<u> 10Ghz – Q65 decoding</u>

Introduction.

I wanted a simple and cheap system to be able to decode Q65 signals on 10Ghz EME.

A simple LNB is good to convert the signals down to an acceptable level for a RTL dongle but the stability is by far not good for decoding SSB or CW signals. So maybe this instability will also not work out properly for digital signals.

The RTL dongle can be connected to HDSDR, but this program is not able to decode digital signals. So a connection must be made from HDSDR to WSJT-x.

As both programs run on the same computer, virtual connections must be made to get is working. I took me a while to understand how I should proceed to get a good working system.

Below you will find my steps and notes.

The scheme for connection.

Below the initial set-up for the receiver system.



Bullseye LNB PLL TCXO.

This LNB is perfect to convert the 10Ghz signals into a frequency range for the RTL dongle. Using a DC splitter the DC power can be fed through the coaxial line. Depending on the voltage one can select the polarity in case it was mounted in the wrong way.



VB-cable.

This program is used to route the audio from HDSDR into WSJT-x It is a simple program for just 2 connections, which fits our needs here. It can be downloaded from: <u>www.VB-cable.com</u>

VB-A Options	Audio Virtual Cable About	Control Panel (/ersion 1.0.3.5)			-		×
Driver Driver Inte Max	er Name: VB-Aud Version: 1.0.3.5 ernal SR: 96000 H Latency: 7168 sn t Levels 6.7 % 4.3 % 0.0 %	fio Virtual Ca	ble	Statistics Buffers: 225 Push loss: 216 Pull loss: 0 Init: 1	Input b128: 4 b256: 220 b512: 0 b1024: 0	b b b1	Ou 128: 0 256: 0 512: 0 024: 0	itput
3 4 5 6 7 8	0.0 % 0.0 % 0.0 % 0.0 % 0.0 %	FC LF BL BR FLC FRC	Input ch: 2 sr: 48000 Hz res: 24 bits	C. A		ch sı res	Outpu : - :: - :: -	Jt

VSP-manager.

Todays computers use USB ports, rather then COM ports. In case your computer does not have COM ports, you will have to create them.

This program is used to create two virtual COM ports, connected together.

After defining the ports they can be used in the settings for HDSDR and WSJT-x.

Here I created COM-5 and COM-6. Make sure you use port numbers which don't exist already. The software can be downloaded from: <u>www.k5fr.com</u>

Co VSP	Manager by	K5FR -	Version 1.0.3.0						×
Ports	Options	Help							
			Refresh	Port Ma	nagement				
	Physical Por firtual Ports COM5 COM6	rts ;		Select Please 'COM'	the port r note that for use wi	numbers you t all virtual po ith DDUtil.	want as a ort names n	virtual pa nust start	ir. with
					End 1 End 2	COM7 COM8	1	Create	Pair
				94	End 1 End 2	No Port Se No Port Se	elected elected	Delete	Pair
					En Bre	able Strict Ba ak Line/Res	audrate En store Conn	nulation ection	
					All virt delete that al	ual serial por d. Please ma I ports are clo	ts will be ake sure osed.	Delete	e All

HDSDR settings.

Make sure the RTL dongle is recognised by HDSDR. If not then you might use ZADIG to install the correct drivers for the RTL dongle. If you push F8 or SDR device on the screen, the RTL dongle interface will pop-up.

Using the Soundcard section select the virtual audio cable. See below screen-copy.



Set the output audio channel as below.

If you select the audio as the otput, besure you move the slider to the right and unlock the MUTE button on the main screen. You may also select I/Q output, that will work as well but seems it have less sensitivity, compared to the audio setting.

Select Input	>	DIG FreqMgr
Visualization	>	nn 2m 🗸
Input Channel Mode for RX	>	
Output Channel Mode for RX	>	AF to Both channels (default)
RF Front-End Configuration Calibration Settings Recording Settings+Scheduler DigiMode Settings		AF to Left Channel only AF to Right Channel only IF as I (Left) / Q (Right) IF as Q (Left) / I (Right)
Misc Options Mouse Wheel DDE to HDSDR CAT to Radio (Omni-Rig) CAT to HDSDR TX About HDSDR / Help / Update	> > > >	-25 -50 -75 -100 -125 -150/ ^{w///w///////////////////////////////}

Then make the Com port selection in the option menu [F7], as below

Select In	put	>		DIG	FreqMgr					
Visualiza	ation	>		21	1 v					
Input Cl Output	nannel Mode for RX Channel Mode for RX	> >		- 2.9	5 kHz 🗸	and the second se			同時間	
RF Front Calibrati Recordin DigiMoo	t-End Configuration ion Settings ng Settings+Scheduler de Settings					Uas				
Misc Op	otions	>		What	s this?					
Mouse \	Wheel	>		Port			>	• (COM5	
DDE to F	HDSDR Radio (Omni-Rig)	>		Baudi PTT a	rate (bps) ctivation pi	n	> >	(COM6	
CAT to H	HDSDR	>	~	activa	ted			man	mithal	AAmot
TX About H	IDSDR / Help / Update	>				-1 % 0)				

If you do not find the ">"sign left of the port selection, you did not create the com port yet

WSJT-x settings.

Launch the program and go to the settings menu **RADIO**. Select TS-2000 radio and add the COM port information as below.

General	Radio	Audio	Tx Macros	Reporting	Frequ	lencies	Colors	Advanced	
lig: Ken	wood TS-2	000					✓ Poll I	nterval: 1 s	+
CAT Cor	trol			PTT	Method				
Serial Po	rt: COM	5		~ •	VOX			ર	
Serial	Port Param	eters		0	CAT		O RTS	3	
Baud I	Rate: 576	500	~	Port	: COM	3			-
Data	a Bits Default () Seven	• Eight		smit Aud Rear/Da	lio Source ta	Fro	nt/Mic	
Stop	Bits			Mod	e	0		0	
0	Default (One	O Two	•	None	O Us	SB	O Data/Pkt	-
Han	dshake			Split	Operatio	on			
0	Default XON/XOFF		None Hardware	0	None		g	Fake It	
Forc	e Control L	ines V RTS:	~		Test CAT	-		Test PTT	

Go to the Audio menu, to set the audio input.

General	Radio	Audio	Tx Macros	Reporting	Frequencies	Colors	Advanced	ł
Soundca	rd							
Input:	CABLE O	utput (VB-	Audio Virtual Ca	ble)		`	Left	~
Output:	Default (Dutput Dev	ice (Not found)	l)		`	Mono	~
Save Dir	ectory							
Location	: C:/WSJT	r/decodes-	Erica				Select	
AzEl Dire	ectory							
Location	: C:/Users	s/Kappert//	AppData/Local/	WSJT-X			Select	
Damash						1		
	er power s	ettings by	band	🖂 Tun	-			
	anne							

Last be not least, go the the **Frequencies** section to set reception on 10Ghz using a converter type. In the station informationi section add a new bnad: 3cm, then you are able to inform on the LO frequency. Here I used –9.618.000Mhz for an input frequency of 750Mhz.

Settings						?	
eneral F	adio Audio	Tx Macros	Reporting	Frequencies	Colors	Advanc	ed
Frequency (Slope: () Working Fre	Calibration D,0000 ppm 🔹	Intercept:	0,00 Hz 🜩				
IARU Reg	ion Mode		1	Frequency			1
All	JT65				3,570 000 1	MHz (80m)	
All	JT9				3,572 000 1	MHz (80m)	
All	FT8				3,573 000 1	MHz (80m)	
All	FT4				3,575 000 1	MHz (80m)	
All	WSPR				7,038 600 1	MHz (40m)	
All	FT4				7,047 500 1	MHz (40m)	
All	FT8				7,074 000 1	MHz (40m)	~
Station Info	rmation						
Band 3cm	Offset) MHz	,	Antenna Descript	tion		

Now once all set and connected you may run your system.

Start up HDSDR first and then WSJT-x, and select 3cm in WSJT-x

When all works ok, you can select a frequency in the HDSDR screen or use the TUNE function. This change will also change the frequency in the WSJT-x main screen, as per example below.

		Settings		
130 750140 750150	WST-X v2.5.4 bv KUT, G4WJS, K9AN, and IV3NWV	General Radio Frequency Calibr Slope: 0,000	Audio Tx I ation 00 ppm 🜩 Interce	Macros Reporting Frequencies Cc
Fi gitereter genergised subservets and particulation, about the first state of the state of the state of the state	ie Configurations View Mode Decode Save Tools Help Single-Period Decodes	IARU Region All	Mode JT65	Frequency 3,57
M ECSS FM LSB USB CW DIG FreqMgr =	UTC dB DT Freq Message	All	JT9 FT8	3,57:
▲ 750.190.000		All	FT4 WSPR	3,57! 7,038
ne 750.200.000 500 Hz v ume	Lon OSO Ston Manihur Frase Clear &	All	FT8	7,07
C Thresh. •	3cm ✓ 10.368,200 000 ☑ Tx even/ist Tx 1000 Hz	Station Informati Band 3cm -9.	Offset 618,000 000 MHz	Antenna Description
-25 -25 NR NB RF NB IF AFC RF+0 -50 Iute AGC/Med Notch ANotch -100	B0 DL 3WDG JN49 Rx 882 Hz 60 Az: 157 386 km Report -15 40 Lookup Add T/R 60 s			
-12 -12-2022 14:51:48 -12 -12-2022 14:51:48 -12 -12-2022 14:51:48 -12	20 2022 dec 11 39 d8 13:51:48 □ Auto Seq			

S-meter calibration

Connecting a RTL dongle and LNB most likely will push the noise into the S9 range. Go to options menu calibration settings menu for **S-meter calibration**.

Using S-meter calbration you will be able to reduce the metering as per example below:

" היינה היי יפו	1925 - 1977 - 1972 - 24		
Current Level [dBm]	Correct Level [dBm]	Correction Value [dBm]	Last Calibration:
-119,0	-120 Calculate	-71,8	Time: 20221211_1356192 Input: Extl0_RTL2832.dll L0: 750.130.000Hz RF-Gain: +0,0dB IF-Gain: +0,0dB
Smoothing for FM/AM	/ECSS	Smoothing	for LSB/USB/CW/DIG
Attack Time (ms): 5	0 [Default:50]	Attack Time	e (ms): 150 [Default:150]

It took some time to get this setup deifned but finally I am happy with the result.

I hope it will help others to start receiving EME signals on 10Ghz, altough this set-up is as wide as the frequency range of the RTL dongle.

So you may use it in different configurations as well.

GL, Jan, PA0PLY