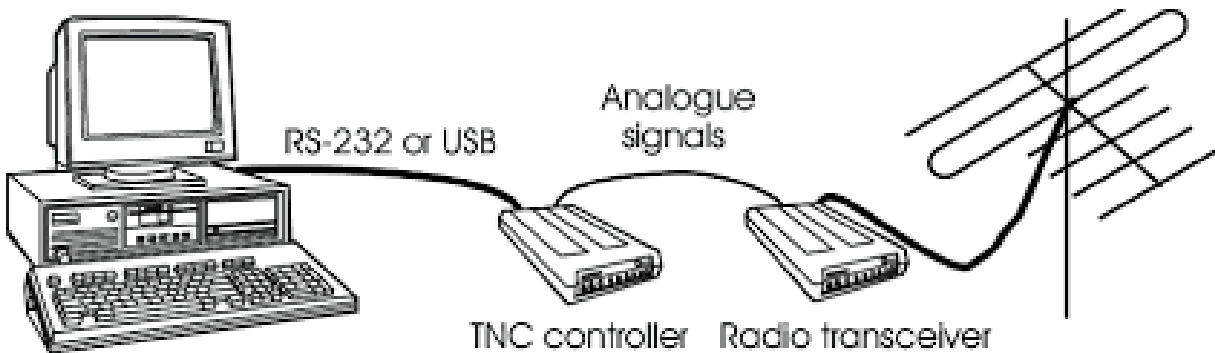


10 Meter Packet Radio on the cheap



© Mark Phillips, N12O 10/2024 All Rights Reserved

Mark Phillips	Initial Release	V1.0a 10/2024

Table of Contents

1.0 Abstract	2
2.0 Assumptions	2
3.0 Assemble the required equipment	3
3.1 Buy/build a modem	3
3.2 Buy 10M radio	3
3.3 Buy/build interconnecting cables	3
3.4 Buy/build a 10M antenna	4
3.5 Buy coax cable	4
3.6 Buy a 10A power supply	4
3.7 Get a computer	4
3.8 Get software	4
4.0 Get on the air	5

1.0 Abstract

The purpose of this document is to help the reader assemble the necessary components and then build a functioning Packet Radio node. While this document speaks to a 10 Meter node, the frequency the node operates on is largely irrelevant. The steps and components are mostly the same for 70 Centimeters as they are for 10 Meters.

This document does not aim to teach the reader how to “do Packet” but rather outline the hardware requirements of a Packet Radio system.

2.0 Assumptions

For this document we will assume that the reader has the appropriate license to operate in the band they are building for. 10 Meters presents a particular challenge for US based Technician Class operators as the definition of their privileges as outlined in the FCC’s Part 97 rules are vague at best. At time of writing the rules allow for CW, RTTY and Data from 28.0-28.3MHz only. It does not specify what type of emission is permissible (FM/SSB/TDMA/etc).

It is further assumed that the user will be building an FM based Packet Radio node. The FM mode presents the best platform for a successful experience. We’ll be using an FM radio carrier to transfer our modem tones which technically makes our emission designator F3E. However, we’ll be classifying it as F2D as there is no human voice component. Other emission types are also possible such as J3E. Indeed anything that can transmit analog voice can be used to greater or lesser extents.

Symbol rates over the radio will not exceed 1200bd or a data throughput of 768bps.

3.0 Assemble the required equipment

Lets break this down into steps;

- 1) Buy/build modem
- 2) Buy 10M radio
- 3) Buy/build interconnecting cables
- 4) Buy/build 10M antenna
- 5) Buy coax cable
- 6) Buy/build 10A 12v PSU
- 7) Get a computer
- 8) Get software

3.1 Buy/build a modem

A modem is the device that takes data from your computer and turns it into sound that you send out over the radio. This is often erroneously called a TNC or Terminal Node Controller. A TNC contains a modem as well as some computer power to provide a stand alone data node with no computer requirement. They have a micro controller inside them that provides the compute power necessary to operate the node without the aid of an attached computer. While there are quite a number of true TNC's available on the used market (often at hamfests for less than \$10) the trend today is to use a simple modem that converts pre-made (by the attached computer) data frames into audio for onward transmission. See appendix A for some modem suppliers.

3.2 Buy 10M radio

There are any number of 10M transceivers on the market ranging from well known brands such as Alinco/Standard/Icom/etc to the cheap ones you can get from China or via a website named after a South American jungle. As long as it has a microphone input and is an FM radio it'll work for our needs.

You could also use an multiband HF transceiver as long as it too supports the FM mode. Connectors for data are often found on the back of such radio's making modem connection simple.

3.3 Buy/build interconnecting cables

You will need to plug everything into everything else. If you have a modern modem you might simply need a USB cable to connect it to your computer. However, it is likely that you will have to build a cable from your modem to your radio. This cable needs to carry TX/RX audio, PTT and ground signals. If you bought a brand name radio then likely you will be able to find the pinout diagrams for its connectors. Not so much if you bought a no-name brand. Unfortunately

you are on your own here. If you are having difficulty sourcing information or constructing a cable ask your local Elmer for help.

3.4 Buy/build a 10M antenna

It's almost obvious that you'll need an antenna for your radio. But the type you'll need will vary upon how your local Packet Radio network is built. Some for example use horizontal polarization and so a vertical antenna would not work so well. Again, ask your local Elmer for help in establishing the best type of antenna for your local needs. Note the use of the word "local". Even though we are using 10 Meters we are not trying to break any DX records here or earn DXCC via Packet Radio. Local is of course relative. You might get 50 miles from your setup?

3.5 Buy coax cable

Well, DUH!! How are we going to connect our antenna to our radio? At 10M/28MHz we start to see cable loss in coax. It was always there but at lower frequencies the losses are negligible for our needs.

When installing your antenna try to get the SWR match as low as possible. In this way we can remove components such as antenna tuners which sap power from our outgoing signal. All the usual antenna installation rules should apply here (NEC [800.xx](#) applies too!).

3.6 Buy a 10A power supply

Again, sounds obvious but our goal here is to create a stand-alone Packet Radio system. Sharing your power supply with other devices could mean a shortage of available current to operate it all concurrently.

3.7 Get a computer

Give a little thought to this. Sure you could use your behemoth gaming rig. You could also use a single board computer. I've even seen this done using a Docker container on a home-lab server. How you want to "do Packet" will dictate the type of computer you need.

If you simply want to dip in every now and then your normal desktop/laptop machine is perfectly adequate. If you want to leave your Packet system on 24/7 then it will need its own compute device. There are many devices on the market. The Raspberry Pi3 is a good choice (RPi4++ not necessary) as are the many diskless workstations that can be found on your favourite auction site (often used in AllStarLink systems). Anything that has a low power draw would be ideal. Running the computer headless is also a good choice.

3.8 Get software

This is where things get a little tricky. Which software you use very much depends upon the type of “doing Packet” you want to do. If you simply want to send and receive email and perhaps participate in the chat room then a terminal emulator is all you’ll need. If you want to become an integral part of the network then you’ll need different software. Again, your local Elmer is your friend here. Discuss your needs with them to establish the path you are going to take.

4.0 Get on the air

Congratulations! By this point you should have a functioning Packet Radio system and are ready to make your first connection. As previously stated this document does not presume to teach you how to operate your equipment or software. There are so many combinations of each that it would be impossible. Take instruction from your Elmer.