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# W5LUA 5760 MHz and 10368 MHz Transverters using the N5AC A32 PLL

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November 5, 2011

Phase Noise Plots

Phase Noise in dBc/Hz

Black line shows theoretical noise floor of 8560 E Series at 200 MHz
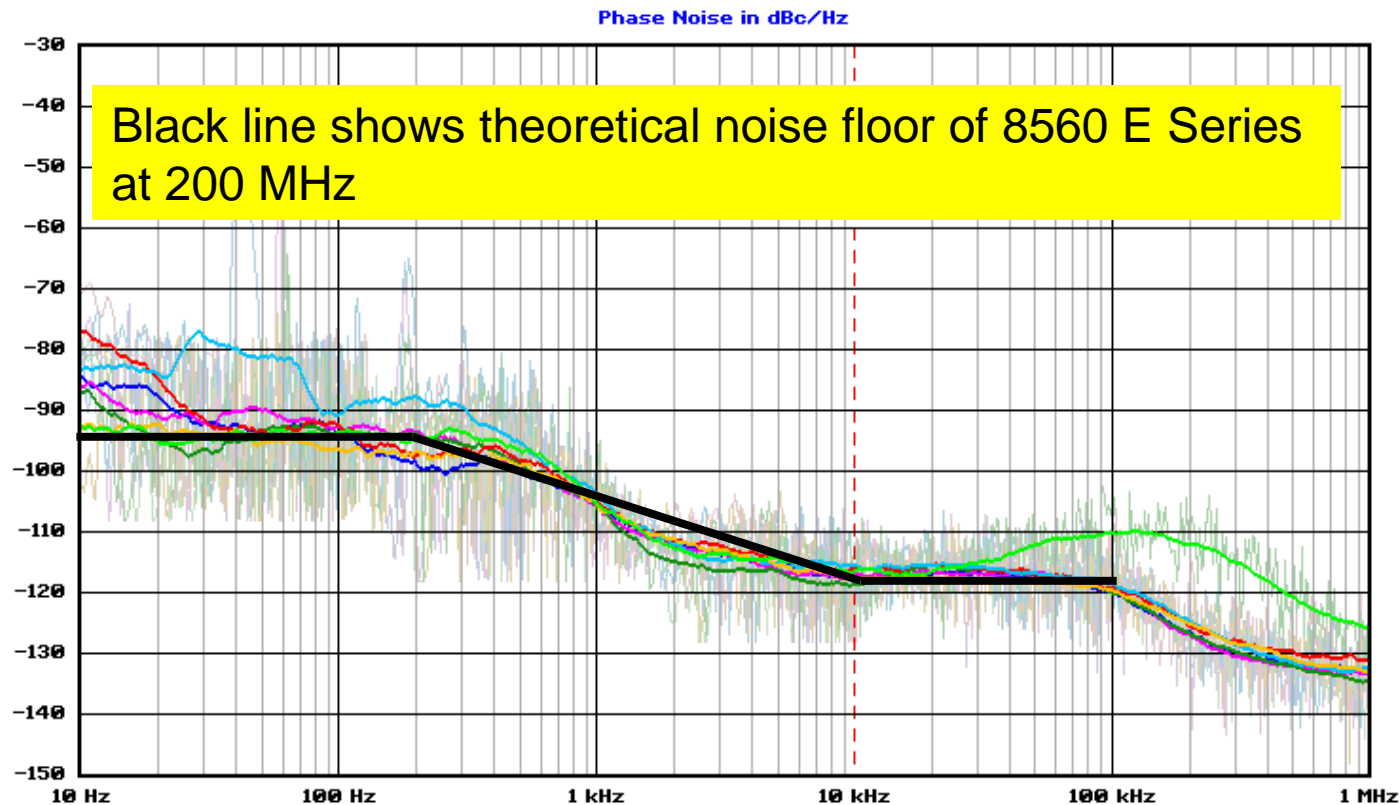
Trace	Carrier Hz	Carrier dBm	dBc/Hz at 10000 Hz	RF Atten dB	Instrument
96MHz_Clock	95 999 950	12.00	-117.4	20	HP8565E
80MHz_Clock	80 001 320	13.00	-116.7	20	HP8565E
50MHz_Clock	50 000 050	9.67	-118.4	10	HP8565E
23.4MHz_Clock	23 408 000	5.83	-116.0	10	HP8565E
99.6MHz KD6OZH	99 600 600	9.83	-115.4	10	HP8565E
10MHz_Isotemp_MSA1104	10 000 000	16.00	-117.3	20	HP8565E
10MHz_Isotemp_MSA1104_X10Mult	99 999 980	5.00	-116.1	10	HP8565E

W5HN

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# N5AC A32 Synthesizer
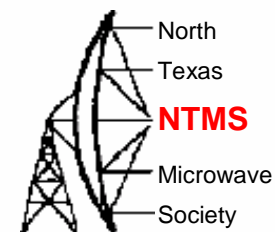
DEM A32 Synthesizer

The DEM A32 is a pre-programmed 750 -1300 MHz. synthesizer designed exclusively for DEMI by N5AC. This synthesizer is a derivative of his original USB controllable ApolLO-1 design. The A32's design intentions are to directly replace our DEM MICRO-LO assembly used in all of our 2.3 GHz through 10 GHz transverters.

The A-32 now has 50+ pre-programmed synthesized frequencies. The frequencies include the basic RF and IF combinations required to allow any DEMI 2.3 GHz through 10 GHz transverter to operate in the standard band plans. Other frequencies include weak signal source frequencies in all bands from 902 MHz. through 24 GHz.
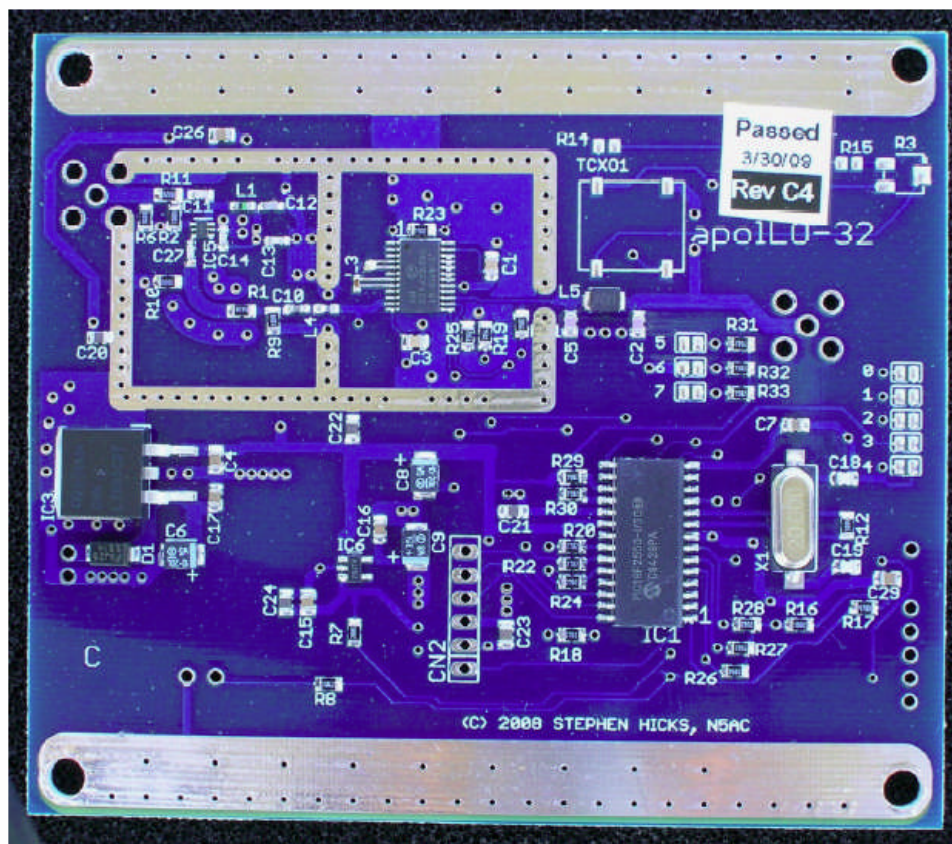
N5AC A32 Frequency Matrix

For 5760 MHz, I use 1123 MHz from the A32 X5 = 5615 MHz for a 145 MHz IF
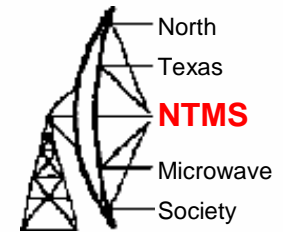
| Band	1	IF		Synth	Frequency	4	3	2	1	0		R	N	Phase Det. kHz	PN, dBc/Hz @ 10Hz	PN, dBc/Hz @ 1 kHz
2304		144		1	1080				X	X	3	1080	10	1000	-67	-80
"		145	2	1	1079.5			X		X	5	2159	20	500	-65	-79
"		147	3	1	1078.5		X			X	9	2157	20	500	-65	-79
2320		144	4	1	1088		X	X	X		7	1088	10	1000	-70	-81
2424		144	5	2	1140	X		X	X		11	1140	10	1000	-70	-81
3456		144	6	2	1104			X	X		6	1104	10	1000	-70	-81
"		145	7	2	1103.666666		X		X		10	3311	30	333	-63	-78
"		147	8	2	1103	X	X	X	X		10	1103	10	1000	-70	-81
3400		144	9	1	1088.333333		X	X	X		14	1625	15	667	-67	-80
"		145	10	1	1085	X	X		X		16	1085	10	1000	-70	-81
5760		144	11	2	1123.2			X	X		12	2806	15	400	-64	-79
"		145	12	2	1123			X	X	X	13	1123	10	1000	-70	-81
"		147	13	2	1122.6		X	X	X	X	15	5613	50	200	-59	-76
"		432	14	1	1065.6	X			X		18	2664	25	400	-64	-80
"		455	15	1	1065	X				X	17	1065	10	1000	-60	-78
10368	All Open	144	16	2	1136						0	1136	10	1000	-72	-87
"		145	17	2	1135.888888	X			X	X	19	10223	90	111	-60	-77
"		147	18	2	1135.666666	X		X			20	3407	30	333	-62	-78
"		432	DUPE	2	1114			X	X		6	1104	10	1000	-70	-81
"		455	DUPE	2	1103.666666		X		X		10	3311	30	333	-62	-78
"		1296	19	1	1008	X		X		X	11	1008	10	1000	-70	-81
24192		144	20	1	1002	X		X	X		12	1002	10	1000	-70	-81
"		147	21	1	1001.875	X	X				14	1602	16	625	-60	-85
"		432	22	1	990	X	X		X	X	17	990	10	1000	-70	-81
"		455	23	1	989.875	X	X	X			18	7919	80	125	-56	-75
24048		144	24	1	996	X		X	X	X	13	996	10	1000	-70	-81
"		147	25	1	995.875	X	X			X	15	7967	80	125	-56	-75
"		432	26	1	984	X	X	X	X		31	984	10	1000	-70	-81
"		455	27	1	983.875	X	X	X		X	19	7871	80	125	-56	-75
903.1	1	WSS	28	1	903.1					X	1	9031	100	100	-60	-79
915	2	WSS	29	1	915				X		2	915	10	1000	-70	-83
1296.1	3	WSS	30	2	1296.1			X			4	12961	100	100	-54	-74
1152.022	4	WSS	31	2	1152.022		X				8	10253	89	112	-55	-74
2401	5	WSS	32	2	1200.5	X					16	2401	20	500	-68	-88

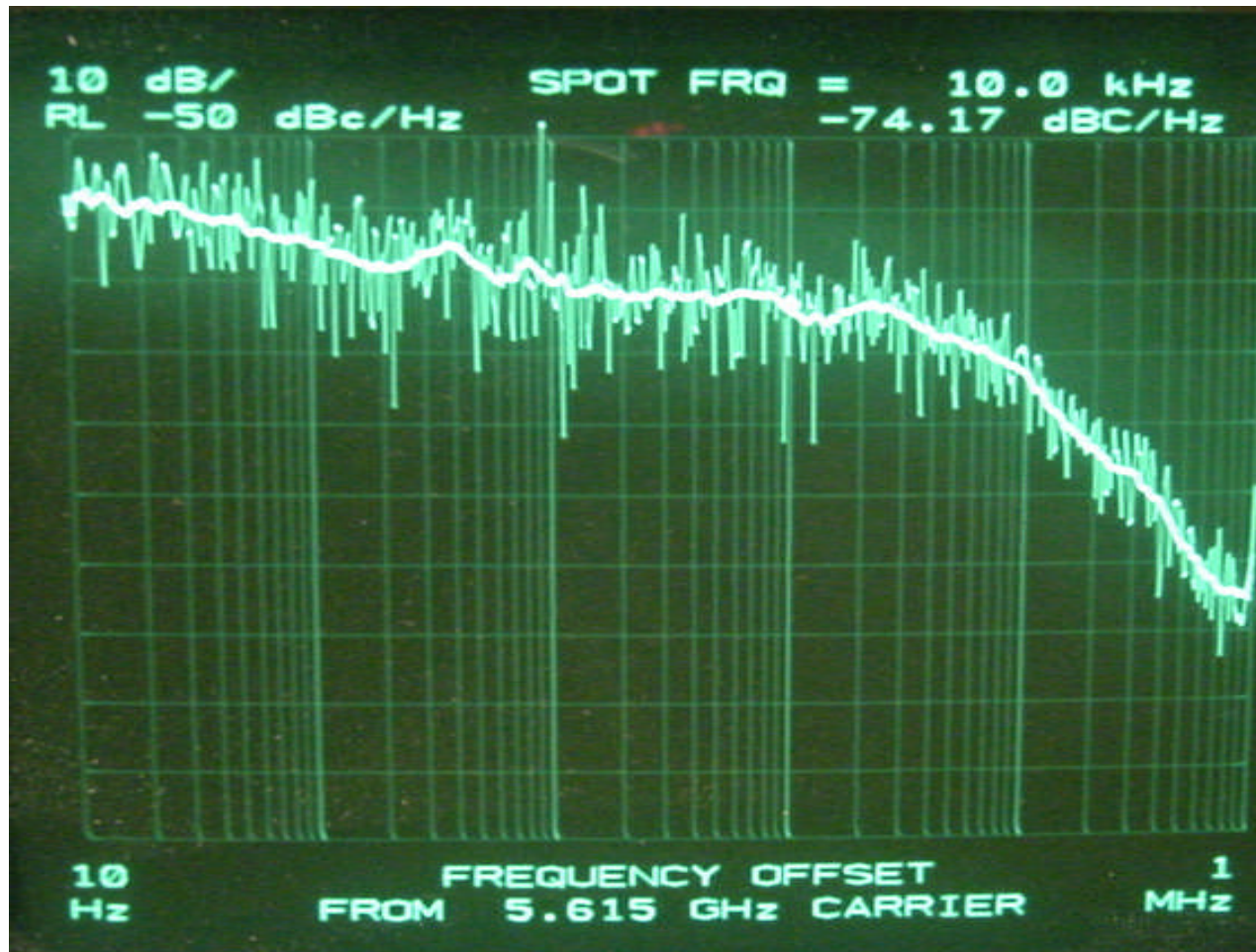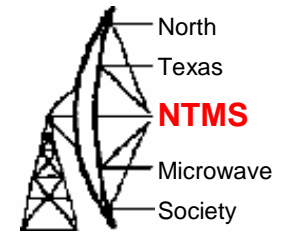# ISOTEMP 10 MHz Reference Oscillator
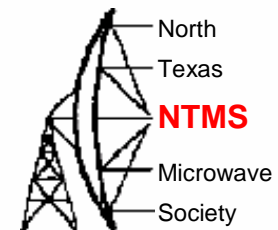
Noise floor of 8563E
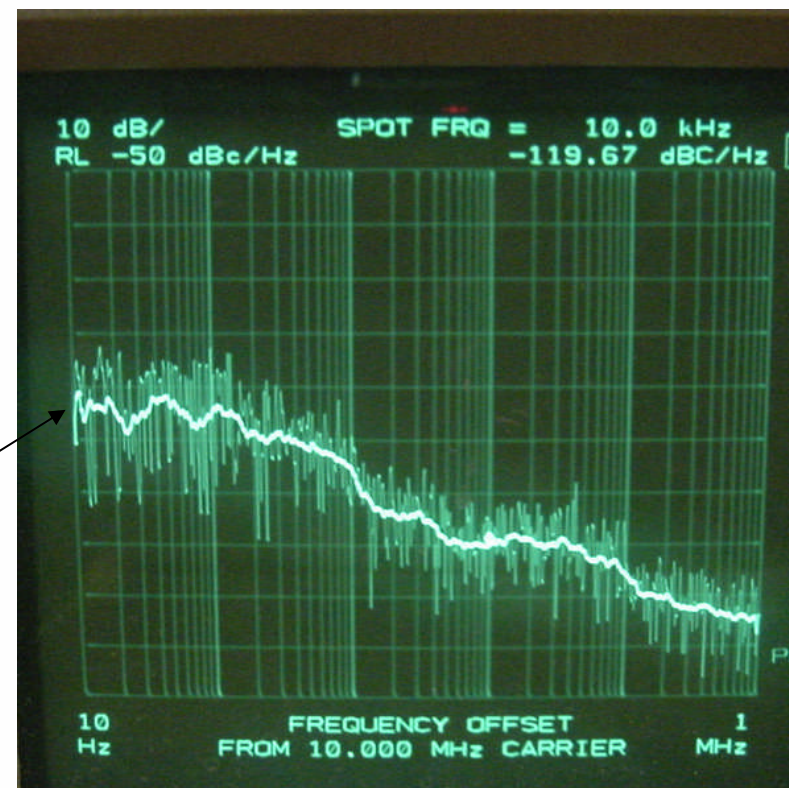
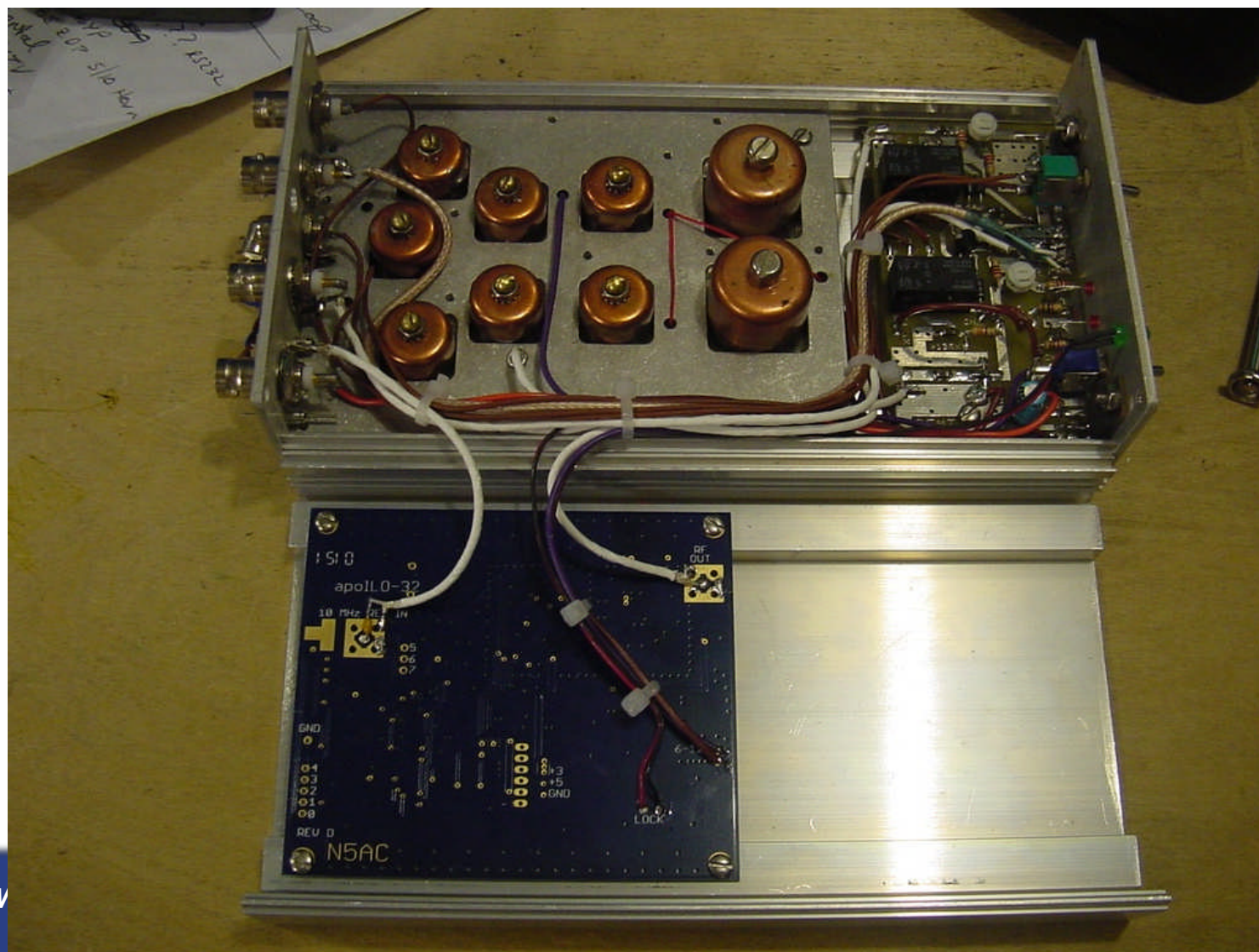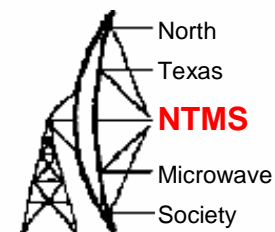# N5AC 1123 MHz A32 PLL with Amplifier – Filter – Amplifier for 5615 MHz LO
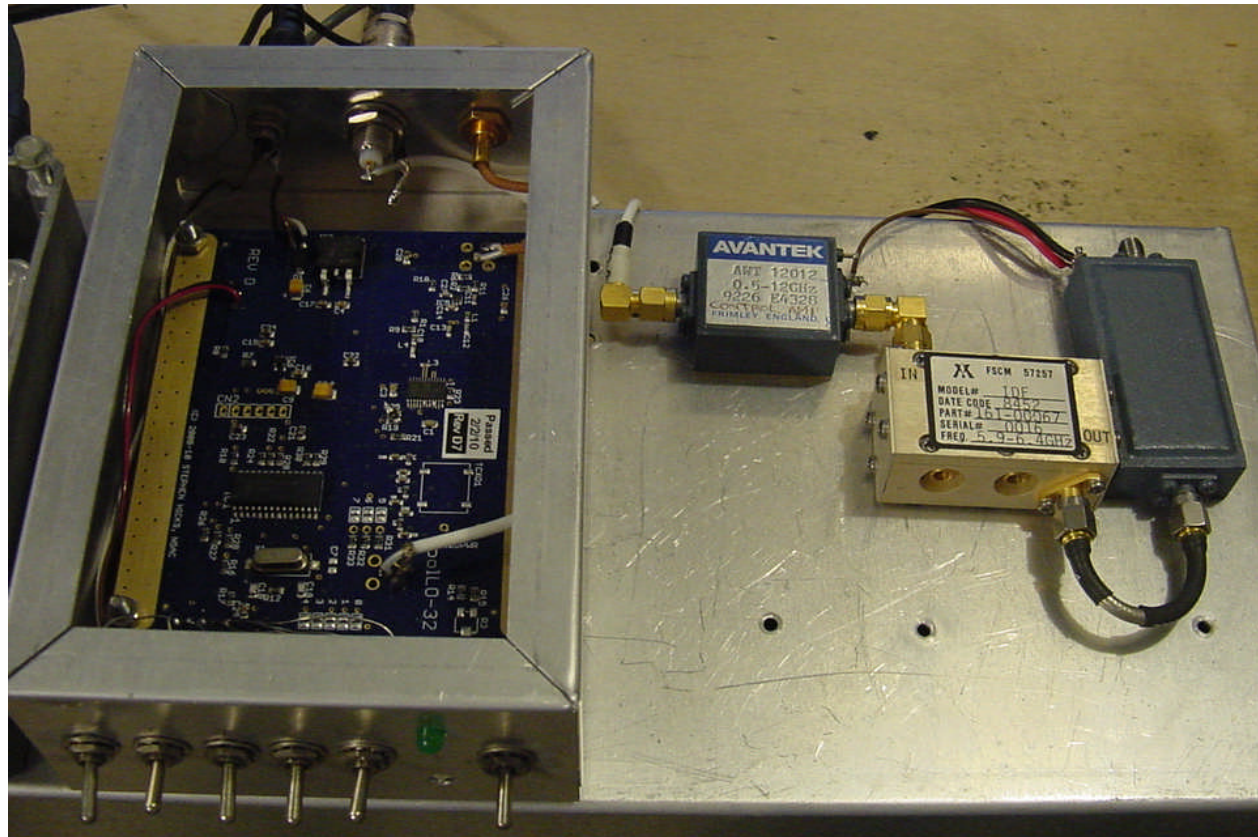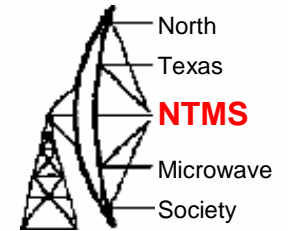
Close-up of N5AC A32 PLL with Switches to set Frequency
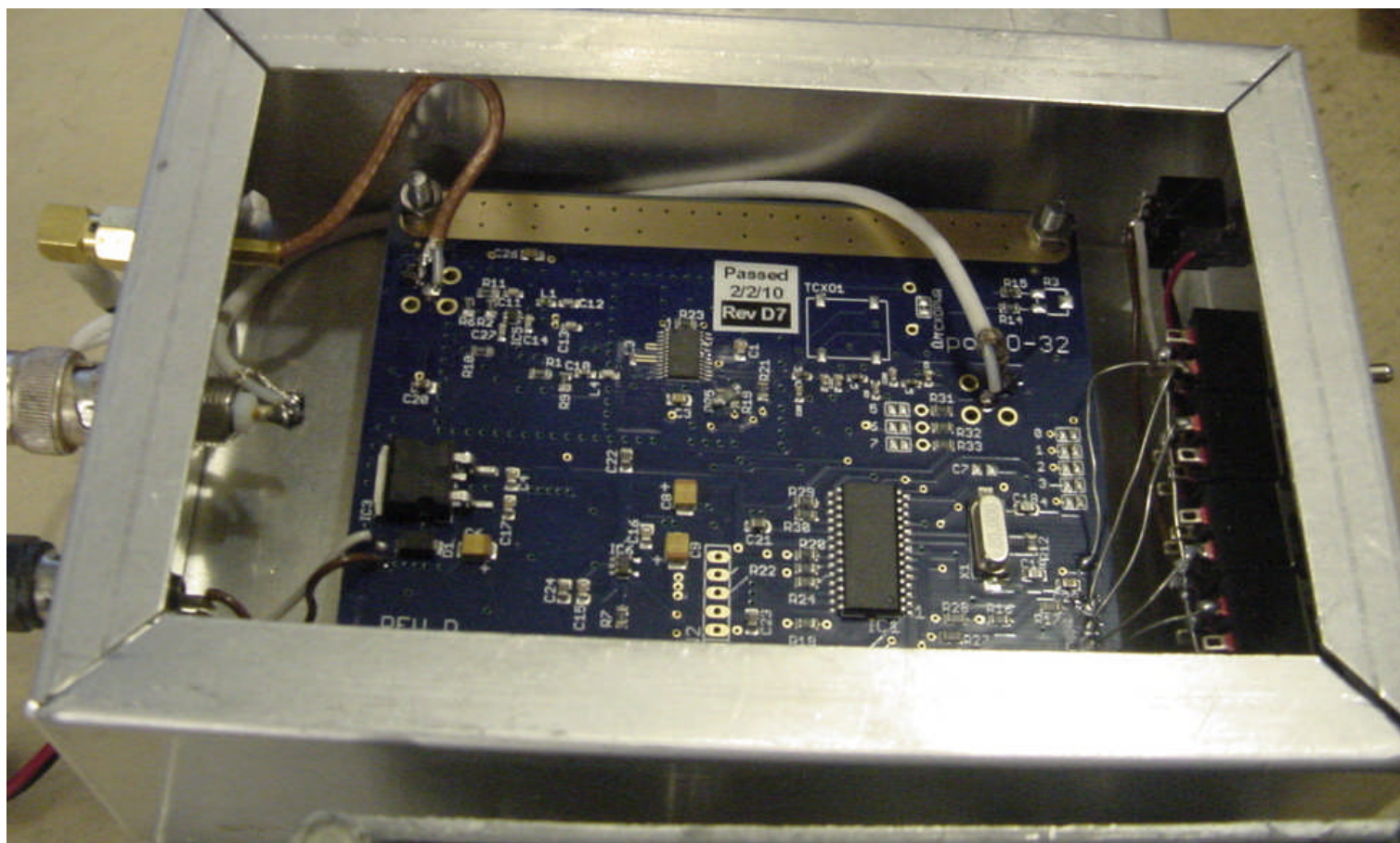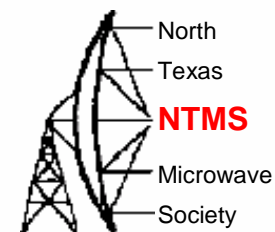
5615 MHz N5AC A32 PLL / Multiplier Phase Noise

10 GHz DEMI XVTR with N5AC PLL

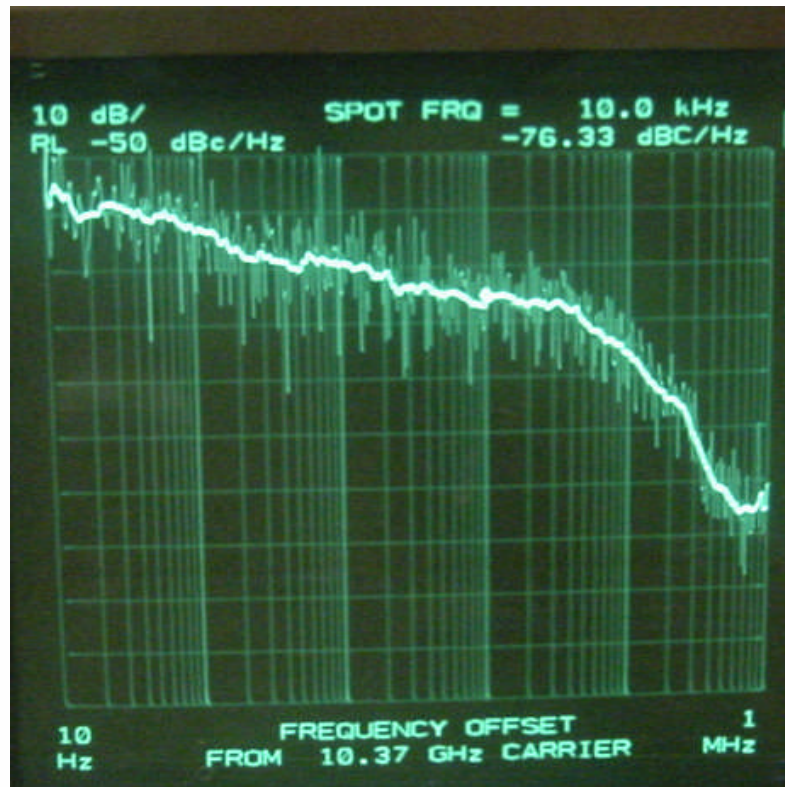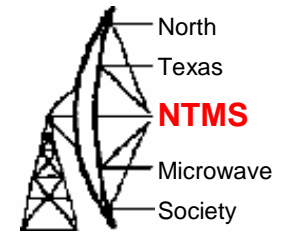# DEMI_N5AC_Datum_8dB Pad

-60dBc/Hz

-60dBc/Hz

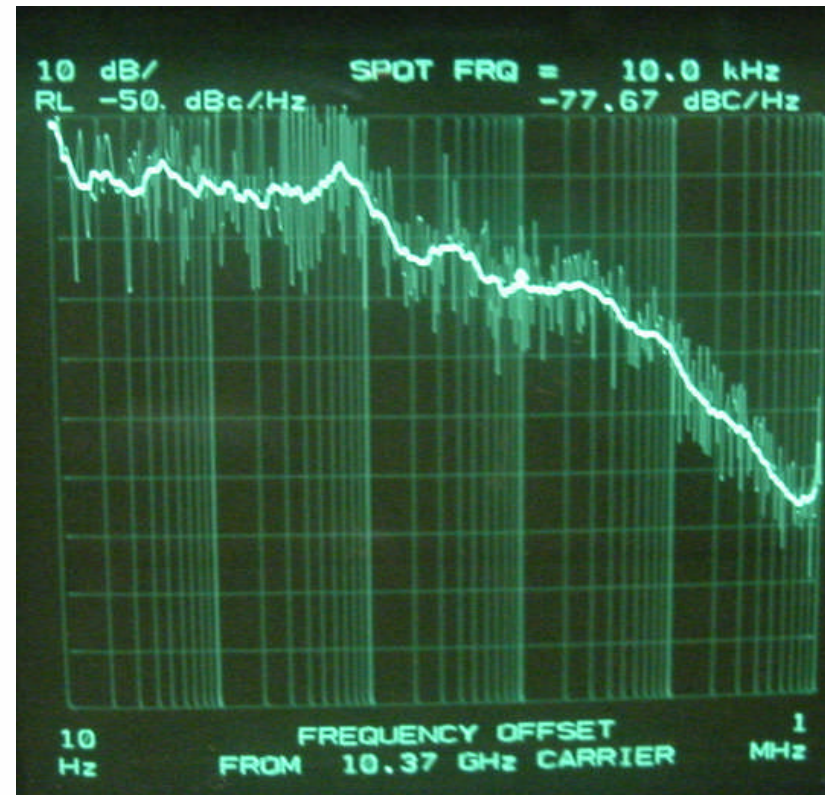My Frequency West Brick Oscillator   A32 with +5 dBm 10 MHz Reference

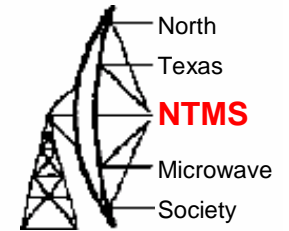# Phase Noise of Transmitted Signal from DEMI XVTR, IF in = 0dBm from HP 83712A

Z3801A_Distribution Box plus 8 dB pad

Datum plus 8 dB pad

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Summary

- Both LOs have been used successfully on 5760 and 10368 terrestrial and EME

- Phase noise of -60 dBc/Hz at 10 Hz to 1 kHz offset appears be minimum acceptable for terrestrial

- Any questions?

- Thanks and 73