Chapter 7 Propagation

[3 Exam Questions – 3 Groups] G3

Solar Disturbances

The **radio energy emitted by the sun** is measured by the **solar flux index**
The **solar-flux index** is a measure of solar activity at **10.7 cm** wavelength
The **sunspot number** is based on **counting sunspots** and sunspot groups
It takes **20 to 40 hours** for charged particles from **Coronal Mass Ejections to affect Earth**
The ultraviolet and X-ray **radiation** from solar **flares** take **8 Minutes** to affect Earth
The typical **sunspot cycle is 11 years**

Magnetic Disturbances

The **K-index** is the **short term** stability of the Earth's **magnetic field**
The **A-index** is the **long term** stability of the Earth's **magnetic field**
A **sudden change** in the **Earth's magnetic field is a geomagnetic disturbance**
North or South Latitudes **above 45 degrees** are **more sensitive to geomagnetic disturbances**
Degraded high-latitude HF is caused by **geomagnetic storm** on radio-wave propagation
Aurora from periods of **high geomagnetic reflect VHF signals**

Propagation

A **Sudden Ionospheric Disturbance (SID) disrupts on lower frequencies** more than higher frequencies
HF communications are disturbed by the charged particles from **solar coronal holes**
Try a higher frequency to continue communications during a sudden **ionospheric disturbance**
DX in the **upper HF and lower VHF range is enhanced** by high **sunspot numbers**
20 meters supports worldwide propagation during **daylight at any point in the solar cycle**
If HF radio-wave **propagation (skip) is good** on now expect it **again 28 days later**
DX Frequencies **above 20 MHz** are **least reliable** during periods of **low solar activity**

Maximum Usable Frequency; Lowest Usable Frequency; propagation "hops"

"MUF" the maximum usable frequency for communications between two points
The **best propagation is** a frequency just **below the MUF**
The **best propagation is** frequency is **bent back to the Earth**
Distance, location, Time, Season, Solar Flux & SID all affect MUF
"LUF" the Lowest Usable Frequency for communications between two points
Frequencies **below the LUF are completely absorbed** by the ionosphere
2,500 miles is the maximum distance covered in **one hop using the F2 region**
1,200 miles is the maximum distance covered in **one hop using the E region**
An **echo** can be heard when **both short and long path propagation are received**

Ionospheric Layers

The **D layer is closest** to the surface of the Earth **absorbing** most long **skip signals**
The D layer absorbs lower HF frequencies during daylight hours
The **F2 region** will reach its **maximum height at noon during the summer**
F2 region is the **highest ionospheric** region and provides the **longest distance propagation**

Sky waves

"Critical Angle" is the highest takeoff angle that **bends RF back to Earth**
Combining of **several paths** makes HF scatter signals **sound distorted**
HF scatter signals are weak as a small part of the signal get to the skip zone
A **wavering sound** is a characteristic of **HF scatter** signals
Scatter allows a signal to be detected **too far for ground wave but too near for sky** wave
Signals heard above the MUF are scatter propagation