Fox Delta

Amateur Radio Projects & Kits

FoxDigi

Technical Details and Schematic: FoxDigi - A 1200-Baud Packet Digipeater/TNC

Project Introduction:

Although Sound Card Interfaces are already there with good amount of free Sound Card software, there is a great interest in radio modems too.

FoxDigi is a PIC16F88 based 1200-Baud Mini-TNC, replacing traditional expensive chip MX614 from Maxcom, making it ideal modem for VHF & Satellite digital work.

This project is based on articles written by many radio amateurs using this particular IC, Firmware and associated application notes of the chip manufacturer.

A FoxDigi Demo at Japan Ham Fair Aug 2008:

FoxDigi is expected to achieve some of the following:

1. A 1200 baud packet modem/tnc
2. **Stand-Alone Simple Digipeater**.
3. Easy Interfaces to UI-View APRS Software
4. A Tracker with GPS

However, this particular project is targeted to make a simple, low power, stand-alone Digipeater. Other function, Tracker with GPS, is readily available. Some of the oher options may need firmware update. I have avoided a boot loader concept and a TNC/DIGI firmware is supplied with this kits. If you wish to experiment with this modem/TNC, you may do so by simply reprogramming the PIC.

Modem 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, FoxDigi will work well without this chip installed. (Rest of the installed resistors act as a passive filter components)

A MX232 (or equivalent) is used to get true RS232 levels.

Modem has front panel LEDs for "RX", "TX" and "Power".

FoxDigi takes very low current and its ideal for mountain top HT+FoxDigi+Solar Panel setup, to get aprs data digipeated.

Back of the board has two D9 Connectors for following:

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

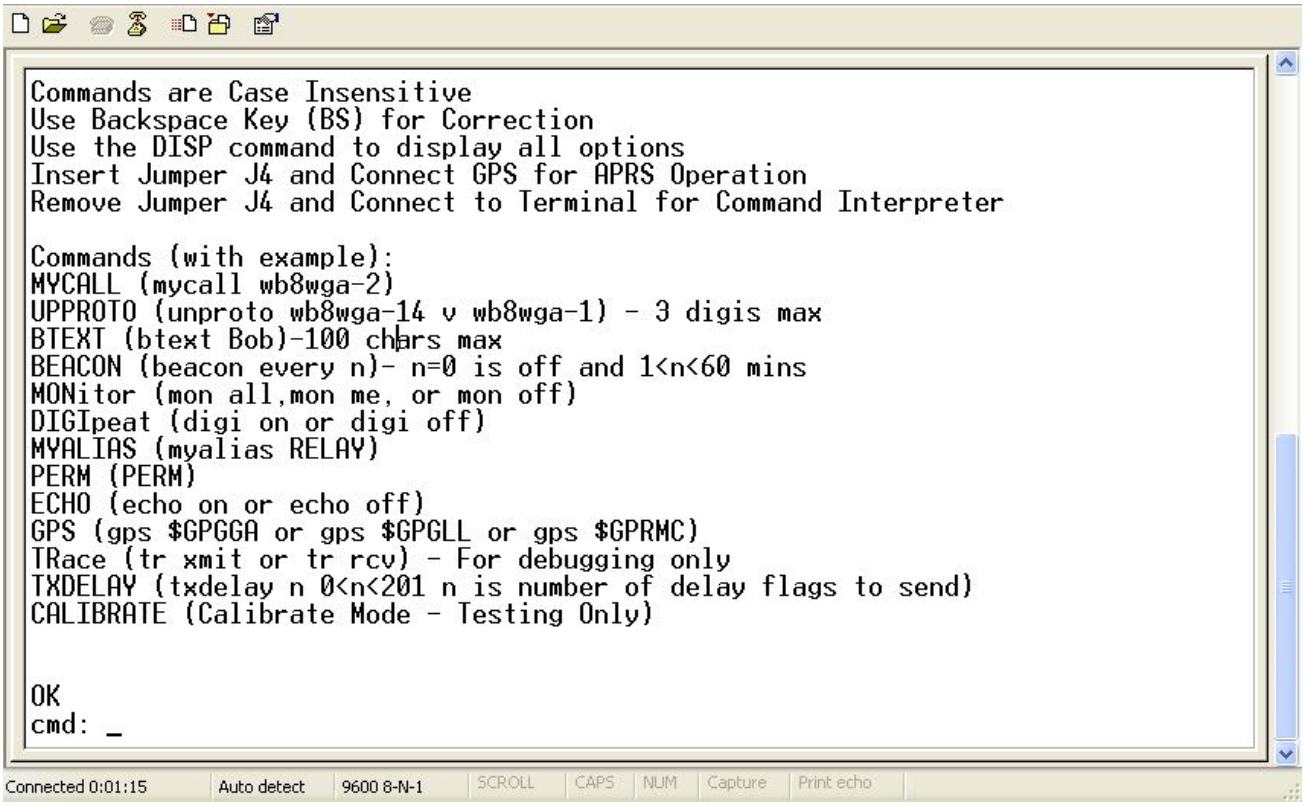
There is a header "GPS EN" which is provided for those looking for "Tracker" functionality from this TNC!!

Project is designed on a Double Sided PTH board measuring 8X6cm. With this modem, you may stop worrying about those hard to find, MX614s!!

Modem Configuration:

User data in Modem (PIC88) chip is stored by using a simple "HyperTerminal" of the windows. To enter config. mode, connect a serial cable to J2. Open HyperTerminal and set it up for 9600N1 or 4800N1. Apply power to Foxdigi & a message will appear. Type "help" to get list of commands.

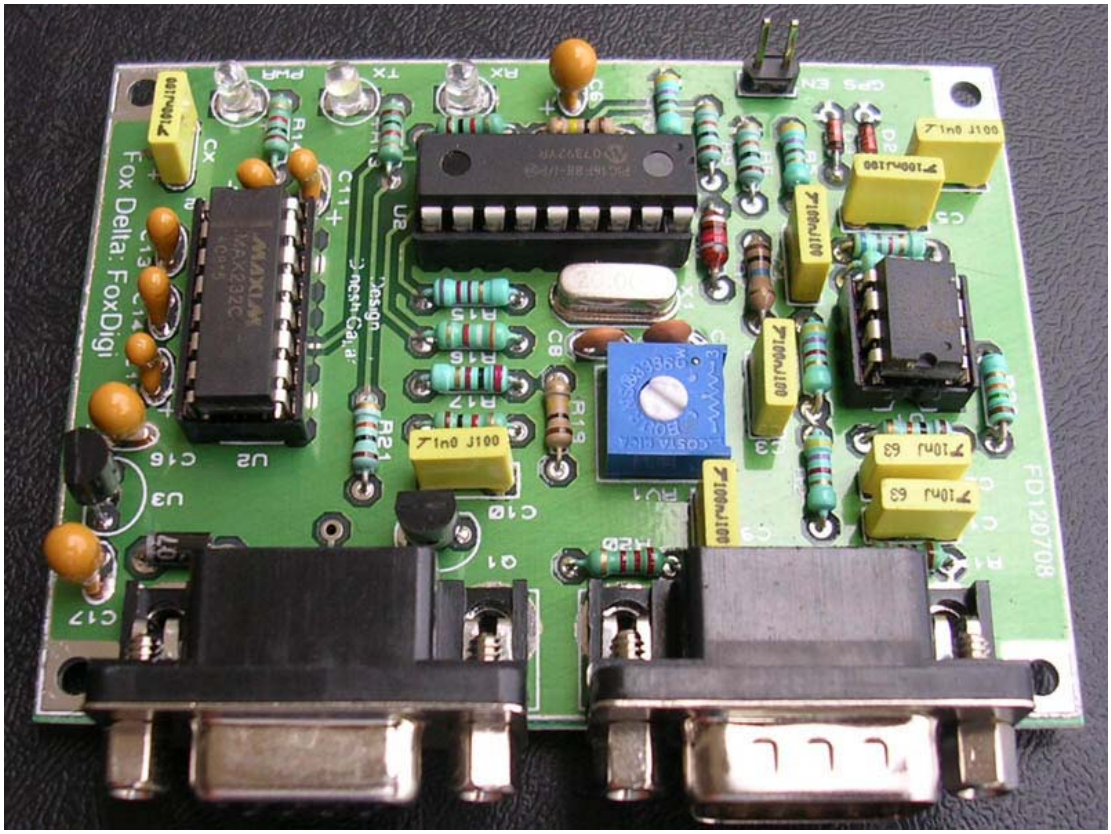
Config screen looks something like this:



Do not forget to save your settings by entering "PERM".

I will make a separate document with screen shots of config process.

Picture of the completed FoxDigi:



External Connections:

User will be required to prepare a cable for Radio Connection.

J1 is a Male D9 connector. You will require a D9 Female connector, a shielded 4-core cable and connector for your transceiver.

J1 Pin Connections: (Male D9 PCB Connector)

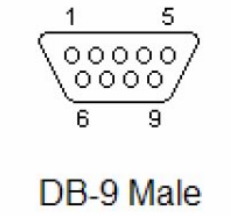
1. **Mic Audio to Transceiver**
2. **NC**
3. **PTT to Transceiver**
4. **NC**
5. **Transceiver receiver audio to foxdigi**
6. **Power & Signal Ground**
7. **+12V for Foxdigi.**
8. **NC**
9. **NC**

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

J2 Pin Connections are:

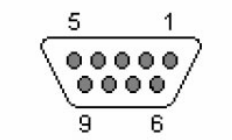
1. **NC**
2. **Serial Out**
3. **Serial In**
4. **NC**
5. **Ground**
6. **NC**
7. **NC**
8. **NC**
9. **NC**

When you look from the connector side of FoxDigi, pin connections are like this:



DB-9 Male

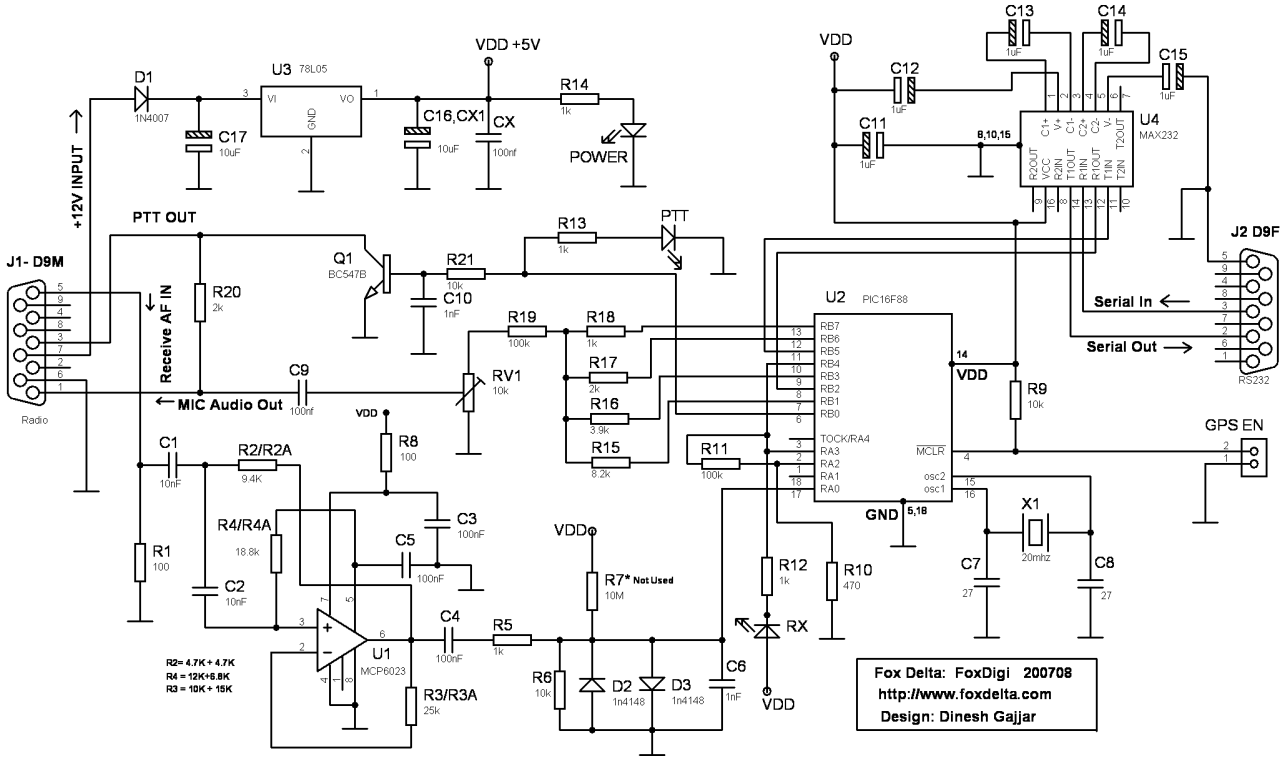
J1 is a Male D9 Connector
Connect this to your transceiver



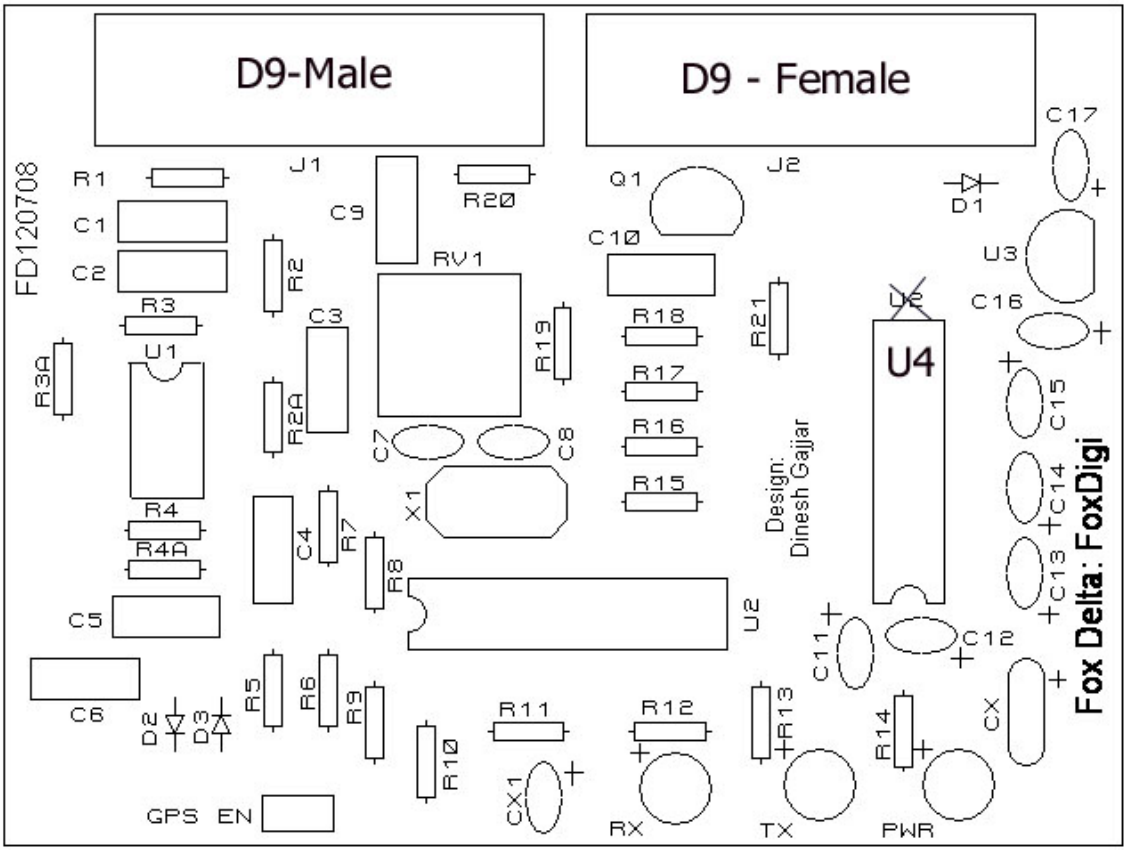
DB-9 Female

J2 is a Female D9 Connector
Connect this to your PC's COM Port using a simple Serial Cable. (Not a NULL Cable)

Schematic of the FoxDigi:



Silk Snap of the FoxDigi Board:



FoxDigi Parts List:

Qty	ID	Details
1	U2	PIC16F88, Pre-Programmed With suitable Firmware
1	U4	MAX232 or Equiv. RS232 Driver
1	U3	78L05
1	U1	MCP6023, Audio Filter/Amplifier
1	Q1	BC547B, PTT Switch
1	GPS-En	2pin Header with Shorting pin
1	J1	D9 Male Right Angle Connector
1	J2	D9 Female Right Angle Connector
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

Qty	ID	Details
6	C11, 12, 13, 14, 15, CX1	1uf 35V Tantalum
2	C16, 17	10uf 35V Tantalum
5	C3, 4, 5, 9, CX	100nf Poly
2	C1, 2	10nf Poly
2	C10, 6	1nf Poly
2	C7, 8	27pf Ceramic
19		
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
2	R10,	470
3	R6, 9, 21	10K
0	R7*	10M (Not used & not part of this kit)
2	R11, 19	100k
5	R12, 13, 14, 18, 5	1K
1	R15	8.2k
1	R16	3.9K
2	R17, 20	2K
24		

Dinesh Gajjar / 16th September 2008

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