ANDEX

INTERNATIONAL

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IONOSPHERIC RADIO PROPAGATION

by Jim Heck
HCJB Engineer, Pifo

In last month's ANDEX issue we began with an introduction to inospheric radio propagation. In this issue the subject of the normal structure of the inosphere will be treated.

As the sun's ultraviolet rays strike the air molecules in the upper reaches of our earth's atmosphere they impart energy which causes the air molecule to become ionized, breaking apart into free electrons and positive ions. Because the density of air molecules is so low the rate of recombination of these charged particles is slow. The continual bombardment by the sun's rays producing new ions and electrons and the slow recombination of these charged particles cause the upper regions of the atmosphere to take on the characteristics of a charged layer. This layer is called the inosphere. The inosphere is not, however, a single layer but is composed of series of layers of varying densities of ionization occurring at different altitudes above the earth's surface. Each of these layers will now be described in the order of increasing height.

THE "D" LAYER

The "D" layer is found between 30 and 50 miles above the earth's surface. It is strictly a daylight phenomenon and disappears completely at local sundown. The major effect of the "D" layer is to absorb radio signals which pass through it. During sunlight hours the "D" layer effectively absorbs lower frquency signals (.5 to 4mHz) preventing them from reaching targets which require sky wave propagation. This is the reason that no DX signals are heard below 10 mHz during most of the daylight hours.

THE "E" LAYER

The "E" layer is the next highest ionized layer and is found at a height of 70 miles. As with the "D" layer, the "E" layer is mainly a sunlight phenomenon and exists only during daylight hours. The inoization level in the "E" layer reaches its highest level around noon local time. At these times the "E" layer is capable of reflecting signals in the 6 to 12 mHz region. Because of its relative low height of 70 miles the maximum skip distance from the "E" layer is around 200 km. or about 1400 miles.

THE "F" LAYER

The "F" layer is located at heights ranging from 125 to 210 miles. This variation in height springs from the fact that the "F" layer in the sunlight side of the earth splits into two layers, one at 125 miles and the other at around 210 miles in

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CHANGE OF ADDRESS ANDEX BADGES

Mr. & Mrs. Clayton Howard are due to return to Quito around the middle of the month of August. We look forward to their return to Quito and HCJB. After August 1st, please order all **ANDEX cloth badges** from the following address:

ANDEX
HCJB
P. O. Box 3000
Opa-Locka, FLA 33055
U. S. A.

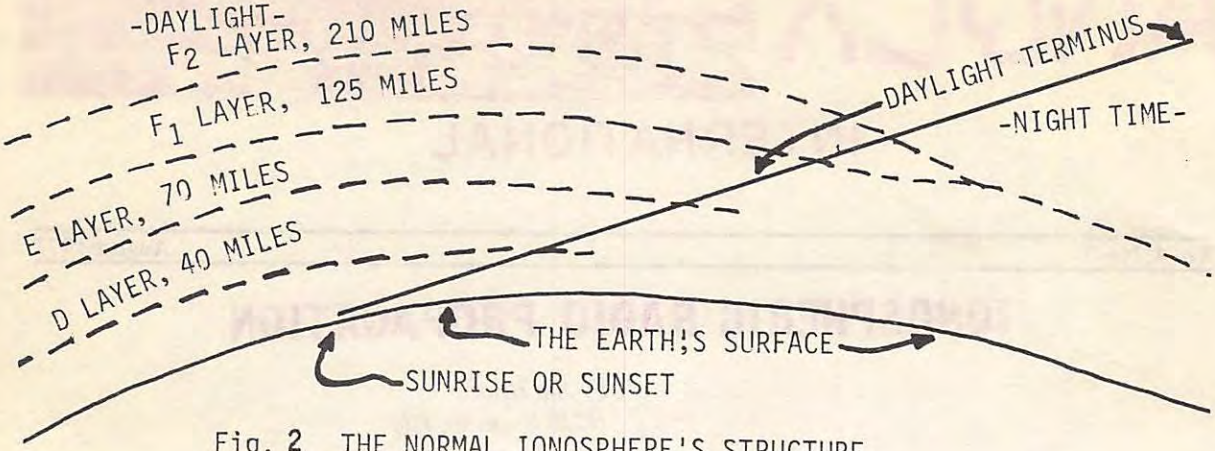

Fig. 2 THE NORMAL IONOSPHERE'S STRUCTURE AT THE DAYLIGHT-NIGHT TIME INTERFACE

height. These layers are called F_1 and F_2 layers. At sunset the F_1 and F_2 layers begin to recombine into one layer, called simply the "F" layer, at around 175 miles in height. During the daylight hours the F_1 layer provides for radio propagation between 1400 and 2000 miles. The F_2 layer, because of its greater height, provides for propagation distances from between 1700 and 2800 miles. The maximum one hop distance which can be achieved is around 2800 miles. Distances beyond 2800 miles require additional inospheric reflections. The transmissions between HCJB and London, England require three 3600-mile inospheric reflection hops. From HCJB to Chicago, Illionois two 1500-mile long hops are required. To reach Sydney, Australia four 2800-mile inospheric hops are required from here in Ecuador.

Figure 2 gives a simplified representation of the normal inosphere at the daylight-nighttime interface. It is interesting to note the disappearance of the "D" and "E" layers just to the right of the daylight terminus. Also represented is the recombination of the F_1 and F_2 layers to form the single "F" layer.

In a future ANDEX issue methods will be suggested by which you can predict your own inospheric radio conditions between your location and any other location in the world.

73's and Best DX

The above data was taken from the following publications:

1. **The Radio Amateur's Handbook**, ARRL.
2. **Inospheric Radio Propagation**, U.S. Dept. of Comerce, National Bureau of Standards.
3. NBS Course in Radio Propagations, Summer 1961.

Ability to give wise advice satisfies like a good meal. (Prov. 18:20 –*Living Bible*)

It is hard to stop a quarrel once it starts, so don't let it begin. (Prov. 17:14 –*Living Bible*)

Ill-gotten gain brings no lasting happiness; right living does. (Prov. 10:2 –*Living Bible*)

Despise God's Word and find yourself in trouble. Obey it and succeed. (Prov. 13:13 –*Living Bible*)

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DXER OF THE MONTH

Mr. Dave Browne, Executive Secretary, ANARC (Association of North American Radio Clubs) is our DX-er of the Month.

Dave was the Master of Ceremonies of the annual picnic for the Los Angeles City Employees recently. The above picture was taken at that picnic.

Dave has been a DX-er for twenty-five years. He became interested in SWLing while working at the Caltex Jet Propulsion Laboratory in Pasadena, California. He has been the West Coast editor of "Electronic News", a weekly trade newspaper published in New York.

For the past fourteen years, Dave has been Manager of Publications and Public Relations for the All City Employees Association of Los Angeles.

Dave holds a B.A. degree in Journalism from the University of Southern California, and a Certificate in Industrial and Labor Relations from UCLA.

Dave has been the Executive Secretary of ANARC since 1974. He is ANDEX member #41. He says, "HCJB is my favorite shortwave station. Among my favorite programs are Morning in the Mountains, Passport, and DX Party Line."

He listens to the world on a Drake SW-4A shortwave receiver with a 50 foot antenna on the roof of his home in Pasadena.

ON THE TOP

by Don Jensen

Do you know, for example, the time of day, the time of year, when your chances of hearing a rare station are optimum? Do you know the great circle path between your receiving location and the target DX stations? Do you know, at any particular time of year, when paths of darkness exist for these stations? Do you know when you can normally expect the 60 meter Latins to fade out and the Asians to fade in in the morning?

Keep records of excellent openings from various parts of the world. Look for patterns, daily, seasonally, geographically.

Geographical patterns can be broad or very selective. When you note the Peruvians coming in with exceptional strength, don't waste time with random tuning. Go after the specific unheard Peruvians you most want. Unusually powerful station signals from Togo? Hunt for other West Africans you need!

As suggested previously, knowledge is the key to success. DXers should concentrate on learning all they can about the major DX bands below about 7mHz, starting with the best of the batch, 60 meters. Concentrate on learning patterns of propagation; ideally the theoretical hows and whys, but, minimally, observe and learn by actual on-the-bands observation.

This leads to the next point of concentration.

Concentrate on certain stations. One reason experienced listeners manage to hear the really rare ones is because having logged so many stations, they can concentrate efforts on a relatively few wanted targets. The less experienced, needing more stations, often take a scattergun, hit-or-miss approach.

For example, when a good opening occurs for Indonesian reception, the less experienced DXer might spend his time taking a log on RRI, Ambon, 4839 kHz. He "needs" it and is pleased to receive a new one. But the veteran, already having logged and verified Ambon, concentrates on trying for the rarer Indonesians, say the local government station, Radio Pemerintah Daerah Kabuptan Poso!

Ambon may be a good catch, a new logging for you. But wouldn't you be happier receiving Poso? It takes self discipline to pass up a sure Ambon for a chancier Poso, but the odds are that

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GHOST ALONG THE MISSISSIPPI

One of the incredible mythical ghosts along the Mississippi River in the lower parishes in the State of Louisiana in the United States is Charles J. Durande. In a state which has been particularly fruitful in the strange and the fantastic, both in persons and in things, Charles J. Durande has a niche by no means inferior. Durande possessed enormous wealth, an enormous flair for life, and an equally expansive imagination. His deeds seem like the sheerest fiction. Yet, they can not be dismissed as mere fables in the extravagant nature of plantation culture.

Sometime before 1820 Durande came to the country around St. Martinville, Louisiana. No one knows why he left France. Already possessed of huge wealth, he became the owner of thousands of acres in the rich Bayou country. He pyramided his wealth with sugar. Slaves planted an oak and pine alley a full three miles from Bayou Teche to the house in 1829. He had a set of regal carriages which even had the harnesses of the horses ornamented with gold. Each morning slaves woke him with sprays of perfume. The family of fourteen bathed in water strewn with perfumed crystals.

Durande was inconsolable when his wife died. He visited her grave each day. Extreme with grief, he had an iron statue placed of himself kneeling before her tomb. Durande swore that he would never marry again. Yet, within a year he was wedded once more. "By his second wife, too, his children numbered twelve."

It is said that on occasion of the wedding of two of his daughters his imagination soared to really superb heights. Large spiders were brought in from China. These were set free in the oak alley several days in advance. Thus, great webs had been spun. On the morning of the wedding the slaves were given bellows and gold and silver dust. With these the webs were coated. Carpets were spread between the trees. There were two thousand invited guests.

However, like a blight, the Civil War in the United States came. Charles J' Durande lost everything. His mansion was stripped and his crops ruined. He died. With the destruction of the plantation house, the last traces of Durande were lost with tragic irony.

Today, the oak and pine alley remains. As you proceed down the magnificent arcade it comes like a shock to find only emptiness at the end. It is, we suddenly realize, like the life of Charles J. Durande himself . . .

"What shall it profit a man if he gain the whole world and lose his own soul?"

(Adapted from **Ghost Along the Mississippi**, A Photo Essay on Plantation Culture, by Clarence John Laughlin).

On the top

you'll next hear Ambon–and get a reportable logging–far sooner than another crack at Poso!

The choice – and naturally you won't always opt for the chance of hearing the ultra rare one over the sure bet logging – is tough for the less experienced listener. It means gambling on the possibility of a rare one and, for that day at least, passing up a medium-hard station already at hand. The veteran DXer who has already QSLed the easier station doesn't have to think twice before chasing the really rare outfits when top notch openings occur.

Don't let the higher stakes -- giving up temporarily a sure catch for a gamble -- color your judgment. Apply the same identification standards you always do. The weak muddle down in the mud may be Poso . . . or it may not. Your gamble may not pay off. But if it does . . .

The decision as to when to play it safe and take the needed logging at hand, and when to gamble on the possible really rare one, is easier if you have a "want" list.

Rare is the experienced DXer who doesn't have his own list of most wanted stations. Check on what others are hearing, particularly the DXers you regard as "pros." Draw up a list of about 10 such stations that you really want to log. In any situation where you're faced with the decision to play it safe or gamble on the rare catch, let your want list establish the priority.

Concentrate on these stations when conditions to a certain area of the world are most favorable. If you have no luck, then go after secondary targets. When you knock one off, replace it on the list with one you badly want to hear.

to be continued