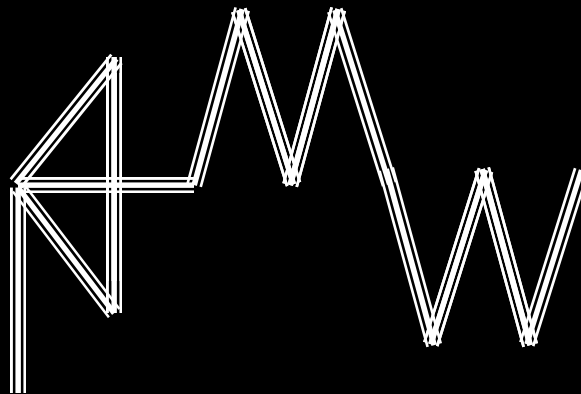


N4MW Dual Band Beacon Packrats – NEWS 2012

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Topics

- ▶ N4MW beacon history
- ▶ Synthesizers
- ▶ Keyer and Keying Sequence
- ▶ Return to EM55
- ▶ New W4HHK beacons
- ▶ WA4FC Beacons
- ▶ References
- ▶ Acknowledgements

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N4MW Beacon History

- ▶ *1980's: W4HHK built beacons for 50, 144, 432 and 1296*
- ▶ *1980's: Operation by N4MW took over and expanded*
- ▶ *1990's: Eventually all 11 bands from 10 meters to 10 GHz*
- ▶ *1994: Operation QRT – N4MW moves to FM17, Virginia*
- ▶ *1995: N4MW/B 144.280 back on the air from FM17*
- ▶ *2006: N4MW retires and puts up taller tower*
- ▶ *2009: N4MW upgrades and expands FM17 beacons*
- ▶ **2011: Hurricane Irene topples beacon towers**

N4MW Dual Band Beacon

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Current FM17 Beacon Information



A photograph of a radio tower with multiple antennas, situated behind a wooden building with a window. The image is used as a background for the table.

28.250	WA4FC/B
50.0785	WA4FC/B
144.280	N4MW/B
222.060	N4MW/B
432.300	N4MW/B
903.280	N4MW/B
1296.280	N4MW/B
2304.280	N4MW/B
10368.280	N4MW/B

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Synthesizers - info

- ▶ PTS: Programmed Test Sources, Inc. or Wavetek Rockland
- ▶ PTS Models: 160, 250, 310, 500, etc.
- ▶ Resolution: 1 Hz typical, 0.1 Hz optional
- ▶ 10 MHz reference input/output
- ▶ Front panel control or remote
- ▶ BCD or GPIB interfaces
- ▶ Output variable up to +13 dBm
- ▶ Power consumption 40 watts



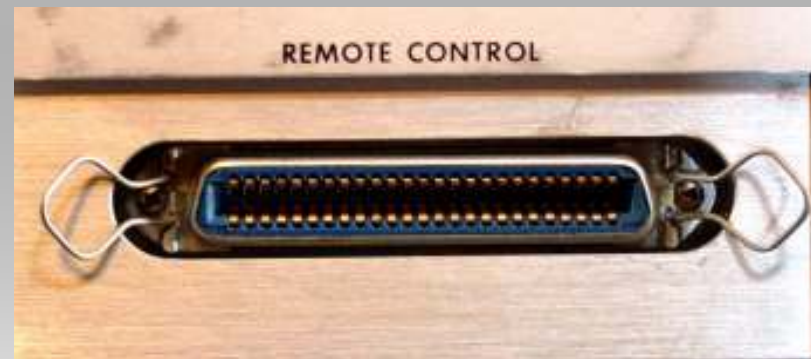
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PTS Synthesizer – BCD programming

A PTS box with no front panel controls and a BCD interface can easily be programmed for a fixed frequency:

- ▶ 50 pin AMP connector
- ▶ Ground pin 42 for remote
- ▶ Ground pins for desired bits

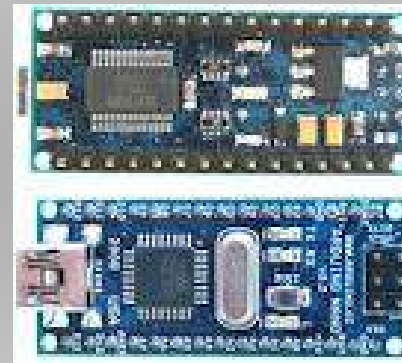
Sample plug programmed
for 144.280, requires
grounding only 6 data pins



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► Arduino Nano

- <\$20 from various sources
- USB port
- C-like language programming
- Multiple keyed outputs



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- ▶ Band A Callsign
- ▶ Tuning Dashes
- ▶ Band B Callsign
- ▶ Tuning Dashes
- ▶ Band A Grid
- ▶ Tuning Dashes
- ▶ Band B Grid
- ▶ Tuning Dashes

N4MW Dual Band Beacon Packrats – NEWS 2012 W4HHK/B



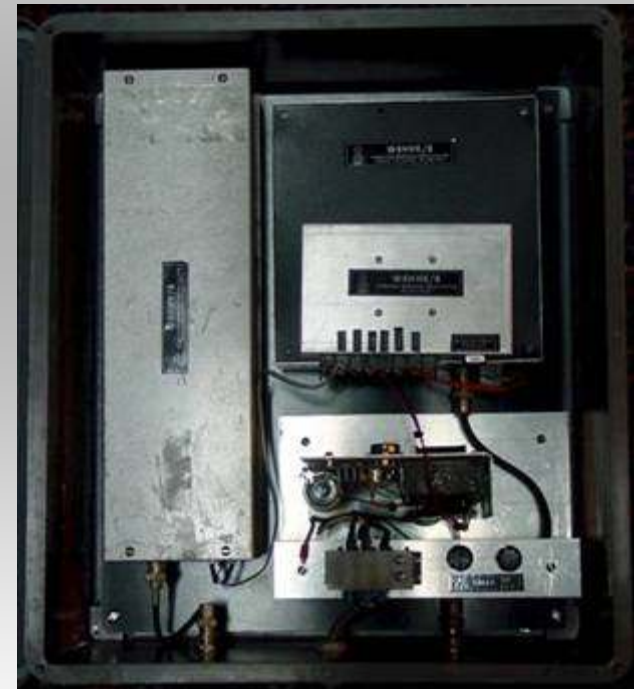
Antennas

Transmitters

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Return to EM55: Memphis Area

- ▶ 144 and 50 MHz installed June 2009
- ▶ Beacons worked until June 2011
- ▶ Repaired/reinstalled July 2011
- ▶ Lasted 1 week – 2 meter failed
- ▶ Returned after CSVHF and removed
- ▶ Decision to rebuild - better!



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W4HHK/B Dual Band Beacon

- ▶ Two frequencies: 50.070 and 144.280 MHz
- ▶ Single OCXO referenced synthesizer
- ▶ Diode arrays programming
- ▶ Arduino keyer with special keying sequence
- ▶ Comet CF-706 duplexer to separate bands
- ▶ Separate power amplifiers and antennas

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WA4FC/B Dual Band Beacon

- ▶ Two frequencies: 28.231 and 50.078 MHz
- ▶ Single OCXO referenced synthesizer
- ▶ Diode arrays programming
- ▶ Arduino keyer with special keying sequence
- ▶ Common power amplifier
- ▶ Vintage Bud LF-601 low pass filter
- ▶ Comet CF-360 duplexer to separate bands
- ▶ Separate antennas on 200 foot water tower

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Bonus: Synthesized 10 GHz FSK Beacon

- ▶ PTS-160 programmed using remote control (BCD)
- ▶ Reference and power supplied to remote Micromega source via single long coax cable
- ▶ FSK imparted by toggling bit 1 of 10 Hz decade with keyer output: $10 \text{ Hz} \times 105 = 1050 \text{ Hz shift}$
- ▶ $98.745 \text{ MHz} \times 105 = 10,368.225 \text{ MHz}$



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References

- Memphis area beacons: www.n4mw.com
- W4HHK/B: www.qrz.com/db/w4hhk
- WA4FC/B: www.fieldcomm.org
- N4MW beacons: www.n4mw.com/beacons.htm
- Programmed Test Sources, Inc.: www.programmedtest.com
- Arduino keyer – just google it!

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Acknowledgements

- ▶ Cissy Meier N4ZRW for going along with my acquisition of many synthesizers for this and other projects
- ▶ Steve and dB Wilson, N4HHK and W4UDQ, for their support of the W4HHK beacon project
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- ▶ Jay Lovelady of Fieldcomm for hosting the FM17 10/6 beacons