Sherwood Engineering HF Test Results

Model FTdx10 Serial # 0N010029 Lab Test Date: 12/29/2020

IF BW 2400 –6 / -60, Hz	/	Ultimate	>100	dB
IF BW 500 –6 /-60, Hz	/	Ultimate	>105	dB

Front End Selectivity	Half Octave	
First IF rejection 9005 kHz	91	dB

Dynamic Range of radio, no preamp		
Dynamic Range 20 kHz	107	dB
Dynamic Range 10 kHz	107	dB
Dynamic Range 5 kHz	107	dB
Dynamic Range 2 kHz	107	dB

Dynamic Range with radio, Preamp 1		
Dynamic Range 20 kHz	106	dB
Dynamic Range 10 kHz	106	dB
Dynamic Range 5 kHz	106	dB
Dynamic Range 2 kHz	104	dB

Blocking above noise floor, 1uV signal @ 100 kHz, AGC On,	141*	dB
* Limited by phase noise		

Phase noise (normalized) at 2.5 kHz spacing:	-145	dBc/Hz
Phase noise (normalized) at 5 kHz spacing:	-150	dBc/Hz
Phase noise (normalized) at 10 kHz spacing:	-152	dBc/Hz
Phase noise (normalized) at 20 kHz spacing:	-153	dBc/Hz
Phase noise (normalized) at 30 kHz spacing:	-153	dBc/Hz
Phase noise (normalized) at 40 kHz spacing:	-153	dBc/Hz
Phase noise (normalized) at 50 kHz spacing:	-153	dBc/Hz
Phase noise (normalized) at 100 kHz spacing:	-153	dBc/Hz
Phase noise (normalized) at 200 kHz spacing:	-153	dBc/Hz
Phase noise (normalized) at 300 kHz spacing:	-154	dBc/Hz
Phase noise (normalized) at 400 kHz spacing:	-155	dBc/Hz
Phase noise (normalized) at 500 kHz spacing:	-155	dBc/Hz

RMDR at 2.5 kHz spacing:	118	dB
RMDR at 5 kHz spacing:	123	dB
RMDR at 10 kHz spacing:	125	dB
RMDR at 20 kHz spacing:	126	dB
RMDR at 50 kHz spacing:	126	dB
RMDR at 100 kHz spacing:	126	dB
RMDR at 200 kHz spacing:	126	dB
RMDR at 500 kHz spacing:	128	dB

Noise floor, SSB bandwidth 14 MHz, no preamp		-121	dBm
Noise floor, SSB bandwidth 14 MHz, Preamp 1 On		-130	dBm
Noise floor, SSB bandwidth 14 MHz, Preamp 2 On		-133	dBm
Sensitivity SSB at 14 MHz, no preamp		0.63	uV
Sensitivity SSB at 14 MHz, Preamp 1 On		0.21	uV
Sensitivity SSB at 14 MHz, Preamp 2 On		0.15	uV
Noise floor, 500 Hz, 14.2 MHz, no preamp		-126	dBm
Noise floor, 500 Hz, 14.2 MHz, Preamp 1 On		-135	dBm
Noise floor, 500 Hz, 14.2 MHz, Preamp 2 On		-138	dBm
Noise floor, SSB, 50.125 MHz, no preamp		-123	dBm
Noise floor, SSB, 50.125 MHz, Preamp 1		-133	dBm
Noise floor, SSB, 50.125 MHz, Preamp 2		-135	dBm
Sensitivity, SSB, 50.125 MHz, no preamp		0.42	uV
Sensitivity, SSB, 50.125 MHz, Preamp 1		0.15	uV
Sensitivity, SSB, 50.125 MHz, Preamp 2		0.14	uV
Noise floor, 500 Hz, 50.125 MHz, no preamp		-130	dBm
Noise floor, 500 Hz, 50.125 MHz, Preamp 1 On		-139.5	dBm
Noise floor, 500 Hz, 50.125 MHz, Preamp 2 On		-140	dBm
Signal for S9, no preamp	-67 dBm	100	uV
Signal for S9, Preamp 1	-76 dBm	35	uV
Signal for S9, Preamp 2	-85 dBm	12	uV
Gain of preamp(s)			
Preamp 1		9	dB
Preamp 2		18	dB
AGC threshold at 3 dB, no preamp		4.2	uV
AGC threshold at 3 dB, Preamp 1 On		1.46	uV
AGC threshold at 3 dB, Preamp 2 On		0.54	uV

Transmit composite noise, 20m (Composite noise is phase noise + AM noise)

Offset kHz	100 watts dBc/Hz	30 watts dBc/Hz
2 kHz	-123	-120
5 kHz	-129	-122
10 kHz	-130	-124
20 kHz	-132	-125
50 kHz	-134	-127
100 kHz	-136	-129
200 kHz	-140	-133
300 kHz	-143	-135

Notes:

Transmit composite noise is not as low as an FTdx101D, but similar to an IC-7610.

S meter: From S3 to S9, one S unit equals 3 dB. Above S9, the meter is accurate.

In order to see signals at the receiver noise floor with IPO selected (no preamp), scope gain has to be set at +30 dB.

In noisy Denver on 20m, I set the scope gain around +15 dB, dependent on the span. At +15, a -110 dBm signal reads about 1 division on the scope scale of 5 dB/division. These values are with IPO selected, which is no preamp.

Scope dynamic range is only 50 dB at 5 dB/division, unlike Icom at 10 dB/division. The IC-7610 has a 100 dB scope dynamic range, while the IC-7300 is 80 dB.

The band scope / waterfall is more like an Icom 7610/7300 than the FTdx-101D. There is no extra gain inside the roofing filter which I found distracting with the 101D

I consider the band scope jumpy, needing averaging options. When the scope gain is set for waterfall band noise to be barely displaying, the band scope noise spikes are 1 to 2 divisions.

The current draw is more like an IC-7610 than an IC-7300, causing the cooling fan to cycle ON/OFF when in receiver mode only, as does the 7610.

Enabling preamp 1 does not increase noise output at the speaker, which is nice.

Receive audio on CW and SSB is better using an external front-facing speaker. As with any top cover mounted speaker, the high frequencies are attenuated.

The speed of the tuner reaching a solution is relatively slow. It doesn't memorize a match on any given frequency. A tuner solution takes 7 to 8 seconds even if looking into a perfect 50 ohm load. After a match has been achieved, when pushing the tune button again on the same frequency, the matching algorithm starts from scratch every time.

Ergonomics are an operational issue for me. I wish the AF/RF gain controls were interchanged with the notch/APF controls. Being right handed, it is very easy bump the tuning when adjusting the volume. Buttons around the VFO are small and very close together, which may be an issue for those with large hands.

The rear larger tuning knob makes slewing the band very easy, however it is possible to inadvertently bump the larger rear knob by mistake.

As with many noise blankers, it distorts the signal if turned up very high.

Noise reduction beyond a modest level has weird audio artifacts.

No dedicated power output knob, as with the 101D.

A USB mouse can access and click anywhere on the LCD screen.

On-air and operational and contest observations.

The FTdx10 was used extensively in the January 2021 CQWW 160m CW contest. Basic functionality, as the lab values would indicate, was great. DSP selectivity was adjusted to between 250 Hz and 150 Hz. The Audio Peak Filter (APF) was changed from Medium to Wide as my preference. That setting is located in the following menu. Push the multi-function knob, select Operation Settings, RX DSP, APF Width: Wide, Medium or Sharp.

The limitations of the FTdx10, from my perspective, are ergonomics and firmware programming choices

When scope sensitivity is properly set so band noise on the waterfall is barely blue (or whatever color was selected), any signal S7 or stronger reads full scale on the scope graticule. This reduces the value of the band scope.

Major Issue: Any data on the band scope and waterfall is erased as soon as the rig transmits. This is completely unacceptable, removing most of the advantage of a waterfall in particular. Even a single "dit" sent on CW, or a tap of the microphone PTT, wipes the LCD screen and it has to start filling in all over again. If this problem is fixed in firmware, then the waterfall needs to be able to run slower than the present option to provide a longer history.

Note: The FTdx101D/MP functions the same way. I am surprised I hadn't heard about this issue which I consider a significant limitation.

When tuning the waterfall slews off at an angle as do current Icom radios. The Kenwood TS-890S waterfall is much more useful, as tuning simply shifts the whole screen left or right, a major advantage particularly for the Search and Pounce (S&P) operator. I am told that the Flex 6000 series operates like the Kenwood TS-890S.

Several times I ran into a glitch where if I pushed the band selection button, and then in a few seconds let it time out, all my settings changed. For instance, the radio re-tuned to 1.800 MHz, DSP bandwidth changed from 150 Hz to 500 Hz, DSP offset of -100 Hz changed to 0 Hz, APF offset of -100 Hz changed to 0 Hz, Break-in tuned OFF, turned the 12 dB attenuator OFF, and IPO (no preamp) changed to Preamp 1.

Testing after the contest, I observed that the glitch noted above is random, and the settings that change may be all, some or none for a given push of the band selector button. Let me be clear that simply pushing the band button, and doing nothing but let it time out, causes these settings changes.

Hopefully there is a transmit scope sensitivity adjustment which I haven't found yet. When transmitting, the displayed signal goes way off scale. This has to be fixed.

With full break-in, the relays are loud, so I switched to semi-break-in. Break-in delay was set to 250ms for sending at 26 WPM.

CW rise times are approximately half of what the menu selection specifies. This causes excessive key clicks.

The fan runs periodically in receive mode only. Fan noise is a bit louder than other rigs I generally operate.

The FTdx10 is supported by N1MM+. I used the serial interface at 19200 baud.

The roofing filter auto selects when changing modes. However when adjusting the DSP filter bandwidth wider than the roofing filter bandwidth, the roofing filter does not automatically select a wider width. On AM the width and shift controls are not active.

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