Sherwood Engineering HF Test Results

Model TS-2000X Serial # A9100049 Starting test date: 8/28/2019

IF BW 2400 –6 / -60, Hz	/	Ultimate		dB
IF BW 500 –6 /-60, Hz	/	Ultimate		dB

Front End Selectivity (A – F)

First IF rejection +/- kHz		dB

Dynamic Range, 144.2 MHz, Preamp OFF

Dynamic Range 20 kHz	87	dB
Dynamic Range 10 kHz	82#	dB
Dynamic Range 5 kHz	72*	dB
Dynamic Range 2 kHz	65*	dB

Combination of phase noise and 3rd order product
* Consisted of phase noise only

Dynamic Range, 144.2 MHz, Preamp ON

Dynamic Range 20 kHz	84	dB
Dynamic Range 10 kHz	78	dB
Dynamic Range 5 kHz	68	dB
Dynamic Range 2 kHz	64*	dB

* Consisted of phase noise only

Dynamic Range, 435.2 MHz, Preamp OFF

Dynamic Range 20 kHz	91	dB
Dynamic Range 10 kHz	81	dB
Dynamic Range 5 kHz	72*	dB
Dynamic Range 2 kHz	61*	dB

Dynamic Range, 435.2 MHz, Preamp ON

Dynamic Range 20 kHz	88	dB
Dynamic Range 10 kHz	78	dB
Dynamic Range 5 kHz	68*	dB
Dynamic Range 2 kHz	60*	dB

Dynamic Range, 1245.2 MHz, Preamp ON

Dynamic Range 20 kHz	77	dB
Dynamic Range 10 kHz	74	dB
Dynamic Range 5 kHz	66	dB
Dynamic Range 2 kHz	49*	dB

* Consisted of phase noise only

Blocking above noise floor, 1uV signal @ 100 kHz, AGC On,	124*	dB

*Measurement on 2 meters. Phase noise limited with or without preamp.

Reciprocal Mixing Dynamic Range (RMDR)

Spacing kHz	2m	70cm	23cm	
2.5	68	63	53	dB
5	79	76	67	dB
10	86	88	77	dB
20	94	98	85	dB
50	104	108	93	dB
100	110	114	99	dB

Phase noise 2 meters

Phase noise (normalized) at 2.5 kHz spacing:	95	dBc / Hz
Phase noise (normalized) at 5 kHz spacing:	106	dBc / Hz
Phase noise (normalized) at 10 kHz spacing:	113	dBc / Hz
Phase noise (normalized) at 20 kHz spacing:	121	dBc / Hz
Phase noise (normalized) at 50 kHz spacing:	131	dBc / Hz
Phase noise (normalized) at 100 kHz spacing:	137	dBc / Hz

Noise floor, SSB bandwidth 14 MHz, no preamp	-125	dBm
Noise floor, SSB bandwidth 14 MHz, Preamp On	-131	dBm
Sensitivity SSB at 14 MHz, no preamp	0.3	uV
Sensitivity SSB at 14 MHz, Preamp On	0.2	uV
Noise floor, 500 Hz, 14.2 MHz, no preamp	-131	dBm
Noise floor, 500 Hz, 14.2 MHz, Preamp On	-138	dBm
Noise floor, SSB, 50.125 MHz, no preamp	-115	dBm
Noise floor, SSB, 50.125 MHz, Preamp On	-134	dBm
Sensitivity, SSB, 50.125 MHz, no preamp	1.2	uV
Sensitivity, SSB, 50.125 MHz, Preamp On	0.15	uV
Noise floor, 500 Hz, 50.125 MHz, no preamp	-120	dBm
Noise floor, 500 Hz, 50.125 MHz, Preamp On	-140	dBm
Noise floor, 500 Hz, 144.2 MHz, no preamp:	-123	dBm
Noise floor, 500 Hz, 144.2 MHz, preamp ON	-140	dBm
Noise floor, 500 Hz, 435.2 MHz, no preamp:	-130	dBm
Noise floor, 500 Hz, 435.2 MHz, preamp ON:	-143	dBm
Noise floor, 500 Hz, 1245.2 MHz, preamp ON:	-142	dBm*

* Note: preamp cannot be turned off on 23cm.

Signal for S9, no preamp, 20m	-71 dBm	63	uV
Signal for S9, Preamp ON	-86 dBm	11	uV
Gain of preamp 20m		15	dB
Gain of Preamp 6m		24	dB
AGC threshold at 3 dB, no preamp		2.8	uV
AGC threshold at 3 dB, Preamp On		0.45	uV

Transmit Composite Noise. Values are in dBc/Hz

Offset	20m 100w	30w	2m 100w	30w	70cm 50w	10w
2 kHz	-95	-96	-92	-93	-88	-86
5 kHz	-109	-109	-106	-107	-103	-98
10 kHz	-117	-117	-113	-114	-113	-101
20 kHz	-123	-122	-120	-121	-119	-107
50 kHz	-127	-125	-131	-131	-117	-106
100 kHz	-129	-126	-137	-136	-120	-111
200 kHz	-130	-126	-142	-138	-133	-121
300 kHz	-132	-128	-143	-138	-137	-123

Comparisons of IC-7610 on 20m and IC-9700 on 2m and 70cm

	20m 100w	35w	2m 100w	30w	70cm 75w	30w
5 kHz	-126	-121				
10 kHz	-127	-122	-121	-120	-111	-112
20 Hz	-129	-124	-122	-121	-113	-113
50 kHz			-125	-123	-115	-116
100 kHz			-129	-128	-120	-120

Comparison of TS-890S on 20m

	20m 100w	35w
5	-118	-112
10	-120	-113
20	-129	-122

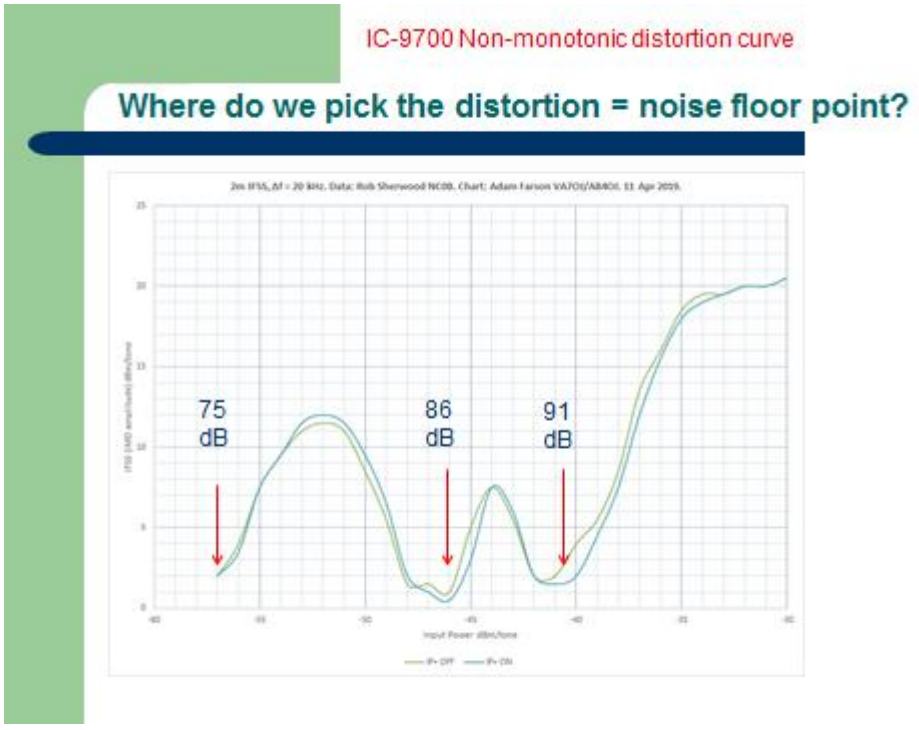
Notes:

The Sherwood dynamic range values of the TS-2000X are very similar to data published in 2001 in QST for 2m and 70cm. The term RMDR did not exist until 2012, and accurate transmit composite noise measurements are still in a state of flux at the League in the fall of 2019. In general VHF and UHF products are far behind HF through 6m products in 2019.

Preamp usage on VHF and UHF: On 6 meters in a quiet location, any rig I have used demonstrates almost no antenna noise gain vs. a termination with the preamp OFF. This is even more so on 2 meters. The TS-2000X can be operated with or without the internal preamp on 2m and 70cm. On 23cm the preamp is ON all the time. From a potential overload standpoint, I doubt many VHF/UHF rigs are used with the preamp OFF. The same can be said of the IC-9700.

Some comparison data is listed to compare the TS-2000X as to transmit noise on HF and VHF/UHF for a frame of reference.

A dynamic range comparison between the TS-2000X and the new IC-9700 is difficult because input vs. output distortion curve of the direct sampling Icom is far from monotonic.



The IC-9700 dynamic range is either 75, 86 or 91 dB.

Rev F