

33CM (902MHz) Ham Band

An Introduction to the Band and
Available Equipment

By John Stradal, N5API

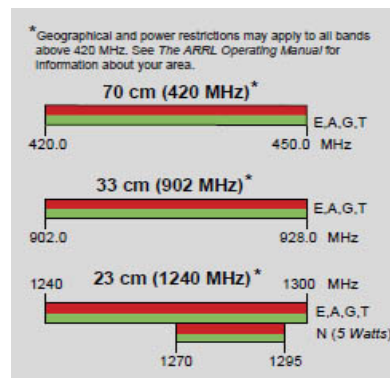
What I'm going to cover...



- What can I expect from 33cm?
- What equipment is available?
- What does it take to get a model on the air?
- What are the pros/cons of particular models?
- What considerations should be made for mobile installations?

What to Expect from 33cm

- **Most activity is FM repeater operations (User RX 927-928MHz & TX 902-903MHz)**
- Propagation characteristics somewhat similar to 70cm
- Extreme line-of-sight
- Multi-path
- Short wavelength (advantage and disadvantage)
- Rice Krispies (not to be confused with the breakfast cereal)



33cm Band Plans

NESMC 902 BANDPLAN
6/2/2007

902.xxx see table 25	903.xxx	904.0-907.0	907.xxx see table 25	908.xxx	909.0 - 910.0	910.0 - 915.0	915.0 - 916.0	916.0-919.0	919.xxx	920.xxx	921.0-927.0	927.xxx see table 25
902.100 CW Calling	903.100 CW Calling		907.000 907.025 907.050 907.075 907.100 907.125 907.150 907.175 907.200 907.225 907.250 907.275 907.300 907.325 907.350 907.375 907.400	908.000 908.025 908.050 908.075 908.100 908.125 908.150 908.175 908.200 908.225 908.250 908.275 908.300 908.325 908.350 908.375 908.400	909.000 909.025 909.050 909.075 909.100 909.125 909.150 909.175 909.200 909.225 909.250 909.275 909.300 909.325 909.350 909.375 909.400	915.000 915.025 915.050 915.075 915.100 915.125 915.150 915.175 915.200 915.225 915.250 915.275 915.300 915.325 915.350 915.375 915.400	916.000 916.025 916.050 916.075 916.100 916.125 916.150 916.175 916.200 916.225 916.250 916.275 916.300 916.325 916.350 916.375 916.400	919.425 919.450 919.475 919.500 919.525 919.550 919.575 919.600 919.625 919.650 919.675 919.700 919.725 919.750 919.775 919.800 919.825 919.850 919.875 919.900 919.925 919.950 919.975	920.000 920.025 920.050 920.075 920.100 920.125 920.150 920.175 920.200 920.225 920.250 920.275 920.300 920.325 920.350 920.375 920.400	921.000 921.025 921.050 921.075 921.100 921.125 921.150 921.175 921.200 921.225 921.250 921.275 921.300 921.325 921.350 921.375 921.400	927.000 927.025 927.050 927.075 927.100 927.125 927.150 927.175 927.200 927.225 927.250 927.275 927.300 927.325 927.350 927.375 927.400 927.425 927.450 927.475 927.500 927.525 927.550 927.575 927.600 927.625 927.650 927.675 927.700 927.725 927.750 927.775 927.800 927.825 927.850 927.875 927.900 927.925 927.950 927.975	
	903.300 Beacons 903.375	903.300 Beacons 903.300	907.425 907.450 907.475 907.500 907.525 907.550 907.575 907.600 907.625 907.650 907.675 907.700 907.725 907.750 907.775 907.800 907.825 907.850 907.875 907.900 907.925 907.950 907.975	908.425 908.450 908.475 908.500 908.525 908.550 908.575 908.600 908.625 908.650 908.675 908.700 908.725 908.750 908.775 908.800 908.825 908.850 908.875 908.900 908.925 908.950 908.975	909.425 909.450 909.475 909.500 909.525 909.550 909.575 909.600 909.625 909.650 909.675 909.700 909.725 909.750 909.775 909.800 909.825 909.850 909.875 909.900 909.925 909.950 909.975	915.425 915.450 915.475 915.500 915.525 915.550 915.575 915.600 915.625 915.650 915.675 915.700 915.725 915.750 915.775 915.800 915.825 915.850 915.875 915.900 915.925 915.950 915.975	916.425 916.450 916.475 916.500 916.525 916.550 916.575 916.600 916.625 916.650 916.675 916.700 916.725 916.750 916.775 916.800 916.825 916.850 916.875 916.900 916.925 916.950 916.975	919.425 919.450 919.475 919.500 919.525 919.550 919.575 919.600 919.625 919.650 919.675 919.700 919.725 919.750 919.775 919.800 919.825 919.850 919.875 919.900 919.925 919.950 919.975	920.425 920.450 920.475 920.500 920.525 920.550 920.575 920.600 920.625 920.650 920.675 920.700 920.725 920.750 920.775 920.800 920.825 920.850 920.875 920.900 920.925 920.950 920.975	921.425 921.450 921.475 921.500 921.525 921.550 921.575 921.600 921.625 921.650 921.675 921.700 921.725 921.750 921.775 921.800 921.825 921.850 921.875 921.900 921.925 921.950 921.975	927.425 927.450 927.475 927.500 927.525 927.550 927.575 927.600 927.625 927.650 927.675 927.700 927.725 927.750 927.775 927.800 927.825 927.850 927.875 927.900 927.925 927.950 927.975	

The amateur allocation on this band is secondary to military/government users. Amateur operations must not cause, and must accept interference from, these primary allocations.

note (a): There are six existing FM repeaters with inputs at 909-910 and outputs at 921-922 MHz. These repeaters must share their spectrum with ATV. No new coordinators for FM repeaters will be made in these subbands.

- TX uses the ARRL Band plan, which is outdated (last revised in 1989)
- Band Plan shown is from NESMC, which was adopted from SERA plan (will show on a later slide)

ARRL Band Plan

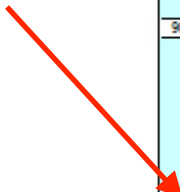
902.0 - 903.0	Narrow-bandwidth, weak-signal communications
902.0 - 902.8	SSTV, FAX, ACSSB, experimental
902.1	Weak-signal calling frequency
902.8 - 903.0	Reserved for EME, CW expansion
903.1	Alternate calling frequency
903.0 - 906.0	Digital communications
906 - 909	FM repeater inputs
909 - 915	ATV
915 - 918	Digital communications
918 - 921	FM repeater outputs
921 - 927	ATV
927 - 928	FM simplex and links

NESMC 902 BANDPLAN

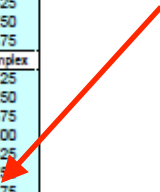
6/2/2007

902.xxx <small>ips (output + 25)</small>	903.xxx	904.0-907.0	907.xxx <small>(input, (output+12))</small>	908.xxx	909.0 - 915.0	915.0 - 916.0	916.0-919.0	919.xxx	920.xxx	921.0-927.0	927.xxx <small>sub (input - 25)</small>
902.100 CW Calling	903.100 CW Calling		907.000 907.025 907.050 907.075 907.100 907.125 907.150 907.175 907.200 907.225 907.250 907.275 907.300 907.325 907.350 907.375 907.400	908.000 908.025 908.050 908.075 908.100 908.125 908.150 908.175 908.200 908.225 908.250 908.275 908.300 908.325 908.350 908.375 908.400	909 see note (a) 910	915.0 ISM		919.000 919.025 919.050 919.075 919.100 919.125 919.150 919.175 919.200 919.225 919.250 919.275 919.300 919.325 919.350 919.375 919.400	920.000 920.025 920.050 920.075 920.100 920.125 920.150 920.175 920.200 920.225 920.250 920.275 920.300 920.325 920.350 920.375 920.400	921 see note (a) 922	927.0125 927.0375 927.0625 927.0875 927.1125 927.1375 927.1625 927.1875 927.2125 927.2375 927.2625 927.2875 927.3125 927.3375 927.3625 927.3875
902.250 SSB Calling	903.250 SSB Calling		907.425 907.450 907.475	908.425 908.450 908.475	910.25 NTSC Video Carrier			919.425 919.450 919.475	920.425 920.450 920.475	922.25 NTSC Video Carrier	927.4125 927.4250 927.4375 927.4500 927.4625 927.4750 927.4875
902.300 Beacons 902.375	903.300 Beacons 903.350		907.475	908.475	ATV #1	Mixed Use: Digital, Links, Wide Band Data, Experimental		919.475	920.475	ATV #2	927.5 - Simplex
902.400	903.400		907.500 907.525 907.550 907.575 907.600 907.6125 907.6250 907.6375 907.6500 907.6625 907.6750 907.6875 907.7000 907.7125 907.7250 907.7375 907.7500 907.7625 907.7750 907.7875 907.8000 907.8125 907.8250 907.8375 907.8500 907.8625 907.8750 907.8875	908.500 908.525 908.550 908.575 908.600 908.6125 908.6250 908.6375 908.6500 908.6625 908.6750 908.6875 908.7000 908.7125 908.7250 908.7375 908.7500 908.7625 908.7750 908.7875 908.8000 908.8125 908.8250 908.8375 908.8500 908.8625 908.8750 908.8875			919.500 919.525 919.550 919.575 919.600 919.625 919.650 919.675 919.700 919.725 919.750 919.775 919.800 919.825 919.850 919.875	920.500 920.525 920.550 920.575 920.600 920.625 920.650 920.675 920.700 920.725 920.750 920.775 920.800 920.825 920.850 920.875		927.5125 927.5250 927.5375 927.5500 927.5625 927.5750 927.5875 927.6000 927.6125 927.6250 927.6375 927.6500 927.6625 927.6750 927.6875 927.7000 927.7125 927.7250 927.7375 927.7500 927.7625 927.7750 927.7875 927.8000 927.8125 927.8250 927.8375 927.8500 927.8625 927.8750 927.8875	
902.5 - Simplex		Mixed Use: Digital, Links, Experimental									
Weak Signal			907.900 907.925 907.950 907.975	908.900 908.925 908.950 908.975				919.900 919.925 919.950 919.975	920.900 920.925 920.950 920.975		Weak Signal (Beacons)

25MHz Split
Inputs



25MHz Split
Outputs



The amateur allocation on this band is secondary to military/government users. Amateur operations must not cause, and must accept interference from, these primary allocants.

note (a): There are six existing FM repeaters with inputs at 909-910 and outputs at 921-922 MHz. These repeaters must share their spectrum with ATV. No new coordinations for FM repeaters will be made in these subbands.

33cm Repeaters in TX

- 30 Repeaters listed in the State of TX
- 8 are located in the DFW area
- Denton County currently has the largest concentration in the metroplex, and the 3rd largest concentration in the state (3 repeaters)
- Between the 3 repeaters, county-wide handheld coverage is available

33cm Repeaters in DFW (On Air)

- **Denton County**
 - 927.4125 – N. Denton (N5API)
 - 927.6125 – S. Denton (DCARA)
 - 927.8750 – Flower Mound (N5ERS)
- **Dallas County**
 - 927.1125 – Richardson (T.I. ARC)
 - 927.8500 – Dallas (DARC) (off air, may be back soon)
- **Collin County**
 - 927.0750 – Murphy (may be moving to Garland)
- **Tarrant County**
 - 927.0125 – Azle
- **Ellis County**
 - 927.7125 – Waxahachie

Available Equipment



Motorola GTX 900 (Handheld)

- Software mod only
- Accessories readily available (common business form-factor)
- Deviation levels may fluctuate
- No alpha-numeric display
- 10 channel max.



Motorola MTX9000 & Motorola MTS2000



- Software mod only
- May need to tweak VCO to enable simplex (may not be possible with some radios)
- 14 character Alphanumeric display
- 16 or 160 channel max.
- Accessories readily available (common public safety form-factor)
- Different configurations available

Motorola MTX 900

- Hardware mod required (pic stick)
- Accessories harder to come by (older product line)
- No display
- 15 channel max.



Motorola GTX 900 (Mobile) & Motorola LCS 2000

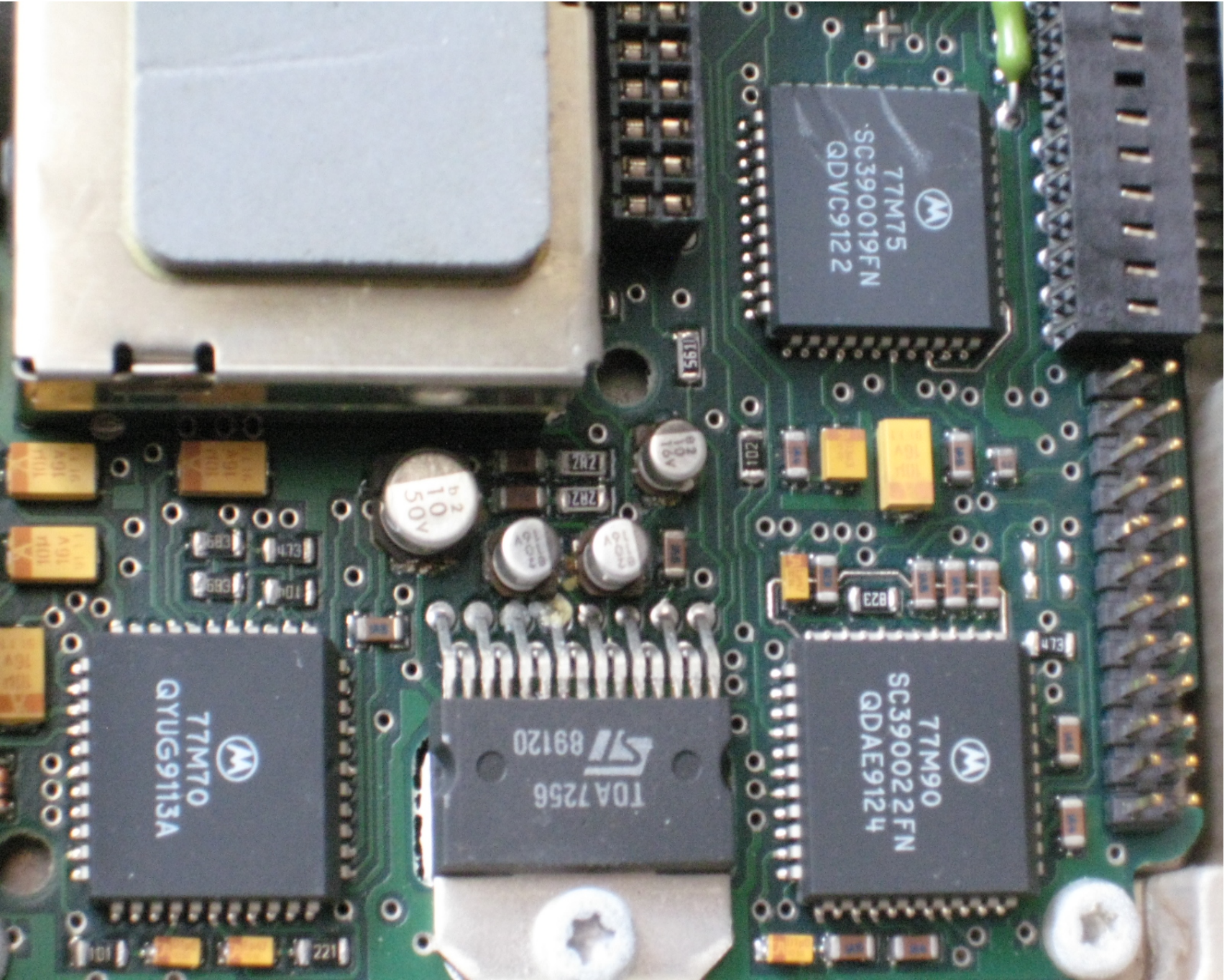


- Software mod only
- Accessories somewhat available
- 12w & 30w models available (30w rare)
- TX Power levels may fluctuate
- 10 channel max.
- No alphanumeric display
- Not remote mountable* (without creative engineering)

Motorola Spectra

- Software and hardware mod required
- Accessories readily available (rebanding)
- 8 or 14 character Alphanumeric display
- 128 channel max.
- Many different configurations available (including control head and output power)
- Remote mountable
- Leaky capacitors





Motorola MCS2000



- Software mod only
- Accessories harder to come by on used market (model still in use)
- 8, 14, or 28 character Alpha-numeric display
- 48 or 160 channel max.
- Many different configurations available (including control head and output power)
- Remote mountable

Motorola Maxtrac

- Extensive software and hardware mod required
- Accessories readily available
- Only model that will cover entire 902-928 band after mods
- No alphanumeric display
- 16 channel max.
- Several configurations available
- Remote mountable



What you need to ask yourself before buying...

- What model will work best for my application
- How much work do I want to put into the radio to get it on the air
- Do I have (or know someone who has) the correct equipment to program the radio
- Standard radio questions... (who's selling it, what might be wrong with it, what condition is it in, etc.)

The MOST important part of a commercial radio...



Where do I get one?



- eBay
- Ham swap meets

Special Considerations for Converting Commercial Equipment

- Make sure the radio works in its native form before attempting a conversion
- Test it on all programmed channels after it has been modified.

Special Considerations for 33cm in a Mobile Environment

- Coax Length & Type
 - RG58 loss at 17ft. = 2.646db!
 - LMR240 loss at 17ft. = 1.288db
- Coaxial Adapters
- Antenna Type
- Mounting Location

Where do I go for more info?

- <http://www.repeater-builder.com/rbtip/mojoinindex.html>
- <http://batboard.batlabs.com/index.php>
 - A free user account is required
- [AR902Mhz Yahoo Group](#)
 - A free user account is required
- <http://www.batlabs.com/>

Questions?



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