

# KAM Plus

## Reference Manual



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# Introduction to Commands

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## Some Abbreviations

**<Ctrl-x>**: This represents a single control character sent from your terminal program to the KAM Plus. To send this character, press and hold the control key and type the second key (*x*) while holding the control key down. If another letter follows this (i.e. <Ctrl-C>T) do not continue to hold the control key down while pressing the other letter. If your keyboard does not have a control key, consult your computer/terminal manual to determine which key performs the control key function. If your terminal does not have a key that performs this function, you will need to change the Parameters in the KAM Plus that define these special Ctrl key characters.

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

**<CR>**: carriage return, \$0D, decimal 13, <Ctrl-M>, ENTER key

**<LF>**: line feed, \$0A, decimal 10, <Ctrl-J>

**I/O**: Input / Output

## Entry

A command is entered to the KAM Plus by typing the command name and its argument (setting or value) in the Command mode. The prompt for the Command mode is **cmd :**.

The command name and the argument must be separated by a space, and the KAM Plus takes action when a carriage return <CR> is typed. All commands may be abbreviated to the shortest string indicated by the CAPITAL letters in the command reference.

You may examine the value of any parameter by typing the command name followed by a <CR>. The DISPLAY command allows you to display sets of related parameters as a group.

## Format

All commands are listed alphabetically in this manual. On the first line of a command will be the command name followed by any arguments used with the command. Arguments shown in square brackets ([ ]) are optional. If a command accepts several different values, or a range of values, the permissible values will be shown in parentheses (). Arguments may also be shown separated by a vertical bar ( | ). This indicates that you may choose ONE of the items separated by the bar.

Some of the commands in the KAM Plus are dual-port commands, allowing you to set one value for the HF port of the KAM Plus and a different value for the VHF port. This is indicated by a dual-port default value (e.g. (192/63)). The value shown before the slash bar is the value used for the HF port of the KAM Plus, and the value after the slash is used for the VHF port. There are a few exceptions to the HF/VHF convention, in which the value before the slash applies to non-packet modes of Operation, and the value after the slash is for Packet Operation. These are noted in the description of the command.

## Parameter Types

***n* (range)**: Any number within the range is permissible.

***n* (\$00 – \$FF)**: Any HEX number - normally used to define an ASCII character. When entering a HEX number, be sure to type the \$ Symbol to indicate a hex number follows. See the ASCII chart at the end of the manual to determine the code required.

**flags (choiceA) | choiceB):** Many commands allow a choice of two or more possible entries (e.g. ON | OFF). For ON/OFF choices, you may also enter YES or NO. Other commands accept one of several choices (ON | OFF | TO | FROM). Enter the appropriate word to indicate your choice.

**callsigns xxxxxx-n:** Many commands require a callsign or alias as an argument. These parameters are normally set to Amateur callsigns, however any combination of 6 numbers and/or letters is permitted. You may optionally include an "extension" (SSID, Secondary Station Identifier) which is a decimal number between 0 and 15 (inclusive) used to distinguish two or more stations on the air with the same amateur call. SSIDs of 0 are not displayed by the KAM Plus.

The commands which can be used when INTFACE is set to the default NEWUSER, are underlined.

## Commands

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- **8bitconv** ON | OFF  
Default ON

When ON, transmission of 8-bit data is allowed in PACKET and ASCII Modes. When OFF, the 8th data bit is set to 0 before transmission and all data received in these modes will have the 8th bit set to 0.

See also: parity

- **ABaud** *n* (*n* = 0, 300, 600, 1200, 1800, 2400, 4800, 9600)

This command sets the baud rate for communication with your computer or terminal. It is set automatically when you press the \* during the KAM Plus autobaud routine.

See also: reset, restore

- **AMtor** [xxxx[xxx]] characters (or 4, 5 or 9 digits)  
Immediate command

This command places the KAM Plus in AMTOR STANDBY Mode. Entering **AMTOR** xxxx[xxxxx] will cause the KAM Plus to start a link sequence to the station specified. Entering **AMTOR** without a SELCAL will allow your KAM Plus to respond to a link request from another station, or to transmit Mode B (FEC) AMTOR. To transmit Mode B, type [Ctrl C][T] to begin transmission and type [Ctrl C][E] to end the transmission. You may also copy Mode B transmission in this mode, if ARQBBS is OFF.

See also: arqtime, autostrt, canline, fec, lamtor, misschar, mygroup, myselcal, pmode, rephase, txdtor, txdfec

- **ARqbbs** ON | OFF  
Default OFF

When ON, the PBBS in your KAM Plus may be accessed by another station using AMTOR, G-TOR or PACTOR ARQ. When OFF, the PBBS may only be accessed on PACKET. Note that if **ARqbbs** is ON, you will not be able to transmit FEC from the Standby Modes.

See also: arqid, pbbs

- **ARQId** *n* (*n* = 0 – 31)  
Default 9

This command sets the time interval in 1 minute increments for an automatic CW ID when operating AMTOR, G-TOR or PACTOR ARQ. The CW ID will be transmitted at the speed set by the **CWS**speed command and the text of the ID is set with the **CWID**Text command. Setting **ARQId** to 0 disables the automatic.

See also: arqbbs

- **ARQTime** *n* (*n* = 1 – 10)  
Default 2

This command sets the timeout interval when attempting to link to another station in AMTOR ARQ Mode. The interval is set in increments of 64 ARQ cycles (approximately 28.8 seconds).

See also: amtor

- **ASCBaud** *n* ( *n* = 20 – 500)  
Default 110

This command sets the default baud rate used when entering ASCII Mode with no baud rate specified.

See also: `ascii`

- **Ascii** [*n*] ( *n* = 20 – 500)  
Immediate command

This command places the KAM Plus in ASCII Mode. If you specify the optional value *n*, the KAM Plus will enter ASCII at the specified speed, otherwise it will operate at the speed set in **ASCBAUD**.

See also: `ascbaud`, `autostrt`, `canline`, `hbaud`, `pmode`

- **Autocr** *n* ( *n* = 0 – 255)  
Default 0

A carriage return <CR> character is sent to the radio after *n* characters are typed in a line. when operating RTTY, ASCII, AMTOR, G-TOR or PACTOR. Setting **AUTOOCR** to 0 disables automatic carriage returns.

- **AUTOLF** ON | OFF  
Default ON

When ON, a line feed is sent to the terminal after each carriage return. This command affects only data sent to the terminal, not sent over the radio.

See also: `crsup`, `lfsup`

- **AUTOStrt** ON | OFF  
Default OFF

When ON and operating in RTTY or ASCII Mode, the KAM Plus will receive information only after it has received the **MYAUTOST** identifier. It will then continue to receive until it receives four "N"s signifying the end of message, or 30 seconds of no signal.

When ON and in AMTOR Mode or FEC Mode, only AMTOR SELFEC messages which contain any of the SELCALs in **MYSELCAL** or **MYGROUP** will be received. Loss of lock will cause the KAM Plus to stop receiving data.

See also: `fec`, `myautost`, `mygroup`, `myselcal`

- **AX25I2v2** ON | OFF  
Default ON/ON

When ON, Level 2 Version 2 protocol is implemented for PACKET operation. When OFF, Level 2 Version 1 protocol is used.

See also: `relink`, `retry`, `tries`

- **AXDelay** *n* (n = 0 – 255)  
Default 0

This command specifies a period of time to wait, in addition to **TXDELAY**, after keying the radio before data is transmitted. If you operate through a voice repeater, this delay may be required to allow the repeater's transmitter to turn on. Each unit represents 10 milliseconds.

- **AXHang** *n* (n = 0 – 255)  
Default 0

When operating through a voice repeater, this command should be set to the hang time of the repeater. If the KAM Plus has detected activity within this time interval, it will not use the **AXDELAY** setting, since the repeater should still be transmitting. Each unit represents 10 milliseconds.

- **Beacon (Every | After)** *n* (n = 0 – 255)  
Default Every 0/Every 0

When set to **Every**, a beacon packet will be transmitted every *n* minutes. When set to **After**, a beacon packet will be transmitted ONCE after *n* minutes of no channel activity. Setting *n* to 0 will disable beacon transmissions.

See also: btext

- **BER** v8.2  
In use BER test (???)

- **BIts** *n* (n = \$00 –\$FF)  
Default \$00

This command specifies the bits to be inverted when receiving a RTTY or ASCII signal. This may enable you to decode some scrambled RTTY/ASCII signals. Transmitted RTTY and ASCII is not affected by this command.

- **BKondel** ON | OFF  
Default ON

When ON, the KAM Plus will echo a backspace-space-backspace sequence to your terminal when the DELETE character is received from the terminal. When OFF, the KAM Plus will echo a backslash character ( \ ) when the DELETE character is received.

See also: delete, redisplay

- **BLt** *n* **Every** | **After** hh:mm:ss [START hh:mm:ss] (n = 1–4) v8.0  
Default EVERY 00:00:00/EVERY 00:00:00

This command sets the interval between beacons for the associated string. *n* identifies which LT is used (1–4). If **Every** is specified, the LT will be transmitted at the interval specified by the hh:mm:ss parameter. This is set in hours:minutes:seconds, and all characters must be specified. The values before the / apply to the HF port and the values after the / apply to the VHF port. If the optional key word **START** is given followed by a time (in 24 hour format), the beacons will not be transmitted until the specified time. The beacon will then be transmitted according to the setting of the **Every** parameter. (**NOTE:** If the current time is past the start time, the beacon will start at the next scheduled interval based on the start time.)

If **AFTER** is specified, the beacon will be transmitted once after no activity is detected on the channel for hh:mm:ss time. Selecting **AFTER** does not allow the optional **START** parameter.

For example, setting **BLt3 Every 00:15:00 START 03:30:00** would cause the third string (LT 3) to be transmitted every 15 minutes, with the first transmission each day occurring at 03:30:00.

- **BReak** ON | OFF v8.2  
Default OFF

If **BREAK** is ON, a break at the keyboard causes a return to Command Mode from Converse of Transparent Mode.

- **BText** *text* (0 – 128 characters)

**BTEXT** specifies the content of a BEACON packet. To clear the **BTEXT**, enter a single % character (**BT %**).

See also: beacon

- **BUDCalls** [+ | -] callsign(s) | NONE NOT IN v8.2  
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.

See also: budlist, conlist

- **BUDlist** OFF | TO | FROM | ON  
Default OFF/OFF

When OFF, all packets are eligible to be displayed as monitored packets. When ON, only those packets TO or FROM stations listed in the **BUDCALLS** will be monitored. When TO, only those packets addressed TO stations in the **BUDCALLS** will be monitored, and when FROM, only those packets FROM stations listed in the **BUDCALLS** will be monitored.

See also: budcalls, monitor, suplist

- **BUDlist** [ON | OFF] [NONE | {+|-}call | call1,call2,...] v8.2  
where call={callsign | {<|>}callsign | callsign{>|<>}callsign}  
Default OFF NONE

**BUDlist** is used to determine which received packets will be monitored. When OFF or NONE, **BUDlist** will allow monitoring of all packets, even if it has callsigns in it's list.

The maximum number of callsigns allowed in **BUDlist** is 10. Up to 10 callsigns may be entered at one, using the format shown after the command name, and the new list from 1 to 10 callsigns will replace whatever list was there before. The **BUDlist** command can be used to add a single callsign (+callsign), so long as there is room for the new callsign on the list (if there is not, the TNC responds with **EH?** and returns you to the command prompt). Similarly, you can remove a single callsign (-callsign) from the list. And to remove all items from the current list, enter **BUDlist None**.

A callsign entered without a SSID will match any SSID of that callsign. To match a specific SSID only, enter the callsign with that SSID; for example, callsign-*n*, where *n* = 0–15.

More selective monitoring is enabled when a callsign or two callsigns is combined with a ">" and/or "<" character. For example, entering ">callsign" will enable monitoring of packets TO that callsign (assuming **BUDlist** is ON), entering "<callsign" will enable monitoring of packets from the callsign, entering "callsign1>callsign2" will enable monitoring of packets from callsign1 to callsign2,



and entering "callsign1 <>callsign2" will enable monitoring of packets from callsign1 to callsign2 and vice versa.

☞ Note that an entry of callsign1>callsign2 or callsign1<>callsign2 counts as 2 of the 10 allowed callsigns.

- **CALibrat**  
Immediate command

The CALIBRATE command is used to generate a signal which may be used as an aid in tuning the transceiver for operation with the KAM Plus. Use of this command is detailed in the Calibration/Equalization section of this manual. The letter **X** will return you to the Command Mode.

- **CAnline** *n* (*n* = \$00 – \$FF)  
Default \$18 (Ctrl-X)

When entering commands or data to the KAM Plus, you may cancel the current line you are typing (back to the last un-passed carriage return) by sending a [Ctrl-X] to the KAM Plus from your terminal. When operating non-packet modes, a [Ctrl-X] will clear the transmit buffer of any character you have typed which have not already been transmitted over the radio.

See also: canpac, cpactime, pass

- **CANPac** *n* (*n* = \$00-SFF)  
Default \$19 (Ctrl-Y)

When entering commands or data to the KAM Plus, you may cancel the entire packet (back to the last un-passed SENDPAC character) by sending a [Ctrl-Y] from the terminal to the KAM Plus. When in Command mode, [Ctrl-Y] acts as a cancel output character, turning off any output from the KAM Plus. Typing another [Ctrl-Y] re-enables output.

See also: canline, cpactime, sendpac

- **CD Internal | External | Software**  
Default INTERNAL/INTERNAL

When set to INTERNAL, the KAM Plus will detect a signal when any energy is present on the audio input to the KAM Plus. When set to EXTERNAL, the signal detection is supplied by an external device, connected to the XCD pin of the radio port. When set to SOFTWARE, the firmware in the KAM Plus will detect a signal based on the presence of PACKET data on the audio input. This setting allows open-squelch Operation. Proper equalization is important for correct operation of software carrier detection.

When operating RTTY or ASCII, the KAM Plus will use only INTERNAL or EXTERNAL. If this command is set to SOFTWARE, the KAM Plus will act as though it were set to INTERNAL when operating these modes.

See also: swp

—> !!!

- **CD** {Internal | External | Software}  
Default INTERNAL/INTERNAL

The CD command selects which carrier detect method will be used for a given port.

For either port, set to INTERNAL, the TNC will detect a signal present on the channel – using an energy type carrier detect – allowing shared voice and data on the same channel.

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

If port 1 is 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 carrier 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.)

When CD is set to **Internal** or **Software** (port 1 only), the external carrier detect pin on the radio connector (if wired) will also be used to hold off the TNC from keying the radio.

☞ Hint: For one use of this function, see the APRS and GPS section of this manual.

See also: swp

- **Check**  $n$  ( $n = 0 - 255$ )  
Default 0

This command specifies the time interval, in 10 second increments, used to check the condition of a PACKET connection if no data is passing between the connected stations. If **AX25L2V2** is ON, the KAM Plus will send a "check" packet every  $n \times 10$  seconds to insure the other Station is still responding. If **AX25L2V2** is OFF and  $n \times 10$  seconds has passed with no data being transferred, the KAM Plus will send a disconnect to the other station. Setting CHECK to 0 disables the automatic check function.

See also: ax25l2v2, kntimer, relink, rnrtime

- **Cmdtime**  $n$  ( $n = 0 - 15$ )  
Default 1

This command sets the permissible time (in 1 second increments) between characters when attempting to exit from the Transparent Mode. WARNING: Setting **Cmdtime** to 0 will prevent you from exiting the Transparent Mode.

See also; command, trans

- **CMSg** ON | OFF | DISC | PBBS  
Default OFF/OFF

When OFF, the custom text stored in **CTEXT** will not be sent to a connecting station. When ON, the custom text will be sent. When set to DISC, the custom text will be sent, and then your KAM Plus will disconnect from that station. When set to **PBBS**, the custom text will be sent to the connecting station and then the connection will automatically be transferred to your PBBS, if it is available. If the PBBS is not available, the KAM Plus will disconnect from the station.

See also: ctext, pbbs

- **CODE** [AMTOR | RTTY] [ITA2 | US | LCRTTY | APLINK | MARS]  
Default AMTOR ITA2/RTTY ITA2]

This command allows you to select the alphabet used to send and receive RTTY and AMTOR. ITA2 uses the International Telegraph Alphabet Number 2, US selects the U.S. character set (not available in AMTOR), LCRTTY provides a complete upper/lower case character set, and APLINK uses the full printable character set developed by G3PLX and W5SMM (currently used on APLINK BBS systems). When set to MARS, special characters can be used as required by the Military Affiliate Radio System. (See the MARS Feature section of this manual.)

- **COMmand** *n* (*n* = \$00 – \$FF)  
Default \$03 (Ctrl-C)

This command sets the character used to enter the Command mode from the Convers mode, or to exit from the Transparent mode. It also defines the lead-in character for non-packet mode directives.

- **CONList** ON | OFF  
Default OFF/OFF

When ON, the KAM Plus will recognize only those packets received with a callsign that appears in the BUDCALLS list. All other packets are completely ignored. When OFF, packets originating from any station are accepted.

See also: budcalls

- **CONList** [ON | OFF][NONE | {+|-} callsign | callsign2...] v8.2  
Default OFF NONE

**CONList** is used to determine which stations (callsigns) may use your station for ANY purpose, including digipeating. When ON, the TNC will recognize only those packets received with a callsign that appears in the **CONList**'s list of callsigns; and you will not be able to connect to any station that is not in the **CONList**. When OFF, the TNC will process all packets.

The maximum number of callsigns allowed in **CONList** is 10. Up to 10 callsigns may be entered at once, using the format shown after the command name, and the new list of from 1 to 10 callsigns will replace whatever list was there before. The **CONList** command can be used to add a single callsign (+callsign), so long as there is room for the new callsign on the list (if there is not, the TNC responds with **BH?** and returns you to the command prompt). Similarly, you can remove a single callsign (-callsign) from the list. And to remove all items from the current list, enter **CONL N**.

A callsign entered without a SSID will match any SSID of that callsign. To match a specific SSID only, enter the callsign with that SSID; for example, callsign-*n*, where *n* = 0–15.

- **CONMode** CONVERS | TRANS  
Default CONVERS

This command sets the mode the TNC will be placed in AUTOMATICALLY when a connect occurs if **NOmode** is OFF.

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

- **Connect** call1 [VIA call2,call3,...call9]  
Immediate command

This command is used to initiate a PACKET connection to another station. Each call sign may have an optional SSID specified as *-n* where *n* = 1 to 15. Call2 through call9 are used to specify digipeaters required to connect to a distant station.

This command can also be used to reconnect through a different set of digipeaters to a distant station you are already connected to.

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

- **CONOk** ON | OFF  
Default ON

When ON, connect requests from other TNCs will automatically be acknowledged. When OFF, a connect request from a distant station will be answered with a <DM> packet, causing that station to get a busy message from you. When this occurs, you will see a **connect request** message on your terminal.

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

- **CONPErm** ON | OFF  
Default OFF

v8.2

Forces connection present stream to be permanent.

- **CONVers**  
Immediate command

This command will place your KAM in the Convers mode on the current I/O stream.

See also: k, command, stat

- **CPactime** ON | OFF  
Default OFF

When OFF and in the Convers mode, packets are transmitted when the **SEndpac** character is entered, or when **Paclen** is exceeded. When ON, packets are sent at periodic intervals determined by **PACTime**.

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

- **CR** ON | OFF  
Default ON

When ON the **SENDPAC** character (normally carriage return) is appended to packets send in Convers Mode. When OFF, the **SENDPAC** character is not transmitted as part of the packet.

See also: lfadd, sendpac

- **CRAdd** ON | OFF  
Default OFF

When ON, a carriage return will be added to every carriage return received from your terminal before being transmitted in RTTY, ASCII, AMTOR, G-TOR and PACTOR. When OFF, no extra carriage returns are added by the KAM Plus.

See also: lfadd

- **CRSup** ON | OFF  
Default ON/OFF

When ON, every other carriage return will be suppressed when two or more carriage returns are received with no data between them. When OFF, no carriage return suppression occurs.

See also: autolf, lfsup

- **CStamp** ON | OFF  
Default OFF

When ON, the daytime stamp is printed with all **\*\*\* CONNECTED TO** and **\*\*\* DISCONNECTED** messages. When OFF, no daytime stamping of connects and disconnects occurs.

See also: connect, daytime, disconnect, mstamp

- **CText** *text* (0 – 128 characters)

This command sets a custom text message to be sent to any user who connects to your *MYCALL*. To clear the **CTEXT** enter a single % character (**CT %**).

See also: cmsg, connect

- **CW** [*n*] (n = 5 – 99)  
Default 20

This command places the KAM Plus in the CW Mode. If *n* is not specified, the speed set in **CWSPEED** will be used for transmit and receive. Specifying *n* will allow you to enter the CW mode at the desired speed. The KAM Plus will automatically adjust to copy stations within approximately ±20 WPM from the speed selected.

See also: canline, cwspeed, morse, pmode, prosign

- **CWAudio** ON | OFF  
Default ON

When ON, the AFSK Output of the KAM Plus HF port will provide Morse code with an on/off audio tone. This can be used for automatic **CWID** when operating ARQ modes (G-TOR, PACTOR and AMTOR) or for sending Morse code over an FM transceiver. You must also set the **CWPTT** command ON for this to operate.

- **CWBand** *n* (n = 10 – 1000)  
Default 200

This sets the audio bandwidth for CW Operation. A small bandwidth will improve reception of CW signals, but will be more difficult to tune.

- **CWFarnsw** *n* ( *n* = 5 – 99)  
Default 15

This commands sets the character speed used when operating CW and the **CWSPEED** is less than **CWFARNSW**. Characters will be sent at this speed, and additional time will be placed between characters to lower the CW word rate to your selected speed.

- **CWId** [EVERY | AFTER] *n* ( *n* = 0 – 255)  
Default EVERY 0/EVERY 0

When operating PACKET, this command will cause a **CWID** to be transmitted periodically. When set to EVERY, a **CWID** will be transmitted every *n* minutes. When set to AFTER, a **CWID** will be transmitted ONCE after *n* minutes of no channel activity.

See also: arqid, cwidtext

- **CWIDText** *text* (0 – 15 characters)  
Default DE *mycall*

This command sets the text to be sent during a **CWID** or an automatic **ARQID**.

See also: arqid

- **CWPtt** ON | OFF  
Default OFF

When ON the PTT line from the KAM Plus HF port will be keyed when transmitting CW (**ARQID**, **CWID** or CW Mode). When OFF, the PIT line will not be keyed. With this command OFF, CW mode operation requires that your radio be in VOX operation and CW Mode and the CW key line from the KAM Plus must be connected to your CW key jack on the radio.

- **CWSpeed** *n* ( *n* = 5 – 99)  
Default 20

This command sets the CW speed used when entering the CW mode. If this value is less than **CWFARNWS**, the KAM Plus will transmit CW using Farnsworth spacing.

See also: cw

- **CWTone** *n* ( *n* = 50 – 2000)  
Default 750

This command sets the center frequency of the CW filter of the KAM Plus. It also sets the transmitted AFSK CW tone if **CWAUDIO** and **CWPtt** are turned ON.

- **CWWeight** *n* ( *n* = 0 – 15)  
Default 0

This command adds weighting to a transmitted CW signal. Normally a dash is three times the length of a dot. If weighting is used, the dash will be *n* × 0.1 dot times longer than normal. For instance, if *n* is set to 7 then a dash would be 7 × 0.1 (or 0.7) times longer than normal, making the dash 3.7 times the length of the dot.

- **DAMa** ON | OFF  
Default OFF

**v8.2**

DAMA Slave protocol used when ON and connected to DAMA Master.

- **DAMACHck** *n* (*n* =  
Default 18 (180 sec)

No activity time before protocol checks on DAMA link (10 sec).

- **DAYStr** dayform  
Default mm/dd/yy hh:mm:ss

This command sets the format for the date/time display. This display is used for all time stamps, including the PBBS, KA-Node, MHEARD list, etc. The lower case characters m, d, y, h and s have special meaning to this command and will be replaced with data from the software clock. The lower case m will be replaced with the minutes the first time it appears after a lower case h. If h, m, y, d, or s is specified as a single character, the corresponding date/time element will be displayed as a single digit if the value is less than 10. Entering two characters will force a two digit display for values under 10. If the month is entered as three characters (mmm), the month will be displayed as the first three characters of the month name (APR). You may also enter any other text you wish, allowing you to add such things as your time zone.

Caution: When entering real text into the display, ALL lower case m, d, y, h, and s characters WILL be translated! Some samples of possible format strings and the resulting display

mm/dd/yy hh:mm:ss	02/18/93 11:30:00
d.m.y h:mm:ss	18.2.93 11:30:00
d.mm.yy h:mm	18.02.93 11:30
mmm d 19yy h:mrn CST	FEB 18 1993 11:30 CST
TIME hh:mm DATE: mmm dd, 19yy	TIME 11:30 DATE: FEB 18, 1993

- **DAYtime** yymmddhhmm[ss]  
Default 01/01/93 00:00:00

This command sets or reads the real-time clock and software clock in the KAM Plus. The clock determines date and time display in conjunction with the **CSTAMP**, **MHEARD**, **MSTAMP** and PBBS/Node messages. When entering the daytime digits to set the clock, enter in pure number sequence with no spaces, dashes or slashes. Entering the seconds digits is optional, and if not entered, the seconds will be set to 00.

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

- **DAYTWeak** *n* (*n* = 0 – 15)  
Default 8

This command is used to tweak the software clock for accurate time keeping. Increasing the value will slow the clock, decreasing the value will speed up the clock. Each count corresponds to 0.85 seconds increase or decrease per day. Ambient temperature will affect the clock to some degree.

- **DBldisc** ON | OFF  
Default OFF

When OFF, only one disconnect command needs to 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. A second disconnect command would be required to force a local disconnect independent of the retry counter.

See also: disconnect

- **DElete** *n* (n = \$00 – \$FF)  
Default \$08 (⇐)

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

- **DIdle** ON | OFF  
Default ON

When ON, a diddle character is sent when no characters are available from the keyboard or buffer during transmission in RTTY or ASCII Mode. In RTTY the diddle character is the LTRS character; in ASCII the diddle character is a null. When OFF, a constant MARK frequency is transmitted.

- **DIGipeat** ON | OFF  
Default ON/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 KAM Plus 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, mygate, mynode

- **Disconne**  
Immediate command

This command will initiate an immediate command disconnect request on the current I/O stream. When an acknowledgment is received, your KAM Plus will display the message **\*\*\* DISCONNECTED**. If you issue a second disconnect command before receiving the acknowledgment, your KAM Plus will immediately enter the DISCONNECTED state, but this may leave the other station thinking it is still connected.

See also: dbldisc, nowmode, retry, status

### **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.



- **DISPlay** [class]

This command will display a list of parameters in the KAM Plus. If you do not specify a class, all parameters will be displayed. You may display one specific class of related parameters by specifying the class with the display command, The classes of parameters are:

(A)sync	asynchronous port parameters (KAM Plus to computer)
(AM)tor	parameters affecting AMTOR (ARQ and FEC) and NAVTEX/AMTEX Modes
(ASC)ii	parameters affecting ASCII Mode
(C)haracter	special KAM Plus characters
(CW)	parameters affecting CW Mode
(G)tor	parameters affecting G-TOR Mode
(I)d	ID parameters
(L)ink	parameters affecting packet link (KAM Plus to other TNC)
(M)onitor	monitor parameters
(P)bbs	mailbox parameters
(PT)	parameters affecting PACTOR Mode
(R)tty	parameters affecting RTTY Mode
(T)iming	timing parameters
(X)tra	some transmission related parameters, such as FSKINV

Individual parameters may be displayed by entering the command name followed by a carriage return.

- **DWait** *n* ( *n* = 0 – 255)  
Default 0

This value is used to avoid collisions with digipeated packets. The KAM Plus will wait  $n \times 10$  milliseconds after last hearing data on the channel before it begins its own key-up sequence. When this method of collision avoidance is used, the value is normally agreed upon by users in the local area. Most PACKET operators are now using the PERSIST/SLOTTIME method of collision avoidance and setting DWAIT to 0.

See also: persist, slottime

- **Echo** ON | OFF  
Default ON

When ON, characters received from the terminal are echoed back to the terminal. If you are seeing double printing of characters you type, set this command OFF. The KAM Plus will not echo the XOFF or XON characters to your terminal. ECHO is automatically disabled when in Transparent Mode.

See also: bkondel, flow, xmitecho

- **EScape** ON | OFF  
Default OFF

When OFF, an escape character (\$1B) will be sent to the terminal when one is received in a packet. When ON, the KAM Plus will send a dollar sign (\$) to the terminal instead of the escape character.

- **Fec** [*xxxx[xxxxx]*]  
Immediate command

This command sets the KAM Plus in FEC Mode. When the optional *xxxx[xxxxx]* is specified, the KAM will call the specified station using SELFEC. The optional *xxxx[xxxxx]* can be any of the following:

AMTOR (476) SELCAL (4 characters, 4 digits or 5 digits)  
AMTOR (625) SELCAL (7 characters or 9 digits)

Amateur Radio callsign – in this case, the KAM Plus will automatically create a unique AMTOR 625 SELCAL from the callsign and initiate a 625 SELFEC transmission.

See also: *amtor, autostrt, canline, lamtor, pmode, txdfec*

- **Filter** ON | OFF  
Default OFF/OFF

When ON, this command will inhibit the printing of control characters (\$00 – \$1F) which may be present in monitored packets. 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. When operating RTTY or ASCII, this will also inhibit printing of control codes.

See also: *monitor*

- **Flow** ON | OFF  
Default ON

When ON, any character entered from the terminal will stop output from the KAM Plus to the terminal until the current line or packet is completed (by **SENDPAC**, **PACLEN**, or **PACTIMEj**). Canceling the current input or typing the **REDISPLAY** character will also cause output to resume. When OFF, received data will be inter-leaved with keyboard entry. If you use 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 KAM Plus' type-ahead buffer.

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

- **FRack** *n* (*n* = 1 – 15)  
Default 4/4

After transmitting a packet requiring acknowledgment, the KAM Plus waits FRACK seconds before incrementing the retry counter and sending the packet again. If the retry count is exceeded, the current operation is aborted. If the packet address includes relay-requests (digipeaters) the time between retries is adjusted to **FRACK** × ((2 × *m*) + 1) where *m* is the number of intermediate relay stations. 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*

- **FREqual** *n* (*n* =  
Default 20

**v8.2**

Maximal number of bits in error when scanning for free signal.

- **FSkinv** ON | OFF  
Default OFF

This command controls the polarity of the FSK output on the HF port of the KAM Plus. When OFF, MARK is open-collector and SPACE is ground. When ON, the polarity of MARK and SPACE is reversed.

- **FULLdup** ON | OFF  
Default OFF/OFF

When OFF, the presence of a received signal will prevent the KAM Plus from transmitting to avoid collisions. When ON, the VHF modem is run full-duplex and the presence of a received signal will not inhibit transmission. Full-duplex may be especially useful for split-frequency operations.

- **FULLdup** {ON | OFF | LOOPBACK} v8.2  
Default OFF/OFF

When OFF (i.e., half duplex), 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. LOOPBACK is the same as half duplex (i.e., **FULLDUP** OFF) as far as protocol is concerned, but the receive circuit is still active; this allows you to connect a simple wire between the transmit and receive pins on the radio connector to verify operation of the modem circuitry.

- **GMON** v8.0  
Immediate command

The **GMON** command places the KAM in the Monitor Mode, allowing you to monitor G-TOR QSOs. To exit the **GMON** Mode and return to the command prompt, type **[Ctrl-C][X]**.

- **GPShead** *n string* (*n* = 1 – 4) (*string* up to 8 characters) v8.0  
Default blank

This command determines which GPS NMEA sentences will be stored in the LT buffers. *n* determines which which buffer will be used to store the data (1 – 4) and *string* is a NMEA sentence header.

When the string is received, the KAM Plus will store the up to 128 characters in the associated LT.

- **GPSInit** *string* Initial text sent to terminal in GPS Mode (string up to 128 characters) v8.0  
Default blank

This command establishes a string which will be sent to the attached GPS unit upon power-up. This may be useful to configure your GPS unit to provide only the information you require. Some GPS units may require more than one sentence; consult your GPS unit manual. To send more than one, enter a **[Ctrl-N]** at the end of each sentence and the KAM Plus will send a CR/LF sequence to the GPS unit.

- **GSCAN** *r,m,s,f* v7.0  
Immediate command

GSCAN is a general scan function that will sample the audio signal applied at the HF port of the KAM Plus. The signal is sampled *r* times per second, and the resulting binary data is sent to the computer through the serial port. The first sample will be in the Most Significant Bit (MSB) of the byte. Valid sample rates are from 1 to 4800 samples per second. The *m*, *s*, and *f* values, if specified, set the MARK frequency, SPACE frequency and demodulated filter output bandwidth. If not specified, *m* defaults to the MARK command setting, *s* defaults to the SPACE command setting, and *f* is set to the **HBAUD** setting for the HF port (normally 300). NOTE: You must set **MAXUSERS** to n/0 (disabling the VHF port) to use the **GSCAN** mode.

We have provided a program for PC computers which allows monitoring of G-TOR ARQ links using the GSCAN function. Documentation for this program can be found on the diskette provided in a file called "GMON.DOC".

- **GDown** *n* (*n* = 2 – 30) v7.0  
Default 6

Sets the number of consecutive bad frames received before switching to the next lower speed.

- **GErrs** *n* (*n* = 30 – 255) v7.0  
Default 40

Sets the time-out attempts for G-TOR. When attempting to link with another station, the unit times out after *n* attempts without a response. When already linked, reception of *n* consecutive faulty frames results in a timeout.

- **GFuzzy** *n* (*n* = 0 – 3) v7.0  
Default 3

Sets the number of bits in a data acknowledgment that may be corrupted.

- **GTor** [*xxxxxxxxxx*] v7.0  
Immediate command

Entering **GTOR** with no parameters will place the KAM Plus in G-TOR Standby, allowing you to respond to an incoming link request or transmit a CQ or other broadcast. If you also have **MONITOR ON**, you can monitor FEC G-TOR broadcasts. By using the optional callsign Parameter, this command will initiate a link attempt with station *xxxxxxxxxx*. You can discontinue the link attempt, or break an existing link, with the [Ctrl-C][D] directive, which will leave you in the G-TOR Standby Mode, or with the [Ctrl-C][X] directive which returns you to PACKET Mode (**cmd:** prompt). NOTE: If ARQBBS is on, you cannot transmit FEC and you will not be able to monitor FEC.

- **GTTries** *n* (*n* = 0 – 9) v7.0  
Default 2

Sets the maximum number of attempts to speed up. If unsuccessful after *n* attempts, the KAM Plus will return to its previous G-TOR speed until it receives **GTUP** consecutive good frames.

- **GTUp** *n* (*n* = 2 – 30) v7.0  
Default 3

Sets the number of consecutive good frames received before switching to 300 baud operation.

- **HBaud** *n* ( *n* = 50 – 300 for HF; 300, 400, 600 or 1200 for VHF)  
Default 300/1200

This command sets the baud rate used by the KAM Plus for transmission of data over the radio link. It is not related to the terminal baud rate (set by **ABAUD**). HF PACKET is normally operated at 300 baud, and VHF PACKET is most commonly found at 1200 baud. FCC rules currently limit the maximum baud rate to 300 when operating below 28 MHz. NOTE: 300 baud on VHF uses different tones than 300 baud on HF.

- **HEAderIn** ON | OFF  
Default ON

When ON, a carriage return is Output to the terminal between the header and text of monitored packets. This allows 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(s). When receiving connected packets, no header is displayed if **MONITOR** or **MCON** is OFF.

See also: `cstamp`, `mcon`, `monitor`, `mstamp`

- **Help** [cmd] ? [cmd]  
Immediate command

The HELP command will display a table of all available commands. If you specify a command name after the **HELP** command (e.g. **HELP TXDELAY**) the KAM Plus will display a one-line description of the command. The command **HELP HELP** will display a one-line description of ALL commands.

- **HId** ON | OFF  
Default ON/ON

When ON, an ID packet will be sent every 9.5 minutes if packets are being digipeated through your Station or routed through your KA-Node, or if your PBBS is used. When OFF, no periodic ID packets will be transmitted.

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

- **HText** *text* (0 – 33 characters)

This command is used to set the hierarchical portion of your packet address. Your KAM PBBS will not forward (or reverse forward) any messages to another BBS if this command is empty and **PBPERSON** is OFF. We suggest you read the section on the Kantronics PBBS to become familiar with BBS operation and hierarchical addressing. You should ask your local BBS SysOp if you are unsure of the proper hierarchical address for your station.

- **Id**  
Immediate command

When this command is entered an identification packet will be transmitted on the current I/O port. The ID packet consists of your station identification as set in **MYCALL**. The **MYCALL** will be appended with **"/R"**, **MYALIAS** callsign (if any) appended with **"/D"**, **MYGATE** (if any) with **"/G"**, **MYNODE** (if enabled) with **"/N"** and the **MYPBBS** callsign (if enabled) with **"/B"**.

See also: `hid`, `unproto`

- **INTface** **TERMINAL** | **NEWUSER** | **BBS** | **KISS** | **HOST** | **GPS**  
Default **NEWUSER**

When set to **NEWUSER**, a basic set of only 30 commands is available to simplify operation, When set to **TERM**, the full command set of the KAM Plus is available (over 200 commands). Setting this command to **BBS** will prevent certain messages from being sent to the terminal (**\*\*\* connect request**, **\*\*\* FRMR**, etc). This is provided for those running a full service BBS to prevent these messages from appearing in received text. Setting this command to **KISS** will enable the KISS code as specified by Phil Karn (KA9Q) for use with TCP/IP or other KISS programs in your computer. Setting this command to **HOST** will enable the Kantronics Host mode for use with special host programs such as Host Master.

v8.0

When this command is set to **GPS**, the KAM Plus will enter GPS Mode upon power up. Data from the serial port will be parsed according to the **GPSHEAD** command, text will be placed into the LT buffers, and beacons will be transmitted according to the setting of the BLT commands.

To have the KAM exit GPS Mode, connect a PC or terminal to it and issue three [Ctrl-C] characters.

NOTE: After changing the **INTFACE** command, you may need to do a soft reset for the new mode to take effect.

See also: pmode

- **INTface** **Terminal** | **Newuser** | **BBS** | **KISS** | **Host** | **GPS** | **Modem**  
Default **NEWUSER**

v8.2

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 WORLI, WA7MBI, CBBS, etc. When **INTFACE** is set to **KISS** mode of operation, users interact with the TNC using software that implement the KISS code specified by Phil Karn (for more information, see the KISS Operation section of this manual). When **INTFACE** is set to **Host**, the TNC will talk to the attached computer using the Kantronics **HOST** mode and users communicate with the TNC using "host mode" software (for more information, see **HOST** Operation section of the "User's Guide" manual).

When **INTFACE** is set to **GPS**, the TNC will enter GPS mode upon power up. Data from the serial port will be parsed according to the **GPSHEAD** command, text will be placed into the LT buffers, and beacons will be transmitted according to the setting of the BLT commands.

When **INTFACE** is set to **Modem**, the TNC mirrors at the RS-232 port what it receives at the radio port (for more information, see the "modem mode" in the Modes of Operation chapter).

To have the TNC exit GPS Mode, connect a PC or terminal to it and issue three [Ctrl+C] characters (see **COMMAND** for details).

For instructions on exiting **KISS**, **HOST** and **MODEM** modes, see appropriate sections of the "modes of operation" of the "User's Guide" manual.

- **INVert** ON | OFF  
Default OFF

When ON, signals received in RTTY, ASCII or AMTOR, and signals transmitted using AFSK are inverted. While in RTTY, ASCII or AMTOR mode, entering a [**Ctrl-C**][**I**] directive will toggle the inversion ON and OFF.

- **K**  
Immediate command

This command will place the KAM Plus in the Convers mode on the current I/O stream. It is synonymous with the **CONVERS** command.

See also: convers

- **KNtimer** *n* ( *n* = 0 – 255)  
Default 51

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

See also: rnrtime

- **KNXcon** ON | OFF  
Default OFF

When OFF, the KA-Node will not allow the Xconnect command (cross connecting). When ON, the Xconnect command is enabled, allowing users to cross-connect from the one port of the KAM Plus to the other port.

See also: numnodes, mynode

- **Lamtor**  
Immediate command

This command places the KAM Plus in the Listen AMTOR mode. The KAM Plus will receive FEC, SELFEC or ARQ signals. The KAM Plus will not transmit when operating in LAMTOR mode.

See also: amtor, fee, misschar

- **LCok** ON | OFF  
Default ON

When ON, upper and lower case characters will be sent to the attached terminal. When OFF, lower case character are translated to upper case before being sent to the terminal. This case translation is disabled in Transparent Mode.

- **LCStream** ON | OFF  
Default ON

**Not in v8.2**

When ON, lower case characters may be used in stream switching. When OFF, stream switching requires upper case characters.

See also: status, streamsw

- **LFadd** ON | OFF  
Default ON/OFF

When ON, a line feed will be appended to every carriage return transmitted over the radio. When OFF, no line feeds will be added to the transmitted data. In this command the value before the / applies to the non-packet modes (RTTY, ASCII, AMTOR, G-TOR and PACTOR) and the value after the / is for PACKET (HF and VHF).

See also: cradd

- **LFSup** ON | OFF  
Default ON/OFF

When ON, received line feeds are removed from the data and are not sent to the attached terminal. When OFF, received line feeds are sent to the terminal. In this command the value before the / applies to the non-packet modes (RTTY, ASCII, AMTOR, G-TOR, and PACTOR) and the value after the / is for PACKET (HF and VHF).

See also: autolf, crsup

- **LList** ON | OFF  
Default OFF

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

See also: supcalls

- **LList** ON | OFF | NONE | {+|-}callsign| callsign1,callsign2 v8.2  
Default OFF NONE

**LList** is used to determine which stations (callsigns) may NOT use your station for ANY purpose, including digipeating. When **LList** is ON, the TNC will NOT recognize those packets received with any callsign that appears in the **LList**'s (lid) list of callsigns. In addition, when **LList** is ON, you will not be able to connect to any station that is on that list.

The maximum number of callsigns allowed in **LList** is 10. Up to 10 callsigns may be entered at once, using the format shown after the command name, and the new list of from 1 to 10 callsigns will replace whatever list was there before. The **LList** command can be used to add a single callsign (+callsign), so long as there is room for the new callsign on the list (if there is not, the TNC responds with "EH?" and returns you to the command prompt). Similarly, you can remove a single callsign (-callsign) from the list. And to remove all items from the current list, enter **LList None**.

A callsign entered without a SSID will match any SSID of that callsign. To match a specific SSID only, enter the callsign with that SSID; for example, callsign-*n*, where *n* = 0–15.

- **LOWtones** ON | OFF  
Default OFF

When ON, the European low-tones are used with 170, 425, or 850 shift RTTY. These tones are: Space = 1275 Hz, Mark = 1445 Hz, 1700 Hz, or 2125 Hz. When OFF, the Mark frequency will be 2125 Hz and the Space will be above the Mark frequency by the selected shift (170, 425, or 850).



- **LT** *n text* (n = 1 – 4) (*text* up to 128 characters) v8.0  
Default blank

This command fills the specified Locate Text (LT) buffer with text. *n* specifies which buffer to use (1 – 4). If GPSHEAD is set for this buffer and if the INTFACE command is set to GPS, the buffer contents will be updated automatically by the GPS data.

- **LTP** *n dest* [via call1[,call2,...]] (n = 1 – 4) v8.0  
Default GPS/GPS

This command sets the destination callsign and the digipeaters used to transmit the LT strings. *n* specifies which string (1 – 4). The destination callsign defaults to GPS; however, you may want to change it to APRS, LOCATE, POSIT or some other destination. Up to 8 digipeater callsigns may be specified. The values before the / apply to the HF port and the values after the / apply to the VHF port.

- **LTRack** *n* [LT1] [LT2] [LT3] [LT4] [SYSOP] [TIME]  
Default 0

This command allocates memory for a special tracking buffer used to store LT messages. *n* defines the amount of memory (kBytes) set aside for the LT messages (limited by available RAM). Specifying the LT1 through LT4 parameters determines which message will be stored in the tracking buffer. If SYSOP is specified, only a user with SYSOP privileges may access the tracking buffer, and if TIME is specified, a time stamp will be appended to the front of the LT message.

The **LTRACK** buffer is accessed by connecting to the mailbox (**MYPBBS**) and using the **LTRACK** command.

- **MAII** ON | OFF  
Default ON/ON

When ON, monitored packets include "connected" packets between other stations. If OFF, other stations connected packets will not be monitored.

See also: monitor

- **MARK** *n* (n = 50 – 4000)  
Default 1600

This command sets the mark frequency for HF PACKET operation, and also sets the mark frequency used for non-packet modes when the **SHIFT** command is set to MODEM. The **MARK** command must be set less than the SPACE command.

See also: shift, space

- **MAXframe** *n* (n = 1 – 7)  
Default 1/4

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

See also: paclen

- **MAXUsers** *n* (n = 0 – 26)  
Default 10/10

This command sets the maximum number of streams (channels) available for PACKET connections. Each stream is designated by a stream letter beginning with "A". With the default value of 10, streams are lettered A – J for each port (HF and VHF). In order to change the value of MAXUSERS, you must spell out the complete command name. This will cause the KAM Plus to perform a soft reset. If either the HF or VHF value is 0, that port of the KAM Plus will be disabled. If the HF side is 0, attempting to enter a non-packet mode will produce an **INVALID MODE** error message.

Setting **MAXUSERS** to 0/0 is a special case which will allow only ONE connect at a time, but the connect may be on either HF or VHF. This is provided as a special case for those using BBS systems on two frequencies, but can only accept one connect at a time.

See also: status, streamsw, users

- **MBeacon** ON | OFF  
Default ON/ON

When ON, packets addressed to **BEACON** or **ID** will be monitored. When OFF, these packets will not be monitored.

See also: beacon, id, monitor

- **MCOM** ON | OFF  
Default ON/ON

When ON, monitored packets include connect frames **<C>**, disconnect frames **<D>**, disconnected mode frames **<DM>** and unnumbered acknowledgments **<UA>**. In addition, the following information will be added to monitored information frames as appropriate:

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

See also: ax25l2v2, monitor, mresp

- **MCon** ON | OFF  
Default OFF/OFF

When OFF and connected to another station, you will see only data being sent to you by the other station. When OFF and not connected, normal monitoring will occur based on the settings of the other "monitor" commands. When ON, all eligible packets will be monitored whether you are connected or not.

See also: monitor, streamca, streamev

- **MHClear**  
Immediate command

**Not in v8.2**

This command clears the stations heard log.

See also: mheard

- **MHEADer** {ON | OFF} \*

v8.2

\* Multi-port command on multi-port devices  
Default ON/ON

When ON, the headers are displayed for all monitored packets.

When OFF, headers are not displayed and only data is output to the terminal. Since only I and UI frames have data, only these frames are displayed.

☞ To avoid confusion when **MHEADer** is OFF, use **BUdlist** to restrict the monitored data.

See also: monitor, mcon, mbeacon, mall, suplist, budlist

- **MHeard** [S | L ]

Immediate command

This command will display a list of stations heard by your KAM Plus recently. 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 (**MH S**), only the callsigns of the stations heard will be displayed. If the L option is used, all call signs contained in the received packet, including digipeater paths, will be displayed.

See also: daytime, mhclear

- **MHeard** [Short | Long | Clear]

v8.2

Immediate command

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. **MH S**, then only the callsigns of the station heard will be displayed.

If the L option is selected, all callsigns contained in the received packet including the digipeater paths, are displayed. For example (on port 1):

```
NOGRG/I > ID    10/16/88 14:31:30  VIA TOP,KCI,W0XI
```

Here, your station heard NOGRG transmitting an ID packet. NOGRG was also using the digipeating path TOP, KCO, W0XI. If your station heard NOGRG via one of these other stations, an asterisk would show by the call or alias of the last digipeater heard. When listed short, the asterisk would show beside NOGRG.

☞ Whenever **PASSall** is ON, packets will not be checked for errors and no additions will be made to the **MHeard** list.

If the C option is used, the list is cleared.

See also: daytime, passall

- **MIsschar** *n* ( *n* = \$00 – SFF)  
Default \$20

This command defines the character to be sent to the terminal when operating in AMTOR or NAV-TEX and the received character is invalid or unrecognized.

See also: amtor, fee, lamtor, navtex

- **Monitor** ON | OFF  
Default ON/ON

When ON, unconnected packets will be monitored unless prohibited by **SUPLIST**, **BUDLIST**, **CONLIST**, **LLIST** or **PID**. The **MONITOR** command acts as a master switch for the **MALL**, **MCOM**, **MCON**, **MRESP**, **MRPT** and **MXMIT** commands. The addresses in the packet are displayed along with the data portion of the packet. Callsigns are separated by a ">" and the Secondary Station Identifier (SSID) is displayed if it is not 0. If any data is contained in a 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 only receive data from stations connected to you.

When **MONITOR** is ON for the HF port, the KAM Plus will copy ARQ or FEC PACTOR signals in the PACTOR Standby Mode, and will also copy AMTOR FEC signals in the G-TOR Standby Mode. You may also monitor data sent to your PBBS in AMTOR, G-TOR, or PACTOR if the **MONITOR** command is ON for the HF port.

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

- **MORse** code TX RX

Where: code is entered as a combination of \* and - characters; TX represents a keyboard character entered in hex or decimal; and RX denotes the character(s) displayed upon reception, entered in hex, decimal, or two alpha characters.

This command is used to define the desired keyboard character and display character(s) represented for each code listed in the table below. Only those codes listed may be defined using the **MORSE** command; standard Morse codes may not be redefined.

If you try to define a previously defined code, you will get the message **TX CHARACTER ALREADY DEFINED**. In order to delete an entry, use the command **MOR 0 0** to clear the code, and then re-define it. Refer to the ASCII chart at the end of this manual for a listing of hex codes. Codes available for definition by the **MORSE** command are:

MORSE CODE	TX	RX
**_--	\$00	\$00
---*	\$00	\$00
***_*	\$21 (!)	\$534E (SN)
**_*_	\$00	\$00
*_***	\$25 (%)	\$4253 (AS)
*_*_*	\$2B (+)	\$4152 (AR)
*_**_*	\$00	\$00
*_---*	\$00	\$00
_**_--	\$00	\$00
_*_*_	\$26 (&)	\$4B41 (KA)
_*_---	\$00	\$00
---*_*	\$00	\$00
---*_	\$00	\$00
*_***_*	\$00	\$00

MORSE CODE	TX	RX
*_*_*	\$2A (*)	\$4141 (AA)
----	\$00	\$00
**_**	\$00	\$00
**_**_*	\$00	\$00
*_***_	\$00	\$00
*_***_*	\$00	\$00
*_***_*	\$00	\$00
*_***_*	\$00	\$00
_**_*	\$2F (/)	\$2F (/)
_*_**	\$00	\$00
_*_**	\$28 (())	\$28 (())
_**_*	\$00	\$00
_**_*	\$00	\$00
***_*_*	\$23 (#)	\$534B (SK)

See also: cw, prosign

- **MResp** ON | OFF  
Default ON/ON

When ON, monitored packets will 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. Upper case characters denote command frames and lower case characters denote response frames.

- <FRMR> Frame reject
- <REJr> Reject, *r* = receive sequence number
- <RNRr> Device busy, *r* = receive sequence number
- <RRr> Receive ready, *r* = receive sequence number

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

- <Isr> Information frame (connected);  
*s* = send sequence number, *r* = receive sequence number

See also: ax25l2v2, mcom, monitor.

- **MRPt** ON | OFF  
Default ON/ON

When ON, the callsigns of all digipeaters listed in a packet will be displayed in the header line of a monitored packet. An asterisk will be shown next to the callsign of the digipeater that transmitted this frame. When OFF, only the callsigns of the originating station and the destination station will be displayed.

See also: monitor

- **MStamp** ON | OFF  
Default OFF

When ON, this command enables the display of a date/time stamp on all monitored packets in the header information. The date and time are set with the **DAYTIME** command, and the format of the date/time display is set with the **DAYSTRING** command.

See also: *cstamp*, *daytime*, *monitor*

- **MXmit** ON | OFF  
Default ON/ON

When ON, the KAM Plus will display transmitted packets as monitored data on your terminal. Repeated packets will be displayed as they are sent over the radio. The frames to be displayed will be controlled by the **MONITOR**, **MCOM**, **MCON** and **MRESP** commands, and will obey the settings of **TRACE**, **MSTAMP**, **HEADERLN**, **8BITCONV**, **CRSUP**, **LFSUP** and **FILTER** commands.

- **MYAlias** xxxxxx-n  
Default disabled

This commands sets the alias to be used as a digipeater. The alias may be up to 6 characters (plus optional SSID) which are different than those used for **MYCALL**, **MYNODE**, **MYPBBS**, **MYREMOTE**, and **MYGATE**. To disable the alias function, give the command **MYA %**.

See also: *hid*

- **MYAutost** xxxxxxx  
Default *mycall*

This command specifies the callsign used for automatically starting receive operation in RTTY or ASCII when the **AUTOSTRT** command is ON. The callsign may be up to seven (7) characters long, allowing for MARS callsigns.

See also: *autostrt*

- **MYcall** xxxxxx-n

This command tells the KAM Plus what callsign to use for PACKET operation. When the KAM Plus is first turned on or after a hard reset or a **RESTORE D**, it asks you for your callsign.

The callsign you enter is placed in this parameter. All packets originated by the KAM Plus will contain this callsign in the FROM address field. Any packets received by the KAM Plus with this callsign in the TO address field or digipeat fields will be responded to appropriately (connect, disconnect, ack, digipeat, etc).

See also: *digipeat*, *id*, *myalias*, *mygate*, *mynode*, *mypbbs*, *rnyremote*

- **MYGate** xxxxxx-n  
Default *mycall-3*

Setting this parameter to a callsign or character string enables cross-port digipeating by using the **MYGATE**. Enter up to six characters (plus optional SSID) which are different than those used for **MYCALL**, **MYALIAS**, **MYPBBS**, **MYREMOTE** and **MYNODE**. You may disable the gateway digipeating with the command **MYG %**.

See also: *hid*

- **MYGRoup** cccc | nnnn | nnnnn | cccccc | nnnnnnnn | callsign  
Default based on *mycall*

This command is used to set a SELCAL that can be used for reception of SELFEC transmissions. This allows several stations to use the same group SELCAL and still maintain their own individual SELCAL. You may set the 4-character group SELCAL using 4 characters, 4 numbers, or 5 numbers. To set the 7-character (CCIR 625) group SELCAL, enter 7 characters, 9 numbers, or an amateur callsign.

See also: *autostrt*

- **MYGTcall** xxxxxxxxxx v7.0  
Default based on *mycall*

Establishes the callsign used for G-TOR link. Up to 10 printable ASCII characters/numbers may be entered.

- **MYNode** xxxxxx-n  
Default *mycall-7*

Setting this command to a callsign or character string enables the KA-Node in the KAM Plus. Enter up to six characters (plus optional SSID) which are different than those used for **MYCALL**, **MYALIAS**, **MYPBBS**, **MYREMOTE** and **MYGATE**. 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*

- **MYPbbs** xxxxxx-n  
Default *mycall-1*

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

See also: *pbbs*

- **MYPTcall** xxxxxxxx  
Default *mycall*

This command sets the callsign used for PACTOR links. Up to 8 characters/numbers may be entered.

- **MYRemote** xxxxxx-n  
Default disabled

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

See also: *rtext*

- **MYSelcal** cccc | nnnn | nnnnn | cccccc | nnnnnnnn | callsign  
Default {based on *mycall*}

The SELCAL specified by this command will be recognized, when operating in AMTOR Mode A, as your station identification. The convention used for AMTOR SELCALs is to use the first letter and the last three letters of your call sign as your 4-character SELCAL. The **MYSEL**CAL will also accept 4 or 5 digit numbers and generate the corresponding 4-character SELCAL automatically from these numbers.

If you enter 7 characters, 9 numbers or an amateur radio call sign, this command will use this as your 7-character SELCAL for the CCIR 625 form of AMTOR operation. If you choose to enter your own seven characters, you must remember that the CCIR 625 recommendation does not allow the use of the letters G, H, J, L, N or W.

You must use the **MYSEL**CAL command twice to change both the 4-character and the 7-character SELCAL. The KAM Plus keeps both SELCAL and will respond to either one automatically.

See also: amtor, fec

- **NAVClr**  
Immediate command

This command clears the list of messages which have been received in the NAVTEX/AMTEX mode. Any message which has previously been received will be eligible to be received again.

See also: navtex

- **NAVErrr** *n* ( *n* = 0 – 10)  
Default 5

The NAVERR command specifies the maximum percent of errors allowed in a NAVTEX/AMTEX message before the message is considered invalid. If a message is received with less than *n* % errors, that same message will not be sent to the terminal if received a second time. If the received message contains excessive errors, the message **\*\*\*TOO MANY ERRORS XXXX** will be sent to the terminal and the message will be sent to the terminal if received again.

See also: navtex

- **NAVLog**  
Immediate command

This command displays a list of the NAVTEX/AMTEX messages which have been properly received and therefore are ineligible to be printed if received again.

- **NAVMsg** *c*[ccc...] | ALL | NONE (*c* = A – Z)  
Default ALL

The **NAVMSG** command specifies which classes of NAVTEX messages will be sent to the attached terminal. Three classes (A, B, and D) must always be sent according to the specification, but may be eliminated by the user. If any of these required message classes are not selected, the KAM Plus will issue a warning message. Specifying ALL will set the NAVTEX mode to copy all classes of messages, and setting **NAVMSG** NONE will exclude all classes. Message classes are listed in the NAVTEX section of this manual.

See also: navsta, navtex



- **NAVSta** *c*[*ccc...*] | ALL | NONE (*c* = A – Z)  
Default ALL

The **NAVSTA** command specifies which originating stations will be copied in the NAVTEX mode. Each transmitting station uses a unique identifier, allowing you to select only those stations of interest in your area. If you specify ALL, the KAM Plus will copy all NAVTEX stations. Specifying NONE will disable copying of any NAVTEX station, thus effectively disabling the NAVTEX mode, and will cause a soft reset.

See also: navmsg, navtex

- **Navtex**  
Immediate command

This command will place your KAM Plus in the NAVTEX mode. This allows you to copy AMTEX messages (refer to the NAVTEX section of this manual and the 8th Computer Networking Conference papers for details).

See also: misschar, navclr, naverr, navlog, navmsg, navsta, pmode

- **NDHClear**  
Immediate command

**Not in v8.2**

This command clears the list of nodes heard by the KAM Plus.

See also: ndheard

- **NDheard** [S | L]  
Immediate command

This command displays a list of nodes whose ID packets have been heard by the KAM Plus. The list includes KA-Nodes, Net/Rom nodes, TheNet nodes and G8BPQ nodes. An asterisk, \*, indicates that the station was heard through a digipeater. The date/time stamp is also displayed indicating the last time this station was heard. If the S option is used (**ND S**), 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 also: mynode, ndhclear

- **NDheard** [Short | Long | Clear]  
Immediate command

**v8.2**

This command allows the operator to display a list of nodes whose ID packets have been heard by the TNC. The list includes KA-Nodes as well as K-Net.

K-Net, 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. **ND S**, then only the callsigns of the stations heard will be displayed. If the L option is selected, all callsigns contained the received

packet are displayed (see **MHeard** for display format). If the **C** option is used, the list of nodes is cleared.

See also: mynode

- **NDWild** ON | OFF  
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 KAM Plus.

See also: my alias, mycall, mygate, mynode, mypbbs, myremote

- **NEwmode** ON | OFF  
Default ON

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

See also: connect, disconnect, status

- **NOmode** ON | OFF  
Default OFF

When OFF and a connection takes place, the KAM Plus will change to the mode specified by the **CONMODE** command. When ON, the KAM Plus stays in the mode it was in after connecting to another station – it does not immediately change to Convers or Transparent Mode.

See also: conmode, connect

- **NText** *text* (up to 128 characters)

This entry specifies the customized text to be sent with the initial KA-Node sign-on message (when a remote station connects to the KA-Node). Enter any combination of characters and spaces, up to a maximum of 128 characters. To clear the **NTEXT**, give the command **NT %**.

See also: mynode, numnodes

- **NUcr** *n* (n = 0 – 31)  
Default 0

This command sets the number of null characters sent to the terminal after a carriage return. This may be useful for some hardcopy terminals to delay the beginning of each line.

- **NULf** *n* (n = 0 – 31)  
Default 0

This command sets the number of null characters sent to the terminal after a line feed. This may be useful for some hardcopy terminals to delay the beginning of each line.

- **NUMnodes** *n* ( *n* = 0 – 5)  
Default 0

This command sets the number of allowable circuits through the KA-Node. The maximum number allowed will depend on the amount of RAM that is available for node circuits and will vary based on the values you specify for **PBBS** and **MAXUSERS** and also will depend on whether or not you have the **MYREMOTE** and **NAVTEX** modes enabled. The Default configuration allows a maximum of 4 KA-Node circuits.

See also: mynode

- **Paclen** *n* ( *n* = 0 – 255)  
Default 64/128

This command specifies the maximum length of the data portion of a packet. The KAM Plus will automatically send a packet when the number of input characters reaches *n*. This setting applies to both the Convers and Transparent modes. Setting a value of 0 will allow a maximum of 256 data characters in a packet.

See also: maxframe

- **PACTime** [EVERY | AFTER] *n* ( *n* = 0 – 255)  
Default AFTER 10

The time specified by this command is used in Transparent mode to cause packets to be transmitted periodically. When set to AFTER *n*, a packet will be transmitted when input from the terminal stops for *n* × 100 milliseconds or when **PACLEN** is reached. When EVERY *n* is specified, a packet will be transmitted every *n* × 100 milliseconds or when **PACLEN** is reached. The KAM Plus will not transmit a packet that contains no data. If **CPACTIME** is ON, this command will have the same function in Convers Mode.

See also: cpactime, trans

- **PACTOr** [!][callsign]  
Immediate command

Entering **PACTOR** with no argument will place the KAM in PACTOR Standby Mode allowing you to respond to an incoming link request, to transmit a CQ or other broadcast (**ARQBBS** must be OFF), or monitor FEC and ARQ PACTOR signals (**MONITOR** must be ON for the HF port). By specifying the optional callsign parameter, your KAM Plus will initiate a link attempt with that station. If the optional ! is given, the attempt to link will use the long-path protocol, allowing longer distance communication. You can discontinue the link attempt, or break an existing link with the [Ctrl-C][D] directive, which will leave you in PACTOR Standby Mode, or with the [Ctrl-C][X] directive which returns you to PACKET Mode (**cmd:** prompt).

To transmit a CQ from this mode, use the [Ctrl-C][T] directive to begin transmitting, type your message, then use the [Ctrl-C][E] directive to return to Standby Mode after all of your message has been transmitted.

- **PARity** ODD | EVEN | MARK | SPACE | NONE  
Default set by autobaud routine

This command sets the parity mode for communication with the attached terminal. The autobaud routine sets **PARITY** based on what is received from the terminal when you press the \* to set the baud rate. If the 8th bit is set, **PARITY** is set to **EVEN** and if the 8th bit is not set, **PARITY** is set to **NONE**. This command corresponds to the parity setting in your communications program. If **PARITY** is set to **NONE** all 8 data bits from the terminal may be transmitted over the radio if the **8BITCONV** command is ON and operating PACKET or ASCII. If **PARITY** is set to ODD, EVEN, MARK, or SPACE, the 8th bit from the terminal will be set to 0 when transmitted over the radio.

See also: 8bitconv

- **PASs** *n* (n = \$00 – \$FF)  
Default \$16 (Ctrl-V)

The **PASS** command sets the character used to transmit those characters which normally have special meaning to the KAM Plus when operating in packet Convers mode. A list of the special characters can be displayed with the command **DISPLAY C**. In order to transmit any of these, you must precede that character with the PASS character. For instance, if you want to send a [Ctrl-C] to the station you are talking to, you must type [Ctrl-V][Ctrl-C] since a [Ctrl-C] would normally return you to the Command mode.

- **PASSAI** ON | OFF  
Default OFF/OFF

When OFF, packets will only be displayed if the CRC (error checking) is correct, and according to the monitor commands. When this command is ON, the KAM Plus will print packets to your terminal regardless of whether or not the CRC is correct. An 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 this command is ON.

NOTE: Turning **PASSALL** ON will not cause your TNC to acknowledge connected packets if the CRC is incorrect, it simply displays them on the terminal.

- **PBbs** *n* (n = 0 – 121)  
Default 100

This command sets the size of the KAM Plus Personal Mailbox (in kilobytes). The maximum value will depend on the amount of RAM available for the mailbox. The amount of RAM will also depend on the setting of **MAXUSERS** and **NUMNODES** and will be affected by enabling the **MYREMOTE** or the **NAVTEX** mode. Changing the size of the **PBBS** will not affect the contents of the mailbox as long as sufficient memory remains allocated to store the existing messages.

To renumber the messages in your PBBS, give the **PBBS** command with *n* being the same as the current size of the PBBS.

See also: cmsg, mypbbs

- **PBForwrd** bbscall [VIA call1,call2,...call8] [HF | VHF] [EVERY | AFTER *n*]  
Default NONE VHF EVERY 0

This command will cause your PBBS to attempt to initiate a forward of any eligible mail to another BBS system periodically. Any message in your PBBS which contains an @BBS field and is not being HELD (H) or has not previously been FORWARDED (F) is eligible to forward. If the keyword EVERY is used, the PBBS will attempt to forward once every *n* hours. If you specify the keyword AFTER, the PBBS will attempt to forward whenever a user disconnects from the PBBS, and every *n* hours after that. Setting the time interval will cause the PBBS to attempt to forward immediately.

- **PBHeader** ON | OFF  
Default ON

When ON, all of the routing headers (R: lines) received from a full service BBS will be stored in the PBBS mailbox. When OFF, only the last R: line (the first BBS handling the message) will be saved. The routing headers are those lines you normally see in messages beginning with R:. The PBBS will ignore ail 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:.

**NOTE:** If you have your PBBS set to initiate forwarding (see **PBFORWRD**) we recommend leaving **PBHEADER** ON.

- **PBHOLD** ON | OFF  
Default ON

When ON, any message received over the radio will automatically be held by your PBBS for you to review. You may then release the message for forwarding by editing it and changing the H flag (for example, to edit message number 4: **E 4 H**). When OFF, messages received over the radio are not held, but may immediately be forwarded from your PBBS. (Note that any message addressed TO or @ your MYCALL or **MYPBBS** call will be held regardless of the setting of **PBHOLD**.)

- **PBKilfw** ON | OFF  
Default ON

When ON, private and traffic messages will be killed (deleted) from your PBBS automatically after they have been forwarded to another BBS. When OFF, these messages will not be killed, but will be marked with the forwarded flag (F) to prevent them from forwarding again.

- **PBList** [ON | OFF][NONE | {+ | -}callsign | callsign,callsign,...] **v8.2**  
Default OFF NONE

The front panel of your TNC has a mail-status indicator that blinks when there is unread mail in your PBBS addressed to your callsign (**MYCALL**) or to your **MYPBBS**. And several PBBS commands (LISTMINE, READMINE, and KILLMINE) operate on mail addressed to your callsign (**MYCALL**) or to your **MYPBBS**.

**PBLIST** allows you to add up to ten more callsigns to the set of callsigns included as "mine" for use with the "mail" indicator and the PBBS commands (LISTMINE, READMINE, and KILLMINE). The **PBLIST** command has two parameters: one for creating, changing, or deleting the list of callsigns on the **PBLIST** and the other for turning ON or OFF the use of the callsigns on the current **PBLIST**.

☞ SSIDs attached to callsigns are always ignored in the mailbox.

The maximum number of callsigns allowed in **PBLIST** is 10. Up to 10 callsigns may be entered at once, using the format shown after the command name, and the new list of from 1 to 10 callsigns

will replace whatever list was there before. The **PBList** command can be used to add a single call-sign (+callsign), so long as there is room for the new call-sign on the list (if there is not, the TNC responds with **EH?** and returns you to the command prompt). Similarly, you can remove a single call-sign (-callsign) from the list. And to remove all items from the current list, enter **PBL N**.

*When you change **PBList**, the new list of call-signs takes effect immediately for use with the PBBS commands (LISTMINE, READMINE, and KILLMINE). But the new list will not be used with the mail-status indicator until after the next disconnect from the PBBS or the next reset.*

When PBLIST is ON, the call-signs on the current **PBList** list are included as "mine" for use with the "mail" indicator and the PBBS commands (LISTMINE, READMINE and KILLMINE). Your call-sign (**MYcall**) and your **MYPBBS** are also included as "mine" when **PBList** is ON.

When PBLIST is OFF, only your call-signs (**MYcall**) and your **MYPBBS** are included as "mine" for use with the "mail" indicator, the **PBPerson** command, and the **PBBS** commands LISTMINE, READMINE, and KILLMINE.

☞ Hint: Some uses of **PBList** to give you additional use of your "mail" indicator (and the PBBS commands shown above) would be to include on **PBList**: (1) call-signs of family members who are also hams, (2) old call-signs that people might still be using for you, and/or (3) call-signs that are common errors in trying to reach you (e.g., replacing a "zero" with an "O" in your call-sign).

- **PBLO** [OLD | NEW] [FIXED | VARIABLE]  
Default NEW VARIABLE

When set to NEW, the PBBS will list messages to a user with the newest message (highest number) listed first. When set to OLD, the oldest message will be listed first. When the second parameter is set to VARIABLE, the user may change the order of the listing by using the LO command in the PBBS. When set to FIXED, the user cannot change the listing order.

- **PBPerson** ON | OFF  
Default OFF

When OFF, your PBBS will accept messages addressed to any station. If the message is then forwarded to another BBS, your PBBS will add an R: line indicating that the message was forwarded by your system. When ON, your PBBS becomes a PERSONAL system. This means that it will only accept messages addressed to your **MYCALL** or your **MYPBBS** call. In addition, the PBBS will only forward messages to another BBS if they are FROM your MYCALL. When forwarding or reverse forwarding with **PBPERSON** ON, the PBBS will not include its own R: line.

- **PBRevers** ON | OFF  
Default OFF

When OFF and your KAM initiates a forward (**PBFORWRD** command) it will send all eligible messages to the other BBS. After all messages have been sent, the KAM will then disconnect from the other station.

When ON, the KAM will poll the other BBS for any messages after it has forwarded the KAM messages to the other BBS and before disconnecting.

- **PErsist** *n* ( *n* = 0 – 255)  
Default 192/63

This command sets the value used to determine the probability of transmitting a packet after SLOTTIME expires. This method of determining access to the radio channel has proven more efficient in sharing the frequency than using the **DWAIT** method. The higher the **PERSIST** value, the more likely it is that your station will transmit when the channel is clear. A reasonable rule-of-thumb for selecting the **PERSIST** value is to divide 256 by the number of users on the channel at the same time. Using this method allows many users to share the channel and still be successful in passing their data.

See also: slottime

- **PHClear** **Not in v8.2**  
Immediate command

This command will clear the list of stations who have connected to the PBBS.

- **PHeard [Clear]**  
Immediate command

This command will display a list of stations that have recently connected to your KAM Plus PBBS. The list will show the callsign of the connecting stations and the time they connected and disconnected.

To clear the **PHeard** list of all current entries, enter **PHeard Clear** (in v8.2).

See also: passall

- **PId** ON | OFF  
Default OFF/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 packets (Net/Rom, TCP/IP etc.) can cause strange displays on monitoring stations. The header line of monitored frames will show the PID in curly braces.

- **PMode** NONE | ASCII | AMTOR | CW | FEC | GTOR | RTTY | NAVTEX | PACTOR | TOR **v7.1**  
Default NONE

When set to NONE, the KAM Plus will display the Kantronics sign-on message and **cmd:** prompt when power is first applied to the unit, entering the PACKET Mode of operation. When set to any other value, the KAM Plus will not send a sign-on message, but will enter the specified mode on the HF port. **NOTE:** If set to FEC or NAVTEX, you will not receive any message on your terminal when the unit is powered up. To exit any of these modes, type [**Ctrl-C**] then the letter [**X**].

See also: intface

- **PMode** NONE | CONV | TRANS | RTTY | ASCII | AMTOR | PACTOR | GTOR | TOR | CW **v8.0**  
Default None

The **PMODE** command controls the mode your KAM Plus will be in when it is first powered up or reset. When set to NONE, the KAM Plus will produce a sign-on message followed by the command prompt (**cmd:**). When set to CONV, the unit will be in Convers Mode. Setting **PM TRANS** sets the KAM Plus in Transparent Mode. Exiting Transparent Mode with three [**Ctrl-C**]s will set the **PMODE** command to the default value (NONE).

- **POrt** HF | VHF  
Default VHF

This command determines the radio port that will be used to transmit packet when the KAM Plus is first powered up. To change to PACKET operation on the other port after the KAM Plus is operating, you must type the **STREAMSW** character and stream letter.

See also: streamsw

- **POStkey** *n* ( *n* = 0 – 15)  
Default 0

This command sets a time delay after the last data has been sent to the radio before the PTT line is released on the HF port of the KAM. The audio will be turned off  $n \times 0.83$  milliseconds before releasing the PTT line.

See also: prekey

- **PRekey** *n* ( *n* = 0 – 15)  
Default 0

This command sets a time delay between the assertion of PTT and the beginning of any audio from the KAM HF port to the radio. The audio will begin  $n \times 0.83$  milliseconds after the PTT line is activated.

See also: postkey

- **PROsign** *n* ( *n* = \$00 – \$FF)  
Default \$5C ( \ )

The **PROSIGN** command is used to select the character used to introduce a CW prosign. When the selected character is entered during CW transmission or within text to be used for CW transmission, it will cause the NEXT TWO character codes to be combined. For example **AS** will cause the codes for A and S to be combined into the "wait" code or "AS".

See also: morse

- **PTDown** *n* ( *n* = 2 – 30)  
Default 6

Sets the number of consecutive bad frames received before switching to 100 baud PACTOR.

- **PTErrs** *n* ( *n* = 30 – 255)  
Default 80

Sets the time-out attempts for PACTOR. When attempting to link with another station, the KAM Plus will time out after *n* attempts without response. When already linked, reception of *n* consecutive faulty frames results in a timeout.

- **PText** *text* (up to 128 characters)

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

See also: pbbs



- **PTFecspd** 100 | 200  
Default 100

This command will set the speed to be used for PACTOR FEC transmissions. When set to 100, all FEC transmissions will be at 100 baud and when set to 200, FEC transmissions will be at 200 baud.

- **PTHuff** ON | OFF  
Default OFF

When ON, allows Huffman compression of 7-bit data when operating PACTOR. The KAM Plus will automatically detect any 8-bit data and will not apply compression if any 8-bit data is contained in the frame being transmitted. It will also not compress unless the compression will result in greater throughput. When OFF, Huffman compression is disabled.

- **PTListen**  
Immediate command

Places the KAM Plus in the PACTOR Listen Mode. This mode will allow you to copy FEC or ARQ (linked) PACTOR stations, but you cannot transmit from this mode. Use the [Ctrl-C][X] directive to return to the command prompt.

- **PTRpt** *n* ( *n* = 2 – 5)  
Default 2

When transmitting an unproto PACTOR FEC message (i.e. calling CQ) the information will be transmitted *n* times. This is done to improve the chances of other stations copying your message since FEC transmissions do not use memory ARQ.

- **PTSi** ON | OFF  
Default OFF

When OFF, supervisory information exchanged between two PACTOR units is not displayed on the terminal. When ON, supervisory information is displayed.

- **PTSum** *n* ( *n* = 0 – 120)  
Default 5

When linked in PACTOR, the KAM Plus will attempt to assemble up to *n* received frames to obtain a valid frame. This process is called memory ARQ. When a frame is received, the KAM Plus checks the CRC-16 checksum and if it is invalid, that frame is stored in memory. The sending station will then repeat the frame, and the KAM Plus will check again to see if the frame is completely correct. If not, it will attempt to assemble a good frame by combining the frames received.

- **PTTries** *n* ( *n* = 0 – 9)  
Default 2

Sets the maximum number of attempts to increase a PACTOR link to 200 baud. If unsuccessful after *n* attempts, the KAM Plus will remain at 100 baud until it receives **PTUP** consecutive good frames.

- **PTUp** *n* ( *n* = 2 – 30)  
Default 3

Sets the number of consecutive good PACTOR frames that must be received before requesting a switch to 200 baud PACTOR.

- **RBaud** *n* ( *n* = 20 – 500)  
Default 45

This command sets the Default baud rate used when entering RTTY mode. It also sets the baud rate used for RTTY operation if **PMODE** is RTTY. When operating in the RTTY Mode, typing the [Ctrl-C][0] directive will also switch to the **RBAUD** rate.

See also: pmode, rtty

- **REdispla** *n* ( *n* = \$00 – \$FF)  
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 use the REDISPLAY-packet character to see a "clean" copy of your input if you are using a printing terminal for have **BKONDEL** OFF and you have deleted characters. The redisplayed packet will show the corrected text.

See also; bkondel, canline, canpac, flow

- **RELink** ON | OFF  
Default OFF/OFF

When OFF and operating PACKET using the Level 2 Version 2 protocol (see AX25L2V2), the KAM Plus will not attempt to automatically reconnect when data has not been acknowledged and a disconnect occurs. When ON, the KAM Plus will attempt to reconnect if the RETRY count has been exceeded.

See also: ax25l2v2, retry, tries

- **REPhase** ON | OFF  
Default ON

When ON and operating Mode A AMTOR, the KAM Plus will automatically attempt to rephase with the other station if repeated errors occur. When OFF, repeated errors will cause the KAM Plus to return to AMTOR Standby mode.

- **RESET**  
Immediate command

This command performs a soft reset of the KAM Plus. Any existing connections will not be recognized, but your parameter settings and messages in the mailbox will not be disturbed. The Kantronics sign-on message will be displayed.

See also: intface, maxusers, myremote, navsta, numnodes, pbbs, pmode, port, restore

- **RESPtime** *n* ( *n* = 0 – 255) **Not in v8.2**  
Default 15

When connected to another PACKET station, your KAM Plus will send an acknowledgment for a received information packet after *n* × 100 milliseconds. This command is useful in avoiding collisions during such activity as file transfers using full-length packets. If operating half-duplex, this timer is suspended whenever the PTT line is active, or when carrier detect is present.

See also: frack

- **RESTORE Defaults**

Immediate command

This command will completely restore your KAM Plus to factory defaults. The KAM Plus will return all parameters to factory values, and will run the autobaud routine, asking you to **PRESS (\*) TO SET BAUD RATE**. Any messages in the mailbox will be deleted.

See also: reset

- **RETry** *n* (n = 0-15)  
Default 10/10

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: ax2512v2, frack, relink, tries

- **RIng** ON | OFF  
Default ON

When ON, three bell characters (\$07) are sent to the terminal with each **\*\*\* CONNECTED TO** message when another station initiates the connect. When OFF, no bell characters are sent with the connect message.

- **RNrtime** *n* (n = 0 – 255)  
Default 0

If a packet connection stays in a remote device busy state (continues to receive RNR frames) for  $n \times 10$  seconds, the KAM Plus will disconnect that station. If a KA-Node connection stays in a remote device busy for  $n \times 10$  seconds, the KA-Node will disconnect the input and output sides of that KA-Node circuit. Setting **RNRTIME** to 0 disables this function.

See also: mresp

- **RPrint** *text* (text up to 128 characters)  
Immediate command

This is an immediately command which sends the *text* string from the serial port of the KAM Plus to the attached device (e.g. GPS unit). It is intended to allow a remote SysOp (connected to the KAM Plus with the **MYREMOTE** callsign) to send a string to a unit attached to the serial port. This can be used to change the configuration of a GPS unit.

- **RText** *text* (up to 128 characters)

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 KAM Plus will send three sets of numbers, one of which must be properly decoded using this string.

- **Rtty** *n* (n = 20 – 500)  
Immediate command

This command places the KAM Plus in the RTTY mode. The parameter *n* sets the transceiver baud rate. If *n* is not specified, the baud rate specified in **RBAUD** is used.

See also: autostrt, canline, pmode, rbaud

- **Screenl** *n* ( *n* = 0 – 255)  
Default 0

This value is used to format data sent to your terminal. A carriage return sequence is sent to the terminal at the end of a line when *n* characters have been printed. A value of 0 inhibits this action.

See also: autolf

- **SEndpac** *n* ( *n* = \$00 – \$FF)  
Default \$0D (↵)

This command specifies a character that will force a packet to be transmitted 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

- **SShift** 170 | 425 | 850 | MODEM  
Default 170

This command sets the Default shift used in RTTY, ASCII, AMTOR, NAVTEX and PACTOR Modes. When MODEM is specified, the MARK and SPACE commands set the frequencies used by adjusting the switched capacitance filters in the KAM Plus. The MARK and SPACE settings are always used for the HF PACKET tones and when operating G-TOR. When operating in a non-packet mode, the [Ctrl-C][S] directive may be used to change shifts.

See also: mark, space

- **SLotime** *n* ( *n* = 0 – 255)  
Default 5/10

Sets the time between successive tries of the persistence algorithm to *n* × 10 milliseconds.

See also: persist

- **SPace** *n* ( *n* = 50 – 4000)  
Default 1800

This command sets the space frequency used for HF packet operation and (if the shift command is set to MODEM) for non-packet modes. The **SPACE** command must be set greater than the MARK command.

See also: mark, shift

- **STart** *n* ( *n* = \$00 – \$FF)  
Default \$11 (Ctrl-Q)

This command specifies the character sent by the terminal to the KAM Plus to restart input from the KAM Plus. 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 and be sure **XFLOW** is ON.

See also: stop, xflow, xoff, xon

- **STATShrt** ON | OFF  
Default ON

**Not in v8.2**

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

- **Status**  
Immediate command

This command displays the identifier and link state of all allowed streams. The current input and output stream is indicated with I/O. 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.

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

- **Status [Long]**  
Immediate command

**v8.2**

Entry of the **STATUS** command will display the number of bytes available (i.e., free bytes) in the RS232 input buffer, the current I/O stream and any streams having a connected status.

Entering **Long** will cause the TNC to display the status of all streams allowed by **MAXUsers**, **PBBS**, **NUMnodes** and **MYRemote**.

The current KA-NODE 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 die number of bytes outstanding. The number in parentheses is the number of packets not yet acknowledged.

The following is an example of a display (using STATUS LONG). A, B, C (i.e., **MAXUsers** = 3 ) indicate the stream. "A" stream is connected to N0GRG and has 50 bytes in 2 packets that are unacknowledged, The current stream (IO) is the "B" stream, which is connected to N0KN. KB0NYK is connected on circuit "A" of the KA-Node. All other streams, node circuits, the BBS, and the remote access are disconnected. Appending **/P** to the callsign indicates that the connection is permanent (see **CONPerm**).

Example for single port TNC:

```
cmd: Status long
FREE BYTES 1661
A stream - #50(2) CONNECTED to N0GRG
B stream - IO CONNECTED to N0KN/P
C stream - DISCONNECTED
BBS DISCONNECTED
REM DISCONNECTED
Ain CONNECTED to KB0NYK
Aout DISCONNECTED
Bin DISCONNECTED
Bout DISCONNECTED
```

The same example as above, modified for multi-port TNC:

```
cmd: Status long
FREE BYTES 1661
A/1 stream - #50 (2) CONNECTED to N0GRG
B/1 stream - IO CONNECTED to N0KN/P
C/1 stream - DISCONNECTED
A/2 stream - DISCONNECTED
B/2 stream - DISCONNECTED
C/2 stream - DISCONNECTED
BBS DISCONNECTED
REM DISCONNECTED
Ain/1 CONNECTED to KB0NYK
Aout DISCONNECTED
Bin DISCONNECTED
Bout DISCONNECTED
```

See also: conperm, mayusers, myremote, numnodes, pbbs, streamsw

- **STOP** *n* ( *n* = \$00 – \$FF)  
Default \$13 (Ctrl-S)

This command specifies the character sent by the terminal to the KAM Plus to stop input from the KAM Plus. If set to \$00 only hardware flow control will be used. For software flow control set this parameter to the character the terminal will send to stop data flow and be sure **XFLOW** is ON.

See also: start, xflow, xoff, xon

- **STREAMCa** ON | OFF  
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.

See also: mcon, monitor, streamev

- **STREAMEv** ON | OFF  
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 applies only when **MONITOR** or **MCON** is OFF and you are connected to another station.

See also: mcon, monitor, streamca, streamsw

- **STReamsw** *n* ( *n* = \$00 - \$FF)  
Default \$7E (-) / \$7C (!)

This command selects the characters used to signify that a new "stream" or connection channel is being addressed. To change streams or to change from VHF to HF, type the streamswitch character for the port you want, followed by the letter of the stream you want to use.

See also: maxusers, pass, status

- **SUPCalls** [+ | -]callsigns | NONE  
Default NONE

Not in v8.2

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.

See also: llist, suplist

- **SUplist** OFF | TO | FROM | ON  
Default OFF

When OFF, allows monitoring of all eligible packets (according to other monitor commands) even if the **SUPCALLS** list has callsigns in it. When ON, packets addressed TO or FROM those stations listed in the **SUPCALLS** will not be monitored. When set to TO, those packets addressed TO stations in the **SUPCALLS** will not be monitored, and when set to FROM, those packets FROM stations in the **SUPCALLS** list will not be monitored.

See also: monitor, supcalls

- **SUplist** [ON | OFF][NONE | {+|-}call | call1,call2,..]  
where call={callsign | {<|>}callsign | callsign{>|<}callsign}  
Default OFF NONE

v8.2

**SUplist** is used to determine which received packets will not be displayed, i.e. suppressed. When OFF or NONE, **SUplist** will not prevent the display of packets, even if it has callsigns in its list.

The maximum number of callsigns allowed in **SUplist** is 10. Up to 10 callsigns may be entered at once, using the format shown after the command name, and the new list of from 1 to 10 callsigns will replace whatever list was there before. The **SUplist** command can be used to add a single callsign (+callsign), so long as there is room for the new callsign on the list (if there is not, the TNC responds with "EH?" and returns you to the command prompt). Similarly, you can remove a single callsign (-callsign) from the list. And to remove all items from the current list, enter **SU N**.

A callsign entered without a SSID will match any SSID of that callsign. To match a specific SSID only, enter the callsign with that SSID; for example, callsign-*n*, where *n* = 0–15.

- **SWp** *u,d,t*  
Default 25,8,75/17,17,108

This command sets the parameters used by the KAM Plus 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 made false.

See also: cd

- **TOr**  
Immediate command

This command places the KAM Plus in TOR Standby Mode. In this mode, your KAM Plus will respond to other stations calling you in AMTOR, PACTOR or G-TOR automatically. In addition you can monitor or transmit AMTOR FEC.

If INTERFACE is set to TERM, when a station links to you the linked message will indicate which mode is being used.

- **TRACe** ON | OFF  
Default OFF/OFF

When ON, frames received in PACKET, G-TOR, PACTOR and AMTOR ARQ 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. The TRACE function may be toggled on and off when operating AMTOR ARQ, G-TOR, or PACTOR by using the [Ctrl-C][Ctrl-T] directive.

- **Trans**  
Immediate command

This command places the KAM in 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 over the radio as received. To get out of Transparent Mode, send the KAM Plus a modem break, or send three COMMAND characters rapidly to the KAM Plus.

See also: cmdtime

- **TRFlow** ON | OFF  
Default OFF

This command allows the KAM Plus to respond to Software flow control from the terminal when in the Transparent Mode.

See also: trans, txflow, xflow

- **TRIEs** *n*                      (*n* = 0 – 15)

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).

See also: retry

- **TXdelay** *n*                      (*n* = 0 – 255)  
Default 30/30

Sets the transmitter key-up delay to  $n \times 10$  milliseconds for PACKET Operation. PACKET data will be transmitted  $n \times 10$  milliseconds after the PTT line has been activated.

- **TXDFec** *n*                      (*n* = 0 – 25)  
Default 0

Sets the number of extra seconds that the KAM Plus will send phasing signals at the beginning of an AMTOR FEC transmission. This allows more time for a Station to tune your FEC transmission and obtain a lock condition before you actually begin transmitting data.

See also: fec



- **TXDTor**  $n$  (  $n = 0 - 15$ ) v7.0  
Default 5

This command establishes the transmit key-up delay used in AMTOR, G-TOR and PACTOR Operation. Each number increment sets a multiple of 10 ms.

- **TXFlow** ON | OFF  
Default OFF

This command allows the KAM Plus to send software flow control signals to your computer when operating in Transparent Mode.

See also: trans, trflow, xflow

- **UIDigi** [ON | OFF][NONE | {+|-}callsign | callsign,callsign,...] v8.2  
Default OFF NONE/OFF NONE

Up to 4 call signs can be specified for special digipeater duty. If any of the **UIDIGI** calls appears in the to-be-digipeated field of a UI packet, and if **MYCALL** does not appear in the source field or any of the has-been-digipeated fields, the **UIDIGI** call in the to-be-digipeated field will be replaced by **MYCALL** with the H bit set and the packet will be digipeated.

See also: dwait, persist, uidwait, unproto

- **UIDWait** ON | OFF v8.2  
Default OFF/OFF

When **UIDWAIT** is OFF, "special" digipeat packets (those formed by **UIDIGI**, **UIFLOOD** or **UI-TRACE** only) have their usual channel access; that is, there is no wait **DWAIT** or slottime added before transmission once the channel is clear. However, if **UIDWAIT** is set ON, the packets awaiting to be digipeated will be subject to the same wait times as not-to-be-digipeated packets awaiting transmission.

By subjecting "special" to-be-digipeating packets to a delay determined by slottime and persist, it is more likely that to-be-digipeated packets of two or more stations in the same vicinity would not collide. This may be good if one wants to guarantee that a digipeated packet will "make it out" of its neighborhood but bad if one wishes to limit the number of times a packet is redigipeated, such as in APRS applications.

See also: dwait, persist, uidwait

- **UIFlood** name, $n$ ,[ID | NOID] (name = 5 char max) ( $n = 0-255$ ) v8.2  
Default disabled,30,NOID/disabled,0,NOID

When a UI frame is received with a call in the to-be-digipeated field of the form 'name' $x$ - $y$  where  $x$  is a number (1-7) appended to 'name' and  $y$  is a SSID (1-7), the SSID is decrement and the UI frame is digipeated without setting the H bit. When the packet is digipeated, a checksum is formed over the source, destination and data fields of the packet. This checksum is kept for  $n$  seconds (0-255). If an incoming UI packet is eligible for digipeating as above, but its checksum matches one of those being saved, the packet is discarded (not digipeated). The buffer holds a maximum of 64 checksums. If the optional parameter ID is selected, the **MYCALL** call sign is inserted in an additional digipeater address field with its H bit set.

See also: uidwait

- **UIGate** ON | OFF  
Default OFF/OFF

v8.2

The purpose of this command is to prevent heavy high speed UI frame activity from congesting ("flooding") the low speed port (port 1) frequency.

UI packets with a to-be-digipeated address of **MYGATE** that enter a port with **UIGATE** ON will be digipeated out the other port. If **UIGATE** is OFF for a port, UI packets with a to-be-digipeated address of **MYGATE** entering that port will be discarded.

See also: digipeat, mygate

- **UITrace** name  
Default disabled/disabled

v8.2

When a UI frame is received with a call in the to-be-digipeated field of the form 'name'x-y where *x* is a number (1–7) appended to 'name' and *y* is a SSID (1–7) and **MYCALL** does not appear in the source field or any of the has-been-digipeated fields, **MYCALL** with the H bit set is inserted before the to-be-digipeated field, the SSID of the to-be-digipeated field is decremented and the UI frame is digipeated without setting the H bit of the to-be-digipeated field.

☞ If the packets should already have 8 digipeater fields, **MYCALL** is not inserted.

See also: dwait, persist, uidwait

- **Unproto** call1 [VIA call2,call3,...call9] | NONE  
Default CQ/CQ

This command sets the destination callsign (call1) and the digipeaters (call2 – call9) used when transmitting unconnected packet data. Each callsign may have an optional Secondary Station Identifier (SSID) specified as -n where *n* = 1 – 15. When a **BEACON** or **ID** packet is transmitted, the destination address will be set to **BEACON** or **ID** and the digipeaters specified in the **UNPROTO** command will be used.

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

- **USers** *n* (*n* = 0 – 26)  
Default 1/1

This command specifies the channels (streams) which may be available to incoming connect requests. If **USERS** is 5, an incoming connect request will connect to the lowest stream A – E if any of these streams are not currently connected. If none of the 5 streams is available, a <DM> packet will be sent back to the requesting station and the message **\*\*\* connect request: (call)** will be Output to your terminal. 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

- **USOs** ON | OFF  
Default ON

When ON, an unshift to letters case occurs when a space is received in RTTY. If **CODE RTTY** is set to **LCRTTY**, a space will shift to lower case.

- **Version**  
Immediate command

Displays the current firmware version number installed in your KAM Plus.

- **WEFAX** *n*

This command permits the reception of Weather Facsimile. The audio input to the VHF port of the KAM Plus 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 to the terminal. A special program is required to display WEFAX pictures. The WEFAX program you use will send the proper WEFAX *n* command to start WEFAX reception.

See also: `daytweak`

- **WText** *message* (up to 128 character)  
Default DE (*mycall*)

This entry specifies the text to be sent in response to a WRU command while in AMTOR ARQ Mode only. Enter any combination of characters and spaces up to a maximum length of 128. Entering a single % will clear **WTEXT**.

To use the WTEXT as an automatic logon for APLINK BBS systems, set the WTEXT to **DE call/selcal+?** or **QRA call/selcal+?** – be sure to include the +? as part of the WTEXT.

- **Xflow** ON | OFF  
Default ON

When ON, software flow control will be used between the terminal and the KAM Plus. When OFF, software flow control is not used, and the only flow control possible is hardware flow control using the RTS and CTS lines from the KAM Plus.

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

- **XMitecho** ON | OFF  
Default OFF

When ON, characters are echoed to the terminal as they are transmitted over the radio in the non-packet modes. When OFF, echo to the terminal is immediate.

- **XMITOK** ON | OFF  
Default ON/ON

When ON, transmitting functions are enabled. If OFF, transmitting is inhibited (the PTT line will not operate) while all other functions of the KAM Plus are unchanged.

- **XOff** *n* ( *n* = \$00 – \$FF)  
Default \$13 [Ctrl-S]

This command selects the character sent by the KAM Plus to the terminal to stop input from the terminal.

See also: `xflow`, `xon`

- **XON** *n* ( *n* = \$00 – \$FF)  
Default \$11 [Ctrl-Q]

This command selects the character sent by the KAM Plus to the terminal to restart input from the terminal.

See also: xflow, xoff

## Operation of the KAM Plus

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This section of the manual describes KAM Plus operation. Each operational mode of the KAM Plus is described including an example of that mode. You will benefit most from this section if you read from it while you are at your station with your KAM Plus connected to your computer and radio; therefore you may follow the examples and experiment with the unit. Start with your KAM Plus in the Command Mode. When you first turn the KAM Plus on, it sends its sign-on message (`KANTRONICS ALL MODE...`) and then the prompt `cmd:`. This is the Command mode of your KAM Plus. Anytime you want to operate the KAM Plus in a non-packet mode, you must start from this `cmd:` prompt and give the command indicated in this section to enter the new mode.

The operational examples we use to explain these modes assume a standard terminal communications program such as the PACTERM program provided with the KAM Plus, or a telephone communications program such as PROCOM PLUS is in use. If you are using a specialized ham-radio program, or a Host mode program (Host Master), the examples will not apply. Host programs typically communicate with the KAM Plus for you, simplifying your operation. Refer to your software manual if you are using these specialized programs.

Digital mode operation on HF amateur bands is usually accomplished using the Lower Sideband (LSB) mode of your radio and applying your transmitted signal to the microphone input. It is also possible to operate the HF modes with FSK if your radio supports this mode.

### Tuning in the Signals

When operating any of the HF modes, use the bargraph on the front of the KAM Plus as your tuning indicator. For RTTY, ASCII, AMTOR, PACKET and PACTOR operation, a properly-tuned signal will light the two outside LEDs on the bargraph. The left end of the bargraph is the MARK LED and the right end is the SPACE LED. As signals are received, these two LEDs should light with approximately the same brilliance.

When operating CW, the MARK LED will light when no signal is present, and when a tone is received, the bargraph should move quickly and completely to the SPACE LED. Slow movement toward the SPACE LED indicates that you are not tuned properly on the CW signal.

## **AMTOR Operation**

With your KAM Plus, several modes of AMTOR operation are possible. Each AMTOR station is identified by a SELCAL (Selective Call) which is derived from your amateur callsign. The accepted practice in AMTOR is to use the first letter of your callsign and the last three letters of your callsign as your AMTOR SELCAL. The KAM Plus will automatically assign your SELCAL using this method, but you may change it by using the MYSELCAL command. In addition, the KAM Plus supports a 7-character SELCAL and generates a unique SELCAL for this mode from your callsign. The KAM Plus will accept a link from another station calling you with either the 4-character or 7-character SELCAL.

Mode A AMTOR is called ARQ and is a connected mode allowing you to communicate with just ONE other station at a time. The two stations send data back and forth at a rapid interval (every 450 milliseconds); therefore, this mode requires radios capable of switching from receive to transmit and back to receive very rapidly. Relay-switched radios typically cannot operate Mode A AMTOR.

Mode B AMTOR is called FEC. This mode broadcasts continually, allowing simultaneous reception by several stations. Since there is no back-and-forth transmission between stations, the switching speed of the radios is not significant and all SSB radios will operate Mode B AMTOR. A subset of Mode B AMTOR is called SELFEC – Selective FEC. In this mode, stations using the proper SELCAL on their equipment automatically receive and you will only receive transmissions that also send the correct SELCAL.

The third mode of AMTOR operation is a listen only mode, called LAMTOR. In this mode, you can monitor two stations communicating with each other using Mode A AMTOR; you can even monitor SELFEC transmissions that do not contain your SELCAL.

### **Mode A (ARQ) Operation**

To operate Mode A AMTOR, you must first be sure you are in the Command Mode (**cmd:**). Type **AMTOR** and press return. This places your KAM Plus in the AMTOR Standby Mode and you will see the message **<AMTOR STANDBY>** on your terminal. In this mode you can monitor other stations transmitting FEC (calling CQ), transmit FEC allowing you to call CQ, and respond to a Mode A link request from another station. **NOTE:** You will not be able to monitor or transmit FEC from this mode if ARQBBS is ON. If AUTOSTRT is ON, you will only copy SELFEC transmissions from other stations if they contain your SELCAL in the transmission.

### **Calling CQ**

To call CQ from this mode, type **[Ctrl-C][T]**. The KAM Plus keys your transmitter, the bargraph on the KAM Plus goes dark, and the HF transmit LED (red LED at the far left of the KAM Plus) lights. Now type your CQ message on the keyboard. A typical CQ message would be like the following:

```
CQ CQ CQ CQ DE WK5M WK5M (WWKM)
CQ CQ CQ CQ DE WK5M WK5M (WWKM)
CQ CQ CQ CQ DE WK5M WK5M (WWKM)
SELCAL: WWKM WWKM PSE K K K
```

After you've finished typing your CQ, type **[Ctrl-C][E]**, instructing the KAM Plus to return to the AMTOR Standby mode. After all of the data has been transmitted, the KAM Plus will send the **<AMTOR STANDBY>** message to your terminal and enter the Standby mode; the KAM Plus is now able to respond to any station that attempts to link to you.

When a station links to you, your KAM Plus becomes the Information Receiving Station (IRS), and the station that called you is the Information Sending Station (ISS). When the other station keys in data, it will be transmitted to you and will appear on your screen. At some point in the conversa-

tion, the other station will "turn it over" to you so you can send data to him, Normally the other station will make some kind of statement in the message to indicate that he is going to let you talk. For instance, he might say **SO HOW COPY?**. The other station then types a **+?** which is transmitted to you. When the KAM Plus receives the **+?**, it is displayed on your screen and you become the ISS. You now type on your keyboard, and this data is sent to the other station. When you want the other station to again talk to you, type the **+?** on your keyboard. The **+?** is the "changeover sequence" in AMTOR. Whenever the IRS receives this sequence, a changeover occurs, allowing the other person to begin talking.

At the end of the QSO one of the two stations must "break the link". This is equivalent to hanging up a phone at the end of a conversation. To break the link with your KAM Plus, type **[Ctrl-C][D]**; the KAM Plus will then send the AMTOR shutdown sequence to the other station, and both stations will stop transmitting. Common practice among operators is that the ISS station sends a short message indicating that he is going to break the link. Usually it is something like **Link Down - SK**.

### **Answering a CQ**

While you are in the AMTOR Standby mode, you may see another station calling CQ and you want to call that station. You must know the station's SELCAL, and this information is normally sent in the CQ message. In the example above, the station's SELCAL is WWKM. If you want to call this station, you must first leave the AMTOR Standby mode and get the command prompt (**cmd:**) from your KAM Plus. To do this type **[Ctrl-C][X]**.

From the command prompt, type AMTOR **WWKM** and press return. Your KAM Plus begins sending the link request to the other station, and, after receiving the proper acknowledgments, the message **<LINKED TO WWKM>** will appear on your screen. You are now the ISS and may begin typing your message to be transmitted.

From this point on, you switch back and forth from sending station to receiving station with the changeovers as described above in "Calling CQ." When the conversation is finished, you or the station you are talking to must break the link. If you want to break the link type **[Ctrl-C][D]**.

While you are linked to another station and receiving data from him, you may want to interrupt and make a comment of your own. To do this, you must first "seize" the link, making your station the ISS. To do this type **[Ctrl-C][T]**. When you are finished with your comment, use the normal **+?** changeover sequence to again become the IRS.

### **Mode B (FEC) Operation**

To operate Mode B AMTOR, you must first be in the Command Mode (**cmd:**). Type **FEC** and press return. This places the KAM Plus in the FEC Mode without sending any message to your terminal. In this mode you can receive any FEC transmissions made by another station or transmit FEC from your station. Since FEC can be copied by several stations at the same time, you would use this mode to have a conversation with numerous stations at the same time (a round-table discussion). **NOTE:** If AUTOSTRT is ON you will only monitor SELFEC transmission from other stations that contain your SELCAL in the transmission.

To transmit Mode B type **[Ctrl-C][T]**. This keys your radio, the bargraph on the KAM Plus goes dark, and the red HF transmit LED lights. Type the message you want to send. At the conclusion of your message type **[Ctrl-C][E]**. Your KAM Plus will transmit your message in FEC mode and return to the receive mode when all of the data has been transmitted.

## **Mode B (SELFEC) Operation**

### **Receiving Mode B SELFEC**

If you want to receive only messages specifically addressed to you, you can set up your KAM Plus for Mode B SELFEC receive. To do this, set the AUTOSTRT command ON in your KAM Plus and then enter the AMTOR Standby mode or the FEC mode as described above. Your KAM Plus will now copy only Mode B SELFEC transmissions that include your SELCAL in the transmission.

### **Transmitting Mode B SELFEC**

To transmit a Mode B SELFEC broadcast type **FEC** followed by the SELCAL to be transmitted and press return. The KAM Plus keys your radio, the bargraph goes dark, and the red HF transmit LED lights. The KAM Plus then sends the SELCAL you entered as the preamble to a transmission, followed by any message you type on the keyboard. To return to the receive mode, type [**Ctrl-C**][**E**]. The KAM Plus unkeys the transmitter after all of the data has been transmitted and will now receive ANY FEC transmission. Should you desire to only receive SELFEC transmissions, you must have AUTOSTRT ON in the KAM Plus.

When you are ready to transmit again, type [**Ctrl-C**][**T**]. The KAM Plus will again send the SELCAL you entered previously and then your next message. The SELCAL will automatically transmit each time you start a new transmission while in the SELFEC mode. To cancel SELFEC mode, you must type the [**Ctrl-C**][**X**] directive to return to the Command mode.

## **Listen AMTOR Operation**

To enter the Listen AMTOR mode, the KAM Plus must first be in the Command mode (**cmd:**). Type **LAMTOR** and press return. This places the KAM Plus in a Monitor-Only Mode that will let you listen to Mode A, Mode B, or SELFEC AMTOR transmissions. If you are monitoring a Mode A link between two other stations, it is very possible that you will miss parts of the transmissions and possibly print repeated information as the two connected stations are attempting to pass their information. It is also possible that your KAM Plus will not be synchronized properly to the signals and must be re-synchronized in order to print readable information. If you are receiving what appears to be random garbage characters while monitoring Mode A AMTOR, you can force the KAM Plus to attempt to re-synchronize by typing [**Ctrl-C**][**R**].

NOTE: You cannot transmit from the LAMTOR mode.

### **Notes on AMTOR Operation**

You can set your KAM Plus to automatically send a CW ID during Mode A operation if desired. To do this, set the text you want to send (up to 15 characters) with the CWIDTEXT command, set the CWPTT command ON and set ARQID to the number of minutes between CW IDs. If you operate AFSK (SSB) you must also set CWAUDIO ON. The CW ID speed is set by the CWSPEED command.



## AMTOR Directives

While operating your KAM Plus in the AMTOR modes, several directives are available to perform various functions without returning to the Command mode (**cmd:**) The directives and their purposes are:

[Ctrl-C][A]	Abort link
[Ctrl-C][D]	Break link and remain in AMTOR Standby
[Ctrl-C][E]	Return to receive mode when transmit buffer is empty in FEC transmit. If linked, inserts +? (changeover) after all data in the transmit buffer
[Ctrl-C][I]	Invert received MARK/SPACE signals and invert transmitted MARK/SPACE if using AFSK (SSB)
[Ctrl-C][R]	Return to receive mode immediately in FEC transmit. (If the transmit buffer isn't empty, the remaining data will remain in the buffer.) Re-sync if monitoring. If linked, inserts +? (changeover) immediately. If the transmit buffer isn't empty, the remaining data will remain in the buffer.
[Ctrl-C][S]	Select the next MARK/SPACE shift (170/425/850/MODEM)
[Ctrl-C][T]	Enter transmit mode – seize ISS status
[Ctrl-C][X]	Exit AMTOR mode and return to Command mode (packet)
[Ctrl-C][Ctrl-T]	Toggle TRACE mode ON/OFF
[Ctrl-W]	Send 'Who Are You' inquiry

## ASCII Operation

To operate ASCII mode with your KAM Plus, you must first have the Command prompt (`cmd:`). Type `ASCII` and press return. This places the KAM Plus in the ASCII mode and the `ASCBAUD` command controls the baud rate of the transmitted data. If you want to operate ASCII at a different speed, enter the ASCII mode and specify the speed on the command line (e.g. `ASCII 200`), then press return. When you enter the ASCII mode, the KAM Plus sends the mode and speed indication to your terminal:

```
-ASCII 110-
```

The KAM Plus is now in the receive mode and will decode a properly tuned ASCII signal and display the information on your terminal. **NOTE:** If `AUTOSTRT` is ON, received ASCII will not be displayed until the KAM Plus receives the characters contained in your `MYAUTOST` parameter.

To transmit ASCII, type `[Ctrl-C][T]`. This causes the KAM Plus to key your transmitter, the bargraph on the KAM Plus goes dark, and the HF transmit LED lights. Type the message you wish to send and when you are through, type `[Ctrl-C][E]`. The KAM Plus will transmit your message and, when the data has all been transmitted, will return to the receive mode.

You may change speeds while you are in the ASCII mode by using the `[Ctrl-C][n]` directives listed below. To leave the ASCII mode and return to Command mode, type `[Ctrl-C][X]`.

## ASCII Directives

While you are in the ASCII mode, several directives are activated and function as indicated.

<code>[Ctrl-C][E]</code>	Return to receive mode when transmit buffer is empty
<code>[Ctrl-C][I]</code>	Invert received MARK/SPACE signals and invert transmitted MARK/SPACE if using AFSK (SSB)
<code>[Ctrl-C][R]</code>	Return to receive mode immediately (If the transmit buffer isn't empty the remaining data will stay in the buffer)
<code>[Ctrl-C][S]</code>	Select the next MARK/SPACE shift (170/425/850/MODEM)
<code>[Ctrl-C][T]</code>	Enter transmit mode
<code>[Ctrl-C][X]</code>	Exit ASCII mode and return to Command mode (PACKET)
<code>[Ctrl-C][n]</code>	Change operating speed

<u>n</u>	<u>Speed (baud)</u>	<u>n</u>	<u>Speed (Baud)</u>
1	45	6	110
2	50	7	150
3	57	8	200
4	75	9	300
5	100	0	ASCBAUD

## **CW Operation**

Type **CW** and press return to place the KAM Plus in the CW mode of operation from the command prompt (**cmd:**) by typing CW and pressing return. The KAM Plus will enter the CW code, ready to receive Morse code at the speed set in the CWSPEED command. The KAM Plus will automatically adjust its receive speed to match the incoming signal within approximately  $\pm 20$  words per minute.

You will find that the KAM Plus usually receives CW most effectively when the AM/FM switch (on the front of the KAM Plus) is pressed in to the AM position. If you find that your KAM Plus prints a lot of E's and T's while receiving, try setting the CWBAND command to a smaller value. This narrows the input bandpass filter on the KAM Plus, and while it makes tuning a bit more difficult, it eliminates much of the noise that results in poor copy. If a properly tuned CW signal on your radio results in the tone being received at some frequency other than 750 Hz, you can change the KAM Plus center frequency using the CWTONE command.

## **Transmitting CW**

To transmit CW with your KAM Plus, you must wire the KEY OUT pin from the HP port of the KAM Plus to your key jack on your transceiver. The KAM Plus uses a relay to provide a ground on this pin when sending CW, and therefore you must turn OFF any internal electronic keyer in your radio. Be sure you have your radio in the CW mode. With the Default setting (CWPTT OFF) you must also have your radio set for VOX operation so that it will actually transmit any time the KAM Plus closes the relay. If you prefer (or need) to have the KAM Plus directly key the radio into transmit, set the CWPTT command ON and be sure you have the PTT line of the KAM Plus connected to the PTT input to your radio. In this mode, you do not need the radio set for VOX operation.

It is also possible to generate tone CW (audio tones applied to the microphone input of your radio). This is most useful when sending code on an FM radio (i.e. 2 meters) for code practice or when connecting the KAM Plus to an amplifier and speaker for local code practice. To use this mode, you must set the CWPTT command ON and the CWAUDIO command ON. The tone frequency is controlled by the CWTONE command.

To begin transmitting, type **[Ctrl-C][T]** to place the KAM Plus in the transmit mode. Type your message on the keyboard followed by **[Ctrl-C][E]**. This causes the KAM Plus to transmit your message and then return to the receive mode when after all of the message has been transmitted.

In CW operation, several prosigns are used to indicate end of message, break, wait, and many other common phrases. To transmit these with the KAM Plus, type the keystroke shown to send the pre-defined prosign.

<u>Keystroke</u>	<u>Prosign</u>	<u>Meaning</u>
<b>+</b>	AR	End of Message
<b>=</b>	BT	Break or Pause
<b>%</b>	AS	Wait
<b>&amp;</b>	KA	Attention
<b>#</b>	SK	End of Transmission
<b>(</b>	KN	Invitation to Transmit
<b>*</b>	AA	All After
<b>!</b>	SN	Attention

You may also generate any prosign (combination of two characters transmitted as one) by typing the PROSIGN character (Default **\**) and then the two characters to be combined.

In addition the MORSE command allows you to define several special code combinations. You can specify which key you type on the keyboard, the code transmitted when you type that key, and the

character(s) displayed on your terminal when that code is received. (See the MORSE command for details)

**NOTE:** If the CWPTT command is OFF, the KAM Plus front panel will not indicate that you have entered the transmit mode, or that you have returned to receive. If it is ON, the bargraph will go dark and the HF transmit LED will light when you are transmitting.

## Receiving CW

During reception, you may find that the station from which you are receiving is sending at a much slower rate than you are set to transmit. You can lock your transmit speed to the speed of the received station with the [Ctrl-C][L] directive. This sets your transmit speed approximately equal to the speed of the station from which you are receiving. You should then send the [Ctrl-C][U] directive from the keyboard to unlock the KAM Plus, allowing it to again track the speed of the other station.

To exit the CW mode and return to the Command mode type [Ctrl-C][X].

## CW Directives

While your KAM Plus is in the CW mode, several directives are activated and function as described.

- [Ctrl-C][E] Return to receive mode when transmit buffer is empty
- [Ctrl-C][L] Lock transmit and receive speed to current receive speed
- [Ctrl-C][R] Return to receive mode immediately (If the transmit buffer isn't empty the remaining data will stay in the buffer)
- [Ctrl-C][T] Enter transmit mode
- [Ctrl-C][U] Unlock receive speed to allow tracking of incoming signal. Transmit speed stays at current setting
- [Ctrl-C][X] Exit CW mode and return to Command mode (PACKET)
- [Ctrl-C][n] Change operating speed

<i>n</i>	Speed (wpm)	<i>n</i>	Speed (wpm)
1	5	6	30
2	10	7	35
3	15	8	40
4	20	9	45
5	25	0	50

## **G-TOR Mode**

G-TOR, short for Golay-TOR, is an innovation of Kantronics, G-TOR was implemented in the KAM Plus and Enhancement Board for the KAM in early 1994 and establishes a completely new hybrid-ARQ HF digital communications system for the amateur service. Golay error correction coding forms the basis for G-TOR.

The benefits of G-TOR are exceptional compared to previous multi-mode HF digital modes: 1) substantially higher effective data rates (throughput), 2) apparent reduction in the effects of interference and multi-path, and 3) low cost for error-correcting systems. The key features of G-TOR are a typical: 1) extended Golay forward error correction coding, 2) full-frame interleaving, 3) on-demand Huffman and run-length encoding, 4) link-quality-based baud rate: 300, 200, 100, 5) 2.4 second hybrid-ARQ cycle, 6) reduced data frame overhead, and 7) use of standard AFSK tone pairs (mark and space).

G-TOR operates as a synchronous ARQ mode, like AMTOR and PACTOR. At 300, 200, or 100 baud, G-TOR's ARQ cycle remains at 2.4 seconds, All data frames are 1.92 seconds in duration and contain one control byte and two checksum bytes (CRC). Data frames contain 69, 45, and 21 data bytes at 300, 200, and 100 baud respectively. Acknowledgments are 0.160 seconds in duration. The effective performance of two stations linked in G-TOR relies on the combined use of forward error correction, data interleaving, and its ARQ cycle with CRC checking. Operation in the G-TOR mode is described in the following sections.

G-TOR activity, at present, is found on all the HF bands near AMTOR and RTTY. CW will typically be found at the bottom of each band while AMTOR, RTTY, G-TOR, and PACTOR are higher up the band in frequency. For example, on 20 meters, activity can generally be found as listed below. Note that G-TOR, PACTOR, and AMTOR may tend to overlap.

CW	14.000 – 14.070 MHz
AMTOR, G-TOR, PACTOR	14.070 – 14.085 MHz
RTTY	14.080 – 14.095 MHz
PACKET	14.095 – 14.111 MHz

## **G-TOR Operation**

The G-TOR protocol is a linked mode where two stations are communicating with each other. Although the G-TOR Mode does not incorporate a broadcast mode, G-TOR uses AMTOR FEC for its broadcasts (from G-TOR Standby), such as calling CQ. If you have the MONITOR command turned on when you enter the G-TOR Mode, you will be able to monitor AMTOR FEC transmissions.

The following example illustrates G-TOR operation with your KAM Plus:

Turn the MONITOR command ON by typing **MONITOR ON** at the command prompt (**cmd:**) and press return. This will enable you to copy CQ calls.

The G-TOR Mode will follow the setting of the SHIFT commands in your KAM Plus. For instance, if shift is set to 170, 425 or 850, the mark frequency used for G-TOR will be 2125 Hz, and the space will be above the mark by selected shift. If the SHIFT command is set to MODEM, G-TOR will use the tones selected with the Mark and SPACE commands.

Next, place your KAM Plus in G-TOR Mode by typing **GTOR** at the **cmd:** prompt and pressing return. Your KAM Plus will respond with **<GTOR STANDBY>**. If you now tune your KAM Plus to a station transmitting AMTOR FEC, you'll be able to copy that transmission. You'll also be ready to receive a link request from another station.

To call CQ, type [**Ctrl-C**][**T**] (that's a control-c followed by the letter T). Your KAM Plus will enter the AMTOR FEC transmit mode, key your radio, and start transmitting. Type your CQ message on

the keyboard. It is very important that you include in your CQ the fact that you are asking for a G-TOR contact. For instance, you might send:

```
CQ CQ CQ DE W0XI W0XI W0XI - GTOR
CQ CQ CQ DE W0XI W0XI W0XI - GTOR
CQ CQ CQ DE W0XI W0XI W0XI - GTOR
PSE ARQ IN GTOR MODE ONLY KKK
```

Be sure you include your callsign (as set by MYGTCALL) in the transmission. After you have typed your entire CQ message, type [Ctrl-C][E]. This will return your KAM Plus to G-TOR Standby mode after all of the message has been transmitted. Your KAM Plus is then ready to respond if someone calls you in G-TOR.

## Tuning G-TOR

G-TOR signals are similar to AMTOR or PACTOR signals in that MARK and SPACE tones are used. Hence the bargraph indicator will be lit at both ends when properly tuned. When you are linked to another G-TOR station, the HF CON LED will be lit. The HF STA LED is used in G-TOR to indicate the G-TOR speed. When the STA LED is off, the G-TOR rate is 100 baud, when FLASHING 200 baud, and when the STA light is lit constantly, 300 baud.

## Monitoring G-TOR

In the G-TOR Standby mode, your KAM will monitor G-TOR CQ calls or other G-TOR FEC broadcasts, which use the AMTOR FEC mode. In order to monitor two stations that are linked to each other, you must use the GMON.EXE or GOFF.EXE program (for PC compatible computers) which we have provided on the enclosed diskette. Real-time monitoring of linked G-TOR stations will require a fairly fast computer (286/16 or better). This monitoring uses the GSCAN function of your KAM firmware and processes the data in your computer. For slower computers, you may use the GSCAN function and capture the raw data to a disk file. This allows you to use the GOFF program to view the data, although it will not be real-time.

## Entering G-TOR Standby mode

To enter G-TOR Standby mode simply type **GTOR** and press return from the command prompt (**cmd:**). Your KAM Plus will then respond to any attempt from another station to link to you in G-TOR. You must have ARQBBS OFF if you wish to talk to other stations from your keyboard. If ARQBBS is ON, a station who links to you will be connected to your KAM Plus PBBS.

## Calling another station on G-TOR

To call another station using G-TOR, at the command prompt (**cmd:**) enter the **GTOR** command and the callsign of the station you wish to link to. For instance:

```
cmd:GTOR WK5M
```

Your KAM Plus will begin transmitting a link establishment frame and, if the other station is on the air and in G-TOR Standby Mode, that station will respond to your link request and you will see the message **<LINKED to WK5M>** on your screen. You can then start typing your message to the other station. Since you started the link, your station will be the "Information Sending Station" (ISS). After you have entered all that you want to say, use the [Ctrl-C][E] directive to allow the other station to send data to you. This causes the KAM Plus to send the G-TOR changeover sequence and you become the "Information Receiving Station" (IRS). While the other station is sending data to you, you may force a changeover (seize the link) by typing the [Ctrl-C][T] directive. You then become the ISS again.

Once you have concluded your conversation, you may break the link by typing the [Ctrl-C][D] directive. This will send the proper QRT frame to the other station and return your KAM Plus to G-TOR Standby mode. Alternatively you may use the [Ctrl-C][X] directive which will also break the link and return you to the `cmd:` prompt, thus leaving the G-TOR mode.

## Speed changes

The HF Val light on the front of the KAM Plus will indicate the speed of the G-TOR signal you are receiving or transmitting. When lit the G-TOR signal is 300 baud, when flashing 200 baud, and when OFF 100 baud.

The baud rate is automatically selected based on the quality of the link between the two stations. A link will begin at 100 baud. If the receiving station then detects a number of correctly received frames (set by GTUP) it will request a speed change to 300 baud. When operating at 300 baud or 200 baud the receiving station will request a lower speed when it receives a number of incorrect frames in a row (set by GTDOWN).

While you are linked to another station, the receiving station (IRS) controls the speed of the link. If you are the IRS, you can force the other station to send at 100 baud by using the [Ctrl-C][1] directive. The KAM Plus will then send the speed change command to the other unit (if needed) to change to 100 baud, Once the change occurs, your KAM Plus will not direct the other station to speed up again until a changeover has occurred or you set your KAM Plus back to auto-speed with the [Ctrl-C][G] directive. If the change fails to occur for any reason, the KAM Plus will revert to the speed it was operating at prior to the [Ctrl-C][1] directive.

If you are the IRS and wish to speed up, you can use the [Ctrl-C][2] directive to switch to 200 baud, or the [Ctrl-C][3] directive to switch to 300 baud. The KAM Plus will then send the proper speed change command to the other unit, and if successful, your KAM Plus will not request the other unit to slow down even if the band conditions change unless you set the KAM Plus back to auto-speed with the [Ctrl-C][0] directive. We strongly recommend that you leave your KAM Plus in the normal mode, which is the automatic baud rate selection.

If you have selected a forced speed, you can return the KAM Plus to automatic speed selection by using the [Ctrl-C][0] directive.

## G-TOR Mailbox

Your KAM Plus allows access to its PBBS (mailbox) using G-TOR mode. To enable a user to access the PBBS on G-TOR, you must set the ARQBBS command ON and place your KAM Plus in the G-TOR Standby Mode.

If you link to another station who is using a KAM Plus, you will normally communicate with the operator at the other end. If that station has the ARQBBS command ON, you will automatically be connected to his PBBS and will receive the mailbox prompt.

## Formatting Data

When operating G-TOR, several of the KAM Plus commands, including the following, will apply in formatting your transmitted data.

CRADD	adds a CR after every CR you send from the terminal
LFADD	adds a LF after every CR you send from the terminal
CRSUP	suppresses every OTHER consecutive CR from the TNC
LFSUP	suppresses all LF characters from the TNC

You should also remember, that any special characters defined in the KAM Plus (DISP C) must be "passed" in order to transmit them from a standard terminal program.

## Hints for G-TOR Operation

If you choose to use the FSK mode of your transceiver, you must connect the FSK output from the KAM Plus (Pin 5) to the FSK input of your radio. The actual tones transmitted are controlled by your radio in this mode. Most radios use a mark frequency of 2125 Hz and a space of 2295 Hz. These are the tones used by the KAM Plus when the SHIFT command is set to 170, 425 or 850. If you have set your radio to operate with different tones, you must set the SHIFT command to MODEM and set the MARK and SPACE commands in the KAM Plus to match your radio selection.

When you are linked to another station and you want to break the link, you should use the [Ctrl-C][A] directive. This directive will attempt to send the proper QRT sequence to the other station, but if the KAM Plus receives an invalid response sequence (unrecognized CS code) it will immediately return to G-TOR Standby and discard any pending data. If you attempt to break the link with the [Ctrl-C][X] directive, then the KAM Plus will attempt the QRT sequence, but will only return to PACKET Mode after receiving the proper acknowledgment (CS code) or after GTERRS attempts to break the link. This could take a long time.

When you attempt to link to a nearby station, it is possible that the transceivers (yours and the other station) may not switch fast enough to permit a link to occur. In this case, we suggest that both stations set the TXDTOR command to a higher value (try 7, 8, or 9). This has been proven to allow links on very short paths with very slow radios.

If you use an external power amplifier with your HF transceiver, you may set a time delay to key your transmitter before the audio is sent to your radio by using the PREKEY command. This will allow your amplifier to turn on before full transmitter power is applied. You may also set the POSTKEY command to stop the transmit audio before releasing the PTT line to your transceiver. (Note that PREKEY adds delay time before data begins.)

**NOTE:** Do not change TXDTOR, PREKEY or POSTKEY values while you are linked. This is only possible with Host mode programs, but changing these values while linked will cause the link to fail.

## Binary Files and G-TOR

The G-TOR Mode provides complete data transparency, allowing binary file transfers between G-TOR stations. The ability to send and receive binary files in this mode will depend on the terminal program you are using. Since G-TOR provides complete error detection and correction, binary files should be send in a raw data mode – that is, no error correction protocol (such as X-modem) needs to be used from your terminal program.

Host mode programs simply include the raw binary data in the data stream, however if you are using a standard telephone communications program, it is possible to allow the KAM Plus to send raw binary data. To do this, once you are linked to another station in G-TOR and wish to send a raw binary file, type the [Ctrl-C][B] directive. This places the KAM Plus in a data transparent mode, allowing ALL characters to be transmitted from the computer.

**NOTE:** When you have done this, there are no special characters recognized by the KAM Plus, and there are no directives available. This means that typing [Ctrl-C][E], for instance, will NOT cause a changeover, it will simply transmit the [Ctrl-C] character and the E to the other station. To exit this data transparency mode, you MUST send a modem break signal. Most telephone communications programs support this feature. (Procomm Plus, for instance, sends a modem break when you press [ALT-B]). If your communications program does not support the modem break, you will NOT be able to leave the data transparency mode.

The KAM Plus will automatically exit data transparency if the other station disconnects from you, or at any time your KAM Plus leaves the linked state (due to errors or retries).



## Summary of G-TOR Directives

[Ctrl-C][A]	Abort a link or abort an attempt to link after the first invalid response code
[Ctrl-C][B]	Enter data transparency mode (for binary file transfer)
[Ctrl-C][D]	Disconnect from the station you are linked to. A changeover will be performed if required, and the KAM Plus will return to G-TOR Standby mode
[Ctrl-C][E]	Changeover from ISS to IRS when all pending data has been transmitted (ARQ Mode) Return to receive when transmit buffer is empty (used when calling CQ). (FEC Mode – AMTOR FEC)
[Ctrl-C][R]	Changeover from ISS to IRS immediately. Return to receive immediately (FEC mode - AMTOR FEC)
[Ctrl-C][T]	Seize the link if IRS (ARQ mode) Enter AMTOR FEC transmit mode
[Ctrl-C][X]	Disconnect the link (if linked) and return to PACKET
[Ctrl-C][0]	Set automatic baud rate selection
[Ctrl-C][1]	Force 100 baud operation (IRS only)
[Ctrl-C][2]	Force 200 baud operation (IRS only)
[Ctrl-C][3]	Force 300 baud operation (IRS only)
[Ctrl-C][Ctrl-T]	Toggle TRACE mode ON/OFF
MODEM BREAK	Exit data transparency mode

## **NAVTEX Operation**

### **NAVTEX/AMTEX Theory**

NAVTEX transmissions are, in reality, Mode B AMTOR (FEC). What makes NAVTEX unique however, is the actual message format. NAVTEX stations always transmit on 518 kHz LSB and are typically located on the coast lines. The same format is now being used by the American Radio Relay League (ARRL) to transmit their bulletins on a daily basis. These are transmitted during their scheduled teleprinter bulletins.

At the beginning of a NAVTEX (or AMTEX) transmission, the sending station will send a preamble, identifying the station that is transmitting, the type of message, and the message sequence number. The preamble would look like this:

ZCZC AG25

The ZCZC is always present, and the receiving unit sees this as the indication that the identifier is coming next. The components of the identifier, as defined in the NAVTEX documentation are:

B1 B2 B3 B4

B1 is used to identify the station that is transmitting and consists of the letters A through Z. B2 indicates the message class (A through Z). Note that class A, B and D messages must always be printed once. B3 and B4 are the sequence number for the message, and will have values from 00 through 99. Messages with sequence number 00 are always printed. When the message numbers reach 99, they wrap to 01 as the next number.

Currently operating NAVTEX stations are:

Halifax, Nova Scotia	Guam
Boston, MA	Honolulu, HI
New Orleans, LA	Kodiak, AK
Miami, FL	Astoria, OR
San Juan, P.R.	Long Beach, CA
Chesapeake, VA	San Francisco, CA

For NAVTEX messages, the currently assigned message classes are:

A	Navigational warnings
B	Meteorological warnings (storm warnings)
C	Ice reports
D	Search and Rescue Information
E	Meteorological forecasts
F	Pilot messages
G	DECCA message
H	LORAN-C message
I	Omega message
J	differential Omega message
Z	QRU - no message on hand
K-Y	Reserved

**NOTE:** K has been proposed for "other electronic navigational aid system message".

Once a message has been received from a particular station with less than a specified amount of errors, it will not be printed again, as the receiving system keeps track of the message numbers it has received. If it then sees the same message class and number from the same transmitting station, it will not output the message to the terminal.

For ARRL AMTEX bulletins, the defined B1 codes are:

A	ARRL issued bulletins
C	CRRL issued bulletins (Canadian)
I	IARU issued bulletins
J	JARL issued bulletins
S	AMSAT issued bulletins
X	Miscellaneous

and the currently assigned message classes are:

A	Emergency bulletins
B	Priority bulletins
D	Reserved
E	DX bulletins
G	General bulletins
K	Keplarian bulletins
P	Propagation forecasts
S	Satellite bulletins
X	Miscellaneous bulletins

### **NAVTEX/AMTEX Operation**

To enter the NAVTEX/AMTEX mode, you simply type **NAVTEX** from the **cmd:** prompt and press return. At this point you will see nothing on the terminal until a valid NAVTEX message is received.

To exit the NAVTEX mode and return to the **cmd:** prompt, type a [**Ctrl-C**] followed by the letter [**X**]. (Do not hold the control key when you type the X.)

Before entering the NAVTEX mode (while you still have the **cmd:** prompt) you may specify which stations you wish to receive using the NAVSTA command. For instance, if I wish to copy AMTEX bulletins issued by ARRL, but do not want those from other stations (CRRL for example), I would type **NAVSTA A** at the **cmd:** prompt. To monitor all stations, simply type **NAVSTA ALL**.

You may also specify which message classes you wish to receive by using the NAVMSG command. If you want the Satellite bulletins and DX bulletins, you would type **NAVMSG ES** and press return. Note that if you eliminate message classes A, B, or D from the list of valid message classes, you will receive a WARNING message from the KAM Plus since the NAVTEX specification requires that these classes must be printed at least once. To set your system to copy all message classes, type **NAVMSG ALL**.

The NAVERR command is used to specify the percent of errors allowed in a received message before the KAM Plus considers the message as not being received properly.

In the event you wish to clear the message sequence numbers, allowing all messages to be received again, use the **NAVCLR** command. If the NAVTEX Mode is used infrequently, it is advisable to clear the numbers, since the transmitting station may have already wrapped sequence numbers back around to those you have stored.

## PACKET Operation

When you first turn your KAM Plus on, it sends you a sign on message and then a command prompt (**cmd:**). Anytime you see this command prompt, your KAM Plus is in the PACKET Mode of operation.

After you first turn on your KAM Plus it will monitor PACKET data received on HF and on VHF. As packets are received, the KAM Plus displays them on your terminal. After a period of monitoring, your screen may look like the following:

```
WK5M>KA5ZTX/V:<<I12>>;
Hello there... how are you today?
WD0EMR>W0XI,*KSLAW/V:<<I32>>
Are you there Phil?
KA5ZTX>WK5M/V: <<rr2>>:
WD5GAZ>WB4HFQ/H: <<I4>>
Hi Lin, yes I received my KAM Plus just the other day and it really
is working well.
KF7QZ>VE1AMA/H:<<D>>:
VE1AMA>KF7QZ/H:<<DM>>:
```

These are all monitored packets. The line with the callsigns separated by > symbols is the header line, which shows the callsigns of the stations talking and the port of the KAM Plus that received the information. The /v indicates this packet was monitored on the VHF port of the KAM Plus, and /H indicates the HF port heard the packet. The line above showing KSLAW in the header indicates that WD0EMR is transmitting to W0XJ, and is using a digipeater (KSLAW). The \* in front of the KSLAW name means that your KAM Plus actually received this packet as it was being transmitted by KSLAW, and not when it was being transmitted by WD0EMR.

Suppose you want to connect to KA5ZTX. Since this station was monitored on VHF, you must be sure your KAM Plus is set to transmit on VHF. Type the [I] character and the letter [A]. The | character is your VHF streamswitch character, and the letter A means you will transmit on the A stream. Now type C KA5ZTX and press return. Your KAM Plus will transmit a connect frame addressed to KA5ZTX and start the connection. When KA5ZTX responds to your connect request, the KAM Plus will send a message to your terminal saying \*\*\* CONNECTED to KA5ZTX. You are now ready to start talking to this station. You simply type your message and press return. Each time you press return, you will send a packet to KA5ZTX.

While you are talking to KA5ZTX, you decide you want to talk to KF7QZ. This station was heard on HF, so you must set your KAM Plus to operate on HF. You may do this even though you are still connected (and talking) to KA5ZTX. To start the new connection you must be in the Command mode, so type [Ctrl-C] to leave the Convers mode and get the cmd: prompt. Next, type the [~] character and the letter [A] This makes your current Input/Output (I/O) addressed to the HF port, A stream. (The ~ is your HF streamswitch character, and the A is the stream letter.) Now type C KF7QZ and press return. Your KAM Plus keys your HF radio and attempts to connect to KF7QZ. When this station responds, you receive the message \*\*\* CONNECTED to KF7QZ. Your KAM Plus switches to the Convers mode, and you may now type your messages to KF7QZ.

Since you are now connected to two different stations, you will be receiving packets from both of them. As they talk, your screen will display data similar to the following:

```
|AHello, Name here is gloria. Nice to meet you.
Hope all is going good there. I see you have the KAM Plus.
~AHi. You've connected to Scotty!
```

What you see above is the **|A** (indicating that this information was received from VHF stream A, followed by the text. The second line came from the same station as the previous line (since you don't see a streamswitch displayed). The third line starts with **~A** and then some text. The KAM Plus displays the streamswitch character (| or ~) and the letter of the stream for every received packet unless the packet is from the same station as the last displayed packet.

For you to talk back to any of these stations (remember you are already in the Convers mode) you simply type the **|A** or **~A** and then your text (press return when you are through).

After you have finished your conversation with a station, you will need to disconnect from that station. To do this, first make sure you are on the stream for the station from which you wish to disconnect. For instance, if you want to disconnect from KF7QZ, type the **~A** characters. Next, type **[Ctrl-C]** to get the command prompt, then type **DISCQNE** and press return. The KAM Plus sends a disconnect packet to the other station, and when that station acknowledges the disconnect, the KAM Plus sends **\*\*\* DISCONNECTED** to your terminal.

Suppose that the station you want to talk to is one that you cannot hear from your location. In the example above, WDOEMR is talking to WOXI, but we can't hear WDOEMR. We noticed in the monitored packet that we did hear a packet from WDOEMR as it was being relayed by KSLAW. If you then want to connect to WDOEMR, you need to use a relay station (called a digipeater). To connect to a station this way, use the **CONNECT** command as before, but specify the relay stations along with the callsign of the station you want to connect to. In this case, the command would be **C WDOEMR VIA KSLAW**, and the KAM Plus will send a connect request to WDOEMR, routing all data through the relay station.

If your terminal or computer program does not allow you to type the **|** or **~** characters required for streamswitching, you can change the characters used with the **STREAMSW** command. This command defines the characters used to switch to HF or VHF, and the stream letters will always be the letters A-Z, depending on the setting of **MAXUSERS**.

## **PACTOR Operation**

PACTOR operation is possible in two modes. The first mode, normally referred to as ARQ mode, is a "connected" or linked mode where two stations are in conversation with each other. Complete error checking occurs in this mode and the receiving station will request retransmission of any data frames containing errors. The KAM Plus uses memory ARQ in this mode to improve reception.

The second mode of operation transmits data in an unconnected (or un-linked) state, allowing several stations to copy the transmission. This is referred to as the FEC mode and is the mode used for calling CQ or other broadcast transmissions. Receiving stations do not use memory ARQ to copy FEC transmissions; therefore, a frame must be copied without any errors in order to be printed. You may miss complete frames when receiving FEC broadcasts.

### **Monitoring PACTOR**

To operate PACTOR mode with your KAM Plus, you must first have the command prompt (`cmd:`). Type **PACTOR** and press return. This places your KAM Plus in the PACTOR Standby Mode and the message `<PACTOR STANDBY>` is displayed on your terminal. **NOTE:** Since the MONITOR command is ON by Default, your KAM Plus will now monitor any PACTOR FEC or ARQ transmissions.

### **Calling CQ or Transmitting FEC**

To call CQ, place your KAM Plus in the PACTOR Standby mode by giving the **PACTOR** command from the command prompt (`cmd:`) and pressing return. To begin transmitting, type `[Ctrl-C][T]`. This keys your transmitter, the bargraph on the KAM Plus will go dark, and the HF transmit LED will light. Type in your CQ message and then type `[Ctrl-C][E]`. Your KAM Plus will return to the Standby Mode after all of the data has been transmitted and will respond automatically if another station attempts to link to you. A typical PACTOR CQ might be:

```
CQ CQ CQ de WK5M WK5M WK5M
CQ CQ CQ de WK5M WK5M WK5M
CQ CQ CQ de WK5M WK5M WK5M KKK
```

### **Connecting to another station**

Suppose you see someone call CQ and you want to call that station. First, return to the Command mode by typing `[Ctrl-C][X]`. Your KAM Plus sends the `cmd:` prompt to your terminal. Next, type **PACTOR xxxxxxxx** (where xxxxxxxx is the callsign of the station you want to call) and then press return. Your KAM Plus now attempts to connect to the other station by keying your transmitter and sending the link request. When the other station has properly acknowledged the request, your KAM Plus sends the message `<LINKED TO xxxxxxxx>` to your terminal. Since you started the connection (link), you are the Information Sending Station (ISS) and may begin typing your message. When you have finished your part of the conversation and want to receive from the other station, type `[Ctrl-C][E]`. This causes the KAM Plus to send a request for the other station to begin transmitting data (a changeover). You become the Information Receiving Station (IRS) and the other station's message will appear on your screen.

When you have completely finished your conversation, one of the two stations must "break the link" or disconnect. Your KAM Plus allows you to issue the disconnect command when you are either the IRS or the ISS. To disconnect, type `[Ctrl-C][D]`. If you are the IRS, the KAM Plus will first perform a changeover and then perform the disconnect sequence. You may leave the PACTOR Standby Mode by typing `[Ctrl-C][X]`.

**NOTE:** If the station to which you are trying to connect is a long distance away, you may need to use the PACTOR's long-path option when you attempt to connect. Normally this will only be required if the station is more than about 5500 miles away from you. To connect long-path on

PACTOR, precede the callsign of the station with an exclamation point (!) when starting the connection (e.g. **PACTOR !DC7XJ**).

## Monitor Only Mode

The KAM Plus provides you with a method to monitor PACTOR without allowing another station to link to you. To enter this mode, you must first have the command prompt (**cmd:**). Type **PTLISTEN** then press return. You can now monitor FEC or ARQ PACTOR signals, but your KAM Plus will not respond to any attempt to link to you. To exit this mode, type **[Ctrl-C][X]** and the KAM Plus will return to the Command mode, sending you the **cmd:** prompt.

## PACTOR Directives

While operating your KAM Plus in the PACTOR modes, several directives are available to perform various functions without returning to the Command mode (**cmd:**). The directives and their purposes are:

<b>[Ctrl-C][A]</b>	Abort a link or abort an attempt to link after the first invalid response code
<b>[Ctrl-C][D]</b>	Disconnect
<b>[Ctrl-C][E]</b>	Changeover from ISS to IRS (ARQ mode) when transmit buffer is empty. Return to receive when transmit buffer is empty (FEC Mode)
<b>[Ctrl-C][R]</b>	Changeover from ISS to IRS (ARQ mode). Changeover is immediate if data has not all been transmitted, it stays in the transmit buffer
<b>[Ctrl-C][S]</b>	Select the next MARK/SPACE shift (170/425/850/MODEM)
<b>[Ctrl-C][T]</b>	Seize the link if IRS (ARQ mode). Enter transmit mode (FEC mode)
<b>[Ctrl-C][X]</b>	Disconnect the link (if linked) and return to PACKET
<b>[Ctrl-C][0]</b>	Set automatic baud rate
<b>[Ctrl-C][1]</b>	Force 100 baud mode
<b>[Ctrl-C][2]</b>	Force 200 baud mode
<b>[Ctrl-C][Ctrl-T]</b>	Toggle TRACE mode ON/OFF

## **RTTY Operation**

To operate RTTY mode with your KAM Plus, you must first have the Command prompt (`cmd:`). Type `RTTY` and press return. This places the KAM Plus in the RTTY Mode and the baud rate of the transmitted data is controlled by the `RBAUD` command. If you want to operate RTTY at a different speed, you may enter the RTTY Mode by giving the RTTY command and specifying the speed on the command line (e.g. `RTTY 75`) and then press return. When you enter the RTTY Mode, the KAM Plus sends the mode and speed indication to your terminal:

```
-RTTY 45-
```

The KAM Plus is now in the receive mode and will decode a properly tuned RTTY signal and display the information on your terminal. **NOTE:** If `AUTOSTRT` is ON, received RTTY will not be displayed until the KAM Plus receives the characters contained in your `MYAUTOST` parameter.

To transmit RTTY, type `[Ctrl-C][T]`. This causes the KAM Plus to key your transmitter, the bargraph on the KAM Plus goes dark, and the HF transmit LED lights. Type the message you wish to send and when you are through, type `[Ctrl-C][E]`. The KAM Plus will transmit your message and, when the data has all been transmitted, returns to the receive mode.

Use the `[Ctrl-C][n]` directives listed below to change speeds while operating the RTTY mode. To leave the RTTY mode and return to Command mode, type `[Ctrl-C][X]`.

### **RTTY Directives**

While you are in the RTTY mode, several directives are activated and perform the indicated functions.

<code>[Ctrl-C][E]</code>	Return to receive mode when transmit buffer is empty
<code>[Ctrl-C][I]</code>	Invert received MARK/SPACE signals and invert transmitted MARK/SPACE if using AFSK (SSB)
<code>[Ctrl-C][L]</code>	Send LETTERS shift character
<code>[Ctrl-C][N]</code>	Send FIGURES shift character
<code>[Ctrl-C][R]</code>	Return to receive mode immediately (If the transmit buffer isn't empty the remaining data will stay in the buffer)
<code>[Ctrl-C][S]</code>	Select the next MARK/SPACE shift (170/425/850/MODEM)
<code>[Ctrl-C][T]</code>	Enter transmit mode
<code>[Ctrl-C][X]</code>	Exit RTTY mode and return to Command mode (PACKET)
<code>[Ctrl-C][n]</code>	Change operating speed

<u>n</u>	<u>Speed (baud)</u>	<u>n</u>	<u>Speed</u>
1	45	6	110
2	50	7	150
3	57	8	200
4	75	9	300
5	100	0	ASCBAUD



## MARS Feature

When you set CODE RTTY MARS in your KAM several special functions are enabled for RTTY operation.

- A. Typing [Ctrl-G] on the keyboard automatically sends (FIGS)JJJJSSSS(LTRS) over the radio. This is an attention signal.
- B. When you first enter the transmit mode (with [Ctrl-C][T]), the KAM will transmit 5 SPACES followed by <CR><CR><LF> before any other data.
- C. Typing [Ctrl-P] will signify a page break in a long message by transmitting <CR><CR><LF><LF><LF>.
- D. Typing [Ctrl-Z] will transmit the end-of-message signal as <CR><CR><LF><LF><LF>NNNN and 12 LTRS shift characters.

In order to fully comply with the MARS RTTY guidelines published in FM 11-490-7, you will need to set CRADD ON, LFADD ON, AUTO CR 69, AUTOLF OFF, CRSUP OFF and LFSUP OFF.

CRADD ON and LFADD ON causes the KAM to transmit a <CR><CR><LF> whenever you press the return key on your terminal. AUTO CR 69 causes the KAM to insert a <CR><CR><LF> into your transmitted text after 69 characters have been received from your terminal without a carriage return. These commands insure your transmitted data meets the guidelines.

In order to receive exactly what the other station is sending, you will need to set CRSUP OFF and LFSUP OFF so your KAM does not suppress any carriage return or line feed characters.

## Kantronics PBBS

Your Kantronics TNC includes a Personal Bulletin Board System (PBBS) which is capable of storing and forwarding messages for you and other users. This PBBS provides the same message facilities as a computer based BBS (normally referred to as a full-service BBS), including the forwarding of Bulletins, Private mail, and NTS traffic.

Before explaining details of your Kantronics PBBS, it is important that you understand the basics of a full-service BBS system. Each user should select one (and only one) full-service BBS that will normally be used to send and receive mail. This BBS is then called your "HOME BBS" and should not be changed unless you move to a new location. When you connect to your home bulletin board system and list the messages (using the L command), you will see a list containing information about each message on the system. A recent list of messages on one local system might look like this:

```
Msg #   TSL   Size To      @BBS   From    Date/Time Subject
=====
59765   BS    1491 NASA  @ALLUS N5IST   1004/1529 GALILEO STATUS 09/30/93
59764   BNL    458 WX                NOKEJ   1012/1017 KC Forecast 10/12 400am
59763   BNL    659 WX                NONEJ   1012/1017 MO Forecast 10/12 400am
59759   B$    2240 NASA  @ALLUS N5IST   1004/1529 MARS OBSERVER STATUS Pt1
59758   B$    1642 NASA  @ALLUS N5IST   1004/1529 MARS OBSERVER STATUS Pt2
```

This list shows the message number, type and status information, size of the message, the address-see (TO field), distribution (@BBS field) and originator (FROM field). In addition the list shows the date and time the message was received at this BBS and a short subject for the message.

Under current FCC requirements, BBS systems that can store and forward messages without an operator being present must have the capability to provide a record of the path the message has taken from its origination, To accomplish this, BBSs include a routing line, beginning with R:. This R: line includes the date/time the message was received, message number, BBS call and hierarchical routing information.

When you read a message using the R command (e.g. R 59765) you see the header displayed. For example:

```
From      : N5IST
To        : NASA  @ALLUS
Type/status : B$
Date/time  : 04-Oct 15:29
Bid       : NASA093C.GAL
Message #  : 59765
Title     : GALILEO STATUS 09/30/93
Path:     !WK5K!NOLLY!NOOER!NOOBM!NX0R!AG0N!N7MMC!KT0H!KAOWIN!N5IST!
```

The Path: statement in the header lists the most recent BBS systems that have been used to relay this message from its origin to the BBS you read it from. This path information is required by the FCC to allow them complete traceability for any message in the system. What you see in the PATH statement is not the complete information on the routing, but simply a summary of the systems that have handled the message. To see the complete information, BBS systems allow a second version of the READ command (RH or V) that will display more routing information. A routing list from a recent bulletin appears below.

R: 931012/1107 27268@WK5M.#NEKS.KS.USA.NOAM  
R: 931012/1025 16433@NOLLY.#NEKS.KS.US.A.NOAM  
R: 931011/2021 928@N0OER.#NEKS.KS.USA.NA  
R: 931008/1814 2072@N0OBM.#NCKS.KS.USA.NA  
R: 931008/2003 19520@NX0R.#NKS.KS.USA.NA  
R: 931008/1153 30798@AG0N.#WNE.NE.USA.NA  
R: 931007/1147 35850@N7MMC.#SEWY.WY.USA.NA  
R: 931007/1712 49403@KT0H.#NECO.CO.USA  
R: 931007/1639 63792@KA0WIN.#SECO.CO.USA.NA  
R: 931004/1529 46383@N5IST.#WTX.TX.USA.NOAM

By examining this list from the bottom up, we may see that the message entered the system on October 4, 1993 at 15:29 (R:931004/1529). It was message number 46383 on the N5IST BBS (@N5IST) which is located in West Texas (#WTX), which is in Texas (TX), which is in the United States (USA) which is in North America (NOAM). From this station, it was relayed on October 7 at 16:39 to the KA0W1N BBS in Southeastern Colorado. By following this information it is possible to determine where the message traveled and when it was relayed from each station. The information following the ©BBS calisign is called the hierarchical routing information (in this case #WTX.TX.USA.NOAM).

When you connect to your local BBS and send a message, that BBS automatically generates this R: line. As the message is sent to its destination, each BBS adds its own R: line to the message. Besides the requirement of the FCC, the R: line provides a method for any user, anywhere in the world, to send a reply or respond to your message. As the message is passed through the many BBSs, each BBS will add you into its White Pages – a directory of PACKET users. Each BBS makes note that you (the originator of the message) sent the message, and that you entered the message at the BBS listed in the last R: line in the message.

Because of this, a distant user can simply send a reply using the send reply (SR) command of his local BBS. That BBS will then address the message to you using the @BBS and hierarchical routing information in the last R; line of the message you sent. A user may also simply use the send private command (SP) to send a message to you. If the user does not enter complete addressing on his SP command, the BBS will attempt to look up your call in its White Pages and add the routing automatically. However, if the user supplied complete addressing information, the BBS would normally assume it is correct and not check the White Pages.

BBSs use this hierarchical information to send the message back to you. The message someone sent to you (using the above example) would be addressed to *URCALL@N5IST.#WTX.TX.USA.NOAM*. As the message passes through the BBS system for forwarding, the BBS first looks at the callisign of the addressee (*URCALL*). If that BBS doesn't know how to forward the message to you, it then looks at the @BBS field (N5IST). If it doesn't have any information on how to forward to N5IST, it looks at the first part of the hierarchical address (#WTX), not knowing that, it would then look at the next part of the hierarchical address (TX). Assuming this BBS is in the United States, it knows TX means Texas and knows that this message needs to be relayed to a station in that area.

Once the message reaches the first BBS in Texas, that system must use the previous field for forwarding (#WTX). Once it reaches a system in West Texas, the forwarding occurs based on the @BBS.

When the message reaches the BBS specified in the @BBS field, it can forward the message directly to you, since you are using that system as your HOME BBS.

When you enter a message into your Kantronics PBBS and supply the routing information, that message may be forwarded automatically to another BBS. When the message is forwarded from your Kantronics mailbox, an R: line is included as the originating BBS. This line includes the same information as any other BBS. This R: line consists of the date/time the message was entered into

your PBBS, the message number, your MYCALL (*URCALL*) and the HTEXT you have set. For instance, your R: line might be:

**R: 931008/1255 23@URCALL.#WTX.TX.USA.NOAM**

Some BBS operator groups are insisting that your system is NOT a BBS, and therefore should not include R: lines. Their reasoning is that in the above example, EVERY BBS in West Texas would have to know how to send messages to your callsign – not just to your HOME BBS. One solution to this is to include the callsign of your HOME BBS as part of your HTEXT. This would change your R: line to:

**R: 931008/1255 23@URCALL.N5IST.#WTX.TX.USA.NOAM**

As this forwards through the system, all West Texas BBSs can still forward the message to N5IST because his call is a part of the hierarchical routing.

As of this writing, there seem to be at least two groups with strong opinions on the use of, or prohibition of, R: lines by TNC based PBBSs. Some think the volunteer BBS network may be overloaded by personal boards including the R: lines; others insist that the R: lines are required by regulations. We suggest you adapt to "local custom" by turning the R: line feature ON or OFF accordingly.

If your local SysOp demands that you not add R: lines to your messages, you must set the PBPERSON command ON. This will limit your PBBS to receiving messages addressed ONLY to your MYCALL or your MYPBBS call. In addition, your PBBS will only forward messages from YOU (no third-party messages) and will not add the R: line to the routing.

## **Setting Up Other Functions of your KAM Plus**

### **PBBS**

Your KAM Plus automatically configures your Personal Mailbox when your first sign on to it. The PBBS is initially set with a callsign including your call and an SSID of -1 (e.g. W0XJ-1) and a size of 100 kbytes. To change the callsign, use the MYPBBS command and to change the size, use the PBBS command.

You may at times, want to set up your KAM Plus so that a user who connects to your MYCALL will automatically be switched into the mailbox, For instance, if you are not at your station, the user who tries to connect to you would end up connected to the mailbox to leave you a message. To do this set the CMSG command to PBBS.

You can set a customized text to be sent to any user that connects to your PBBS using the PTEXT command. Some users are also required to allow the PBBS to only accept personal messages (i.e. no third-party traffic). This can be done by setting the PBPERSON command ON.

Your KAM Plus PBBS is capable of forwarding messages to, and receiving messages from, another BBS system automatically. To set up your mailbox to forward to another BBS, use the PBFORWRD command. To receive messages from another BBS, contact that BBS's SysOp and ask him to set up his system to forward to you. Note that many SysOp do not forward mail to personal mailboxes.

For details on SysOp functions available in your PBBS, see the PBBS SysOp section of this manual.

### **KA-Node**

Your KAM Plus contains a KA-Node which allows users to connect to the node and then connect to other users, either on the same port or on the other port of your KAM Plus. To activate the KA-Node function, set the NUMNODES command to a non-zero value. This value sets the number of users who may simultaneously use the node and allocates node "circuits" for each user. The circuits will be designated as Channel A through Channel E, depending on the number of circuits allocated, The callsign used by the node is initially set to your callsign with an SSID of -7 (e.g. DC7XJ-7). You can change the node callsign with the MYNODE callsign. In order to allow connections to the opposite port of the KAM Plus, the KNXCON command must be ON.

### **Gateway**

The Kantronics gateway serves as a cross-port digipeater, allowing a user to digipeat through your KAM Plus from HF to VHF or from VHF to HF. The gateway is activated by setting the MYGATE callsign. To disable the gateway, give the command **MYGATE %**. Note that users cannot CONNECT to the MYGATE callsign, it is used just like a digipeater (i.e. C W0XI VIA my gate).

### **PBBS SYSOP Functions**

Some functions in your KAM Plus PBBS are restricted, allowing only you, the owner, or a trusted individual to access them. These functions are called SYSOP functions and allow editing of the message headers (who the message is address to, who it is from, and so on). Suppose a user put a message in your mailbox addressed to ALL, and you want to change it so it is addressed to SAT. You must have SYSOP privileges in order to do this, and it is accomplished by using the EDIT command in the PBBS.

There are two methods of gaining SYSOP status, the first is simply connecting to your own PBBS from the terminal attached to your KAM Plus The second method is to connect to your KAM Plus from another station over the radio and provide the proper validation to become SYSOP. To use this method, the station from which you are operating must have the same BASE call as the sta-

tion to which you are connecting (i.e. PBBS is W0XJ-1, your station must be W0XJ-n). Once connected to the PBBS, the very first command you enter must be SYSOP. The KAM Plus PBBS will then respond with three lines of six numbers each. Choose one of these three lines and decode the RTEXT using these numbers.

For example, assume your KAM Plus has the RTEXT set to "This is a sample rtext." When you connect to this KAM Plus PBBS from a remote station and give the SYSOP command, it will send you:

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

To simplify this, let's re-write the RTEXT as:

```
12345678901234567830123  
This is a sample rtext.
```

Using the first line of numbers to decode this, the number 1 means the letter "T", the number 12 means "a", 3 means "i", 18 means "r", 6 means "i", and 9 means "a". The proper response is therefore Tairia – note that this is case sensitive, so you must properly use upper and lower case characters to gain SYSOP access.

Once you have gained SYSOP status, a new command is available through the PBBS – Edit. The Edit command is used to change information contained in the message, and also to change the message header.

Each message will have a TYPE indicated by the letter P (private), B (bulletin) or T (traffic). To change the message type, enter the edit command with the message number and the new type (i.e. E 2 P would edit message number 2 to become a private message). Messages may also have a STATUS which is indicated by the letters shown below:

```
Y (yes it has been read) – Private messages only
N (no it has not been read) – Private messages only
F (this message has been forwarded to another BBS)
H (this message is being HELD)
```

If a message is marked as HELD, you can "unhold" it by using the EDIT command followed by the number of the message, and the letter H. The letter H acts as a toggle: it will hold an unhold message or unhold a held message (e.g. E 2 H).

A message marked with F means that this message has already been forwarded to another BBS. You should NOT change this flag, as this could cause duplicate messages to be introduced into the BBS system. If you absolutely MUST change it, use the Edit command with the message number and F (e.g. E 3 F).

A private message may have the Y or N flag set. This indicates whether or not the addressee has read the message. You can change this using the Edit command, message number, and either Y or N (e.g. E 6 Y).

As SysOp, you can also change the TO field, @BBS field, FROM field or even the subject/text of the message. The following commands are used for these purposes:

E # >callsign	Changes the TO field to a new callsign
E # <callsign	Changes the FROM field to a new callsign
E # @bbSCALL	Changes the @BBS field to bbSCALL
E # "string1" "string2"	Changes the FIRST occurrence of string1 to string2, starting with the subject of the message.

The EDIT command will also permit you to edit the text of a message. The format to edit text is:

```
E # "string1" "string2"
```

Specify the message number in place of #. The KAM Plus will then replace the FIRST occurrence of string1 with string2. You may use either double quotes ( " ) or single quotes ( ' ) to delimit the strings. Be careful when editing a message. For instance, if you try to replace "the" with "those" and the first occurrence of "the" happens to be in the word thermal, you would end up with tho-sermal. It may be wise to search for "the" if you want to replace the word "the".

## Remote Access to your KAM Plus

Your Kantronics KAM Plus includes the ability to connect from a remote station and change the parameters in the KAM Plus. This allows you to add or delete stations from the LLIST, change the size of the PBBS, change the MYCALL and so on. Extreme caution must be used when you are accessing your KAM Plus from a remote location. There is no built-in safeguard, and as such it is possible for you to change parameters such that the remote KAM Plus will no longer communicate.

In order to change parameters in a remote KAM Plus, the RTEXT in the remote KAM Plus must be set to a text string that will be used as the password string. For instance, you might set your RTEXT to:

```
RTEXT This system belongs to W0ABC in Lawrence, Kansas 66046
```

The remote KAM Plus must also have its MYREMOTE set to a unique callsign (i.e. W0ABC-4, or XYZREM). If these two parameters are not set as indicated, remote access to the command set of this KAM Plus is not possible.

When these parameters are set, you can connect to the MYREMOTE callsign of the remote KAM Plus. The MYCALL in your TXC must match the MYCALL of the remote KAM Plus (excluding SSID). In the example above, the MYCALL callsign of the KAM Plus I want to change is set to W0ABC and the MYREMOTE is XYZREM, so the callsign of the connecting station must be W0ABC-x (x = any SSID).

When the connection is made, the remote KAM Plus will send three lines of numbers. The numbers would look like:

```
5 20 43 36 18 3
37 1 44 14 28 19
48 26 8 52 22 1
```

You must then pick ONE of these lines and decode the password string. Let's say I choose to decode line 3 (48 26 8 52 22 1). Rewriting my RTEXT string to make this easier I would have:

```
          1          2          3          4          5
123456789012345678901234567890123456789012345678901234
This system belongs to W0ABC in Lawrence, Kansas 66046
```

To decode the string, character 48 is "s", character 26 is "A", character 8 is "s", character 52 is "0", character 22 is "o" and character 1 is "T". I must send the following in response to my remote access attempt:

```
sAs0oT
```

Note that case is significant and spaces are considered valid characters. If you fail to properly decode the password, the KAM Plus 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 KAM Plus will disconnect you and disable connects to the MYREMOTE for 15 minutes. Also, if you

connect to the MYREMOTE and start the password sequence but then disconnect, the penalty timer is in effect for 15 minutes.

Be careful when using the remote access feature. You can change ANY command in the KAM Plus without restriction, but this can lead to problems. For instance, if you change the INTFACE command to KISS and then send a RESET command, the remote KAM Plus will be placed into the KISS mode and will completely quit talking to the radio! Also, if you connect to the MYREMOTE of a KAM Plus and then issue a command like CONNECT W1ABC, the remote KAM Plus will indeed connect to the station, but there will be no data sent to you from that connection. The connected data would be sent to the serial port of that remote KAM Plus. We urge EXTREME caution when using the remote access! Note also that any command that causes a reset (i.e. NUMNODES, PBBS, MAX-USERS) will disconnect all current users (PBBS, NODE, and YOU).

One other minor limitation applies to receiving data from the remote KAM Plus. When you give any command, the response is limited to 300 characters so some commands will not fully display their response. If you give the command DISPLAY, the full list will begin, but you will not receive the entire list because of the limitation on this buffer.

## Host Mode Operation

Your KAM Plus provides a Host mode for communication with more sophisticated computer software. If your software supports this mode, it will place the KAM Plus in the Host mode of operation automatically.

When operating a standard terminal program like Pacterm or a telephone communications program like Procomm Plus, you will never need to place the KAM Plus in the Host mode; however, you may find that your KAM Plus has been left in Host mode accidentally by another program. If you can not communicate with your KAM Plus, first be sure your terminal program is set for the baud rate you have used with your host program. Turn the KAM Plus off and on. If you see `LLS00L`, this means your KAM Plus is in Host mode. To exit Host mode, hold the ALT key down and type the numbers 192 on the numeric keypad of your keyboard (NOT THE NUMBER KEYS ABOVE THE KEYBOARD), Release the ALT key. Type the letter Q and then repeat the ALT 192 sequence. Your KAM Plus will now reset, sending you the sign-on message and the command prompt (`cmd:`).

## KISS Mode Operation

Some special software requires that your KAM Plus be placed in KISS mode. TCP/IP programs (NET, NOS, JNOS and others) and some networking software (G8BPQ) require this mode of operation. To place your KAM Plus in KISS mode, you must first have the command prompt (`cmd:`). Type **INTFACE KISS** and press return. You will not see a message or any prompt back from the KAM Plus. It is now in KISS mode.

To force your KAM Plus out of the KISS mode from a standard terminal program, hold the ALT key down and type the numbers 192 on the numeric keypad of your keyboard (NOT THE NUMBER KEYS ABOVE THE KEYBOARD). Release the ALT key. Press and hold the ALT key and type the numbers 255 on the numeric keypad. Release the ALT key. Repeat the ALT 192 sequence. Your KAM Plus will now reset, sending you the sign-on message and the command prompt (`cmd:`).

## WEFAX Operation

Your KAM Plus can receive HF WEFAX transmissions by connecting the receive audio from your HF receiver to the VHF radio port of the KAM Plus. You must run a special software program on your computer that will display graphics images, and knows how to receive the data from the KAM Plus. These software programs will automatically place your KAM Plus in the WEFAX mode, and will exit the WEFAX mode after you are through receiving.



## **Hardware Information**

### **Precautions**

The KAM Plus 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.

Cables provided with your KAM Plus are shielded. If you use other cabling, be certain it is shielded. We do not recommend the use of unshielded RS-232 ribbon cable in an amateur radio environment.

The supplied serial cable contains all 25 wires and is designed to be used with your KAM Plus. Before using this cable with any other equipment, you should check your equipment manuals to determine that no damage will result.

### **Connecting to the Computer**

The KAM Plus serial port is shipped from the factory configured to communicate with your computer using RS-232 signaling. This is compatible with PC compatible computers, Macintosh, dumb terminals, and most other terminal devices. The Commodore 64, however, requires TTL signaling as do a few other computers. If your computer requires TTL, you may configure your KAM Plus to use these signals by placing jumper K7 on the center post and the post marked TTL (toward the rear of the KAM Plus), See the assembly/disassembly instructions in this manual.

### **Cable Wiring**

ALL Kantronics software uses a minimum of five wires between the computer and the KAM Plus. The pins that must be connected from the KAM Plus to your computer for these programs are TXD, RXD, SG, RTS and CTS. (See chart below.) You may optionally choose to connect the DSR, DTR, and DCD pins, however these are not used by Kantronics programs or by the KAM Plus.

Some terminal programs do not support hardware flow control, and will fail to operate if these lines are connected – refer to your software manual to determine the capabilities of your program. If your program does not support hardware flow control, you should connect only the TXD, RXD and SG pins from the KAM Plus to your computer.

Still other terminal programs require the presence of a signal on the DSR pin in order to operate. If your program requires this, connect the DTR and DSR pins on your computer end of the cable together with a jumper.

The KAM Plus serial port (computer) connector has 25 pins, which are configured as:

<b>Pin Name</b>	<b>KAM Plus Pin Number</b>	<b>Computer Pin Number</b>	
		<b>(DB9)</b>	<b>(DB25)</b>
FG	1	N/A	1
TXD	2	3	2
RXD	3	2	3
RTS	4	7	4
CTS	5	8	5
DSR	6	6	6
SG	7	5	7
DCD	8	1	8
DTR	20	4	20

**NOTE:** FG (Frame Ground) and SG (Signal Ground) are tied together in the KAM Plus.

The purpose of the pins (by name) is:

- FG – FRAME GROUND: This pin is attached to the chassis of the equipment as a safety ground.
- TXD – TRANSMIT DATA; This line carries the data from your computer to the KAM Plus.
- RXD – RECEIVE DATA: This line carries the data from the KAM Plus to your computer.
- RTS – READY TO SEND: The KAM plus checks this line to see if it is permitted to send data to your computer. This pin is controlled by your computer software program to provide this information to the KAM Plus. This pin is used for hardware flow control.
- CTS – CLEAR TO SEND: The KAM Plus uses this line to signal your computer when it can no longer accept any data from the computer, or to signal that it is again ready to accept data. This pin is used for hardware flow control.
- DSR – DATA SET READY: The KAM Plus applies a positive voltage on this pin when it is turned on. This may be required by some computer software to detect the presence of a modem.
- DCD – DATA CARRIER DETECT: The KAM Plus uses this pin to signal the status of the current I/O stream to your computer. If you are currently connected to another PACKET station, this line will have a positive voltage on it. If you are disconnected, the voltage on this line will be negative.
- DTR – DATA TERMINAL READY: This line is connected to the DSR line inside the KAM Plus and is not used by the KAM Plus for any purpose.

### Software settings

When using a standard terminal program to communicate with the KAM Plus, we recommend you set the serial port configuration in your program for 8 data bits, no parity, and one stop bit. The baud rates supported by the KAM Plus are 300, 600, 1200, 1800, 2400, 4800 and 9600. In general, you should use the fastest baud rate your terminal program supports (up to 9600). The KAM Plus defaults with ECHO ON, so you should set your terminal program for "full-duplex" Operation.

If you are using a host-mode program like Host Master, there is no serial port configuration for data bits and stop bits - this is automatically set by the program. You must specify the COM port and the baud rate to be used.

### Connecting to your Radios

#### VHF

The VHF radio connector on the KAM Plus rear panel is a 9-pin DB style connector with a pre-wired 9 conductor cable and a mini-plug attached. The cable wiring is:

Pin Number	Pin name	Color	Function
1	AFSK	white	Transmit audio
2	XCD	yellow	External carrier detect
3	PTT	brown	Push-to-Talk
4	RCV	blue	Receive audio
5	RCV	mini-plug center	Receive audio
6	GND	shield	Ground
7	+12V	red	
8	GND	green	Ground
9	GND	black	Ground

- Pin 1: Connects to your mic input of your radio, providing the audio signal to be transmitted.
- Pin 2: When a ground is applied to this pin and the KAM Plus CD command is set to SOFTWARE, the KAM will not transmit packet. This is normally used as an external means of supplying carrier detect to the KAM Plus.
- Pin 3: When the KAM Plus needs to key your transmitter, it will apply a ground to this pin. This is an open-drain circuit and requires a positive voltage from your radio (not to exceed 50 volts or 200 mA).
- Pin 4: Receive audio from your radio may be connected to this pin. This will normally be used only if your radio has its receive audio present on the microphone plug.
- Pin 5: This pre-wired mini-plug connects to the external speaker jack on your transceiver for receive audio. If you use this connection you will not need to use pin 4.
- Pin 6: This pin connects to the ground of your radio mic connector.
- Pin 7: +12 VDC in – red lead. This lead is provided as an alternate power input. It may be used in place of the +12 VDC jack.
- Pin 8: This pin is also ground. Only one ground needs to be connected to your radio.
- Pin 9: This pin is also ground. Only one ground needs to be connected to your radio.

## HF

The HF radio connector on the KAM Plus rear panel is an 8-pin DIN style connector with a pre-wired 9 conductor cable and a mini-plug attached. The cable wiring is:

Pin Number	Pin name	Color	Function
1	AFSK	white	Transmit audio
2	GND	black/shield	Ground
3	PTT	brown	Push-to-Talk
4	KEY	orange	CW Key line
5	FSK	red	FSK output
6	RCV	mini-plug center and purple	Receive audio
7	RCV	blue	Receive audio
8	XCD	yellow	External carrier detect

- Pin 1: Connects to your microphone input of your radio, providing the audio signal to be transmitted.
- Pin 2: This pin connects to the ground of your radio mic connector.
- Pin 3: When the KAM Plus needs to key your transmitter, it will apply a ground to this pin. This is an open-drain circuit and requires a positive voltage from your radio (not to exceed 50 volts or 200 mA).
- Pin 4: This line connects to CW Key jack on your transceiver. When operating CW, the KAM will ground this pin through a 100 ohm resistor to key your radio. You must have your radio in CW mode with the VOX turned ON and any electronic keyer turned OFF.
- Pin 5: If your radio supports FSK operation, connect this wire to the FSK input of your radio.
- Pin 6: This pre-wired mini-plug connects to the external speaker jack on your transceiver for receive audio. If you use this connection you will not need to use the purple wire. If your radio provides receive audio on the mic connector, you may use the purple wire instead of the mini-plug.
- Pin 7: Same as pin 6.
- Pin 8: When a ground is applied to this pin and the KAM Plus CD command is set to SOFTWARE, the KAM will not transmit packet. This is normally used as an external means of supplying carrier detect to the KAM Plus.

## **AFSK Output Level**

### **VHF**

The AFSK output level from the KAM Plus to your VHF transceiver may be adjusted using potentiometer R-10 and jumper K2. When the K2 jumper is placed on one post only, the output level may be adjusted from 2 mV<sub>pp</sub> to 60 mV<sub>pp</sub>. Placing the jumper on both posts allows adjustment from 40 mV<sub>pp</sub> to 2 mV<sub>pp</sub>. This level should be adjusted to provide approximately 3.5 kHz deviation on your radio.

### **HF**

The AFSK output level from the KAM Plus to your HF transceiver may be adjusted using potentiometer R-28 and jumper K9. When the K9 jumper is placed on one post only, the output level may be adjusted from 20 mV<sub>pp</sub> to 400 mV<sub>pp</sub>. Placing the jumper on both posts allows adjustment from 200 mV<sub>pp</sub> to 4 mV<sub>pp</sub>. This level should be adjusted to provide full power output from your HF radio and very little deflection of your ALC meter.

## **Hand Held modification**

Jumper K3 on the KAM Plus provides an alternate means to connect your VHF hand-held radio to the KAM Plus. If you do not want to include the interface circuitry shown in the Getting Started manual into your cable, you can place jumper K3 on the center post and the post marked HT. This provides the isolation and keying necessary for most ICOM and Yaesu hand-held radios, and other radios which use similar keying circuits. If you make this change, you must not connect the PTT line from the KAM Plus to your mic jack.

## **Watchdog Timer**

The KAM Plus has a Push-to-Talk watchdog timer for the HF port and a separate watchdog timer for the VHF port. These watchdog timers are both enabled at the factory by placing jumpers K4 (HF) and K5 (VHF) on just one post. If the KAM Plus attempts to keep your radio transmitting continuously for over 2½ minutes, the watchdog timer will activate and release the PTT line to your radio. **NOTE:** This also applies when operating RTTY or other HF modes, so you may want to disable this for your HF port. Current FCC rules require a watchdog to detect such a failure and stop the transmission.

You may disable the watchdog timer for either port by placing the appropriate jumper (K4 or K5) on both posts.

## **Assembly and Disassembly of your KAM Plus**

Should you require access to the KAM Plus to reposition jumpers or for any other purpose, disassemble as follows:

1. Turn off power to your KAM Plus and disconnect all cables from the unit.
2. Using a small phillips screwdriver, remove the two rear panel screws just far enough to free the panel and bezel.
3. Slide the PC board out of the case from the back.

To reassemble, reverse the procedure above. Be careful to align the LEDs with the holes in the front panel as you re-insert the board. You may find it helpful to remove the front panel first, insert the board, and then re-install the front panel.

## Hard Reset

A hard reset process is provided, although you will rarely need to perform this step. A hard reset will completely erase the memory of your KAM Plus, test some internal hardware, and re-initialize all parameters to the factory Default values.

When performing a hard reset, you should connect your terminal to the serial port of the KAM Plus and set your terminal for 1200 baud operation. This allows you to see the messages reported by the KAM Plus during the resetting process. We recommend using the Pacterm program (provided) for this. Host mode programs will not display the messages shown.

1. Remove the PC board from the case as detailed in the Assembly and Disassembly section, above.
2. Connect the serial cable to your KAM Plus and start the Pacterm program.
3. Locate Jumper K6 on the PC board and place the jumper on the both posts.
4. Apply power to the KAM Plus. You should see the following messages displayed on your terminal: **CHECKSUM OK . . . .RAM OK 128K BYTES REPLACE TEST JUMPER**
5. Turn the power off and disconnect all cables from the KAM Plus.
6. Place jumper K6 on one post only to re-enable normal Operation.
7. Reassemble the KAM Plus and re-install it in your station. Be sure to re-connect all cables.

If you do not see the message indicated in step 4 above, your KAM Plus has developed a problem. You should contact Kantronics Service department and discuss the problem with the Service technician.

## Calibration/Equalization

The CALIBRAT command is used to assist the KAM Plus operator in determining the need for equalization of a received signal. Since this feature is unique to Kantronics TNCs, two stations using Kantronics TNCs are necessary to utilize this command.

You must have your current I/O stream on the VHF radio port. Once the CALIBRAT command is given, three options will appear on the terminal screen:

**Calibrate Mode Press M.R.S.T, or X**

Pressing **M** will transmit a constant Mark.

Pressing **R** will measure a square wave received.

Pressing **S** will transmit a constant Space.

Pressing **T** will transmit a square wave (space/mark) at the selected tones until a key is pressed.

Pressing **X** will return the TNC to the Command Mode.

One Station should be used to transmit the square wave, while the receiving station should measure and compare the space/mark square wave. The transmitting station should set the microphone level in the mid range.

Once the receiving KAM Plus is placed in the CALIBRATE receive mode, two numbers will appear on the screen. The KAM Plus is measuring the space/mark square wave generated by the transmitting Station. For the best calibration of the receiving transceiver, set the radio tone controls so that the two given values are as close to equal as possible.

In most instances when the ratio of the numbers is within a 40/60 or 60/40 range, the PACKET Station will function normally. A larger disparity in the tones may cause additional retries during PACKET operation. This ratio may be determined by the following formula:

$$(N1 \times 100) / (N1+N2)$$

where N1 is the number to the left of the displayed slash, and N2 is to the right of the slash. For instance, if the KAM Plus displays 1400/1800, the ratio can be determined by:

$$(1400 \times 100) / (1400 + 1800) \text{ or } 140000/3200 = 44$$

Since the total is 100, the ratio is then 44/56 and is within the 40/60 criteria.

If the ratio of the numbers exceeds 60/40, you should reset the internal Equalization jumper(s) for partial equalization. If, with partial equalization these numbers are still outside the 60/40 ratio, set the Equalization jumper for NO equalization.

Jumpers are appropriately labeled on the PC board. Refer to the parts location diagram for help in locating them. Also refer to the Assembly and Disassembly section for information on obtaining access to the interior of the KAM Plus.

Jumper K1 – VHF Equalization – This jumper is provided to alter the equalization characteristics of the VHF modem. The KAM Plus is shipped with the jumper placed on ONLY ONE of the posts effectively "OFF" so that full equalization is in effect. With no jumper installed on the 3-pin header, full equalization is in effect. With the jumper connecting the center post and the post marked 1, there is no equalization, With the jumper connecting the center post and the post marked 2, partial equalization is in effect. Testing has shown that most VHF transceivers require that the input audio signal be fully equalized for best performance. Should you wish to operate the KAM Plus in a hard wire packet line, no equalization should be in effect.

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Jumper K1 – VHF Equalization – This jumper is provided to alter the equalization characteristics of the VHF modem. The KAM Plus is shipped with the jumper placed on only one of the posts, effectively provided partial equalization. Placing the jumper on both posts will set the KAM Plus for no equalization. Most radios will work properly with partial equalization, however if the receive audio is taken directly from the discriminator of your radio, no equalization will probably work better

## Specifications

Size:	1-¾" × 6" × 9" (4.5 cm x 15.3 cm x 23 cm)	
Weight:	2.5 lbs (1.1 kg)	
Input Voltage Requirements:	9 VDC – 15 VDC	
Current Requirements:	260 mA (max), 160 mA (idle)	
Power plug polarity:	Center pin positive	
Watchdog timer:	2.5 minutes	
External Carrier detect:	Pulldown to ground	
PTT Output:	Open drain (+50 VDC max.)	
FSK Output:	Open drain (+50 VDC max.)	
Key Output:	Reed relay (rated at 0.5 A, 300 VDC max., 100 ohm series resistance)	
Audio Output:	HF	NF
Drive level (lo)	20 – 400 mV	2 – 60 mV
Drive level (hi)	200 mV – 4 V	40 mV – 4 V
Impedance (ac coupled)	600 Ω	600 Ω
Audio Input:		
Sensitivity (FM)	2 mV	
Sensitivity (AM)	40 mV	
Sensitivity		4 mV
Dynamic range	> 80 dB	>73 dB
Maximum input V	35 V <sub>pp</sub> (±12 VDC)	35 V <sub>pp</sub> (±12 VDC)
HF Modulation:	up to 300 BPS FSK, programmable MARK/SPACE tones.	
VHF Modulation:	1200 BPS FSK (Bell 202 - 1200/2200 Hz standard, CC1TT v.23 optional by cutting trace at K18)	
Modes of operation:	PACKET, G-TOR, PACTOR, RTTY, ASCII, AMTOR (CCIR 476 and CCIR 625), CW, WEFAX, KISS, HOST	
Other features:	PBBS, KA-Node, Gateway, cross-connect, remote access	

# ASCII Chart

Ctrl	Dec	Hex	Code	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
@	0	00	NUL	32	20	SP	64	40	@	96	60	`
A	1	01	SOH	33	21	!	65	41	A	97	61	a
B	2	02	STX	34	22	"	66	42	B	98	62	b
C	3	03	ETX	35	23	#	67	43	C	99	63	c
D	4	04	EOT	36	24	\$	68	44	D	100	64	d
E	5	05	ENQ	37	25	%	69	45	E	101	65	e
F	6	06	ACK	38	26	&	70	46	F	102	66	f
G	7	07	BEL	39	27	'	71	47	G	103	67	g
H	8	08	BS	40	28	(	72	48	H	104	68	h
I	9	09	HT	41	29	)	73	49	I	105	69	i
J	10	0A	LF	42	2A	*	74	4A	J	106	6A	j
K	11	0B	VT	43	2B	+	75	4B	K	107	6B	k
L	12	0C	FF	44	2C	,	76	4C	L	108	6C	l
M	13	0D	CR	45	2D	-	77	4D	M	109	6D	m
N	14	0E	SO	46	2E	.	78	4E	N	110	6E	n
O	15	0F	SI	47	2F	/	79	4F	O	111	6F	o
P	16	10	DLE	48	30	0	80	50	P	112	70	p
Q	17	11	DC1	49	31	1	81	51	Q	113	71	q
R	18	12	DC2	50	32	2	82	52	R	114	72	r
S	19	13	DC3	51	33	3	83	53	S	115	73	s
T	20	14	DC4	52	34	4	84	54	T	116	74	t
U	21	15	NAK	53	35	5	85	55	U	117	75	u
V	22	16	SYN	54	36	6	86	56	V	118	76	v
W	23	17	ETB	55	37	7	87	57	W	119	77	w
X	24	18	CAN	56	38	8	88	58	X	120	78	x
Y	25	19	EM	57	39	9	89	59	Y	121	79	y
Z	26	1A	SUB	58	3A	:	90	5A	Z	122	7A	z
[	27	1B	ESC	59	3B	;	91	5B	[	123	7B	{
/	28	1C	FS	60	3C	<	92	5C	\	124	7C	
]	29	1D	GS	61	3D	=	93	5D	]	125	7D	}
^	30	1E	RS	62	3E	>	94	5E	^	126	7E	-
_	31	1F	US	63	3F	?	95	5F	_	127	7F	DEL

Dec	Hex
128	80
129	81
130	82
131	83
132	84
133	85
134	86
135	87
136	88
137	89
138	8A
139	8B
140	8C
141	8D
142	8E
143	8F
144	90
145	91
146	92
147	93
148	94
149	95
150	96
151	97
152	98
153	99
154	9A
155	9B
156	9C
157	9D
158	9E
159	9F

Dec	Hex
160	A0
161	A1
162	A2
163	A3
164	A4
165	A5
166	A6
167	A7
168	A8
169	A9
170	AA
171	AB
172	AC
173	AD
174	AE
175	AF
176	B0
177	B1
178	B2
179	B3
180	B4
181	B5
182	B6
183	B7
184	B8
185	B9
186	BA
187	BB
188	BC
189	BD
190	BE
191	BF

Dec	Hex
192	C0
193	C1
194	C2
195	C3
196	C4
197	C5
198	C6
199	C7
200	C8
201	C9
202	CA
203	CB
204	CC
205	CD
206	CE
207	CF
208	D0
209	D1
210	D2
211	D3
212	D4
213	D5
214	D6
215	D7
216	D8
217	D9
218	DA
219	DB
220	DC
221	DD
222	DE
223	DF

Dec	Hex
224	E0
225	E1
226	E2
227	E3
228	E4
229	E5
230	E6
231	E7
232	E8
233	E9
234	EA
235	EB
236	EC
237	ED
238	EE
239	EF
240	F0
241	F1
242	F2
243	F3
244	F4
245	F5
246	F6
247	F7
248	F8
249	F9
250	FA
251	FB
252	FC
253	FD
254	FE
255	FF

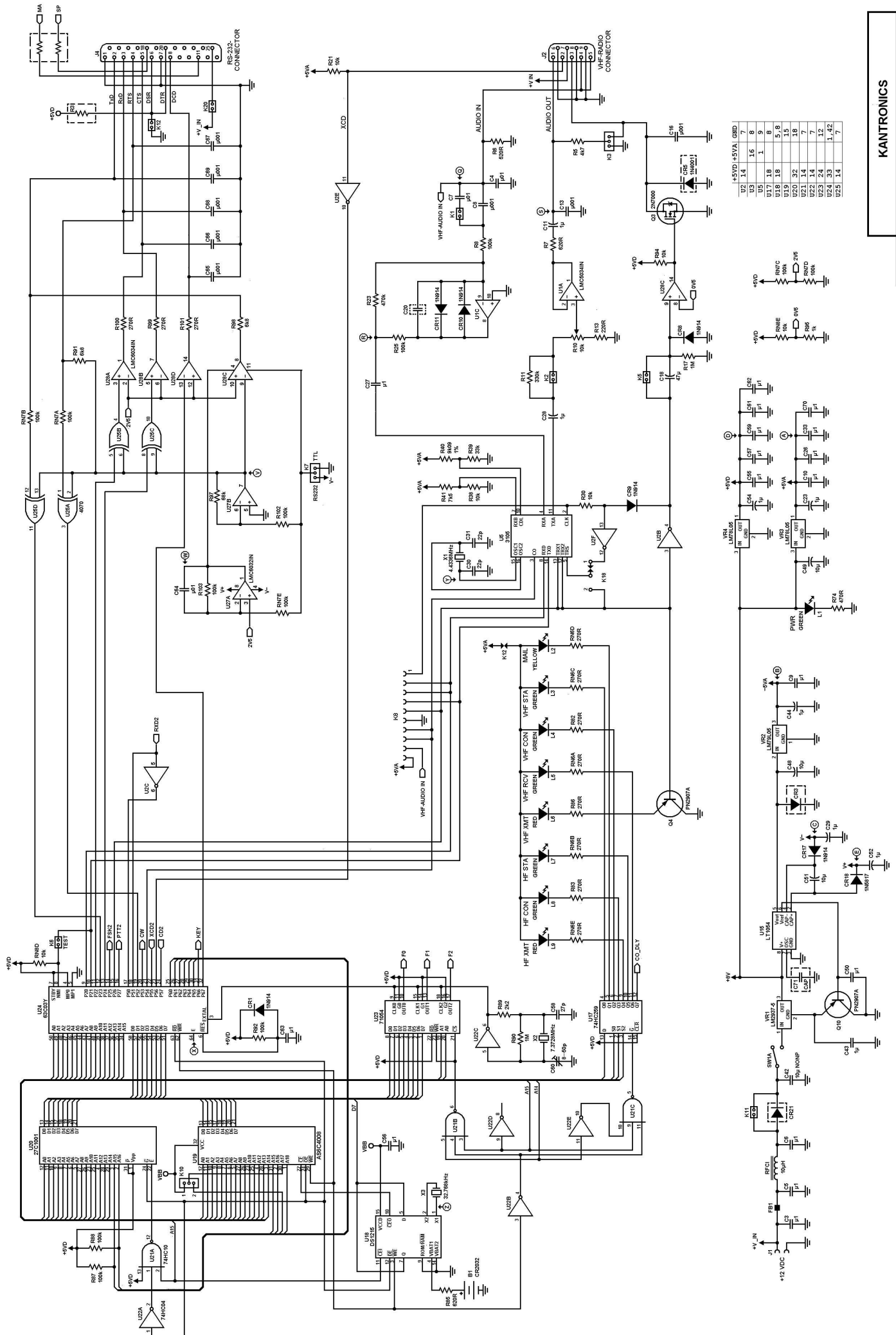


## Parts List

Ref.	Part Type	PCB Loc.						
			C55	μ1	E4	K20	Not installed	A3
			C56	μ1	E3			
B1	CR2032	E3	C57	μ1	C4	L1	LED, green	F1
			C58	27p	C4	L2	LED, yellow	F2
C1	μ01	A2	C59	μ1	C4	L3	LED, green	F2
C2	μ001	A2	C60	6–50p	B4	L4	LED, green	F3
C3	μ1	A1	C61	μ1	B4	L5	LED, green	F3
C4	μ01	A1	C62	μ1	B3	L6	LED, red	F3
C5	μ1	A1	C63	μ1	B3	L7	LED, green	F3
C6	μ1	A1	C64	μ01	A3	L8	LED, green	F4
C7	μ01	A1	C65	μ001	A3	L9	LED, red	F4
C8	μ001	A1	C66	μ001	A3			
C9	μ1	A1	C67	μ001	A3	Q1	2N7000	A2
C10	μ1	B1	C68	μ001	A4	Q2	2N7000	A2
C11	1μ	A1	C69	μ001	A4	Q3	2N7000	B2
C12	1μ	B1	C70	μ1	A4	Q4	PN2907A	E4
C13	μ001	A1	C71	Not installed	F2	Q5	PN2907A	B1
C14	μ001	A1				Q6	2N7000	B1
C15	μ001	A2	CR1	1N914	B3	Q7	PN2907A	D2
C16	μ001	A1	CR2	1N914	A2	Q8	PN2907A	E2
C17	μ1	A2	CR3	Not installed	A2	Q9	PN2222	E2
C18	47μ	B2	CR4	Not installed	A2	Q10	PN2907A	F2
C19	47μ	B2	CR5	Not installed	A2			
C20	Not installed	B1	CR6	1N914	B2	R1	620R	A2
C21	μ001	B1	CR7	1N914	B2	R2	100R	A2
C22	μ1	B1	CR8	1N914	B2	R3	Not installed	A2
C23	1μ	B1	CR9	1N914	B2	R4	10k	A2
C24	μ1	B1	CR10	1N914	B2	R5	4k7	A1
C25	1μ	B1	CR11	1N914	B2	R6	620R	A1
C26	μ1	B1	CR12	1N914	D2	R7	620R	A1
C27	μ1	C2	CR13	1N914	D2	R8	100k	A1
C28	1μ	B2	CR14	1N914	D2	R9	10k	A1
C29	1μ	C2	CR15	1N914	E1	R10	10k Pot.	B1
C30	22p	C2	CR16	1N914	E1	R11	330k	B1
C31	22p	C1	CR17	1N914	E2	R12	620R	B1
C32	μ01	C1	CR18	1N5817	E2	R13	220R	B1
C33	μ1	C2	CR19	Not installed	E1	R14	100k	B1
C34	μ1	D2				R15	100k	B2
C35	1μ	D2	J1	2.1 mm jack	A1	R16	1M	B2
C36	1μ	D2	J2	DB9F	A1	R17	1M	B2
C37	1μ	D2	J3	8 pin DIN	A2	R18	100R	B1
C38	μ01	D2	J4	DB25F	A3	R19	68k	B1
C39	μ01	D2				R20	10k	B1
C40	μ01	D2	K1	2 pin SIH	A1	R21	10k	B1
C41	μ01	E2	K2	2 pin SIH	A1	R22	1M	B1
C42	10μ	F1	K3	3 pin SIH	A1	R23	470k	B1
C43	1μ	E1	K4	2 pin SIH	B2	R24	10k	B1
C44	1μ	E1	K5	2 pin SIH	B2	R25	100k	B1
C45	μ01	E1	K6	2 pin SIH	B3	R26	620R	C1
C46	330p	E2	K7	3 pin SIH	B3	R27	2k7	C1
C48	10μ	E2	K8	Not installed	B3	R28	10k Pot.	B1
C49	10μ	E2	K9	2 pin SIH	C1	R29	100k	C1
C50	μ1	F2	K10	3 pin SIH	D4	R30	10k	B2
C51	10μ	E2	K11	Not installed	E1	R31	150k	C1
C52	1μ	F3	K12	Not installed	F2	R32	150k	C1
C54	1μ	E3	K18	Not installed	C2	R33	100k	C1

R34	100k	C1	R75	100k	E2	SW1	Switch	F1
R35	27k	C1	R76	1M	E2	SW2	Switch	F2
R36	12k	C1	R77	100k	E2			
R37	100k	C1	R78	100k	E2	U1	LMC6034IN	B1
R38	10k	C2	R79	9k09	E3	U2	74HC04	B2
R39	33k	C2	R80	2k2	E3	U3	4018	C1
R40	9k09	C2	R81	Not installed	E3	U4	MF4CN-50	C1
R41	7k5	C2	R82	270R	F4	U5	3105	C2
R42	27k	C2	R83	270R	F4	U6	MF10	C1
R43	22k	C2	R84	820R	E4	U7	LM339	D2
R44	10k	C2	R85	620R	E3	U8	MF10	D1
R45	220k	C2	R86	270R	E4	U9	MF10	D1
R46	620k	C2	R87	100k	D4	U10	MF4CN-50	D2
R47	100k	C2	R88	100k	D4	U11	LM324	D2
R48	10k	D2	R89	2k2	C4	U12	MF10	E1
R49	51k	D1	R90	1M	C4	U13	LM358	E2
R50	150k	D1	R91	6k8	B3	U14	4066	E2
R51	95k3	D1	R92	100k	B2	U15	LT1054	E2
R52	820k	D1	R93	10k	B2	U16	LM3914	E3
R53	220k	D2	R94	10k	B2	U17	74HC259	E3
R54	100k	D2	R95	1k	B2	U18	DS1215	E3
R55	150k	D2	R96	10k	B2	U19	628128	D4
R56	680k	D2	R97	68k	B3	U20	27C1001	D4
R57	150k	D2	R98	6k8	A4	U21	74HC10	C3
R58	150k	D2	R99	270R	A4	U22	74HC04	C3
R59	150k	D2	R100	270R	A3	U23	71054	C2
R60	27k	D1	R101	270R	A3	U24	63C03Y	B2
R61	12k	D1	R102	100k	A3	U25	4070	B4
R62	150k	D1	R103	100k	A3	U26	LMC6034IN	A4
R63	51k	D1	R104	Not installed	A4	U27	LMC6032IN	A3
R64	820k	E1	RFC1	10 $\mu$	A1	U28	LM339	A2
R65	95k3	E1	RL1	Relay	A3	U100	Bargraph	F3
R66	680k	E1	RN1	100k	C1			
R67	47k	E2	RN2	100k	D1	VR1	LM2937-5	E1
R68	100k	E2	RN3	100k	D1	VR2	LM79L05	E1
R69	150k	E2	RN4	10k	C2	VR3	LM78L05	F2
R70	22k	E2	RN5	10k	E2	VR4	LM78L05	E3
R71	680k	E1	RN6	220R	E3			
R72	1M	E1	RN7	100k	B3	X1	4.4336 MHz	C2
R73	1M	E1	RN8	10k	B3	X2	7.3728 MHz	C4
R74	470R	E1				X3	32.768 kHz	E4





U2	1,4	7	8
U2	1,6	8	
U3	1,8	9	
U4	1,9	1	
U15	1,8	5,8	
U15	1,9	1,5	
U21	3,2	1,8	
U21	1,4	7	
U22	1,4	1,2	
U23	1,4	1,2	
U23	1,4	1,2	

