



Using a Raspberry Pi with an IC-7300 Transceiver

Ray Hitt, N8VMX
Bellbrook Amateur Radio Club

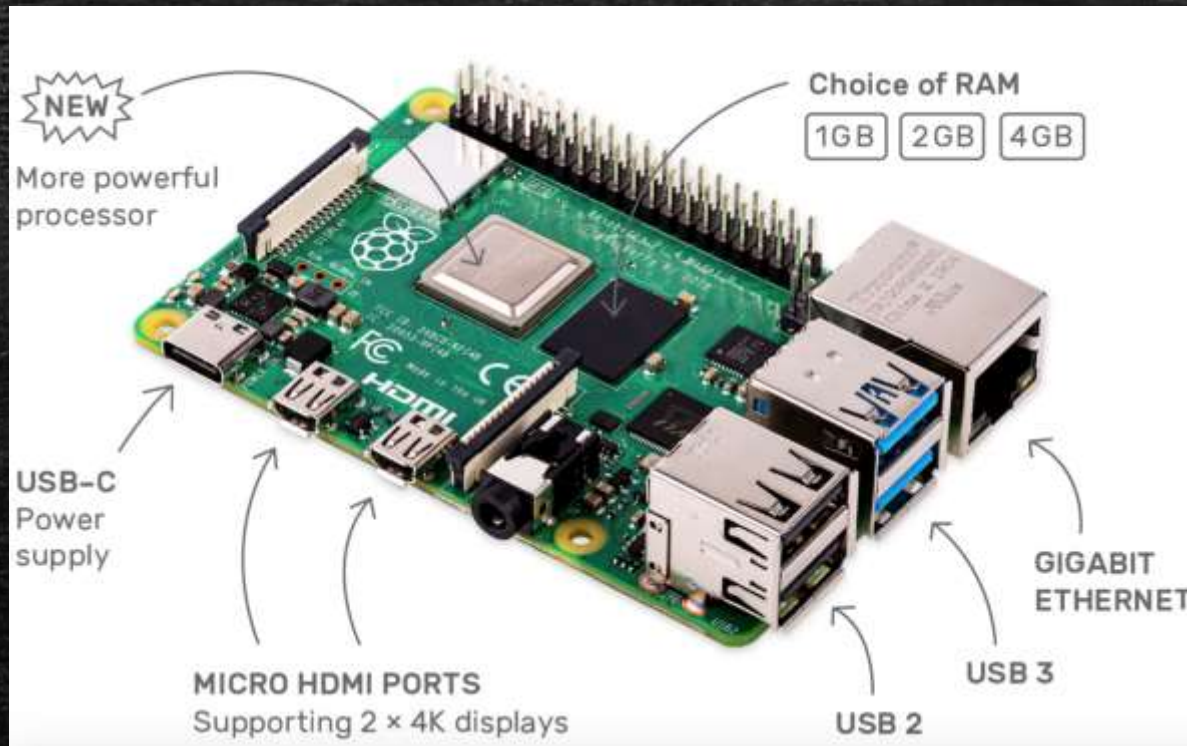


Using a Raspberry Pi with an IC-7300 Transceiver

- Background
- Assembling the Raspberry Pi
- Setting up the Raspberry Pi software
- Connecting to the IC-7300
- Using the Raspberry Pi Ham apps with the IC-7300
- Demo



Raspberry Pi-4



Main Features

- Powered by USB-C
- True USB-3 ports (2) and True USB-2 ports (2)
- 1,2,4 GB RAM – your choice
- Dual Micro HDMI Displays
- Fast enough to run digital modes in Linux
- Price: \$43 (1G), \$45 (2G), \$61 (4G)
- Con: will throttle back CPU speed unless cooling fans are used

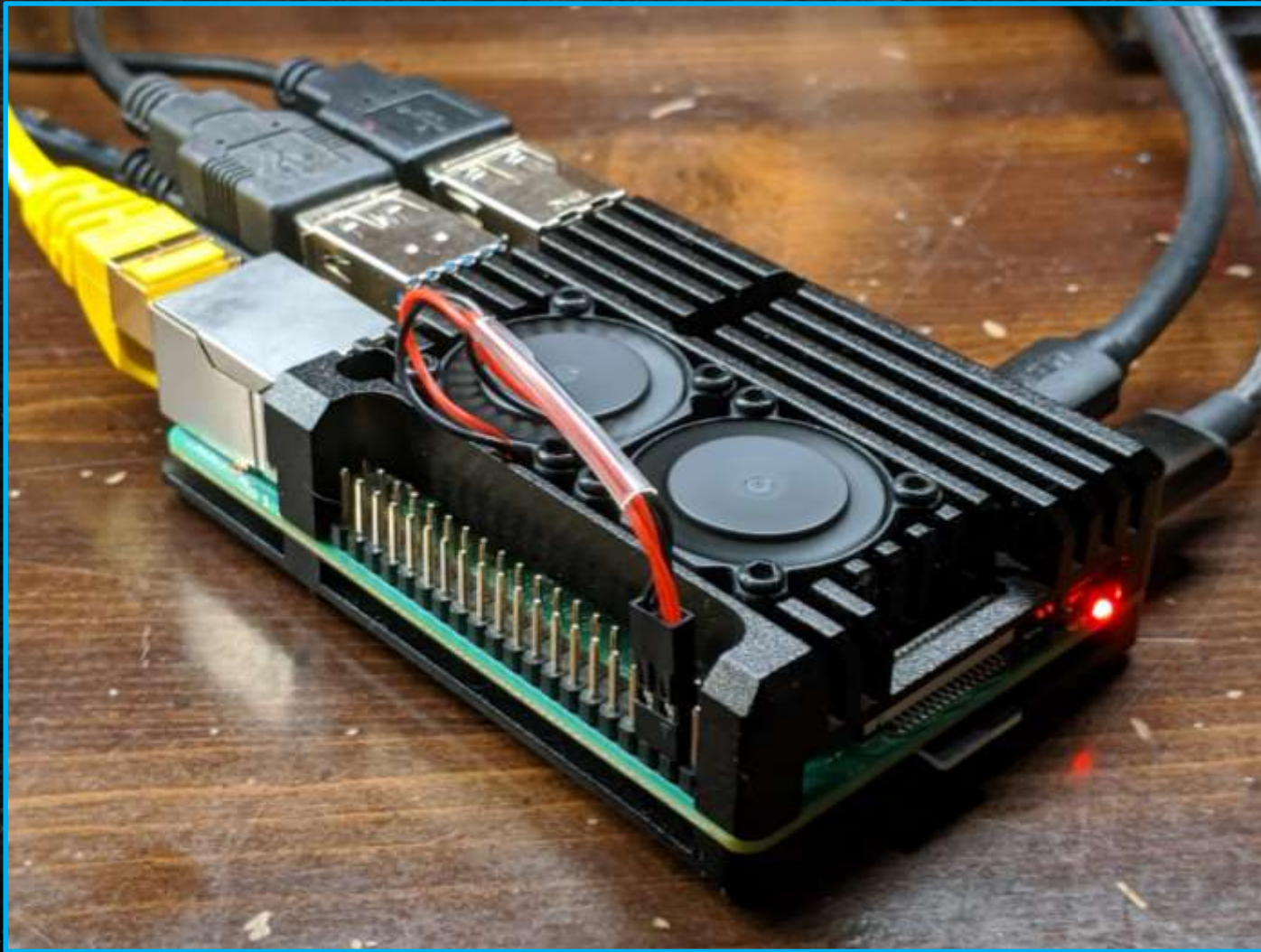


Raspberry Pi 4 Armor Case





Raspberry Pi at N8VMX QTH





Raspberry Pi at N8VMX QTH





Setup Procedure

- Assemble Raspberry Pi and case, without SD Card installed
- Prepare SD Card (on PC)
- Install Raspbian Linux OS - download on PC, copy to SD Card
- Initial boot and setup of Raspberry Pi
- Install RealVNC for remote control of Raspberry Pi
- GPS Clock (time sync and position) – optional if NTP servers available
- Install ham radio applications one by one – skip the ones you don't need
- **Tip: Backup SD Card image on PC before installing each app on Pi**
- Adjust settings on IC-7300 for digital operation



Setting up the IC-7300

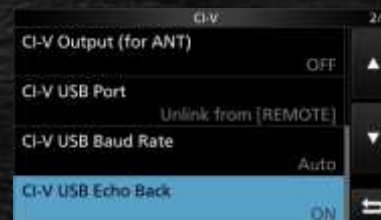
- Digital control and audio all is through the USB connector
- Just connect the USB to the Raspberry Pi
- Adjust the front panel settings on the IC-7300 if required
- Baud rate can be set to Auto, then it is controlled by FLRig on the Raspberry Pi





IC-7300 Tx and Rx Settings

- ACC/USB AF Output Level: default 50% - adjust up or down if waterfall looks too dark or too noisy
- USB MOD Level: default 50%, adjust down or up to increase output power level
- TX Power Level: Can leave at 80-100%, adjust output power with the USB Mod level instead
- Audio levels are also adjusted in the software on the Raspberry Pi, and add with USB Mod Level and TX Power Level settings





FL-Rig Settings

The screenshot shows a Linux desktop environment with a dark, aurora-themed background. The top panel includes a taskbar with icons for a terminal, file manager, and the 'flrig IC-7300' application. The system tray on the right shows network, volume, and Bluetooth icons, along with the time 08:28.

The 'flrig IC-7300' application window is the primary focus. It features a menu bar (File, Config, Memory, Help) and two frequency display fields: 7242.000 and 3902.000. Below these are frequency range sliders (S3, S6, S9, +20, +40, +60) and mode selection options (vfoA, vfoB, A<->B, Split). A volume control slider is set to 14. Other controls include FST (100), SQL (9), NR (5), Lock (0), ClrPBT (0), Nch (3000), Mic (50), and Pwr (30). At the bottom of the window are buttons for ATT, PRE, NB, AN, Tune, and PTT.

The 'Configuration' dialog box is open, showing a tree view on the left with 'Configure' selected. The main area displays settings for the 'Rig: IC-7300'. Key settings include: Retries (2), Update path (/dev/serial/by-id/usb-Silicon_L), Baud rate (19200), Cmds (5), Poll interval (200), and Byte interval (0). PTT options are set to 'PTT via CAT', 'RTS +12 v', and 'DTR +12 v'. The 'USB audio' option is checked, and the status is 'Connected'. An 'Init' button is located at the bottom right of the dialog.



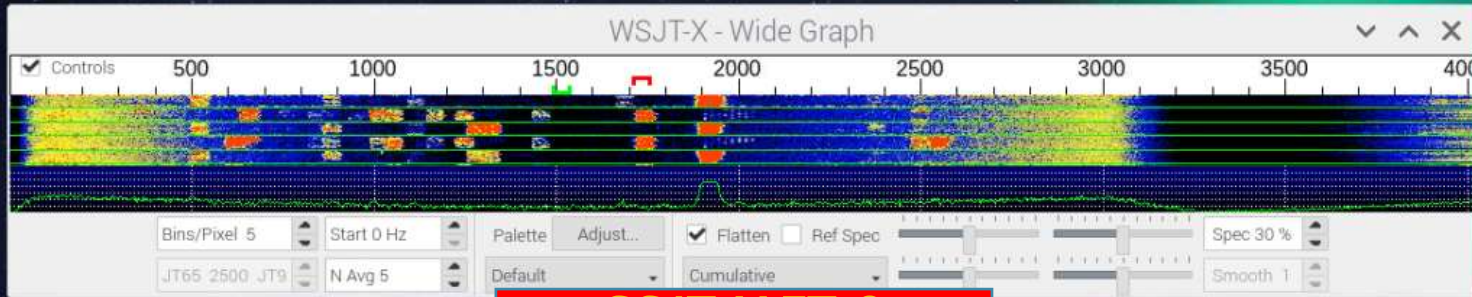
Ham Apps Available to Install

- Packet Radio (Hamlib, Direwolf, Xastir, Linpac)
- Hamlib (Transceiver Control)
- Direwolf (Sound Modem)
- Xastir (APRS)
- Linpac (Packet Radio Terminal)
- FLRig (Transceiver Control)
- FLDigi (Data Mode)
- WSJT-X (Data Mode)
- JTDX (Data Mode)
- GridTracker (Display connections on a map)
- JS8Call (Data Mode)
- CQRLOG (Advanced ham radio logbook)
- GPredict (Sat-Tracking)
- QSSTV (Slow Scan Television)
- GQRX (SDR)
- FreeDV (Digital Voice)
- VOACAP (Propagation Prediction)
- Chirp (Programming transceivers)
- Otel (Echolink Client)
- RPI-Monitor
- HamClock



Ham Apps Installed at N8VMX QTH

- Packet Radio (Hamlib, Direwolf, Xastir, Lincac)
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SSJT-X FT-8 program

Band Activity

UTC	dB	DT	Freq	Message
200300	-11	-0.1	502	~ W8FR N8NXN RR73
200300	-12	0.1	863	~ CQ AE8S EM79
200300	-13	-0.2	1095	~ W3PH WB0DBQ -03
200300	-1	0.3	1258	~ IZ0AXF W3LES RR73
200300	-2	0.5	1300	~ N8GM Y AC9DX RR73
200300	11	0.5	1898	~ K4ZZT KN4JSF R+05
200300	-20	0.3	2354	~ CQ KR0P EN10
200315	4	0.5	635	~ CQ W2NER FM03
200315	-18	0.2	821	~ OE3UKW K2AMI FN20
200315	-19	0.1	932	~ CQ W2GLH FM29
200315	-2	0.1	992	~ CQ K9RJ0 EN52
200315	-4	-0.1	1032	~ R6FFB K1BDC EL96
200315	-6	0.2	1147	~ CQ W4DOE FM18
200315	-6	0.2	1225	~ AC9DX N8GM Y 73
200315	-11	0.2	1435	~ WB0DBQ W3PH FM09
200315	5	-0.0	1722	~ KN4JSF K4ZZT RR73
200315	-22	-0.1	864	~ AE8S KA2KAR FN20
200315	-24	0.2	1119	~ N8NXN W8FR 73

Rx Frequency

UTC	dB	DT	Freq	Message
195700	-16	-1.0	1498	~ KB9AVX W9GF -05
195730	-16	-1.0	1498	~ KB9AVX W9GF -05
195930	-15	-1.0	1498	~ KB9AVX W9GF -05
200200	-11	-1.0	1498	~ KB9AVX W9GF -05

Buttons: CQ only, Log QSO, Stop, Monitor, Erase, Generate, Enable Tx, Halt Tx, Tune, Menus

40m band, Frequency: **7.074 000**

Tx 1710 Hz, Rx 1492 Hz, Report -15, Auto Seq, Call 1st

Generate Std Msgs

Next	Now
KM5LY N8VMX EM79	Tx 1
KM5LY N8VMX -15	Tx 2
KM5LY N8VMX R-15	Tx 3
KM5LY N8VMX RR73	Tx 4
KM5LY N8VMX 73	Tx 5
CQ N8VMX EM79	Tx 6

DX Call: KM5LY, DX Grid: EM12, Az: 238, 1330 km

2020 Feb 16 20:03:44

Receiving IC-7300 FT8 14/15 WD:0m

HamCLOCK

N8VMX

20:03 44 UTC
Sun Feb 16, 2020

DX Cluster: 14032.5 E70X 2003, 21020.9 HC2AO 2003, 14040.8 G4EDM 2003, 10100.8 HP1UPR 2003, 21033.9 PJ5/KGSH 2003, 14042.1 ED8H 2003, 7020.8 552NR 2003

DE: 15:03 Feb 16 40N 84W EM79

DX: 16:03 Feb 16 80N 81W ER90

2789:@1

Small Hamclock

NASA

flrig IC-7300

File Config Memory Help

7074.000 7070.000

53 56 59 +20 +40 +60 vfoA vfoB A<->B Split

1 3000 USB-D

FL Rig – used to control IC7300

Lock 0, ClrPBT 0, Nch 0, Mic 0, Pwr 75

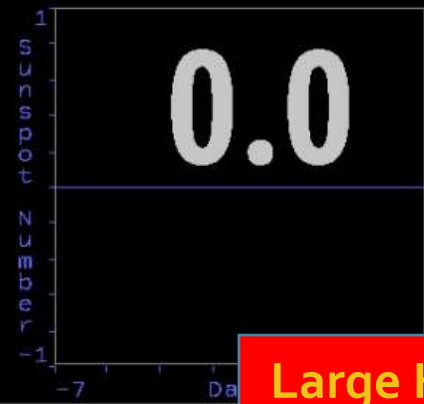
ATT Amp 1 NB AN Tune PTT

N8VMX

Up 43s WiFi -50 dBm Ver 2.40

20:19³⁷

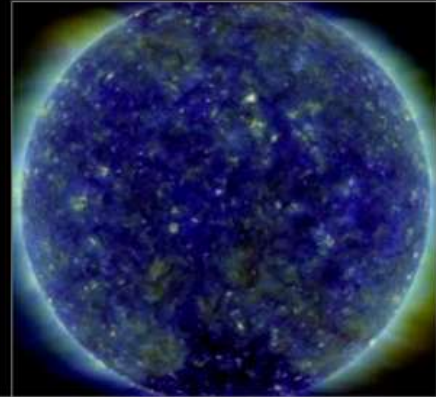
Sun Feb 16, 2020 UTC



DX Cluster

dxcluster.com:7300

7014.0	W3LPL	2018
14012.7	K1IR	2018
14035.6	9A1A	2018
7014.7	W2FU	2019
14039.7	OH/M0CFW	2019
21024.2	V3O	2019



NCDXF

Large Hamclock

DE:

15:19 Feb 16
40N 84W
EM79 S in 2:53
R 7:50 ago



**Gridtracker
(FT-8 on 40m)**



GridTracker
 7,074,000 Hz (40m) FT8
 Sun 16 Feb 2020 20:15:34 UTC

RECEIVE
 PSK-Reporter Band Activity

N8VMX EM79
 Calling
 KM5LY EM12 -15
 United States 1328km 237°

Grids **28** Calls **35**
 DXCCs **3** QSO **3**
 LCD **0** QSL **0**
 Decodes **81** Last **11**

Clear Live Clear QSO
 Clear Paths Clear All

QSO/Live View
 Band **All**
 Mode **FT8**

LIVE ADIF PSK 24/7 MH4

CQ KR0P EN10
 CQ NBNXN EN72
 N7IHB K4ZZT -24
 W3LES T45FM 73
 OE3UKW K2SCH FN20
 EA8CVR N2YG FN30
 CQ W4DOE FM18
 AK0IL K9RJO RR73
 CQ W2GLH FM29
 W3PH W1WWA 73
 WB5E K5SGD 73
 W1WWA W3PH 73
 K5SGD WB5E RR73
 CQ K8SIA EN84
 W4DOE KE0OVX DN98
 CQ CO7KD FL11
 CQ MT N3CHW FM19
 CQ K0PT EM94
 T45FM W3LES RR73
 N0AWT WB0DBQ -10
 K9RJO AK0IL R-12
 CQ W0BL EM96
 NR0Q N4JRS -22
 W4VP KM4RNO RR73

Legend

QSO	QSL
QSX	CQ
QRZ	QTH
	WSPR
	CQDX

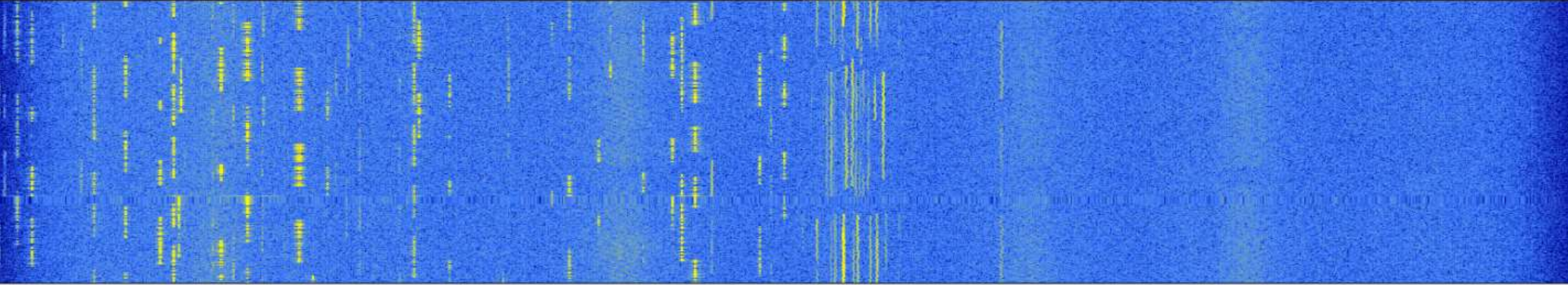
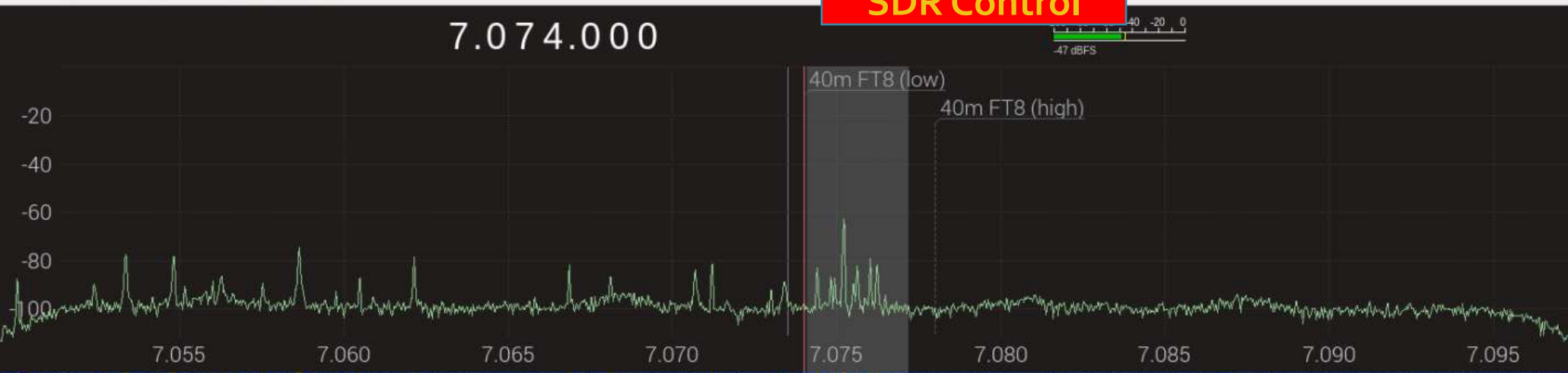
Gqrx 2.11.5 - airspyhf=0

Gqrx SDR Control

File Tools View Help



7.074.000



FFT Settings

- FFT size: 4096
- RBW: 11.7 Hz
- Rate: 10 fps
- Overlap: 0%
- Time span: Auto
- Res: - s
- Window: Blackman-Harris
- Averaging: [Slider]
- Pandapter: [Slider] Waterf
- Peak: Detect Hold
- Pand. dB: [Slider] Lock
- Wf. dB: [Slider]
- Freq zoom: [Slider] 1x
- Buttons: Reset, Center, Demod
- Color: Green Fill

Input con... Receiver Op... FFT Set...

Bookmarks

	Frequency	Name	Modulation	Bandwidth	Tag
8	7074000	40m FT8 (low)	USB	2700	FT-8
9	7078000	40m FT8 (high)	USB	2700	FT-8
10	101360...	30m FT8	USB	2700	FT-8
11	140740...	20m FT8 (low)	USB	2700	FT-8

- AM Broadcast
- FM Broadcast
- FT-8
- Untagged
- WX

Audio

Gain: [Slider] -0.2 dB

Buttons: UDP, Rec, Play, ...

DSP

fldigi ver4.1.08 / IC-7300 - N8VMX

File Op Mode Configure View Logbook Help

7015.000 Freq 7015.000 [Redacted] Notes

CW-R 800 Call [Redacted] Qth [Redacted]

T D I IM N PA E KE TU NK8Q E EE E DM3 DM3PKK N PA L NR? EU NK8Q ? * T EZMA T E * K *PA M ER? NR? I IIEA Z O T T? E E *N E IRR
TU TU NK8Q CQ TEST NK8Q FQ TEST NK8Q CQ TEST NK8Q E CQ TEST NK8Q E CQ TEST NK8Q E M CQ TEST NK8Q T TEST NK8Q *
EN *8Q CQ TEST NK8Q N T WJQ AJQ M I T O T E Q T E A

CQ 3.0 [Clear]

RsiD CQ ANS OSO KN SK Me/Qth Brag T/R Tx Rx TX 1

500 1000 1500 2000 2500 3000 3500 4000 4500

WF 0 60 x1 NORM 904 QSY Store Lk T/R

CW Rx 18 17 AFC SQL

FLDigi

flrig IC-7300

File Config Memory Help

7015.000 7070.000

53 56 59 +20 +40 +60 vfoA vfoB A<->B Split

1 800 CW-R

FL Rig – used to control IC7300

Lock 11
ClrPBT 11
Nch 0
Mic 0
Pwr 75

ATT Amp 1 NB AN Tune PTT

JS8Call

21:31:51
2020 Feb 16

7.078 000

1168 Hz

RX

TX

NORMAL+MULTI

SPOT

LOG

TUNE

Offset	Age	SNR	Message(s)	INCOMING AND OUTGOING MESSAGES WILL APPEAR HERE.	Callsigns (5)	Age	SNR	Offset	✓	Name	Comment
1362 Hz	now	-08 dB	WE4SEL: K4FMM ACK +08 ◊		@ALLCALL						
1503 Hz	now	-12 dB	KV4ATV: K4FMM ACK -11 ◊		KD4E	now	-11 dB	1647 Hz			
1647 Hz	now	-11 dB	KD4E: K4FMM ACK -13 ◊		KD6GNF	2m	+02 dB	1247 Hz			
					KE4BML	2m	-09 dB	1204 Hz			
					KV4ATV	now	-12 dB	1503 Hz			
					WE4SEL	now	-08 dB	1362 Hz			

TYPE YOUR OUTGOING MESSAGES HERE.

CQ
REPLY
SNR
INFO
Saved
Directed
Deselect
Send
Halt

CAT

800 1000 1200 1400 1600 1800 2000 2200

21:31:30 40m

21:31:15 40m

21:31:00 40m

21:30:45 40m

21:30:30 40m

Receiving
IC-7300
JS8

6/15

flrig IC-7300

7078.000

7070.000

53 56 59 +20 +40 +60

vfoA vfoB A<->B Split

1 800 CW-R

FL Rig – used to control IC7300

Lock 11

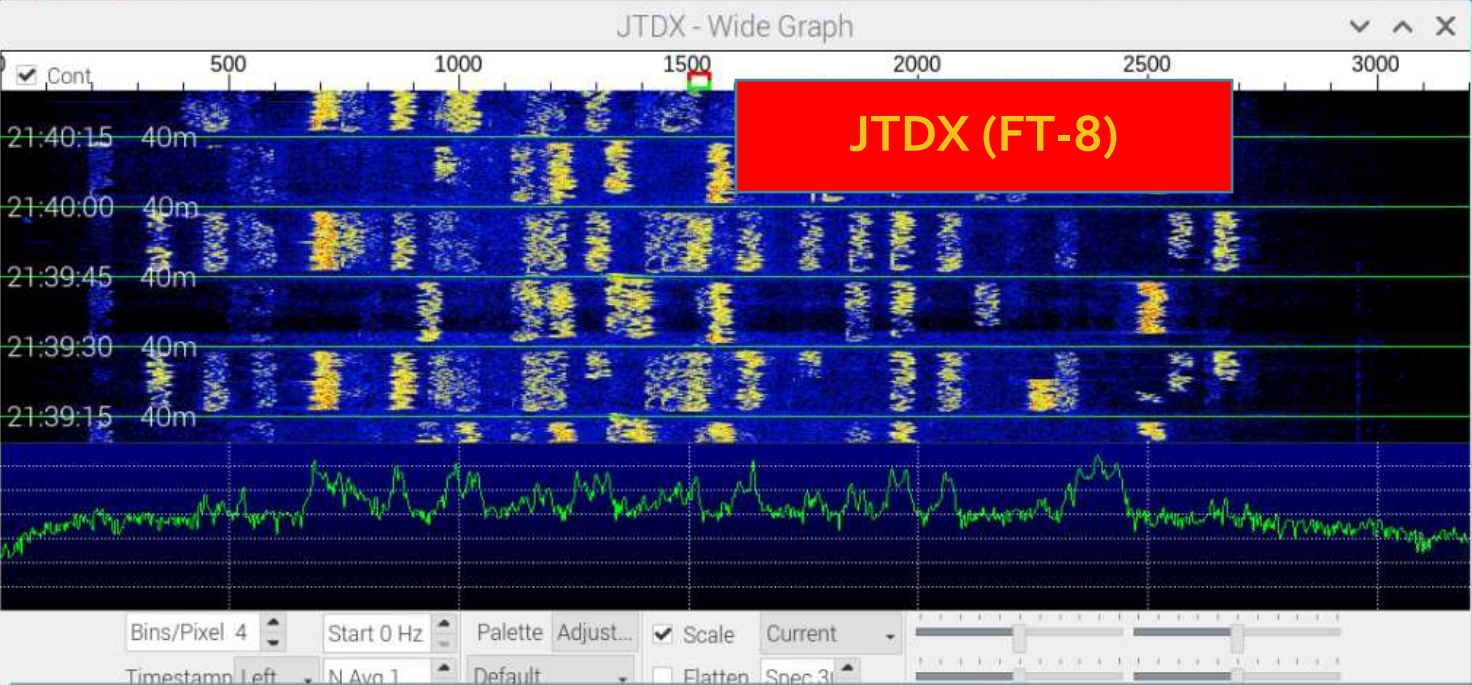
ClrPBT 11

Nch 0

Mic 0

Pwr 75

ATT Amp 1 NB AN Tune PTT



JTDX (FT-8)



JTDX by HF community v2.1.0-rc140, derivative work based on WSJT-X by K1JT

File View Mode Decode Save AutoSeq DXpedition Misc Help

UTC	dB	DT	Freq	Message	Band Activity
213945	-12	0.1	787	- K9NYO KC3SN FM19	U.S.A.
213945	-12	-0.1	696	- KE8NIM AE4CC -02	U.S.A.
213945	-13	0.2	1548	- NA3P W1ZAD R-07	U.S.A.
213945	2	0.4	2650	- VK7AC VE3PS FN05	Canada
213945	2	0.1	2550	- K4JEL NY4P EM75	U.S.A.
213945	-15	0.4	2697	- CQ F5MXH JN07	France
214000	1	0.1	1204	- WB2MOH N9SL R-07	U.S.A.
214000	-11	0.1	497	- EG7FIM OK1WCF J080	Czech Rep.
214000	-3	0.2	1944	- CQ DX K9GL EM60	U.S.A.
214000	-9	0.1	549	- <...> KC1LWH FN41	U.S.A.
214000	4	-0.1	1549	- W1ZAD NA3P RR73	U.S.A.
214000	-6	0.2	1117	- N8OYY NS4M EL87	U.S.A.
214000	-8	0.3	1853	- K1RMN KD2RWC FN03	U.S.A.
214000	1	2.0	1326	- CU3ED K2LDK R-24	U.S.A.
214000	-18	0.1	783	- W0AES WA7BGI -21	U.S.A.
214000	-4	0.1	2129	- <...> K3WSP FM29	U.S.A.
214000	-9	0.2	952	- CQ KM4UJI EL88	U.S.A.
214000	1	0.1	1798	- CQ K4JEL FM14	U.S.A.
214000	-7	0.1	2195	- N3PKJ KN4ZXG FM16	U.S.A.
214000	-13	0.1	1603	- CQ W2GLD EN82	U.S.A.
214000	-10	-0.8	1178	- WA3GGM C07YMC FL11	Cuba
214000	-16	0.1	583	- K4SSK KC1BTV -15	U.S.A.
214000	-16	0.1	1854	- N8GMY K4WPC RR73	U.S.A.
214000	-18	0.4	1044	- JH1RFM IW6MSQ -10	Italy
214000	4	0.1	2489	- W1QFB N4JRS -09	U.S.A.
214000	-3	0.6	2627	- <...> WA8AHZ FM18	U.S.A.
214000	-16	0.2	2628	- VK8KMD DL5XU J050	Germany

7.074 000 21:40:25 TX 00/30 Pwr 0 W

40m Spt Menu Tx FT8 ~ Report -15 -133 dBm

DX Call DX Grid Tx 1500 Hz Tx=Rx Hound

Rx 1500 Hz Rx=Tx AutoTX

Lookup Add Wanted Tx/Rx Split AutoSeq0

UTC	dB	DT	Freq	Message	Rx Frequency
213915	-4	0.1	1501	- KE0QLX W9HJ FM19	U.S.A.
213945	-5	0.1	1502	- KE0QLX W9HJ FM19	U.S.A.

Enable Tx Halt Tx GenMsgs CQ RRR SkipTx1

Log QSO Erase Tx 1 Tx 2 Tx 3 Tx 4 Tx 5 Tx 6

Hint SWL mode

AGCc Filter

Decode Clear DX CQ N8VMX EM79

Receiving FT8 WD 6m 10/15 Logd 16 Feb 2020 FT8 0

flrig IC-7300

Config Memory Help

7074.000 7070.000

S3 S6 S9 +20 +40 +60 vfoA vfoB A<->B Split

1 3000 USB-D

Monitor Bypass 1 QSO

73dB

lock 0 BT 0 ch 0 Mic 0 wr 75

ATT Amp 1 NB AN Tune PTT

FL Rig – used to control IC7300



**Cgps
ublox GPS output**

```

hittra@Pi-4: ~
File Edit Tabs Help

Time:      2020-02-16T21:49:40.000Z
Latitude:  39.65146166 N
Longitude:  84.09827066 W
Altitude:  941.601 ft
Speed:     0.15 mph
Heading:   0.0 deg (true)
Climb:     0.00 ft/min
Status:    3D DIFF FIX (87 secs)
Longitude Err: +/- 11 ft
Latitude Err: +/- 10 ft
Altitude Err: +/- 30 ft
Course Err: n/a
Speed Err:  n/a
Time offset: 0.049
Grid Square: EM79wp

PRN:  Elev:  Azim:  SNR:  Used:
 7    82    298    29    Y
 8    57    050    36    Y
 9    22    203    19    Y
11    55    122    33    Y
27    23    045    15    Y
28    24    276    19    Y
30    47    310    30    Y
133   25    238    31    Y

:52, "az":80, "ss":0, "used":false}, {"PRN":81, "el":3, "az":24, "ss":0, "used":false}, {"
"PRN":82, "el":47, "az":45, "ss":0, "used":false}, {"PRN":83, "el":62, "az":143, "ss":0,
"used":false}, {"PRN":84, "el":12, "az":188, "ss":0, "used":false}}]
{"class": "TPV", "device": "/dev/ttyACM0", "status": 2, "mode": 3, "time": "2020-02-16T21
:49:40.000Z", "ept": 0.005, "lat": 39.651461667, "lon": -84.098270667, "alt": 287.000, "e
548, "epy": 3.273, "epv": 9.372, "track": 0.0000, "speed": 0.065, "climb": 0.000}
    
```

**Ntp (Network Timing Protocol)
Time sync software**

```

hittra@Pi-4: ~
File Edit Tabs Help
Every 8.0s: ntpq -pn
Pi-4: Sun Feb 16 16:49:37 2020

  remote           refid      st t when poll reach  delay  offset  jitter
-----
x127.127.28.0      .GNSS.    3 l   8   8  377   0.000  -42.574  1.021
*192.168.1.41      .PPS.     1 u  14  16  377   1.542   -0.034  0.504
+192.168.1.42      .PPS.     1 u   3  16  357   1.379   -0.032 10.583
 192.168.1.101     .INIT.    16 u   -  16   0   0.000   0.000  0.000
 192.168.1.102     .INIT.    16 u   -  16   0   0.000   0.000  0.000
+192.168.1.25     192.168.1.42  2 s   9  16  377   1.059   0.523  0.701
 192.168.1.43     .INIT.    16 s   -  64   0   0.000   0.000  0.000
-192.168.1.150    192.168.1.42  2 s  41  16  210   1.391   -0.065 16.989
 192.168.1.103     .INIT.    16 s   -  64   0   0.000   0.000  0.000
 3.us.pool.ntp.o .POOL.    16 p   -  64   0   0.000   0.000  0.001
    
```



Web References

Setup Raspberry Pi for Ham-Radio

<https://dl1gkk.com/setup-raspberry-pi-for-ham-radio/>

My portable ham radio setup V2 for the Raspberry Pi4

<https://dl1gkk.com/small-portable-digital-amateur-radio-station-v2/>

Thinlerrain 11.6 inch HDMI VGA Portable Monitor

https://smile.amazon.com/gp/product/B07Q271XF4/ref=ppx_yo_dt_b_asin_title_ooo_soo?ie=UTF8&th=1

Pastall Raspberry Pi 4 Armor Case

https://smile.amazon.com/gp/product/B07X59H4RR/ref=ppx_yo_dt_b_asin_title_ooo_so1?ie=UTF8&psc=1

Building and Running WSJT-X on Raspberry Pi

<http://www.kk5jy.net/wsjt-x-build/>

FL-Digi and FL-Rig

<http://www.w1hkj.com/>

Ham Clock Raspberry Pi

<https://dl1gkk.com/ham-clock-raspberry-pi/>



Web References

Icom 7300 Easy Transmitter Settings For Digital Operation

<https://www.kopir.us/transmitter-settings-digital-operation/>

Icom 7300 Receiver Settings For Digital Operation

<https://www.kopir.us/icom-7300-receiver-settings/>

WSJT-X FT8 and the Icom 7300 the Easy Way!

<https://www.kopir.us/icom-7300-wsjt-x-ft8-easy-way/>

IC-7300 and Fldigi

<http://klsin.bpmsg.com/ic-7300-and-fldigi/>