



# ANDEX INTERNATIONAL

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# Flaviano

by Karen Mace

Flaviano staggered up the dirt path to his home. His wife, watching covertly from the only window in the one-room *choza*, felt a sickness wash over her as she anticipated the beating that would inevitably come. The shouts and profanities began even before he stepped in the door. She covered her ears as much for protection as to cut out the horrible sounds.

The next morning Flaviano awoke with a horrible headache, and remorse filled him as he looked at the bruised countenance of his wife. With a cry of, "God, forgive me," he leaped from his bed and quickly dressed. There began his search.

"I knew in my heart that what I was doing was wrong," says Flaviano, "but I couldn't stop." He sought God through pilgrimages to various shrines, going from one virgin saint to another, seeking God and never finding Him. Each time, after leaving gifts and beseeching the virgin's intervention in his life, he fell back into his old ways.

"I'd had enough after trying to find God via the *Virgin of the Bridge*," comments Flaviano. As he went down into waters which were to cleanse him of all sin, he slipped and almost knocked himself out on a large rock. He decided then that he would give up searching.

A short time later, Flaviano traveled to a nearby town. As he walked through the town square, he noticed a man seated on a bench. The man was listening



*Food! Food! Food! Flaviano's concern is that people also be fed spiritually. That's why HCJB missionaries Karen Mace, Américo and Kathy Saavedra (above, left to right) recently met with Flaviano and other church members, giving them scriptural advice on the family.*



to a radio. As Flaviano passed by the bench he heard

(cont. on p. 6)



# Antenna “notebook”

## Isotropic Antenna

(cont. from ANDEX, July-August 1995, Vol. 22, No. 4)

The first antenna we will look at doesn't exist. Such a theoretical antenna might not seem valuable, but there are cases where it comes in very handy. You may recall that we said the decibel is a measure of change (not a measurement of power), with two powers always needed for the calculation. We also mentioned that one of the powers can be assumed as a standard against which other powers can be compared and converted to decibels. The **isotropic radiator** is that standard.

Most antennas have gain (for example, they radiate more energy in certain directions than others). Even the simple dipole exhibits some directivity. By definition, the isotropic antenna radiates uniformly in all directions. It might be thought of as a point source of radiation within the center of a sphere. The sphere represents the RF energy being emitted. Since the radiation from an isotropic antenna is uniform in all directions, its gain equals one.

While this theoretical antenna cannot exist, it gives us the standard against which we can compare real-life antennas. The accuracy of such a measurement is greater than if we would simply compare the test antenna against a dipole.

## Antenna Efficiency

One of the basic characteristics of an antenna is efficiency. This is the relative ability of an antenna to convert RF energy from a transmitter into electromagnetic waves. Not all of the energy fed to the antenna will be radiated. Let's take as an example the half-wave dipole we spoke of earlier. The half-wave dipole probably has the highest efficiency of any antenna around. At its resonant frequency, the impedance of that dipole in free space is about 70 ohms. Of that figure, the radiation resistance is about 68 ohms. The ohmic resistance (the actual resistance of the wire) is around 2 ohms. We can consider the reactance to be negligible, or zero ohms. That makes the antenna efficiency around 90 percent.

As the antenna size is decreased, the radiation resistance drops, and the ohmic resistance rises. That results in the antenna efficiency dropping as well. For example, a mobile whip for 80 meters is a terribly inefficient antenna. Most of the power is dissipated as heat in ohmic losses (mostly in the car body and frame), with

very few watts being radiated. Also, if the antenna is too long for the frequency, inductive reactance increases. Conversely, if the antenna is too short, capacitive reactance increases. The presence of nearby objects will also usually lower the impedance.

## Antenna Gain

Remember that we described the decibel as a measurement of change or a comparison of powers. Later we spoke about the isotropic antenna--a theoretical one that has no gain (for example, it radiates equally well in all directions). Any other antenna will exhibit some sort of gain (for example, an apparent increase in power). However, some antennas are such poor performers they actually exhibit a negative gain--in other words a loss!

The half-wave dipole in free space will exhibit a gain of 2.14 dBi (a decibel gain as compared with the isotropic reference antenna). The gain will be in the directions broadside to the antenna and will form a figure-8 pattern. (This is referred to as a *broadside array*. Antennas that have the pattern coming off the ends are referred to as *endfire arrays*.) This means the antenna will focus the transmitter power to the extent that it seems as if the transmitter power is almost doubled.

Two dB figures you might want to remember are 3 dB and 10 dB. A power increase of 3 dB means a power factor increase of two times. A power increase of 10 dB means a power increase factor of about ten times. Again, note it is important to know what the quoted antenna gain is being referenced against. For example, a typical 3-element beam has a gain of around 7 dB as compared to a dipole. However, if the same antenna is compared to an isotropic antenna, the gain figure increases to 9.2 dB. The antenna is the same. It's the reference that has moved! One should also remember that fractional dB figures are sometimes difficult to prove, much less measure. This power gain is achieved by controlling the amplitude and the phase of the currents in each one of the elements through two means: (1) Connecting the transmission line to one driven element. All other elements (if present) are considered parasitic and by their proximity are coupled to the driven element. (2) One can also connect all of the elements to the transmission line and control their currents through one or more phasing networks.

(cont. on p. 3)



## Antenna "Notebook" (cont. from p. 2)

### Polarization

The radio wave we are trying to either intercept (on receive) or emit (on transmit) is going to exhibit a certain polarity. Remember that we earlier described an electromagnetic wave as consisting 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 (that looks like an "S" lying on its side) on a piece of paper. That would represent 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. If the electric component of the wave front were horizontal with the magnetic component vertical, then we would have a horizontally polarized antenna.

Generally speaking, communications are better when stations with like antenna polarizations are transmitting to each other. On HF this is not always the case since the signals coming from multiple refractions tend to have random and constantly fluctuating polarizations. Some hams can switch between vertically and horizontally polarized antennas to choose the strongest signal. The higher you go in frequency, the more critical antenna polarization becomes. At VHF frequencies, a mismatch in polarization can create an 18 to 36 dB difference in signal strength. In fact, when one gets into satellite communication, the antennas utilized are circularly polarized to reduce polarization shifts going to and from the satellite. On geostationary commercial birds (satellites), two users can use the same channel without any co-channel interference. The difference is solely in the polarization being utilized.

*John Beck is director of International Radio at HCJB and holds amateur radio licenses HC1QH and WBORXL.*

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## DXer of the Month

Congratulations to **Larry Dean** (Andex # 9046), **DXer of the Month!**

"Today is a special day for me," Larry writes. "I am 61 years of age. And also today I received a letter from Andex International, with a membership card included. I think it's something to be proud of!"



*Larry Dean*

"When I was attending Moody Bible Institute--between 1955 and 1957--some missionaries in Ecuador were killed by the Auca Indians, and HCJB was the closest radio station to the incident at that time. That's what attracted me to listening to HCJB.

"I am not working per se as I am living at the Grand Rapids Home for Veterans. Each one of us, as members here, have to be a veteran of a U.S.A. military service, so I am living on my veteran's pension.

"I'm interested in some things besides DXing/SWling: photography, helping people through the Red Cross and a few smaller items.

"I presently have a Radio Shack DX 390 and a Radio Shack amplified indoor antenna and scanner.

"Andex International is the first club I've belonged to. As a retired person, I can honestly say that DXing/SWling has brought more enjoyment into my life because of being able to hear of different happenings throughout the world."

*If you'd like to write to Larry, his address is: Larry Dean, 3000 Monroe Ave. N.E., Grand Rapids, MI 49505, U.S.A.*

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# Nuts and bolts of HCJB

by David Sawatzky

**H**CJB World Radio's shortwave broadcast site, located just outside the town of Pifo, Ecuador, maintains a collection of 11 high-power transmitters and 32 antenna arrays, used to effectively beam the gospel in 16 languages, plus a number of dialects, throughout many parts of the globe. This makes HCJB one of the largest shortwave broadcasting facilities in the world. Transmitter powers range from 10 kilowatts all the way up to 250 kilowatts, with the average being about 100 kilowatts.

Six missionary engineers reside on or nearby the site in order to make sure that all transmitters and antennas are kept in an operational state 24 hours a day.

HCJB provides a total of 220 broadcast hours daily, with as many as six programs being aired simultaneously. The key to being able to provide such a full programming schedule is that HCJB produces its own electricity. The hydroelectric plant, in Papallacta, is capable of producing almost six megawatts of essentially free power, which makes it feasible to run a large number of high-power transmitters simulta-

neously.

Although a few of HCJB's transmitters are 20 to 30 years old, others are new and very much on the cutting edge of technology, using computers to control them, providing maximum efficiency.

HCJB produces its own shortwave transmitters at a plant in Elkhart, Indiana. Three of these transmitters are already in service in Pifo, and one more is on the way later this year. The engineering team there have also sold two of their HC-100 transmitters to other mission organizations.

God has richly blessed HCJB with the resources and expertise to cover many parts of the globe with the gospel via shortwave.

*David Sawatzky is an engineer at HCJB's antenna site in Pifo.*



# Waterfall Way

by Allison Pollock

“Waterfall Way” might be the most appropriate term to describe the road to Shell, at the edge of the Ecuadorian jungle. That’s where HCJB’s Hospital Vozandes-Shell is located.

Along the way I saw incredibly beautiful waterfalls. Sometimes I even felt I could put my hand out the window and catch one. Looking down into the gorge on our right, I could see even more. Often times the falls appear to be coming right out of the mountain, with no visible source of water--just mighty forces spilling over the mountains and into the valleys.

The small town of Shell, named for Shell Oil Company which opened an oil exploration camp nearby in the 1940s, is unique. I don’t think I’ve been in a place where the contrasts are so distinct from one side to the other. Shell’s population of almost 5,000 is 50 percent military personnel. Military fences on one side of the street show structure and formality. Walls are tall and uninviting. But the little shops across the street are open and inviting--a place where strangers are usually welcomed with a smile.

As I toured HCJB’s Hospital Vozandes-Shell, I was impressed. It’s very clean and modern. The staff does everything they can to help their patients. They’re dedicated to the well-being of everyone they serve. In Ecuador, people with disabilities are looked down on, and there is no welfare. In the eastern jungle, where most of the patients come from, it’s hard for people without limbs to earn a living for their families. Therefore, everything is done to avoid amputation.

Patients don’t always have cash to pay for medical services they’ve received. Instead, they donate a chicken, monkey, fish, or any other animals of value; then these animals can be sold or used to feed other patients in the hospital.

HCJB’s guesthouse in Shell is a great place to go! I really felt welcome as the hosts went out of their way to help. Some of us went on a hike, and we knew we’d miss lunch. No problem. When we got back, there was bread and bologna to make sandwiches, and a pot of hot potato soup. To top it off, there



*A typical waterfall on the road to Shell.*

were plastic cups with rhubarb crunch and whipped cream, which we took with us on the trip back to Quito.

*Allison Pollock was a summer missionary in HCJB’s public information department during June and July.*



*HCJB nurse Jill Prinsen cares for a young patient in Hospital Vozandes-Shell.*



## Flaviano (cont. from p. 1)

Flaviano passed by the bench he heard someone on the radio talking about a wonderful book that had the answer to life.

"Is that the book this man is speaking of?" he asked the person seated next to the radio. He was reading a green book.

"Oh, no," was the response. "This is about keeping bees. That man is talking about the Bible."

This was very confusing for Flaviano. "Where can I get one of these books?"

"Well," said the man, "there are two kinds--the Catholic one and the evangelical one, and they are very different."

Flaviano had heard about evangelicals and was not sure he should have anything to do with them. He asked where he could get a Catholic one. The man directed him to the local priest.

"Of course I can sell you a Bible, but it won't do you any good," the priest told Flaviano. "Only the priest can interpret it. Nevertheless, if you want one, you'd better buy it from me. The evangelical one is of the devil and will teach you only how to serve the devil. The Bible will cost you 700 sucres." Then, in 1969, 700 sucres was the price of a cow, and Flaviano couldn't afford to sell one of his cows to buy a book. He vowed he would stop drinking and save his money.

On his next trip to town, Flaviano came across a man selling books. When he checked, he discovered--to his joy--that they were Bibles. He dared ask the price and couldn't believe his ears when he was told, "Fourteen sucres." Even though the priest had told him it was the devil's book, Flaviano knew he had to try it.

He began to read on the way home. "Nowhere could I find that it said I should follow the devil," he says. "In fact, it was quite the opposite. I was seeing God revealed to me there."

It was HCJB that Flaviano heard on that decisive day, and he is grateful that although he had given up on finding God, God had not given up on him.

*Karen Mace is an English program producer in HCJB's English Language Service.*

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