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	-139	-133
300 kHz	-142	-135

Transmit composite noise, 6m at 100 watts

2 kHz	-127
5 kHz	-131
10 kHz	-132
20 kHz	-134
50 kHz	-135
100 kHz	-137
200 kHz	-140
300 kHz	-142
400 kHz	-143
500 kHz	-143
600 kHz	-143
700 kHz	-143
800 kHz	-143
900 kHz	-143
1000 kHz	-144

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, each 10 dB increment increases 10 dB as it should.

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 50 dB at 5 dB/division by default, but can be changed to 10 dB per division for a dynamic range of 100 dB in a menu setting.

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 of any brand or model, the high frequencies are attenuated. Recommend an external front-facing speaker if not using headphones.

The speed of the tuner reaching a solution is relatively slowly. A tuner solution takes 7 to 8 seconds even if looking into a perfect 50 ohm load.

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 as with many other brands.

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

A USB mouse can access and click anywhere on the LCD screen. A USB mouse is very helpful for navigating the menus.

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

Comments updated after April firmware update.

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 with the default gain setting. They scope dynamic range can be increased from 50 dB to 100 by a menu setting.

With the firmware update, data on the band scope and waterfall is no longer erased in 2D mode as soon as the rig transmits, a major improvement. In 3D mode, however, the screen erases as soon as you transmit, removing the usefulness of the 3D waterfall. Even a single "dit" sent on CW, or a tap of the microphone PTT, wipes the LCD screen in 3D mode, and it has to start filling in all over again. 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.

While I installed the May 14, 2021 firmware update, I haven't used the FTdx10 other than to measure transmit composite noise on 6 meters.

When tuning the waterfall slews off at an angle. A recent Icom firmware update for direct sampling radios offers a curser mode that doesn't slew off at an angle when tuning. I prefer the Kenwood TS-890S waterfall as it 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, as it has been a few years since I have operated a Flex.

The band stacking registers now work properly after the April firmware update.

The transmit scope sensitivity should be fixed and independent of the receive sensitivity. When transmitting, the displayed signal goes way off scale.

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.

The CW transmit spectra (key clicks) have been vastly improved, and now operate properly according to rise time settings, which should typically be at 6 or 8 ms.

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, though other speeds will work correctly.

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.

Antenna noise gain measured on 6m with different preamps. Note: Antenna is a 5-element OWA at 50 feet pointed north towards Cheyenne, WY. North is my quietest direction.

Preamp	Antenna Noise Gain
IPO	1 dB
Pre #1	5 dB
Pre #2	5.5 dB

Rev H5