Multi-Mode Transmitter for Balloons
Multi-Mode Transmitter

MODES
- Hellscreiber
- 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 Hellscreiber transmission

• On/Off keyed mode
• 8.163 msec per pixel
DominoEX mode

- MFSK mode
- 18 tones

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

Table of DominoEX modes. * Default mode (with FEC off)
dl-FLdigi

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

$$\text{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
Map shows ground station locations during a recent HF balloon flight
Camcorders for balloons

- Hobbypartz $59 thumbdrive camcorder

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)

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

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

Modules

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 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
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