INSTALLATION OF THE UPDATE KIT

Your update kit contains the following items:

1. New program EPROM
2. Operator's Manual including this manual addendum

INSTALLATION OF THE NEW COMPONENT

1. Remove all cables from the KAM.

2. Using a small phillips screwdriver, remove the two front panel screws just far enough to free the panel and bezel.

3. Carefully remove the front panel and bezel.

4. Note the screw holding the voltage regulator (VRI) to the metal case. Remove this screw.

5. Slide the PC board out of the case.

6. Locate the IC socket U22. Carefully remove the plug-in component at U22.

7. Install the new EPROM in IC socket U22.

   ********** CAUTION DO NOT KEEP THE KAM ON FOR THIS STEP
   MORE THAN A MINUTE OR THE REGULATOR WILL OVERHEAT******

8. CAUTION YOU MUST COMPLETE THIS STEP. This step initializes your KAM with the new EPROM commands. First, locate the jumper at the side of the PC board labeled NORM/TEST. It should be in the normal (NORM) position. Pull off the jumper and place it in the TEST position.
   While the PC board is out of the case, cable it to your computer and add power. Run your terminal program at 300 baud and turn on the KAM. The following should appear on the screen.

   EEPROM INIT OK
   CHECKSUM OK
   RAM OK 8000H BYTES
   REPLACE TEST JUMPER

If you receive this response, then the EPROM is correct. Turn off the KAM and uncable it from your computer.

If you receive a different response, check to make sure you have socketed your EPROM correctly. Check for pins bent underneath or out of the socket. Do this with power OFF, and then repeat the test procedure.

Finally, place the TEST/NORMAL jumper back into the NORM position.

Now you are ready to install the PC board back into the case.

a.   Slide the PC board back into the case.

b.   Put the screw back into the regulator and secure it to the case.   DON'T FORGET THIS STEP - THE CASE IS THE HEATSINK.

c.   Now put the bezel and front panel back on, and tighten the screws.   Make sure the front panel is secure.
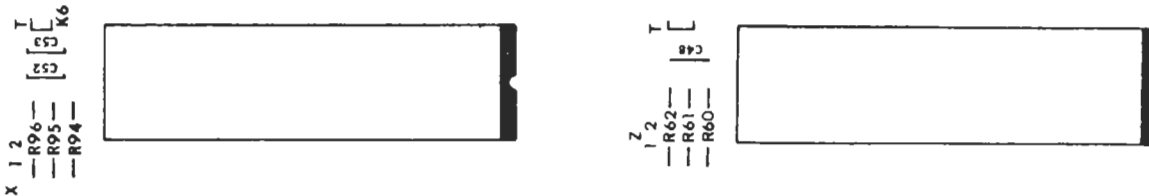
d.   Recable your KAM.

THIS COMPLETES THE INSTALLATION OF THE V2.70 UPDATE.

2.8 UPDATE INSTALLATION INSTRUCTIONS, 12-15-87

Your update kit contains the following items: new program EPROM, 32K expansion RAM (optional), manual addendums, and a summary letter.

INSTALLATION OF THE EPROM IC

1. Remove all cables from the TNC.
2. Using a small Phillips screwdriver, remove the two front panel screws to free the panel and bezel.
3. Carefully remove the front panel and bezel.
4. Note the screw holding the voltage regulator to the metal case. Remove this screw (not applicable to the KPC-4).
5. Slide the PC board out of the case.
6. Locate the IC with the Copyright label (white). Carefully remove this IC, noting its orientation.
7. Install the new EPROM in its place.
8. **KAM AND KPC-4 ONLY.** With the front of the unit facing you, locate the printed-circuit pads marked 'X' (KAM) or 'Z' (KPC-4) to the left of the largest IC (the processor). You'll see 3 pads (holes) with a '1' and '2' printed between them. With an exacto-blade, cut the trace jumper marked '1' and install a jumper between pads at '2'. Be careful to use a low-heat iron. This completes installation of the 512K EPROM.

9. **YOU MUST COMPLETE THIS STEP.** Do not keep the TNC power on for more than a minute or the regulator will overheat. Locate the normal/TEST jumper on the PC board. It should be in the normal position. Pull it off and place it in the TEST position. While the PC board is out of the case, cable it to your computer and add power. Run your terminal program at 300 baud and turn on the TNC. The following should appear on the screen.

        EEPROM INIT OK
        CHECKSUM OK
        RAM OK (with # of bytes)
        REPLACE TEST JUMPER

If you receive this response, then the EPROM is correct, and you are ready to repackage and use your TNC. Otherwise repeat the steps outlined above.

10. **KPC-1 Owners:** If you have a KPC-1 that is at a level below 2.70, then you'll have to make some board modifications prior to installing the 2.8 update. Also, you'll need a 2.70 KPC-1 manual or manual addendum. Please contact the service department.

MAXFAX (tm) = FLEXIBLE WEFAX

MAXFAX-64/128 (tm) AND MAXFAX-PC (tm)

features:
* screen display weather facsimile charts

* store in RAM, then to print or

* store to RAM, then to diskette

* simply MAXFAX, dial what you want!

With EPROM Update 2.8, Kantronics has added a weather facsimile command, WEFAX. Update 2.8 is available for the KAM, KPC-4, KPC-2, KPC-1, and the KPC-2400. In addition, we have on the drawing board two programs to work in conjuction with the KAM or KPCs, MAXFAX-64/128 or MAXFAX-PC. These programs shall be ready by January 1988, or sooner; the first is for the C-64/128 family of computers and the second is for PCs and compatibles. If you use a PC, the CGA (color graphics adapter) is required.

With MAXFAX, you can store the pixel bytes from the KAM or KPC directly in RAM; to the screen for viewing; or from RAM to diskette for transport to a friend's house for printing; or from RAM to your graphics printer. An Epson graphics format is assumed, such as with the EPSON LX-80.

Order MAXFAX today with your EPROM 2.8 update. Each MAXFAX copy comes on diskette and is only $19.95. COME ON! GET THE FAX. Order form below.

2.8 EPROM UPDATE AND MAXFAX ORDER FORM

Check which KPC you have and what you're ordering:

KPC: KAM_____KPC-4_____KPC-2_____KPC-1_____KPC-2400_____

MAXFAX-64/128_____MAXFAX-PC_____

mailing information

name_____
call _____
street _____
city _____
state _____zip_____
day phone (____)_____

send order to:
    Kantronics INC
    1202 E 23rd st.
    Lawrence, KS 66046

payment information

check: VISA___MC___check____
card# _____
exp. date _____

order total $_____
shipping $ 2.50

total cost $_____

2.8 UPDATE FOR KPC-1, KPC-2, KPC-2400, KPC-4, AND KAM

KA-NODE and WEFAX COMMANDS + MORE

12-15-87

Dear KPC or KAM User:

Enclosed you'll find the EPROM and manual addendums for EPROM
update 2.8. This update features new KA-NODE and WEFAX commands.

A **KA-NODE** is used in place of a digipeater to allow for local
acknowledgement of packets. Instead of connecting to a distant
station through a digipeater, you may now link to that distant
station through the KA-NODE, and the KA-NODE manages
acknowledgements from each station locally and separately. No
end-to-end ACKS are sent. In addition, you may "link" through
several KA-NODES to establish a connection. Further, you may
inquire of each KA-NODE about other KA-NODES or stations it has
heard. In effect, you build your own virtual circuit route.
Finally, all packets used by a KA-NODE are pure AX.25; no
overhead is added to any packets.

In addition, UPDATE 2.8 adds the **WEFAX** command. This command
allows all Kantronics TNCs to act as WEFAX (weather facsimile)
demodulators. It just so happens that HF weather broadcasters use
an 800 Hertz shift FSK format which is compatible with the
standard 1200 baud Kantronics Packet Modems. All we did was add
the WEFAX command to allow pixel bytes of data to be sent to your
computer via the RS-232 port. To receive FAX charts then, all you
have to do is run a terminal program that can receive 8-bit ASCII
bytes at 1200 baud (or faster), store them, display them, or
print them in EPSON graphics mode (or equivalent). We will have
two basic MAXFAX programs available soon, one for the C-64/128
and one for PCs and compatibles. However, you might want to roll
your own. An outline on how to do so is enclosed in the WEFAX
addendum section.

A **word about RAM memory required.** We recommend that you install
32K of RAM in your Kantronics TNC if you have not already done so.
All units currently shipped from the factory have 32K installed.
Here is the reason why:

For KPC-2, KPC-2400, KPC-4, and KAM, basic operation must be
supported by about 10K. That leaves around 22K for personal
mailbox and KA-NODE operations. Available RAM is allocated
dynamically with the NUMNODES and PBBS commands. For example, you
may select NUMNODES as 2 and PBBS as 2. These actions will
allocate approximately 9.4K (4.7*2) for two KA-NODE circuits and
2.25K (1.125*2) for a personal mailbox. If you attempt to
allocate more than there is RAM available an "out of range"
response will be issued prompting you to reduce your request.

1

Even though the KPC-1 is no longer produced we support it! If you want to run the KA-NODE, we recommend that you install 32K of RAM. Early KPC-1s were shipped with only 8K; that was the standard of the day! WEFAX can be run with 8K, but not KA-NODE.

Additional Commands. This is the "plus more" part. First, we've added 1800 as a valid baud rate for ABAUD. We've also had several requests from BBS operators to limit relinking and to limit access to the board to one station at a time with the KAM and KPC-4 (dual ports). Due to those requests we've added three new commands: RELINK, MAXUSERS 0/0, and modified the PID filter. RELINK is default on, but with it off a KPC operating AX25v2 does not attempt to automatically reconnect after retrying out. With MAXUSERS set to 0/0, the KAM or KPC-4 will accept only one connect at a time even with both ports active. This makes use of the KAM/KPC-4 with MBL or RLI programs on two frequencies feasible. Also, from a Houston request, we've modified the PID command as follows. PID is default off. When ON, I or UI packets are rejected unless they have a PID of F0 (i.e pure AX.25). Finally, XFLOW had a default of OFF; it is now default ON.

For users of the SUPCALLS and BUDCALLS, you can now change individual entries. Before, you had to retype the whole list; yes we heard you! Delete/add an entry by preceding the callsign with a "-" or "+" respectively. For example, delete WD0EMR by typing BUDCALLS -WD0EMR.

Also, we've added some wrinkles to some of the monitoring modes. < and << characters are used to bracket and denote command and response designators as version 1 or version 2. For example, << RR1 >> denotes a version 2 packet. In addition upper case characters are used to designate commands and lower case characters are used to denote responses for RR, REJ, RNR. For example, <<rr1>> is a response in version 2.

Finally, when you install the 2.8 EPROM, remember to **reinitialize** your KPC by putting the test/normal jumper in the test position, turning the TNC on for a few seconds, and then turning it off. Return the jumper to the normal position and the TNC will be ready for use. If you haven't installed an EPROM IC in your unit before, please refer to the "hard reset" section of your manual. Also refer to the enclosed sheet entitled "Installation of the 2.8 EPROM."

Thanks again for your support. Let is know if you have any great feature ideas that we ought to incorporate next year.

Kantronics Field Support.

KPC and KAM WEFAX RECEPTION

addendum to manual

GENERAL:

Facsimile reception (WEFAX) is available with your TNC **provided** that you have a terminal program for your computer that works in conjunction with it. In WEFAX mode, your TNC samples, on a continual basis, the audio input of your radio at a specified baud rate and presents the sampled data as bytes to your computer at its RS-232 port. The bytes contain a start bit, a stop bit, and 8 pixel bits.

WEFAX terminal programs will be available for the C-64/128 and PCs and compatibles from Kantronics. Perhaps, however, you may wish to write your own FAX reception program. In this case, see the section on "Suggestions for Writing a WEFAX Terminal Program."

BACKGROUND: HF WEFAX TRANSMISSIONS AND RESOLUTION

Many of the weather charts broadcast on HF as WEFAX are hand drawn synoptic maps, i.e. a summary of weather conditions, showing such things as atmospheric pressure and surface temperature over wide areas. Many of these maps show whole continents or oceans. These maps and charts are often produced by a particular weather service at their own HF radio station site. Two predominant stations are NAM, the Norfolk US Navy Fleet Weather Service station, and CFH, the Canadian Forces Halifax station.

Full size charts are eighteen (18) inches wide and vary in length from 10 to 18 inches. In past years, many charts were generated on a rotating drum at 60 scan lines per minute, but modern day charts are digitized (placed in computer storage) at the rate of 120 scan lines per minute on a flat-bed scanner. The scanner digitizes with a resolution of 96 lines or pixels per inch. So, the maximum resolution of a hand-drawn synoptic chart, when digitized, is nearly 1800 by 1800 pixels!

In addition to the temperature and pressure charts, redigitized satellite photos are sometimes transmitted over HF. The sources of most of these satellite weather photos are the National Oceanic and Atmospheric Administration (NOAA) operated weather satellites.

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All "WEFAX" charts and pictures received on HF come from an HF
ground station, not from any of the satellites. As mentioned
above, many stations generate their own weather charts. Weather
photos coming from the satellites are received first by a ground
station, reformatted, and then relayed by telephone line to the
HF transmission site for dissemination.

When the WEFAX maps and charts are transmitted on HF, some of the
resolution is lost. This occurs because the FSK modulation scheme
used by all manufacturers of HF WEFAX transmission equipment
will not support the baud rate needed for full horizontal
resolution. The FSK format has been kept, however, to make
today's equipment compatible with that produced earlier, and
received-map resolution is acceptable.

A typical WEFAX chart is transmitted with an IOC of 576, 120 scan
lines per minute, and with a vertical density of 96 lines per
inch. This format exactly matches the 18 inch standard chart. IOC
is defined by the following formula and is the index of
cooperation.

    IOC = (lines per inch * width of chart)/3.1416

Based on the above, the resolution of a chart received on HF can
be expected to be up to 1800 vertical lines by about 600
horizontal pixels. In effect, the FSK format can support a baud
rate of about 1200. With a scan-line rate of 120 per minute,
two per second, one should expect to receive about 600+ pixels
per horizontal line.

FINDING WEFAX BROADCASTS

There are approximately 50 commercial and governmental WEFAX
transmitters located in over 20 countries around the world. Most
broadcast on HF (between 3 and 30 MHZ). Many broadcast
continually while others are on a sporadic schedule. You will
nearly always find the following if ionospheric conditions
permit:

location	frequencies			
Halifax NS	4271	6630	9890	13510
Norfolk VA	8080	10854		
San Diego CA	8646	17410.5		
Mobile AL	9157.5			
San Fran CA	8682	12730		

In addition, many of the frequency guides for sale by various
radio equipment suppliers list WEFAX station frequencies.

TUNING WEFAX SIGNALS ON HF

As mentioned earlier, WEFAX broadcasters use an 800 Hertz shift
FSK format, using mark and space frequencies of 1500 and 2300
Hertz respectively. These tones, like voice broadcasts, are used
to modulate the station RF carrier. You can tune these signals
with your standard 1200 baud packet modem by tuning **DOWN** 1.7
Kilohertz from the published station frequency in upper-sideband
(USB). For example, with your HF transceiver or receiver set to
USB, turn the dial until the frequency readout shows 8078.3 to
receive NAM (the Norfolk US Navy Fleet Weather Service
transmitting on 8080 Kilohertz).

RECEIVING WEFAX TRANSMISSIONS

The KPC-4 uses port 2 and the KAM uses the VHF port for receiving
WEFAX. You should connect an audio cable from the audio output
jack of your HF receiver to the correct audio input pin of the
KPC-4/KAM to receive the WEFAX signal. At the command prompt
(cmd:) enter the following commands:

        CMD: MAXUSERS 0/1 <CR>
        CMD: WEFAX 1280 <CR>

For all single port TNCs (KPC-1, KPC-2, KPC-2400) simply enter
the following command at the cmd: prompt:

        CMD: WEFAX 1280 <CR>

After entering these commands, you then "boot" your WEFAX
terminal program to begin copying and displaying WEFAX.

THE WEFAX X COMMAND

        WEFAX X

This command will cause the TNC to sample the audio input at X
samples per second. Restrict X to multiples of 160. We suggest
1280. These values keep your TNC in sync with the HF WEFAX
transmitting station. If your WEFAX picture skews, adjust the TNC
clock by using the command DAYTWEAK. The abaud rate of the TNC
must be set so that it is at least twice the WEFAX x rate. This
gives the terminal program time to display or store each pixel
byte and to handle the extra start and stop bits added to the 8
pixel bits/byte (coming at xxxx baud rate). XFLOW may be used
with WEFAX.

To leave the WEFAX mode, just issue a control-C (command
character) to the TNC.

SUGGESTIONS FOR WRITING A WEFAX TERMINAL PROGRAM

Preferences will vary for each WEFAX terminal program writer or user, but the following functions seem appropriate, at a minimum, for enjoyable operation:

WEFAX PROGRAM FUNCTIONS:

1. Be able to display maps and charts on your computer screen as they are being received,
2. Be able to store them as they are being received or after you have taken a look,
3. Be able to print the displayed or stored maps or charts,
4. Be able to clear the screen or map storage area at any time.

What about hardware requirements? First of all, you'll have to have enough computer storage to handle the resolution you want. To save every pixel the HF station sends, you'll need up to 1800 lines by at least 600 pixels, or 135K bytes! However, your screen will not show this much. A PC or compatible in graphics mode can display 200 by 640 pixels, so we suggest that you program to save say 600 of 1800 lines at 640 pixels, or 48K bytes. Then, you'd be saving every third line received and sampling at an incoming bit rate of 1280 (640 by 2, hence the reason for WEFAX 1280).

What about the timing of your program? Generally, interpretive BASIC will be too slow unless you want to limit reception to say one picture at a time. Most advanced basics will allow the allocation of up to 32K of storage in the I/O buffer. Then, as you are displaying incoming WEFAX lines, new data will be slowly accumulating in the buffer. If you don't have your program try to do too much, interpretive BASIC can just make it. Compiled BASIC, C, or assembly language programs, of course, are faster and more preferable.

What about the RS-232 port? When the TNC is set in WEFAX mode, it will send pixel bytes to your computer continually until you send it a control-C or turn it off! When in WEFAX mode, the TNC will do nothing else; it is simply too busy handling all that data. The bytes sent to your computer on the RS-232 receive data line include one start bit, eight pixel bits, and one stop bit. The most significant bit is the left-hand bit for your display. In effect then, if you specify WEFAX 1280, the TNC will send you bytes every 1280/8 or 160/second.

What about printing? We recommend that you use a printer that is EPSON graphics compatible. If you write the program and your printer can handle 600+ pixels per line and at least 32 lines per inch, then it should be capable of printing WEFAX maps and charts.

What about the structure of your program? We recommend that you include a simple terminal program that would be used to place the TNC in and recall it from the WEFAX mode. In addition, we

recommend that you have a software loop that is interruptable by
the arrival of pixel bytes. These bytes would then be stored
and/or displayed in the interrupt routine. Once the bytes are
processed, the interrupt routine would return to the main loop to
await more pixel bytes from the TNC. If you use BASIC, BASICA,
or compiled BASIC, then the ON COM statement is useful.
Look in the manual under trapping.

Good luck and have fun.

KANTRONICS KA-NODE

addendum to manual

GENERAL

The Kantronics KA-NODE configures your TNC so that it may be used as a NODE as well as a personal mailbox, end-user station or gateway (KAM or KPC-4 only). KA-NODE features local acknowledgement of packets, a table of NODES HEARD for manual routing, and utilizes AX.25 unmodified packets, and is fully compatible with any AX.25 TNC.

A KA-NODE operates with commands that are presented to the user similar to those of the Kantronics Personal Packet Mailbox. These commands are BYE, CONNECT, NODES, JHEARD and XCONNECT (KAM and KPC-4 only). Additional commands, as outlined below, allow the TNC owner to configure the node.

You may connect to the KA-NODE, then **query** the nodes heard and stations heard log, **connect** to a distant KA-NODE or other network node, connect to a user, or **leave** the node. In addition, connects between KA-NODES allow "VIAs" or digipeating. Hence, a string of stations can be linked together without all stations being KA-NODES.

CONFIGURING YOUR KA-NODE

The following commands are issued by you, from your keyboard, to establish the conditions under which the KA-NODE will operate. All commands must be entered in Command Mode (at the CMD: prompt).

MYNode (callsign)

Enter up to six characters which will be used as the operating address for your KA-NODE. Use a callsign which is other than that used for MYCALL, MYALIAS, MYPBBS or MYGATE(KPC-4 or KAM only).

NUMNODES n   default 0

This command is used to set the number of allowable circuits through the KA-NODE. For example, if you wish to allow up to 6 simultaneous "circuits" through the node, set NUMNODES to 6. The number allowed will depend upon the amount of RAM available in your TNC. A maximum of 13 are allowed with a KPC-4 with 64K of RAM. If you select n larger than the available RAM will allow, an "out of range" message will be returned to you. Generally, set the amount of RAM required first for your PBBS (personal bulletin board) and then set the desired number of circuits. Approximately, 4K of RAM is used for each circuit.

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NDMon   ON/OFF   default OFF

This command allows you to monitor traffic routed through your node between other stations.

HId   ON/OFF   default OFF

This command is modified to include indentification of nodes and personal mailboxes. If on, an ID packet will be sent every 9.5 minutes PROVIDED THAT packets are being routed through your node or into your PBBS. The ID packet is an unnumbered (UI) packet with data consisting of your station ID as set by MYCALL; the node callsign appended by an "/N"; and the PBBS callsign appended by "/B".

ACTIVATING THE NODE

After turning on the TNC, entering your callsign, allocating PBBS RAM, and obtaining a CMD: prompt, you may allocate RAM for node use. At the CMD: prompt make the following entry:

        CMD:NUMNODES 4 <CR>

When you enter this command, the TNC will reset and any data in storage will be lost. (i.e., messages in your PBBS). The KA-NODE will allocate 4 circuits for connections. You may verify this by again entering the NUMNODES command without a number following it. The unit will respond with the following message printed on your display:

        NUMNODES 4
        CMD:

Next you should enter the callsign or identification for the KA-NODE. In all examples we will identify your node as LAW. At the CMD: prompt enter the following command:

        CMD:MYNODE LAW <CR>

The unit will respond with a new CMD: prompt. Your KA-NODE is now ready for use.

OPERATING FROM THE KEYBOARD, OPERATING COMMANDS

Your TNC configured as a KA-NODE is still useable as a regular TNC, a digipeater, a mailbox, or a gateway (gateway in KAM or KPC-4 only). In other words, you do not have to access your TNC by going through the KA-NODE. KA-NODE operates independently of your MYCALL station and the mailbox. Two additional KA-NODE commands are listed below.

NDHeard
    This command will display the contents of the nodes heard
table. This allows the operator to display a list of KA-NODES
heard at MYNode.

ND X
    X may be any of the 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.

ACCESSING THE KA-NODE THROUGH THE RADIO PORT

    Your KA-NODE can be accessed by another station through a
remote digipeater or another node by use of the standard packet
connect request. The connect request must use the call
established with the MYNODE command. Once connected to the KA-
NODE the following commands are used:

Bye
    This command will cause the KA-NODE to initiate a
disconnect.

Connect callsign
    This command will cause the node to issue a connect request
to "callsign" in the usual AX.25 mode. If the connect is
successful, a link will be made to the next node or end-user
station.

Nodes
    This command will cause the node to return a list of the
last 16 different KA-NODES it has heard to your TNC.

XConnect callsign (KAM & KPC-4 only)
    This command will cause the node to issue a connect request
to "callsign" in the usual AX.25 format from the node but uses
the other port of the KA-NODE. Cross-connecting enables you to
gain access via the node to another frequency.

Jheard
    This command will cause the KA-NODE to transmit its TNC
MHeard log. The format of this list is:

```
    (KAM or KPC-4 only)                      (KPC-1,2 or 2400)
 LAWKAN/1 *   01/09/88   08:25:15     LAWKAN    01/09/88 08:25:15
 N66046/2     01/10/88   00:03:10     N66046*   01/10/88 00:03:10
 WA5RGU-3/1   01/10/88   00:03:19     WA5RGU-3  01/10/88 00:03:19
 WD0EMR/2     01/10/88   00:04:15     WD0EMR    01/10/88 00:04:15
```

The left column indicates the callsign (and SSID if appropriate)
of a station heard. The number following the slant bar (/) shows
the port on which the station was heard, if both ports are
active. The asterisk indicates the station was heard via a
digipeater. The center and right columns indicate date and time the
station was last heard. In both cases, the last call on the list

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will be that of the connecting station. The above Jheard lists
show WD0EMR connecting to the KA-NODE and requesting the node's
jheard log.

OPERATING VIA THE RADIO PORT

To use the KA-NODE as a means of connecting to some
other node or end-user, you must first connect to the
KA-NODE. At the CMD: prompt on your TNC, issue a connect request
to the callsign of the KA-NODE, let's say LAW. When you make
connection you will see the following messages on your display:

```
*** CONNECTED TO LAW
### CONNECTED TO NODE LAW (mycall of node) CHANNEL A
ENTER COMMAND BYE, CONNECT, JHEARD, NODES, XCONNECT
>
```

LAW names the KA-NODE, mycall is the call of the station
that contains the KA-NODE, and CHANNEL A indicates that you have
channel A. If A is in use, you may obtain channel B. The
channels, or circuits, are assigned by the node as needed, and
the maximum number allowable are set by the NUMNODES command at
the node. If all channels are busy you will receive a busy
message. At this point, you may still have the option to digipeat
via the node callsign.

After connecting to the KA-NODE, you are in CONVERS mode at
your own station, but the KA-NODE is waiting for a command. You
issue a command to the node by STAYING IN CONVERS MODE. The KA-
NODE will interpret your data as its command. It can receive only
commands; it doesn't know what data is. At this point, let's
assume that you wish to know what other KA-NODES are nearby.
Issue the NODES COMMAND by typing N, or Nodes, in response to
the above KA-NODE "enter command" prompt:

N

You will receive a list of the last 16 different KA-NODES
heard. For example, let's suppose that KC was heard by LAW. Your
list received from the N query would be:

```
KC 12/23/87 02:38:45
ENTER COMMAND BYE, CONNECT, JHEARD, NODES, XCONNECT
>
```

KC denotes the MYNODE callsign, followed by date and time
heard. If LAW had heard nothing, it would respond with:

NO KNOWN NODES

You may also query the node using the Jheard command. The node
will respond by listing its own MHeard log. This is basically a
remote MHeard command. The list can contain both end user and
node callsigns.

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At this point, let's suppose that you would like to connect to the node called KC through your current connection with LAW. Just issue a connect request to KC as follows in response to the "enter command" from LAW:

CONNECT KC

The response will be:

```
###LINK MADE
###CONNECTED TO NODE KC (MYCALLSIGN OF KC) CHANNEL A
ENTER COMMAND BYE, CONNECT, JHEARD, NODES, XCONNECT
>
```

At this point you are "patched" through the KA-NODE LAW to the KA-NODE KC. When LAW issued the connect request to KC it used your own call, MYCALL, but subtracted a count of one from your SSID. For example, if you connected to LAW with W0XI, LAW connected, via your request, to KC with W0XI-15. This is automatic. At this point, you could connect to another KA-NODE, some other network node using AX.25 as an uplink or downlink protocol, or to an end-user. Let's assume that you desire to connect to N0APJ. So, just enter in response to the node "enter command" above

C N0APJ

and you'll get the response

```
###LINK MADE
```

You are now connected to N0APJ.

LOCAL ACKNOWLEDGEMENTS, HIGHER THROUGHPUT

Now that you are connected to N0APJ, you can carry on a normal packet QSO. While everything appears "normal" and AX.25 compatible, acknowledgements to your packets are generated by the KA-NODE directly connected to you. Each channel in the link takes care of its own errors. In other words, the link between KC and LAW handles its own error checking. In this way, one weak link will not cause end-to-end packets and acknowledgements to be repeated as they would with digipeating. The result is SUBSTANTIAL IMPROVEMENT IN THROUGHPUT for connections using nodes.

When it comes time to disconnect, you do so in the standard AX.25 manner. To disconnect the link described above, type control-C, obtain the CMD: prompt on your TNC, and issue the disconnect command:

```
CMD: D
***DISCONNECTED
```

You'll get the usual disconnect message from your TNC as
noted. If however, your distant partner, in this case N0APJ,
disconnects the link, you'll see the following:

        ###DISCONNECTED AT NODE KC
        ###DISCONNECTED AT NODE LAW
        ***DISCONNECTED

AUTOMATIC DISCONNECT

        If a user abandons a connection to a KA-NODE or a link between
two KA-NODES without disconnecting and there is no activity
through the link for 4 minutes, the node will initiate a
disconnect.

STATUS COMMAND

        In Kantronics TNCs with the KA-NODE installed,
the status command will list not only the status of all
streams but also the status of the channels in use by the
node. For example if port 1 of a KPC-4 is acting as a KA-NODE
connecting W0XI and N0APJ together, a status command will list:

        A/1 stream I/O CONNECTED
        Ain/1 connected to W0XI
        Aout/1 connected to N0APJ

USING THE XCONNECT COMMAND (KAM & KPC-4 only)

        The cross-connect (XCconnect) command is a unique feature of
the KA-NODE. This command allows cross linking between two
frequencies through the node in much the same manner as the
Kantronics unique "Gateway" command, but with local
acknowledgement of packets.

For example, suppose you just connected to node LAWKAN and wish
to cross-connect to WD0EMR whose station is tuned to the
frequency of the other port of the node. Just issue XC WD0EMR
following the the node prompt:

        ENTER COMMAND BYE,CONNECT,JHEARD,NODES, XCONNECT
        >XC WD0EMR <CR>
Response:
        ### Link MADE
        ### CONNECTED TO WD0EMR

6

You can also determine from the response to Node command
which port a station is on. Below is an illustration of a KA-
NODE response to a node heard query:

```
LAWKAN       *  12/02/87   15:45:00
N66046      /X  12/02/87   15:49:15
OLAKAN      /X  12/02/87   16:15:21
```

In this typical display the callsign of the node is given,
followed by the date and time it was last heard. The slant bar X
(/X) indicates that the node was heard on the **port opposite** the
one you are connected on. The asterisk (*) means that the node
was heard via a digipeater.

DETERMINING WHICH PORT YOU HAVE CONNECTED TO

When you are connected to a KPC-4 or KAM node, you can
determine which port you are on, at the node, by using the Jheard
command. A typical node response to the Jheard command may
appear on your display as shown:

```
N66046/2*        12/01/87   14:32:69
WA5RGU-1/1       12/01/87   16:25:01
W0XI/2           12/02/87   16:28:05
WD0EMR/1         12/02/87   16:32:09
```

In this illustration the number following the slant bar (/)
indicates the port the station was heard on. **Your Callsign** will
always be the last one in this list.

You can now see that by comparing the port on which your
call appears in the Jheard list to the port indicated for other
stations, you may connect or cross connect to the station of your
choice.

Again, good luck and have fun!

COVER LETTER FOR THE 2.83 ADDENDUM

Due to the complexity of some of our updates and the fact that
different units require different modifications, Kantronics found
it helpful to briefly summarize the information you need to know
in order to install your new EPROM, PROM or RAM. Before
beginning, locate your unit and current firmware level in the
list below. Follow the directions stated for successful
installation of the 2.83 firmware.

KPC-1   **LEVEL 1.5 THROUGH 2.4M**
           Follow the instructions for installation of the update
           kit in the 2.70 manual. Those instructions are on page
           1 following the pink sheet in the manual. Substitute
           the number 2.83 where you see 2.70.

           LEVEL 2.7 THROUGH 2.82
           Follow the installation instructions beginning on page 8
           of the 2.83 addendum.

KPC-2   **ALL LEVELS**
           Follow the installation instructions beginning on page
           8 of the 2.83 addendum.

KPC-2400   **ALL LEVELS**
           Follow the instructions beginning on page 8 of the 2.83
           addendum.

KAM   **LEVEL 2.0 THROUGH 2.70**
           Follow the installation instructions on page 1 of the
           2.80 addendum (12-14-87). A board modification is
           required for units at this level.

           LEVEL 2.80 THROUGH 2.82
           Follow the installation instructions beginning on page 8
           of the 2.83 addendum.

KPC-4   **LEVEL 2.0 THROUGH 2.70**
           Follow the installation instructions in the 2.80
           addendum. A board modification is required for units
           at this level.

           LEVEL 2.80 THROUGH 2.82
           Follow the installation instructions beginning on page
           8 of the 2.83 addendum.

NOTE FOR ALL UNITS:
Installation of the Battery Backup Option is covered in the 2.83
addendum. If you are installing the battery backup, you will
need to refer to steps 6 and 7 on page 8 of the 2.83 addendum.

BATTERY BACKUP OPTION FOR KPCs and KAM

and FIRMWARE LEVEL 2.83

April 1, 1988

CONTENTS:

1. Overview

2. New Commands, Firmware Level 2.83:

        CONList   on¦off
        K   =CONVers
        MORse   code, TX, RX
        MHeard   [S¦L]
        NDHeard   [S¦L]
        NText   message
        PBSend   call, subject
        PROSIGN   default $5C
        PText   message
        WText   message

3. New Personal Mailbox and KA-NODE Directives:

        Jheard   [S¦L]
        Nodes   [S¦L]
        Help

4. New Morse (CW) Directives:

        prosign   '\'
        CTRL-C L   lock xmit speed
        CTRL-C U   unlock xmit speed

5. Specific Firmware Changes:

        AMTOR   selcal by #
        AMTOR   'who are you' operation
        Battery Backup automatically compatible
        HBaud   port 2, KAM
        KAM/KPC-4   HF streamsw '@" now '~'
        KA-NODE   prompt change '?'
        KA-NODE   timeout to 15 minutes
        PBBS   subject field added
        PBBS   contents protected

6. Installation of 2.83 EPROM and Battery Backup Socket

1. Overview:

Update 2.83 consists of new firmware for all Kantronics packet units (KPC-1, KPC-2, KPC-2400, KPC-4, and the KAM) and can include an optional battery backup socket. The new firmware includes ten new or changed commands, three KA-NODE directives, three Morse directives, and a number of minor changes involving AMTOR, stream-switching, KA-NODE operation and personal mailbox contents protection.

The optional battery backup socket provides for protection of RAM contents during a power failure or while power is turned off. The socket includes a sealed 70ma-hour battery which will hold static RAM contents (RAM chip 62256) for up to 4 years. Lifetime of the battery could be somewhat shorter.

The major firmware changes include permable sign-on texts for the personal mailbox, KA-NODE and AMTOR who-are-you response; a presentation of digipeater paths in response to a Nodes or Jheard directive to 'see' routing; and Morse operation enhancements. The sign-on texts are similar to BText and CText.

READ THIS:

If your unit is already at firmware level 2.82, then you will have to change only the EPROM to have level 2.83. The optional battery backup socket must be used in conjuction with firmware level 2.83. If your unit is below level 2.82, then you may have additional modifications or additions to make. See the cover letter. If you add battery backup for your RAM, the EEPROM used for parameter storage is ignored and may be left in or removed.

The new commands, directives, and installation instructions for firmware level 2.83 follow.

2. New Commands, Firmware Level 2.83:

The following commands are new or have been changed at level 2.83. Parameters enclosed with square brackets, [ ], are optional. Character parameters are denoted between apostrophies, for example '?'.

CONList   ON¦OFF   default off
> When ON, the unit will recognize only those packets received with a callsign that also appears in the BUDCalls list. All other packets are ignored.

K   =CONVers
> This single letter command is synonymous with CONVers. It is included as a single-keystroke convenience for entering Convers Mode.

MORse   code, TX, RX   (KAM only)

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 2 alpha characters.

This command is used to define the desired keyboard character, and display character(s) for each code listed in the table below. Only those codes listed may be defined using the MORse command.

For example, suppose you wish to define the 'wait' code *-*** by the keystroke '!' and wish received 'wait' codes to display 'AS'. You would enter:

    cmd: MORSE *-***, $2A, $4153.

Refer to your computer manual for a listing of hex codes if needed. Codes available for definition are:

MORSE

CODE	TX	RX	CODE	TX	RX
**--	$00	$00	*-*-	$2A(*)	$4141(AA)
---*	$00	$00	----	$00	$00
***-*	$21(!)	$534E(SN)	**-**	$00	$00
**-*-	$00	$00	**--*	$00	$00
*-***	$25(%)	$4153(AS)	*-**-	$00	$00
--*	$2B(+)	$4152(AR)	*-*--	$00	$00
*--**	$00	$00	*--*-	$00	$00
---	$00	$00	-**-*	$2F(/)	$2F(/)
-**--	$00	$00	-*-**	$00	$00
-*-*-	$26(&)	$4B41(KA)	-*--*	$28(()	$28(()
-*---	$00	$00	--**-	$00	$00
--*-*	$00	$00	--*--	$00	$00
---*-	$00	$00	***-*-	$23(#)	$534B(SK)
*-***-	$00	$00			

If SCREEN is set to a value from 1 to 60, the above table will be displayed in one instead of two columns.

MHeard   [S¦L]

This command causes display of a list of stations heard. An asterisk, *, indicates that the station was heard through a digipeater. The time the station was last heard is also displayed. If the S option is evoked, i.e. MHeard S, then only the callsigns of the stations heard will be displayed.

If the L option is selected, all callsigns contained in the received packet are displayed. For example:

    WD0EMR > ID   date   time
         VIA TOP, KSBRE, W0XI, SUTNE

Here, your station heard WD0EMR transmitting an ID packet. WD0EMR was also using the digipeating path TOP, KSBRE, W0XI, SUTNE. If your station heard WD0EMR via one of these other stations, an asterisk would show by its call or alias.

NDHeard   [S¦L]
     This command causes display of the contents of the nodes
heard table, a list of KA-NODES heard. NETROM (1) nodes
heard are also added to the list with firmware level 2.83. NETROM
nodes are identified as

     'Network' (MYCALL) or
     'ALIAS ' (MYCALL) if an alias is used.
     (1) NETROM is a trademark of Software 2000.

The S and L options are like those used in MHeard, see above.

NText   message   default blank
     Enter any combination of characters and spaces up to a
maximum length of 128. Entering a single '%' will clear NText.
This entry specifies customized text sent with the initial KA-
NODE sign-on message.

PBSend   call, subject   (message request follows)
     This command is used to enter messages into the personal
mailbox from your keyboard. Firmware releases prior to 2.83
limited messages to 256 characters. You may now enter larger
messages but you must delimit each set of 255 characters by a
carriage return, <CR>, otherwise, your computer may hang,
depending on your terminal program. The 255 limitation includes
the characters of the command.
     The command is also changed in that you must now enter a
subject field for the message. To execute this command, enter
PBSend call, subject   followed by a carriage return first; you
will then be prompted to enter the message. For example:

     cmd: PBSend N0APJ, NEW RADIO <CR>
     msg: BUD, I HAVE A NEW HT-110 KANTRONICS RADIO <CR>
     msg: MORE MESSAGE <CR>
     msg: /EX or CTRL-Z and <CR> .....to end message
     cmd:

PROSIGN   default $5C (\)
     This command defines the prosign directive used during CW
operation. See New Morse Directives.

PText   message   default blank
     Enter any combination of characters and spaces up to a
maximum length of 128. Entering a single '%' will clear PText.
This entry specifies the customized text sent with the initial
PBBS (personal mailbox) sign-on message.

WText   message   default blank
     (KAM only). Enter any combination of characters and spaces
up to a maximum length of 128. Entering a single '%' will clear
WText. This entry specifies the text to be sent in response to a
WRU command while in AMTOR (ARQ) Mode only. A FIGS (figures
character) followed by the letter D (5-bit code) is generally
used as the WRU character, or use CTRL-W.

3. New Personal Mailbox and KA-NODE Directives:

A directive is a data mode command; that is, a directive is a command issued while in a data mode such as CONVers.

Jheard   [S¦L]

This directive will cause the KA-NODE or PBBS to transmit its MHeard log. See MHeard command. If the S option is selected, only the callsigns of the log are transmitted. If the L option is selected, then the total path stored in the MHeard log of the other station is passed to you, including VIA paths (see the MHeard command). Paths will, of course, be provided only by Kantronics TNCs at or above level 2.83.

Nodes   [S¦L]

This directive will cause the *connected to* node to return a list of nodes heard, including KA-NODES and NETROM nodes (1). See the NDHeard command regarding the S and L option formats. For example, if you are connected to a second KA-NODE through an intermediate KA-NODE, you will receive the nodes heard of the second KA-NODE.
(1) NETROM is a trademark of Software 2000.

Help

Help is a new directive added to both KA-NODES and PBBSs. When a connect to a KA-NODE or PBBS is successful, a list of directives will be delivered to the connecting station. For example, with a KA-NODE:

```
###CONNECTED TO NODE mynode (mycall of node) CHANNEL A

ENTER COMMAND: BYE, CONNECT, HELP, JHEARD, NODES
?H
B(ye)   NODE WILL DISCONNECT
C(onnect) callsign  CONNECT TO ANOTHER NODE OR END USER
J(heard)  LIST OF HEARD CALLSIGNS WITH DAYSTAMP
J(heard) S(hort)  LIST OF HEARD CALLSIGNS ONLY
J(heard) L(ong)   LIST OF HEARD CALLSIGNS WITH DAYSTAMP AND VIAS
N(odes)  LIST OF HEARD NODE CALLSIGNS WITH DAYSTAMP
N(odes) S(hort)  LIST OF HEARD NODE CALLSIGNS ONLY
N(odes) L(ong)   LIST OF HEARD NODE CALLSIGNS WITH DAYSTAMP AND VIAS
ENTER COMMAND: BYE, CONNECT, HELP, JHEARD, NODES
?
```

4. New Morse (CW) Directives:

PROSIGN   default '\' $5C

When the prosign directive '\' is entered during CW transmission or within text to be used for CW transmission, it will cause the NEXT TWO CW 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'.

CTRL-C L   the xmit lock directive

Entering this combination during CW operation will cause the CW transmit speed to be set to the receive speed at that moment. The directive also disables autotracking of received CW speed.

CTRL-C U   the xmit unlock directive

Entering this combination during CW operation will unlock the CW transmit speed set by CTRL-L and will enable, once again, the autotracking of CW received speed.

5. Specific Firmware Changes with 2.83:

The following list of changes have been implemented at level 2.83:

AMTOR	selcal by #
AMTOR	WRU operation
Battery	backup, automatically compatible
HBaud	VHF port, KAM
KAM	HF streamsw '@' changed to '~', the tilde
KA-NODE	prompt changed to '?'
KA-NODE	timeout is now 15 minutes
PBBS	subject field added
PBBS	contents preserved after changing numnodes, pbbs, maxusers, or reset

AMTOR selcal by #

You may now enter a 4 or 5-digit number when calling in ARQ or FEC, (KAM only).

AMTOR WRU operation

The KAM now supports WRU operation. See the WTEXT command.

Battery Backup, Automatically

Firmware level 2.83 supports the later addition of battery backup but can be used without it. The backup option, however, requires that the 2.83 firmware be installed.

KAM HF Streamsw change

The default value for the HF streamsw character has been changed from '@' to '~', the tilda.

KA-NODE prompt change

The prompt that appears after sign-on with a KA-NODE has been changed from the '>' to a question mark '?'.

KA-NODE timeout change

The timeout for a KA-NODE has been changed from 4 minutes with no activity to 15 minutes with no acitvity.

PBBS subject field added

A subject field has been added to messages for personal packet mailbox operations (PBBS). A listing will now show call and subject.

PBBS contents preserved

Prior to firmware level 2.83, execution of the NUMNODES or PBBS command would destroy existing messages in the PBBS. With firmware 2.83, messages are protected when NUMNODES is used. If the PBBS command is used, existing messages are protected (if you allocate sufficient memory for these messages.)

Hbaud n   default 1200

This command was added at level 2.82 but never documented for the KAM. n may be set to a rate of 300, 400, 600, or 1200. This baud rate specifies the rate of data exchange between the radio stations. The value of Hbaud has NO relationship to the terminal baud rate selected by ABaud. In order to communicate with other packet stations, the baud rate must be the same at each end of the link. As a general rule, 300 baud is used on frequencies below 28Mhz, 1200 baud is used at frequencies above 28Mhz.

Japanese version of firmware 2.83

Special Japanese characters are sometimes stored in the CTEXT message which is presented initially upon a connection. These special characters use all eight bits, and the usage of these 8 bits is affectd by the amount of EEPROM available in the unit.

If only one 2404 EEPROM is present, PERM will truncate TEXT message bytes to 7 bits before putting them in the EEPROM. If 2 2404s are present, all 8 bits are saved. However, with battery backup installed and the EEPROMS removed, all 8 bits are preserved.

5. Installation of 2.83 Firmware and the Battery Backup Option:

2.83 firmware may be installed without the battery backup socket, but battery backup requires 2.83 firmware. 2.83 firmware is installed by removing the old EPROM or PROM and replacing it with the new 2.83 EPROM or PROM. The battery backup socket is installed by removing existing RAM, plugging the socket in where the RAM was, and then inserting a static RAM into the battery backup socket.

READ THIS: The 32K RAM chip used with the socket must be a 62256 (static RAM). *Wait at least one second when turning the unit OFF and then ON again during operation. The firmware requires this to automatically check for battery backup.*

Installation:

1. Turn your KPC or KAM off and remove all cables.
2. Using a Phillips screwdriver, remove the two front panel screws and panel.
3. **NOTE THE SCREW ON THE VOLTAGE REGULATOR ATTACHED TO THE CASE**, except KPC-4. Remove the screw before proceeding.
4. Slide the PC board out of the case.

Note: The EPROM, PROM, and RAM chips have a dimple on one end. Make sure the new memory chips and battery backup socket are installed with their dimples in the same direction as those removed.

5. Locate the EPROM or PROM firmware chip according to the table below. Replace it with the 2.83 EPROM or PROM.

6. (Optional Step for RAM only or RAM and battery backup installation:)
   To fully utilize the features of firmware 2.83, we advise that you have or install 32K of RAM. Your unit may currently have anywhere from 8K to 32K of RAM, pseudo-static or static, installed in one or two sockets as per the table below. If you are installing just the 2.83 firmware, then 32K of pseudo-static RAM may be retained. If you are installing the battery backup socket, then all pseudo-static RAM must be replaced with static RAM (62256).

   If you are installing the battery backup socket, remove the existing RAM chips now, and install the socket as per the table. Then place the static RAM in that socket.

7. (Step for KPC-4 or KAM owners only) If you are installing level 2.83 and have NOT installed level 2.82, then you must complete step 8 of the 2.82 installation instructions. This consists of changing a jumper on the pc board to accommodate a 512K EPROM.

8. (Optional step for KPC-4 owners only) If you desire 64K of backed-up RAM, you must install two battery backup sockets, each one with 32K of RAM. These install in RAM-A and RAM-B (see table below). The unit will not accept a backed up RAM in one socket and a non-backed up RAM in the other socket.

9. You **must complete this step.** Perform a *hard reset* on the unit. This is outlined as step 9 in the atttached 2.82 installation instructions. If you have installed the battery backup and removed the EEPROM chip(s), then you will receive an EEPROM init error. Disregard this message. When a battery backup socket is installed, the firmware ignores the EEPROM(s).

10. We acknowledge that these instructions are 'IRS' like and are happy to help you if necessary. Service is available between 9AM and noon, and 1 PM to 5 PM, CST, at (913)-842-4476.

EPROM AND RAM CHIP LOCATION TABLE

unit	EPROM	EEPROM	RAM-A	RAM-B
KPC-1	U-4	U-7	U-5*	U-6
KPC-2	U-9	U-12	U-11*	U-10
KPC-2400	U-15	U-18	U-13*	U-14
KPC-4	U-14	U-16	U-10#	U-12
KAM	U-22	U-25	blank	U-21

* empty when 32K installed in other socket
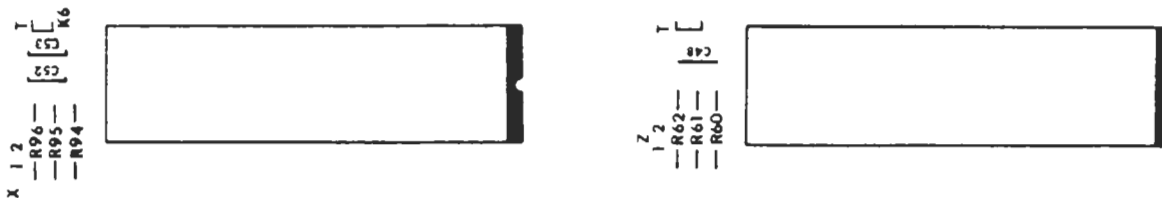\# 32K expansion to 64K only
   the backup socket goes in RAM-B.

2.8 UPDATE INSTALLATION INSTRUCTIONS, 12-15-87

Your update kit contains the following items: new program EPROM, 32K expansion RAM (optional), manual addendums, and a summary letter.

INSTALLATION OF THE EPROM IC

1. Remove all cables from the TNC.
2. Using a small Phillips screwdriver, remove the two front panel screws to free the panel and bezel.
3. Carefully remove the front panel and bezel.
4. Note the screw holding the voltage regulator to the metal case. Remove this screw (not applicable to the KPC-4).
5. Slide the PC board out of the case.
6. Locate the IC with the Copyright label (white). Carefully remove this IC, noting its orientation.
7. Install the new EPROM in its place.
8. **KAM AND KPC-4 ONLY.** With the front of the unit facing you, locate the printed-circuit pads marked 'X' (KAM) or 'Z' (KPC-4) to the left of the largest IC (the processor). You'll see 3 pads (holes) with a '1' and '2' printed between them. With an exacto-blade, cut the trace jumper marked '1' and install a jumper between pads at '2'. Be careful to use a low-heat iron. This completes installation of the 512K EPROM.

9. **YOU MUST COMPLETE THIS STEP.** Do not keep the TNC power on for more than a minute or the regulator will overheat. Locate the normal/TEST jumper on the PC board. It should be in the normal position. Pull it off and place it in the TEST position. While the PC board is out of the case, cable it to your computer and add power. Run your terminal program at 300 baud and turn on the TNC. The following should appear on the screen.

        EEPROM INIT OK
        CHECKSUM OK
        RAM OK (with # of bytes)
        REPLACE TEST JUMPER

If you receive this response, then the EPROM is correct, and you are ready to repackage and use your TNC. Otherwise repeat the steps outlined above.

10. **KPC-1 Owners:** If you have a KPC-1 that is at a level below 2.70, then you'll have to make some board modifications prior to installing the 2.8 update. Also, you'll need a 2.70 KPC-1 manual or manual addendum. Please contact the service department.

4.0 Update Cover Letter

Congratulations on your decision to update your Kantronics KAM to the new version 4.0 EPROM. This version enhances the Host Mode to include support for RTTY, ASCII, AMTOR, CW and NAVTEX, and includes update pages to be inserted into your Kantronics Manual Set.

This enhanced Host Mode will allow specially written terminal programs to operate both VHF packet and simultaneously operate HF RTTY, ASCII, AMTOR, CW, or Packet, or receive NAVTEX/AMTEX transmissions. Kantronics has the Host Master II software available for PC compatible computers to provide such operation.

Please follow the instructions contained with this package CAREFULLY and STEP BY STEP.

Updating Your Manual Set

The pages supplied with this update EPROM are replacement pages to the Kantronics Manual Set, version 2.85, first printed in February, 1989 and updated by the version 3.0 manual addendum. We suggest that you read this new material before inserting it into your manuals so you will be familiar with all of the changes.

To update your Manual Set, remove the pages indicated below and replace them with the pages shown. Note that there are three manuals, and this update changes only the Operations Manual.

Operations Manual

Remove pages	Insert new pages
30 A & B	30 A, B, C, & D

Installation Instructions

Updating you Kantronics KAM to the new version 4.0 EPROM is easy. Just follow these instructions carefully and you should have no problems with the installation. Before you begin, you should determine the current version level of the firmware in your KAM. To find this version number, start your terminal program and obtain the cmd: prompt from your KAM in the usual manner. Then type RESET and press return. You should see a sign-on message with the version number included:

KANTRONICS ALL MODE COMMUNICATOR version 2.82.

If you do not see this message, you may determine the level from the white sticker (Copyright notice) affixed to the top of your currently installed EPROM when the unit is disassembled.

Please be sure to follow these instructions PRECISELY.

1. Turn off power to your KAM and remove all cables from the unit.

2. Using a small Phillips screwdriver, remove the two front panel screws just far enough to free the panel and the bezel.

3. Carefully remove the front panel and bezel.

4. Note the screw holding the voltage regulator to the metal case. Remove this screw.

5. Slide the PC board out of the case.

6. If your current version of the KAM EPROM is below 2.8, perform the following board modification. Skip this step if your current version is 2.8 or higher.

With the front of the KAM facing you, locate the printed circuit pads marked X to the left of the largest IC (the processor). You'll see 3 pads (holes) with a "1" and "2" printed between them. With an exacto blade, cut the trace jumper marked "1" (between the center pad and the pad closest to the front of the KAM) and install a jumper between pads at "2". Be careful to use a low-heat iron. It is recommended that you place the jumper on the back of the board. (The jumper should now be installed between the center pad and the pad closest to the rear of the KAM.)
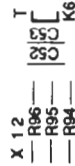
7. Remove the EPROM in socket U-22 and replace it with the version 4.0 EPROM, being careful to insert the new EPROM with pin 1 oriented as the old EPROM currently is installed.

8. Perform a hard reset on the KAM. To perform a hard reset, first DO NOT KEEP THE KAM POWER ON FOR MORE THAN A MINUTE OR THE REGULATOR WILL OVERHEAT. Locate the normal/test jumper on the PC board. It should be in the normal position. Pull it off and place it in the TEST position (center post and T). Cable the PC board to your computer while the board is still out of the case. Set your terminal program to 300 baud and turn on the KAM. The following message should appear on the screen:

EEPROM INIT OK
CHECKSUM OK
RAM OK (with # of bytes)

If you receive this response, then the EPROM is properly installed. Move the normal/test jumper back to the NORMAL position and you are ready to reassemble your KAM. Otherwise recheck your steps above and repeat them if necessary. If you receive a message to "Check 512K mod" recheck your modification to the circuit board performed earlier. NOTE: This mod is only required if you are updating from a version earlier than version 2.8.

9. Carefully re-insert the PC board into the case.

10. Secure the voltage regulator to the case using the screw removed in step 4.

11. Carefully replace the front panel and bezel, insuring that the LEDs align with the slots in the front panel. Using a small Phillips screwdriver, secure the front panel with the two mounting screws.

12. Reconnect the cables to your KAM.

This completes the installation of your 4.0 upgrade.

Kantronics Host Mode Operation

To operate in the Host Mode with a Kantronics TNC you must first set the INTFACE command to HOST. After this is set, it will be necessary to perform a soft reset to enter the Host Mode. This may be accomplished by typing RESET at the cmd: prompt. If you want the TNC to always operate in the Host Mode, be sure to give the command PERM. You will also need to set the ABAUD command to the appropriate baud rate for your terminal. If the ABAUD command is not set, the TNC will run its normal autobaud routine, looking for an asterisk (*) from the keyboard. When the asterisk is entered, the TNC will then immediately enter Host Mode. While operating Host Mode, your program must use hardware flow control (RTS/CTS). Software flow control is not possible in Host Mode.

Communication Format

Host computer to TNC

Communication from the host to the TNC must occur in blocks. The block of data is delimited with a FEND character ($C0) at the beginning and end. If the FEND character appears within the block as valid data, the host must replace this character with a special sequence, consisting of a FESC ($DB) followed by a TFEND ($DC). One other special sequence may be required in the event a FESC ($DB) character is required in the data field. This is accomplished by the special sequence of a FESC ($DB) followed by a TFESC ($DD). These special sequences are the same used in the KISS code, as implemented by Phil Karn, KA9Q.

After the opening FEND, the next character is the command byte and will indicate the type of command being given to the TNC. The permissible characters in the command byte are C, D, or Q. For the KAM only, there are some other combinations used for non-packet HF mode operation. These will be covered later.

A 'C' command byte indicates a command that the TNC will interpret as if it were in the Command Mode. If the command byte is a 'D', the TNC will consider the data as data to be transmitted on the specified port and stream. The letter 'Q' in the command byte will cause the TNC to exit the Host Mode and return to Terminal Mode.

The next byte is the port byte. This byte must be used with every block of type 'D' to signify which port (1 or 2) is to be used for transmission of the data. Type 'C' blocks must always specify this byte as either a 1 or 2, but this is only used on those commands that are specific to a port. This would include the CONNECT and DISCONNECT commands. When using the KAM, the VHF port is selected by a port byte of '1' and the HF port is '2'. Single port units use port byte '1'.

The fourth byte is the stream byte. This byte determines which stream (A-Z) the TNC will use for the data. If the stream byte is 0 for a data packet (command byte D), the data will be sent out UNPROTO. (See the section on the KAM HF modes for more information.) For commands that do not involve a specific port or stream, the port and stream bytes are ignored, but must be specified. In these cases, you should address port 1 stream A.

After these four header bytes, the structure of the block for a command is exactly the same as if you were entering the command from the Terminal Mode of the TNC. If entering data to be transmitted, simply place the data in the following bytes. Note that commands do not need a carriage return included in the data portion of the packet.

After the data or command, terminate the information from the host with a FEND ($C0) character.

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Operations Manual

KAM HF Modes

When operating non-packet modes (i.e., RTTY, ASCII, AMTOR, or CW) with the KAM, a few additional host to TNC frames are required. First, select the mode with the standard command structure as described above (e.g., FEND C2ARTTY 75 FEND). Data that you wish to transmit to the other station should have command byte 'D', port byte '2', and stream byte '0'. Special host frames for these modes are:

FEND T FEND	Enter transmit mode
FEND E FEND	Enter receive mode when buffer empty
FEND R FEND	Enter receive mode immediately
FEND X FEND	Return HF port to packet mode
FEND CTRL-X FEND	Clear the transmit buffer in KAM HF

TNC to Host Computer

Communication from the TNC to the host also occurs in blocks which are delimited at beginning and end with FEND characters ($C0).

After the beginning FEND, the next character is the status byte. A status byte 'C' is a response to a command from the host with the command byte 'C'. A status byte of 'D' indicates that the data was received on a connected stream (See the section below on the KAM HF operation). 'M' in the status byte means that the data in this block is the result of the monitor commands.

A status byte of 'S' is a status message caused by a change in the link state. Such messages include the *** CONNECTED TO, *** DISCONNECTED, and FRMR sent. A special 'S' block of data consists of two FEND characters, the characters S00 and another FEND character. This indicates that the TNC has performed a soft reset, and all existing connections (if any) are no longer valid. This is equivalent to the TNC having just been turned on. A data block with the status byte 'R' is a *** CONNECT REQUEST. A block with status byte 'T' is the result of the TRACE command. Port and stream bytes (defined below) are valid for 'D' and 'S' blocks, but only the port byte is valid for 'T', 'M', and 'R' blocks.

The port byte follows the status byte, and will contain the port number the specific information is from. This will be a '1' if the TNC is in single port operation, or a '1' or '2' if in dual port operation. When using the KAM, the VHF port is indicated by a port byte of '1' and the HF port is '2'. Single port units use port byte '1'.

The stream byte follows the port byte. The stream byte will be 'A' - 'Z' for data on the connected streams. Data being sent to the host which is not connected data will have the stream byte set to '0'.

If the TNC returns a 'C' status block with no data, this indicates that the command was accepted. This will occur on connect and disconnect commands.

A 'T' block from the host (TRACE information) is raw data, and not a hex dump of the received packet.

The KISS transparency (FESC, FEND, TFEND, and TFESC) described above is always applied to all blocks.

HF Mode operation

When using a non-packet mode on the HF port of the KAM, received HF data will be sent to the host with status byte 'D', port byte '2', and stream byte '0'. Each received character is sent from the KAM to the host in a separate block.

When operating AMTOR mode A, another KAM to host block is possible, indicating the current status of your station (IRS or ISS). This block has a status byte of 'I', port byte '2', and the stream byte indicates IRS ('0') or ISS ('1'). This block will be sent whenever there is a change.

When operating in the AMTOR mode A (ARQ) the KAM will send an 'S' block containing information pertinent to the link. For instance, when the link is established, the KAM sends an 'S' frame with the message <LINKED> or <LINKED to xxxxxxx>. 'S' frames are also sent indicating a link failure, or anytime the KAM returns to AMTOR STANDBY. This can occur when the other station breaks the link, or if the link fails due to poor propagation.

When receiving NAVTEX, the KAM does not send any information to the host until it has received a proper NAVTEX header for a message that is eligible to be printed (See the NAVTEX section of the Operations manual). When the header is received (ZCZC XXNN) this header will be sent to the host in a single block. After the closing NNNN of the message if the number of errors received exceeds the NAVERR setting, an error message will be sent from the KAM to the host indicating "***TOO MANY ERRORS" and the message number. This will be sent as a 'D20' frame and not as a status frame. This allows this message to be stored in the file if you are capturing the HF channel to disk. This message will also be sent if the link fails before the closing of the current message.

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