical, maritime, local and international broadcasters all have their sections on the band. Sometimes this assignment is given on an exclusive basis while at other times two services must share the same frequency area.

Amateur radio operators have been given the following bands. On the low end of the frequency spectrum is what is known as the 160 meter band. (Although there are lower bands which experimenters can legally transmit on, such as the 1,750 meter band, they do not require a license, but simple adherence to rules limiting their emissions.) The 160 meter band covers from 1.8 to 2.0 MHz and is the least affected by the 110-year solar cycle. Even during years of low sunspot activity, the MUF (Maximum Usable Frequency) does not usually drop below 4 MHz. As a rule, the band is often confined to ground-wave or single hop contacts of 1,600 km (1,000 miles) or less. However, on some occasions, contacts of 16,000 km (10,000 miles) have been made. The band was very popular before World War II, but interest usage fell off during the sharing of the band with megawatt LORAN stations. Now that these have been phased out of service, coupled with the increased use of solid state rigs which include the band, 160 meters is seeing a revival of use.

You should be aware of a gentleman's agreement to leave 1.830 to 1.850 MHz open for use as a DX window (i.e.: intercontinental contacts only).

(To be continued next issue)

John Beck is director of International Radio at HCJB.

ANDEX INTERNATIONAL
is the official bimonthly publication of *Andes DXers International,* a listeners' club operated in conjunction with the DX Partyline broadcast on HCJB.

ANDEX Managing Editor Ken MacHarg
Editor Ruth Ann De Flon

World Radio Missionary Fellowship, Inc., P.O. Box 39800
Colorado Springs, CO 80949-9800

HCJB, Casilla 17-17-691
Quito, Ecuador