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 addenda, 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. RAM AND KPC-4 ONLY. With the front of the unit facing you, locate the printed-circuit pads marked 'X' (RAM) 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.

EPROM 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 repack 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 save
- 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 our drawing board two programs to work in conjunction 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__________________________
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 $________
Dear KPC or KAM User:

Enclosed you'll find the EPROM and manual addendum for EPROM update 2.8. This update features new KA-NODE and WFAX 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 mans the 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 WFAX command. This command allows all Kantronics TNCs to act as WFAX (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 WFAX 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 WFAX 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 16K. 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 (4.7K*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.
Even though the KPC-1 is no longer produced we support it! If you want to run the RA-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 RA-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, MAX USERS 0/0, and modified the PID filter. RELINK is default off, but with it off a KPC operating AX25v2 does not attempt to automatically reconnect after retrying out. With MAX USERS 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 FO (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 WDØEMR by typing BUDCALLS -WDØEMR.

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 TMC on for a few seconds, and then turning it off. Return the jumper to the normal position and the TMC 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

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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 CFM, 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.

3
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.

\[
IOC = \text{(lines per inch} \times \text{width of chart})/3.1416
\]

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:

<table>
<thead>
<tr>
<th>Location</th>
<th>Frequencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Halifax NS</td>
<td>4271 6630 9890 13510</td>
</tr>
<tr>
<td>Norfolk VA</td>
<td>8000 10854</td>
</tr>
<tr>
<td>San Diego CA</td>
<td>8646 17410.5</td>
</tr>
<tr>
<td>Mobile AL</td>
<td>9157.5</td>
</tr>
<tr>
<td>San Fran CA</td>
<td>8682 12730</td>
</tr>
</tbody>
</table>

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 Kiloertz 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 8000 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: MAXUSER 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 baud 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 taken a look at later,
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 136K 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 any 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.
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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 acknowledgment 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 MCALL, MYALIAS, MYPBBS or MGATE(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.
This command allows you to monitor traffic routed through your node between other stations.

This command is modified to include identification of nodes and personal mailboxes. If on, an ID packet will be sent every 9.6 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.
ND Heard

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 00:00:00 08:15:15 LAWKAN 01:00:15 08:25:15
N56046/2 01:10:88 00:03:15 N56046* 01:10:88 00:03:10
W5SSGU-3/1 01:10:88 00:03:15 W5SSGU-3 01:10:88 00:03:15
WDGEMR/2 01:10:88 00:04:15 WDGEMR 01:10:88 00:03:15

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

3
will be that of the connecting station. The above Jheard lists show WDEMR 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 NODE. 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 Jheard log. This is basically a remote Jheard command. The list can contain both end user and node callsigns.
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

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You'll get the usual disconnect message from your TNC as noted. If however, your distant partner, in this case NSAPJ, 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 NSAPJ together, a status command will list:

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

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

The cross-connect (XConnect) 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 BVK,CONNECT,JHEARD,NODES, XCONNECT
>XC WD0EMR <CR>
```

Response:

### Link MADE
### CONNECTED TO WD0EMR
You can also determine from the response to Node command which port a station is on. Below is an illustration of a RA-NODE response to a node heard query:

<table>
<thead>
<tr>
<th>Node</th>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAWKAN</td>
<td>12/02/87</td>
<td>15:45:00</td>
</tr>
<tr>
<td>N66046 /X</td>
<td>12/02/87</td>
<td>15:49:15</td>
</tr>
<tr>
<td>OLAKAN /X</td>
<td>12/02/87</td>
<td>16:15:21</td>
</tr>
</tbody>
</table>

In this typical display the call sign of the node is given, followed by the date and time it was last heard. The slant bar X (\(\text{\char'92}/\)) 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 KFC-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:

<table>
<thead>
<tr>
<th>Node</th>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>N66046/2*</td>
<td>12/01/87</td>
<td>14:32:09</td>
</tr>
<tr>
<td>WASRU-1/1</td>
<td>12/01/87</td>
<td>15:25:01</td>
</tr>
<tr>
<td>W0XI/2</td>
<td>12/02/87</td>
<td>16:28:04</td>
</tr>
<tr>
<td>WD0EMR/1</td>
<td>12/02/87</td>
<td>16:32:09</td>
</tr>
</tbody>
</table>

In this illustration the number following the slant bar (/) indicates the port the station was heard on. **Your Call sign** 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!
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
   KEY coax
   MORses code, TX, RX
   MHeard [S:L]
   NHeard [S:L]
   NText message
   PBBs call, subject
   PROSIGN default "5C"
   PText message
   WText message
3. New Personal Mailbox and KA-NODE Directives:
   JHeard [S:L]
   NHeads [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 select by #
   AMTOR 'who are you' operation
   Battery Backup automatically compatible
   HBAud port 2, KAM
   KAM/KPC-4 HF streamaw '8' 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

Copyright 1988, by Kantronics Inc., 1202 E. 23rd St., Lawrence, KS, 66046. All rights reserved.
Update 2.83 consists of new firmware for all Kantronics packet units (KPC-1, KPC-2, KPC-2400, KPC-4, and the RAM) 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 conjunction 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.

2
**MORse**

Where code is entered as a combination of *x* and *r*-characters. TX represents a keyboard character entered in hex or decimal. 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:

<table>
<thead>
<tr>
<th>CODE</th>
<th>TX</th>
<th>RX</th>
<th>CODE</th>
<th>TX</th>
<th>RX</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>---</em></td>
<td>$00</td>
<td>$00</td>
<td><em>---</em></td>
<td>$2A(*)</td>
<td>$4141(AA)</td>
</tr>
<tr>
<td>---x</td>
<td>$00</td>
<td>$00E(SN)</td>
<td>---x</td>
<td>$00</td>
<td>$00</td>
</tr>
<tr>
<td>x-x-x</td>
<td>$21( )</td>
<td>$534E(SN)</td>
<td>x-x-x</td>
<td>$00</td>
<td>$00</td>
</tr>
<tr>
<td>t-x-x-x</td>
<td>$25( )</td>
<td>$4153(AS)</td>
<td>t-x-x</td>
<td>$00</td>
<td>$00</td>
</tr>
<tr>
<td>x-x-x-x</td>
<td>$2B( )</td>
<td>$4152(AR)</td>
<td>x-x-x</td>
<td>$00</td>
<td>$00</td>
</tr>
<tr>
<td>x-x-x-x</td>
<td>$20</td>
<td>$00</td>
<td>x-x-x-x</td>
<td>$2F( )</td>
<td>$2F( )</td>
</tr>
<tr>
<td>-----</td>
<td>$00</td>
<td>$00</td>
<td>-----</td>
<td>$26( )</td>
<td>$28( )</td>
</tr>
<tr>
<td>-----</td>
<td>$26( )</td>
<td>$4B41(KA)</td>
<td>-----</td>
<td>$00</td>
<td>$00</td>
</tr>
<tr>
<td>-----</td>
<td>$00</td>
<td>$00</td>
<td>-----</td>
<td>$00</td>
<td>$00</td>
</tr>
<tr>
<td>-----</td>
<td>$00</td>
<td>$00</td>
<td>-----</td>
<td>$00</td>
<td>$00</td>
</tr>
<tr>
<td>-----</td>
<td>$3( )</td>
<td>$534B(SK)</td>
<td>-----</td>
<td>$00</td>
<td>$00</td>
</tr>
</tbody>
</table>

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

**MHeard**

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:

```
    W00EMR > ID date time
    VIA TOP, KSBR, W0XI, SUTNE
```

Here, your station heard W00EMR transmitting an ID packet. W00EMR was also using the digipeating path TOP, KSBR, W0XI, SUTNE. If your station heard W00EMR via one of these other stations, an asterisk would show by its call or alias. 

3
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 2.8.3. 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 'X' 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 2.8.3 limited messages to 256 characters. You may now enter larger messages but you must delimit each set of 256 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 NOAPJ, NEW RADIO <CR>

mag: BUD, I HAVE A NEW HT-110 KANTRONICS RADIO <CR>

mag: MORE MESSAGE <CR>

mag: /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 'X' 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 'X' 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.

4
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 CONVExa.

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 (mcall of node) CHANNEL A

ENTER COMMAND: BYE, CONNECT, HELP, JHEARD, NOGRES

Bye) NODE WILL DISCONNECT
Connect callsign CONNECT TO ANOTHER NODE OR END USER
Jheard) LIST OF HEARD CALLSIGN WITH DAYSTAMP
Jheard) S(hort) LIST OF HEARD CALLSIGN ONLY
Jheard) L(ong) LIST OF HEARD CALLSIGN WITH DAYSTAMP AND VIAS
Nnodes) LIST OF HEARD NODE CALLSIGN WITH DAYSTAMP
Nnodes) S(hort) LIST OF HEARD NODE CALLSIGN ONLY
Nnodes) L(ong) LIST OF HEARD NODE CALLSIGN 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 streamaw '!' 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 ARG 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 Streamaw change
The default value for the HF streamaw character has been changed from '!' to '~~', the tilde.

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

6
KA-NODE timeout change

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

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 RAM. n may be set to a rate of 300, 480, 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 affected 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 RAM 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 (52256).
   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 RAM owners only) If you are installing level 2.83 and have NOT installed level 2.82, then you must complete step 6 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 attached 2.82 installation instructions. If you have installed the battery backup and removed the EPROM 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.

<table>
<thead>
<tr>
<th>unit</th>
<th>PROM</th>
<th>EEPROM</th>
<th>RAM-A</th>
<th>RAM-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>KPC-1</td>
<td>U-4</td>
<td>U-7</td>
<td>U-5#</td>
<td>U-6</td>
</tr>
<tr>
<td>KPC-2</td>
<td>U-9</td>
<td>U-12</td>
<td>U-11#</td>
<td>U-10</td>
</tr>
<tr>
<td>KPC-2400</td>
<td>U-15</td>
<td>U-18</td>
<td>U-13#</td>
<td>U-14</td>
</tr>
<tr>
<td>KPC-4</td>
<td>U-14</td>
<td>U-16</td>
<td>U-10#</td>
<td>U-12</td>
</tr>
<tr>
<td>KAM</td>
<td>U-22</td>
<td>U-25</td>
<td>blank</td>
<td>U-21</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Remove pages</th>
<th>Insert new pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 A &amp; B</td>
<td>30 A, B, C, &amp; D</td>
</tr>
</tbody>
</table>

Installation Instructions

Updating your 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.
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 ($DB) followed by a TFESC ($D3). These special sequences are the same used in the KISS code, as implemented by Phil Xarn, 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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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 29RTTY 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 HP 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. A status byte of 'M' indicates that the data 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 now open. 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 byte 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.

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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 '1', 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 with XXXXXX>. '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 'U2O' 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.