KPC-3

Reference Manual

Kantronics

RF Data Communications Specialists

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RF Data Communications Specialists

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The KPC-3 is a Kantronics hardware and software design incorporating the AX.25 Level 2 Version 2 Packet protocol as adopted by the American Radio Relay League. This manual contains information from earlier KPC-1, KPC-2, KPC-2400, KPC-4, and KAM manuals and addendums, modified as appropriate. In addition, Kantronics acknowledges the use of material from the original Tucson Amateur Packet Radio Corporation (TAPR) TNC-1 manual granted by OEM agreement.

We have attempted to make this manual technically and typographically correct as of the date of the current printing. Production changes to the TNC may add errata or addendum sheets. We solicit your comments and/or suggested corrections. Please send to Kantronics Co., Inc., 1202 E. 23rd Street, Lawrence, KS 66046.

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Kantronics Company, Inc.
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Consult the limited warranty policy in this manual for the service provisions offered by Kantronics at no charge. This warranty is considered to be in force only when the customer has submitted his completed warranty registration within 10 days of purchase, and when the stipulations of the warranty have been met. Violations of warranty clauses will automatically void the warranty and service or repairs will be charged to the owner.

Service outside the warranty will be charged at the cost of parts, labor, and return shipping. Units returned for service without a Return Authorization number will be subject to a minimum charge of 1/2 hour labor plus shipping and handling. Contact the Service Department (913-842-4476) to obtain a Return Authorization number. Repaired units will be returned via UPS C.O.D. These C.O.D. charges can be avoided by including your VISA or MasterCard number with your unit to be repaired. Shipping and repair may then be charged.

When service or repairs appear necessary, it may be wise to call or write Kantronics to determine if the problem can be solved without returning the unit. Should you encounter difficulty in getting your KPC-3 to "talk" to your computer, you may wish to perform some limited checks before calling or writing. Carefully check your wiring connections to the RS-232 port. Verify your terminal baud rate. It may be useful to perform a "Hard Reset". (See Hard Reset section.)

When calling, report the product name and ask for the Amateur Radio Service Department. Should you find it necessary to call for assistance, please have the following information available:

1. The unit name and serial number (the serial number is found on the rear panel.)

2. The firmware version number (the version number is displayed when you give the Version command.)

If possible, you should have the KPC-3 and your computer available to perform troubleshooting operations when you call.

The Service Department telephone hours are 9 am - noon and 2 pm - 5 pm Central Time 913-842-4476, Monday through Friday.

When writing, include a clear description of the problem, unit name, computer type, computer software used and if possible a DISPLAY listing from the KPC-3.

Returns to the factory for refund or exchange are strictly regulated. Any return for refund or exchange must be approved by the service department.

Radio Frequency Interference Statement

INFORMATION TO THE USER

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital Device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that the interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced Radio/TV technician for help.

The user is cautioned that any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The user is also cautioned that any peripheral device installed with this equipment must be connected with a high-quality shielded cable to insure compliance with FCC limits.

RFI Suppression

In moving to the world of digital communications via computers, a new dimension of RFI may be encountered. In spite of the equipment manufacturers' diligence, each new piece of electronic equipment will react differently in each separate environment. Every amateur station will have its own unique layout, equipment variation, and antenna installations. Experience has shown that these differences are related to the total RF environment, and may be causative factors in RFI induced problems. The suggestions given here may assist in resolving RFI problems you may encounter in your "unique" station.

1. Use shielded cable for all connections between equipment.

2. Make all interconnecting cables as short as practical. A balance should be maintained between cable length and equipment proximity. At times simply moving the video monitor one foot further from an interface or other device will solve the "screen hash" problem.

3. Antenna runs should be kept away from equipment control lines and/or interconnecting cables. If it is necessary for such lines to cross each other they should do so at 90 degree angles.

4. Ground leads should be as short as possible and go to a GOOD EARTH GROUND.

5. Interconnecting cables appearing to act as radiators or antennas should be looped through a toroid. Be certain toroids, if used, are designed for the frequency in use.

Precautions

Proper Ground

The TNC is grounded through its connections to your transceiver. Make sure your transceiver is properly grounded and your computer has equal ground potential. Follow the grounding instructions in your transceiver manual.

Lithium Battery

CAUTION: Battery can explode or leak if heated, disassembled, recharged, exposed to fire or high temperature, or inserted incorrectly.

Preface

This manual is designed to be used as a reference source for your KPC-3. If you are not familiar with connecting a Kantronics TNC to your computer and radios, we suggest that you refer to the Getting Started manual.

The first part of this manual describes all of the commands that are present in the KPC-3 and should be used mainly as a reference to find the purpose of a specific command. The commands are listed alphabetically. Following the commands section is an operational description of each mode available with your KPC-3 – Packet, Wefax, Host and Kiss modes are explained.

The final sections of this manual include information concerning the installation of your KPC-3 (which supplements the Getting Started manual), calibration and equalization, installing options into the KPC-3, and other hardware related matters.

An Introduction to Packet Radio

The KPC-3 is a Terminal Node Controller (TNC). A TNC is very similar to a telephone modem in that it receives digital signals from your computer (Terminal) and converts them to tones suitable for transmission to a distant location. The TNC also receives tones from your radio and converts them into the digital signals understood by your computer.

A TNC, however, does much more, because it also controls the push-to-talk line of your transmitter, keying the radio whenever it needs to send data. It also converts the data you want to send into a "packet", adding the required addressing, error checking and control information to insure the data gets from one Node to the next. The error checking implemented in your TNC must be the same as the error checking used by any other station you want to talk to, and this standard method is called a protocol. The protocol used in Amateur Radio Packet TNCs is called AX.25. Different protocols are used for other modes of operation, such as AMTOR.

In order for your TNC to do something, you must issue instructions to it, letting it know exactly what you want done. In order to accomplish this, the TNC must be in the Command Mode (expecting you to give it instructions) and any time you want to change the way your TNC operates, you must be in this mode. The TNC tells you that it is ready for your commands by sending you the prompt "cmd:".

When you want to send data to another station, you must place your TNC into the CONVERS mode, which allows you to converse with other users. This is normally done automatically for you when you connect to another station, or when another station connects to you.

At this point, if you are unfamiliar with packet radio operation, you may want to read the section on packet in this manual. This section is a guide to operating packet, and will help you understand the use of Command mode versus Convers mode.

Some Abbreviations

<Ctrl-x> = This represents a single control character sent from your terminal program to the TNC. To send this character, you press and HOLD the control key and type the second key (x) while holding the control key down. If your keyboard does not have a key labeled Ctrl, consult your computer/terminal manual to determine which key performs the control key function. If you don't have any key that performs this function, you will need to change the parameters in your TNC that define these special Ctrl key characters.

$ preceding a number denotes a hex number (base 16)

<CR> = carriage return, enter, $0D, decimal 13, <Ctrl-M>

<LF> = line feed, $0A, decimal 10, <Ctrl-J>

I/O = Input/Output

Computer and terminal are used interchangeably to describe whatever device is attached to talk to the TNC.

Introduction to Commands

Commands Structure

There are many commands which affect operation of the KPC-3. Some commands affect performance under specific conditions, some change parameters affecting general operation and others direct a one-time action.

The user changes parameters and issues instructions to the TNC by typing commands composed of English-like word abbreviations and variables which are numbers or strings of characters chosen by the user. You will probably never change some of these parameters.

Default values are stored in the EPROM and are the settings used at power-on. If you change any setting or value, the new setting or value will be stored in RAM and will be the value used at future power-on.

● Entry

A command is entered to the TNC by typing the command name and its argument (setting or value) in the Command Mode. The prompt for Command Mode is:

    cmd:

The command and argument must be separated by a space, and the TNC takes action when a carriage return <CR> is typed. All command entries may be abbreviated to the shortest unique string. In the command list which follows, those required entries are denoted by capital letters.

You can examine the value of any parameter by typing the command name followed by a <CR>. A special command, DISPLAY, allows you to see the values of all parameters or groups of related parameters.

Once you go into Packet Convers Mode or WEFAX Mode a <Ctrl-C> (see COMMAND) needs to be entered to return you to the Command Mode. In the Packet Transparent Mode a special sequence is needed (see CMDTIME).

If packets have been printing on the screen you may have forgotten which mode you are in. If you wish to see the cmd: prompt type a <Ctrl-C>, to be sure you are in Command Mode. If the prompt does not appear then you already are in Command Mode, just type a return if you wish to see the cmd: prompt.

● Format

All commands are listed alphabetically. A ○ precedes a command from the NEWUSER set (when a unit is new, INTFACE is set to NEWUSER, or a hard reset has been performed). All other commands begin with a ●. On the first line of a command will be the command name followed by any arguments required. Any optional arguments will

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be shown in square brackets [ ]. If the command accepts several different values, or a range of values, the permissible arguments will be shown in parenthesis ( ). The permissible arguments may also be shown separated by a vertical bar I. At the far right of the first line will be the version number which introduced this command. The second line will show the default value. Example:

● **COMmand arguments (permissible arguments)**   version
   default

Parameter Types

● **n (range)**

Any number within the range is permissible. The unit of measure (seconds, ms, baud, count, etc.) for the number will be given in the description. These are decimal numbers.

● **n ($00 - $FF)**

Several parameters are numerical codes for characters which perform special functions. The code is simply the ASCII character code for the desired character. (See the ASCII Chart at end of this manual.) Most of these characters have control characters as default values. Control characters are entered by holding down a special control key on the keyboard while typing the indicated key. For example, to type a <Ctrl-X>, hold down the control key while typing an x, then release both keys. These special characters cannot be sent in a packet unless preceded by the pass character (see PASS) or unless you are operating in the Transparent Mode.

These numbers are shown in hexadecimal (hex) form (base 16). They can be entered either in decimal or in hex. A hex number is distinguished from a decimal number by preceding it with a "$" prefix. The "digits" of a hex number represent powers of 16, analogous to the powers of 10 represented by a decimal number. The numbers 10 through 15 are denoted by the hex digits A through F. For example:

$$\$1B = (1*16) + 11 = 27$$

$$\$120 = (1*16*16) + (2*16) + 0 = 288$$

Permissible values are shown as: (n = $00 - $FF). This is true if PARITY is NONE. If PARITY is not NONE, then permissible values are $00 - $7F. See the ASCII Chart at the end of this book for character codes and hex/decimal conversion.

If a streamswitch (STREAMSW) character or any other special character is defined as "$" then you will need to enter values in decimal, or precede the $ with the PASS character in order to enter hex numbers.

● **flags   ChoiceA I ChoiceB**

Many parameters are "flags", meaning they have two possible values, ON and OFF, or YES and NO. All of the command descriptions show ON and OFF as the options; however YES (y) and NO (n) may be typed instead. A few parameters are really flags, but rather than indicating that something is "on" or "off", they select one of two ways of doing things. Some of these parameters have the values EVERY or AFTER indicating operating modes for data transmission. The possible choices are separated by a vertical bar. Some of the flag parameters will allow many choices, such as ON I OFF I TO I FROM.

● **callsigns   xxxxxx-n**

Several commands require callsigns as parameters. While these parameters are normally Amateur callsigns, they may actually be any collection of numbers and/or letters up to six characters; they are used to identify stations sending and receiving packets. A callsign may additionally include an "extension" (SSID, Secondary Station Identifier), which is a decimal number from 0 to 15 used to distinguish two or more stations on the air with the same Amateur call (such as a base station and a repeater). The callsign and extension are entered and displayed as call-ext, e.g. KØPFX-3. If the extension is not entered, it is set to -0, and extensions of -0 are not displayed by the TNC.

● **text**

There are some commands which have a parameter text string. This string can be any combination of letters, numbers, punctuations, or spaces up to 128 characters. In order to be used, all string parameters must contain at least one non-space character. You can even put characters with special meanings, such as carriage return, into the string by preceding them with the PASS character. The string ends when you type a (non-passed) carriage return. If PARITY is NONE, you may even include characters in your text strings which have the eighth bit set. These are typically graphics characters on PC compatible computers.

Commands

● **8bitconv   ON|OFF**   **v5.0**

default ON

When ON, transmission of 8-bit data is allowed in the packet Convers Mode and Transparent Mode. If you wish to obtain 8-bit data transmission but do not want all the features of Transparent Mode, set this command to ON. If OFF, the 8th data bit is stripped (set to 0) for transmission. This does not affect the KA-Node, digipeat or PBBS functions.

If you are set for 8 bits and no parity, then setting this command ON will allow you to transmit any possible character, including graphics characters.

See also: parity

● **ABaud   n   (n = 0, 300, 600, 1200, 1800, 2400, 4800, 9600)**   **v5.0**

default 0

The parameter n sets the baud rate used for input and output through the serial port of the TNC to the computer. If 0 is used, the TNC will run an autobaud routine upon power-up. This routine looks for an asterisk (*) character from the attached computer to set the ABAUD parameter. If you wish to use a different baud rate, or to perform autobaud every time the unit is powered up, you must change the ABAUD parameter. If you change the baud rate in your computer or terminal you should change the baud rate in the TNC first, then issue the RESET command, then set the new baud rate on your computer. Otherwise a hard reset will be required to erase the ABAUD setting and reinitialize the TNC to perform the autobaud routine. (See Hard Reset section.) Note also that a hard reset will erase ALL stored parameters in your TNC and return it to factory defaults.

See also: reset, restore

● **AUtolf   ON|OFF**   **v5.0**

default ON

When ON, a line feed is sent to the terminal after each carriage return. This parameter should be set on when overprinting occurs and the terminal being used does not automatically supply its own linefeed after a carriage return. This command affects only the data sent to the terminal, not data sent to the radio.

See also: cr, lfadd

● Ax25l2v2   ONIOFF ·   v5.0

default ON

This command provides compatibility with all known packet units implementing
AX.25 protocol. When ON, Level 2 Version 2 protocol is implemented and the TNC will
automatically adapt to whichever version the connecting station is using. When OFF,
Level 2 Version 1 is implemented. Set this command to OFF if you need to digipeat
through other units which do not digipeat version 2 packets. You may also find benefit
from setting this command OFF when using several digipeaters (not nodes) to send
packets, or when conditions are marginal between the two stations involved. (NOTE:
Changing this setting after connecting to another station will have no effect on the
current connection.)

The major difference in V1 and V2 protocol is the method used to handle retries. In
the connected mode, if a packet is sent and not acknowledged, Version 1 will resend
the entire packet and then disconnect if the RETRY count is reached. Version 2 will
first send a poll, the response to this poll will determine if the packet was received. It
is possible that the ack was collided with and therefore the packet does not need to be
resent. If the packet was not received it will be re-transmitted. Each time a poll is
answered the TRIES count is reset to 0. If the RETRY count is reached, Version 2 will
attempt to re-connect unless RELINK is OFF. If the re-connect attempt is
unsuccessful, then Version 2 will issue a disconnect.

See also: relink, retry, tries

For more information the book *AX.25 Amateur Packet-Radio Link-Layer Protocol
Version 2.0 October 1984,* can be obtained from the ARRL.

● AXDelay   n   (n = 0 - 255)   v5.0

default 0

Each increment specifies 10 millisecond intervals. This value specifies a period of time
to wait, in addition to TXDELAY, after keying the transmitter before data is sent. This
delay can be helpful when operating packet through a standard "voice" repeater, or
when using an external linear amplifier which requires extra key-up time. Repeaters
using slow mechanical relays, split-sites, or both require some amount of time to get
RF on the air.

● **AXHang   n   (n = 0 - 255)**   **v5.0**

default 0

Each increment specifies 10 millisecond intervals. This value may be used to improve channel utilization when audio repeaters with a hang time greater than 10 msec are used. If the repeater squelch tail is long, it is not necessary to wait for AXDELAY after keying the transmitter if the repeater is still transmitting. If the TNC has heard a packet within the AXHANG period, it will not add AXDELAY to the key-up time.

● **Beacon   (Every I After) n   (n = 0 - 255)**   **v5.0**

default Every 0

Each increment specifies 1 minute intervals. A value of 0 turns the beacon OFF. Setting a value greater than 0 activates the beacon under the conditions specified. If the optional keyword Every is used, a beacon packet will be sent every n minutes. If set to After, a beacon packet will be sent ONCE after the specified interval with no channel activity.

The beacon frame consists of the text specified by BTEXT in a packet addressed to "BEACON". Beacon messages will be digipeated via any addresses specified in the UNPROTO command.

See also: btext

○ **BKondel   ONIOFF**   **v5.0**

default ON

When ON, the sequence backspace-space-backspace is sent to the attached terminal when the DELETE character is entered. When OFF, the backslash character "\" is sent to the terminal when the DELETE character is entered.

See also: delete, redisplay

● **BText   text   (0 - 128 characters)**   **v5.0**

default (blank)

BTEXT specifies the content of the data portion of the beacon packet. Any combination of characters and spaces may be used with a maximum length of 128. Entering a single "%" will clear BTEXT.

See also: beacon

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● **BUDCalls [+ l –]callsign(s) l NONE**   v5.0

default NONE

A list of up to 10 callsigns for use with BUDLIST or CONLIST. To delete or add individual entries precede the callsign with a "–" or "+" respectively. For example to delete WDØEMR type BUDC –WDØEMR.

See also: budlist, conlist

● **BUdlist OFF(NO,NONE) l TO l FROM l BOTH(ON,YES)**   v5.0

default OFF

When OFF, BUDLIST will allow monitoring of all packets even if the BUDCALLS list has callsigns in it. When BOTH or ON, only those stations whose calls are listed in the BUDCALLS will be monitored. Packets addressed to or from those callsigns will be monitored. If BUDLIST is TO, only those packets addressed to a station in the BUDCALLS list will be monitored, those from that station will not be monitored. When set to FROM, those packets from the stations in BUDCALLS will be monitored, but not those packets addressed to the BUDCALLS list. Note that suppressed calls (see SUPLIST) take precedence over BUDLIST. For instance if you have WØABC in your SUPCALLS with SUPLIST TO, and you have WØDEF in your BUDCALLS with BUDLIST BOTH, then packets from WØDEF to WØABC will NOT be monitored.

See also: budcalls, monitor, suplist

● **CALibrat**   v5.0

immediate

The CALIBRATE command is used to generate a signal which may be used as an aid in tuning the transceiver for operation with the TNC. Use of this command is explained in the Calibration/Equalization Section. The letter "X" will return you to Command Mode.

See also: Calibration/Equalization section

● **CAnline n (n = $00 - $FF)**   v5.0

default $18 <Ctrl-X>

This command is used to change the cancel-line input editing command character. When in Convers or Command Mode entering a <Ctrl-X> will cancel all characters input from the keyboard back to the last un-PASSed carriage return (unless PACTIME has expired and CPACTIME is turned on).

See also: canpac, cpactime, pass

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● **CANPac   n   (n = $00 - $FF)**   **v5.0**

default $19 <Ctrl-Y>

This command is used to change the cancel-packet command character. When in the Convers Mode entering a <Ctrl-Y> will cancel all keyboard input back to the last unpassed SENDPAC character (unless PACTIME has expired and CPACTIME is turned on).

This character also functions as a cancel-output character in Command Mode. Typing the cancel-output character a second time re-enables normal output. For example, if you've told the TNC to do a DISPLAY, a <Ctrl-Y> will stop the display and a second one re-enables the cmd: prompt after the next <CR>.

See also: canline, cpactime, sendpac

● **CD   INTERNAL | EXTERNAL | SOFTWARE**   **v5.0**

default INTERNAL

When set to INTERNAL, the TNC will detect a signal present on the frequency based on the method used by the attached modem. This is normally an energy type carrier detect, allowing shared voice and data on the same channel.

When set to EXTERNAL, the carrier detect is supplied by an external device, connected to the XCD pin on the radio port.

If set to SOFTWARE, the firmware inside the TNC will detect the presence of data to enable the carrier detection, allowing operation with un-squelched audio. Correct operation of SOFTWARE detect is affected by proper equalization and the SWP parameter. If your RCV light flickers, this is an indication that you may need to adjust the equalization. (Equalization is set with an internal jumper.)

See also: swp

● **CHeck   n   (n = 0 - 255)**   **v5.0**

default 0

Each increment of check is 10 seconds. If n is greater than 0, then a periodic check (poll) will be made to determine that a connected state still exists when no activity has occurred for n * 10 seconds. This prevents "hang-up" in a connected mode when a link failure occurs as a result of conditions beyond control of the connected stations. If n equals 0 then this timeout function is disabled. If using version 1 (AX25L2V2 OFF), a check timeout will initiate a disconnect.

See also: ax25l2v2, kntimer, relink, rnrtime

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● **CMdtime   n   (n = 0 - 15)**   v5.0

default 1

Each increment specifies 1 second intervals. This command sets the time allowed for
entry of required characters to escape the Transparent Mode. In order to allow escape
to Command Mode from Transparent Mode, while permitting any character to be sent
as data, a guard time of CMDTIME seconds is set up. After a delay of CMDTIME
since the last data characters were sent to the TNC, three COMMAND characters
must be entered within CMDTIME of each other. After a final delay of CMDTIME the
TNC will exit Transparent Mode and enter Command Mode. At this time you should
see the cmd: prompt. If CMDTIME is set to zero, the only exit from Transparent Mode
is a modem break signal. Example (if CMDTIME is 1 second and COMMAND is
<Ctrl-C>): wait one second, type a <Ctrl-C>, within one second type a second
<Ctrl-C>, within one second type a third <Ctrl-C>, WAIT one second, cmd: prompt
should appear. If your computer/program has the capability you can also send a
modem break to escape Transparent Mode.

See also: command, trans

● **CMSg   ON I OFF I DISC I PBBS**   v5.0

default OFF

When OFF, the custom connect text stored in CTEXT will not be sent to the
connecting station upon receiving a connect request. When ON, the custom string will
be sent. When CMSG is set to DISC, the custom text will be sent to the connecting
station, and then your TNC will disconnect from that station. If set to PBBS, the
custom text will be sent to the connecting station, and then the connection will
automatically be transferred to your PBBS. This will occur if the PBBS is available. If
the PBBS is not available, your TNC will disconnect from the station.

See also: ctext, pbbs

● **COMmand   n   (n = $00 - $FF)**   v5.0

default $03 <Ctrl-C>

This command is used to change the Command Mode entry character. When
COMMAND is set to the default value, typing a <Ctrl-C> causes the TNC to return to
Command Mode from packet Convers Mode. (See CMDTIME for returning to
Command Mode from Transparent Mode.)

● **CONList ON|OFF**   v5.0

default OFF

When ON, the TNC will recognize only those packets received with a callsign that also appears in the BUDCALLS list. All other packets are completely ignored. In other words, if a station is not in the BUDCALLS list, he may not use your station for ANY purpose, including digipeating through you. In addition, you will not be able to connect to any station that is not in your BUDCALLS list.

See also: budcalls

● **CONMode (Convers|Trans)**   v5.0

default Convers

This command controls the mode the TNC will be placed in AUTOMATICALLY after a connect if NOMODE is OFF. The connect may result either from a connect request received or a connect request originated by a CONNECT command. If the TNC is already in Convers or Transparent Mode when the connection is completed, the mode will not be changed. If you have typed part of a command line when the connection is completed, the mode change will not take place until you complete the command or cancel the line input.

See also: canline, connect, convers, nomode, trans

○ **Connect call1 [VIA call2, call3, ...call9]**   v5.0

immediate

call1 = callsign of station to be connected to.

call2 ... call9 = optional stations to be digipeated through. A maximum of 8 digipeater addresses (callsigns or aliases) can be specified. This is referred to as a path.

Each callsign may also have an optional Secondary Station Identifier (SSID) specified as -n, where n = 1 - 15. The digipeat callsigns are specified in the order in which they are to relay transmitted packets. The mode set by CONMODE will be entered upon successful connect, if NOMODE is OFF. If no response to the Connect request occurs after RETRY attempts, the command is aborted. A timeout message is printed on the display and the TNC remains in the Command Mode. The station being connected to (call1) may receive the connect request but be unable to accept connects, in which case a busy message will be printed to the screen and the TNC will stay in Command Mode. Connect requests may only be initiated in the Command Mode and the connect will be established on the stream you are on.

If a connect is in progress, or already established, the path may be changed by simply reissuing the CONNECT command with the desired path. This must be done on the same stream as the original connect. CAUTION, packets enroute between your station and the reconnected station may be lost.

If CONNECT is entered with no parameters, the status of the current stream is displayed.

See also: conmode, conok, maxusers, nomode, retry, ring, streamsw, xmitok

● CONOk   ON | OFF   v5.0

default ON

When ON, connect requests from other TNCs will be automatically acknowledged and a <UA> packet will be sent. The standard connect message, with stream ID if appropriate, will be output to the terminal and the mode specified by CONMODE will be entered on the I/O stream if you are not connected to another station and NOMODE is OFF.

When OFF, connect requests from other TNCs will not be acknowledged and a <DM> packet will be sent to the requesting station. The message "connect request: (call)" will be output to your terminal if INTFACE is TERMINAL or NEWUSER.

When operating with multiple connects allowed, the connection will take place on the next available stream. Connect requests in excess of the number allowed by the USERS command will receive a <DM> response and the "connect request: (call)" message will be output to your terminal if INTFACE is TERMINAL or NEWUSER.

See also: conmode, connect, intface, maxusers, monitor, nomode, users

○ CONVers   v5.0

immediate

CONVERS has no options. It is an immediate command and will cause entry into Conversational Mode from Command Mode on the current I/O stream. Any link connections are not affected.

See also: k, command

● CPactime   ON | OFF   v5.0

default OFF

When OFF and in the Convers Mode, packets are sent when the SENDPAC character is entered or when PACLEN is achieved. When ON and in the Convers Mode, packets are sent at periodic intervals determined by PACTIME. Characters are sent periodically as in Transparent Mode but the local editing and echoing features of

Convers Mode are enabled. CR should normally be OFF in this configuration, otherwise the SENDPAC character is appended at random intervals as the input is packetized by the timer.

See also: convers, cr, paclen, pactime, sendpac, trans

● **CR ON I OFF**   **v5.0**

default ON

When ON the SENDPAC character (normally carriage return) is appended to all packets sent in Convers Mode except when PACLEN is exceeded. Setting CR ON and SENDPAC $0D results in a natural conversation mode. Each line is sent when a <CR> is entered and arrives at its destination with the <CR> appended to the end of the line. To avoid overprinting, AUTOLF may need to be ON at the receiving end.

See also: autolf, lfadd, sendpac

● **CRSup ON I OFF**   **v5.0**

default OFF

When ON, this command suppresses every other carriage return (when no data is between them) in the received data before sending the data to the terminal. When OFF, no suppression of data occurs.

See also: autolf, lfsup

● **CStamp ON I OFF**   **v5.0**

default OFF

When ON, the daytime stamp is printed with all "*** CONNECTED TO" and "*** DISCONNECTED" messages on the terminal.

See also: connect, daytime, disconnect, mstamp

● **CText text (0 - 128 characters)**   **v5.0**

default (blank)

Enter any combination of characters and spaces up to maximum length of 128. Entering a single "%" will clear CTEXT. This entry specifies the text of the first packet to be sent in response to an accepted connect request provided that the parameter CMSG is not OFF.

See also: cmsg, connect

● **CWid   (Every | After) n   (n = 0 - 255)**   v5.0

default Every 0

Each increment specifies 1 minute intervals. A value of 0 turns the ID OFF. Setting a value greater than 0 activates the ID under the conditions specified. If the optional keyword Every is used, an ID will be sent every n minutes. If set to After, an ID will be sent ONCE after the specified interval with no channel activity. The callsign specified by the MYCALL command will be sent in CW using AFSK tones. Some countries require all stations to ID in Morse code periodically.

See also: mycall

○ **DAytime   yymmddhhmmss**   v5.0

If the parameter yymmddhhmmss is present, the software clock/calendar is set for MHEARD and NDHEARD logging, and CSTAMP and MSTAMP functions. When entering the daytime digits, enter in pure number sequence with no spaces, dashes, or slashes. For example: 860102223000 would indicate 1986, January 2, at 22:30:00 hours. If DAYTIME is entered with no parameter the daytime is displayed in a form depending on the setting of the DAYUSA flag. Setting DAYTIME to 000000000000 disables the optional real time clock.

See also: cstamp, daytweak, dayusa, mheard, mstamp

● **DAYTWeak   n   (n = 0 - 15)**   v5.0

default 8

This parameter is used to tweak the clock for accurate time keeping. Increasing the parameter will slow the clock, decreasing the parameter will speed up the clock. Each count corresponds to .85 seconds increase or decrease per day. Ambient temperature will affect the clock to some degree.

If WEFAX pictures are skewing, use this command to adjust the clock speed of the TNC.

○ **DAYUsa   ON | OFF**   v5.0

default ON

When ON, the daytime stamp is displayed in the form common in the USA: month/day/year. When OFF, the daytime stamp is displayed in the form common in Europe: day/month/year.

See also: daytime

● DBIdisc   ON I OFF   **v5.0**

default OFF

When OFF, only one disconnect command (D) need be given to terminate an unsuccessful connect attempt. If you are actually connected, the normal disconnect sequence will occur. When ON, a normal disconnect sequence will always occur (you will not be disconnected until you receive an acknowledge of your disconnect or until the retry count is exceeded). A second D is required to force a local disconnect independent of the retry counter.

See also: disconnect

○ DEIete   n   (n = $00 - $FF)   **v5.0**

default $08   <Ctrl-H>

This command sets the character to be used as the delete character. When this character is typed, the last input character is deleted. The most common settings are $08 (backspace) and $7F (delete).

See also: bkondel

● DIGipeat   ON I OFF   **v5.0**

default ON

When ON, any packet received that has MYCALL or MYNODE in the digipeat list of its address field will be retransmitted. Each station included in the digipeat list relays the packet in the order specified in the address field. Digipeating takes place concurrently with other TNC operations and does not interfere with normal connected operation of the station. To disable digipeat operations (via MYCALL or MYNODE) turn this command OFF.

See also: hid, myalias, mycall, mynode

○ Disconnect   **v5.0**

immediate

This command will initiate an immediate disconnect request on the current I/O stream. A successful disconnect results in the display of *** DISCONNECTED. If the RETRY count is exceeded while waiting for the connected station to acknowledge, the TNC moves to the disconnected state on that stream. Entering a second Disconnect command before RETRY has expired will result in an immediate disconnect on your end, but may leave the other station thinking it is still connected to you. Disconnect messages are not displayed when the TNC is in Transparent Mode. Other commands may be entered while the disconnect is in progress.

Disconnect MYPBBS

Issue this command if you want to cause the personal mailbox to issue a disconnect to the user of the mailbox. D MYPBBS is what you should type, do not type the call entered in the mypbbs command.

Disconnect MYNODE x   (x = KA-Node circuit)

x may be any of the KA-Node circuits in use, designated by A, B, C, etc. This command will cause the node to disconnect the stations linked through the node on the circuit specified. MYNODE does not refer to the call entered in the mynode command, but is the actual characters to type.

See also: dbldisc, newmode, retry, status

✪ DISPlay [c]   **v5.0**

immediate

This command causes the TNC to display a list of all the parameters in the TNC. You may also display only selected parameters by specifying the appropriate class identifier for that group. When using the DISPLAY command with a subclass be sure to use a space between the DISPLAY command and the subclass. Subclasses of related parameters are:

(A)sync	asynchronous port parameters (TNC to computer)
(C)haracter	special TNC characters
(I)d	ID parameters
(L)ink	parameters affecting packet link (TNC to TNC)
(M)onitor	monitor parameters
(P)bbs	mailbox commands
(T)iming	timing parameters

Individual parameter values can be displayed by entering the command name followed by <CR>.

See also: Display Listings section

◑ DWait   n   (n = 0 - 255)   v5.0

default 0

Each increment specifies 10 ms intervals. This value is used to avoid collisions with digipeated packets. The TNC will wait n * 10 ms after last hearing data on the channel before it begins its own key-up sequence. This value should be established and agreed on by all members of a local area network. The best value will be determined by experimentation but will be a function of the key-up time (TXDELAY). This feature is made available to help alleviate the drastic reduction of throughput which occurs on a channel when digipeated packets suffer collisions. Digipeated packets are not retried by the digipeater but must be restarted by the originating station. If all stations specify DWAIT, and the right value is chosen, the digipeater will capture the frequency every time it has data to send since digipeated packets are sent without this delay.

Observations have proven that a better algorithm for avoiding collisions between end-user stations, while still allowing digipeaters the high-priority access they require is achieved using persistence and slottime to determine proper transmit intervals, and setting DWAIT to 0.

See also: persist, slottime

◑ Echo   ON I OFF   v5.0

default ON

When ON, characters received from the computer by the TNC are echoed back and displayed. If you are receiving double print of characters entered at the keyboard, turn this command OFF. This corresponds to the setting in your terminal program for duplex. If your program is set for full-duplex set ECHO ON. If your program is set for half-duplex (some call it echo) then set ECHO in the TNC to OFF. Regardless of the setting of this command, the TNC will not echo an X-OFF or X-ON character to the terminal when it receives a STOP or START character. Echo is disabled in Transparent Mode.

See also: bkondel, flow

● EScape   ON I OFF   v5.0

default OFF

This command specifies the character which will be output to the terminal when an escape character ($1B) is received in a packet. When OFF, $1B is sent, this is useful if your terminal interprets ESC characters as screen positioning commands (ANSI). When ON, the escape character is sent as a dollar sign ($).

● FIlter ONlOFF   v5.0

default OFF

When ON, this command will inhibit the printing of control characters (hex $00 - $19)
which may be present in monitored packets. This will be useful if you are monitoring
channel traffic which includes binary file transfers or higher level protocols (networks
talking to each other). Control characters which may be embedded in those packets
can have strange and unpredictable effects on the monitoring TNC. All control
characters except carriage return ($0D) and line feed ($0A) will be filtered. This
command DOES NOT affect receipt of control characters in packets received from a
"connected" station when MONITOR or MCON is OFF.

See also: monitor

● Flow ONlOFF   v5.0

default ON

When FLOW is ON, any character entered from the terminal will halt output to the
terminal until the current packet is completed (by SENDPAC, PACLEN, or
PACTIME). Cancelling the current input to the TNC or typing the REDISPLAY-line
character will also cause output to resume. FLOW will keep received data from
interfering with data entry. When FLOW is OFF, received data will be "inter-leaved"
with keyboard entry. If using a split screen terminal program, you should have FLOW
OFF and ECHO OFF to allow received data to be displayed while you type into the
TNC's type-ahead buffer.

See also: canline, canpac, cpactime, echo, paclen, redisplay, sendpac

● FRack n (n = 1 - 15)   v5.0

default 4

Each increment specifies 1 second intervals. After transmitting a packet requiring
acknowledgment, the TNC waits FRACK seconds before incrementing the retry
counter and sending the packet again. If the retry count (specified by the RETRY
command) is exceeded, the current operation is aborted. If the packet address includes
digipeaters, the time between retries is adjusted to FRACK * ((2 * m) + 1) where m is
the number of digipeater stations specified. When the retried packet is sent, a random
wait time is also added to avoid lockups where two units repeatedly collide with each
other.

The FRACK timer begins when PTT is released (the packet has been sent) and is
suspended when data carrier from the radio is present, or when your station is
transmitting.

See also: connect, resptime, retry

● **FUlldup ON|OFF**   v5.0

default OFF

When OFF, the data carrier detect signal is used as a packet collision avoidance signal. When ON, the modem is run full duplex, and carrier detect does not inhibit transmission. The full duplex mode may be useful especially for satellite operations using duplex radio setups. Full duplex should not be used unless both you and the station you are communicating with have full duplex capability.

● **HBaud n   (n = 300, 400, 600, or 1200)**   v5.0

default 1200

This baud rate specifies the rate of data exchange between the radio stations. The value of HBAUD has NO relationship to the terminal baud rate specified with ABAUD. In order to communicate with other packet stations, the baud rate must be the same at each end of the link. As a general rule, 300 baud is used on frequencies below 28 MHz, 1200 baud is used on frequencies above 28 MHz. FCC rules currently limit the maximum baud rate to 300 when operating below 28 MHz. Although the KPC-3 can operate 300 baud, the modem tones will still use a 1000 Hz shift whereas most HF packet uses a 200 Hz shift.

● **HEAderln ON|OFF**   v5.0

default ON

When ON a carriage return is output to the terminal between the header and text of monitored packets. This causes the packet header and time stamp (if on) to be displayed on one line, with the packet text displayed below it on the next line. When receiving only packets addressed to you (MONITOR and/or MCON OFF) this parameter does not apply. When OFF the data will be on the same line as the header.

See also: cstamp, mcon, monitor, mstamp

○ **Help [command]**   v5.0

immediate

This command, when entered without any arguments, will display a list of all of the commands available in the KPC-3. If an optional command is given, a brief description of the stated command is displayed. NOTE: If you give the Help Help command using a Host mode program, you may experience a *very* long delay before the data appears on your screen.

● **HId   ON/OFF**   v5.0

default ON

When ON, an ID packet will be sent every 9.5 minutes, provided that packets are being digipeated through your station, or routed through your KA-Node, or into your PBBS. This command should be ON if digipeating, node or pbbs is enabled. If OFF, periodic identification packets will not be sent.

See also: digipeat, id, myalias, mynode, mypbbs, numnodes, pbbs

● **Id**   v5.0

immediate

When this command is entered an identification packet will be forced. This command can be used to insure that your station identification is the last transmission before taking the station off the air. The ID packet is an unnumbered information <UI> packet whose data consists of your station identification as set in MYCALL. The MYCALL will be appended with "/R", MYALIAS callsign appended with "/D", MYNODE callsign appended with "/N", and MYPBBS callsign appended with "/B", if these functions are enabled. This packet will be addressed to "ID" and digipeated via any addresses specified in the UNPROTO command.

See also: hid, unproto

○ **INtface   NEWUSER I TERMINAL I BBS I HOST I KISS**   v5.0

default NEWUSER

When set to NEWUSER, the TNC will operate with a standard terminal or computer running a terminal emulation program with a limited command set available. When set to TERMINAL, the full command set of the TNC is available. When set to BBS, the TNC deletes certain messages (i.e. *** connect request, *** FRMR, etc) for greater compatibility with full-service BBS programs such as WØRLI, WA7MBL, CBBS, etc. When set to HOST, the TNC will talk to the attached computer using the Kantronics HOST mode. (See the Host Mode Section for details.) When set to KISS, the KISS code as specified by Phil Karn is implemented for communication to the attached computer. (See the KISS Mode section.)

After changing the setting of this command, a soft reset must be performed for the new mode to take effect (see RESET).

○ **K**   v5.0

immediate

This single letter command is synonymous with CONVERS. It is included as a single-keystroke convenience for entering Convers Mode.

See also: convers

● **KNtimer n (n = 0 - 255)**   v5.0

default 15

If there is no activity (data) on a KA-Node circuit for n minutes, the KA-Node will disconnect both the input and output sides of the KA-Node circuit. Setting KNTIMER to 0 disables this feature.

See also: rnrtime

● **LCok ON I OFF**   v5.0

default ON

When ON, no character translation occurs in the TNC. If OFF, lower case characters will be translated to upper case before being output to the terminal from the TNC. This case translation is disabled in Packet Transparent Mode.

● **LCStream ON I OFF**   v5.0

default ON

When ON, the TNC allows for lower-case characters to be used in stream switching.

See also: status, streamsw

● **Leds ON I OFF**   v5.0

default ON

When OFF the software controlled front panel LEDs will not light, in order to conserve power.

● **LFadd ON I OFF**   v5.0

default OFF

When ON, a line-feed will be appended to every carriage return received from the keyboard before being transmitted. When OFF, no line feeds will be added to the transmitted signal.

● **LFSup ON|OFF**   v5.0

default OFF

When ON, this command suppresses any line-feed characters received from the other station, relying on your terminal program to properly advance to the next line. When OFF, the line-feeds received from the other station are not suppressed but are sent to your terminal as received.

See also: autolf, crsup

● **LList ON|OFF**   v5.0

default OFF

When ON, stations in the SUPCALLS list attempting to connect to or digipeat through your station will be ignored.

See also: supcalls

● **MAll ON|OFF**   v5.0

default ON

When ON, monitored packets include "connected" packets between other stations. If OFF, other station's connected packets will not be monitored. This is a useful arrangement when stations are talking as a group in an unconnected configuration.

See also: monitor

● **MAXframe n (n = 1 - 7)**   v5.0

default 4

MAXFRAME sets an upper limit on the number of unacknowledged packets which can be outstanding at any one time. The TNC will send MAXFRAME number of packets in a single transmission, if they are available.

See also: paclen

● **MAXUsers n (n = 1 - 26)**   v5.0

default 10

This command causes the TNC to allocate the memory required for the maximum number of simultaneous connections you wish to allow. Each connection uses a different stream. In order to direct what you want to say to a different stream you use the STREAMSW character. All streams may be used for outgoing packets, but USERS sets the number that may be used for incoming connections. Changing the value of

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MAXUSERS will cause the TNC to perform a "soft reset". In order to change the current value of MAXUSERS, you must spell out the entire command word. Note that you may not change the value of MAXUSERS while you are connected, since this would reset the TNC and cause all existing connections to be lost.

See also: status, streamsw, users

● MBeacon   ON | OFF   v5.0

default ON

This command determines whether packets addressed to Beacon or ID will be monitored and displayed on the screen. If you do not wish to monitor Beacon or ID packets, turn this command OFF.

See also: beacon, id, monitor

● MCOM   ON | OFF   v5.0

default OFF

When ON, monitored packets include the following AX.25 control packets, if MONITOR is ON. If connected, MCON must also be ON. The "<" and "<<" characters are used to bracket and denote packets received as version 1 or version 2, respectively. The bracketed information will appear at the end of the header information.

<C>	Connect request
<D>	Disconnect request
<DM>	Disconnected Mode
<UA>	Unnumbered Acknowledge

In addition, the following bracketed information will be added to the Information packets as appropriate:

<UI>	Unconnected Information frame
<Is>	Information frame (connected); s = send sequence number

See also: ax25l2v2, monitor, mresp

For more information, the book *AX.25 Amateur Packet-Radio Link-Layer Protocol Version 2.0 October 1984,* can be obtained from the ARRL.

● **MCon   ONＩOFF**   **v5.0**

default OFF

When OFF, and connected, you will monitor only those packets addressed to you. Any header information displayed will be determined by the settings of STREAMEV and STREAMCA. When OFF, and not connected, all eligible packets (as determined by other monitor commands) will be monitored. When ON, all eligible packets will be monitored whether connected or unconnected.

See also: monitor, streamca, streamev

● **MHClear**   **v5.0**

immediate

This command erases the stations heard log.

See also: mheard

◌ **MHeard   [SＩL]**   **v5.0**

immediate

This command causes display of a list of stations heard. An asterisk, *, indicates that the station was heard through a digipeater. The date/time the station was last heard is also displayed. If the S option is used, i.e. MHEARD S, then only the callsigns of the stations heard will be displayed. If the L option is selected, all callsigns contained in the received packet as well as the digipeater paths, are displayed. For example:

> WDØEMR > ID   10/16/88 14:31:30
>   VIA TOP, KSBRE, WØXI, SUTNE

Here, your station heard WDØEMR transmitting an ID packet. WDØEMR was also using the digipeating path TOP, KSBRE, WØXI, SUTNE. If your station heard WDØEMR via one of these other stations, an asterisk would show by the call or alias of the last digipeater heard and an asterisk would show beside WDØEMR.

See also: daytime, mhclear

◌ **Monitor   ONＩOFF**   **v5.0**

default ON

When ON, unconnected packets will be monitored unless prohibited by SUPLIST, BUDLIST, CONLIST, or LLIST. This will also allow monitoring of other packets if permitted by the other monitor commands. The MONITOR command acts as a master switch for the MALL, MCOM, MCON, MRESP, and MRPT commands. The addresses in the packet are displayed along with the data portion of the packet. Callsigns (to and from fields) are separated by a ">"; and the Secondary Station Identifier (SSID) is

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displayed if it is other than 0. If any data is contained in the monitored packet which is not described in the AX.25 protocol, it is displayed in curly braces on the header line. All monitor functions are disabled in the Transparent Mode.

When OFF, you will monitor only those stations connected to you, no matter how other monitor commands are set. Any header information displayed will be determined by the settings of STREAMCA and STREAMEV.

See also: budlist, conlist, headerln, llist, mall, mbeacon, mcom, mcon, mresp, mrpt, mstamp, pid, streamca, streamev, suplist

● MResp   ON|OFF   v5.0

default OFF

When ON, monitored packets include the following AX.25 response packets, if MONITOR and MCOM are ON. If connected, MCON must also be on. The bracketed information will appear at the end of the header information. The "<" and "<<" characters are used to bracket and denote packets received as version 1 or version 2, respectively. For example, "<<RR1>>" denotes a version 2 packet. In addition upper case characters are used to designate commands (polls) and lower case characters are used to denote responses for RR, REJ, and RNR. For example, <<rr1>> is a response in version 2.

\<FRMR\>	Frame Reject
\<REJr\>	Reject, r = received sequence number
\<RNRr\>	Device busy, r = received sequence number
\<RRr\>	Receive Ready, r = received sequence number

In addition, the following bracketed information will be added to the Information packets as appropriate:

\<Isr\>	Information frame (connected);
	s = send sequence number, r = received sequence number

See also: ax25l2v2, mcom, monitor

For more information the book *AX.25 Amateur Packet-Radio Link-Layer Protocol Version 2.0 October 1984*, can be obtained from the ARRL.

● **MRPt ON I OFF**   v5.0

default ON

This command affects the way monitored packets are displayed. If ON, the entire digipeat list is displayed for monitored packets, and the station that relayed the packet is indicated with an asterisk. The MONITOR command must be ON for this command to work, and if connected MCON must also be ON. If OFF, only the originating station and the destination station callsigns are displayed for monitored packets.

See also: monitor

● **MStamp ON I OFF**   v5.0

default OFF

This command enables time stamping of monitored packets. The date and time information is then available for use for automatic logging of packet activity or other computer applications. The date and time are set initially by the DAYTIME command, and the date format is determined by the DAYUSA command. The MONITOR command must be ON for this command to work, and if connected MCON must also be ON.

See also: cstamp, daytime, monitor

● **MYAlias xxxxxx-n**   v5.0

default (blank)

Setting this command to a callsign or character string enables digipeating by using the MYALIAS. Enter up to six characters (plus optional SSID) which are different than those used for MYCALL, MYNODE, MYPBBS, or MYREMOTE. For example: you may enter LAW-3 as the MYALIAS, which would be easier to remember for stations wishing to digipeat through a station in Lawrence, enroute to a station more distant. You may disable the alias digipeating with the command MYALIAS %.

See also: hid

○ **MYcall xxxxxx-n**   v5.0

This command tells the TNC what its callsign is. When the TNC is first turned on out of the box, or after a hard reset, it asks you for your callsign – there is NO DEFAULT. The callsign you enter is placed in this parameter. The extension n is called a Secondary Station Identifier (SSID) and is defaulted as 0, but may be any number from 0 to 15. All packets originated by the TNC will contain this callsign in the FROM

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address field. Any packets received by the TNC with this callsign in the TO address field or digipeat fields will be responded to appropriately (connect, disconnect, ack, digipeat, etc.).

See also: cwid, digipeat, id, myalias, mynode, mypbbs, myremote

● MYNode xxxxxx-n   v5.0

default MYCALL-7

Setting this command to a callsign or character string enables the KA-Node in the TNC. Enter up to six characters (plus optional SSID) which are different than those used for MYCALL, MYALIAS, MYPBBS, or MYREMOTE. You must also have the NUMNODES command set to a non-zero value. You may disable the KA-Node by setting MYNODE to the same as MYCALL, or setting NUMNODES 0.

See also: digipeat, ndwild, numnodes; KA-Node section

○ MYPbbs xxxxxx-n   v5.0

default MYCALL-1

Enter up to six characters which will be used as the operating address for your Personal Packet Mailbox. Enter up to six characters (plus optional SSID) which are different than those used for MYCALL, MYALIAS, MYNODE, or MYREMOTE.

See also: pbbs

● MYRemote xxxxxx-n   v5.0

default (blank)

This command sets the callsign used for remote access to the command set of the TNC. Enter up to six characters (plus optional SSID) which are different than those used for MYCALL, MYALIAS, MYNODE, or MYPBBS. In addition, the RTEXT must be programmed with a text string. A station that connects will be sent a series of numbers that must be decoded according to RTEXT.

See also: rtext; Remote Access section

● NDHClear   v5.0

immediate

This command will clear the list of nodes heard by the TNC.

See also: ndheard

● **NDHeard [S I L]**   v5.0

immediate

This command allows the operator to display a list of nodes whose ID packets have been heard by the TNC. The lists includes KA-Nodes as well as TheNet, NET/ROM and G8BPQ nodes. TheNet, NET/ROM and G8BPQ nodes are identified as:

 ALIAS (CALLSIGN)

and Kantronics KA-Nodes will be identified as:

 MYNODE (MYCALL)

An asterisk, *, indicates that the station was heard through a digipeater. The date/time the station was last heard is also displayed. If the S option is used, i.e. NDHEARD S, then only the callsigns of the stations heard will be displayed. If the L option is selected, all callsigns contained in the received packet are displayed. (See MHEARD for display.)

See also: mynode, ndhclear

● **NDWild ON I OFF**   v5.0

default OFF

When OFF, the KA-Node will only recognize connect requests directed to the MYNODE call. When ON, connect requests to any SSID of the MYNODE call will be recognized as connects to the KA-Node, if that SSID is not being used for any other ID in the TNC.

See also: myalias, mycall, mynode, mypbbs, myremote

● **NEwmode ON I OFF**   v5.0

default ON

When ON, the TNC will return to Command Mode if the station on the current I/O stream disconnects. The TNC will not return to Command Mode if the station disconnecting is on a different stream. When OFF, a disconnect will not cause the TNC to change modes.

See also: connect, disconnect, status

● **NOmode   ON⏐OFF**   v5.0

default OFF

When OFF and a connection takes place, the TNC will change to whatever mode is specified in CONMODE. When ON, the TNC stays in Command Mode after connecting to another station; that is, it does not immediately change to Convers or Transparent Mode.

See also: conmode, connect

● **NText   message   (up to 128 characters)**   v5.0

default (blank)

This entry specifies customized text to be sent with the initial KA-Node sign-on message (when the KA-Node is connected to by a remote station). Enter any combination of characters and spaces up to a maximum length of 128. Entering a single "%" will clear NTEXT.

See also: mynode, numnodes

● **NUcr   n   (n = 0 - 31)**   v5.0

default 0

This command determines the number of nulls sent to the terminal after a <CR>, in order to enable a transmission delay following any <CR> sent to the terminal. This is useful for some hardcopy terminals.

● **NULf   n   (n = 0 - 31)**   v5.0

default 0

This command determines the number of nulls sent to the terminal after a <LF>, in order to enable a transmission delay following any <LF> sent to the terminal. This is useful for some hardcopy terminals.

● **NUMnodes   n   (n = 0 - 6)**   v5.0

default 0

This command is used to set the number of allowable circuits through the KA-Node. For example, if you wish to allow up to 3 simultaneous circuits through the node, set NUMNODES 3. This command will cause a soft reset.

Approximately 4K of RAM is used for each circuit. The amount of RAM available will depend on how much RAM has been used for the PBBS, MAXUSERS, and MYREMOTE parameters. If you select n larger than available RAM will allow, a "Not

35

enough RAM" message will be returned to you. Generally, set the amount of RAM required first for your PBBS (personal bulletin board) and then set the desired number of circuits. If n is set to 6 you can not have a mailbox. If n is larger than 6, a "Value out of range" message will be returned to you.

See also: mynode; KA-Node section

● **Paclen   n   (n = 0 - 255)**   **v5.0**

default 128

This command specifies the maximum length of the data portion of a packet. The TNC will automatically send a packet when the number of input bytes reaches n. This value is used in both Convers and Transparent Modes. A value of 0 means 256 bytes.

See also: maxframe

● **PACTime   (Every|After) n   (n = 0 - 255)**   **v5.0**

default After 10

This parameter is always used in Transparent Mode, and will also be used in Convers Mode if CPACTIME is ON. When After is specified, bytes are packaged when input from the terminal stops for n*100 ms or when PACLEN is reached. When Every is specified, input bytes are packaged and queued for transmission every n * 100 ms or when PACLEN is reached. A zero length packet is never produced, and the timer is not started until a new byte is entered. If Every or After is not given, the current state is retained.

See also: cpactime, trans

● **PARity   NONE|EVEN|ODD|MARK|SPACE**   **v5.0**

default NONE or EVEN   (determined by autobaud routine)

This command sets the Parity mode for communication with the terminal.

The autobaud routine sets PARITY based on what is received when the * is pressed. If the 8th bit is set, PARITY is set EVEN. If the 8th bit is not set, PARITY is set to NONE. This command corresponds to the setting of parity in your communications program. The TNC can only send serial output with 8 data bits and one stop bit. Setting the PARITY parameter defines the eighth bit.

When transmitting in Packet Mode, the 8th bit is stripped (i.e. set to 0) if PARITY is set to EVEN, ODD, MARK, or SPACE. If PARITY is set to NONE, all 8 bits from the computer may be transmitted if the 8BITCONV command is ON.

See also: 8bitconv

● **PASs n (n = $00 - $FF)**   **v5.0**

default $16 <Ctrl-V>

This command selects the ASCII character used for the pass input editing command. You may use this character to send any character in a packet in Convers Mode, even though that character may have a special function. For example, if you wish to send a COMMAND character (<Ctrl-C>) as part of the packet, you can do so by preceding it with the PASS character. The character will be sent rather than returning the TNC to Command Mode. In Transparent Mode all characters are passed, there are no special functions except the one combination to get out of transparent.

● **PASSAll ON|OFF**   **v5.0**

default OFF

When OFF, packets will only by displayed if the CRC (error checking) is correct, and according to monitor commands. When this command is ON, the TNC will accept packets, regardless of whether or not the CRC is correct. The TNC will attempt to decode the address field as well as the data field and display the packets as specified by other commands such as MONITOR. The entire packet, determined by the beginning and ending flags, must be received before an attempt is made to decode. If both flags are not received the data will not be decoded. MHEARD and NDHEARD logging are disabled when PASSALL is ON.

○ **PBbs n (maximum depends on RAM)**   **v5.0**

default 5

Setting n greater than 0 allocates memory and activates the Personal Mailbox in the TNC. The amount of memory allocated will be n kilobytes, and may be limited by other functions requiring memory (e.g. NUMNODES and MAXUSERS). Changing the size of the PBBS memory allocation will not affect the contents of the mailbox (messages will be preserved). If you attempt to set the PBBS smaller than is required for existing messages you will receive the message "Messages would be lost" and no change will be made to the mailbox size. In this case to reduce the size of the mailbox you must first either kill some of the messages or set PBBS 0 which will delete all messages; then set the new size. Using the PBBS n command with n equal to the current size will renumber the messages in the mailbox beginning with message number 1. If n is a different size, the messages will not be renumbered. This command causes a soft reset if n is different from its previous value.

If NUMNODES is set to 6, you can not have a mailbox.

See also: cmsg, mypbbs, pbheader, pblo, pbperson, ptext; PBBS section

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● **PBHeader ON|OFF**   v5.0

default ON

When ON the routing headers received from a full service BBS will be stored in the PBBS mailbox. When OFF, these headers are not stored in the mailbox, allowing messages to require considerably less space. The routing headers are those lines you normally see in messages beginning with R:. Note that the PBBS will ignore all lines beginning with R: until it sees the first line that does not have R: in column one. From that point on, all of the message will be stored, even if a line begins with an R:.

See also: PBBS section

● **PBLo [OLD | NEW] [FIXED | VARIABLE]**   v5.0

default OLD FIXED

When set to OLD the PBBS will list messages to the user from oldest to newest (i.e. ascending numerical order). When set to NEW, the newest message will be listed first. When the second parameter is set to FIXED, the user cannot change the listing order. When the second parameter is set to VARIABLE, the user may change the order in which messages will be listed by using the LO command within the PBBS.

See also: PBBS section

● **PBPerson ON|OFF**   v5.0

default OFF

When OFF the personal mailbox will allow messages to be sent to any callsign. When ON only messages addressed to the MYCALL or MYPBBS callsigns will be accepted over the radio, but a message entered from the terminal may be addressed to anyone.

See also: mycall, mypbbs, pbbs

● **PERsist n (n = 0 - 255)**   v5.0

default 63

n is used to determine if a packet will be sent after SLOTTIME expires. For example, let's assume a PERSIST setting of 63 and a SLOTTIME setting of 10. This slottime setting corresponds to 100 milliseconds. When the TNC detects that the channel is clear and available (no carrier is detected), it starts a timer (SLOTTIME). When the timer expires (100 ms in our case) the TNC generates a random number between 0 and 255. If the generated number is equal to or less than the PERSIST value, the TNC keys up the transmitter and sends the data packet. With our setting of 63 the odds of this occurring after the first slottime are 1 in 4. (Actually the probability is PERSIST plus 1 divided by 256.) If the TNC generated random number is greater

than PERSIST, the TNC restarts the timer and waits for the timer to expire again before generating a new random number. This is repeated until the TNC gains channel access and sends its packet of information.

The algorithm used to determine whether or not to transmit using the PERSIST/SLOTTIME method has been shown to be considerably more sophisticated than the DWAIT method used by most standard AX.25 packet stations. The result of using the persistence algorithm is increased throughput under most channel conditions. Making SLOTTIME smaller will cause the TNC to generate the random number more frequently, whereas raising the PERSIST value will give a better chance (improve the odds) of transmitting the data. Through careful choice of these values, it is possible to improve data throughput while at the same time permitting shared channel usage by other packet stations. The persistence algorithm has been added on top of the DWAIT algorithm.

See also: slottime

● PId   ON I OFF   v5.0

default OFF

When OFF only those packets with a protocol ID of $F0 (pure AX.25) are displayed. When ON all packets are displayed. Some of the information in non-AX.25 (for example: TCP/IP, NET/ROM or TheNet) packets can cause some computers to lock up. The header will also show the PID in curly braces, i.e., (CF). For information, Net/Rom, TheNet and G8BPQ type nodes have a PID of CF, TCP/IP uses CC and CD, and standard AX.25 is F0.

● PText   message   (up to 128 characters)   v5.0

default (blank)

This entry specifies the customized text sent with the initial PBBS (personal mailbox) sign-on message (when the PBBS is connected to by a remote station). Enter any combination of characters and spaces up to a maximum length of 128. Entering a single "%" will clear PTEXT. You should not have the ">" character in your PTEXT, as this is reserved by BBS systems for their prompt.

See also: pbbs

● Redisplay   n   (n = $00 - $FF)   v5.0

default $12 <Ctrl-R>

This command is used to change the REDISPLAY-packet input editing character. The parameter n is the ASCII code for the character you want to type in order to REDISPLAY the packet currently being entered.

You can type this character to cause the TNC to redisplay the packet you have begun. When you type the REDISPLAY-packet character, the following things happen: First, type-in flow control is released (if FLOW was enabled). This displays any incoming packets that are pending. Then a \ (backslash) character is displayed, and the packet you have begun is redisplayed on the next line. If you have deleted and retyped any character, only the final form of the packet will be shown. You are now ready to continue typing where you left off. Incoming packets will continue to be displayed until you type the next character to be inserted into the packet.

You can use the REDISPLAY-packet character to see a "clean" copy of your input if you are using a printing terminal (or have BKONDEL OFF) and you have deleted characters. The REDISPLAYed packet will show the corrected text.

You can also use this character if you are typing a message in Convers Mode and a packet comes in. You can see the incoming message before you send your packet, without cancelling your input.

See also: bkondel, canline, canpac, flow

● RELink ON|OFF   v5.0

default OFF

When OFF, the TNC operating with AX25L2V2 ON does not attempt to automatically reconnect. When ON, the TNC operating with AX25L2V2 ON will attempt to automatically reconnect after RETRY is exceeded.

The KA-Node and the PBBS will never attempt to reconnect regardless of the setting of this command. If using AX.25 Level 2 Version 1 (AX25L2V2 OFF) this command has no effect.

See also: ax25l2v2, retry, tries

✪ RESET   v5.0

immediate

This command is used to perform a soft reset. What is in the mailbox (PBBS) is kept, and the NDHEARD and MHEARD logs are not cleared. Any existing connections will not be recognized by your TNC even though the other end still believes it is connected to you. The initial sign-on message will be displayed.

See also: intface, maxusers, myremote, numnodes, pbbs, restore

● **RESPtime   n   (n = 0 - 255)**   v5.0

default 5

The number specified establishes a minimum delay, in 100 ms increments, that is imposed on acknowledgment of information-bearing packets (I-frames). Delay may run concurrently with DWAIT (PERSIST and SLOTTIME) and any other random delays in effect. This command is useful in avoiding collisions during such activity as file transfers using full-length packets. This timer is suspended whenever PTT or carrier detect is present if operating half-duplex.

See also: frack

● **RESTORE Default**   v5.0

immediate

When RESTORE D is given, the TNC will revert to factory default settings, ask for your callsign, and then perform a soft reset. The ABAUD parameter will be set to 0 but the unit will not perform the autobaud routine until the next time it is turned off and on.

See also: reset

● **RETry   n   (n = 0 - 15)**   v5.0

default 10

This command specifies the number of packet retries. Packets are re-transmitted n times before the operation is aborted. The time between retries is specified by the command FRACK.

See also: ax25l2v2, frack, relink, tries

● **RIng   ON|OFF**   v5.0

default ON

When ON, three bell characters ($07) are sent to the terminal with each "*** CONNECTED TO" message when another station initiates the connect.

● **RNrtime   n   (n = 0 - 255)**   **v5.0**

default 0

RNRTIME is set in 10 second increments. If a connection stays in a remote device busy state (continues to receive RNR frames) for RNRTIME, the TNC will disconnect. If a KA-Node connection stays in a remote device busy for RNRTIME the KA-Node will disconnect the input and output sides of the KA-Node circuit. Setting RNRTIME to 0 disables this function.

See also: mresp

● **RText   text   (up to 128 characters)**   **v5.0**

default (blank)

This command sets the password string for use when accessing the MYREMOTE or when performing SYSOP functions in the PBBS remotely. When you connect to the MYREMOTE or attempt to enter the SYSOP mode of the PBBS, the TNC will send three sets of numbers, one of which must be properly decoded using this string. For instance, if the RTEXT is set to "This is my RTEXT string" and you connect to the MYREMOTE, the TNC would send three sets of random numbers. The numbers would look like:

```
5  20  14  7  18  3
7  1  4  14  8  19
9  3  8  12  22  1
```

You must then pick ONE of these lines and decode the password string. Let's say I choose to decode line 3 (9 3 8 12 22 1). Rewriting my RTEXT string to make this easier I would have:

```
        1         2
1234567890123456789 0123
This is my RTEXT string
```

Now, decoding the string, character 9 is "m" character 3 is "i", character 8 is " ", character 12 is "R", character 22 is "n", and character 1 is "T". I must send the following in response to my remote access attempt:

```
mi RnT
```

Note that case is significant and spaces are considered valid characters. If you fail to properly decode the password, the TNC will send three new lines of numbers. You will be given a maximum of three attempts to properly decode the password string. If you fail in three attempts, the TNC will disconnect you. After failing in three attempts, the MYREMOTE is disabled for 15 minutes.

● **SCrccnl n (n = 0 - 255)**   **v5.0**

default 0

This value is used to properly format what is sent to your terminal. A <CR> sequence is sent to the terminal at the end of a line when n characters have been printed. A value of zero inhibits this action.

See also: autolf

● **SEndpac n (n = $00 - $FF)**   **v5.0**

default $0D <Ctrl-M>

This command specifies a character that will force a packet to be sent in Convers Mode. In the Convers Mode, packets are sent when the SENDPAC character is entered or when PACLEN is achieved.

See also: cpactime, cr

● **SLottime n (n = 0 - 255)**   **v5.0**

default 10

n specifies the amount of time, in 10 millisecond increments, between successive tries of the persistence algorithm.

See also: persist

● **STARt n (n = $00 - $FF)**   **v5.0**

default $11 <Ctrl-Q>

This command specifies the character sent by the computer to the TNC to restart input from the TNC. If set to $00 only hardware flow control will be used. For software flow control, set this parameter to the character the computer will send to restart data flow.

See also: stop, xflow, xoff, xon

● **STATShrt ON l OFF**   **v5.0**

default ON

If ON, entry of the STATUS command will display only the current I/O stream and any other streams having a connected status. If OFF, entry of the STATUS command will display all streams allowed by MAXUSERS, PBBS, NUMNODES, and MYREMOTE.

See also: status

immediate

This command will display both the identifier and link state of all allowed streams. If STATSHRT is ON only active streams will be displayed. The current input and output (IO) stream is also indicated. A pound sign (#) indicates that there is unacknowledged data in the buffers for that stream. The number immediately following the # is the number of bytes outstanding. The number in parentheses is the number of packets not yet acknowledged.

The following is an example of a display (with STATSHRT OFF). A, B, C, through J indicate the stream. "A" stream is connected to KEØSM and has 50 bytes in 2 packets that are unacknowledged. The current stream (IO) is the "B" stream, which is connected to WK5M. KA5ZTX is connected on circuit "A" of the KA-Node. All other streams, node circuits, the BBS, and the remote access are disconnected.

```
cmd:status
FREE BYTES 1661
A  stream -        #50(2) CONNECTED to KEØSM
B  stream - IO  CONNECTED to WK5M
C  stream -        DISCONNECTED
.....

.....
J  stream -        DISCONNECTED
BBS DISCONNECTED
REM DISCONNECTED
Ain  CONNECTED to KA5ZTX
Aout DISCONNECTED
Bin  DISCONNECTED
Bout DISCONNECTED
```

See also: maxusers, myremote, numnodes, pbbs, statshrt, streamsw

● **STOp n   (n = $00 - $FF)**   **v5.0**

default $13 <Ctrl-S>

This command specifies the character sent by the computer to the TNC to stop input from the TNC. If set to $00 only hardware flow control will be used. For software flow control set this parameter to the character the computer will send to stop data flow.

See also: start, xflow, xoff, xon

● **STREAMCa   ON I OFF**   **v5.0**

default OFF

When receiving packets addressed only to you, setting this command ON will enable
the display of the callsign of the connected-to station following the stream identifier of
the connection (controlled by STREAMEV). This is especially useful when operating
with multiple connections allowed.

See also: mcon, monitor, streamev

● **STREAMEv   ON I OFF**   **v5.0**

default OFF

When OFF, the stream indicator is displayed only when a change in streams occurs.
When ON, the stream indicator will be displayed with every incoming packet. This
command takes effect when receiving only those packets addressed to you.

See also: mcon, monitor, streamca, streamsw

● **STReamsw   n   (n = $00 - $FF)**   **v5.0**

default $7C (I)

This command selects the character to be used to signify that a new "stream" or
connection channel is being addressed. To change streams you must type the
streamswitch character followed immediately by the stream designator. The stream
designator is an alphabetic character A through Z limited by the value of
MAXUSERS.

If STREAMSW is set to a dollar sign ($24) you will need to enter numerical code type
parameter values in decimal. Or precede the $ with the PASS character in order to
enter hex numbers.

The character selected can be PASSed in the Convers Mode by using a special PASS
character, and will always be passed as data in the Transparent Mode. If operating in
the Transparent Mode and you wish to change streams, you must first return to the
Command Mode.

See also: maxusers, pass, status

● **SUPCalls   [+ I –]callsigns I NONE**   **v5.0**

default NONE

A list of up to 10 callsigns for use with SUPLIST or LLIST. To delete or add individual
entries precede the callsign with a "–" or "+" respectively. For example to delete
WDØEMR type SUPC –WDØEMR.

See also: llist, suplist

● **SUplist OFF(NO,NONE) I TO I FROM I BOTH(ON,YES)**   **v5.0**

default OFF

When OFF, SUPLIST will allow monitoring of all eligible packets (according to other monitor commands) even if the SUPCALLS list has callsigns in it. When BOTH or ON, packets addressed to or from those stations whose calls are listed in the SUPCALLS will not be monitored. If SUPLIST is TO, only those packets addressed to a station in the SUPCALLS list will not be monitored, those from that station will be monitored. When set to FROM, those packets from the stations in SUPCALLS will not be monitored, but those packets addressed to the stations in the SUPCALLS list will be monitored. Note that SUPLIST takes precedence over BUDLIST. For instance if you have WØABC in your SUPCALLS with SUPLIST TO, and you have WØDEF in your BUDCALLS with BUDLIST BOTH, then packets from WØDEF to WØABC will NOT be monitored.

See also: monitor, supcalls

● **SWp u,d,t**   **v5.0**

default 17,17,108

This command sets the parameters used by the TNC for software carrier detect. The first number (u) is used to increment a counter when a valid mark/space or space/mark transition occurs in the received signal (i.e. transition occurs at the beginning of a bit time). The second number (d) is a penalty subtracted from the counter when a transition occurs in the middle of a bit time. The t value is the threshold value — when the counter total reaches this value, the carrier detect will be set true. Once carrier detect is active, the counter must drop to 0 before carrier detect is again made false.

See also: cd

● **TRACe ON I OFF**   **v5.0**

default OFF

When ON, all received frames are displayed in their entirety, in hexadecimal, including all header information. All packets which are also eligible for monitoring will be displayed in normal text.

● **Trans**   v5.0

immediate

This command causes immediate exit from Command Mode into Transparent Mode. The current link state is not affected. If PARITY is set to NONE you may send all 8 bits from the computer in this mode. There are no special editing characters, all characters are sent out as received. To get out of Transparent, send the TNC a modem break, or see CMDTIME for a special keyboard sequence.

See also: cmdtime

● **TRFlow ONIOFF**   v5.0

default OFF

This command allows the TNC to respond to software flow control from the computer while in the Transparent Mode. When TRFLOW is OFF, software flow control is not used in the Transparent Mode. Hardware flow control will be expected from the computer by the TNC. The computer program needs to use hardware flow control, and the RS-232 cable needs to be wired with CTS and RTS connected. When ON, software flow control is enabled and the START and STOP characters are sent by the computer to the TNC to control the flow of data. When START and STOP are set to $00, hardware flow control must be used. If not zero, the TNC will respond to the computer's START and STOP characters, and remain transparent to other characters from the terminal or computer.

When START and STOP are set for software flow control (normally <Ctrl-Q> and <Ctrl-S>) all characters can be received in Transparent Mode (including the START and STOP characters) by setting TRFLOW ON and TXFLOW OFF. You will not, .owever, be able to send the START and STOP characters, since the TNC will interpret them as flow control.

See also: trans, txflow, xflow

● **TRIes [n] (n = 0 - 15)**   v5.0

The TRIES command will display and optionally set the number of attempts which have been made to re-send a packet (on the current stream) which failed to reach its destination. For instance, if RETRY is set to 10, TRIES will show how many attempts have already been made to pass the data. For example, if TRIES were to show 8, "TRIES 3" would reset the counter to make the TNC believe that it had only tried 3 times so far, thus allowing 7 more attempts before the RETRY limit is exceeded.

See also: retry

○ **TXdelay n   (n = 0 - 255)**   **v5.0**

default 30

This command sets the transmitter key-up delay as 10*n ms. This setting establishes the time delay between the application of push-to-talk and AFSK data tones to the transmitter. Flags (character to begin packet) are sent during the delay. This command needs to be set long enough to give your transmitter time to come to full power before data is sent. If set too short the beginning of the packet will be chopped off and another station will never be able to decode you. If set too long additional flags at the beginning (heard as a repetitive sound) just wastes air time. It may be necessary to increase your TXDELAY to allow the receiving station sufficient time for his receiver to detect your signal (i.e. switch from transmit back to receive).

● **TXFlow ON I OFF**   **v5.0**

default OFF

This command allows the TNC to send software flow control (XON and XOFF) to stop and restart the flow of data from the computer while in the Transparent Mode. When TXFLOW is OFF, hardware flow control must be used between the computer and TNC. RTS and CTS must be connected between the TNC and computer for hardware flow control. When TXFLOW is ON, software flow control between the TNC and computer in Transparent Mode will depend on the setting of XFLOW – XFLOW ON enables software flow control, XFLOW OFF disables it. When software flow control is enabled, the TNC will send the XON and XOFF characters to the computer to control data flow.

When set for software flow control, all characters can be sent in Transparent Mode (including the XON and XOFF characters) by setting TXFLOW ON, XFLOW ON and TRFLOW OFF. You will not, however, be able to receive the START and STOP characters, since your terminal program should interpret them as flow control.

See also: trans, trflow, xflow

○ **Unproto call1 (VIA call2, call3....call9) I [NONE]**   **v5.0**

default CQ

call1 = destination address (this is really just a "dummy" address, as no connection takes place, people often put their name or CQ here)

call2 ... call9 = optional stations to be digipeated through. A maximum of 8 digipeat addresses (callsigns or aliases) can be specified. This is referred to as a path.

Each callsign may also have an optional Secondary Station Identifier (SSID) specified as -n, where n = 1 - 15. The digipeat callsigns are specified in the order in which they are to relay transmitted packets. This command is used to set the digipeat and destination address fields for packets sent in the unconnected (unprotocol) mode.

Unproto packets do not receive an acknowledgment and are not retried. They are sent as Unnumbered I-frames <UI>. The digipeater list is also used for BEACON and ID packets. If UNPROTO is "NONE", no unconnected packets will be sent except for BEACON and ID. Unconnected packets sent from other units can be monitored by setting MONITOR ON. If you are connected, you must also set MCON ON.

See also: beacon, id, monitor, mrpt, xmitok

● USers n (n = 0 - 26)   v5.0

default 1

This command specifies the channels (streams) which may be available to incoming connect requests. For example, if USERS = 5 then an incoming connect request will connect to the lowest channel A - E, if any of these channels are in the unconnected state. If none of the 5 channels are available (all of them are connected), a <DM> packet will be sent back to the requesting station and the message "*** connect request: (call)" will be output to your terminal, if permitted. If USERS is set to 0 no one will be able to connect to you. If USERS is set higher than MAXUSERS, the extra is ignored and the message "USERS LIMITED BY MAXUSERS" will be displayed.

See also: intface, maxusers, streamsw

○ Version   v5.0

immediate

This command causes the TNC to display its current version number along with the name of the unit.

● WEFAX n   v5.0

immediate

This command permits the reception of Weather Facsimile. The audio input is sampled n times per second, and a black/white decision is made on each sample. Each sample becomes one bit of the data sent over the serial port to the computer. A special computer program must be used to display the WEFAX pictures.

See also: daytweak; WEFAX Reception section

● Xflow ON I OFF   v5.0

default ON

When ON software flow control will be implemented according to the settings of START, STOP, XON, XOFF. For normal software flow control set XFLOW ON, START $11, STOP $13, XON $11, XOFF $13. The TNC expects the computer or terminal to

respond to the flow control characters XON and XOFF, and the TNC responds to the START and STOP characters from the computer. When OFF the TNC will only use and recognize hardware flow control lines (CTS and RTS) to start or stop data. The RS-232 cable must be wired appropriately. If the software flow control characters are set to $00, software flow control is not possible.

In the Transparent Mode flow control is also determined by the settings of TRFLOW and TXFLOW.

See also: start, stop, trflow, txflow, xoff, xon

● **XMitok   ON I OFF**   v5.0

default ON

When ON, transmitting functions are enabled. If turned OFF, transmitting is inhibited while all other functions of the TNC are unchanged.

● **XOff   n   (n = $00 - $FF)**   v5.0

default $13 <Ctrl-S>

This command selects the character sent by the TNC to the computer to stop input from the computer. If set to $00 hardware flow control must be used. For software flow control set this parameter to the character the computer expects to see to stop sending data to the TNC.

See also: xflow, xon

● **XON   n   (n = $00 - $FF)**   v5.0

default $11 <Ctrl-Q>

This command selects the character sent by the TNC to the computer to restart input from that device. If set to $00 hardware flow control must be used. For software flow control set this parameter to the character the computer expects to see to restart sending data to the TNC.

See also: xflow, xoff

Packet Mode

Packet radio is the communication of digital data via radio. A packet is a group of characters with a flag and header at the beginning and a checksum and flag at the end. A flag is a specific character used to signify the beginning and ending of a packet. The header is information concerning who the packet is from, who it is to, any relay stations needed to get to the destination and some control information. A checksum is a complicated mathematical formula that produces a number that is unique to the combination of characters that are in the packet. This unique number is calculated by every station that handles the packet and if it does not match the number that is in the packet, the packet is thrown away, thus error-free communications. A packet is also called a frame.

The Terminal Node Controller (TNC) is the workhorse of packet radio. As a listening device it hears an audio signal from the radio, changes the data to digital form, determines if it is a good packet and sends it to whatever device is attached, usually a computer. As a relay device it also checks the packets it receives and determines if the packets need to be resent, then does so if appropriate. As a sending device it receives digital data from the computer, packetizes it and changes it into audio tones which are sent out to the radio. The rules the TNC uses to do all of this is called a protocol.

The most commonly used protocol in amateur packet radio is AX.25 Level 2 and the nitty gritty details of the inner workings can be found in a book named *AX.25 Amateur Packet-Radio Link-Layer Protocol* available from the ARRL. Most of you are not going to want to go that deep, the TNC takes care of the nitty gritty work for you, although there are parameters you can set that determine how efficiently some of that work is done. In this section of the book we will be discussing the fundamentals of how to get on the air and how parameters interrelate. The default parameters will get most everyone on the air, but by using this information you can change your parameters to be most efficient in whatever situation you find yourself.

Command Mode

In order to change parameters, or give any other instructions to the TNC you must be in Command Mode. This is the mode you will be in when you turn on the TNC. Once you have left Command Mode for any reason there is a parameter called COMMAND that determines what special character you will use to return to Command Mode. This comes defaulted as a <Ctrl-C>. (While holding down the control key press "c", then release both.) All parameters are described in alphabetical order in the Commands section. Whenever you enter Command Mode the TNC will send a prompt to your screen that looks like this:

        cmd:

Connected vs Unproto

There are two ways to send data in packet radio, connected or unproto (unconnected). In the Connected Mode you first establish a connection. Then your TNC will send packets to that specific station and expects acknowledgments in return. If an acknowledgment is not received the TNC will resend the data (depending on the setting of AX25L2V2 it may send a poll first). The RETRY parameter will determine how many times this is done before the connection is lost due to bad conditions. If the acknowledgment is received the TNC is happy and will send more data, when available. Therefore the Connected Mode, barring impossible conditions, assures that the station you are connected to will receive everything you say, and in the order you say it.

In the Unproto Mode your TNC sends a packet. As far as the TNC is concerned the packet is not directed to a specific station therefore no acknowledgment is expected and no retrys are attempted. This mode is often used for calling CQ and informal round table chit chats.

Monitoring and Calling CQ

If you turn the MONITOR command ON you will begin to see other people's packets on your screen. You will notice two callsigns at the beginning of each packet separated by a ">". The first callsign is the station the packet is from. And the second callsign is the station the packet is to. An Unproto packet may have a name or CQ for the second callsign.

To set what will be seen as the "to" callsign for Unproto packets you send, you use the UNPROTO command. This comes defaulted as CQ, but if you wanted to put in your name instead, you would be sure you are in Command Mode and issue a command similar to this:

    u name<CR>

where u is short for unproto, name is your name and <CR> is the return or enter key on your computer keyboard. In order to call CQ you must get into the Convers Mode, so that what you are typing to the TNC will be interpreted as data to be sent out on the air and not as commands. To do this type:

    k<CR>

Now anything you type will be packetized and sent out on the air. Remember to get back to Command Mode you enter a <Ctrl-C> (default) by holding down the Control key while pressing "c". You will be going between Command and Convers Modes depending on if you want to talk to the TNC or have the TNC packetize what you type to go out on the air.

A Simple Connect

Once you see a station you would like to connect to, be sure you are in Command Mode, and issue a connect request, example:

c callsign<CR>

where c is short for connect and callsign is the callsign of the station you wish to connect to. If for any reason the connection fails the TNC will send the following message to your screen:

*** RETRY COUNT EXCEEDED
*** DISCONNECTED

When your TNC does receive an acknowledgment for a connect packet it will display a message on your screen like:

*** CONNECTED TO callsign

and your TNC will change to the Convers Mode (dependent on the setting of NOMODE and CONMODE). Now what you type will be interpreted by the TNC as data to be sent to the other station and not commands to the TNC. The MCON parameter comes defaulted to OFF. Therefore once you are connected all you will see is what you type and what the other person sends you. Any packets sent by other people will not be monitored.

Two things determine when the data will be packetized. One is the parameter SENDPAC. This is defaulted as the return or enter key. So as you are typing your message, whenever you hit the return or enter key you are telling the TNC to make a new packet. A second parameter, PACLEN, determines the maximum length of any packet. If you enter data longer than this length a packet will be made even though you have not pressed the return or enter key.

When you have finished your conversation you need to end the connection. To do this you go into the Command Mode and type a "d" for Disconnect. Remember to press the return or enter key after any command to the TNC. Once your station has received the acknowledgment for the disconnect packet the TNC will send this message to your screen:

*** DISCONNECTED

Either station can issue the disconnect command, no matter which station originated the connect.

PACKET

Digipeating

Everything we have done so far will only be heard by those within range to hear your signal. With packet radio it is possible to get further than that. The DIGIPEAT parameter in the TNC comes defaulted ON. This makes you a possible relay station, or digital repeater – digipeater, or just digi for short. In many VHF communities one, or more, of these is put up in a good, high location and referred to as a dedicated digi. The TNC and radio is all that is needed for the digital repeater to do its job. A computer would be needed if you wanted to change a parameter, but it would not need to stay there for the digi to work. The higher the antenna, the more effective a digi will be, but remember every TNC has the capability of being a digipeater.

If we turn the MRPT command ON we will begin to see more than just the "from" and "to" stations of the monitored packets. We will also see the callsigns of those stations that have been used as digipeaters. (If you turn HEADERLN ON the headers will end with a return and be on a separate line from the packet data.) This list of stations is often called a path. Here is an example of what you might see:

        WK5M>KA5ZTX,IAH*,LAG,AUS:
        Hi there

In this example WK5M is talking to KA5ZTX using the digipeaters IAH, LAG and AUS. The asterisk beside IAH tells you that you are hearing that digipeater. You will notice that IAH, LAG and AUS are not real callsigns. The TNC provides a parameter (MYALIAS) to set up an alias, which is often easier to remember than a callsign. To make this connection WK5M would have typed the following command to his TNC:

        c ka5ztx v iah,lag,aus

v is short for via and up to 8 digis may be used. You must specify digis in the order they will be encountered along the path from your station to the station you wish to connect to. A space must be typed after the "c" and on both sides of the "v", but digis are separated by commas and no spaces. A path can also be used with the Unproto command:

        u cq v nom,lch,sli,bix

Unproto sets up the path for anything that is subsequently typed in the Convers Mode where no connect exists. Connect issues a connect request to the specified station, via the specified path. Then an error-free conversation can take place between them.

When digipeating the packet goes all the way from the first station, through all relay stations, then to the destination station. Then the response also has to take this same path in reverse. Chances for collisions, therefore retries, are multiplied with every digi used. This is often called end-to-end acknowledgment. Another way to get from one place to another is to connect to a "node". A node will take care of the acknowledgment between it and the next node or end user. See the KA-Node section for more information. Ask your local packeteers about other types of nodes which may be in your area, such as TheNet, NET/ROM, G8BPQ, and ROSE.

Gateway

In the Kantronics KAM and KPC-4 a Gateway is also available. This is similar to digipeating except that the retransmission of the packet takes place on the other radio port of the TNC from where it was received. In other words, if you are on VHF and send a packet via a Gateway callsign of a KAM your packet would be retransmitted on HF, on whatever frequency the radio connected to the KAM is set for. When you use one of these gateways remember that on HF the baud rate is slower so you may want to lengthen some of your timing parameters. See the KA-Node section for another way to accomplish this with a more reliable connection.

Multi-Connects

The TNC makes it possible for you to talk to more than one person at the same time, if you want to. A stream (or channel) is used for each conversation. The command MAXUSERS determines how many streams may be used at one time. And the command USERS determines how many people can connect to you. An incoming connect uses the next available stream. If the number of streams set by USERS is full, then that station will get a busy message instead of a connect. However, if MAXUSERS is set larger than USERS, you can still issue outgoing connects on the additional streams.

The character specified in the STREAMSW parameter is used to change from one stream to another. The streams are lettered A - Z. So in order to change streams you type the STREAMSW character and then the letter designator for the stream you want (no return or enter in this case). This can be done in Command or Convers Modes and the CON and STA lights on the front panel of the TNC will change appropriately for the stream you choose.

For an example, let's assume I'm connected to a WØXI on the A stream of my KPC-3 and also connected to WDØEMR on the B stream. The default STREAMSW character is the | symbol, so if I want to transmit a packet to WØXI, I simply enter "| a" to cause my current I/O stream to be the A stream. To then send a packet to WDØEMR I type "| b" to go to the B stream. The current I/O stream when the TNC is first turned on will be the A stream.

The STATUS command allows you to see who is on which stream, or the status of the stream, i.e. waiting acknowledgment, connect in progress, disconnected. Turning STATSHRT ON will cause the STATUS command to list only the current Input/Output stream and any connected streams.

If you are connected and have MONITOR and/or MCON OFF, the normal headers containing the "to" and "from" callsigns will not be shown. The setting of STREAMEV will then determine how often you see the stream designator. This parameter comes defaulted OFF, so the stream designators are only shown when a change in streams

occurs. Turning this command ON will make the stream designators show on every packet. Turning STREAMCA ON will also add the callsign of the "from" station beside the stream designator.

Round Table Discussions

Several people talking together present a difficult situation for packet radio since the protocol requires two stations to connect in order to make sure they receive each others' packets. If you wanted to be absolutely sure that everyone got everything you said you would have to connect to each person and retype everything to each person. That could get a bit cumbersome, so most people use the Unproto Mode and are aware that a collision may occur once in a while. You can usually tell by the conversation if something was missed; if you don't get an answer to a question it's probably not that he is ignoring you, but either the question or the answer got collided with.

With MONITOR ON, the BUDLIST and BUDCALLS commands can help in setting up your monitoring to see only those you want to see. List up to 10 calls in BUDCALLS and set BUDLIST to BOTH. Now you will only see packets "to" and "from" those calls. If you like you may each want to connect to one person, then you know at least that one got what was said, but be sure MCON and MALL are ON.

Timing

Dwait vs. Persistence and Slottime

When the TNC acts as a digipeater, packets that need to be relayed are retransmitted as soon as the frequency is clear. Because of the end-to-end acknowledgment of these kinds of packets it is best for an originating station to avoid colliding with digipeated packets. The TNC provides two ways to accomplish this delay. These two methods are the standard DWAIT method, or the newer PERSISTENCE/SLOTTIME algorithm. During a connect using no digis, this delay also gives the receiving station time to switch from transmit to receive.

Using the DWAIT method, once the TNC detects a clear frequency it will wait DWAIT (times 10 milliseconds) time before beginning to key-up the radio to transmit a packet. This is a packet originated by you not a digipeated packet.

The algorithm used with the PERSIST and SLOTTIME parameters helps avoid collisions by randomizing the wait time before transmitting. The more random the timing the less chance of two TNCs transmitting at the same time and colliding.

Once the TNC detects a clear frequency it will wait SLOTTIME (times 10 milliseconds). Then it will generate a random number. If this number is smaller than the setting of PERSIST the TNC will transmit. If it is larger it will wait another

SLOTTIME and then generate another random number and again decide whether to transmit or not. When using PERSIST and SLOTTIME you should set DWAIT to 0, since both will be used if specified.

As an example, let's assume that PERSIST is set to 63, and SLOTTIME is set to 10. This value of SLOTTIME results in a random number being generated every 100 milliseconds. When the TNC sees that the channel is clear, it waits 100 ms, then generates a random number between 0 and 255 (inclusive). If, in our example, the number was 83, then the TNC would not start the key-up of the transmitter since 83 is greater than the 63 PERSIST value. Instead, it would wait an additional 100 ms, and if the channel is still clear, generate a new random number. This time, let's say it comes up with the number 27. Since this is less than the PERSIST value, we now start the key-up of the transmitter to send the packet.

Txdelay

TXDELAY should be adjusted to allow your radio sufficient time to switch from the receive mode to transmit and develop full power output. If the TNC sends the packet before the radio is at full power the beginning of the packet will be lost and no one will be able to decode it. It is a good idea to allow a little extra time for this parameter to allow the station you are talking to sufficient time to switch from his transmit mode back to receive. This is not usually necessary if you are connected through a digipeater, but if you are connected direct, this could make the difference between successful communications and no communications. The TNC sends flags during this period, so if someone has this set extra long you will hear a repetitive sound at the beginning of the packet.

Frack

Frame acknowledgment time. If the TNC expects an acknowledgment of a packet it has sent, it will wait FRACK seconds for the acknowledgment. If the acknowledgment is not received it will either send a poll or retransmit the packet, depending on the setting of AX25L2V2. When digis are used, extra time is allowed for each transmission using the following equation:

FRACK * ((2 * n) + 1) seconds

where n is the number of digipeaters. The lower the baud rate (HBAUD) the longer this parameter should be set, because everything is slower. The length of the transmission (determined by PACLEN and MAXFRAME) also needs to be taken into account when deciding how to set FRACK. Longer packets (and more of them) require more time to be transmitted, more time to be repeated by the digipeater, and so on down the line. The FRACK timer begins when PTT is released (the packet has been sent) and is suspended when data carrier from the radio is present, or when your station is transmitting.

Retries AX.25 Level 2, Version 1 vs. Version 2

The way retries are accomplished depends on AX25L2V2 being OFF or ON. To explain this we will follow a conversation through its path. First lets assume station "A" is connected to station "B" with Version 1 protocol (AX25L2V2 OFF). When station A sends a packet to station B, he expects to receive an acknowledge back indicating that station B has received the information. In order to verify that the proper packet (or frame) has been acknowledged, each frame has a number. This number is sent as a part of the frame so the receiving station knows where this packet belongs in the conversation. The frame numbers range from 0-7 and because of this, we are limited to a MAXFRAME of 7 (we do not want the same frame number reused in the same transmission). This is also true for Version 2. If the first acknowledge is received, there is really no difference between the two versions, practically speaking. The difference shows up with retries, so let's assume that the packet did not get through on the first attempt.

Let's now assume that station A sends frame number 3 to station B. Station B does not receive the frame and therefore no acknowledge is received by station A. With version 1, the entire packet is retransmitted (with the same frame number), again to station B and this continues until station A receives an acknowledge from station B. This acknowledge can take two basic forms. The first time station B receives frame 3 he will send an acknowledge of the form "ready to receive frame 4" <rr4>. If this acknowledge is sent, and station A did not receive it, station A will again send frame 3. Since station B already received frame 3, he would acknowledge it with the form "I've already got frame number 3" <rej4>. This is also known as Reject Frame sent. This process would continue until the retry count is exceeded when, under version 1, the sending TNC will initiate a disconnect and discard the packet. (The monitoring of the commands in < > depends on the settings of MRESP and MCON.)

Now let's look at the same conditions under version 2 (AX25L2V2 ON). Station B does not receive the frame and therefore no acknowledge is received by station A. This time, station A sends a POLL or question to station B saying, in effect, "did you receive my frame number 3?" <<RR3>>. Since station B did not receive the frame, he would respond with a "no I did not" <<rr3>>. This really says "I am ready to receive frame 3". At this point, station A, upon receiving the rr3 would immediately resend the entire frame. If station B had already received frame 3 once but the acknowledge never got to station A the question from station A for the retry would be the same. Station B's response however, would be different. He would respond with "ready to receive frame 4" <<rr4>>. If station A does not receive station B's reply this "POLL/REPLY" sequence would continue for the number of retries set in the sending TNC and if no response was received, the TNC at station A would then begin to issue connect requests to station B since there is still an outstanding packet of information. This is the major difference between version 1 and version 2. The connect attempts would then continue for the number of retries set in the TNC and if no response was received from station B after all of the above, station A would disconnect and discard the packet. The parameter RELINK is defaulted OFF to avoid the reconnect attempt.

Flow Control

The flow control commands insure that the TNC gets everything that is sent to it by the computer and that the computer gets everything the TNC sends it. When the computer sends the TNC data the TNC stores this data in a buffer until it can packetize it, send it, and get acknowledgments. When the TNC sends the computer data it also stores it in a buffer until it can be processed, stored to disk, sent to printer, or whatever. This buffer area is only so big, if more data is sent than will fit in the buffer it is lost. To avoid this the two devices can tell each other to start and stop sending data. This is called Flow Control and can be accomplished in two ways, software and hardware. Which way you implement this depends on the capabilities of your computer communications program and personal preference. The cable between your computer and TNC must also be wired appropriately.

Software Flow Control

Software flow control sends special characters on the TXD and RXD lines of the RS-232 cable. These are the same lines used for sending regular data between the TNC and computer. Software flow control normally sends a <Ctrl-S> to stop data and a <Ctrl-Q> to restart data. When a buffer gets close to full the device will send a <Ctrl-S> and expect the other device to stop. When the buffer gets emptier it will send a <Ctrl-Q> to tell the other device to send more data. How full or empty a buffer is when the special characters are sent is determined by the program. But, since the regular data lines are being used a <Ctrl-S> sent from the keyboard will also stop data. And likewise, if there is a <Ctrl-S> in a file being sent, data flow will stop until a <Ctrl-Q> is received.

XFLOW needs to be turned ON for the TNC to use software flow control. XOFF determines the character sent by the TNC to stop the flow of data from the computer, and the XON character restarts the flow. The TNC expects the computer to send the STOP character to stop data and the START character to restart data. To use software flow control these commands would be set as follows: XFLOW ON, XOFF $13, XON $11, STOP $13, START $11.

In the Transparent Mode two more commands are provided that make it possible to send or receive these special characters and still use software flow control. TXFLOW controls flow control sent by the TNC to the computer and TRFLOW controls what the TNC expects from the computer. If both these commands are ON (and the above commands are set as stated) then software flow control will take place in both directions, to and from the TNC and computer. But if you are in Transparent Mode sending a file the computer is not going to be telling the TNC to stop and start since you are sending the file. But if there is a <Ctrl-S> in the file, the TNC will think the computer is telling the TNC to stop and will not send any data to your computer until it receives a <Ctrl-Q> (even if you have completed sending the file). To solve this problem you can turn TRFLOW OFF and send all characters and turn TXFLOW ON so the TNC will still tell the computer when to stop and restart. On the other hand, if receiving a file set TRFLOW ON and TXFLOW OFF.

Hardware Flow Control

Hardware flow control monitors the voltages on the RTS and CTS pins of the RS-232 cable. Therefore these two wires must be in the cable between your TNC and computer. The TNC holds CTS high as long as it can receive data. Once its buffer gets full it pulls this line low. The computer program monitors this line and when it is pulled low knows to stop sending data. When the line is again pulled high by the TNC the computer program will restart sending data. On the other hand the computer holds RTS high as long as it can receive data and pulls it low to tell the TNC to stop sending data. The TNC always uses hardware flow control, so only wire the RTS and CTS pins if your computer program is also using hardware flow control.

Convers Mode vs. Transparent Mode

In the Convers Mode there are many special characters. To list a few:

Command	Default	Description
SENDPAC	<Ctrl-M>	Causes a packet to be packetized
DELETE	<Ctrl-H>	Backspace character
REDISPLAY	<Ctrl-R>	Redisplays the keyboard buffer
CANLINE	<Ctrl-X>	Cancels a line
STOP	<Ctrl-S>	Stops output from TNC to computer
PASS	<Ctrl-V>	Pass a special character

These characters are all very useful when having a packet conversation with someone. If you want to send a packet you hit the return. If you make a mistake you can backup with the delete or backspace key, or kill the whole line with <Ctrl-X>. And if you really want to send one of these characters you can always precede it with a PASS character.

Transparent Mode is made more for the sending of files, whether they be ASCII data files or program files. The special characters do not mean anything to the TNC, they are just characters to be put in a packet and sent to the radio. (XOFF, XON, STOP, START may be used depending on the settings of XFLOW, TXFLOW and TRFLOW, see the flow control section.) A SENDPAC character will not cause a packet to be packetized, instead this is controlled by a timer (PACTIME). This way short lines do not make short packets, therefore less overhead and more efficient use of the frequency. How congested the frequency is should be kept in mind when setting the PACLEN and MAXFRAME parameters.

All monitor commands are treated as OFF in Transparent Mode. All you will see is what is being sent to you. You would probably want to set USERS to 1 so no one interferes with the transfer. The setting of ECHO is also ignored. Even if ECHO is ON Transparent Mode will not echo to the attached terminal. Some programs allow for local echoing to the screen while uploading.

Getting Out of Transparent

Getting into the Transparent Mode is easy, you just type a "t" in Command Mode. But since Transparent Mode allows the sending of all characters you can not get out of Transparent Mode by just typing a Ctrl-C (COMMAND character) as in Convers Mode. In order to get out of Transparent Mode you must follow a special sequence, or use a modem break if your program supports one. The special sequence must be followed precisely. This example assumes the COMMAND character is <Ctrl-C> and CMDTIME is 1 second:

- Wait at least 1 second since the last character was sent from the computer to the TNC
- Type a <Ctrl-C>
- Within 1 second type a second <Ctrl-C>
- Within 1 second type a third <Ctrl-C>
- Wait 1 second and the cmd: prompt should appear

If the guard time of one second before and after the three <Ctrl-C>s is not there the TNC assumes that they are data and sends them to the radio. Don't get impatient, one second can seem longer than you think it should.

PBBS (Personal Mailbox)

General

Your KPC-3 contains the Kantronics Personal Mailbox system which will allow you to leave messages for others which may be retrieved later. The personal mailbox is compatible with the large community bulletin board systems (RLI, MBL, etc) and will allow them to forward mail for you directly into your KPC-3. You may also place messages in your mailbox, and if the local Community BBS system allows, your KPC-3 mailbox will reverse forward these messages from your personal mailbox into the community system on request. The PBBS supports Bulletin IDs (BIDS), Message IDs (MIDS) and Hierarchical forwarding designators.

Configuring your PBBS

When you first enter your callsign into the KPC-3, your PBBS will automatically be enabled. The MYPBBS callsign is set to your basic call with an SSID of -1, and the PBBS is allocated 5K of RAM. You may change the size of the PBBS using the PBBS command. The maximum amount of memory you can allocate will depend on the amount of free memory available. NUMNODES, MAXUSERS, and MYREMOTE will affect the amount of available memory.

If you change the size of the mailbox, the KPC-3 will not renumber any existing messages, and if the new size is large enough for all existing messages, no messages will be lost. If you want to renumber the messages (starting with 1) give the PBBS n command with n being the current size.

At times, you may be away from your computer and would like to switch a user into your mailbox automatically if he connects to your MYCALL. This can be accomplished by setting the CMSG command to PBBS. When this is done, a user who connects to your MYCALL will be sent your CTEXT (if any) and then be automatically connected to the PBBS. The KPC-3 will then send the PBBS System ID (SID) and sign on message. The SID is enclosed in square brackets and consists of the unit name, firmware version, and the supported feature set. For example the KPC-3 SID is:

[KPC3-5.0-HM$]

This is the unit name (KPC3), version number (5.0) and the feature set (HM$). The H means it supports Hierarchical forwarding, the M stands for Message ID, and the $ indicates BID support. These identifiers are according to the SID definitions published by Hank Oredson (WØRLI) with his Community BBS system.

You can customize a greeting message to be sent to a user who connects to your PBBS by using the PTEXT command. This command accepts up to 128 characters as a text string to be sent to the user immediately after the SID is sent.

If it becomes necessary to disconnect a station from your PBBS, you can use the local terminal connected to your KPC-3 to accomplish this (see DISCONNECT MYPBBS). If a station connects to your PBBS and no activity occurs on the connection for 15 minutes, the PBBS will automatically disconnect the user in order to make your PBBS available to others.

If a community bulletin board forwards messages into your PBBS, it sends you many lines beginning with R:. These are routing headers that show the complete path taken by this message. By default, these headers will be stored in your PBBS with the message. If you choose, you may prevent your PBBS from storing these by setting the PBHEADER command OFF.

If you want your PBBS to only accept messages for you, you can set the PBPERSON command ON. When set ON, this command will make your PBBS only accept messages that are addressed to your MYCALL or MYPBBS.

Finally, the PBLO command is used to determine the order in which messages are listed to a user. When set to OLD, messages will be sent oldest first (message 1, then 2, etc). When set to NEW, the most recent message will be listed first. The second parameter of this command determines whether or not you will allow a PBBS user to change the listing order. When set to FIXED, the user cannot change the order, and when set to VARIABLE, the user may change the order by connecting to the PBBS and using the LO command.

Using the PBBS

In order to use any KPC-3 PBBS (even your own) first, get the cmd: prompt on your KPC-3, and then connect to the callsign of the PBBS. For instance, if MYPBBS is WK5M-1, I would simply type C WK5M-1. Since the PBBS is in my own KPC-3, no packets would be transmitted, but I would connect to the PBBS and receive the same prompt as if I had connected to someone else's PBBS.

When you connect to a KPC-3 PBBS, you will first see the message from your KPC-3 indicating that you are connected:

      *** CONNECTED to WK5M-1

The PBBS will then send you its initial sign on message. If you have defined a PTEXT, the KPC-3 will send it as the next line, and then it sends the PBBS command prompt. Example:

```
[KPC3-5.0-HM$]
4528 BYTES AVAILABLE
PTEXT would be here (if any)
ENTER COMMAND: B,J,K,L,R,S, or Help >
```

Using the PBBS is therefore the same, whether you are using your own PBBS or another persons PBBS. At this point you are ready to send a message to another user, or issue any other mailbox command.

Let's assume I want to send a message to KA5ZTX. I would now use the Send Private command:

```
SP  KA5ZTX
```

and the KPC-3 responds with:

```
SUBJECT:
```

I now enter a short subject line:

```
Just a quick question
```

the KPC-3 responds with:

```
ENTER MESSAGE–END WITH CTRL-Z OR /EX ON A SINGLE LINE
```

Now you enter the text of your message. To end the message and have it saved, type a <Ctrl-Z> (hold down the control key and press Z) or type /EX. The <Ctrl-Z> or /EX must be on a line by itself – do not type anything else on this line. When the message has been ended properly, the PBBS responds with:

```
MESSAGE SAVED
ENTER COMMAND: B,J,K,L,R,S, or Help >
```

You may now enter more mailbox commands. The commands available in the KPC-3 PBBS are:

B(ye)

This command causes the PBBS to disconnect you from the PBBS.

E(dit) n [BPTYNFH] [>tocall] [<fromcall] [@BBS]

This command is only available to the SYSOP (i.e. owner) of the PBBS. It allows you to edit the message header of any message in the mailbox, changing the TYPE of message:

> B – Bulletin
> P – Private
> T – Traffic

the STATUS of the message:

> Y – Yes [it has been read]
> N – No [it has not been read]
> F – Forwarded [it has been forwarded]
> H – Held [it is not available for reverse forwarding]

who the message is to or from:

> >tocall
> <fromcall

and the destination mailbox (@BBS):

> @BBS[.haddr]

When a message is listed, the "tocall" and "fromcall" appear in the TO and FROM columns, respectively. If a message has been entered with an "@BBS" for forwarding, the complete hierarchical address is shown when the message is read:

> MSG2 02/10/92 10:30:58 FROM KA5ZTX TO HELP @wa4ewv.#stx.tx.usa.noam

The @BBS is also listed when using the semi-colon (;) option with any of the list commands.

You can access the Edit command by connecting to the mailbox from the attached terminal, or by connecting over the radio. If you connect over the radio, your MYCALL must be the same base callsign (excluding SSID) as the MYCALL of the KPC-3 containing the mailbox, and the FIRST command you give to the mailbox must be SYSOP. When you give the SYSOP command, the PBBS will send you a password verification string which must be properly responded to in order to gain SYSOP access. This is explained in detail later.

Let's say you want to edit message number 2 which currently is a PRIVATE message addressed to WØXI. The message has been read by WØXI so it shows a status of Y. It may list as:

MSG#	ST	SIZE	TO	FROM	DATE		SUBJECT
2	PY	53	WØXI	WK5M	01/14/92	03:36:45	Good afternoon

Now I want to change this so that it is addressed to WDØEMR and also change the Y flag to N to show that it hasn't been read. To do this, you connect to your PBBS (either from the KEYBOARD or as SYSOP over the radio), and issue the command:

    e 2 N >WDØEMR

You could do this with two separate commands, or it may be accomplished with the single command shown above.

H(elp)

This command displays a HELP menu.

J(heard)

This command displays a list of stations recently heard by the KPC-3. The list will include a date and time stamp indicating when each station was heard.

J S(hort)

This command is similar to the J(heard) command above, but only displays the callsigns of the stations heard.

J L(ong)

This command is similar to the J(heard) command above, but also displays any digipeaters used by the stations it has heard and the destination callsign.

L(ist) [;]

This command will list all messages in the mailbox which you are allowed to read. This will include all BULLETINS, TRAFFIC, and any PRIVATE messages addressed TO you or sent by you. (If you are the SYSOP (keyboard or remote) ALL messages will be listed). Specifying the optional semi-colon (;) in any List command will also show the @BBS and BID of the messages (if any).

L <l> call [;]

This command allows you to list only those messages in the mailbox which are addressed to a specific callsign (>), or which were sent by a specific callsign (<). To list only those messages addressed to AMSAT for instance, you would give the command L> AMSAT.

LB [;]

This command will list all BULLETINS in the mailbox.

LC [cat [;]]

Using the LC command by itself will cause the PBBS to list the TO field of all BULLETINS in the mailbox. This will just be a list of the actual TO fields, and not a list of the messages. If you specify a category (i.e. LC RACES) the PBBS will list the full message headers of all BULLETINS addressed to that category.

LL n [;]

This command will list the most recent n number of messages in the mailbox. Again, only BULLETINS, TRAFFIC, and PRIVATE which you are allowed to read will be listed.

LM(ine) [;]

The LM command will list all messages in the mailbox which are addressed to you.

LO [+ I –]

This command allows you to change the order in which messages are listed. When set to +, the messages are listed in ascending numerical order (oldest to newest). When this command is set to –, the messages will be listed starting with the highest message number (newest to oldest). This command will not be available if the SYSOP has the PBLO command in his KPC-3 set to FIXED.

LT [;]

This command will cause the PBBS to list all TRAFFIC messages that are currently in the PBBS.

K(ill) n

This command will delete message number n from the mailbox. You may only delete TRAFFIC messages, PRIVATE messages addressed TO or FROM you, or BULLETINS you sent. The SYSOP may delete any message, including BULLETINS.

KM(ine)

The KM command will delete any messages in the PBBS which are addressed to you and that you have read. If you have not read a message addressed to you, it will not be deleted.

R(ead) n

The Read command is used to read a specific message by number. Only PRIVATE messages address TO you, or sent by you, may be read, as well as any BULLETIN or TRAFFIC messages. After you read a PRIVATE message addressed to you, the STATUS flag will automatically be set to Y – it has been read.

RM(ine)

The RM command will cause the PBBS to display all messages in the PBBS which are addressed to you, if you have not already read them.

S(end) call

The Send command will send a PRIVATE message to the callsign specified. This is the same as using the preferred SP command.

SB cat

The SB (Send Bulletin) command is used to send a BULLETIN to the PBBS.

SP call

The SP (Send Private) command will send a PRIVATE message to a specified callsign. This is the same as using the Send command.

ST zip

The ST (Send Traffic) command is used to send NTS type traffic messages to the PBBS.

Some of these commands are described in more detail below.

Sending Messages

The SEND command (and its many forms) allows the following syntax:

> S call [@ bbcall[.haddr]] [$ mid]
>
> SP call [@ bbcall[.haddr]] [$ mid]
>
> ST zip [@ location[.haddr]]
>
> SB cat [@ location[.haddr]] [$ bid]

where:

> call is the callsign of the station the message is addressed to.
>
> bbcall is the callsign of a full service BBS where the message should be delivered.
>
> haddr is the complete Hierarchical address designator for the BBS system or destination of the message. (Contact your local community BBS SYSOP for complete information on Hierarchical addressing.)

location is the designator used for distribution of the message. For TRAFFIC, this should be NTSxx where xx is the two letter POSTAL code for the state.

mid is the MESSAGE ID assigned to the message by the originator.

bid is the BULLETIN ID assigned to the message by the originator.

zip is the 5 digit postal zip code (or postal code)

cat is the message category. For instance, a message requesting help on a subject may be sent to the category HELP, info sent to INFO, items for sale to SALE, etc. Contact your local community BBS SYSOP for some other examples and suggestions.

Some examples of commands would be:

SP WB5BBW @ W5AC.#STX.TX.USA.NOAM

this command sends a private message to WB5BBW. The message should be sent to the W5AC BBS system, in South Texas (.#STX), which is in Texas (.TX), which is in the USA (.USA), which is in North America (.NOAM) where WB5BBW can retrieve it.

ST 88030 @ NTSNM

this command sends an NTS traffic message to a non-ham, or to someone who is not on packet, living in zip code 88030 which is in New Mexico. The location field contains the NTSxx (xx = NM) to indicate that the 88030 zip code is in New Mexico.

SB RACES @ ALLUS $RACESBUL.010

this command sends a bulletin addressed to RACES, which should be sent to all BBS system in the USA (ALLUS) and has been assigned the Bulletin ID (BID) RACESBUL.010. This BID prevents the same message from being duplicated as it travels throughout the BBS system.

When you send a message to the PBBS, you must include the @BBS (bbcall[.haddr]) field if you want the message to be reverse forwarded from the PBBS to a full-service BBS system. Any message entered into the PBBS over the radio will initially be marked with a status of H (held) and will not be reverse forwarded until the SYSOP has edited the message header and changed the H flag. This gives the SYSOP full control over the messages relayed by his station.

Messages entered from the local keyboard connected to the KPC-3 do not require editing in order to be reverse forwarded, but must include at least an @BBS field to enable the reverse forwarding.

Listing Messages

When you list messages with any of the LIST commands, you will get a display similar to the one shown below. If you specify the optional semi-colon (;) you will also see the @BBS field in square braces after the message.

MSG#	ST	SIZE	TO	FROM	DATE		SUBJECT
6	B	45	KEPS	W3IWI	12/19/91	09:37:11	2 Line Element set
4	B	26	HELP	WB5BBW	12/19/91	09:34:05	Xerox 820
3	T	38	66044	WØOUU	12/19/91	09:33:42	QTC Lawrence 913/842
2	PN	14	NØAPJ	WØSC	12/19/91	09:33:27	AMTOR
1	B	30	ALL	WK5M	12/19/91	09:32:49	Need help on AMTOR

9712 BYTES AVAILABLE
NEXT MESSAGE NUMBER 7
ENTER COMMAND: B,J,K,L,R,S, or Help >

The message number (MSG#) is listed, followed by the STATUS of the message. This status includes the message type (B=Bulletin, T=NTS traffic, and P=Personal message). The second character in the ST column is the current status of the message.

A Bulletin status can be:

> F — it has already been forwarded to another full-service BBS

> H — it is being held for review by the SYSOP because it was entered into the PBBS over the radio.

An NTS traffic message (type T) may have a status of H, indicating that it is being held for review by the SYSOP before it may be reverse forwarded.

The type P message (Private) can have the following characters in the second position:

> H — This is a personal message that has an @BBS field but is being held for review by the SYSOP before it may be reverse forwarded.

> N — This message is a Personal message that has not been forwarded and has not been read by the station it is addressed to. If it is forwarded to a full-service BBS, it will automatically be deleted.

> Y — This message has been read by the station it is addressed to, but has not been killed. It will not be forwarded even if it has an @BBS since it has already been read.

Remote SYSOP access to the PBBS

Using the PBBS over the radio link and editing messages that are already in your PBBS can be accomplished by entering the SYSOP command as your first command to the PBBS. When you enter this command, you will receive three sets of numbers from the PBBS. These numbers indicate the character positions of the RTEXT to be used as the password for this log on.

For instance, let's say my RTEXT is:

This is a sample rtext.

Now when I give the SYSOP command, the KPC-3 might respond with:

1 12 3 18 6 9
2 10 22 5 7 18
13 16 4 9 1 20

If I choose the first set of numbers, I should send the following as a response:

Tairia

(T is the 1st letter, a is the 12th letter, i is the 3rd letter, and so on. See the RTEXT command in the Commands section for a more detailed explanation.)

NOTE: Spaces DO count as characters, and case is significant!

Reverse forwarding messages from your mailbox

The Kantronics KPC-3 mailbox will allow you to enter messages which will be forwarded by full-service BBSs (RLI, MBL, etc). These messages have a special format, and can be entered in any personal mailbox. Let's suppose I want to send a message to WA4EWV who lives in Texas. I know his home BBS is WB5BBW, so I can put this message in the PBBS with the command:

S WA4EWV @ WB5BBW

Entering an @ BBS will cause the KPC-3 to reverse forward this message to a full service BBS when requested by the full service BBS. In order to improve the chances of this message reaching its destination, you should always enter the message with complete hierarchical forwarding:

S WA4EWV @ WB5BBW.#STX.TX.USA.NA

Complete information on Hierarchical forwarding can be obtained from your local BBS system operator, but basically the first field after the @ symbol is the HOME BBS of the station you are trying to send a message. The next several fields

(separated by periods) are the state (two letter postal abbreviation), country, and continent. In this case, since Texas is so large, it is sub-divided into smaller areas. These are indicated with the # symbol (in this case #STX — South Texas).

Messages entered into your mailbox in this format will be reverse forwarded to the full service BBS when requested, and the following rules apply:

The KPC-3 acts like a "smart BBS" when forwarding to or from a full service BBS. This means that it will no longer send the SUBJECT: prompt, nor will it send the ENTER MESSAGE prompt. You will also notice that when a full-service BBS connects to your PBBS, the KPC-3 does not send the usual ENTER COMMAND prompt, but only the > is sent. This is designed to reduce the amount of data on the packet network, since "smart" BBSs know what is expected of them.

Once a Private or Traffic message has been successfully forwarded out of your mailbox, it will be deleted from the PBBS. Bulletins will be marked with a status of "F" and will remain in the PBBS.