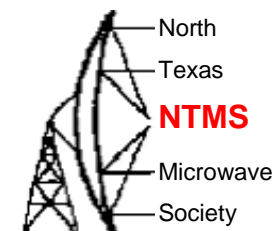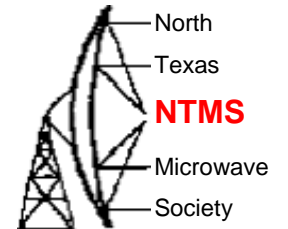North
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# VHF drivers for Microwave local oscillators

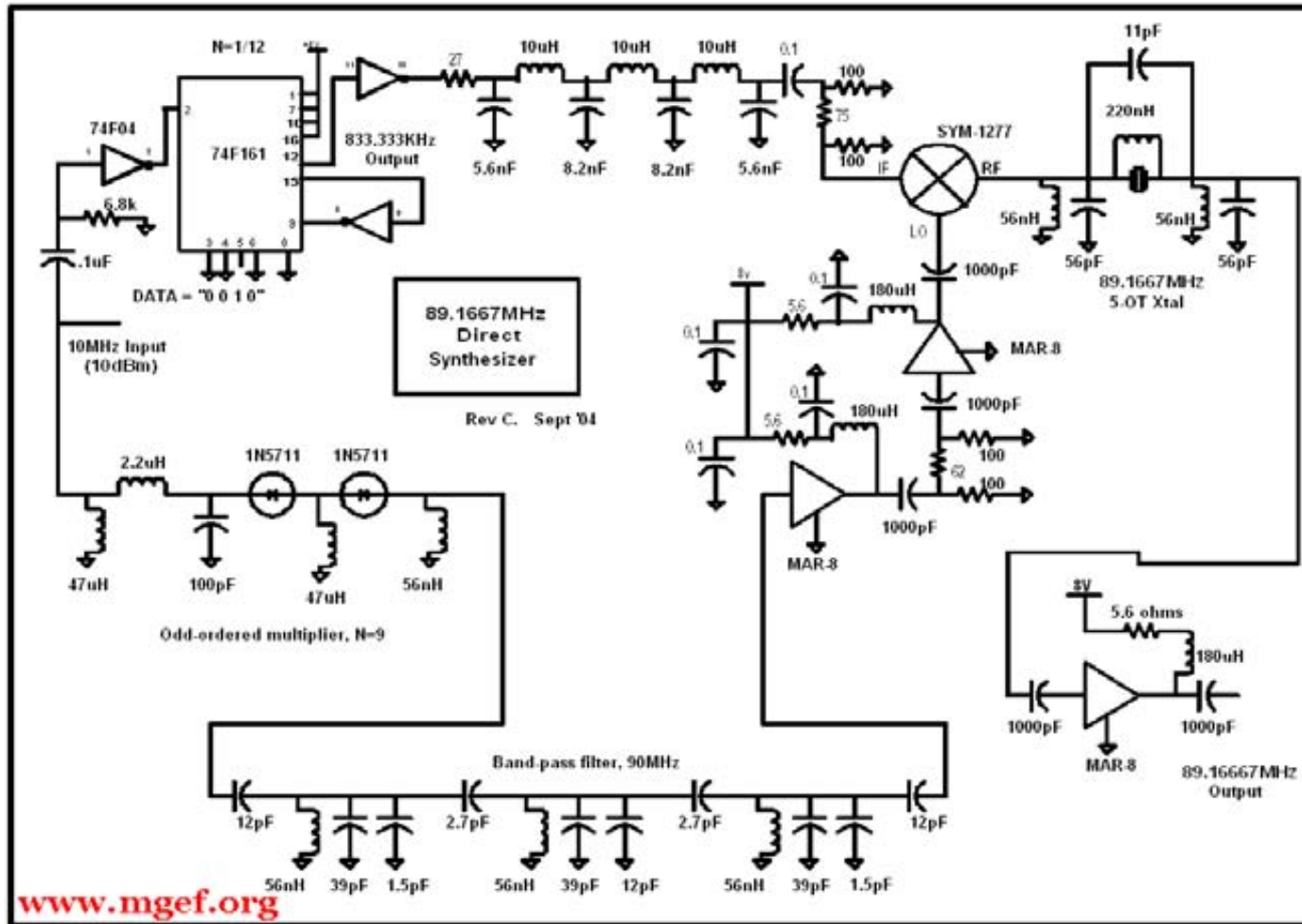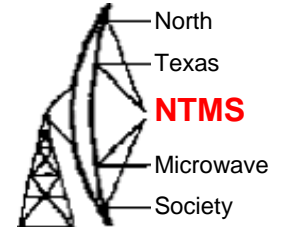## Dave Robinson WW2R, G4FRE

History

1. My DEMI xverter drifts on 1296 EME (but 10G one doesnt!). 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
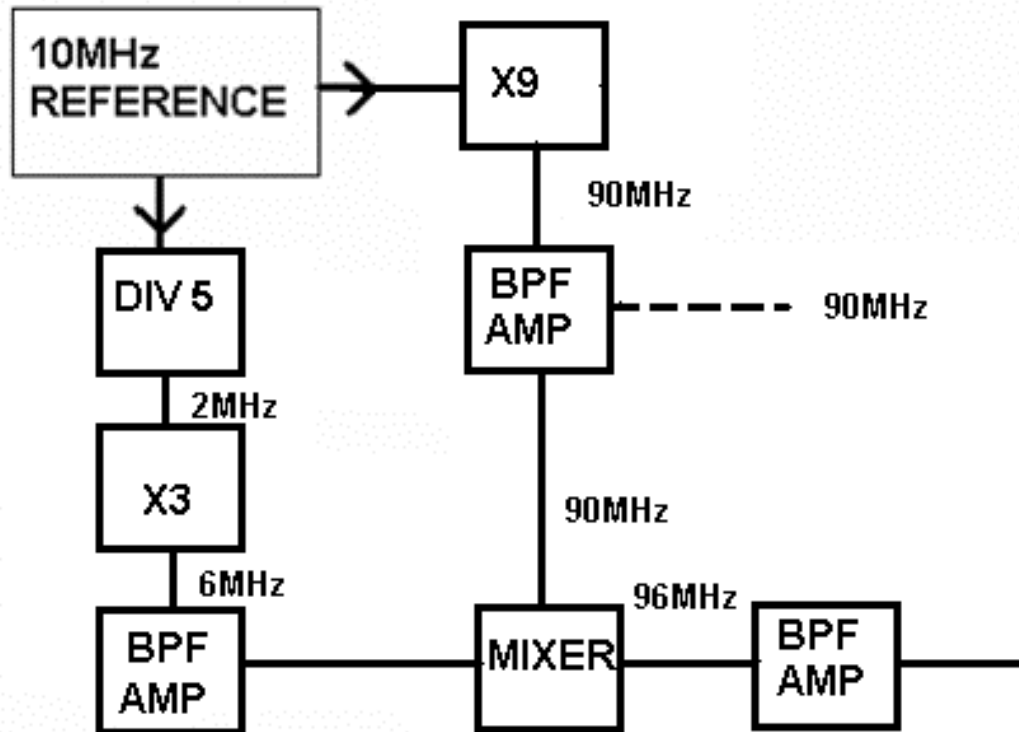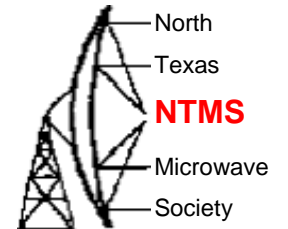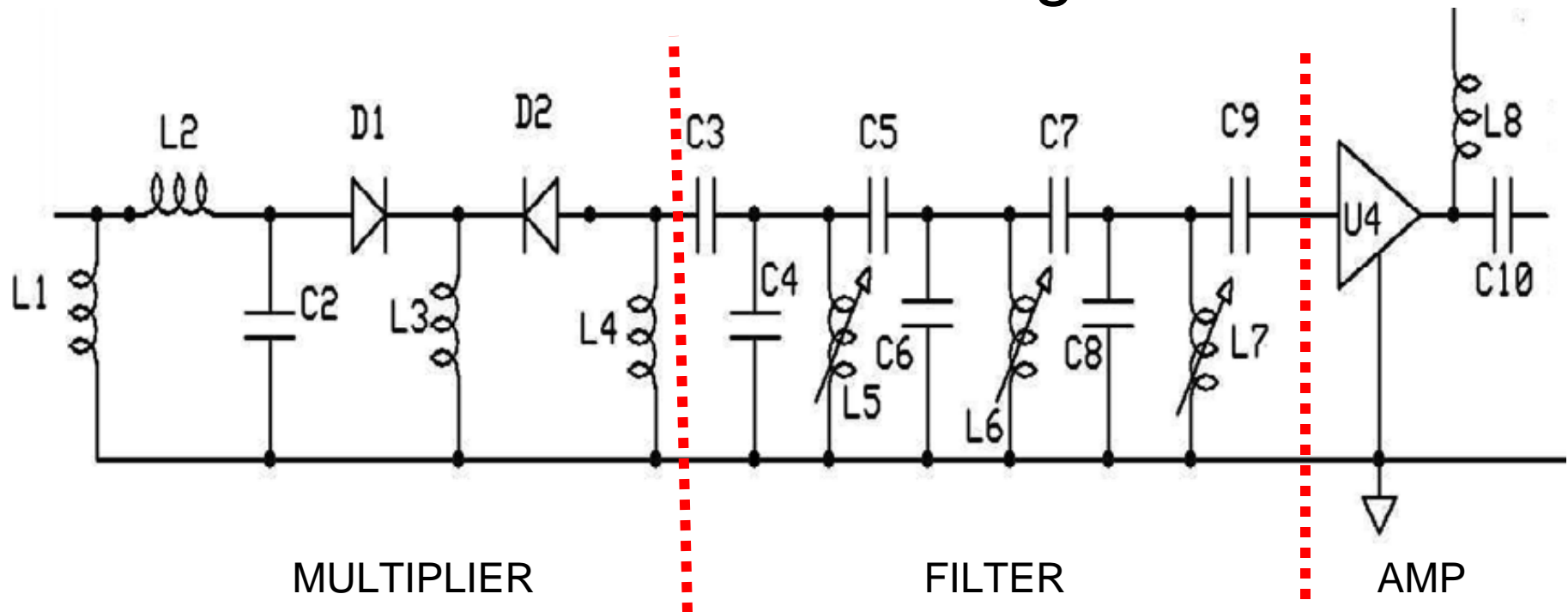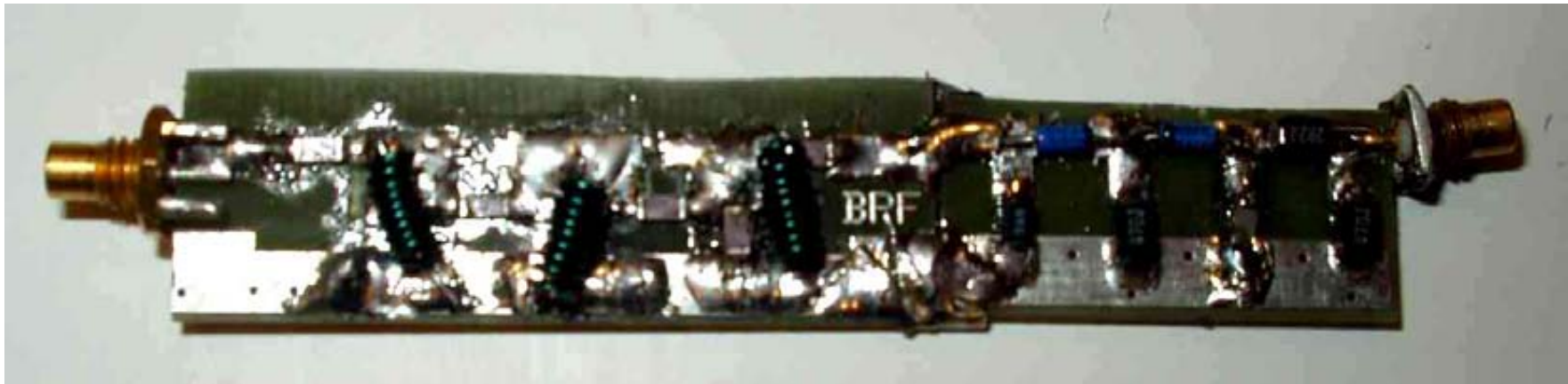
Generic DFS

REFERENCE
R MHz

DIVIDE A

OUTPUT =(C * R) $^+_-$ (R *

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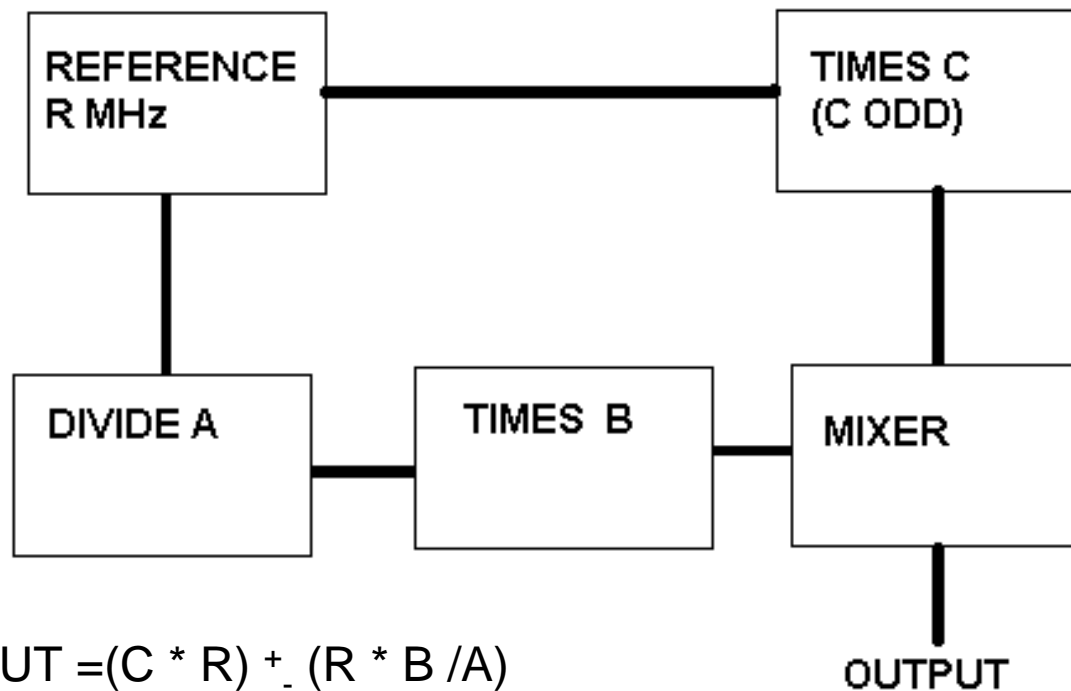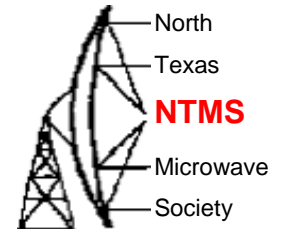
WA1ZMS DFS

DFS9096 Block Diagram

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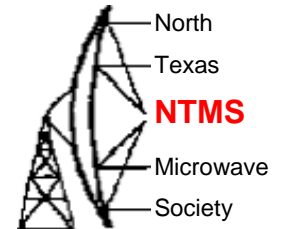**NTMS**
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First wanted to try 90MHz multiplier/filter circuit of WA1ZMS design
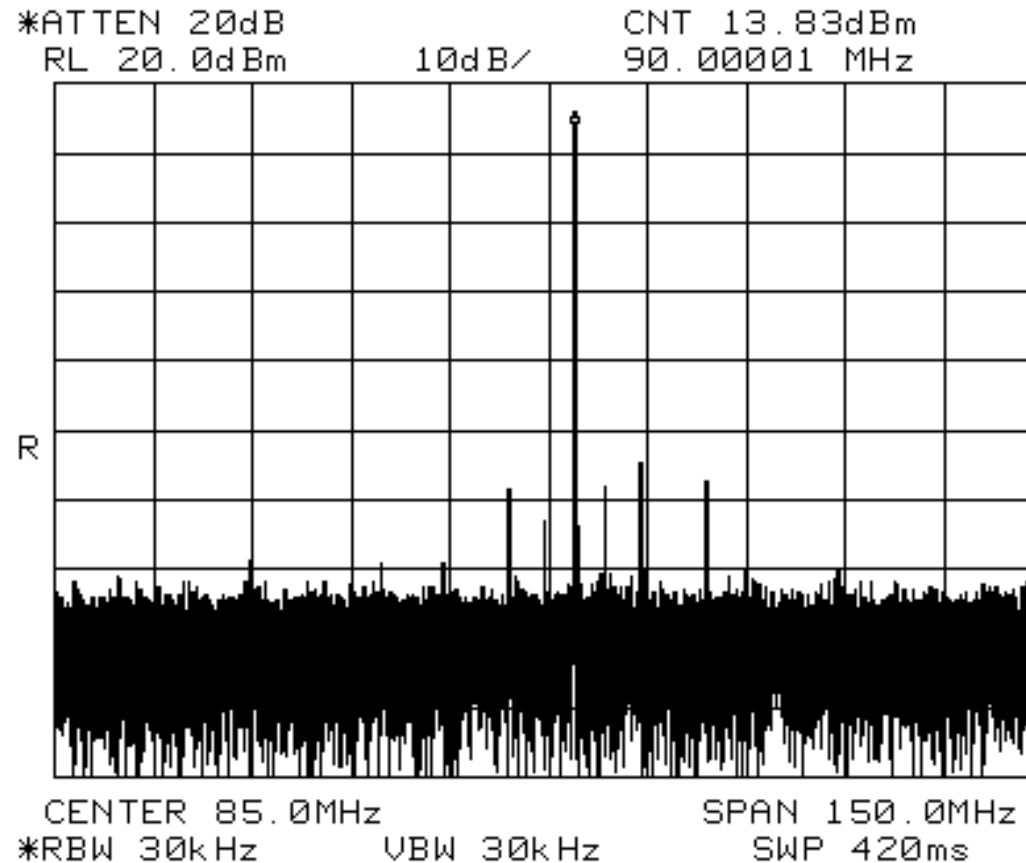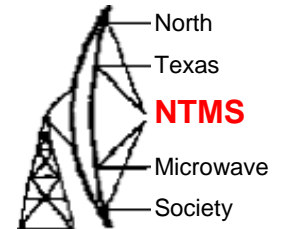

MULTIPLIER   FILTER   AMP

Multiplier Prototype

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

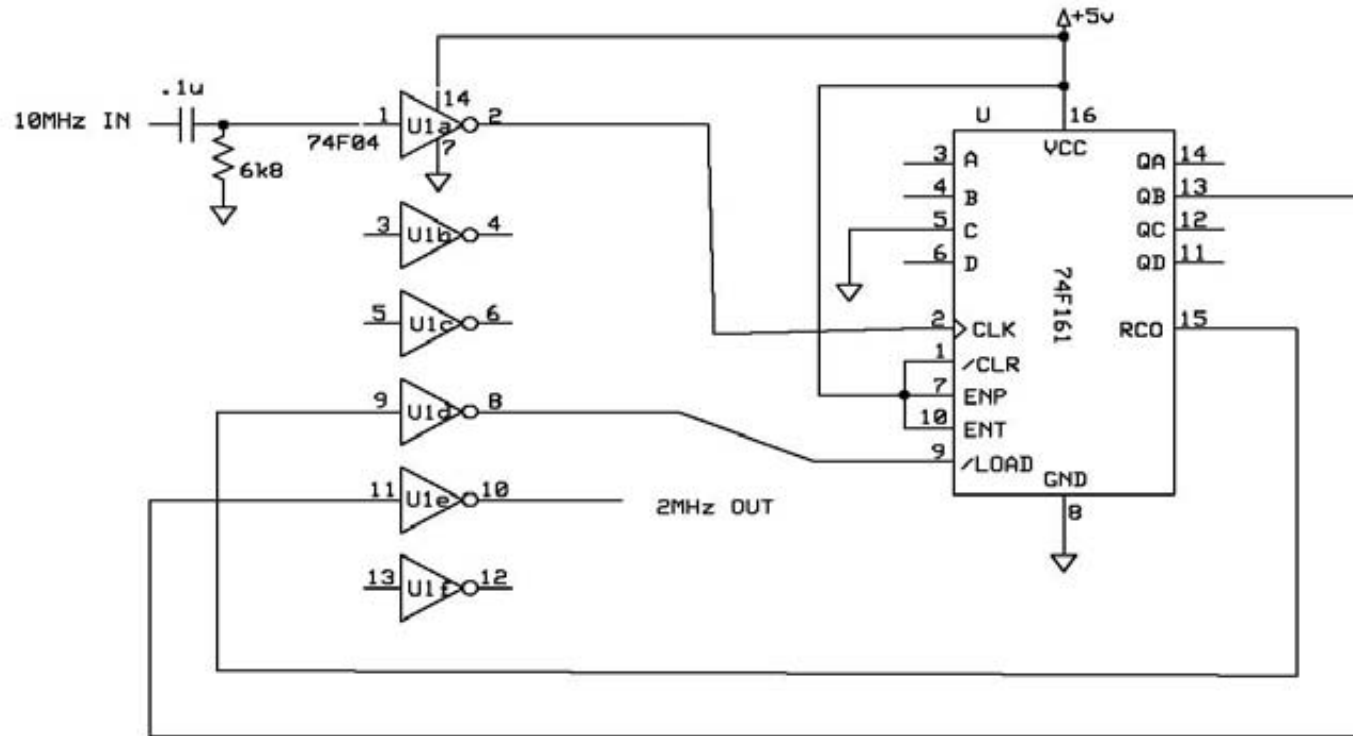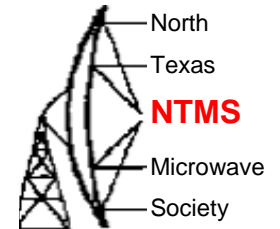With crystal filter could be used as driver for 2304/144 Local oscillator

90MHz Mult/Filter/Amp output

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```
*ATTEN 20dB              CNT 13.83dBm
 RL 20.0dBm    10dB/     90.00001 MHz



R




CENTER 85.0MHz          SPAN 150.0MHz
*RBW 30kHz    VBW 30kHz   SWP 420ms
```

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

74F161 Divider
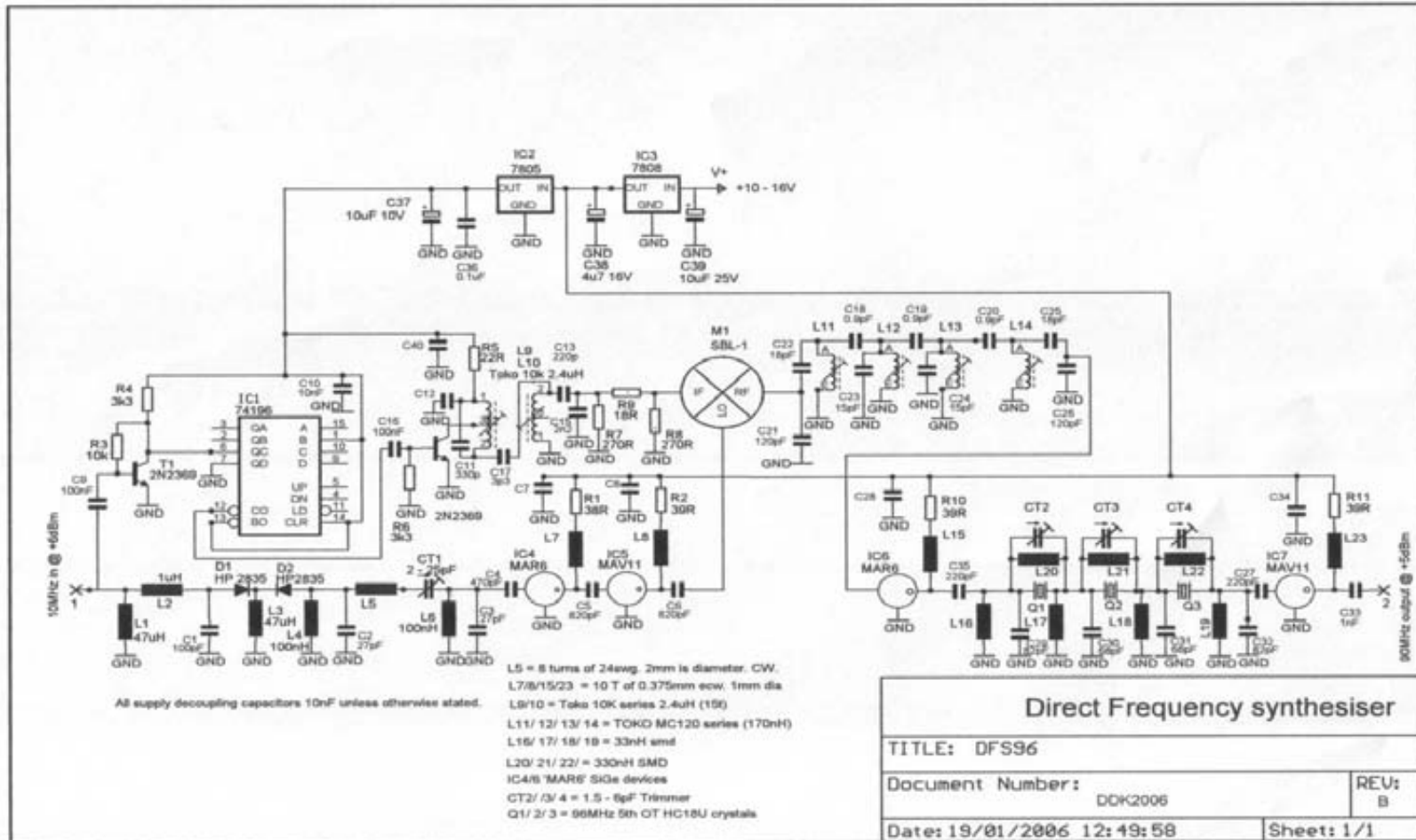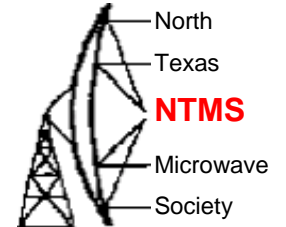
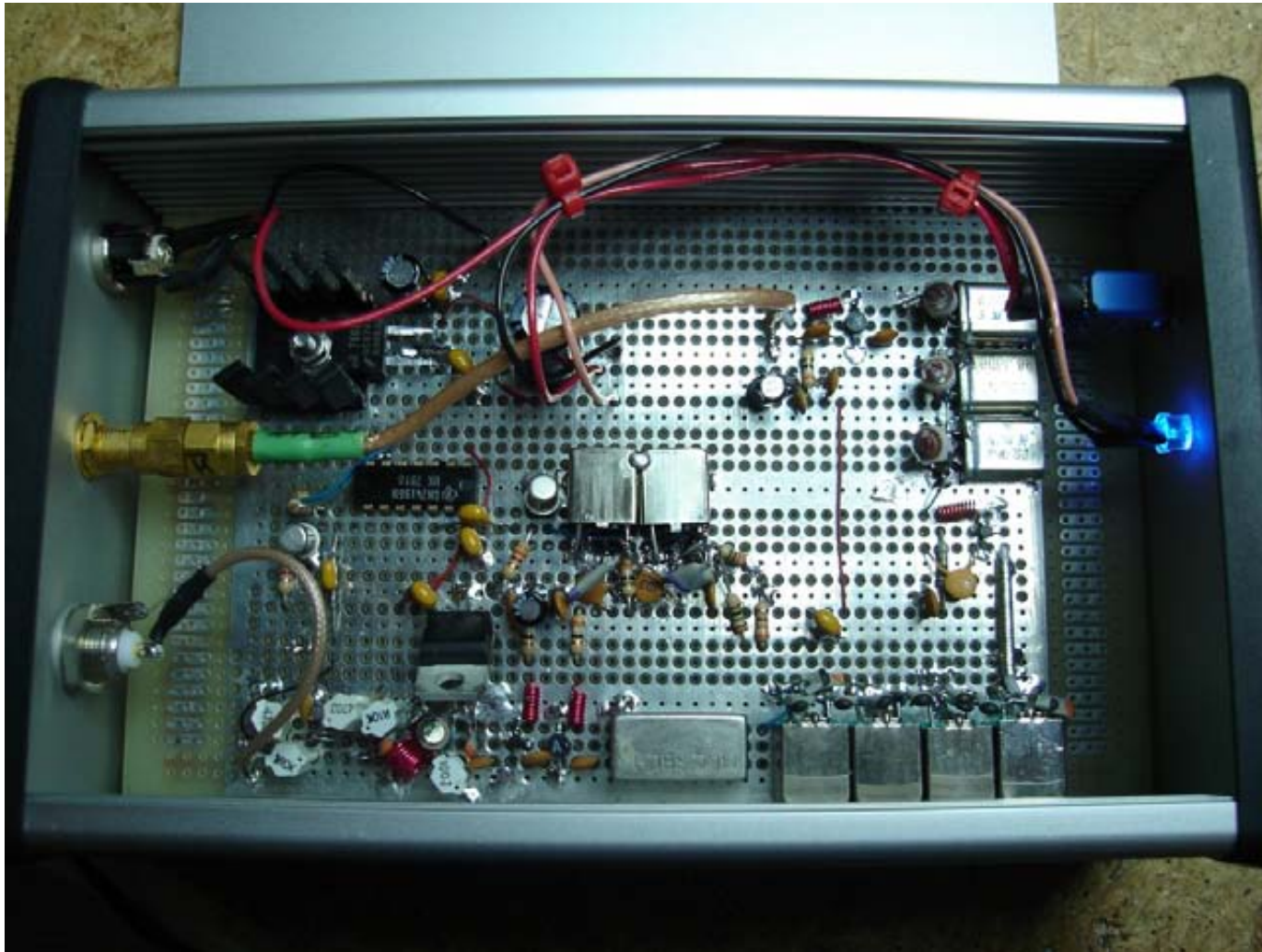A, B, C, D pulled up internally, therefore preset (DCBA) = 1011= 11.

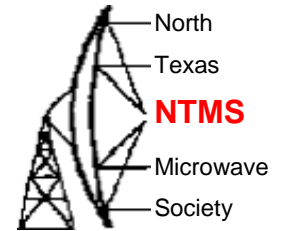74161 will count down from 16 to 11 = 5 before resetting.

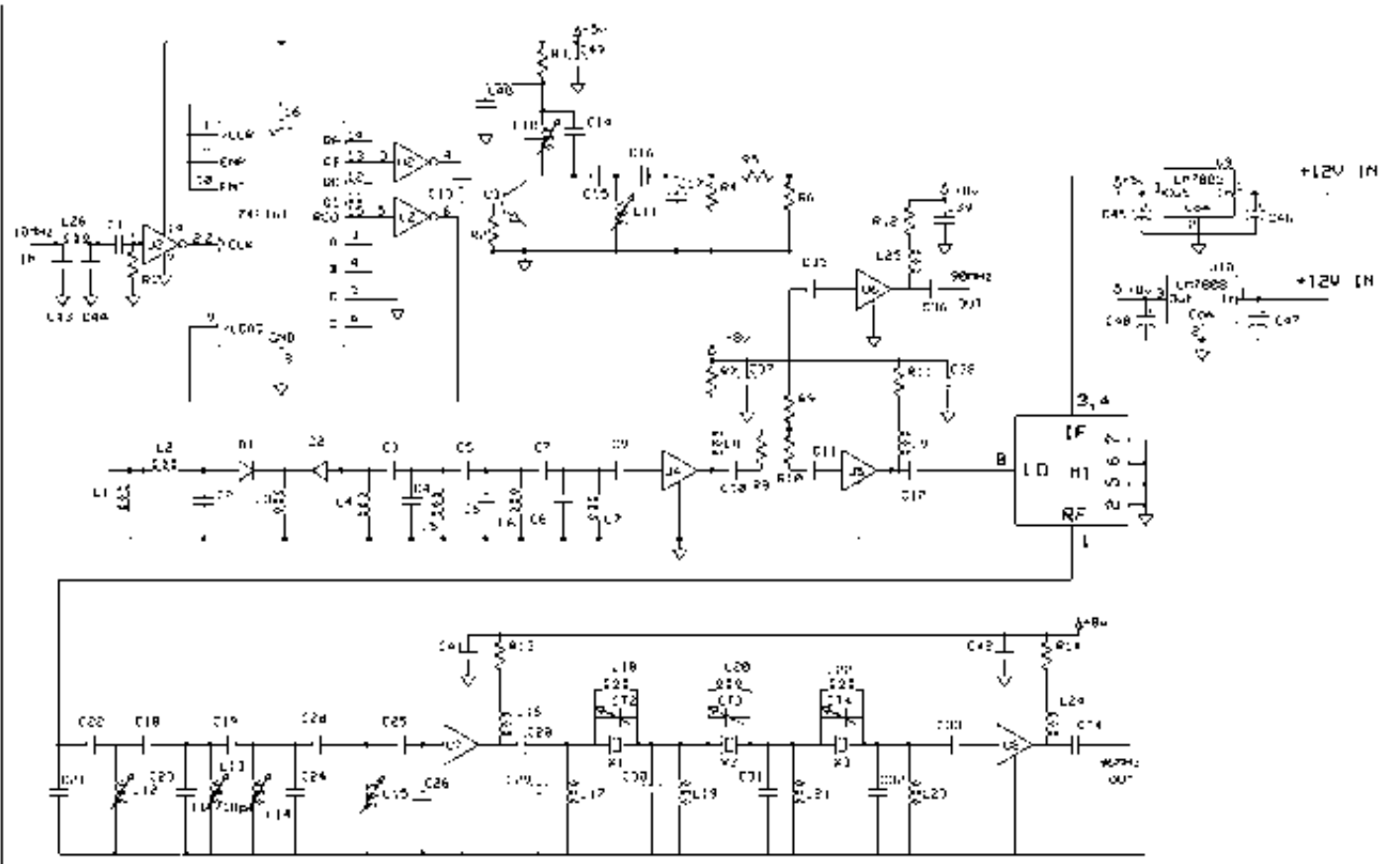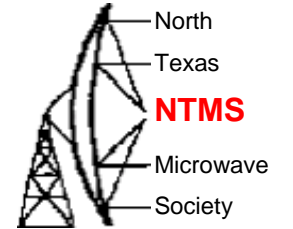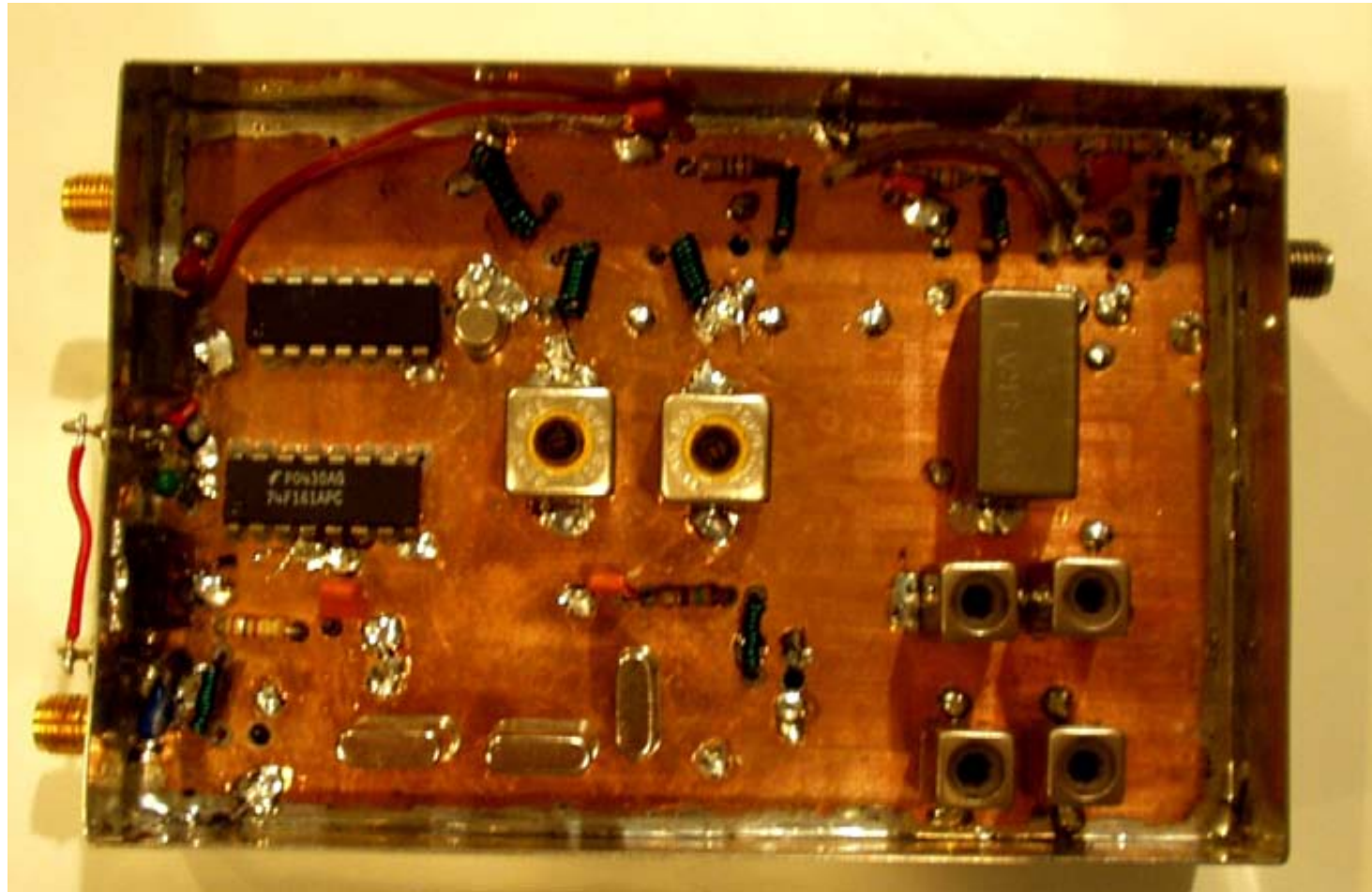Choose Q output that has closest to 50% duty cycle

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G4DDK DFS96

G4DDK Unit

WW2R DFS9096

FRE Engineering
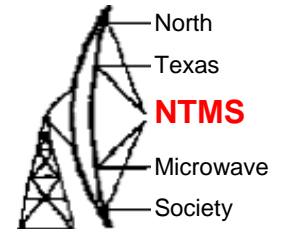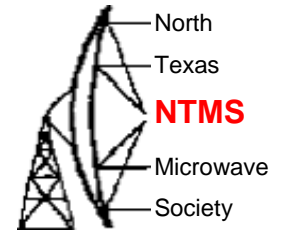
DFS9096

Dave Robinson

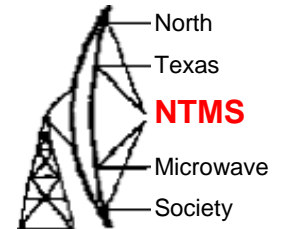# DFS9096

6MHz signal into mixer

96MHz output from mixer

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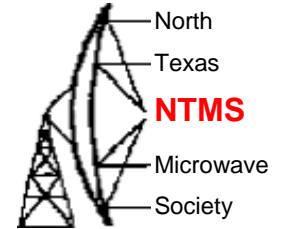
96MHz Crystal Filtering

Crystal filter improves medium and far out phase noise as well as broader spectrum
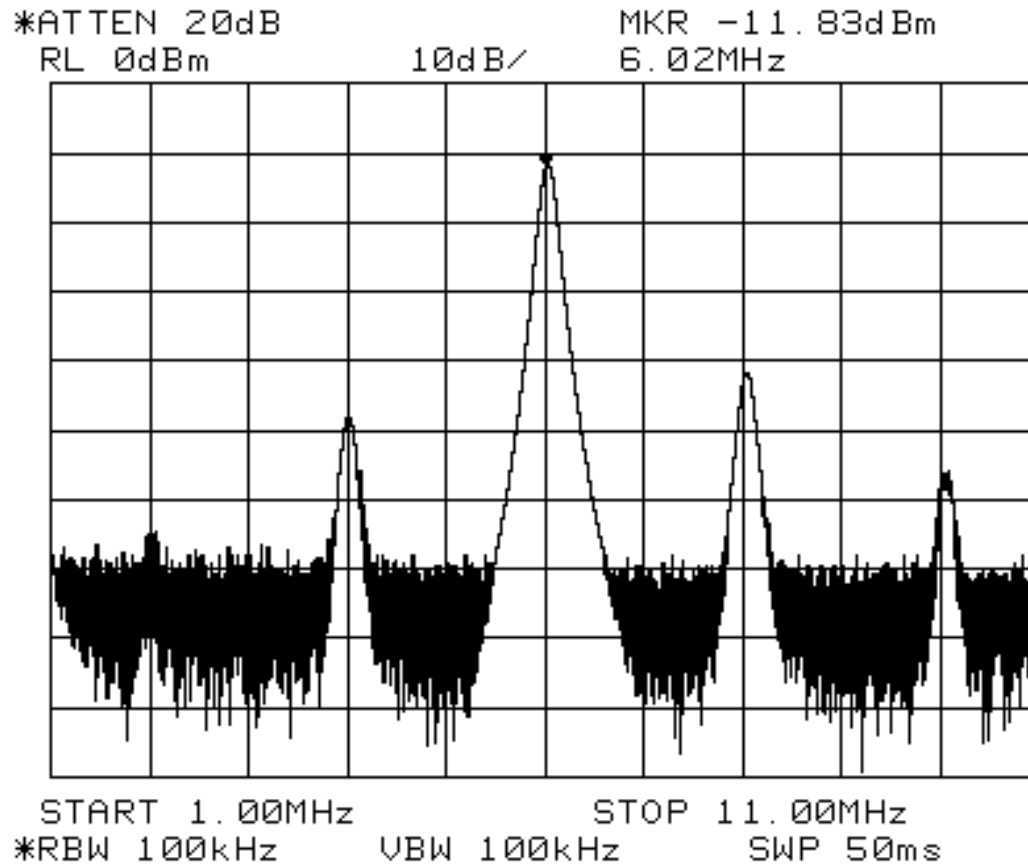
96MHz O/P


```
✳ATTEN 20dB                    CNT  9.33dBm
 RL 10.0dBm        10dB/        96.00001 MHz
```
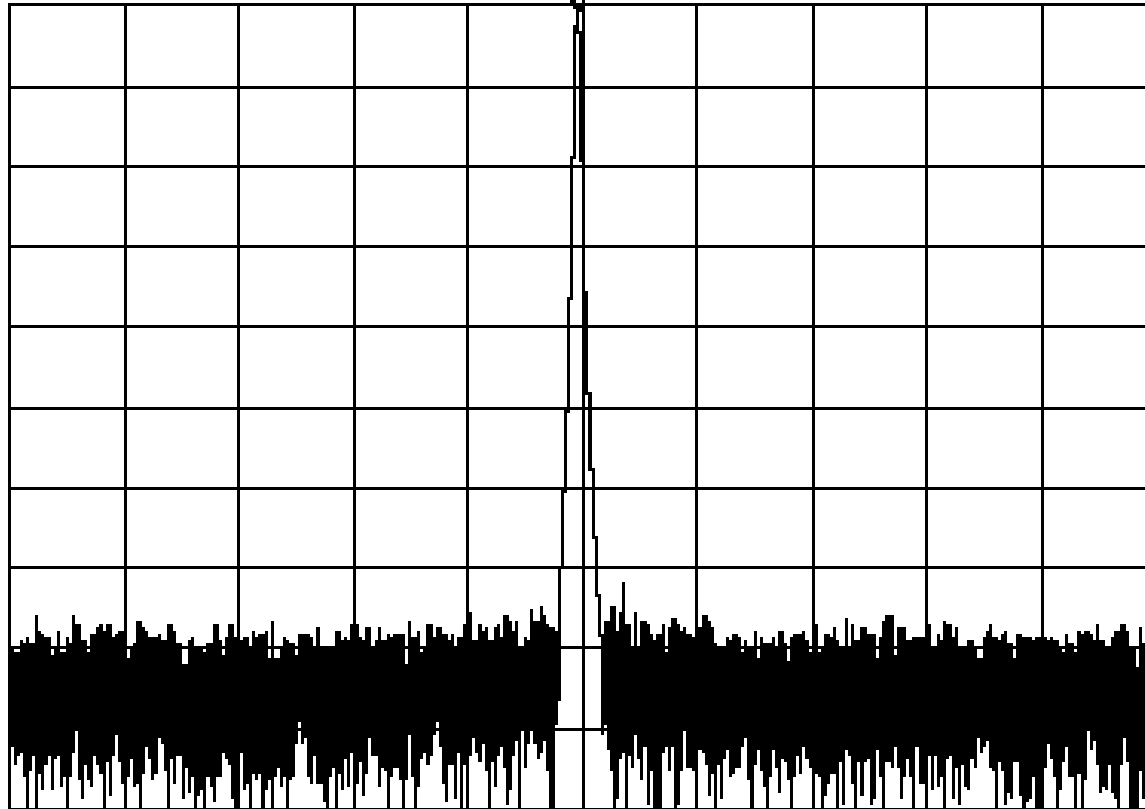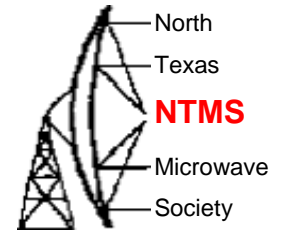
```
CENTER 96.00MHz                SPAN 50.00MHz
✳RBW 100kHz        VBW 100kHz   SWP 50ms
```
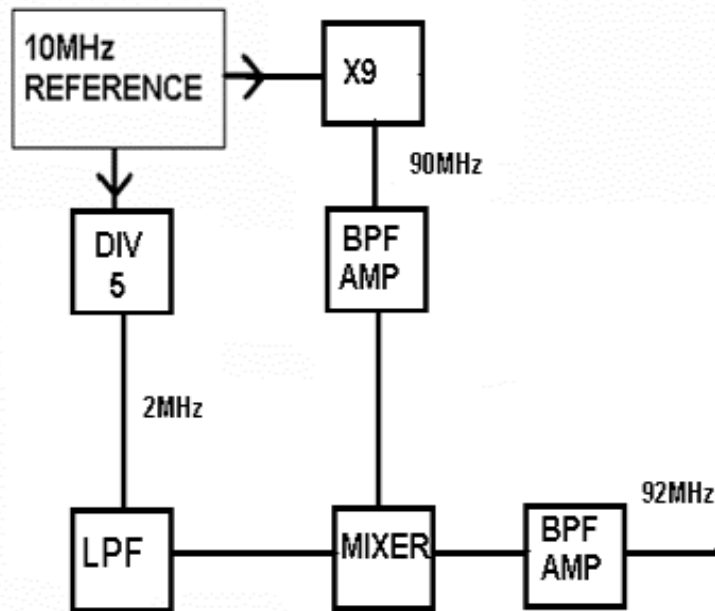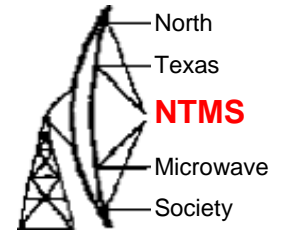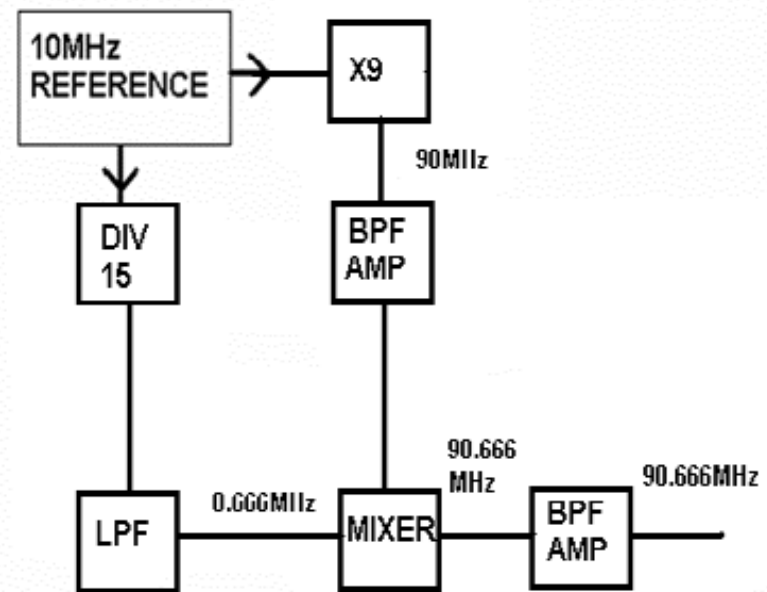
Summary

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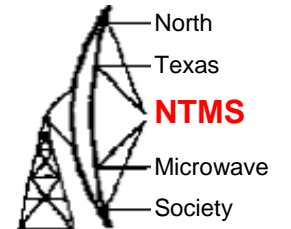
Other Possibilities

3456/144MHz

2320/144MHz

References

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