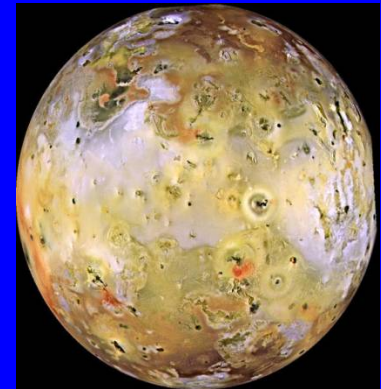


RADIO ASTRONOMY – *You Can Do !*



FRRL Program
January, 2010



By AH6EZ

Purposes of Amateur Radio

- Trained Communicators
- Support Public Service
- Emergency Communications
- Advancement of the Radio Art

Radio Astronomy

- Listening to and observing non-Earthly emissions
- HF through microwave atmosphere transparent
- Low sun spot numbers allow timely HF reception
- Internet supports global cooperation
- Amateur radio knowledge/equipment useful

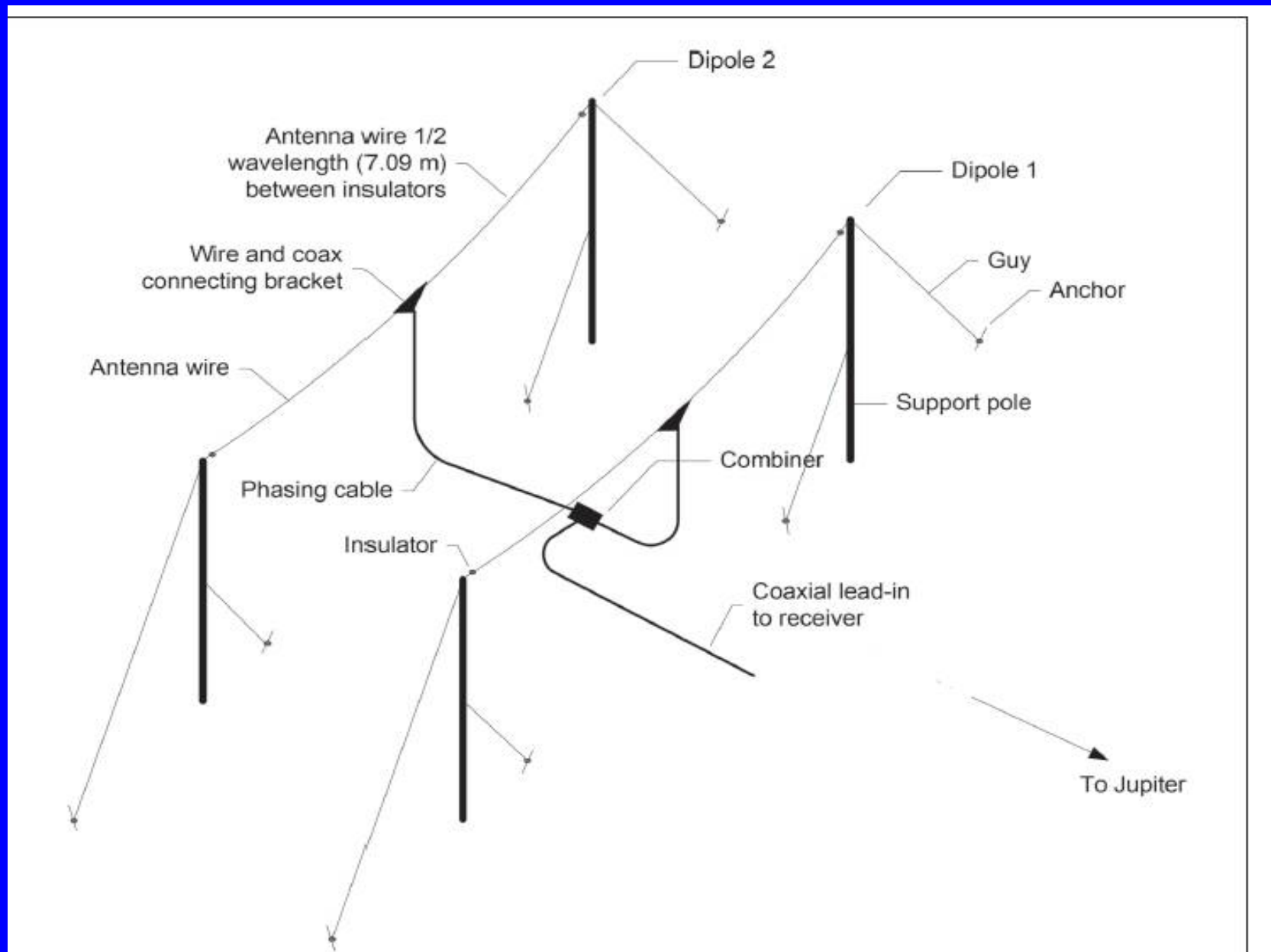
Jupiter Radio Emissions

- First detected in 1950
- Source determined to be Jupiter in 1955
- Emissions span 50 KHz to 38 MHz
 - <15 MHz generally reflected by Ionosphere
 - 18-24 MHz is sweet spot, 20.1 favorite
 - Notice this is close to 17m and 15m ham bands
- Precise cause is unknown
- Orbital latitude of Jupiter important
- Enhanced by orbital position of Io moon

Listening Techniques

- Listen during low sun spots
- Listen between Sunset and Sunrise
- Need low man made noise
- Track azimuth/elevation of Jupiter (and Latitudes)
- Pay attention to antenna pattern
- Watch out for Sun noise (below horizon)
- Use orbital prediction software
- Listen during predicted Io-A, Io-B, Io-C storms
- Audio recording/charting
- Disable AGC

“Recommended” 6-10dBd Antenna



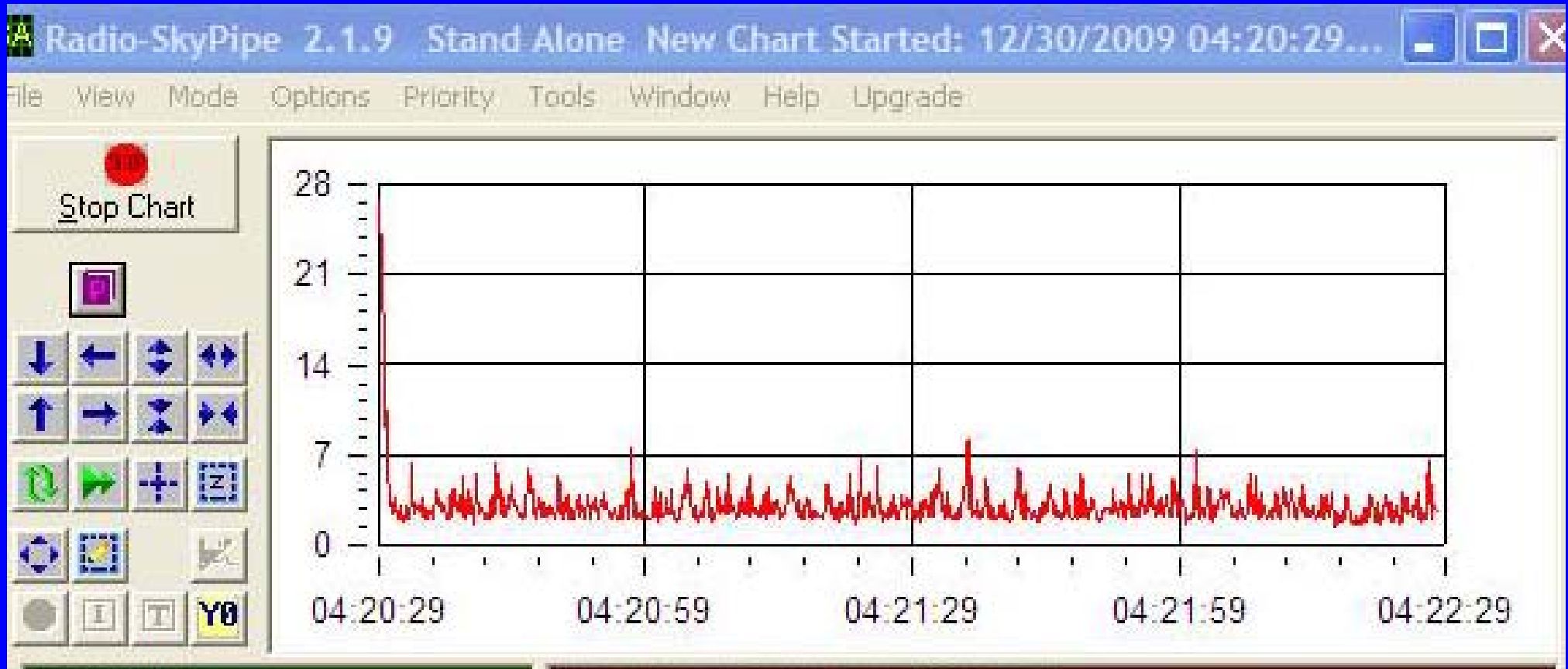
Available as a kit for \$190 with a receiver

Collaborative Listening

- NASA's Radio Jove Project
- Listen to your audio, watch charts of others
 - Useful to eliminate false receptions, man-made noise
- Can sign up for toll free conference call
 - Learn from more experienced listeners
 - Set up during best listening periods
- Yahoo Group

http://tech.groups.yahoo.com/group/Radio_JOVE/

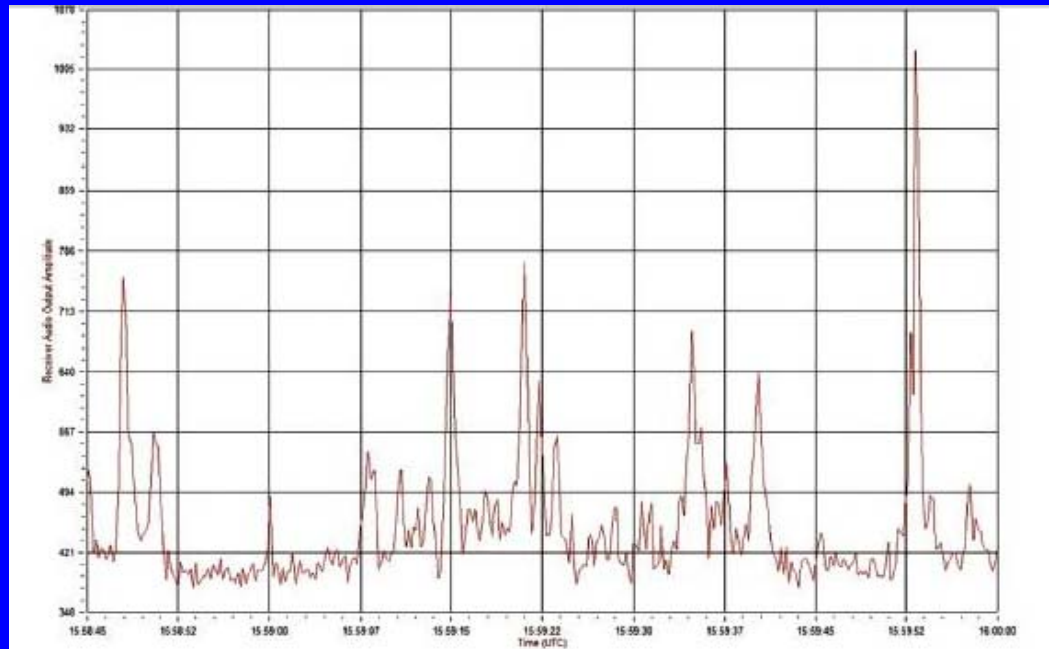
Strip chart recorder



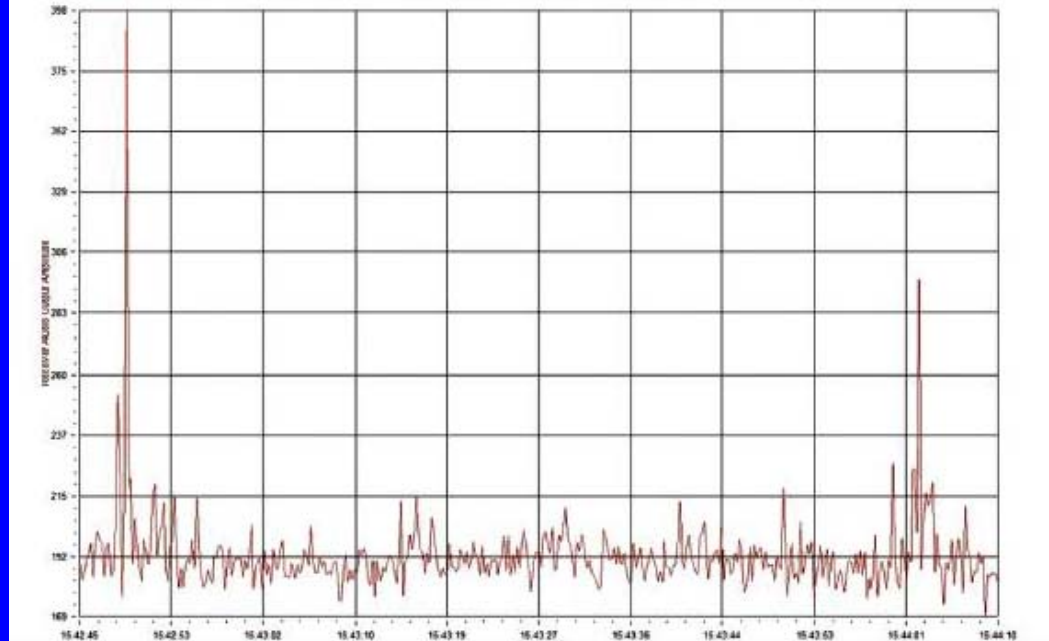
Can act as server for other listeners

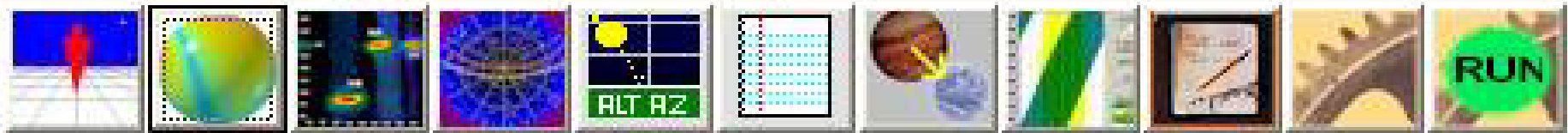
Sample Strip Charts

S-Bursts



L-Bursts





YYYY MM DD

Date 2009 12 30 cal

HH MM SS

Time 02 29 02 GMT

Using Real Time

Lat : 41:57:07.4
Long: 88:26:32.1 W

Jupiter

ALT: -01.5
AZ: 252.6
HA: 05:17
Rise: 16:04
Set: 02:21

RA: 21:53
DEC: -13:52
CML: 10.79
Io Phase: 222.75

Sun

ALT: -44.8
AZ: 278.3
HA: 08:41
Rise: 13:20
Set: 22:18

RA: 18:29
DEC: -23:16

LMST: 03:09:57



Possible Activity: C

Radio-Jupiter Pro

Jupiter Radio Noise Storm Predictions

GMT Date:

GMT: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23

A
Io A
B
Io B
C
Io C

LOCAL: 19 20 21 22 23 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

Sun Visibility:

GMT: 23:57 Jup HA 02.9 Jup Alt 21 deg. Sun Alt -20 deg

Exclude times when Sun altitude is above: deg. Max Hour Angle Allowed

Exclude times when Jupiter altitude is below: deg. Min Hour Angle Allowed

	Begin	End	Begin	End	Begin	End
A	01:46	02:13	21:56	23:59		
Io A	22:56	23:59				
B	00:00	01:47				
Io B	NONE					
C	NONE					
Io C	NONE					

Blue background indicates Jupiter is below the horizon.

Programmable Alerts

Automated Action Parameters

Conditions

GMT Local YYYY MM DD

Do On this Date: 2009 12 29 cal

Do At This Time (HH:MM) 00 00

Do Daily

A

Io A

B

Io B

C

Io C

Tasks performed if any of the checked modes are predicted to be active and other criteria are met. Uncheck all for no mode dependence.

Jup Alt is Between 0 89.9

Jup Az is Between 0 359.9

Only When Sun Is Below Horizon

Jup Alt Changes by 0

Sun Az Changes by 0

OK

Cancel

Tasks

At certain times ...

Run Script: Browse

Script File:

When conditions are met ...

Run Script: Browse

Script File:

When conditions no longer met

Run Script: Browse

Script File:

When Alt Az conditions met

Run Script: Browse

Script File:

Audible Alert



What does Jupiter sound like?

- Broadband, not frequency specific
- Sometimes both L and S bursts
- L-bursts (long-bursts)
 - Ocean surf on a beach
 - Swishing sound
- S-bursts (short-bursts)
 - Pebbles thrown onto a tin roof
 - Snapping/popping of cooking popcorn
 - Spitting sound
 - Short click, several dozen per second