Backup Battery and Smart Watch for KAM KPC

Standard Dallas/Maxim parts - DS1213C and DS1216C
Installation Instructions for Kantronics KAM, KPC-4, KPC-2400, KPC-2, and KPC-1

Note the location of the notch on your RAM chip installed in RAM B. Remove the RAM chip installed in the RAM B socket as follows:

Unit RAM B
KAM U-21
KPC-4 U-12
KPC-2400 U-14
KPC-2 U-10
KPC-1 U-6

Install the SmartWatch (DS1216C) or Battery Backup (DS1213C) socket in RAM B with the notch in the same location that the RAM chip notch had been. Smart Watch provides the clock/calendar as well as backup for the SRAM, while the Battery Backup only provides backup of the SRAM.

NOTE: KPC-4 owners who have 64 K RAM and selected the SmartWatch option must install the SmartWatch in RAM B and the Battery Backup socket in RAM A.

Install your low power static RAM (part number may be 62256LP-15, 43256C-15LL, 58256P-15L, 60L256P15, or 55256L15) in the top socket in RAM B. NOTE: 42832 and 65256 are NOT acceptable for use with these options, because these parts draw too much power from the lithium battery and will shorten the life of this battery. The notch on the RAM chip should be installed in the same orientation as the original RAM.

KPC-4 owners with 64 K RAM remove the RAM chip currently in the RAM A (U-10) socket and install your Battery Backup socket in this location. Again, note the orientation of the socket.

KPC-4 owners with 64 K RAM should now install the second low power static RAM in the top of the Battery Backup Socket in RAM A.

The original DS1213 SmartSocket products have reached end of life, and can be replaced using a pin-compatible, equivalent-density 5V NV SRAM module product. With that Replacement Module product, the Maxim customer will be installing a complete, one-piece memory solution.
See Dallas/Maxim Application Note 4392 www.maxim-ic.com/appnotes.cfm/an_pk/4392

The DS1230AB [256kb/32k x 8] is Replacement Module for DS1213C
~~http://datasheets.maxim-ic.com/en/ds...AB-DS1230Y.pdf~~

The Maxim DS1213C is still available from Jameco P/N 114219 for $15.95

The DS1216C SmartWatch RAM Data Sheet www.maxim-ic.com/quick_view2.cfm/qv_pk/2638/t/al

See Dallas/Maxim Application Note 52 for further information Phantom Real Time Clocks.

The DS124x Nonvolatile SRAM with Phantom Time Clock modules operates identical to a DS1216 (above) with a RAM inserted (full product number determines RAM size and temperature range). For example, the DS1244 provides 32 k of SRAM. Replacing the DS1216C and 32 k memory (62256LP-15) socketed above it. See Maxim DS1244 datasheet.

The DS124x Nonvolatile SRAM with Phantom Time Clock modules will maintain over 10 years of

data retention in the absence of power.

This is a good choice if NO RAM is found in the TNC that you are upgrading/updating!

How to change the battery is described very good here:
https://www.youtube.com/watch?v=0rQXCAyqEGk

Subject: SECRET ON KAM?

I tried to use Pac-File terminal program on WEFAX, no luck. I thought I needed another Terminal program so I got MAXFAX and SUPERFAX. These programs did not work either. I called Kantronics to find out if something might be wrong with my KAM. They told me you have to put the speaker plug from the VHF port on the HF rig! Big Secret! I could not find that instruction in my KAM manuals. Just thought I would share my findings with others who might be having similar results. Just change the plugs from your VHF to your HF rig. Hope this helps someone, who was ignorant like me. Ignorant just means you don't know.

AFSK level mod for KAM

I read the suggestion by Fred about the internal mod for the KAM to reduce the AFSK audio output level. I took another approach which also works well. Rather than terminating the TNC to radio cord with the appropriate mic plug for the rig, I put a 5 pin male DIN connector on instead. Then I made up a patch cord for each radio with a 5 pin female DIN connector on one end and the mic connector on the other.

Inside the back shell of the patch cord DIN plug I've placed an attenuation network made up of 1/4 watt resistors that matches the AFSK level to that needed by the rig. Since each rig has its own patch cord, the level is set automatically when the cord is selected. I used an A.F. millivoltmeter and a deviation meter to determine the values of the resistors needed for each case by comparing the deviation resulting from using the rigs mic to that produced by the TNC. This way there is no need to alter the TNC and you can change rigs without having to make any adjustments after they have been initially determined.

Intermittent XMIT for KAM

I noticed that the KAM, when connected or trying to connect, will start to transmit on top of an other signal at times. This will happen when a received signal appears just before the the KAM wants to transmit.

It is visible by looking at the mark/space display. After a quiet period a received signal will light up the bargraph display and the KAM will transmit on top of it.

Looking at the circuit diagram, I noticed a 1 µF capacitor (C29) in the carrier detect circuit. It seems to slow down the detect function more than desired. Changing the capacitor to µ1 made the carrier detect work more the way I expect it to. It is easy to get at. Somewhere in the middle of the board. There is a layout in the manual.

I didn't ask Kantronics about it. And I didn't notice any side effects. I also didn't try it in any of the other modes.

Over compression with KAM

The AM/FM push-button switch on a KAM panel (S2) changes not only compression rate of the input amplifier system (U1-14, Q5 and Q6), but signal input sensitivity. Reduction of the first is desired for a CW reception to avoid "swamping" of the circuitry (over-compressing); however, the second effect could create a problem in interfacing with a transceiver.

I use ICOM-751 transceiver and feed the KAM from high impedance output (10 kΩ) before AF gain control and power amplifier (pin 4 of 24-pin plug). Since the impedance of KAM audio input is only 600 Ω, the signal is much attenuated. To develop the required 20 mVpp on the input pin for non-CW reception (the switch in FM position), the transceiver has to output 0.35 Vpp (20×10600/600). But, if the switch is in AM position, the de-sensitized input (about 100 mVpp) requires at lest 1.8 Vpp. This value, which is close to distortion limit of the transceiver, I could obtain with strong signals and with disconnected AGC (in OFF) only.

I have slightly modified the KAM circuitry by disconnecting the AM/FM switch from ground and connecting this point to the R1-R13 junction. The switch changes rate of compression only. The sensitivity of AF input remains constant at 20 mVpp.

Now, I could:
- copy very weak CW signals which hardly move the S-meter,
- use large dynamic range of the transceiver automatic gain control and
- enjoy easiness and speed of tuning to a CW station.

This is how I understand the circuit. Sorry for the long text. You could skip it.

The original circuit:

If signal level at U1-14 exceeds 0.6 V in peak, the transistor (Q5) starts feeding the FET transistor (Q6). The FET by-passed by R27 and with series R13 acts as a variable attenuation pad (voltage divider). Timing of this AGC (or compression) is determined by R19-C10 (2.2 ms attack) and R21-C1 (1 s release), and this is independent of AM/FM switch position.

Since an op-amp (U1-14) has amplification of 100, peak voltage at its positive input pin is not much higher than 6 mV (12 mVpp). Diodes CR4 and CR5 are inoperative in this low range of voltages. They protect the KAM circuitry against large voltage, which could be accidentally applied to the input.

Only the FET (Q6) fulfill a function of the gain control. When the AM/FM switch is off, the attenuating pad (R13-Q6) works in a range 1 to 1000 (0 dB to 60 dB according to the specification). When the switch is on, the initial attenuation is 7.7 and the controlling feedback is much reduced.

Modified circuit:

When R27 by-passes R13 (instead of Q6 as in original cct), the initial attenuation remains the same (=1), but attenuation ability in reduced. The circuitry treats the signal with more "respect". The compressor is not "over-doing" its function.

Actual modification:

Cut the PCB track which grounds the AM/FM switch as close as possible to the switch.

Connect this cut-off switch pin to junction R1-R13 with thin wire-wrap wire.

The modification works well not only for me; Art, VE3RX modified his KAM and is satisfied with its results.

CW XMIT prob

Having trouble getting your KAM to key your transmitter on CW? I hooked up mine to a Uniden HR-2600 and found it would not key the rig. So here's a easy mod which I received directly from Karl Medcalf at Kantronics:

Bypass resistor R-107. Check your KAM manual for the location. It's near the connector end of the TNC, close to the DB25 connector. You can solder a jumper wire across the resistor on either side of the board.

Reverse forwarding prob for KAM

As many know that have tried to get the reverse forward to work, it does not! The problem? When the KAM sends its BBS ID, it is missing a "$"...and possibly not in the right place.

The fix:
Enter into ptext the following: [KAM-3.03-H$] if your TNC is a KAM.

If not enter the same message yours has with the $ added as above.

Connecting the data engine to your computer

Just a word of caution, when wiring the "DE, 8-pin plug, to the computer DB-25 pins" page 5. The DE 8 pin plug as shown, is "Reverse". It should be shown from 8 to 1, instead of 1 to 8, top to bottom.

"C O R R E C T W I R I N G"

DE pin	purpose	computer DB-25 pins	color
8	DSR	6	white
7	DCD	8	brown
6	DTR	20	yellow
5	SG	7	green
4	RD	3	red
3	TD	2	black
2	CTS	5	orange
1	RTS	4	blue

This applies with DATA ENGINE TNCs starting with serial no. 850 Kantronics also confirmed this, and has since rectified the problem.

When the wiring was redone, the TNC worked properly without any flaws up to 9600 baud, TNC to COMPUTER.

Just thought I'd tell you guys, who have intention of buying KAMs new "BEAST", HI!

KAM Voltage Problem

I received a new KAM for Christmas and when I hooked it up it was very weird acting. I had trouble getting my call in it, wrong letters would show up the keyboard was sluggish, I had to turn the 8bitconv off and change line settings on the terminal program to make a half way contact. I called the factory and excellent help was immediately given. The problem was too much voltage on the RS-232 Serial Line. It likes to see 12 volts. The new wall supplies were causing the problem. The older 12 volt supplies were 300 ma the new supplies are 500 ma and the KAM uses about 300 ma with the voltage being about 14.5 volts going into the KAM. I measured the DVE supply, a 12 volt 500 ma and it was putting out over 19 volts unloaded, about 14.27 to 14.7 volts into the KAM on. It was suggested I clip the plug off the wall supply and try it to the stations supply. Since I run 13.8 volts there I instead inserted a Radio Shack 12 volt regulator IC in series near the KAM with a .3 µF cap on the input and output as suggested and PRESTO all problems solved. I was able to turn the 8bitconv on, use 1200 baud, no parity, 8bits with 1 stop bit, all as suggested and everything is working great. I must say the first two evening I had my doubts, but now I in total love with the KAM and the help from Kantronics is fast and friendly.
The problem was due to overdriving of the audio from the KAM LO out which is about 10 mVpp. While this worked OK on the older TR7400 rig it caused many repeats and time-outs with the 7800, 7830 and 7850. The change is as follows.. Replace R11 on the KAM board with a 200-500 miniature multi-turn pot and with the help of another station with a VU meter set the pot for a level of zero dB or to the same level as a reference station in your area. The approximate level for the KAM audio out is about 3 mV but you may find minor differences.

Waiting too long to xmit

I have seen and heard many complains about the KAM and KPC2, waiting to long before retying a packet. I had the same problem and phoned the factory about it. They kind of suggest that there is no problem, but also tell you to set the following commands.

DW 0
PERSIST 192/63 for the KAM and 63 for the KPC2,
SLOTTIME 5/10 fr the KAM and 10 for the KPC2,
TXDALAY 30.

Well, that didn't realy help a lot.

Looking on page 47 and 48 of the KAM manual or page 36 and 37 of the KPC2 manual, you will find that for re-transmisions of the **same** packet, the wait time equals to:
Wait time = (DWait + r × TXDelay) ×10 milliseconds where r is a random number from 0 to 15.

That would mean that the maximum wait time would be 4 1/2 seconds. And it will wait this long **after** the channel is clear before trying to retransmit the packet. The problem seems to be that if the channel gets busy before this time is passed, the whole thing starts all over again. It is called a collision-avoidence strategy in the manual. Does it ever work. The station on the receiving end will time out, clearing the frequency for the rest of us. Now here is the solution for the KPC2 and the VHF port on the KAM.

From the above equation we see that the delay is mainly due to TXDelay, because DWAIT would be set at 0 if we use SLottime and PERSsist. What you do is set TXDelay to 10 and make the difference up with AXDelay 20. That will give you a total of 300 milliseconds of time for the transmitter to key up and the receiver at the other end to open its squelch. If you need more time, just increase AXDelay. Also set SLottime to 5 and PERSist to 10 (yes, ten) in this case. This only works for the VHF section of the KAM and for the KPC2. There is no AXDelay on the HF section of the KAM.

On the HF port on the KAM, I have SLottime at 5 and PERSist at 255 with DWait set at 0 and TXDelay at 40. If you add a 27 k resistor across R47 on the bottom of the board if you like, it will speed up the carrier detect. Now make sure that the carrier detect led goes off between monitored packets. Do this by turning the audio down. The manual suggests not to have more than 200 mV going into the KAM. This will let the KAM copy better, including ACKs. That means less retrys.

And a final suggestion. If you use the KAM as HF RLI type BBS, you might consider setting CHeck to 6 (six) and the timeout timer in the BBS program to 600 or higher. This way the KAM will time out the BBS if no packets moved, instead of having the BBS time out while the KAM is still trying to move the packets from its very large buffer. On VHF you might try CHeck 24. This would work for other units as well.

I use the KAM on 14.107 and it seems to work very well this way. Let me know if this works for you like it does for me. Oh yes, I use version 2.85 in both units.

Kantronics KAM HF frontend modifications

I recently received a Kantronics KAM-Plus modem. After comparing the schematics of the KAM and the KAM-Plus, I came up with this modification for the KAM to upgrade it to the improved frontend AGC and limiter used in the KAM-Plus hf modem.

The specs from the manuals for the KAM and the KAM-Plus are as follows;

Audio Input: HF		
FM sensitivity	20 mVpp (KAM)	2 mVpp (KAM+)
AM sensitivity	100 mVpp (KAM)	40 mVpp (KAM+)
Dynamic range	>60 dB (KAM)	>80 dB (KAM+)

With the help of the schematic and the component layout diagram for the KAM the location of components is simple and the use of a solder sucker to clear the holes for the double sided PCB will facilitate a clean job.

Components to replace;

	OLD	NEW	
R17	470	100	(All 1/4 watt carbon resistors)
R18	47 k	68 k	
R19	2k2	10 k	
R27	15 K	2k7	

Remove CR11 and reinstall with polarity reversed
Remove CR5 and discard
Lift the end of R13 that is common with R1

Insert one end of a µ1 50 V capacitor into the PCB hole vacated by the end of R13 common to R1; solder in place. Connect the other end of this cap to the free end of R13.

Install a 100 k 1/4 W resistor between the free end of R13, the µ1 CAP and ground. Use the PCB hole vacated by removing CR5 (ground side). You end up with a tripod of components.

CAUTION: Some PCB holes having double sided traces may need to be soldered on both sides of the board to ensure a through board solder job.

This completes the update modification for the KAM.

You will notice a better dynamic range for input signals to the KAM and an improved limiter using

the FM/AM front panel switch. I noticed an improvement in throughput when operating AMTOR/PACTOR. I also noted improved CW reception using the 'AM' position of the FM/AM switch providing perfect copy on 160 m CW signals.

KAM VHF front end improvement

Original KAM VHF port audio sensitivity 20 mVpp, >60 dB dynamic range KPC9612, KPC3 VHF port audio sensitivity 5 mV, 70 dB dynamic range.

The KAM uses the same modem IC as used in both the KPC3 and KPC9612. By changing some components the KAM VHF performance can be improved to the same specs as the KPC3 or KPC9612.

To improve the KAM VHF performance:

Remove R4, R8, Q4
Remove and place jumpers in place of C14 and R6
Replace R9 6.8 k with 100 k
Replace R26 6.8 k with 100 k
Replace R28 15 k with 470 k
Replace C6 µ001 with µ01

K1 position 2 or off, equalization off
K1 position 1, equalization on

This will change the configuration of the original KAM VHF front end to be similar to the KPC3 and KPC9612. I use a Mocom70 with direct audio feed from the discriminator. There is no way to simply increase the volume level to get more audio. There is a great improvement in the VHF port performance of my KAM since making these changes.
