

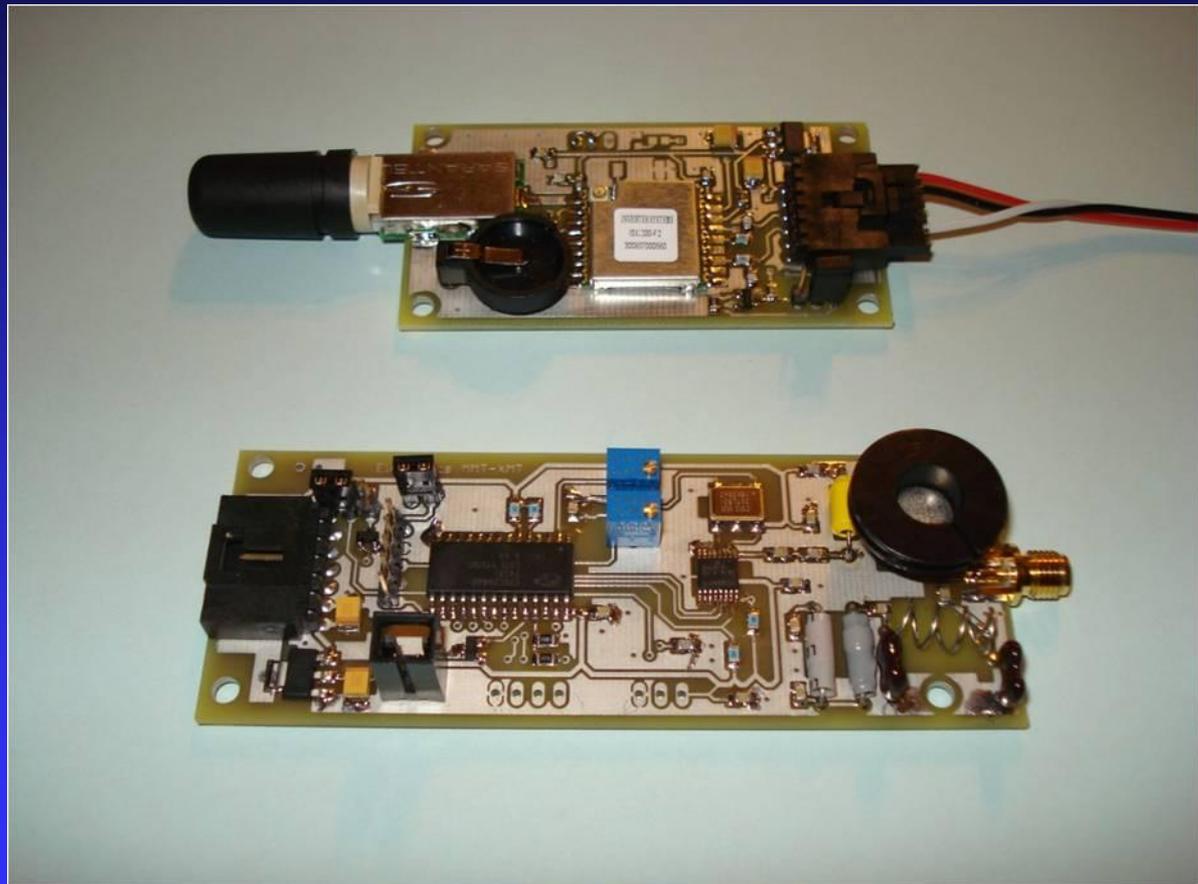
# Multi-Mode Transmitter for Balloons



# Multi-Mode Transmitter

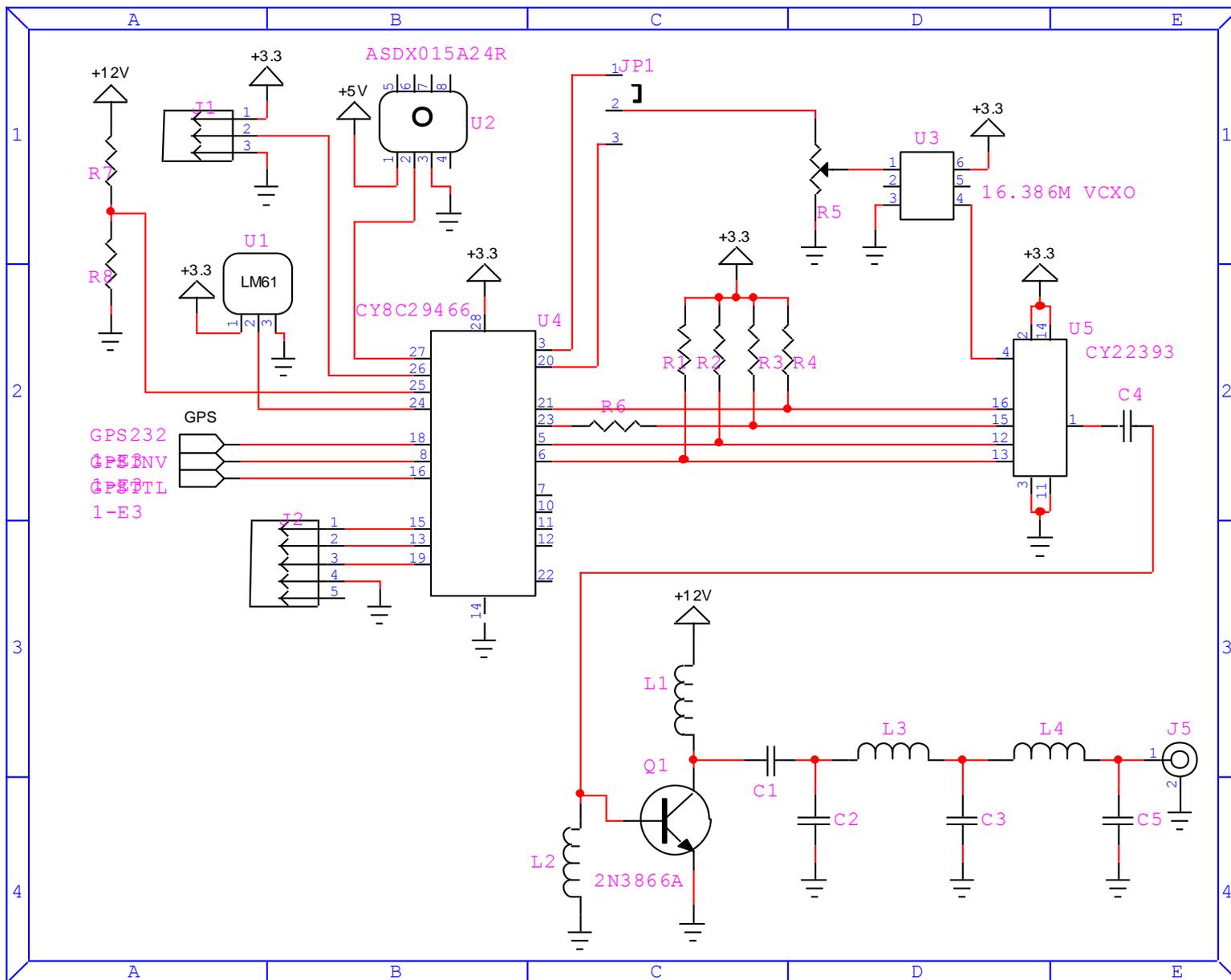
## MODES

- Hellsreiber
- RTTY
- DominoEX
- SSTV
- CW
- APRS (soon)
  
- Onboard GPS
- In/Out Temp
- Battery monitor
  
- 1 W on HF
- 0.3 W on VHF (FM or SSB)



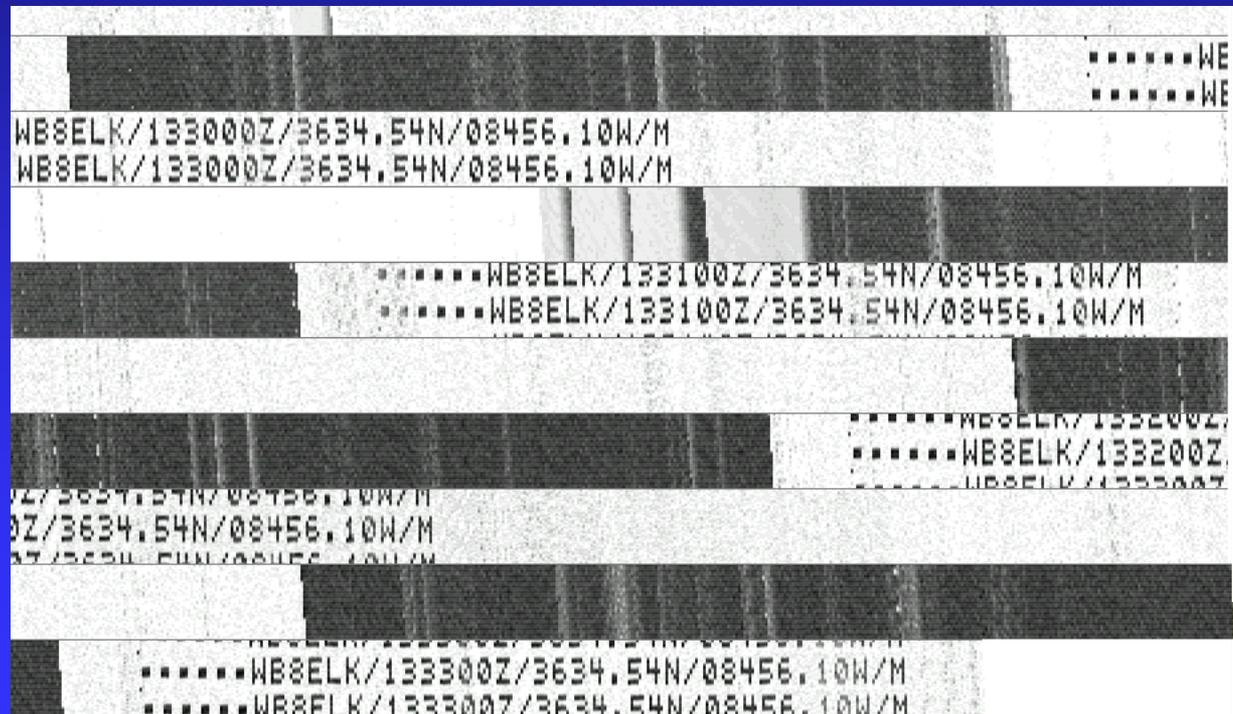
Frequency Agile from 3.5 MHz to 148 MHz

# MMT schematic



# MMT Hellsreiber transmission

- On/Off keyed mode
- 8.163 msec per pixel



# DominoEX mode

- MFSK mode
- 18 tones

	MODE	BAUD	BW	TONES	SPEED	FEC	STONE SPACING
	<b>DominoEX 4</b>	3.90625	173Hz	18	~25 WPM	~12 WPM	Baud rate x2
	<b>DominoEX 5</b>	5.3833	244Hz	18	~31 WPM	~16 WPM	Baud rate x2
	<b>DominoEX 8</b>	7.8125	346Hz	18	~50 WPM	~25 WPM	Baud rate x2
*	<b>DominoEX 11</b>	10.766	262Hz	18	~70 WPM	~35 WPM	Baud rate x1
	<b>DominoEX 16</b>	15.625	355Hz	18	~100 WPM	~50 WPM	Baud rate x1
	<b>DominoEX 22</b>	21.533	524Hz	18	~140 WPM	~70 WPM	Baud rate x1

Table of **DominoEX** modes. \* Default mode (with FEC off)

# dl-FLdigi

- UKHAS mod called dl-FLdigi for uploading data to SpaceNear.us server

The screenshot shows the 'fldigi - WB8ELK' application window. The title bar includes 'fldigi - WB8ELK' and standard window controls. The menu bar contains 'File', 'Op Mode', 'Configure', 'View', and 'Help'. The main window is divided into several sections:

- Header:** 'Rig Not Specified' and 'RSID TUNE' buttons.
- Frequency and Mode:** A large digital display shows '50070.000'. Below it are fields for 'QSO Freq' (3581.208), 'On' and 'Off' checkboxes, 'Call' (0806), 'Name', 'In', 'Out', and 'Notes'.
- Location and Mode:** 'USB' mode selected, 'QTH' field, and 'St', 'Pr', 'Cnty', 'Loc', 'Az' fields.
- Log Window:** A large text area containing a log of operations. The log entries include call signs, frequencies, and dates, such as: '-WSBL /1/080000/3442.75/08646.20/241.3/08/9.48/27/ e', '-WSBL /2/080200/3442.76/08646.20/225.6/09/9.46/27/ e', and '-WSBL /3/080400/3442.75/08646.20/221.2/09/9.48/27/ e'. There is also a block of text starting with 'DeAXaiItiNaeSs0neffm trAEEC0otJrEAn na0Werf?i2m ay4-1,ÁO EFJrr WÁa 23onEfr>np2mÿr rrinornrii05toVi noo6Z iwaieutiIFÁr reervl'.
- Frequency Display:** A horizontal frequency scale from 500 to 2500 kHz. A red vertical line is positioned at approximately 1000 kHz. Below the scale is a spectrogram showing signal activity.
- Control Panel:** A row of buttons for 'CQ', 'ANS', 'QSO', 'KN', 'SK', 'Me', 'QTH', 'Brag', 'Tx', and 'Rx'. Below these are various control buttons like 'WF', 'x1', 'NORM', '1208', 'QSY', 'Store', 'Lk', 'Rv', 'T/R', and 'SQL'.
- System Tray:** The Windows taskbar at the bottom shows the 'start' button, system icons, and the time '3:06 AM'.

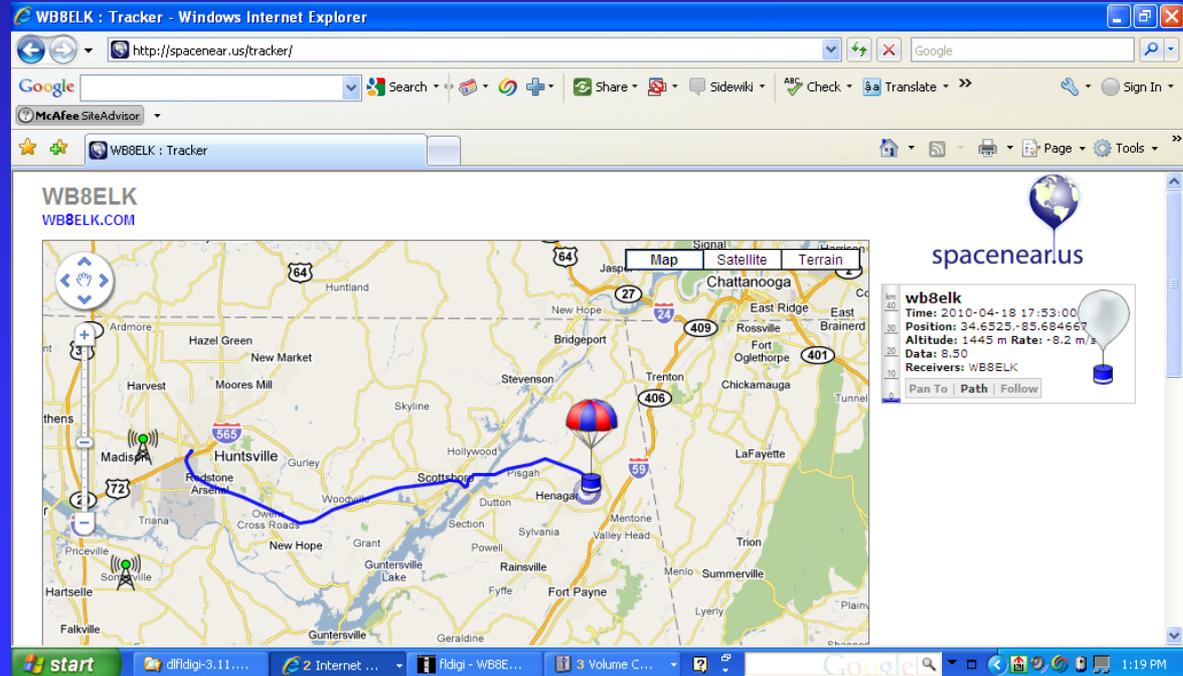
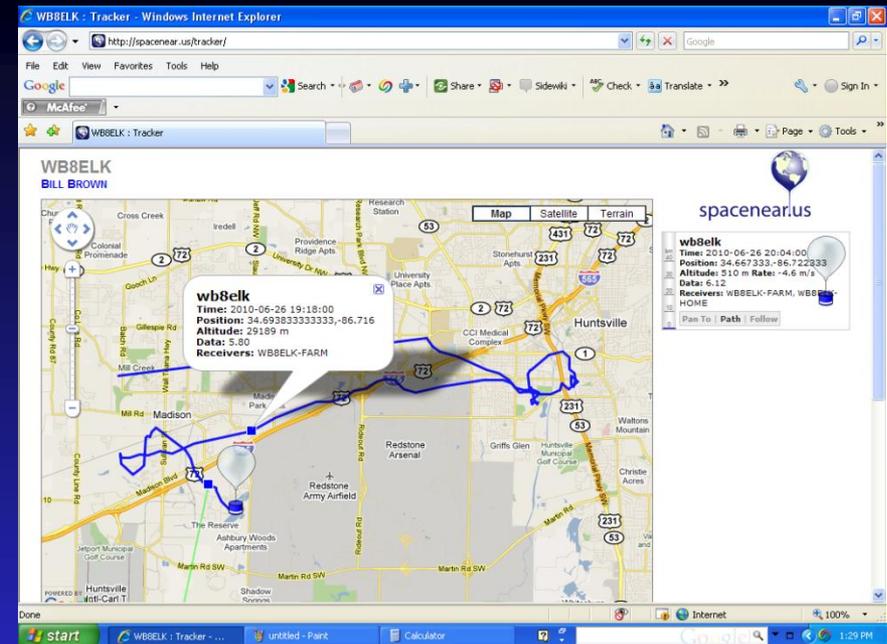
# Spacenear.us/tracker website

Displays positions decoded by dl-FLdigi onto a Google Map with chart and telemetry display box

- Designed by members of the UKHAS group

- Ground stations receiving telemetry are shown as towers

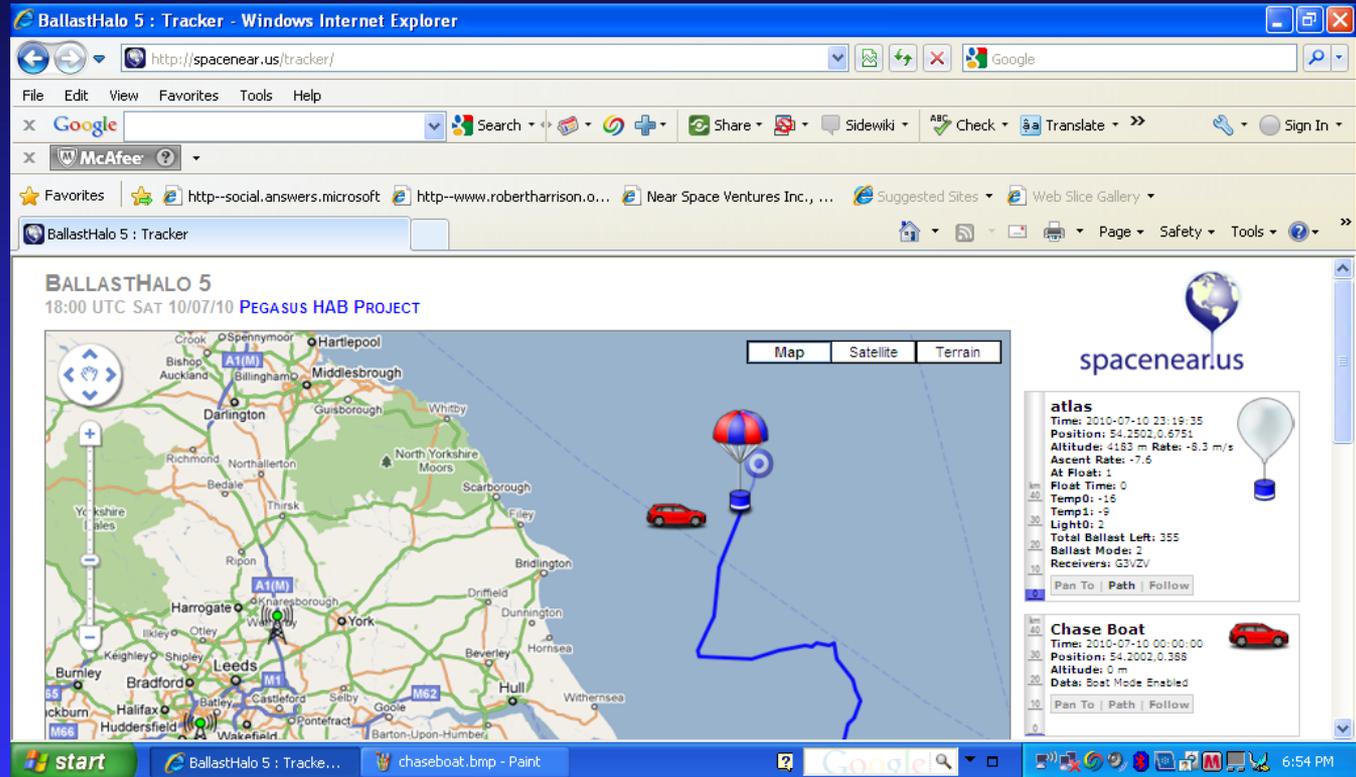
- Parachute comes out during descent



# Spacenear.us/tracker website

- Shows landing prediction in real-time (light blue target)

- Can also upload chase car position directly to server via a wireless cellular link



Telemetry must be uploaded in the following format:

\$\$callsign, sequence, time(UTC), lat, lon, alt(m), sats, batt, temp\*<cksum>

\$\$WB8ELK,128,17:25:00,3441.03,-08554.20,26771,08,8.52,-9\*7F

WB8ELK HF Test Flight, 19/12/10 23:15UTC : Tracker - Mozilla Firefox

http://spaceneur.us/tracker/

WB8ELK HF Test Flight, 19/12/10 23:...

**WB8RC**  
 Radio: 756PRO  
 Antenna: 80 METER INV V  
 Last Contact: 15 hours ago  
 Data Last Received: 2010-12-20 03:44:00  
 Data Total Lines: 8

Map Satellite Terrain

spaceneur.us

**wb8elk**  
 Time: 2010-12-20 07:15:00  
 Position: 32.044833,-81.657167  
 Altitude: 192 m Rate: -4.1 m/s  
 Max. Altitude: 26945 m  
 Data: 5.56  
 Receivers: NARIUM42

Map data ©2010 Europa Technologies, Google, INEGI - Terms of Use

Received 0 new positions. Track in Google Earth

wb8elk

30000  
25000  
20000

Done

Secure Search McAfee

start WB8ELK Hamshack at... BalloonFlights fidiqi - WB8ELK-test WB8ELK HF Test Fligh... untitled - Paint 10:27 PM

Map shows ground station locations during a recent HF balloon flight

# Camcorders for balloons

- Hobbypartz \$59 thumbdrive camcorder

**THE SMALLEST FPV-CAMERA**  
Micro Video CAMCORDER

- Includes 2GB Memory Card - Record up to 2 Hours!
- High Quality 648x480 Video
- Can support up to 4GB
- The Perfect Hidden Camera
- For RC Airplane
- For RC Helicopter
- For RC Cars

Sale: \$59.95



Tachyon XC helmetcam



# 915 MHz telemetry

## Maxstream (Digi)

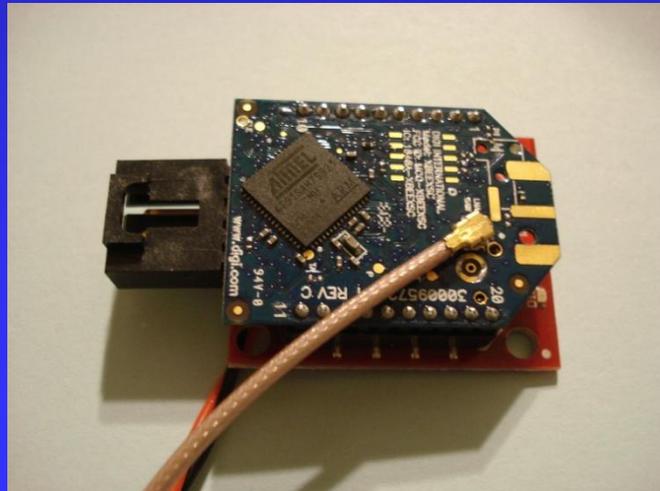
### 9Xtend

- 1 Watt output
- 9600 baud or 115k baud
- Long range with yagi on ground



## Digi XBee Pro XSC

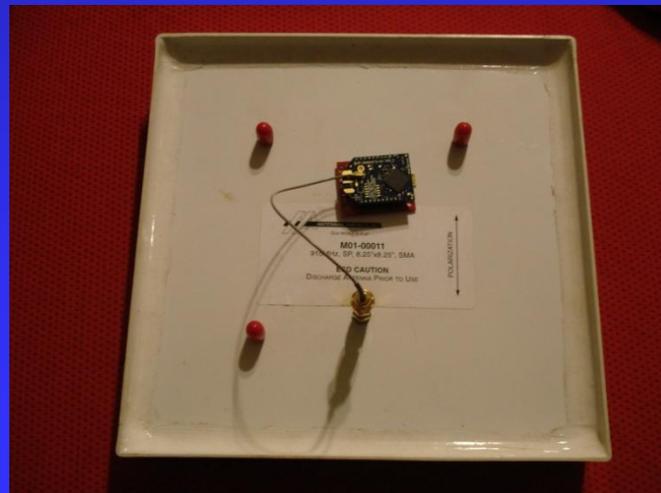
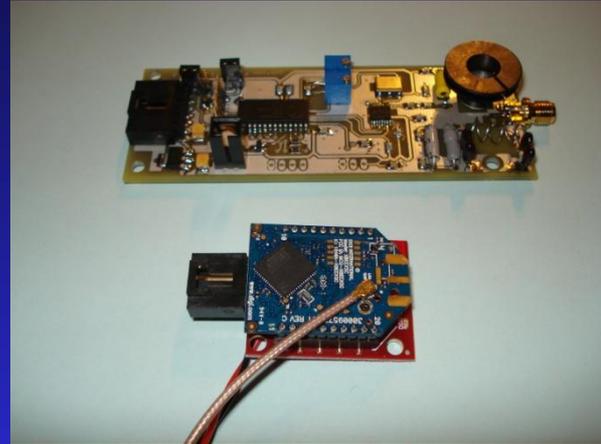
- Up to 100 mW out
- 900 and 2400 MHz versions
- Great for wireless comms between payloads
- With a high-gain yagi it's possible to directly link up to the balloon during flight



# 915 MHz telemetry

## Digi XBee Pro

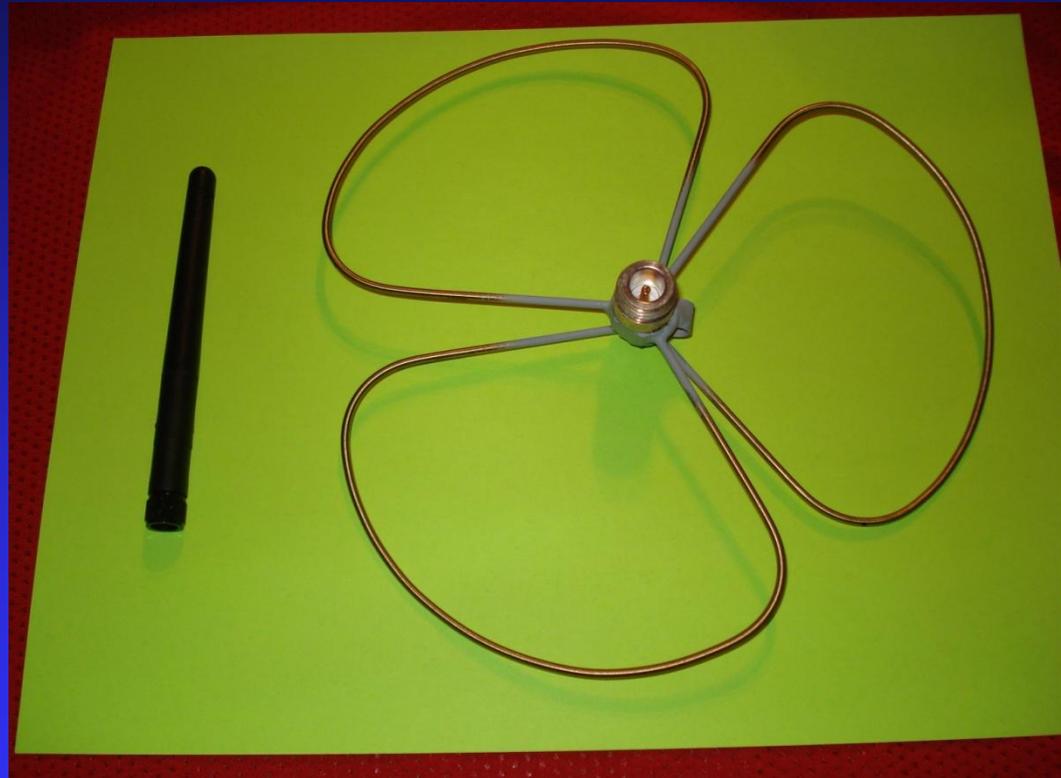
- Serial data from the MMT-XMT is sent to the XBee Pro for payload to payload comms or directly to the ground
- Ground station end showing XBee Pro mounted to the back of an 8 dB patch antenna



# 915 MHz telemetry

-For improved range and better pattern directly below the balloon you can use a “Nanowheel” antenna by Olde Antenna Labs (sold by [www.hamtv.com](http://www.hamtv.com))

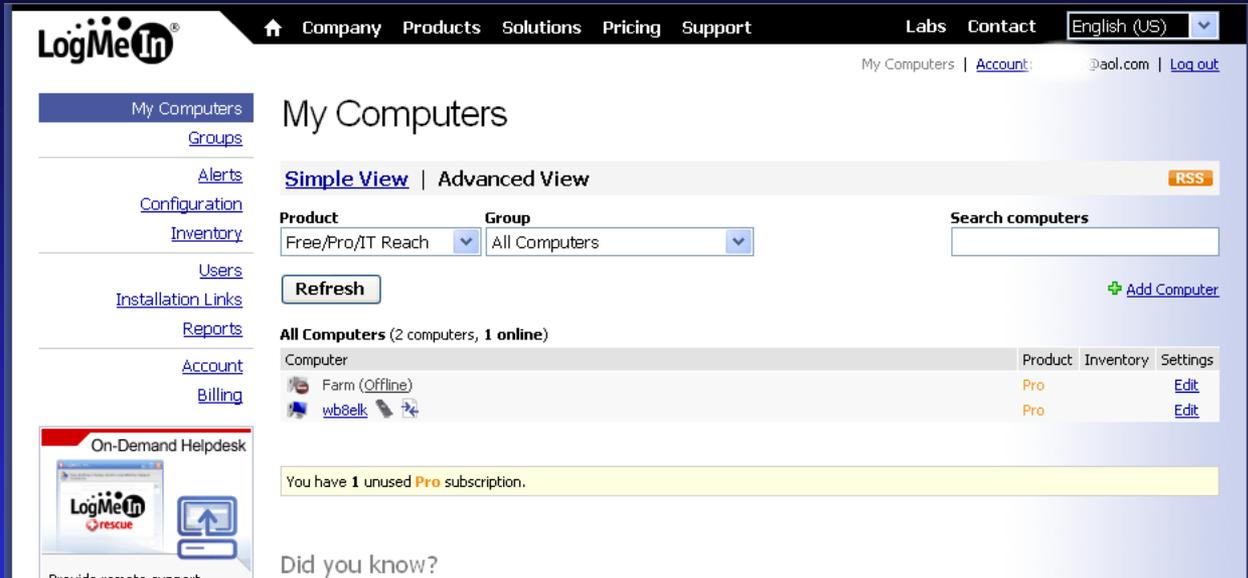
-*900 MHz rubber duck shown for size comparison*



# Remote control your ground station

•Logmein.com

Remotely log  
Onto your  
Computer via  
Logmein



Control your radio with:

Fldigi

Ham Radio Deluxe

MixW

MultiPSK



# Hardware control – Iobridge.com

- Controls relays and sensors via Ethernet/Web connection

ioBridge (beta) Home **Store** Technology Support About

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## STORE

Here are some things that you can buy from ioBridge for your projects.

[View Cart](#)

### Modules



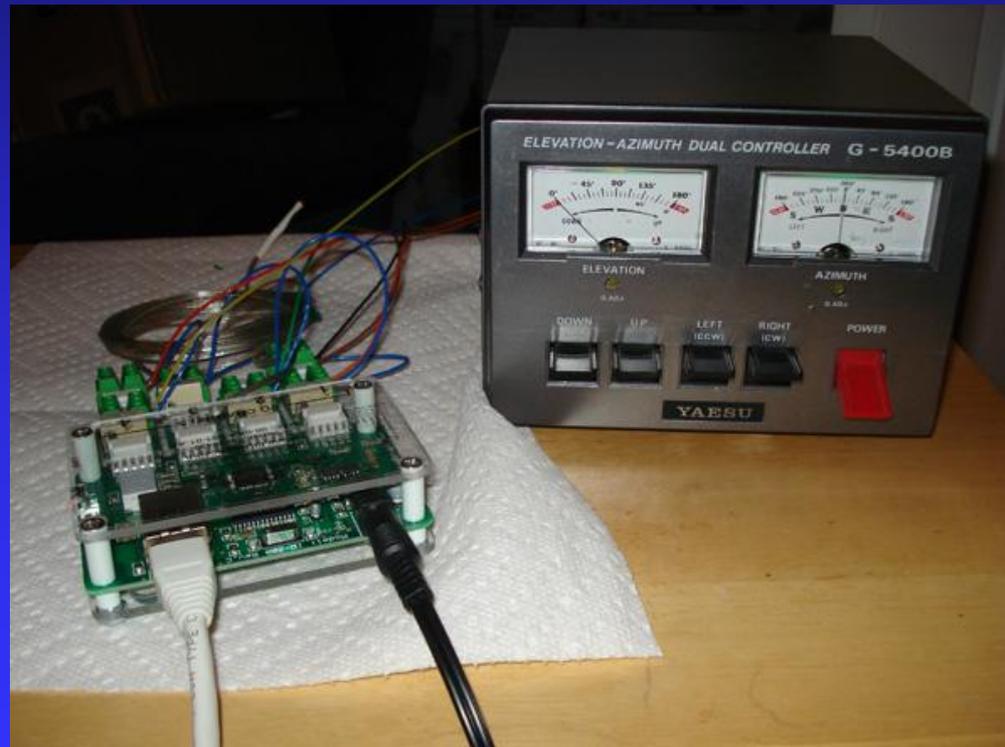
The IO-204 Monitor & Control Module is a green printed circuit board (PCB) housed in a white plastic enclosure. It features a central microcontroller, various integrated circuits, and several connectors. A USB Type-A port is visible on the right side, and a power jack is on the left. The board is populated with numerous surface-mount components and has a white label with the text 'IO-204 Monitor & Control Module'.

#### IO-204 Monitor & Control Module

The IO-204 Monitor & Control Module helps bridge the gap between the physical world and the World Wide Web. The IO-204 module and online tools at [www.ioBridge.com](http://www.ioBridge.com) allow you to easily get your projects on the web. There is no need to run a home web server or track ever changing dynamic IP addresses. The IO-204 module takes care of the internet connectivity and the user customizable widgets on the ioBridge website remove the need for complex programming. Just plug in your IO-204 module, register on the ioBridge website and within minutes, you'll be interacting with lights, switches, servos, sensors and microcontrollers. Keep your widgets private on your secure ioBridge

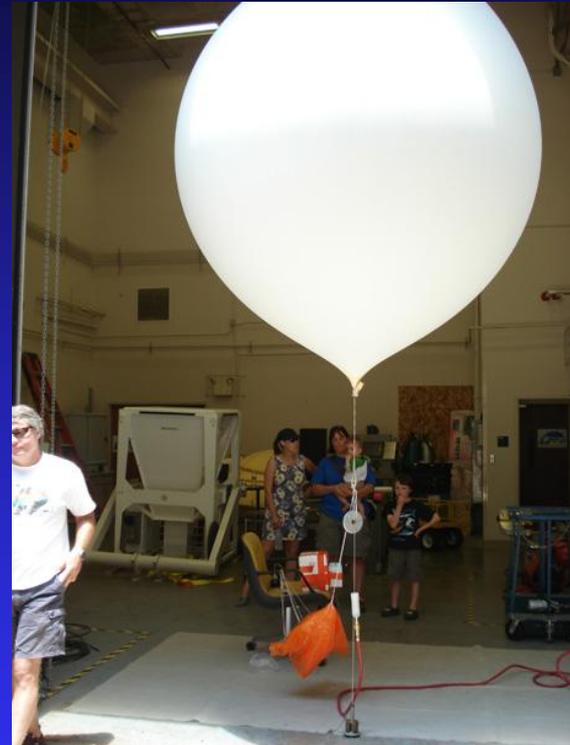
# Hardware control – Iobridge.com

- Internet-controlled AZ/EL Rotor via the Iobridge interface



# Field Day Balloon 2010

- Predicted a landing on top of the Huntsville Amateur Radio Club's Field Day site



# Field Day Balloon 2010

Huntsville Amateur Radio Club members watch as the balloon parachutes down directly across their field day site

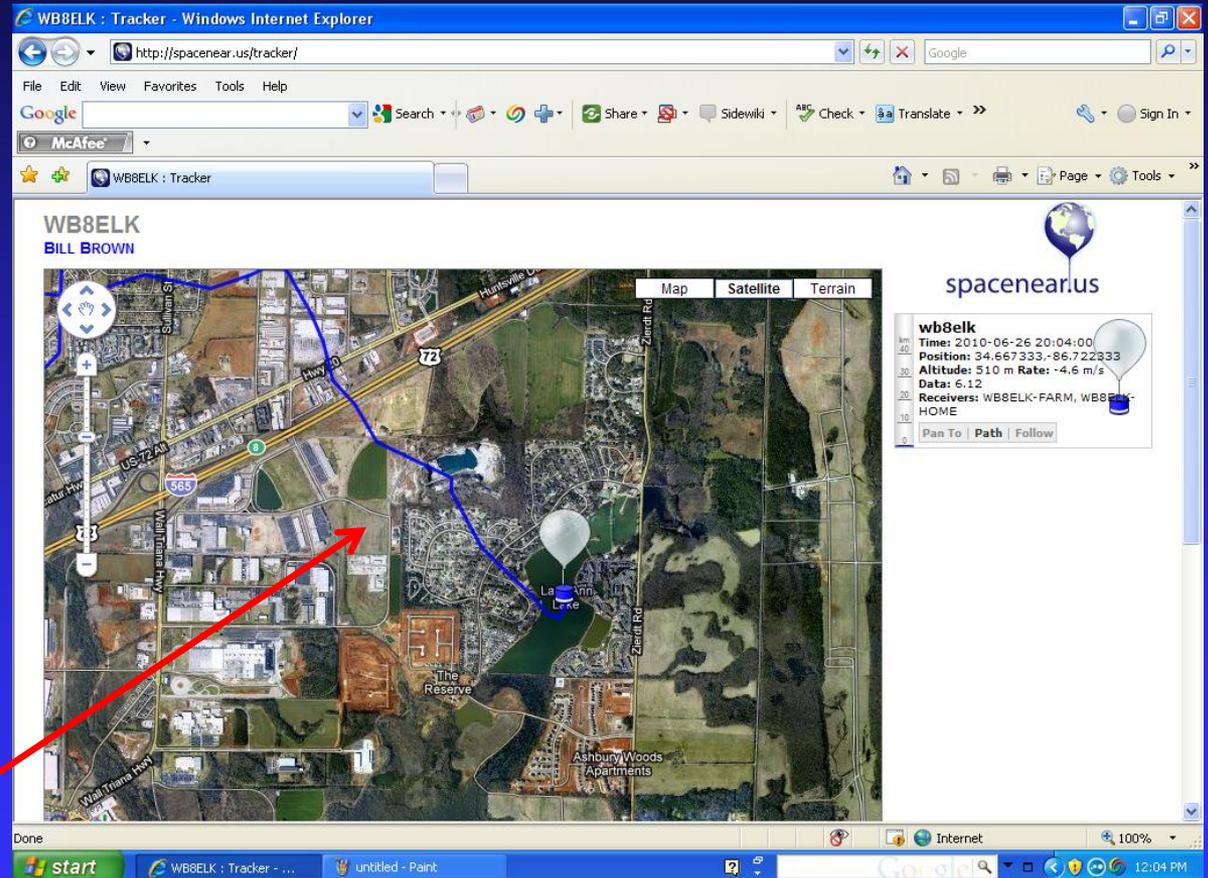


# Field Day Balloon 2010

Missed landing on the HARC Field Day site by 0.75 miles

Landed right in the middle of Lady Ann Lake

Field Day location



# Field Day Balloon 2010

A  
conveniently  
placed kayak  
saves the day

