

# KIO2 / KPA100 / KAT100

## Use the Wrong Serial Cable and... BAD THINGS WILL HAPPEN

by: Gary Surrency (AB7MY) & Tom Hammond (NØSS)  
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There is a warning in the KIO2 manual which reads...



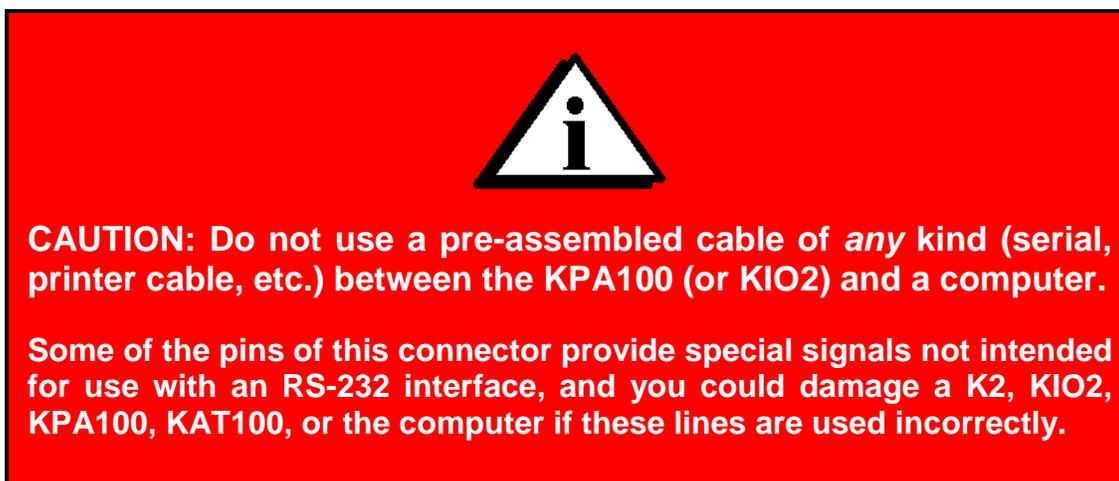
**CAUTION: Do not use a pre-assembled cable of any kind (printer cable, etc.) between the KIO2 and a computer.** Some pins on the KIO2 provide special signals not intended for use with an RS-232 interface, and you could damage the K2, KIO2, or the computer if these lines are used incorrectly.

... and a similar warning in the KPA100 manual...



**CAUTION: Do not use a pre-assembled cable of any kind (printer cable, etc.) between the KPA100 and a computer.** Some of J8's pins provide special signals not intended for use with an RS-232 interface, and you could damage the K2, KPA100, or the computer if these lines are used incorrectly.

Unfortunately, neither of these warnings are blatant to the point that they make a strong enough impression on us, the users. They should be presented in RED...



... because we humans don't remember things NEARLY long enough to keep ourselves out of trouble.

Several K2 owners have inadvertently connected the wrong (non-Elecraft) serial cable to their KIO2 (or KPA100), and found that they'd let the smoke out of one or more components as the result.

Once the damage has been done, the only recourse is to FIX the problem(s) we've created. Unfortunately, it can be difficult to easily locate all the damaged devices. This

document is intended to assist you in your search to revive your K2 and associated equipment.

With many thanks to Gary Surrency, AB7MY, chief tech at Elecraft, we have attempted to compile a list of devices which you will need to check and possibly replace when attempting to recover from a 'wrong serial cable' condition.

Here's what Gary had to say on the subject:

### **Regarding damage to the KPA100, KAT100, and KSB2...**

*(Refer to the illustrations on pages 4 & 5 for all component references and locations)*

Making that error, usually takes out the following **KPA100** devices: U6, U1, and sometimes U3 and U4. It is also possible to burn out one of the tiny RFCs (RFC6 & RFC7) in the KPA100's RS232 lines.

In **K2**, it also often damages the VRFDET pin (Control Board, U6 pin 2), on the **MCU**, making it necessary to replace it as well.

In the **KSB2**, it will occasionally wipe out Q1 and U1.

The usual symptoms are lack of power control and no ALC, no recognition of the KPA100, and HI CUR with maximum and uncontrollable RF output since the ALC doesn't work.



**IMPORTANT:** Though not directly related to damage incurred from using the wrong serial cable, ***misconnecting*** the ribbon cable from the KPA100 to the K2 control board will also ***destroy*** the K2 MCU VRFDET pin, and the EL5146C in the KPA100 as well as the KAT100 if it is connected. Just getting off by one pin vertically can do this, since 12V is on the next pin above the VRFDET pin on the connector on the K2's control board.

**Some folks don't install the index pin into the ribbon connector. This is a VERY SERIOUS MISTAKE which all users of the KPA100 should check immediately it ensure that the blocking plug has been installed.**

### **Regarding damage to the KIO2...**

Testing the KIO2 is a little different than testing the KPA100 if it gets damaged with the wrong serial cable or incorrect connection to the control board. I've seen or heard of

instances of the sub-mini chokes being open, so those should be checked first as they are fragile.

The VRFDET (K2 Control Board, U6 pin 2) of the MCU can still be wiped out with a connection error, resulting in HI CUR and uncontrolled RF output. In a few cases I know of, the MAX1406 RS232 chip (U1 on KIO2) gets damaged. So if everything else checks out and the negative voltages look OK, the MAX1406 should be changed as a matter of standard procedure.

Data can usually be seen on the U6-25 TX line from the MCU (K2 Control Board) if it is present when performing the PORT=ON menu test by pressing the DISPLAY button (page 14 tests in the KIO2 manual). This can then be checked (using an oscilloscope or a voltmeter, set of the lowest available AC range) on the output of the KIO2 to the PC at U1-6 **and** J1-2 on the KIO2 PCB.

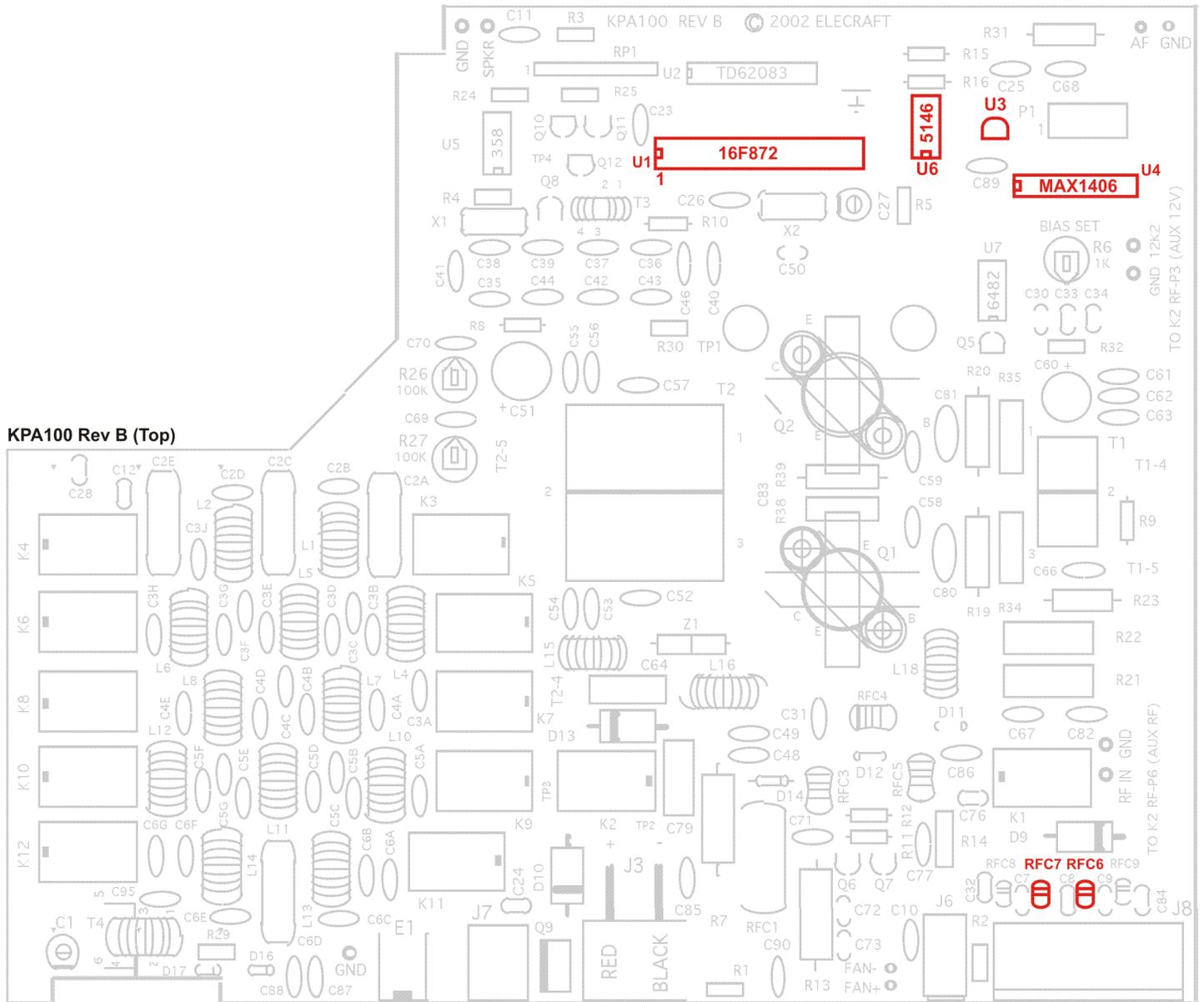
Then a test from the PC to the K2 can be done by using HyperTerm or some other terminal emulator program set to 4800 baud, 8 bits, 1 or 2 stop bits, no parity, and no handshaking. Send "SW01"; or some similar command to send data to the K2 while you look at J1-3 and U1-11 (KIO2), and then U6-26 (K2 Control Board) with a scope or AC voltmeter on the lowest range. Data can usually be seen on AC voltmeter as a brief increase in level when data is present. A DC blocking cap in the meter's AC input is required, which most of them have. Once you do anything to send data, the AC meter will show a brief but clear indication of the data. Even a digital meter will usually show a brief change in level when data is detected. All of mine do.

Of course, these tests apply equally to the MAX1406 chip on the KPA100, with just a note that, on the KPA100, it is U4, *not* U1 that is the RS232 IC, and J8, *not* J2 that is the DB-9 connector.

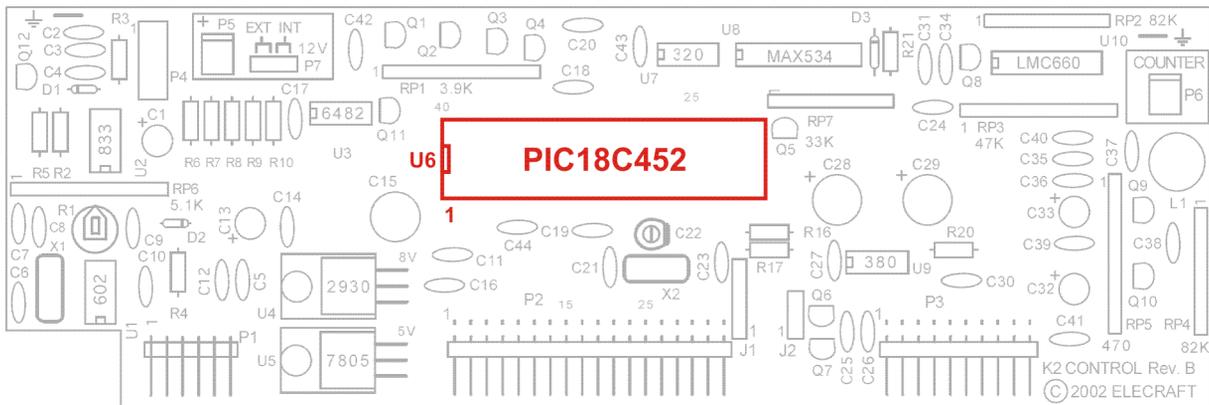
Representative MAX1406 voltages:

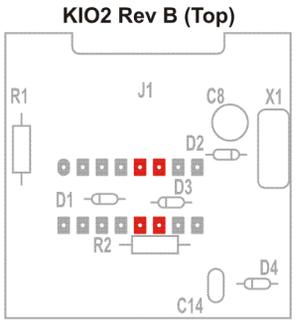
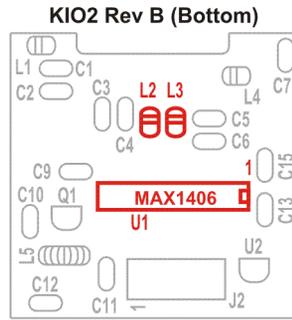
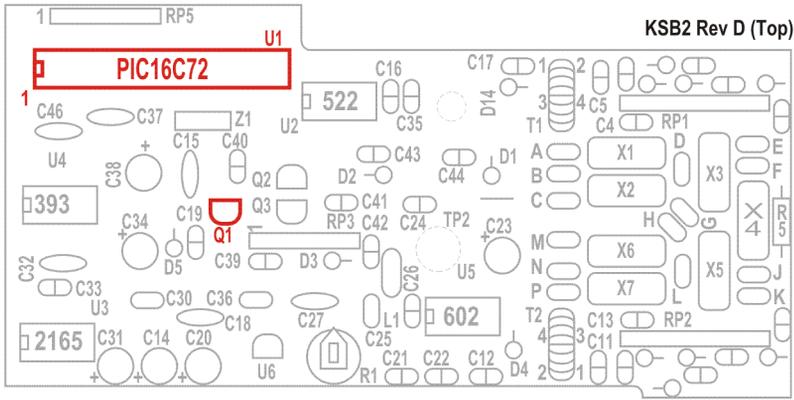
<b>MAX1406 PIN</b>	<b>Signal</b>	<b>O'scope (DC)</b>	<b>DMM (AC)</b>
5	TXD	8-9V	0.2-.05
6	RXD	7-8V	1.0-6.0
11	RX	5V	0.3-1.2
12	TX	5V	0.3-1.2

Note that DMM voltages will be significantly lower than those shown on an oscilloscope due to the very short duty cycle of the data being sent and the unintentional 'averaging' performed by the DMM in order to display a value.



**K2 Rev B Control Board (Top)**





**KAT100 Rev B (Top)**

