split up into two seperate layers, E1, E2, F1 and F2. The general effect of ionisation is to make the outer atmosphere conductive.

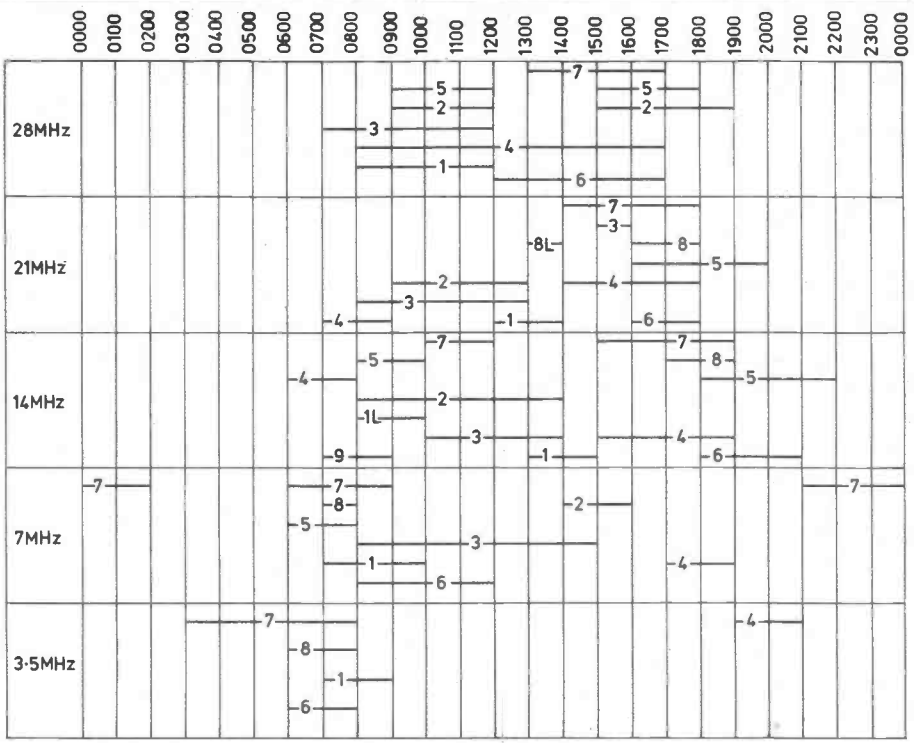
When the conditions of ionisation are absent, as during the local night time, the layers lose their conductivity to some extent but much depends upon the ratio of night and day, and when daytime is long compared to the dark period then the layers may very well retain their conductivity to varying degrees through the 24 hours. During long nights the layers may cease to be conductive for extended periods. The importance of this varying conductivity will now become apparent.

On the HF amateur bands long distance working (DX) is achieved by sending the signal upwards at a small angle to the earth's surface when it eventually reaches the lower regions of, say, the F layer. On passing into the conductive medium the wave is refracted and, if the ionisation is of sufficient magnitude, will eventually emerge from the bottom of the layer and travel on back to the earth's surface from where it may very well be reflected upward again for a second hop or even more. In this way the signal may travel to the furthest points of the earth.

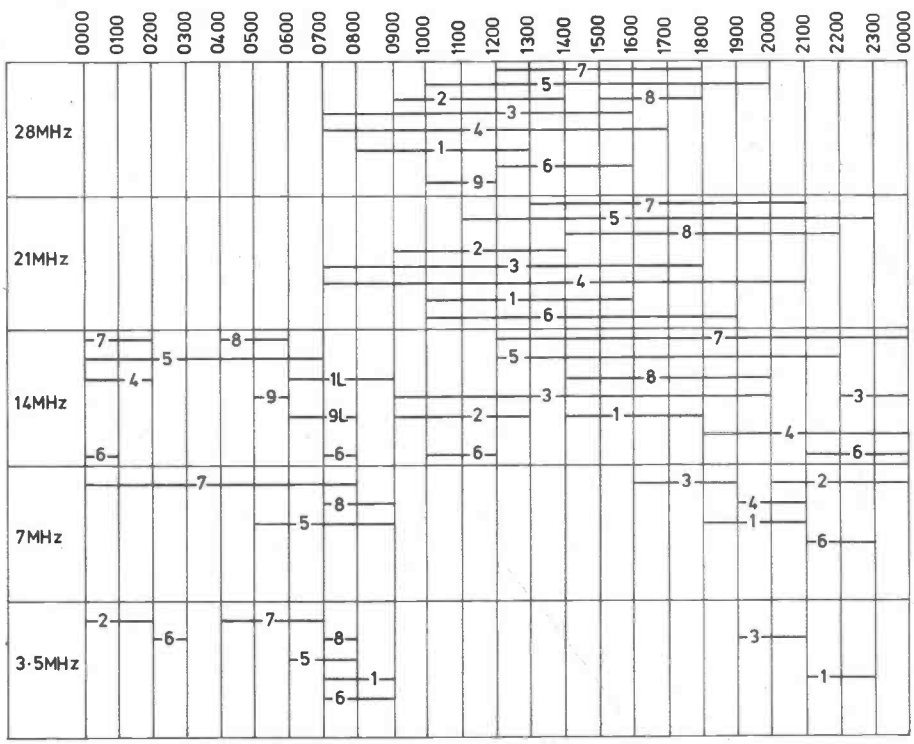
Better signals will be received at the distant station if the reflections from earth have been made from seas or oceans rather than the rough land surfaces. An excellent example is that early mornings, very strong signals are consistently experienced because the signals take the **long** path to Australia over the southern Atlantic and Pacific Ocean which is virtually water all the way providing the best conditions for reflection of radio waves.

The alternative short path over Europe and Asia is best in the early evenings but seldom provides signals of the same strength as those received over the long path. Because the fewer the number of reflections made by the signal means less path loss, antennas for DX working aim at maximising the radiation at low angles to reduce the number of hops required.

To revert to the point where the signal was entering the F layer, if the ionisation level is low enough the signal will not be refracted to any great degree and will pass out of the top of the layer and be lost. The fluctuating nature of the ionisation




Period December–January–February (L=long path)




Period March–April–May (L=long path)

*Propagation conditions in a typical year. Near sunspot maxima the lines will be longer, at the bottom of the cycle shorter. The numbers refer to the great circle bearings given in* **Fig 4** *and the table beneath.*