Contact

The Argus System in **Contact**

- How many telescopes?
- How many channels?
- Channel Width?
- Sensitivity?

ARGUS

131 telescopes pg. 63

Built by expanding the VLA

if similar antennas: $\frac{131}{27} \sim 5 \times$ the area

Coverage: 10^9 channels pg. 56, 62

channel width < 1 Hz pg. 56

$\Rightarrow \sim 10^9$ Hz if width = 1 Hz

Sensitivity: if assume better than VLA by 5,

5 Jy in 1 sec

5×10^{-26} W m^{-2} Hz^{-1}

The Signal

- Frequency at which it was first detected?
- Bandwidth?
- Polarization?
- Other frequencies?
- Strength of the signal?

The Signal

First detected near 9 GHz pg. 66

ν = 9.24176684 } pg. 72

$\Delta\nu$ = 430 Hz }

Linearly polarized pg. 66

Later found at 1.420 GHz H pg. 78

1.667 GHz OH

Bimodal pulses 179 and 174 Jy pg. 72

Source of Signal

- How was terrestrial interference ruled out?
- How was it determined to come from Vega?
- How do we know it was intended for us?
  - Rather than omnidirectional
  - BEFORE the message decoded

The Signal

Not Terrestrial:

Moving Sidereally pg. 66

Vega:

Interferometric Position pg. 65

Proper Motion pg. 78

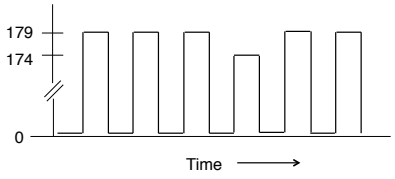
Doppler Corrected pg. 78

What were the 4 Levels of information?

- How encoded (modulation method)?
- What was the purpose of each?

The Prime Numbers

Amplitude Modulation
- ("Strength is the Message")
Bimodal amplitudes 174 & 179 Jy



Convention
179 = 1
174 = 0

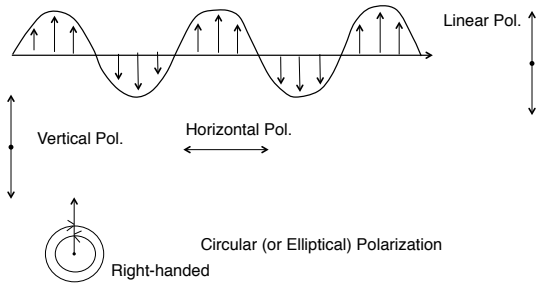
1 1 1 0 1 1

$2^5 + 2^4 + 2^3 + 0 + 2^1 + 1$

32 + 16 + 8 + 0 + 2 + 1 = 59 (pg. 68)

The Movie (and the Instructions)

Polarization Modulation (pg. 83)
- ("Direction is the Message")



Decoding the Movie

- Repeating pattern
- Tens of billions of bits
- Product of 3 prime numbers
- Guess 2D image and time, so movie
- Purpose?
  - They know about us…

Machine Instructions

- Palimpsest (pg. 100)
- Under the movie (pg. 185)
- Polarization modulation
- Purpose:

Suggestions for the Primer

- Sol Hadden made 5 suggestions for finding it
- What were they?
- Which was right?

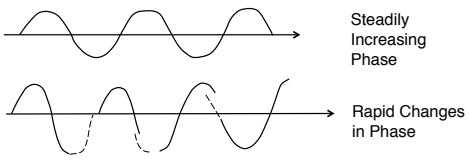
Five Suggestions (pg. 220)

- Slower bit rate (e.g., 1 bit per hour)
- Faster bit rates (would require more BW)
- Occasional fast data dump
- Phase modulation
- Have to detect from space
  - e.g., around 5 mm, where O_2 blocks waves

The Primer

Phase Modulation

- ("Timing is the Message")



How The Primer Works

1 A 1 B 2 Z	1 + 1 = 2	TRUE
1 A 2 B 3 Z	1 + 2 = 3	TRUE
1 A 2 B 4 Y	1 + 2 = 4	FALSE

⇒ A is +
B is =
Z is TRUE
Y is FALSE