Introduction

This document contains instructions on installing JNOS Version 1.10I, and getting started with using JNOS on a Windows PC.

This document features two sections. If you wish to evaluate the JNOS software as a bulletin board system (BBS) before buying hardware for an amateur radio station, you may do so as noted below to send and receive emails to yourself on your PC. Once you see how JNOS operates, you may continue to the second section to attach and configure the additional hardware, and use the additional AX.25 and IP features of JNOS.

Note: JNOS was designed to run within MS-DOS on a PC. You can evaluate it within the MS-DOS compatibility box of a Windows PC, but you will be unable to install all of the DOS-level Ethernet drivers.

What is JNOS?

JNOS is a variation of a program originally written by Phil Karn, KA9Q called NOS for Network Operating System. It featured a bulletin board system (BBS), could send and receive "Internet" using Internet Protocol (IP) communications known as Simple Messaging Transport Protocol (SMTP). It does this by simulating and running a Unix-like program on MS-DOS computers. Since a version of MS-DOS is included with Windows, it could also run on Windows PCs.

NOS was subsequently enhanced by Johan Reinalda, WG7J to add more features, and was known as JNOS.

Both NOS and JNOS could send SMTP email over the amateur radio bands using a technique and protocol called IP (Internet Protocol) over AX.25 (Amateur Radio X.25). It used TNCs (Terminal Node Controllers) to send data between PCs using amateur radio transceivers.

Document History

This document was created on June 1, 2008, and most recently updated on June 29, 2008.

Credits

These individuals made JNOS V1.10 possible. This is a partial list, from the references I could determine:

Area of Effort	Name	Callsign	Contribution

Area of Effort	Name	Callsign	Contribution
Software Development	Phil Karn	KA9Q	Original developer of NOS
	Gerard van der Grinten	PA0GRI	Version 911229 of NOS 2.0m
	Johan K. Reinalda	WG7J	Adapted NOS to JNOS
Documentation	Douglas E. Thompson	WG0B	JNOS40 Documentation
	John Ackerman	AG9V	The ADDENDUM file for the 'Intronos' document
Hawaii Deployment Team	Wayne Carvalho	KH6TZ	Provided the original ISP connection and 9600 baud radio backbone
	Antonio Querubin	AH6BW	Deployment and Installation Support
	Derek Young	WH6BH	AMPR.ORG IP Coordinator for Hawaii and the Pacific Islands
	Ron Hashiro	AH6RH	This installation document

Requisites

In addition to the software contained within this ZIP file, you will need:

1. A PC running MS-DOS, Windows 95, 98, ME or OS/2 V2.0 or higher.

   On a Windows computer, JNOS runs in the MS-DOS Compatibility mode, also known as “Command Prompt” in Windows 2000 and XP, however, you will not be able to install an Ethernet packet driver. This version has not yet been tested with Windows Vista.

2. For the evaluation of the BBS software, all you need is the PC and the ZIP file.

3. An ability to UNZIP the ZIP file.

4. Familiarity with NOTEPAD or similar program to edit text files.

5. For implementing JNOS over amateur radio, you need:

   i. A Terminal Node Controller (TNC) Version 2 with support for KISS mode, such as:
      1. Kantronics KPC-3+
      2. Kantronics 9612

3. MFJ-1270C
4. PacComm SPRINT-2

ii. A radio and TNC2-to-radio interface cables capable of supporting the TNC2. There are websites that document the pin-outs from the radio to the TNC2, so that information is not detailed here.

If you choose to run 1200 baud data rates over the radio, you may connect the cabling to the mike and speaker connections of the radio. If you choose to run 9600 baud data rates over the radio, you will need to use an interface cable that connects the mini-DIN 6 pin data connector in the back of the radio to the TNC. Of course, you can choose to modify your radio by directly cabling into certain points into the radio and that is left as an exercise to the reader.

Or, instead of (i) and (ii) above, you may choose to get an integrated radio and TNC, such as:

- Kenwood TM-D700 (144 and 440 MHz)
- Kenwood TM-D710 (144 and 440 MHz)
- Alinco DR-135TMKIII with the EJ-41U TNC option (144 MHz)
- Alinco DR-235TMKIII with the EJ-41U TNC option (222 MHz)
- Alinco DR-435TMKIII with the EJ-41U TNC option (440 MHz)

6. An RS-232C cable connecting the TNC2 to your Windows PC and a terminal emulation program such as Hyperterm. These instructions presume you are familiar with the cmd: command mode of configuring your TNC2, and that you have an existing, valid connection between your PC and your TNC2 such that you can connect to and configure your TNC2 using a terminal emulator program on your PC.

7. The remainder of the amateur radio station, such as power supply, antenna cable and antenna.

8. An optional Ethernet connection to the Internet. You will need to download and configure DOS Ethernet packet drivers into your DOS configuration. See www.crynwr.com

Program Source and other files

1. If you are interested in viewing or downloading the source code, open an Internet Web Browser, and on the URL window, type in:

   ftp://ftp.ucsd.edu/hamradio/packet/tcpip/jnos/jnos110i.zip

You do not need to compile the program as the executable program file is already included in the distribution zip file.

2. Additional files and documentation are available at:

   `ftp://ftp.ucsd.edu/hamradio/packet/tcpip/jnos/`

Software Installation and Configuration for Evaluation Mode

If you want to download, install and try out JNOS before you commit to buying the hardware for the amateur radio connection, you can install the software according to these instructions and evaluate the BBS portion of JNOS. If you are satisfied with the BBS portion, you can adjust the configuration to add in the connection of a TNC and the amateur radio station, and enjoy the additional built-in functions that JNOS has to offer.

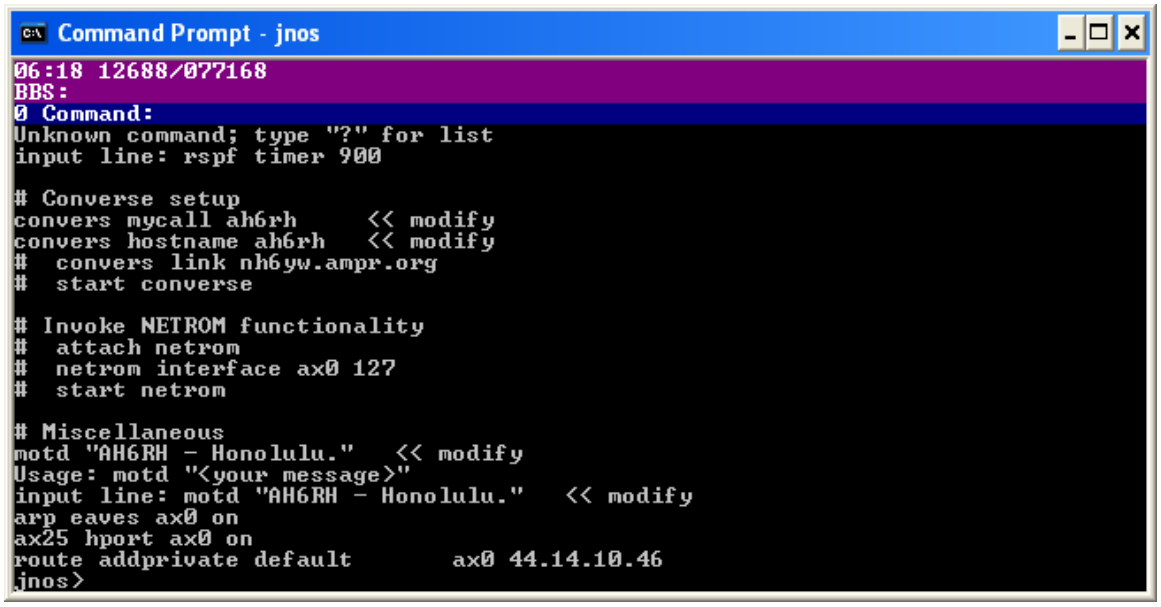
The version of JNOS contained within the ZIP file distribution is Version 1.10I. These instructions assume you've downloaded the ZIP file onto your Windows XP computer. It assumes you'll install the software onto the C: drive into a directory named \JNOS. To install, follow these directions:

1. Unzip the contents of the ZIP file into directory C:\JNOS. You may use Windows Explorer or PCUNZIP to unzip the file.
2. Change the lines in the files noted below with <yourcall> to reflect your callsign and preferred password for the sysop account.
3. Edit C:\JNOS\AUTOEXEC.NOS and review/change the lines that contain "## modify"
   - Replace <yourcall> with the lower case version of your callsign
   - Replace <YOURCALL> with the upper case version of your callsign
4. Edit C:\JNOS\ALIAS. and change the SYSOP callsign to your callsign.
5. Edit C:\JNOS\FTPUSERS. and change the SYSOP callsign and password.
6. Edit C:\JNOS\SPOOL\HELP\INFO.HLP and change the description of the bbs that is provided to users logging into your system to suit your conditions.
7. Edit C:\JNOS\SPOOL\MOTD.TXT with your message of the day to the BBS/email users.

Test Session

1. Starting JNOS In MS-DOS, issue these commands to start JNOS:

```
C:\> cd \jnos          <<< Change to the proper directory
C:\JNOS> jnos          <<< Start the JNOS program using JNOS.BAT
```



2. Ending JNOS Note: in JNOS, issue this command to end the program and exit back to MS-DOS

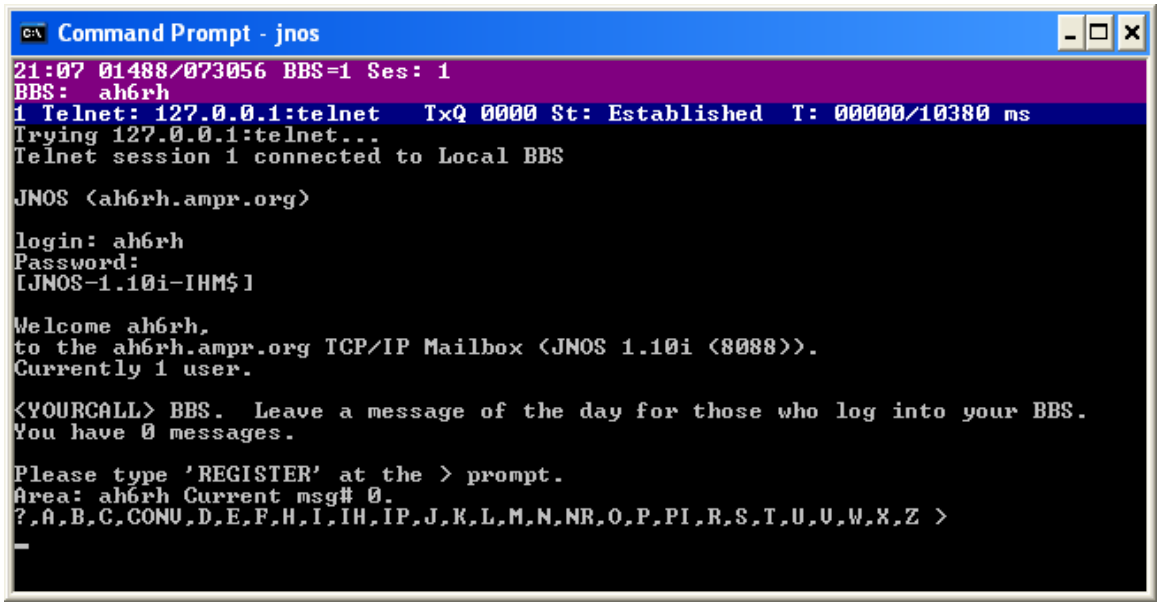
   ```
   jnos> exit
   ```

3. Trying the help functions in JNOS In JNOS, issue these commands to begin a local session on your PC.

   ```
   jnos> help      <<< try the help command for JNOS
   jnos> ?         <<< get a list of available commands
   ```

4. Starting a BBS session in JNOS In JNOS, issue these commands to begin a local BBS session on your PC.

   ```
   jnos> bbs       <<< start a BBS session on your computer
   ```




```
login: yourcall
password: yourpassword
Welcome yourcall
 .
 .
 .
Please type 'REGISTER' at the > prompt:
Area: yourcall Current msg #0   VVV try the ? command to get a brief help
?,A,B,C,CONV,D,E,F,H,I,IH,IP,J,K,L,M,N,NR,O,P,PI,R,S,T,U,V,W,X,Y,Z > ?
Mail   : Area Kill List Read Send Verbose
Gateway: Connect Escape Nodes NRRoute Ports Ping Telnet
File   : Download Upload What Zap
General: ?-Help Bye CONVerse Finger Help Info IHeard
         IPRoute JHeard MBox Operator Xpert
Area: yourcall Current msg #0      VVV try the help command for NOS
?,A,B,C,CONV,D,E,F,H,I,IH,IP,J,K,L,M,N,NR,O,P,PI,R,S,T,U,V,W,X,Y,Z > help
Area: yourcall Current msg #0      VVV register on this bbs
?,A,B,C,CONV,D,E,F,H,I,IH,IP,J,K,L,M,N,NR,O,P,PI,R,S,T,U,V,W,X,Y,Z >
register
Your current settings are:
Name = Unknown
AX.25 Homebbs address = Unknown
Internet Email Address = Unknown
First name.(CR=Cancel)
Yourfirstname
AX.25 Homebbs.(CR=Cancel)
Abbscall.state.us.noam
Internet Email.(CR=ignore)
youremail@internetaddress
Area: yourcall Current msg #0
?,A,B,C,CONV,D,E,F,H,I,IH,IP,J,K,L,M,N,NR,O,P,PI,R,S,T,U,V,W,X,Y,
Z >
```

5. Sending email to yourself on your BBS Issue these BBS commands to test out email capabilities on your BBS.

```
?,A,B,C,CONV,D,E,F,H,I,IH,IP,J,K,L,M,N,NR,O,P,PI,R,S,T,U,V,W,X,Y,
Z > l           <<< list out your messages.
No messages.
Area: yourcall Current msg #0
?,A,B,C,CONV,D,E,F,H,I,IH,IP,J,K,L,M,N,NR,O,P,PI,R,S,T,U,V,W,X,Y,
Z > r           <<< read your messages.
No messages.
Area: yourcall Current msg #0
?,A,B,C,CONV,D,E,F,H,I,IH,IP,J,K,L,M,N,NR,O,P,PI,R,S,T,U,V,W,X,Y,
Z > s yourcall <<< send a message to yourself from session #2
Subject
First test
Enter message.  End with /EX or ^Z in first column (^A aborts):
Send this from session #1.
/ex
Send(N=no)?y
Msg queued
Area: yourcall Current msg #0
?,A,B,C,CONV,D,E,F,H,I,IH,IP,J,K,L,M,N,NR,O,P,PI,R,S,T,U,V,W,X,Y,
Z >
```

6. Starting a second BBS session in JNOS

Note: You may issue the BBS command multiple times to create multiple sessions on your PC. Each BBS command will open a new session, which can be accessed by pressing the F1 key, the F2 key, etc up to a total of eight sessions. Look at the top of the window, and you'll see a line containing:

```
BBS=1; Ses: 1
1 Telnet : 127.0.0.1:telnet     <<< Note the 1 at the beginning is the
                                    session/window number.
```

You can compose an email in one session while reading emails in another. This is where the true power of JNOS lies as a tool for passing Internet email messages using amateur radio emergency communications techniques.

```
?,A,B,C,CONV,D,E,F,H,I,IH,IP,J,K,L,M,N,NR,O,P,PI,R,S,T,U,V,W,X,Y,
Z > f10          <<< Press the F10 key to return to the main window
jnos> bbs        <<< start a BBS session on your computer


Area: yourcall Current msg #0
?,A,B,C,CONV,D,E,F,H,I,IH,IP,J,K,L,M,N,NR,O,P,PI,R,S,T,U,V,W,X,Y,
Z > s yourcall <<< send a message to yourself from session #2
Subject
Second test
Enter message.  End with /EX or ^Z in first column (^A aborts):
Send this from session #2.
/ex
Send(N=no)?y
Msg queued
Area: yourcall Current msg #0
```

```
?,A,B,C,CONV,D,E,F,H,I,IH,IP,J,K,L,M,N,NR,O,P,PI,R,S,T,U,V,W,X,Y,
Z > f10          <<< Press F10 again to get to the JNOS prompt.
jnos> smtp kick <<  Send SMTP emails now, otherwise you'll wait 10 mins.
jnos> f2
Area: yourcall Current msg #0
?,A,B,C,CONV,D,E,F,H,I,IH,IP,J,K,L,M,N,NR,O,P,PI,R,S,T,U,V,W,X,Y,
Z > r            read the emails you just sent to yourself
Area: yourcall Current msg #0
?,A,B,C,CONV,D,E,F,H,I,IH,IP,J,K,L,M,N,NR,O,P,PI,R,S,T,U,V,W,X,Y,
Z > b            <<< "bye" to log off your session
Thank you yourcall for calling yourcall.ampr.org JNOS.
Telnet session 2 closed: EOF
Hit enter to continue
jnos> f1         <<< rejoin session 1

Area: yourcall Current msg #0
?,A,B,C,CONV,D,E,F,H,I,IH,IP,J,K,L,M,N,NR,O,P,PI,R,S,T,U,V,W,X,Y,
Z > b            <<< "bye" to log off your session
Thank you yourcall for calling yourcall.ampr.org JNOS.
Telnet session 1 closed: EOF
Hit enter to continue
```

7. Ending JNOS

```
jnos> exit
C:\JNOS>
```

Options for AX.25 and Internet functionality and connectivity

If you wish to activate the Internet functionality within JNOS, you need to make additional arrangements. You will also need to adjust your computer to boot and run in MS-DOS mode.

IP Address

1. An IP address assigned to your callsign/amateur radio station on domain AMPR.ORG. You may request an IP address assignment by finding the coordinator for your area listed at this website:

   `http://hamradio.ucsd.edu/coord.html`

   Before making a request, determine which radio IP network you will be using to connect your radio station with other amateur radio stations. Check with other fellow amateur radio operators in your area.

Domain Name Servers

2. Domain Name Servers (DNS) are like servers that function like telephone directories, looking up the Internet name of a server finding its matching IP address. You will need to find out the name(s) of DNS servers you can access and use.

SMTP Gateway

3. An SMTP Gateway is a server that connects your network with the rest of the Internet for purposes of routing and forwarding emails. You will need to find out the name(s) of the SMTP gateway(s) you can access and use.

Domain File

4. Optionally, you may install an updated domain.txt file. Normally, the file is updated as JNOS runs and encounters requests for new/additional BBS's and internet nodes.

Full Software Installation and Configuration

The version of JNOS contained within the ZIP file distribution is Version 1.10I. These instructions assume you've downloaded the ZIP file onto your MS-DOS computer. It assumes you'll install the software onto the C: drive into a directory named \JNOS. To

install, follow these directions. If you've already configured JNOS for the evaluation as listed above, you may skip the steps you've done above:

1. Unzip the contents of the ZIP file into directory C:\JNOS. You may use Windows Explorer or PCUNZIP to unzip the file.
2. Change the lines in the files noted below with <yourcall> to reflect your callsign and preferred password for the sysop account.
3. Edit C:\JNOS\AUTOEXEC.NOS and review/change the lines that contain "## modify"

- Replace <yourcall> with the lower case version of your callsign
- Replace <YOURCALL> with the upper case version of your callsign
- Replace <your.IP.addr> with the last three numbers of your assigned IP address for the AMPR.ORG domain.
- Replace the example name of your BBS with the complete hierarchical name of your BBS. For example, it could be the form of yourcall.state.us.noam if you're in the continental USA, or yourcall.hi.usa.oc if you're in Hawaii.
- Replace the domain name servers (DNS) on the line starting with "domain addserver" with the name of your DNS servers provided by your Internet Service Provider (ISP), or other DNS servers as directed by other hams in your neighborhood.
- Replace the SMTP gateway server with the SMTP gateway between the AMPR.ORG subnet in your area and the rest of the Internet.

4. Edit C:\JNOS\ALIAS. and change the SYSOP callsign to your callsign.
5. Edit C:\JNOS\FTPUSERS. and change the SYSOP callsign and password.
6. Edit C:\JNOS\SPOOL\HELP\INFO.HLP and change the description of the bbs that is provided to users logging into your system to suit your conditions.
7. Edit C:\JNOS\SPOOL\MOTD.TXT with your message of the day to the BBS/email users.
8. Edit C:\JNOS\SPOOL\FTPMOTD.TXT with your message of the day to anonymous FTP users.
9. You may need to edit C:\JNOS\CLKKISS.TXT with the MS-DOS DEBUG command sequence to issue the TNC character sequences needed to take your TNC out of KISS mode and back into cmd: mode. The MS-DOS debug commands in the text file sends the character sequence x'0D' x'C0' x'FF' x'CO' to the Com1 port.
10. Configuring an optional Ethernet connection to the Internet. More on this later.

TNC2 Configuration and Integration

This section explains the general conditions and objectives to hooking up your radio and TNC to your MS-DOS PC. Following this section are specific information for each of the types of TNCs tested.

1. Communications program First off, you'll need a terminal emulator program for Windows or MS-DOS. A common program found in the Windows > Accessories > Communications program folder is Hyperterm. This documentation assumes you've set the terminal emulator program and RS-232C link to the COM1 port to:
    a. 9600 baud
    b. 8 data bits
    c. No parity bits
    d. One stop bit

2. DB-9 RS-232C serial comm cable Next, you'll need an RS-232C serial data cable, connecting your PC to the TNC2. It presumes that the RS-232C connector on your PC is a DB-9 male connector, rather than the original DB-25 male connector found on older PCs. The pin-outs at the PC end are:

DB-9 Female PIN (Connector on cable at PC end)	Signal Description	Signal Direction	DB-9 Male PIN (Connector on cable at TNC2 end)
1	DCD (Data Carrier Detect)	<-	1
2	RXD (Receive Data)	<-	2
3	TXD (Transmit Data)	->	3
4	DTR (Data Terminal Ready)	->	4
5	Signal Ground	--	5
6	DSR (Data Set Ready)	<-	6
7	RTS (Request to Send)	->	7
8	CTS (Clear to Send)	<-	8
9	RI (Ring Indicator)	<-	9

TNCs that use this kind of connector include: PacComm SPRINT-2.

3. DB-25 RS-232C serial comm cable If your TNC has a DB-25 Female connector instead of a DB-9 Female connector, this is the pin-outs of an adapter cable that's needed.

DB-9 Female PIN (PC end)	Signal Description	Signal Direction	DB-25 Male PIN (TNC end)
1	DCD (Data Carrier Detect)	<-	8
2	RXD (Receive Data)	<-	3
3	TXD (Transmit Data)	->	2
4	DTR (Data Terminal Ready)	->	20
5	Signal Ground	--	7
6	DSR (Data Set Ready)	<-	6
7	RTS (Request to Send)	->	4
8	CTS (Clear to Send)	<-	5
9	RI (Ring Indicator)	<-	22

TNCs that use this kind of connector include: MFJ-1270C, Kantronics KPC-3 and 9612

Note: The 9612 uses Pin 13 as an external power input/external power reset, which is normally not used for RS-232C. Either don't connect Pin 13, or set the jumper inside the KPC-3. See manual for details.

Note: The 9612 uses Pin 25 as an external power input/external power reset, which is normally not used for RS-232C. Either don't connect Pin 25, or set the jumper inside the 9612. See manual for details.

4. TNC-to-Radio cable For connecting your TNC to your radio, this table presumes you have a 6 pin mini-DIN data connector on the back of your radio. (The key on the connector is at the top.) If your radio does not use a 6-pin mini-DIN, adapt the cabling to suit the mike and speaker connectors on your radio.

6-pin mini-DIN Female (panel socket on the radio)	Pin Location (panel socket on the radio)	Signal Description	Signal Direction
1	Lower Right	TX Data from	<-

6-pin mini-DIN Female (panel socket on the radio)	Pin Location (panel socket on the radio)	Signal Description	Signal Direction
		TNC	
2	Lower Left	Signal Ground	--
3	Middle Right	PTT (Push to Talk)	<-
4	Middle Left	9600 Baud RX Data to TNC	->
5	Upper Right	1200 Baud RX Data to TNC	->
6	Upper Left	Squelch out	->

The connector at the other end of this cable varies, depending on the connector on your TNC:

Type of TNC	Radio Baud rate	TNC end of the Radio-TNC cable
TNC2 Clone	1200	5-pin DIN
Kantronics KPC-3, KPC-3 Plus	1200	DB-9 Male
Kantronics 9612, 9612-Plus	1200	DB-9 Male
Kantronics 9612, 9612-Plus	9600	DB-15 Male
PacComm SPRINT2	9600	8-pin DIN

5. Connecting the power supply Verify that your TNC power switch is turned off. Connect the 12 V DC power cable between the TNC and the 12 V DC power supply.

6. Setting the Comm speed using hardware switches Reset the TNC to factory settings. Configure your TNC2 for 9600 baud communications between the TNC2 and the PC. You will need a terminal emulator program such as HYPERTERM on your PC to connect to the TNC2.
    a. Reset your TNC, usually via software command, to factory default settings.
    b. Set your RS-232C communications parameters on the TNC.(software settings)
        i. Abaud 9600
        ii. Parity
        iii. Echo
        iv. Half duplex
        v. Flow Control

c. If you have a MFJ-1270C or similarly licensed TNC2, set the switch settings on the back of the unit as follows:
    i. Switches 1, 2, 3, 4, 6, 8 down (OFF)
    Switches 5, 7 up (ON)

7. Reset the TNC to factory settings. Configure your TNC2 for 9600 baud communications between the TNC2 and the PC. You will need a terminal emulator program such as HYPERTERM on your PC to connect to the TNC2.
    a. Reset your TNC, usually via software command, to factory default settings.
    b. Set your RS-232C communications parameters on the TNC.(software settings)
        i. Abaud 9600 (PC terminal communications speed with the TNC)
        ii. 8-bit
        iii. No Parity
        iv. Echo
        v. Half duplex
        vi. Flow Control

8. Set your local TNC2 parameters for your station.

    cmd: **my <yourcallsign>**
    MYCALL was NONE

9. You may have to set or clear other parameters for your TNC to the default values, to adapt it to your radio, or the characteristics of the radios belonging to the other stations.

    a. TXDELAY – The delay time that the TNC will wait for a clear channel before it keys the radio to transmit.
    b. AXDELAY – The delay time of audio synch flags to transmit before the TNC sends data.

10. Set your TNC into KISS mode.

11. Exit your terminal emulator program, and return to configuring JNOS.

Set up for TNC2 Clones (MFJ-1270C)

1. Use the DB-25 pin-outs for the RS-232C cabling from your PC to the MFJ-1270C.|

2. If you radio has a 6-pin mini-DIN data connector, use these pin-outs for the TNC cabling from your TNC to the radio. The pin-outs are shown here.

6-pin mini-DIN Male (connector on the wire plugging into the radio)	Pin Location (Viewed looking to the pin-out side of the connector)	Signal Description	Signal Direction	5-pin DIN Male, (viewed from pin-out side of the connector)
1	Lower Left	TX Data from TNC	<-	1 (Right)
2	Lower Right	Signal Ground	--	2 (Bottom)
3	Middle Left	PTT (Push to Talk)	<-	3 (Left)
4	Middle Right	9600 Baud RX Data to TNC	->	N/C
5	Upper Left	1200 Baud RX Data to TNC	->	4 (between 1 & 2)
6	Upper Right	Squelch out	->	N/C

3. Connect your TNC2 to the COM1 serial port on your PC, using the RS-232C serial communications cable. Most modern PCs use a DB-9 female connector on the computer, so your cable should have a DB-9 male connector at the PC end. Many TNC2s use either the DB-9 male connector or DB-25 male connector, so you will need a DB-9 or DB-25 female connector and/or adapter.|

4. Configure your TNC2 for 9600 baud communications between the TNC2 and the PC.
    a. If you have a MFJ-1270C or similarly licensed TNC2, set the switch settings on the back of the unit as follows:
        i. Switches 1, 2, 3, 4, 6, 8 down (OFF)
        ii. Switches 5, 7 up (ON)

5. You may also have to set other RS-232C parameters, such as number of data bits, parity, and echoing characters back to your terminal program.

    More on this later.

6. Set your local TNC2 parameters for your callsign, etc.

    cmd: **my <yourcallsign>**
    MYCALL was NONE

7. You may have to set or clear other parameters for your TNC to the default values, to adapt it to your radio, or the characteristics of the radios belonging to the other stations.

    b. TXDELAY – The delay time that the TNC will wait for a clear channel before it keys the radio to transmit.
    c. AXDELAY – The delay time of audio synch flags to transmit before the TNC sends data.

8. If you have a standard TNC2, type these commands to put it into KISS mode:

    cmd: **xflow off**
    XFLOW was ON
    cmd: **kiss on**
    KISS was OFF
    cmd: **restart**

9. Exit your terminal emulator program.

Setup for the Kantronics KPC-3 Plus TNC

1. Use the DB-25 pin-outs for the RS-232C cable.

2. If you radio has a 6-pin mini-DIN data connector, use these pin-outs for the TNC cabling from your TNC to the radio. The

6-pin mini-DIN Male (connector on the wire plugging into the radio)	Pin Location (Viewed looking to the pin-out side of the connector)	Signal Description	Signal Direction	DB-9 Male, (viewed from wiring side of the connector)
1	Lower Left	TX Data from TNC	<-	1
2	Lower Right	Signal Ground	--	6 or 9 (verify internal jumper)
3	Middle Left	PTT (Push to Talk)	<-	3
4	Middle Right	9600 Baud RX Data to TNC	->	Not connected
5	Upper Left	1200 Baud	->	5

6-pin mini-DIN Male (connector on the wire plugging into the radio)	Pin Location (Viewed looking to the pin-out side of the connector)	Signal Description	Signal Direction	DB-9 Male, (viewed from wiring side of the connector)
		RX Data to TNC		
6	Upper Right	Squelch out	->	Not connected

3. Connect your TNC2 to the COM1 serial port on your PC, using the RS-232C serial communications cable. Most modern PCs use a DB-9 female connector on the computer, so your cable should have a DB-9 male connector at the PC end. Many TNC2s use either the DB-9 male connector or DB-25 male connector, so you will need a DB-9 or DB-25 female connector and/or adapter.|

4. Configure your TNC2 for 9600 baud communications between the TNC2 and the PC. You will need a terminal emulator program such as HYPERTERM on your PC to connect to the TNC2.

    i. 9600 baud (PC terminal communications speed with the TNC)
    ii. 8-bit
    iii. No Parity
    iv. Echo
    v. Half duplex
    vi. Flow Control

5. Turn on the KPC-3 Plus. The first time you turn it on (or reset), it begins an autobaud routine to detect the RS-232C communications settings in use. It will send and resend the message PRESS (*) TO SET BAUD" at one baud rate after another. If the baud rate does not match your PC program, you will see a garbled message appear. Anytime you see this message is being sent, press the "*" character (press and hold the SHIFT key, and press the 8 key). When the KPC-3 receives the asterisk, it will set the baud rate.

6. When the KPC-3 detects the baud rate, it will send a "sign-on" message, and ask for your callsign.

7. You may have to set or clear other parameters for your TNC to the default values, to adapt it to your radio, or the characteristics of the radios belonging to the other stations.

    a. TXDELAY – The delay time that the TNC will wait for a clear channel before it keys the radio to transmit. Each unit is 10 milliseconds.

cmd: **txdelay 40**
TXDELAY was 30

8. Exit NEWUSER mode, and gain access to the full set of commands. Press Control-C to get to the "cmd:" command prompt mode.

   Control-C << Press Control and C.
   cmd: **intface terminal**

9. Exit TERMINAL mode, and place the KPC-3 Plus into KISS mode. Press Control-C to get to the "cmd:" command prompt mode.

   Control-C << Press Control and C.
   cmd: **intface kiss**
   cmd: **reset** << Reset the TNC and put it into KISS mode.

10. Exit your terminal emulator program.

Setup for the Kantronics 9612 TNC

1. DB-25 RS-232C serial comm cable Use the DB-25 pin-outs for the RS-232C cable.

2. TNC-to-Radio cable for the 1200 baud connector For connecting the 1200 baud connector of the Kantronics 9612 to your radio, this table presumes you have a 6 pin mini-DIN data connector on the back of your radio. (The key on the connector is at the top.) If your radio does not use a 6-pin mini-DIN, adapt the cabling to suit the mike and speaker connectors on your radio. The 1200 baud connector is a DB-9 Male connector at the end of the cable at the TNC end.

6-pin mini-DIN Male (connector on the wire plugging into the radio)	Pin Location (Viewed looking to the pin-out side of the connector)	Signal Description	Signal Direction	DB-9 Male (Connector at the radio end of the cable)
1	Lower Left	TX Data from TNC	<-	1
2	Lower Right	Signal Ground	--	6
3	Middle Left	PTT (Push to Talk)	<-	3
4	Middle Right	9600 Baud RX Data to TNC	->	Not connected
5	Upper Left	1200 Baud RX Data to TNC	->	5

6-pin mini-DIN Male (connector on the wire plugging into the radio)	Pin Location (Viewed looking to the pin-out side of the connector)	Signal Description	Signal Direction	DB-9 Male (Connector at the radio end of the cable)
6	Upper Right	Squelch out	->	Not connected

3. TNC-to-Radio cable for the 9600 baud connector For connecting your TNC to your radio, this table presumes you have a 6 pin mini-DIN data connector on the back of your radio. (The key on the connector is at the top.) If your radio does not use a 6-pin mini-DIN, adapt the cabling to suit the mike and speaker connectors on your radio. The 1200 baud connector is a DB-15 Male connector at the end of the cable at the TNC end.

6-pin mini-DIN Male (connector on the wire plugging into the radio)	Pin Location (Viewed looking to the pin-out side of the connector)	Signal Description	Signal Direction	DB-15 Male (Connector at the radio end of the cable)
1	Lower Left	TX Data from TNC	<-	3
2	Lower Right	Signal Ground	--	6
3	Middle Left	PTT (Push to Talk)	<-	1
4	Middle Right	9600 Baud RX Data to TNC	->	2
5	Upper Left	1200 Baud RX Data to TNC	->	Not connected
6	Upper Right	Squelch out	->	Not connected

4. Future section for the Kantronics 9612 configuration.

Setup for the PacComm SPRINT-2 TNC

1. The SPRINT-2 TNC uses a DB-9 Female connector. Use a DB-9 Female to DB-9 Male straight-through cable.

2. The SPRINT-2 TNC uses a 2.1 mm coaxial power connector, with a DC voltage of 12.0 to 14.5 volts. The center pin is connected to the positive power lead. The power consumption is approximately 350 milliamps.

3. TNC-to-Radio cable for 9600 baud For connecting your TNC to your radio, this table presumes you have a 6 pin mini-DIN data connector on the back of your radio. (The key on the connector is at the top.) If your radio does not use a 6-pin mini-DIN, adapt the cabling to suit the mike and speaker connectors on your radio. The Sprint-2 uses an 8 pin DIN connector, as opposed to the usual 5 pin for the original TNC2.

6-pin mini-DIN Male (connector on the wire plugging into the radio)	Pin Location (Viewed looking to the pin-out side of the connector)	Signal Description	Signal Direction	8-pin DIN Male (connector on the wire plugging into the Spirit-2 TNC)
1	Lower Left	TX Data from TNC	<-	1
2	Lower Right	Signal Ground	--	2
3	Middle Left	PTT (Push to Talk)	<-	3
4	Middle Right	9600 Baud RX Data to TNC	->	4
5	Upper Left	1200 Baud RX Data to TNC	->	
6	Upper Right	Squelch out	->	

4. Set these jumpers on as shown.

Jumper Position	Jumper Setting	Function	Comments
JP10	Open	Primary filters selected	
JP11	7-9	9.6 kB Radio	
	17-18	9.6 kB Terminal	

JPB is the Jumper for the Battery Backup. Open disables the battery backup. Closed enables the battery backup, and preserves the RAM contents.

It is suggested to change SP5 on the satellite model from Open to Closed, to force TX and RX to be the same baud rates.

5. To make the SPRINT-2 100% TNC2 compatible, set these jumpers as shown.

Jumper Position	Jumper Setting	Function	Comments

Jumper Position	Jumper Setting	Function	Comments
JP12	1-2	STA LED Control	Factory Configuration
JP13	Open	Bankswitch Control-A	Factory 2-3
JP15	Open	Network Mode	Factory Configuration
JP18	All Open	CoaxLAN RTSB Sense	Factory Configuration
JP19	1-2	Expanded Memory	Factory 2-3
JP20	Open	CoaxLAN disabled	Factory Configuration

JPB is the Jumper for the Battery Backup. Open disables the battery backup. Closed enables the battery backup, and preserves the RAM contents.

6. Future section for the Paccomm SPRINT-2 TNC configuration.

Setup for the Kenwood TM-D700 radio

1. For the RS-232C cable, note that the gender of the DB-9 RS232-C connector on the Kenwood TM-D700 a male DB-9. This is "backwards" from normal, requiring you to get a female-to-female DB-9 to DB-9 adapter to use a normal RS-232C cable.

   This is the cable pin-outs. You need a "straight through" DB-9 female to DB-9 female cable, not a null-modem cable.

DB-9 Female PIN (PC end)	Signal Description	Signal Direction	DB-9 Female PIN (TM-D700 end)
1	DCD (Data Carrier Detect)	<-	Not connected
2	RXD (Receive Data)	<-	2
3	TXD (Transmit Data)	->	3
4	DTR (Data Terminal Ready)	->	4
5	Signal Ground	--	5
6	DSR (Data Set Ready)	<-	6
7	RTS (Request to Send)	->	7
8	CTS (Clear to Send)	<-	8

DB-9 Female PIN (PC end)	Signal Description	Signal Direction	DB-9 Female PIN (TM-D700 end)
9	RI (Ring Indicator)	<-	N/A

2. Future section for the Kenwood TM-D700 configuration.

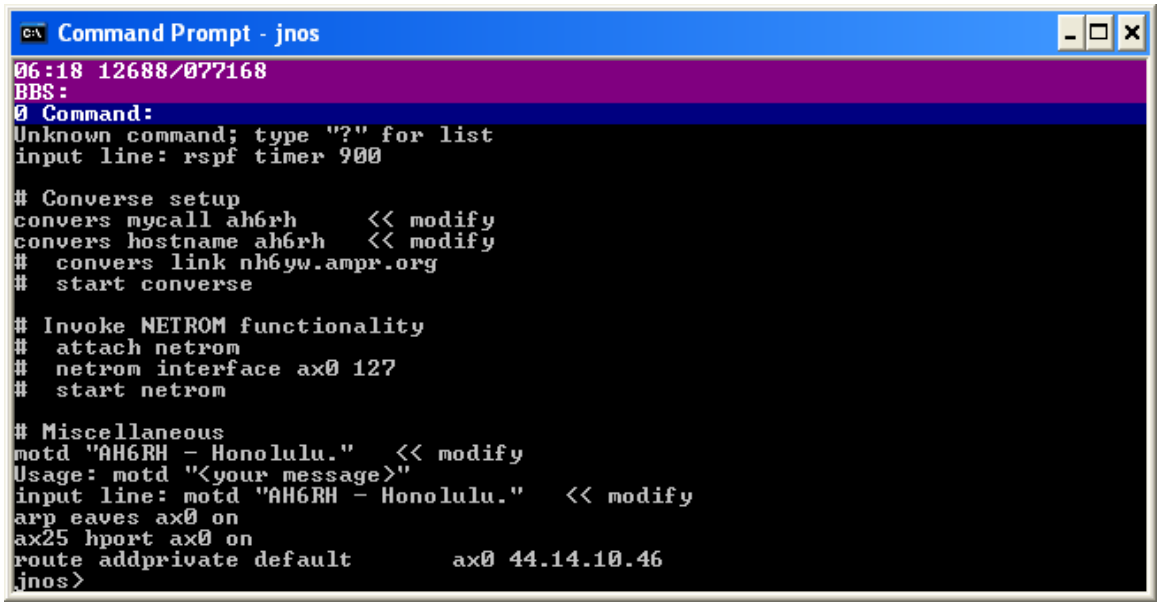
Setup for connection to the Internet via Ethernet

A separate document will outline how to connect your PC and JNOS to the Internet via Ethernet and a broadband connection through your Internet Service Provider.

Testing additional JNOS features

1. Starting JNOS In MS-DOS, issue these commands to start JNOS:

```
C:\> cd \jnos        <<< Change to the proper directory
C:\> jnos            <<< Start the JNOS program using JNOS.BAT
```



2. Starting an AX.25 trace before logging into a neighboring BBS As an exercise, you can watch the communications going in and out of your TNC2 by turning on a trace function within JNOS. Issue these commands to start the trace, and watch it in the f9 window:

```
jnos> trace ax0 011  <<< activate the trace/debug function for AX.25 comms
jnos> f9             <<< Press the F9 key to look at the trace
jnos> f10            <<< Press the F10 key to return to the main window
jnos> smtp ti        <<< display the SMTP (mail) timer
jnos> bbs            <<< enter the bbs mode.
```

3. Starting an AX.25 connection to a neighboring BBS while in JNOS command mode Login to a neighboring BBS using AX.25 communications, using your call sign, and your chosen password. In this example, you're logging into the NH6YW BBS via the KH6GPI-10 digipeater

   > **c ax0 nh6yw v kh6gpi-10**

4. After logging in and interacting on that BBS, log out and resume testing in your JNOS program.

5. Sending email to another Internet mail system (your ISP email account, JNOS, etc) More on this later

6. Taking a TNC2 out of KISS mode Note: To take your TNC2 out of KISS mode,

   a. exit JNOS by typing

      jnos> **exit**

   b. then type:

      C:\JNOS> **clrkiss**

   c. Use your terminal emulator, log into the TNC and verify that you have regained normal command mode. Then, type:

      cmd: **xflow on**
      XFLOW was OFF

Troubleshooting

General Troubleshooting

1. Verify that you've correctly set your callsign, and password in the files above.
2. Verify your PC to TNC connection, and the TNC configurations.
3. Verify that your radio transmits and receives correctly.

Troubleshooting SMTP mail services

1. Use the SMTP LIST command to verify the status of the email exchanges.
2. Verify the line START SMTP is enabled in the file AUTOEXEC.NOS.
3. The default timer setting for SMTP is 600 seconds or ten minutes. Issue the SMTP KICK command to kickstart the SMTP service to run now.