Installing Boca Card Mini–HOWTO

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Describes the basics of a Boca 16–port Serial Card (Boca 2016) used with Linux.

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1. Introduction

This HOWTO is being maintained by David H Dennis, david@amazing.com, to try and help any other individuals who may have acquired a BocaBoard, stared at it and found out that it didn't seem to do anything.

A very high percentage of those interested in the BocaBoard are also interested in becoming Internet Service Providers (ISPs). If you are one of them, please feel free to drop by my web site, http://www.amazing.com, and check out my Inet−Access FAQ, over 9,000 lines detailing how to hook up to the net and how to make your Internet provider business succeed in these most interesting times.

2. Warning

Multi−Port serial cards, such as the BocaBoard, are all but dead. If you are in business as an Internet Service Provider (ISP), you will not want to use any of these devices, because the new 56k modem standards will not support them. Instead, you need digital modem/terminal server combinations such as the Livingston PM3 " , Cisco 5200 " or US Robotics Total Control ". Otherwise, you simply won't be competitive in major markets. Users want high speeds; you won't be able to provide them with a BocaBoard or other multi−port serial card.

Even as a multi−port serial card, the BocaBoard is hopelessly obsolete. The overwhelming majority of people who want to buy a BocaBoard would be better off getting a accelerated card such as the Cyclades" or Rocketport". (When last I looked, Rocketport" was a better board, but Cyclades" had the most stable kernel support). Accelerated cards use less of the CPU of your machine, and so you can support more ports per computer with less performance degradation.

That being said, perhaps you own one of these devices and want to make use of it, or perhaps you are planning an ISP based on a low−cost business model that basically means the use of cast−off equipment from others. In that case, the information in this document should be useful for you. But again, I repeat: The person who buys a new BocaBoard at this point probably needs a few more clues before starting his ISP or other venture.

3. What do you need to install a BocaBoard?

1. The board itself and its manuals
2. Your Linux source tree
3. Patience

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4. The Basic Procedure

4.1. Recompiling the Kernel

The first step is to change your kernel so that it knows you have a BocaBoard. Unfortunately, this is not a part of the configure script; you must go in and modify the source by hand. In the older versions of the kernel, this consists of putting the following line at the beginning of `linux/drivers/char/serial.c`:

```
 #define CONFIG_BOCA 1
```

As of some kernel version or another, this has changed. To make it work with newer kernels, search for the

```
"BOCA_FLAGS" #define
```

in `serial.c`, and change the value to

```
#define BOCA_FLAGS ASYNC_BOOT_AUTOCONF
```

You can then recompile your kernel using the instructions included with the source tree. I recommend running the new kernel from a floppy until you're very sure it works; otherwise, the procedure for getting back your system is mind−numbing at best.

At least to me, digging into my kernel and re−compiling it was quite a stressful venture! Relax; as long as you copy it to a floppy, your new kernel is completely harmless. It won't bite! Honest! :−)

4.2. Installing the Card

The default address on both the card and the Linux software for the configuration is 0x100; leave that alone. Set the IRQ on the card to Linux default of 12. If you want to change the IRQ, you will have to search for "BOCA_FLAGS" in the file. You will find lines like this:

```
 { BASE_BAUD, 0x100, 12, BOCA_FLAGS }, /* ttyS16
                                  */
                                  { BASE_BAUD, 0x108, 12, BOCA_FLAGS }, /* ttyS17
                                  */
```

You can change the IRQ from 12 by changing the 12 to any valid IRQ. I have not tried this, however.

4.3. Telling Linux about Your Card

Once you have compiled your new kernel, switch off the machine and install the card. Then, turn your machine on with the new kernel floppy in the drive. If the installation succeeded, you should see all sorts of strange stuff about 16550 UARTS being connected to ttyS16−ttyS32. The system will then come up normally.

The odds are pretty good that you don't actually have entries in `/dev` for those lines. Remember that they start at 16 and go on to 32. If you look at the source code, you'll see why; support for other cards is included in the code for lower line numbers. Creating them is pretty simple, once you know the trick.

To create entries for dial−out lines (where you call out), type:

```
#mknod /dev/cuaxx c 4 N
```

n = 64 + {line number}. The C indicates that this is a character mode device. For example, to create the first couple of lines on your board, type:

```
#mknod /dev/cua16 c 4 80
                                #mknod /dev/cua17 c 4 81
```

To create dial−in lines (where users call you), type:

```
#mknod /dev/ttySxx c 5 n
```

where N is the same as described above. For example, to create the first couple of lines on your BocaBoard, type:

```
#mknod /dev/ttyS16 c 5 80
                        #mknod /dev/ttyS17 c 5 81
```

It is recommended that you create both dial in and dial out lines for each port, so that you have maximum flexibility. It turns out to be very handy to call another line of your system by activating one of your lines as dial−out and calling your main number. I've done this already and it works great! It's most useful for checking how things look "on the other side of the fence"; I used it to find out how my software looked at 2400bps. (It's slower than the Linux console. A LOT slower, in fact).

Once you've finished with this, you can add entries to your `inittab` file in the same way as you would for a standard ttySx entry, and the modems or terminals should come up!

5. Possible Problems

If you have problems, you may find that this is due to conflicts between your BocaBoard and systems with dual IDE controllers. According to Kevin Traas:

> Is the kernel recognising the board? (i.e. Right at the start of the boot process, all sixteen ports should be listed on screen with ttySxx, I/O Port, and IRQ identified.) Also, **setserial −bg ttyS*** should list *every* port in your system.
>
> By default, the BB2016 is configured to use IO Ports between 0100 and 017f. This creates problems on systems with two IDE controllers. The second controller, ide1, uses 0170−0177 which falls into this range. Big problems!!!
>
> So, the solution, in my cases, is to go with an IO base of 0200 through 027f. I haven't had any conflicts in this region; however, you may want to check you system to be sure. (run **cat /proc/ioports** − better run **cat /proc/interrupts** to make sure IRQ 12 isn't used either.)
>
> Once you've found an IO range and IRQ that isn't used, you'll have to change the jumpers on the BB2016 and edit `/usr/src/linux/drivers/char/serial.c` to reflect the new settings. Then, compile the kernel and install as per normal.

5.1. Additional Information and Service Comments

If you want to use your new Boca card with any standard DB−25 RS232 connector, you will have to get a special breakout box, which costs about $80. The card itself comes with a breakout box that plugs into the card through a truly formidable cable. It then supplies phone−like cables for the ports. The special $80 box has phone−like cables that plug into the breakout box included with the Boca card; you can then plug your modems or terminals into standard RS−232 connectors on the box. Unless you actually have a system that accepts the phone−like connectors, you should add the price of the box to the cost of the card when comparing it to other alternatives.

I got my Boca 2016 card through a special wholesale deal that I don't think many people will be able to reproduce. It was available quickly. However, the breakout box for RS−232 took about two weeks to ship. You should be aware of your need for this box before you acquire the card. The 2016 board was $235 and the additional box was $79.95.

I've heard that this breakout box is no longer available, and that now people just have special cables made. I'm not sure how you would go about doing this, though.

Only one port of my first Boca 2016 worked. I called Boca, expecting to hear a long string of questions and advice. When they said, "Linux? What's that?" I feared the worst. However, upon hearing my actual problem, they cheerfully told me that the card was defective and I should send it back; full 5−year factory warranty, 30−days exchange. I was struck by how cheery the lady was. It was as though they were expecting the worst, and very kindly making the most of it!

I had my hardware guy exchange the card. Unfortunately, the cards were back−ordered and they took about two more weeks to give me my new card. I have to say that I was quite annoyed at this, since I was anxiously chomping at the bit to get this thing up and running.

Some people have problems with ports past the first eight. I have tested my card up to port 11 and all the ports appear to be working. Boca Research quality control may be lacking; I would recommend that people with troubles with the card call Boca and deal with them directly. I suspect that if I'd exchanged the card directly through the factory I would have had better service than through my dealer. The factory people were all quite nice and eager to please.

Right now, I have only four phone lines. I bought the 16−port card for two reasons: because it has modem control (unlike the smaller ones), and in anticipation of future expansion.

Some additional information on this subject from Kevin Traas of Baan Business Systems":

> BTW, I've used the BB2016 several times and found them to work really well under Linux. I'm extremely happy with them. They perform very well, are very inexpensive, and are reliable. They claim 115200 bps per port. I've got a unique situation whereby I've got two systems with a PPP serial link between them. I'm running this link at 115200 and I experience almost 0% error rate (with hundreds of thousands of packets transmitted). My next step is to implement EQL and additional PPP links between the boxes to increase the bandwidth. We'll see how it goes.
>
> One final note. Contrary to the suggestion in the HOWTO, I build my own cables for the BB2016 (they've got RJ ports on them). At first, I "dabbled" with RJ45−8 conductor plugs, but the BB2016 has RJ48−10 conductor jacks, so to get full modem support, I ended up going that route.
>
> I now run all 10 wires between the BB2016 and my modems. It works great! No problems, no regrets! The only initial problem I had was finding a source for RJ48 plugs, 10 conductor wire, and RJ48 to DB25 adapters. None of these are very cheap due to the low demand. Oh, yeah, and you need an RJ48 crimper as well.
>
> If you want, I can build these cables for you and send them to you. If you're interested, e−mail me and I'll let you know pricing, etc. I found building my own was cheaper than the adapter that is mentioned in the HOWTO − which I couldn't find a source for anyway.

I believe the adapter mentioned in this document is no longer being manufacturered, leaving cables such as your own the only remaining way of connecting the device.

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6. Acknowledgements

Kevin Traas has issued a helpful update to this FAQ that contains a major correction to the information on **mknod**. He is also standing in as a new source for cables for the device.

The information here was obtained by begging many people for help. Unfortunately, I have forgotten their names due to a pressing need for disk space on my Netcom account. :−(Nonetheless, I thank them very much for their assistance when things looked blackest. This is my way of paying some of that back.