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Dayton 2010

Putting HPSDR on the Internet

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- Why?
- Hardware
- Server
- Software
- Results

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- Why?

  We needed a vehicle to test multiple receivers implemented in the FPGA code of Mercury/Ozy.

  FPGA code developed originally by Phil HarmanVK6APH. Multiple receivers added by Kirk Weedman KD7IRS and recently developed by Bruce Walker W1BW.

  It just developed into an internet application.

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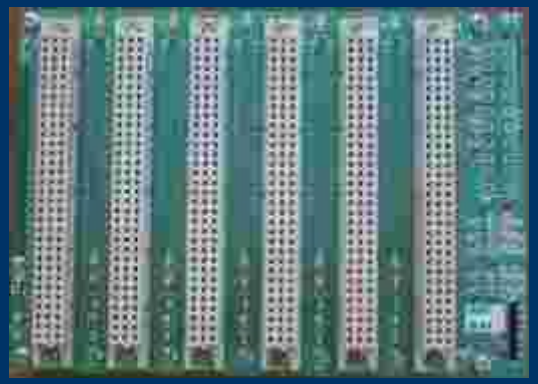
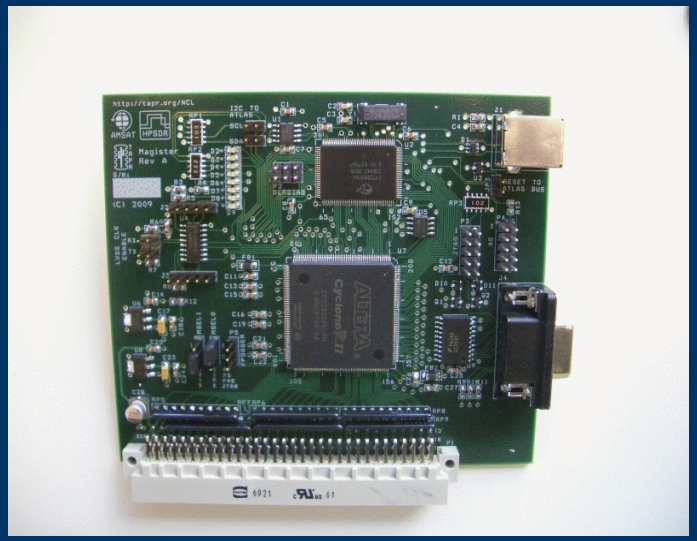
- Hardware

Atlas backplane
Ozy I/O board
Mercury receiver board





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- Hardware

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- Server

  Intel Atom 330
  2 GB Memory
  1 TB ATA hard drive

- Linux - Ubuntu 10.04 64 bit
  Apache2 Web Server

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- Software
  - HPSDR Server
  - DSP Server
  - Client Application

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- Software

USB I/Q Data Stream

USB data is transferred in 512 byte packets.

8 bytes of header data.

Sync	Sync	Sync	C0	C1	C2	C3	C4

Receiver I/Q data and Mic sample.

I and Q samples are 24 bits (3 bytes).
Microphone samples are 16 bits (2 bytes).

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- Software

Bandwidth Requirements

24 bit I samples
24 bit Q samples

48000 samples per second = 2304000 bits per second
96000 samples per second = 4608000 bits per second
192000 samples per second = 9216000 bits per second

For just 1 receiver!

8 receivers at 192000 = 73728000 bits per second

My broadband uplink speed is 360 Kbps

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- Software
  - HPSDR Server
    - USB interface to HPSDR
    - TCP socket interface for client commands/responses
    - UDP socket for I/Q data stream

  For multiple receivers the I/Q data stream is sent over the USB interface as interlaced samples. The server splits these samples out into separate I/Q data stream buffers and when full sends to client over UDP.

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- Software

  - DSP Server
    - TCP connection to HPSDR Server
    - UDP socket to receive I/Q data stream
    - TCP socket for client connection

  One DSP server for each receiver.
  Processes I/Q data stream using DttSP.
  Processes commands from client to set mode, filter, etc and passes frequency commands on to the HPSDR Server.
  Processes commands from client to send spectrum data and audio data to client.

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- Software
  - Bandwidth requirements per receiver
    - Spectrum data sent as 8 bit values
    - Client requests number of samples - currently 480 at 10 requests per second.
    - Audio data sent as 8-bit aLaw at 8000 samples per second.
    - Spectrum data = 480*10*8 = 34800 bits per second
    - Audio data =8000*8 = 64000 bits per second
    - 98800 bits per second per receiver

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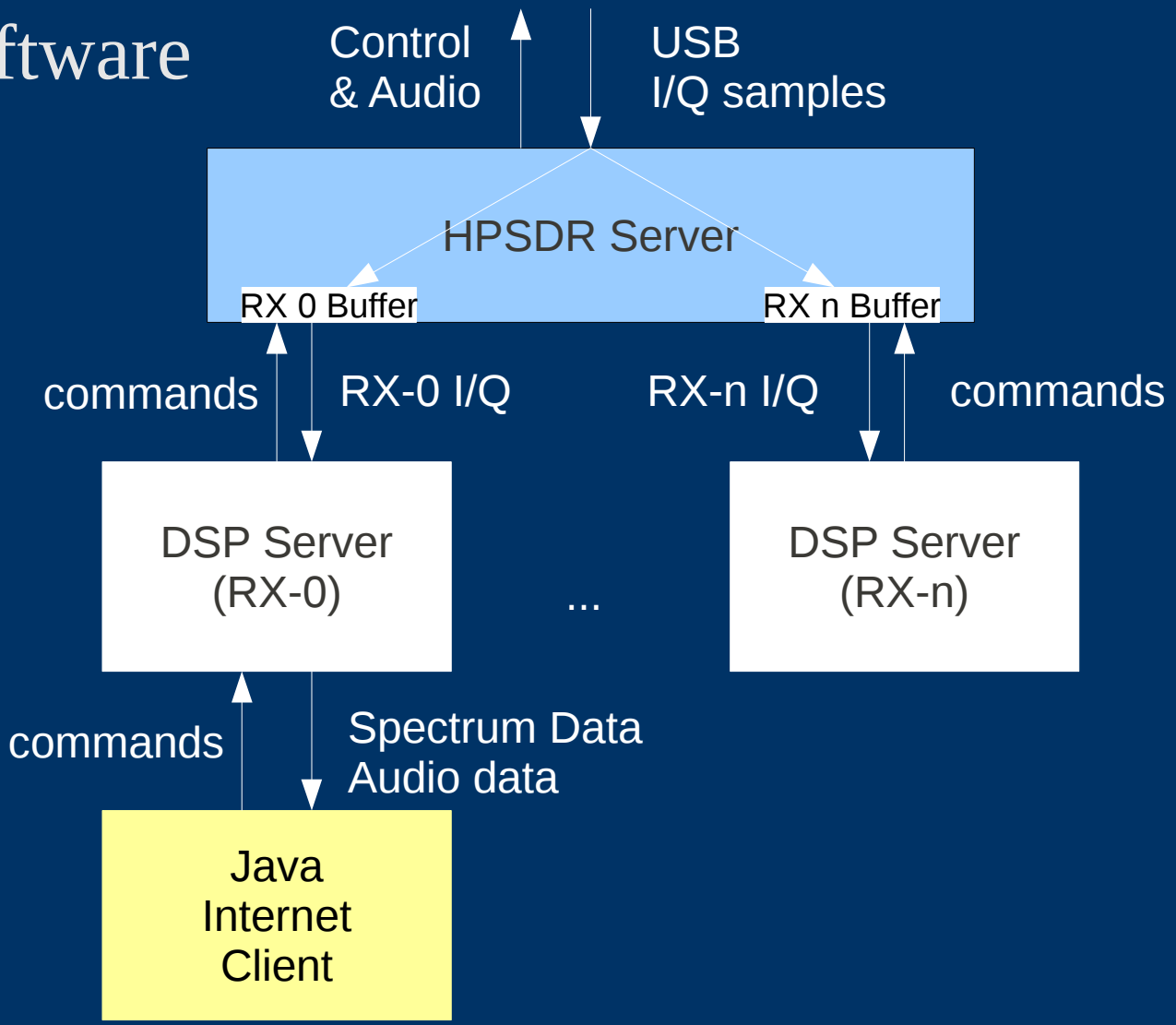
- Software



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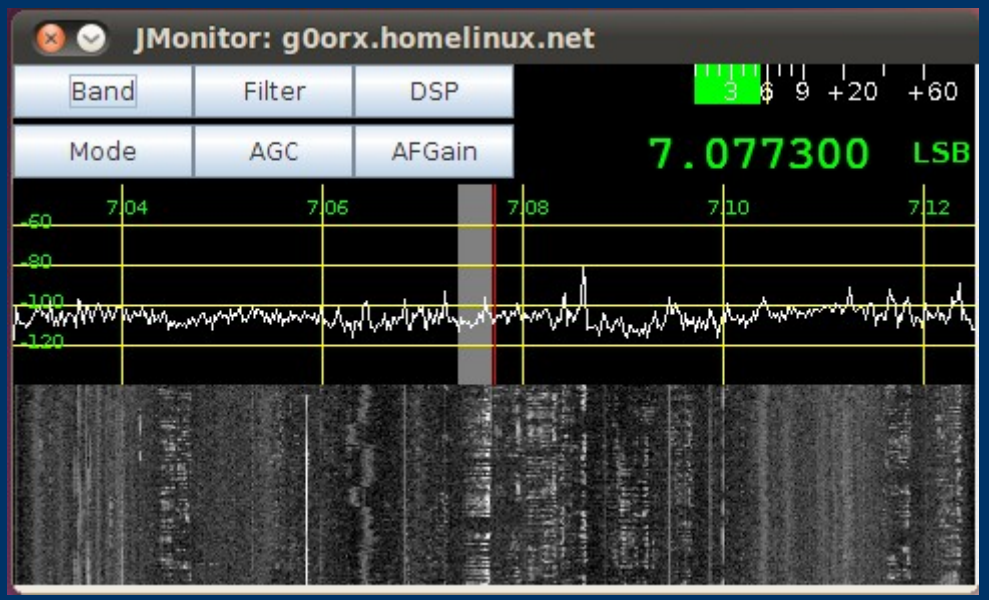
- Software
  - Java Applet Client
    - Runs in any browser window.
    - Can be run as a standalone application.



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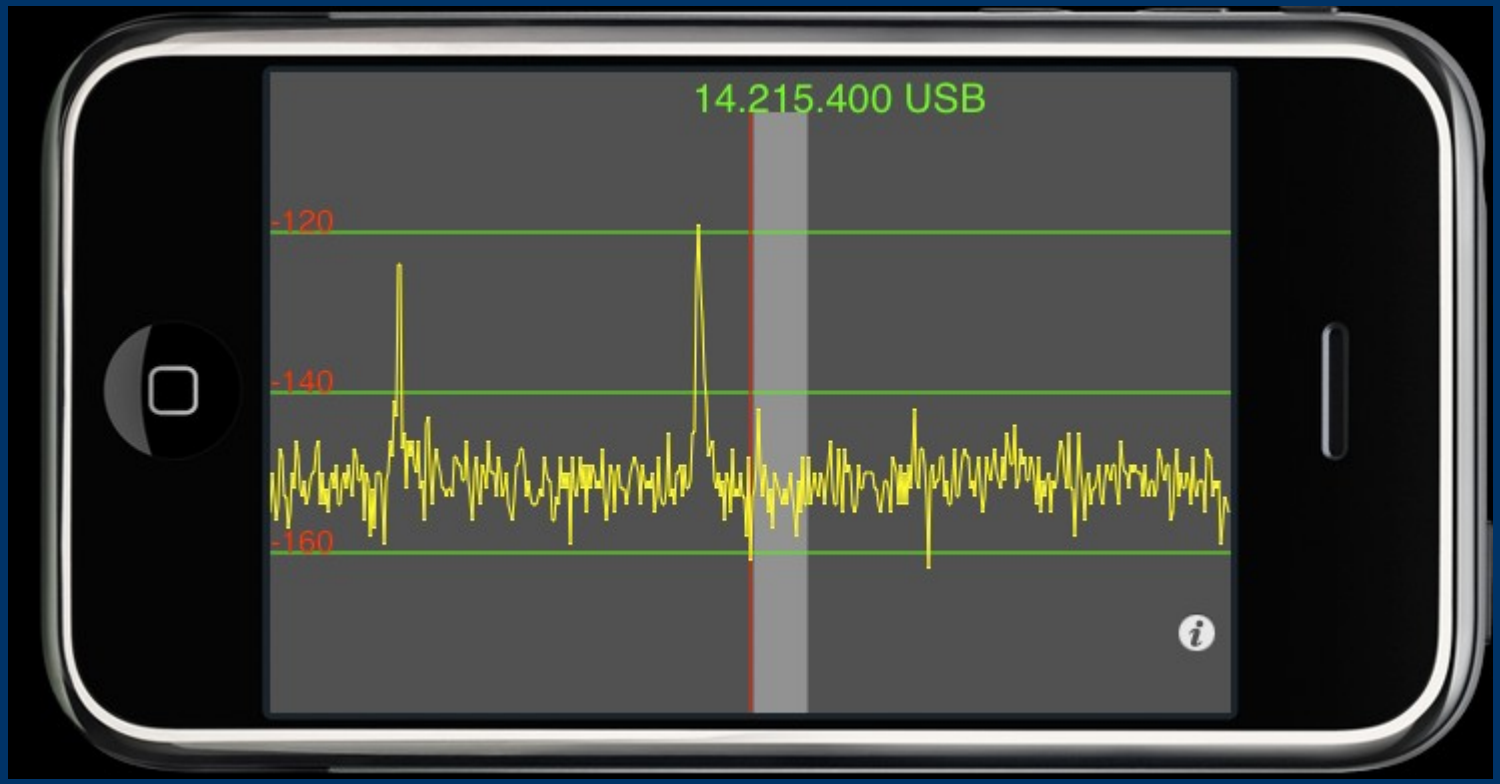
- Software
  - iPhone client



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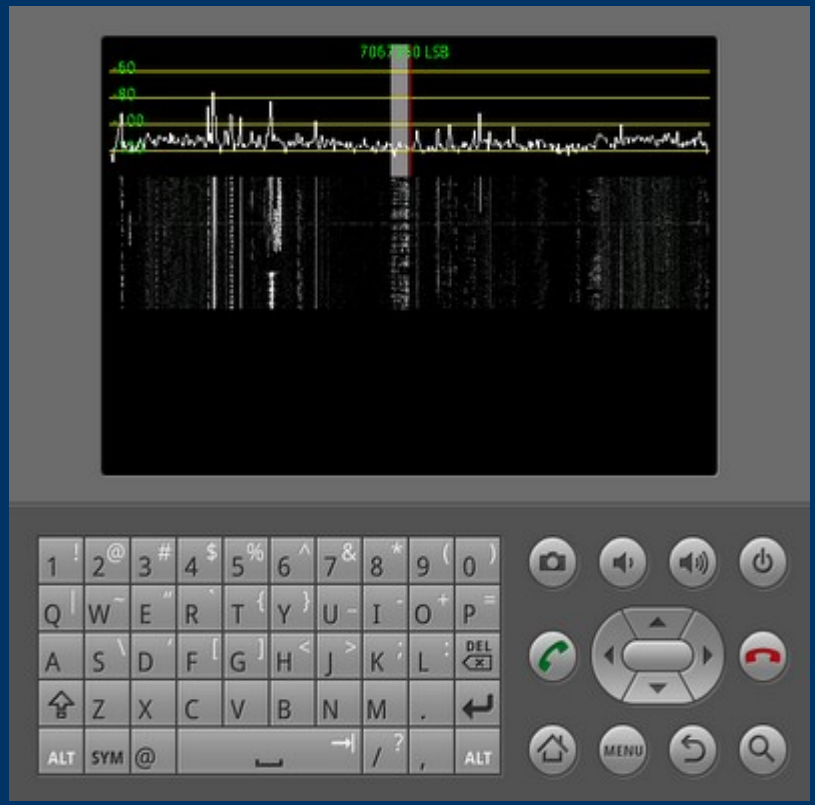
- Software
  - Android Client



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- Software

  Ongoing development to support other hardware

    SDR-1000
    Softrock (both fixed Xtal and Si570)
    UHFSDR

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- Results

  5 Mercury receivers currently active on internet

  - Ken N9VV, Chicago, IL
    http://24.192.100.58/jmonitor.html
  - Bruce W1BW, Concorde, MA
    http://home.w1bw.us/receiver/
  - Jeff KT2K, Sea Girt, NJ
    http://kt2k.ham-radio-op.net/jmonitor.html
  - Chris 4X1RF, Haifa Israel
    http://4x1rf.no-ip.org/jmonitor.html
  - John G0ORX, Copthorne, West Sussex, England
    http://g0orx.homelinux.net/jmonitor.html

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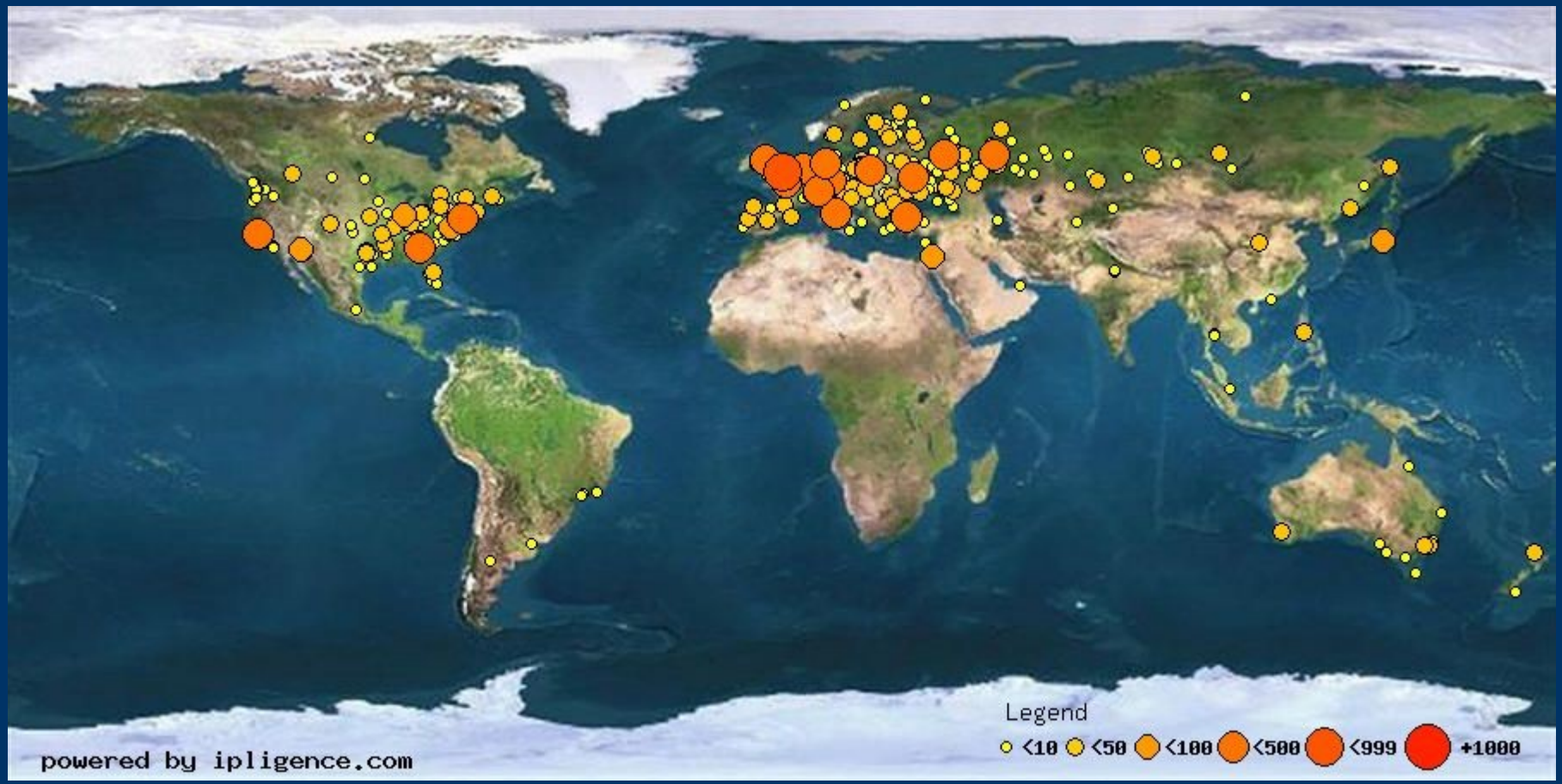
- Results

  Many accesses from around the world to my web page



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Thanks

- HPSDR Group
- TAPR Group
- Phil Harman VK6APH
- Bob McGwier N4HY
- Frank Brickle AB2KT
- Ken Hopper N9VV
- Kirk Weedman KD7IRS
- Bruce Walker W1BW

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- References
  - Source code in HPSDR svn repository:

    svn://64.245.179.219/svn/repos_sdr_hpsdr/trunk/N6LYT

  - Document by Ken, N9VV

    http://www.n9vv.com/N6LYT Online Mercury Receiver.pdf