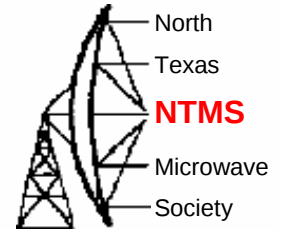


VHF drivers for Microwave local oscillators

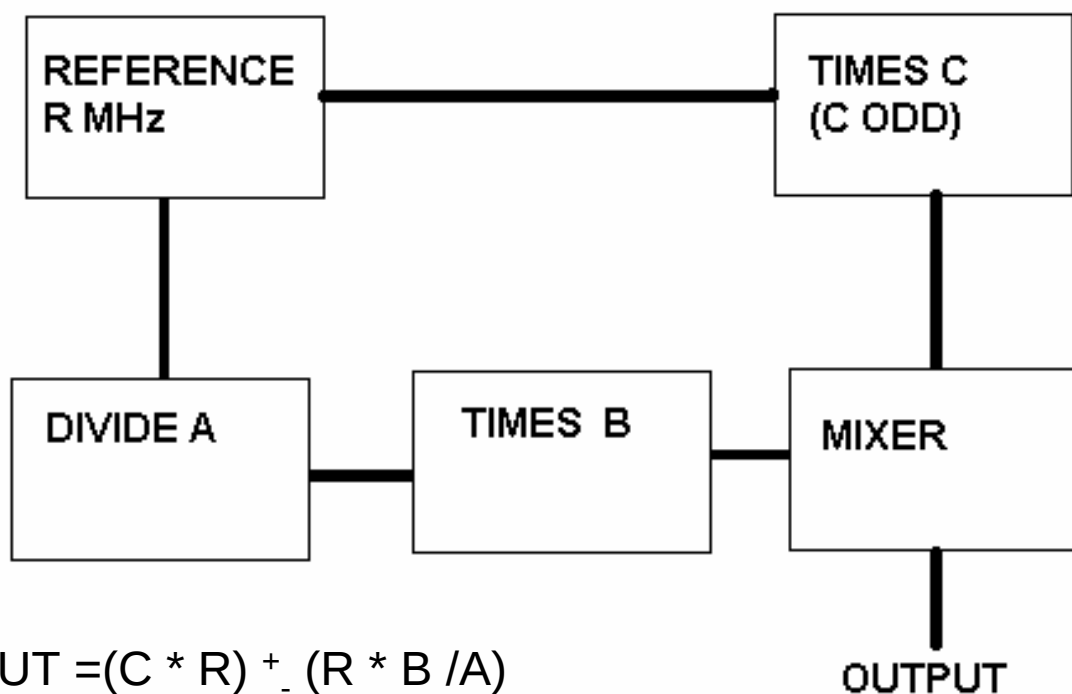
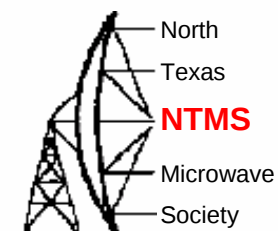
Dave Robinson WW2R, G4FRE

History

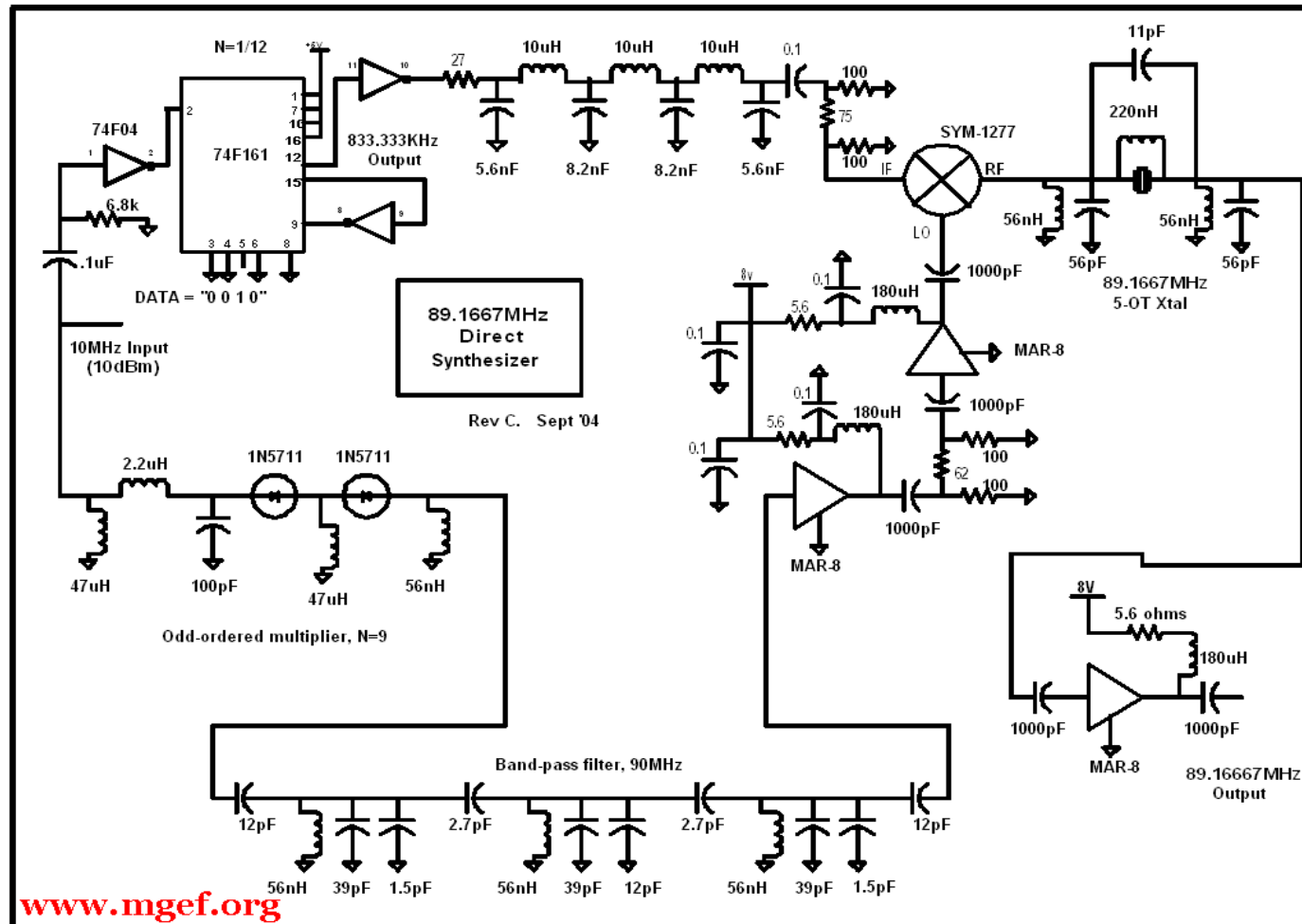
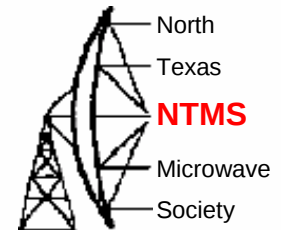


1. My DEMI xverter drifts on 1296 EME (but 10G one doesn't!). Need to fix especially for JT65c
2. Been looking at DMK type circuits for a while; unexpectedly poor phase noise
3. WA1ZMS had given presentation at Martlesham Round Table on 134GHz equipment which renewed my interest in solving the problem using Direct Frequency Synthesis

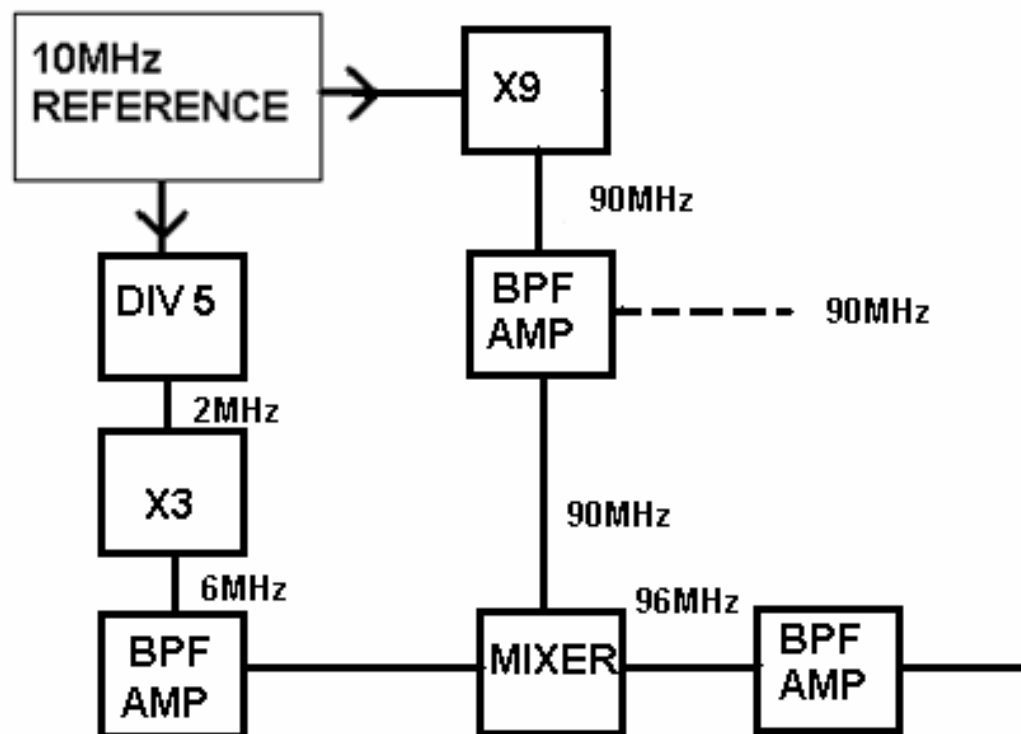
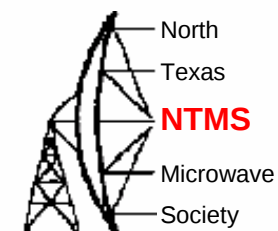
Generic DFS



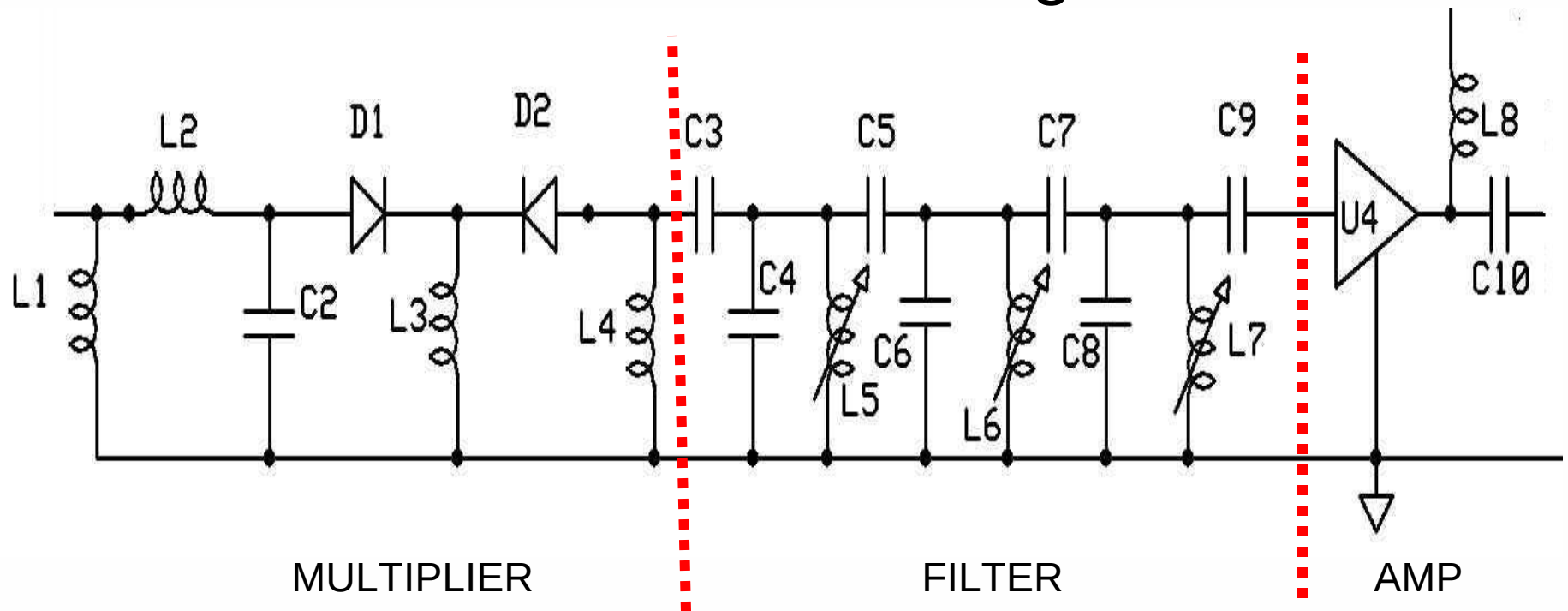
WA1ZMS DFS



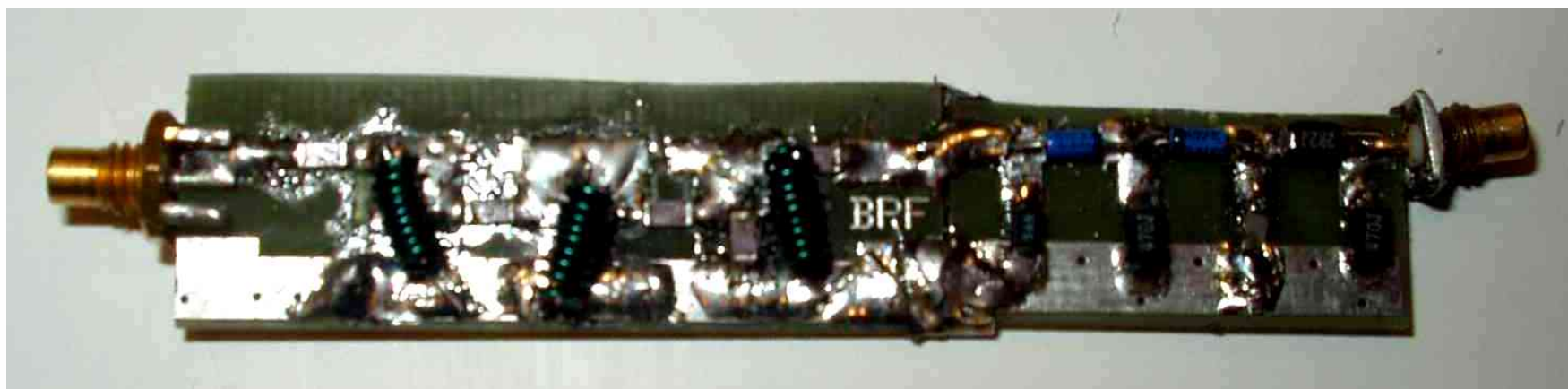
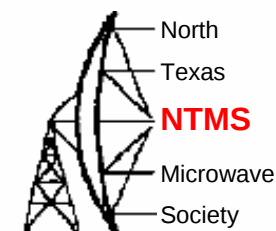
DFS9096 Block Diagram



First wanted to try 90MHz multiplier/filter circuit of WA1ZMS design



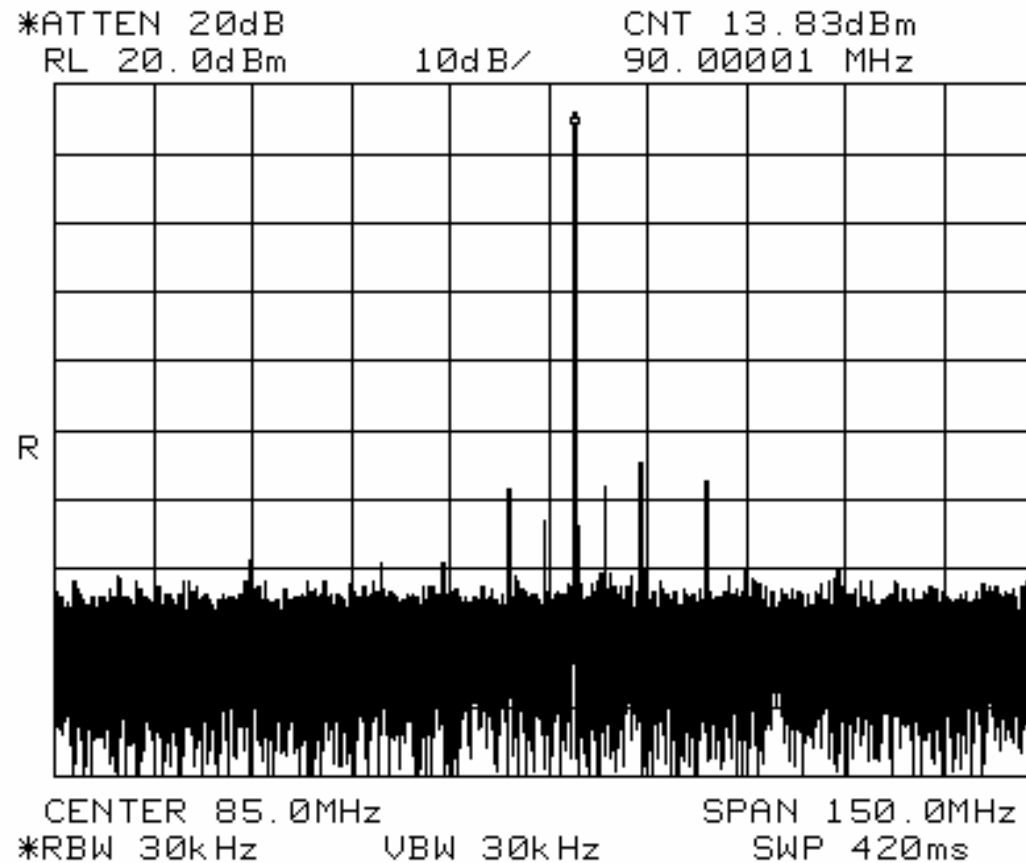
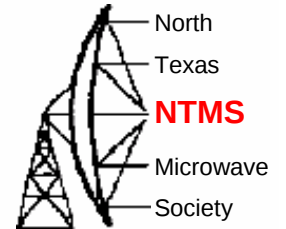
Multiplier Prototype



With mod amp 10dBm in at 10MHz gave 13.8dBm at 90MHz.

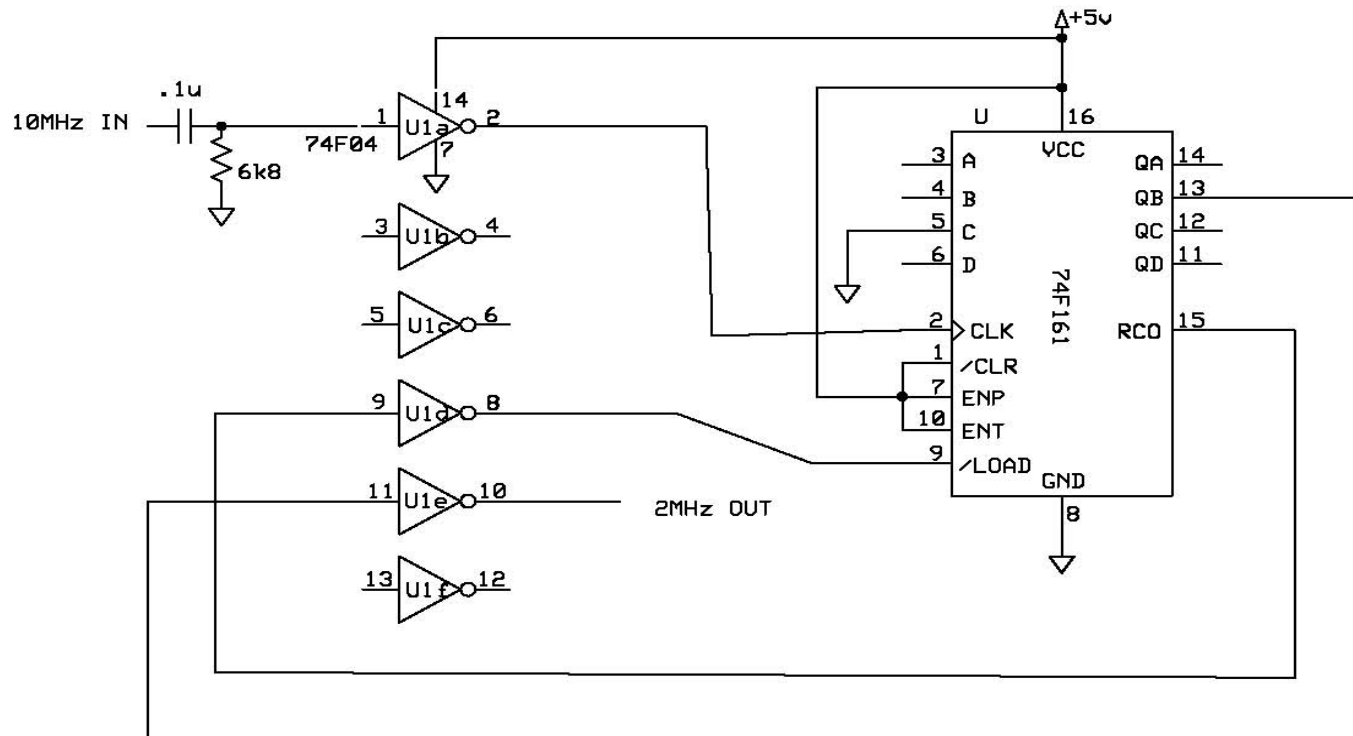
With crystal filter could be used as driver for 2304/144 Local oscillator

90MHz Mult/Filter/Amp output



Note: Stray signals around 90MHz are VHF Broadcast stations (due to lack of screening)

74F161 Divider

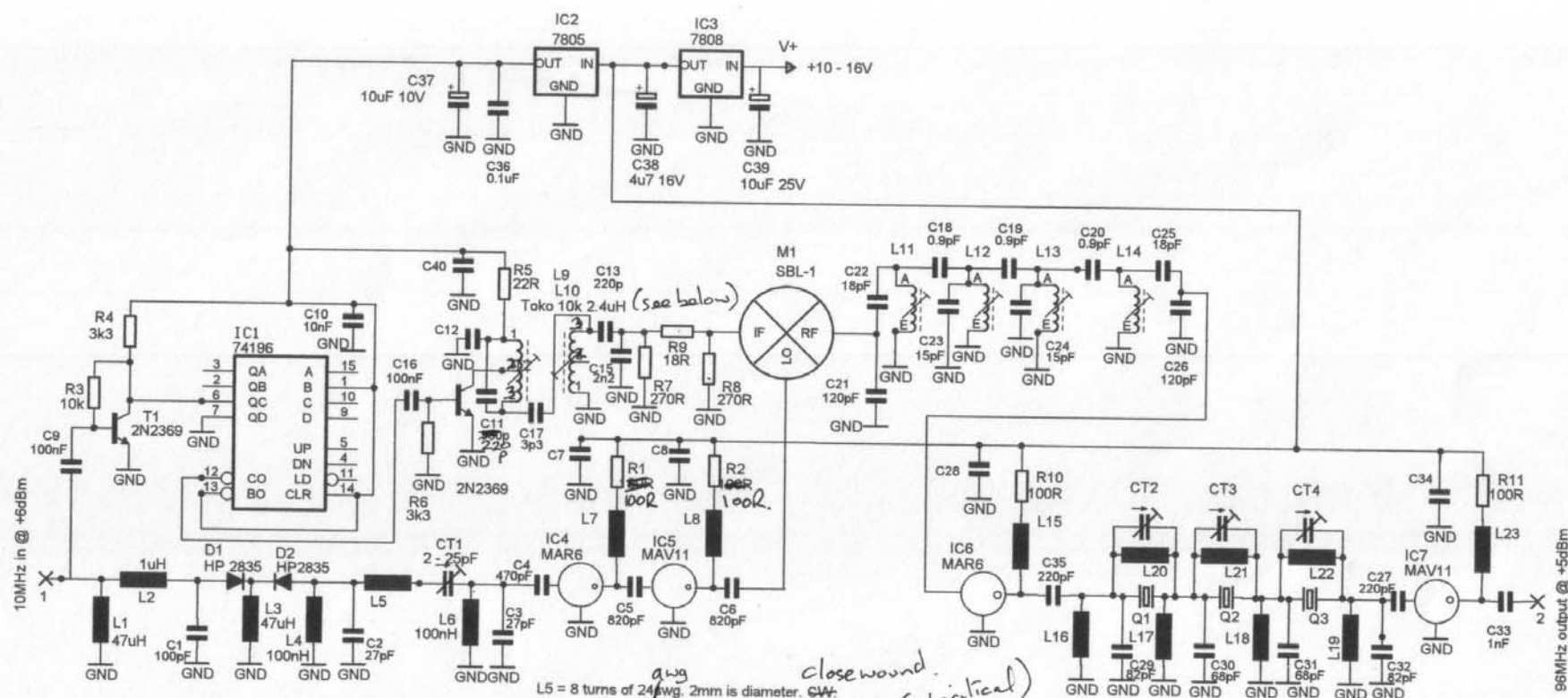
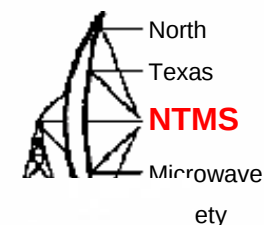


A, B, C, D pulled up internally, therefore preset (DCBA) = 1011 = 11.

74161 will count down from 16 to $11 = 5$ before resetting.

Choose Q output that has closest to 50% duty cycle

G4DDK DFS96



L9/10 = Digikey TK1412 (Toko BTKANS-9449HM) rework with 15t turns 30 Gauge ecw, tapped at 7 turns down from 'cold' end. ~2.4uH

All supply decoupling capacitors 10nF unless otherwise stated.

L11/ 12/ 13/ 14 = Digikey TK3117-ND variable 180nH

L16/ 17/ 18/ 19 = 33nH smd

L20/ 21/ 22/ = 330nH SMD

IC4/6 'MAR6' SiGe devices

CT2/ 3/ 4 = 1.5 - 8pF Trimmer

Q1/ 2/ 3 = 96MHz 5th OT HC18U crystals

96MHz Direct Frequency Synthesiser

TITLE: DFS96v2USA

Document Number:

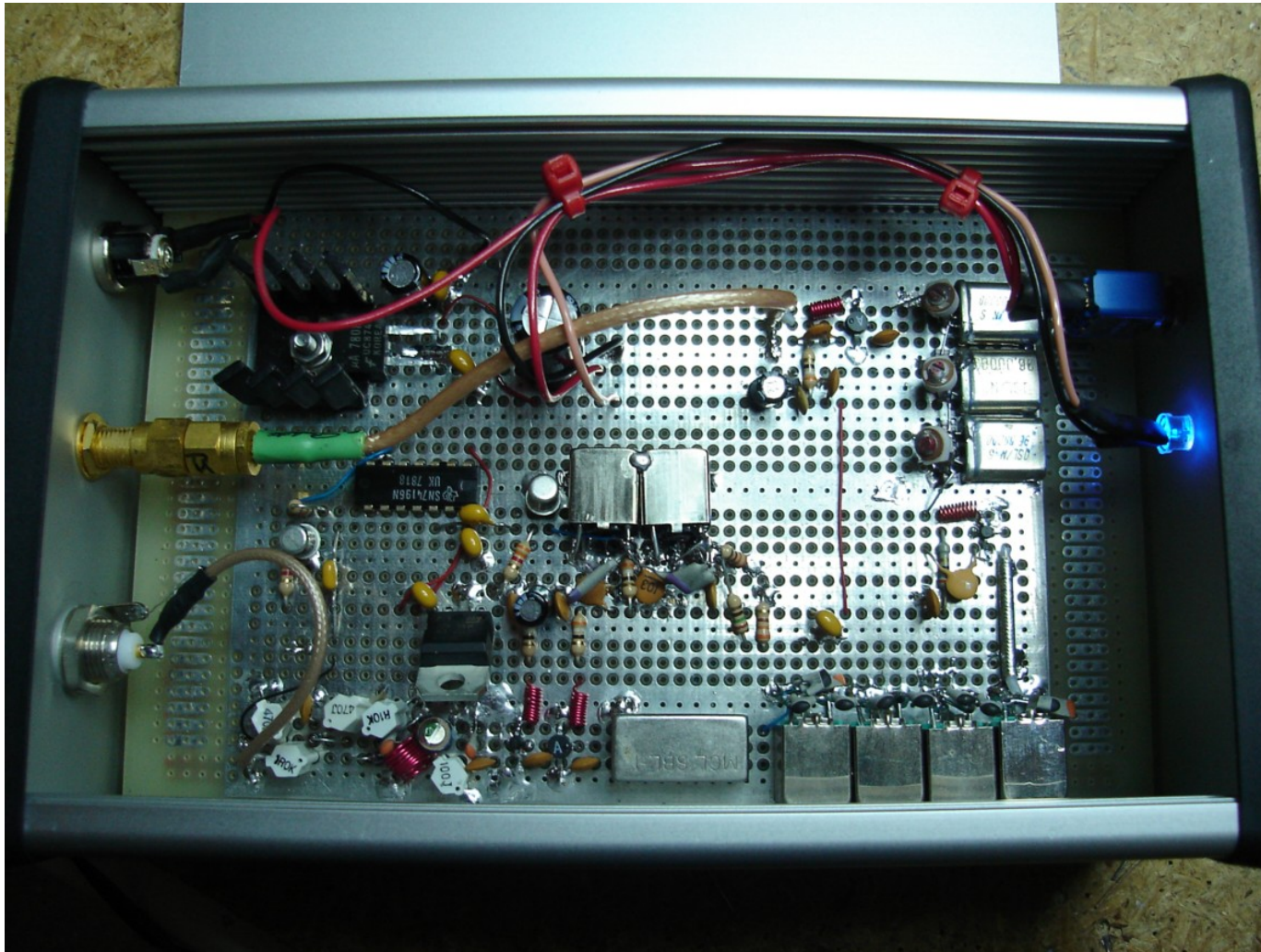
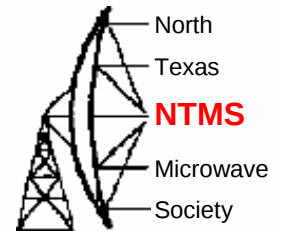
DDK2006

REV:
D

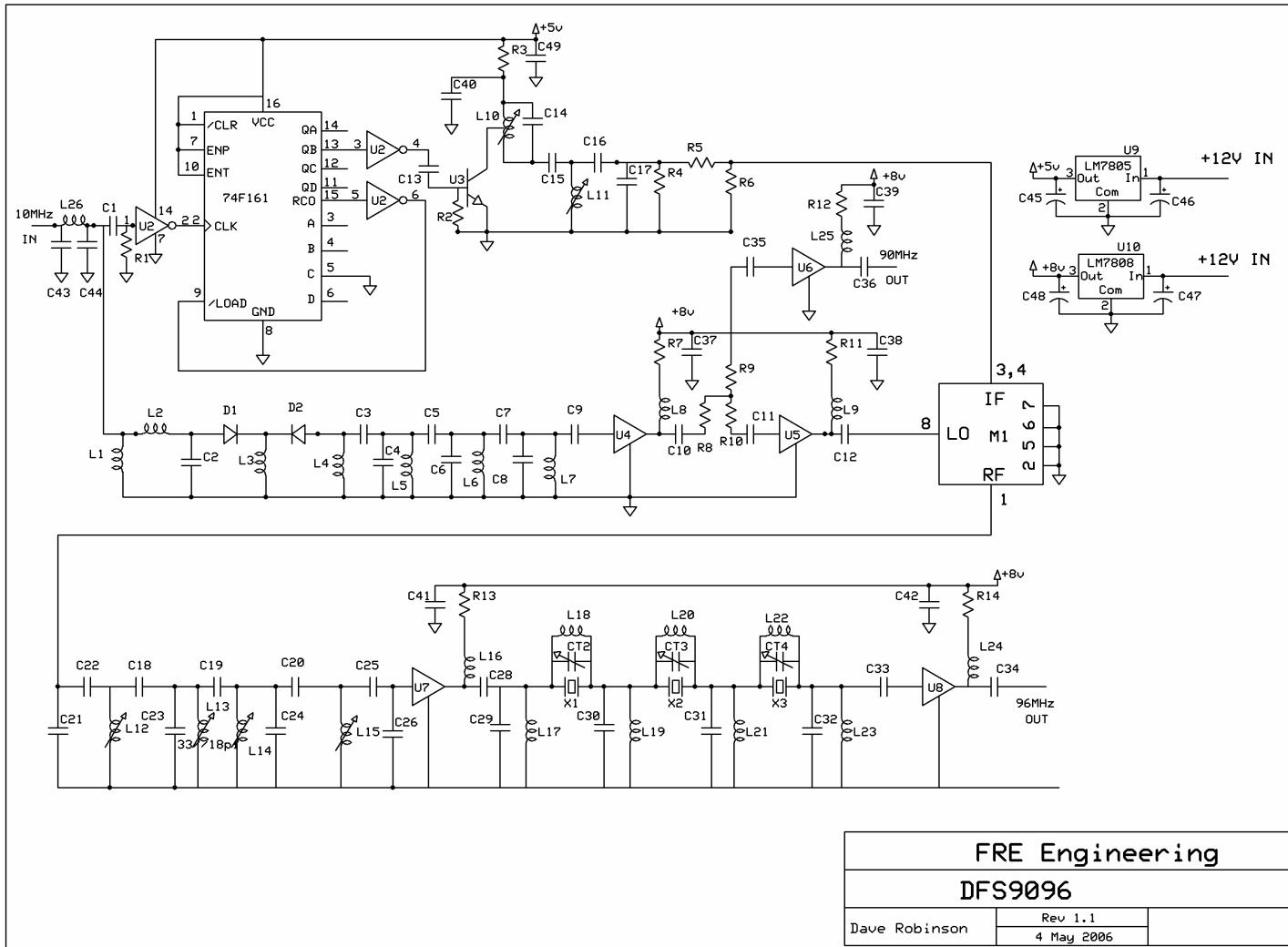
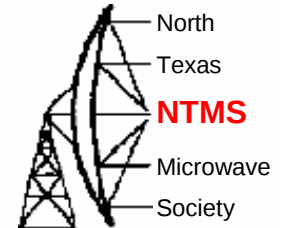
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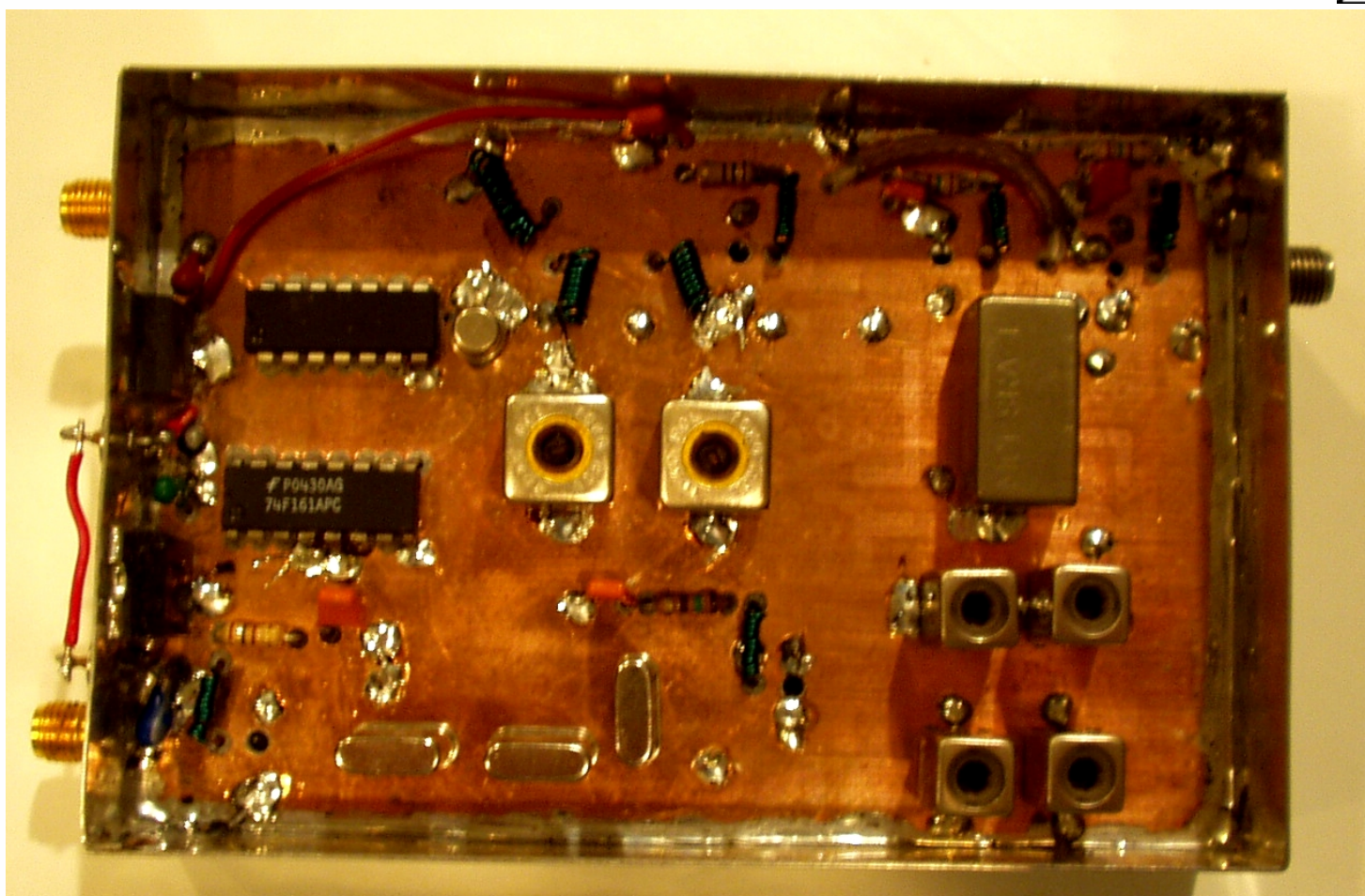
G4DDK Unit



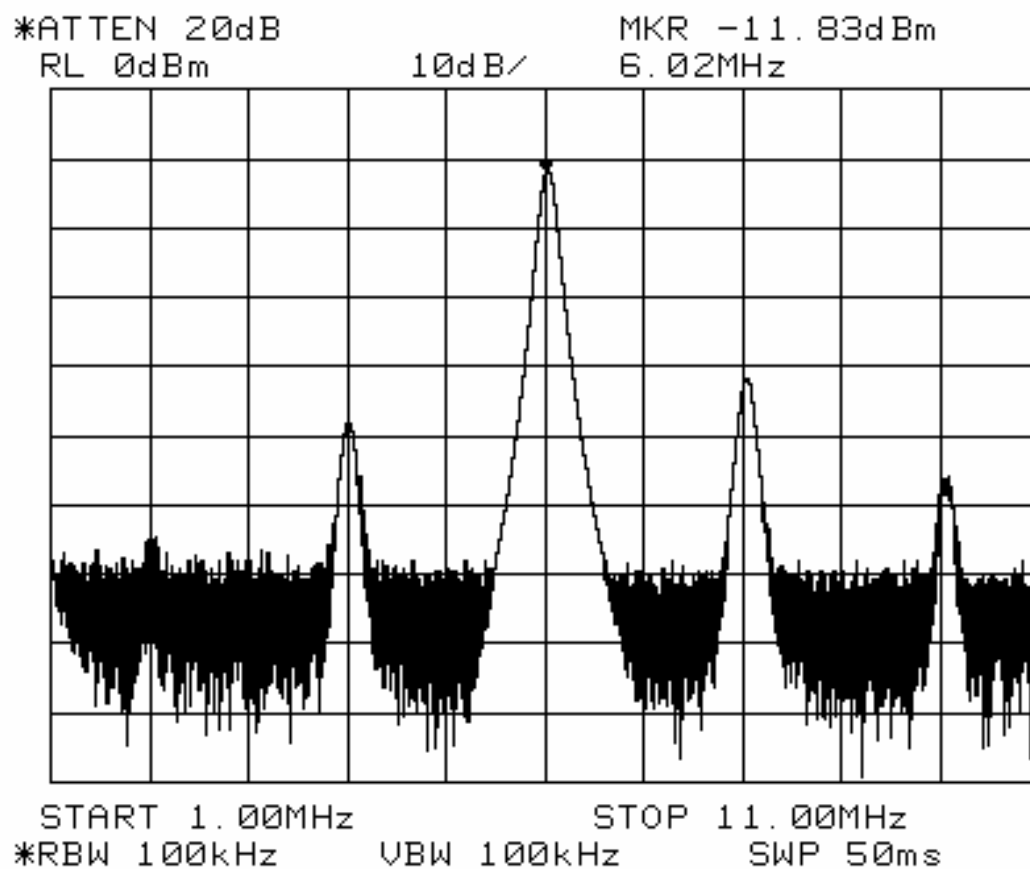
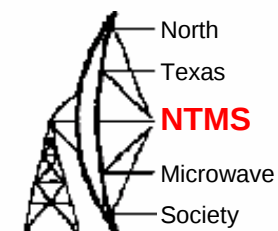
WW2R DFS9096



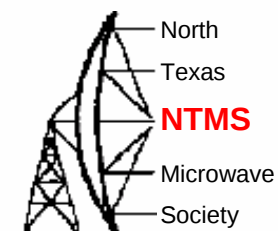
DFS9096



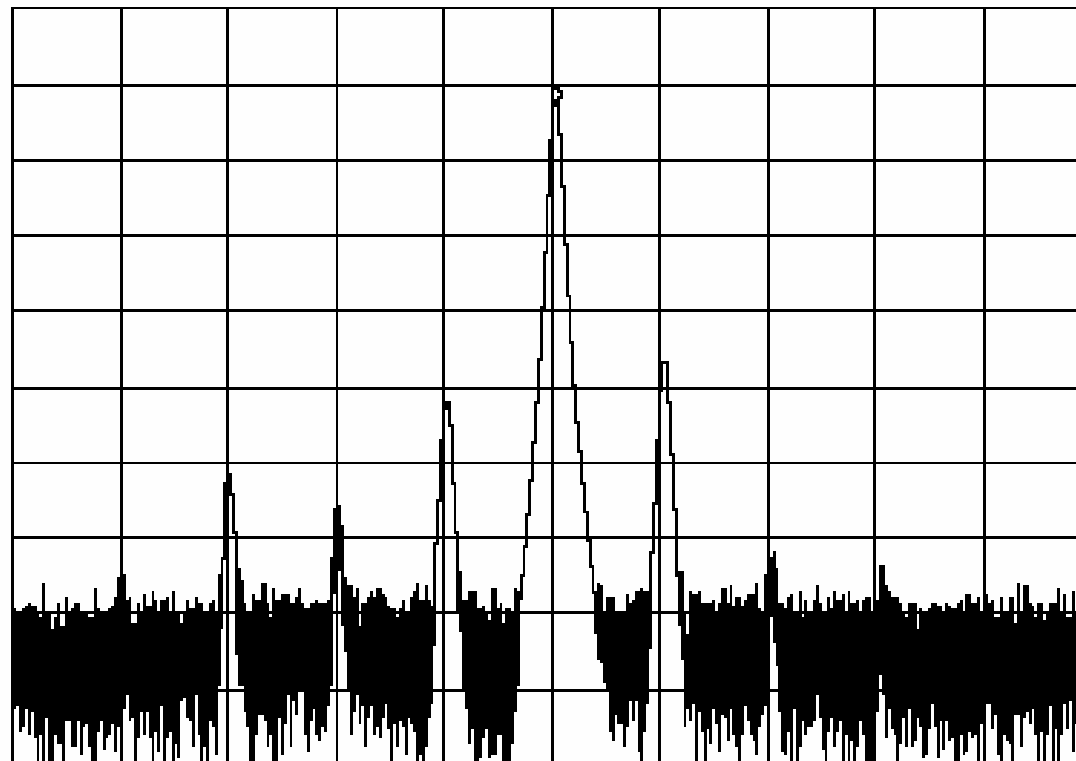
6MHz signal into mixer



96MHz output from mixer

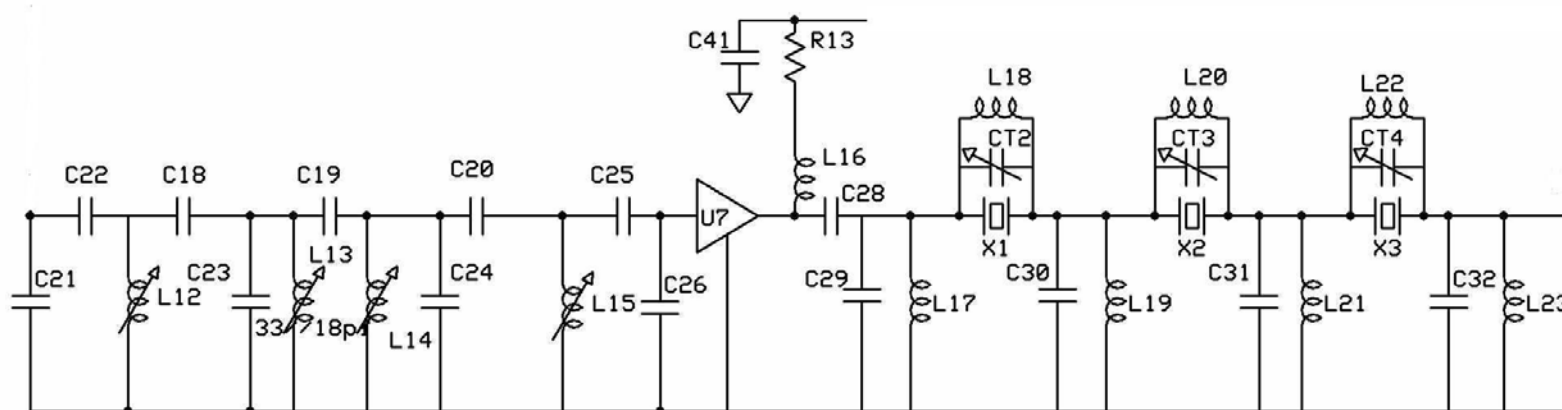
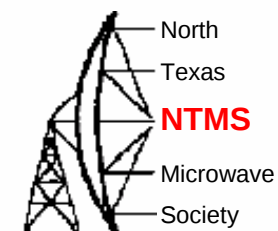


*ATTEN 20dB
RL 10.0dBm 10dB/ CNT -2.33dBm
96.00 MHz



CENTER 96.00MHz SPAN 20.00MHz
*RBW 100kHz VBW 100kHz SWP 50ms

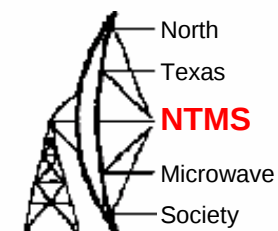
96MHz Crystal Filtering



Crystal filter improves medium and far out phase noise as well as broader spectrum

W5HN

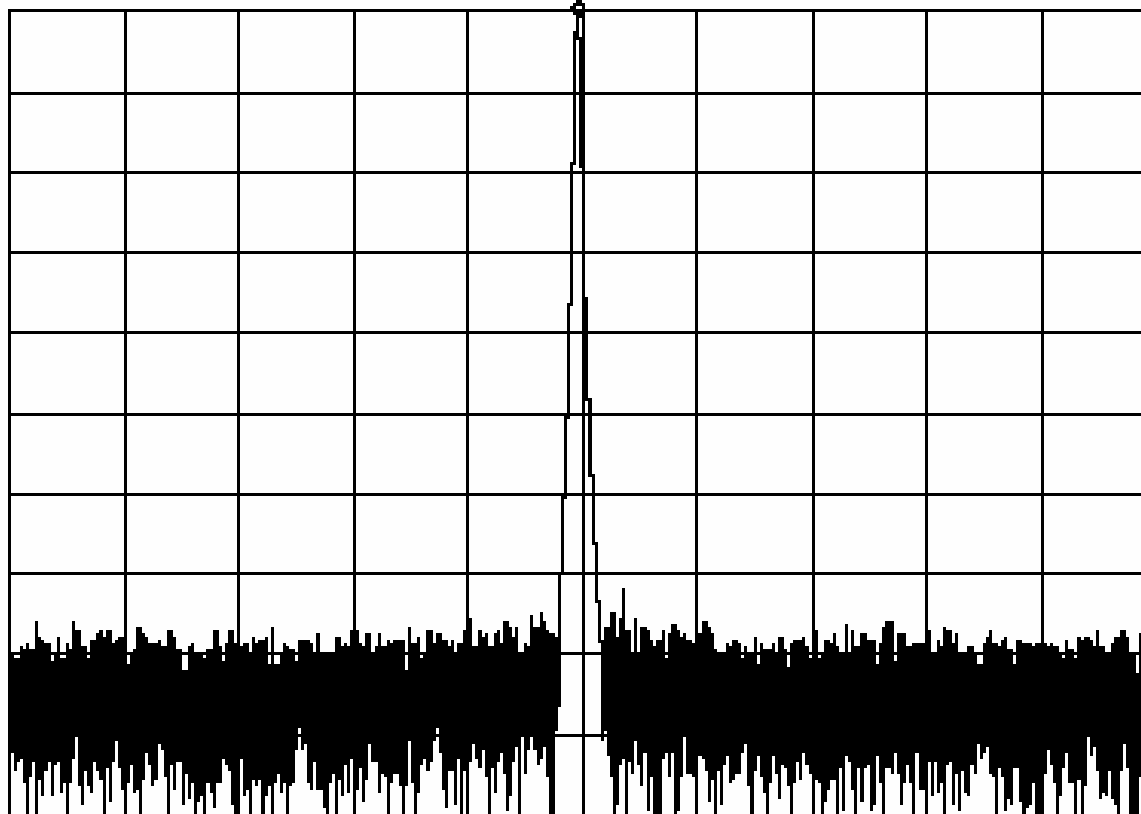
96MHz O/P



*ATTEN 20dB
RL 10.0dBm

10dB/

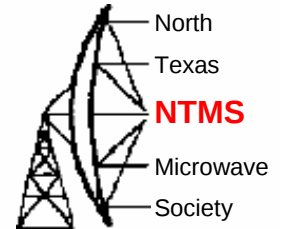
CNT 9.33dBm
96.00001 MHz



CENTER 96.00MHz
*RBW 100kHz VBW 100kHz

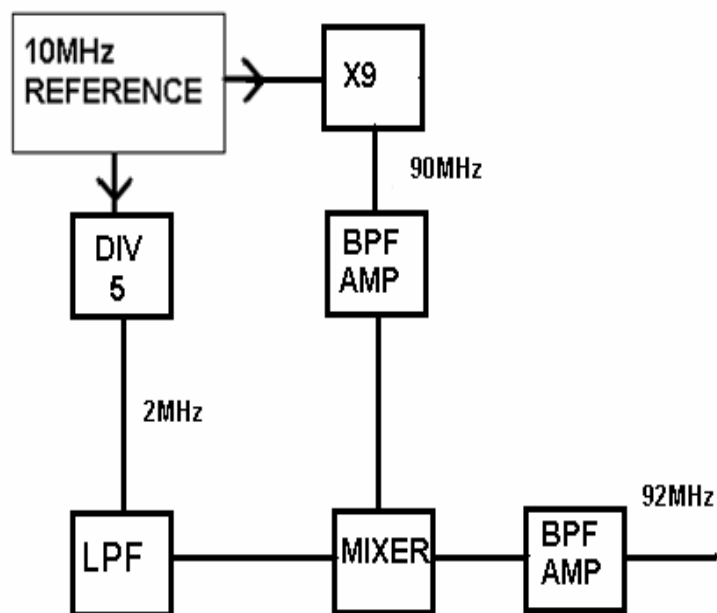
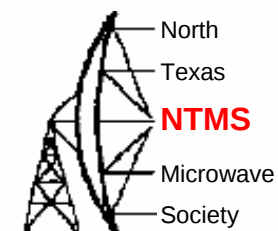
SPAN 50.00MHz
SWP 50ms

Summary

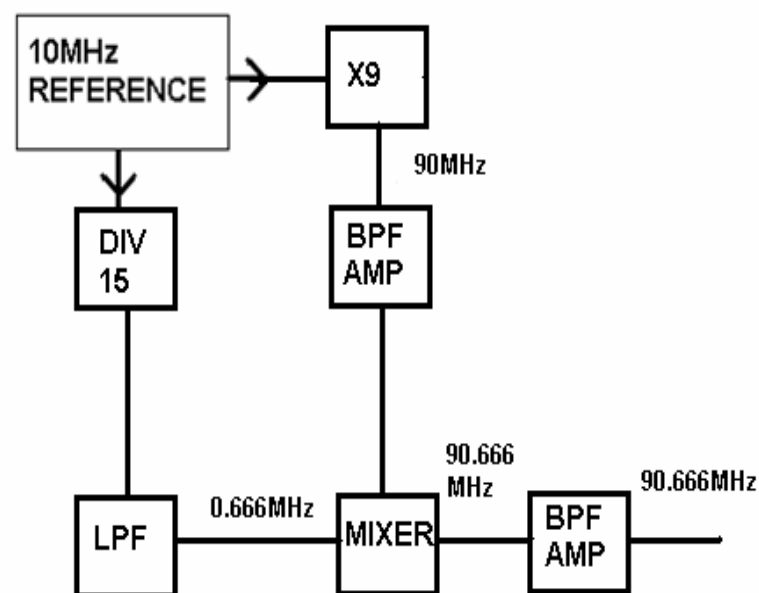


- Technique good for some frequencies but impossible for others with 10MHz reference
- $\text{Output} = (C * R) \pm (R * B / A)$
- Easy Freqs to achieve: 92, 98, 116, 101MHz
- Harder Freqs to achieve: 106.5, 101.5, 94.75

Other Possibilities

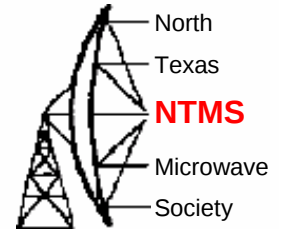


3456/144MHz



2320/144MHz

References



1. <http://www.wenzel.com/documents/2diomult.html>
2. http://mgef.org/zms_134_VUCC.htm