



Technical Details and Schematic: [Mini-TNC](#) - A 1200-Baud Packet TNC

Rev. 0711

Completed Mini-TNC:



Mini-TNC Rev 0711 is designed exclusively to work as an APRS TNC.

This version of Mini TNC has following interesting features:

- 1. Compact, Low power Modemless TNC**
- 2. May be powered from Radio (8 to 12VDC) or PC's USB port (+5V).**
- 3. Audio Input may be fed direct to PIC or thru MCP6023 Active filter.**
- 4. Firmware updated by Dennis/N5VRG V1.09**
- 5. Has GPS activation header for test**
- 6. Metal Case included with Kits**

Schematic Details:

Mini-TNC input design uses a [Microchip MCP6023](#) as an input filter/amp to improve noise level & performance. You may change settings of this stage by changing values of fix resistors used. The Op. Amp Designing software is provided on [Foxdigi](#) Webpage for download. (if you like to experiment with bandwidth & other characteristic of the input stage) However, Mini-TNC will work well without this chip installed.

MCP6023 active filter input stage may be omitted and audio may be fed directly to PIC16F88's PIN17.

A MX232 is used to get true RS232 levels.

Front panel LEDs for “RX”, “TX” and “Power”.

Mini-TNC takes very low current and is ideal for portable use. In this case, it may be powered from your Radio (connected to J1 Pin7), as standard “Tracker Type” Pin outs for D9F connector.

Back of the TNC has two D9 Connectors:

1. **J1:** D9-Female for Radio Connection and
2. **J2:** D9-Femlae for PC Connection. No null modem is required.

There is a header “GPS EN” which is provided for test purpose.

A 2pin header H2 is provided for portable radios to activate PTT thru MIC.

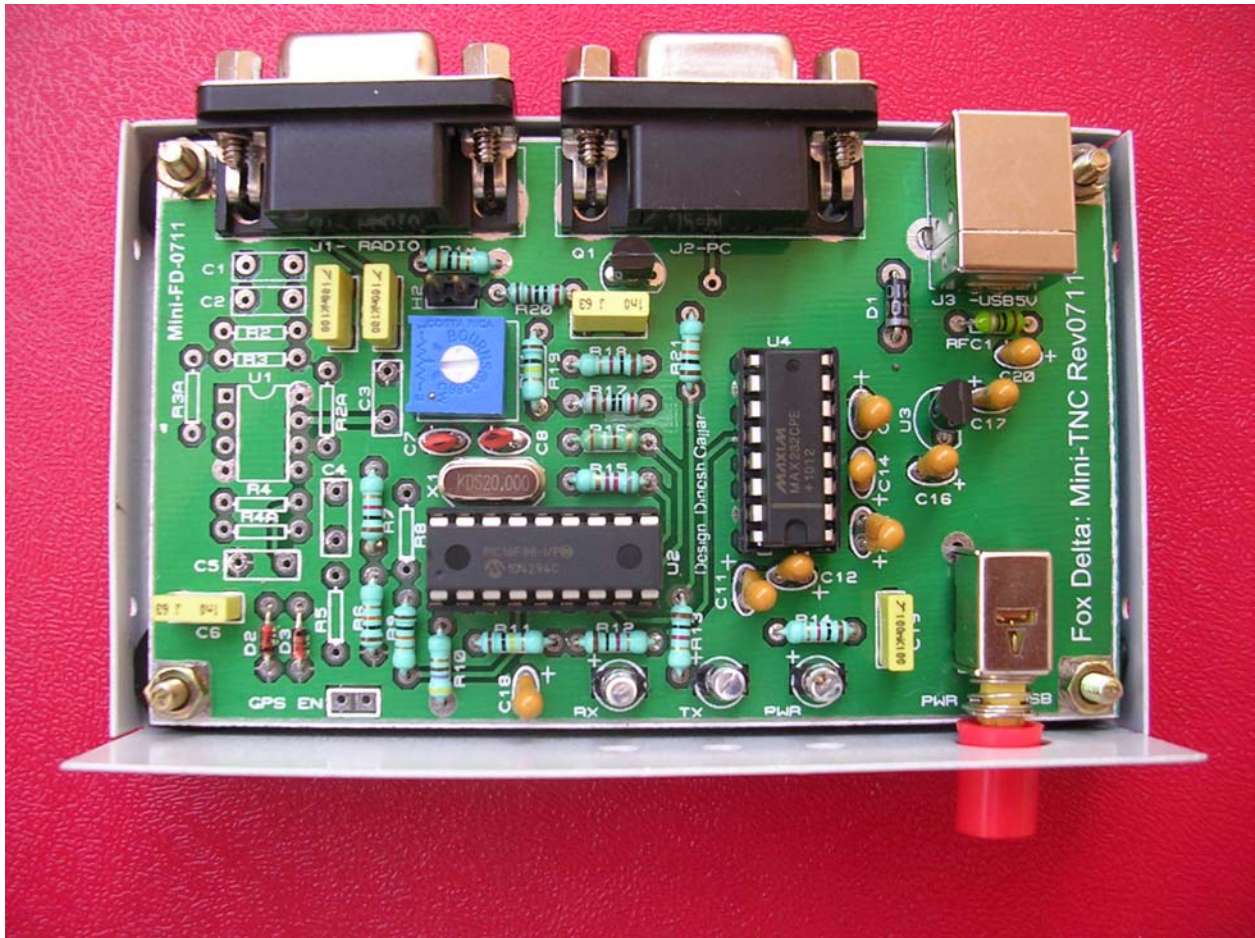
Project is designed on a Double Sided PTH board measuring 10X6cm. With this modem, you may stop worrying about hard to find, [MX614s](#)!!

J3, an USB connector is provided for powering this TNC from a PC USB port (+5V).

Note:

Please refer to parts list where * components are listed for MCP6023 active filter type input . If you want minimum components and wish to feed Radio audio to TNC, you may omit MCP6023 and associated components and install C21.

Completed Mini-TNC: (Without MCP6023 active filter)



Mini-TNC kits are supplied with all the components required: Including MCP6023 active filter.

However, you may Omit MCP6023 and associated parts and feed radio audio direct to PIC16F88 if it suits your requirements.

If MCP active filter is not used, install C21. Do not install C21 if MCP6023 is used. Remaining circuit remains the same for both options.

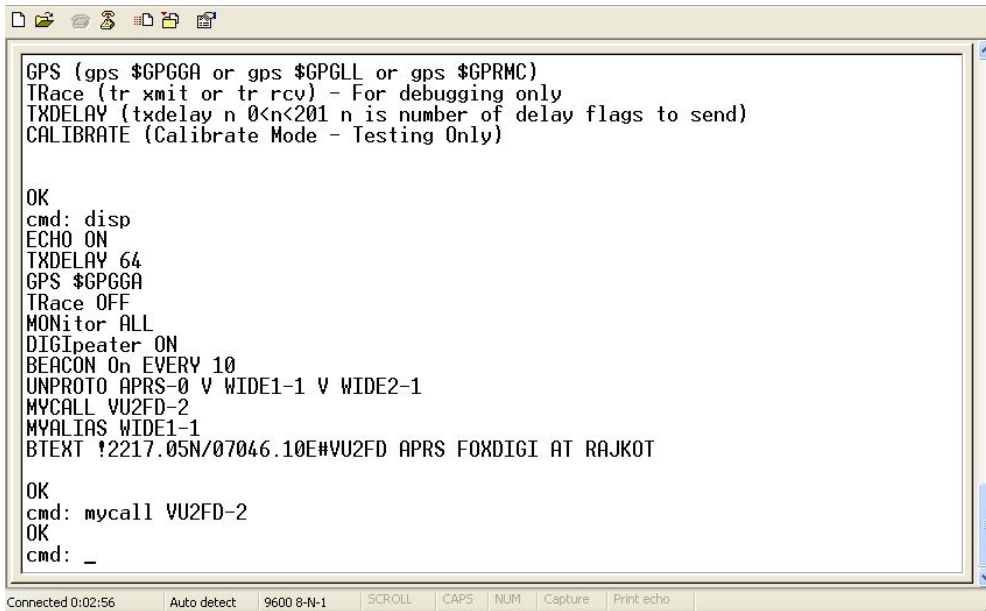
Front Panel push switch is provided to select source of power: USB +5V or 8-12VDC from Radio.

Modem Configuration:

User data in Modem (PIC88) chip is stored by using a simple “HyperTerminal” of the windows. To enter config. Mode:

1. Connect a serial cable to J2.
2. Open HyperTerminal and set it up for 4800 baud.
3. Apply power to Mini-TNC & a welcome message will appear.
4. Type “help” to get list of commands.

Configuration Screen:



```
GPS (gps $GPGGA or gps $GPGLL or gps $GPRMC)
TRace (tr xmit or tr rcv) - For debugging only
TXDELAY (txdelay n 0<n<201 n is number of delay flags to send)
CALIBRATE (Calibrate Mode - Testing Only)

OK
cmd: disp
ECHO ON
TXDELAY 64
GPS $GPGGA
TRace OFF
MONitor ALL
DIGIpeater ON
BEACON On EVERY 10
UNPROTO APRS-0 V WIDE1-1 V WIDE2-1
MYCALL VU2FD-2
MYALIAS WIDE1-1
BTEXT !2217.05N/07046.10E#VU2FD APRS FOXDIGI AT RAJKOT

OK
cmd: mycall VU2FD-2
OK
cmd: _
```

Do not forget to save your settings by entering **“PERM”**.

External Connections:

Connector side view:



USB Power

TO PC

TO RADIO/12V DC

User is required to prepare a cable for Radio Connection.

J1 is a Female D9 connector to connect your radio audio IN and OUT + PTT.(And +12V if you like)

You will require a D9 Male connector (usually Supplied with this kit), a shielded 4-core cable and a suitable connector for your transceiver.

J1 Pin Connections: (Female D9 PCB Connector)

1. Mic Audio to Transceiver
2. NC
3. PTT to Transceiver
4. NC
5. Transceiver receiver audio to Mini-TNC
6. Power & Signal Ground
7. +12V for Mini-TNC.
8. NC
9. NC

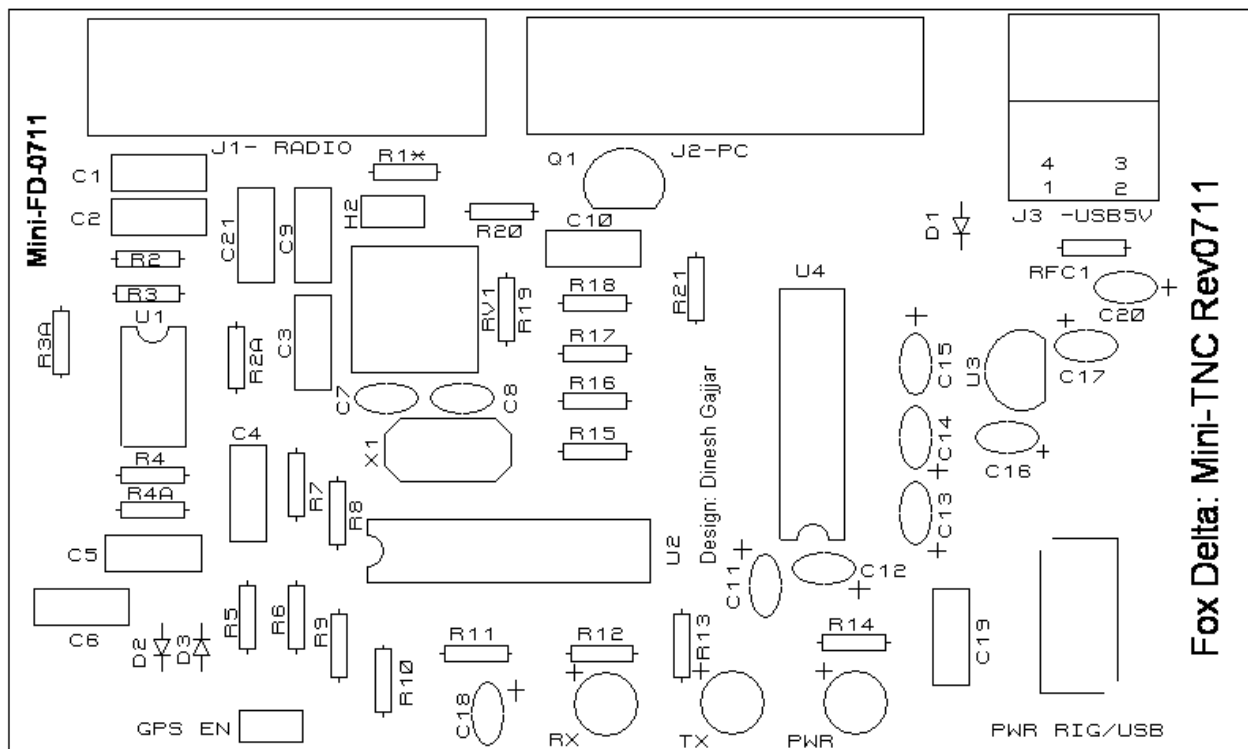
J2 is a D9 Female connector. Connect it to your PC's COM port, using a standard serial cable.

J2 Pin Connections are:

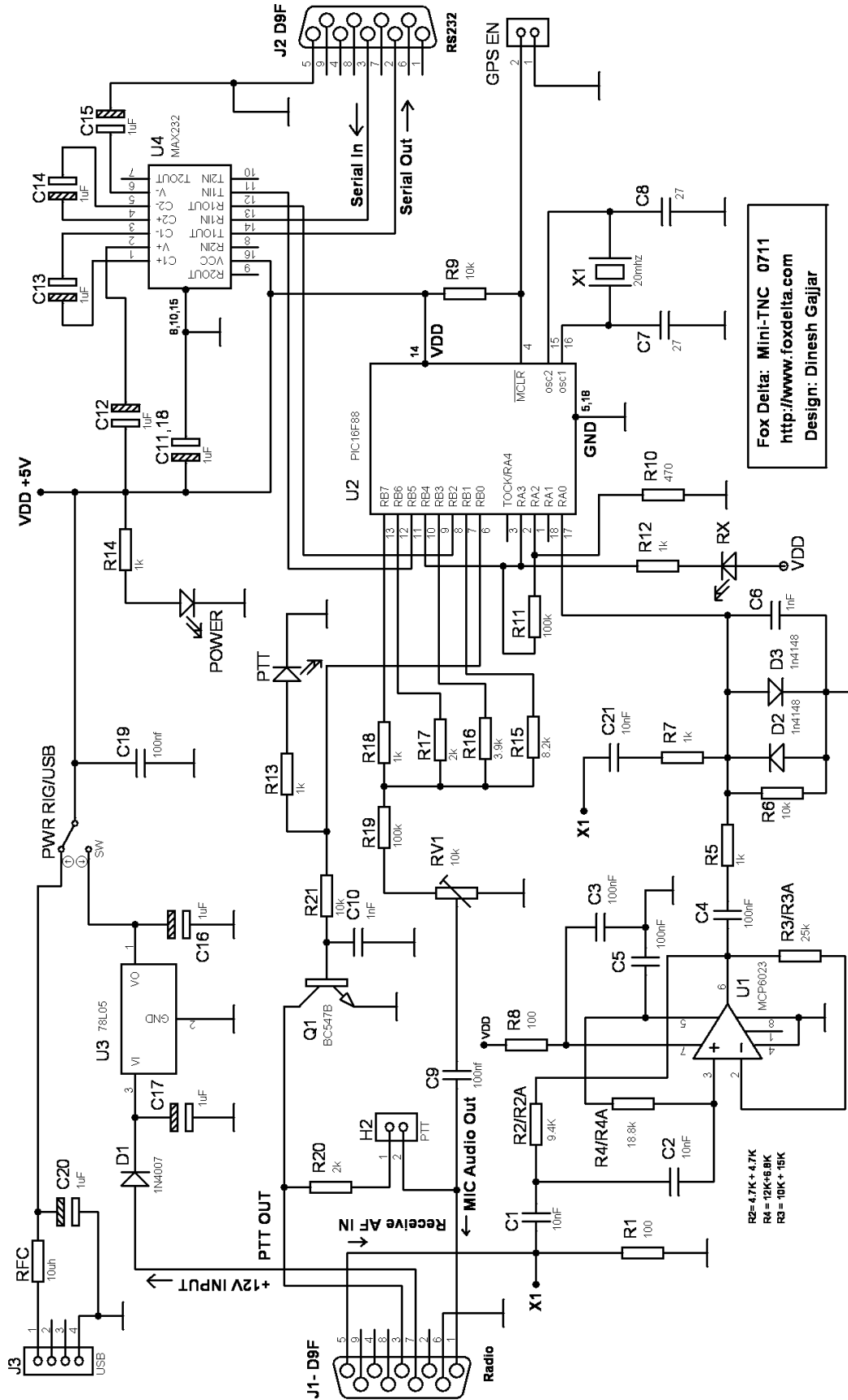
1. NC
2. Serial Out
3. Serial In
4. NC
5. Ground
6. NC
7. NC
8. NC
9. NC

J3: USB +5V to Power Mini-TNC

Silk Snap of the FoxDigi Board: Rev0711



Schematic Mini-TNC Rev0711:



Mini TNC REV 0711 Parts List:

Qty	ID	Details
1	U2	PIC16F88, Pre-Programmed With Firmware V1.09
1	U4	MAX232 or Equiv. RS232 Driver
1	PCB	Mini-TNC Double Sided PTH Board Rev0711
1	U3	78L05
1	U1*	MCP6023, Audio Filter/Amplifier
1	Q1	BC547B, PTT Switch
2	J1, 2	D9 Female Right Angle Connector PCB
1	SW1	Push Switch "USB 5V OR 12V From J2 PIN 7"
3	LED	3mm: RX, TX & Power
1	X1	Crystal 20MHZ HC49US
1	RV1	Preset Bourns 10K
1	D1	1N4007
2	D2, 3	1N4148
1	DIP8*	IC Socket for U1
1	DIP18	IC Socket for U2
1	DIP16	IC Socket for U4
1	D9M	D9 Male Connector for Transceiver Connection
1	Case	Powder Coated Metal Case
Qty	ID	Details
9	C11, 12, 13, 14, 15, 18, 16, 17, 20	1uf 35V Tantalum
5	C3, 4, 5, 9, 19,	100nf Poly
3	C1*, 2*, 21**	10nf Poly
2	C10, 6	1nf Poly
2	C7, 8	22 or 27pf Ceramic
2	R1, 8*,	100 ohms 1/4W
1e	R2/R2A*	2 X 4.7K = 9.4k
1e	R3/R3A*	10K + 15K = 25k
1e	R4/R4A*	12K + 6.8K = 18.8k
1	R10	470
3	R6, 9, 21	10K
2	R11, 19	100k
6	R5*, 7**, 12, 13, 14, 18,	1K
1	R15	8.2k
1	R16	3.9K
2	R17, 20	2K

- *= Parts used if MCP6023 is installed. (Do not install C21 in this case).
- ** = Parts required if direct audio input to PIC16F88's PIN 17 is opted. (Omit all * Parts)

Dinesh Gajjar / 23rd August 2011

Please visit <http://www.foxdelta.com> for more information on this project.