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ERS-110, 111	ERS-210[A], 220[A]	*Programming AIBO with:* YART, RCodePlus OpenR SDK	ERS-311[B], 312[B], 31L	ERS7

Home Movies (all)	PDAs: CLIE (Panel Zipit) Lesser Robots: PleoRB (Pleo RoboSapien ICybie) Game Hacks: Nintendo Wii (Nintendo DS PSP)	*Email:* aibopet@aibohack.com

Super ICybie Upgrade - RS-232 Installation

WARNING: if you have a newly re-released "Outrageous" I-Cybie, do not attempt this modification!!!

Hardware Requirements

- One ICybie **- built before 2005 !!!**
- A PC computer with an available serial port

For the Hardware modification:

- A MAX233 or MAX233A chip (Jameco)
- A small (stereo) phone jack and plug (1/8" recommended).
- An RS-232 connector that will connect to the serial port on your computer (typically a 9 pin female DIN connector)

- A few simple tools like small screwdrivers, and a fine tip soldering iron
- A little bit of wire-wrap wire
- A steady hand
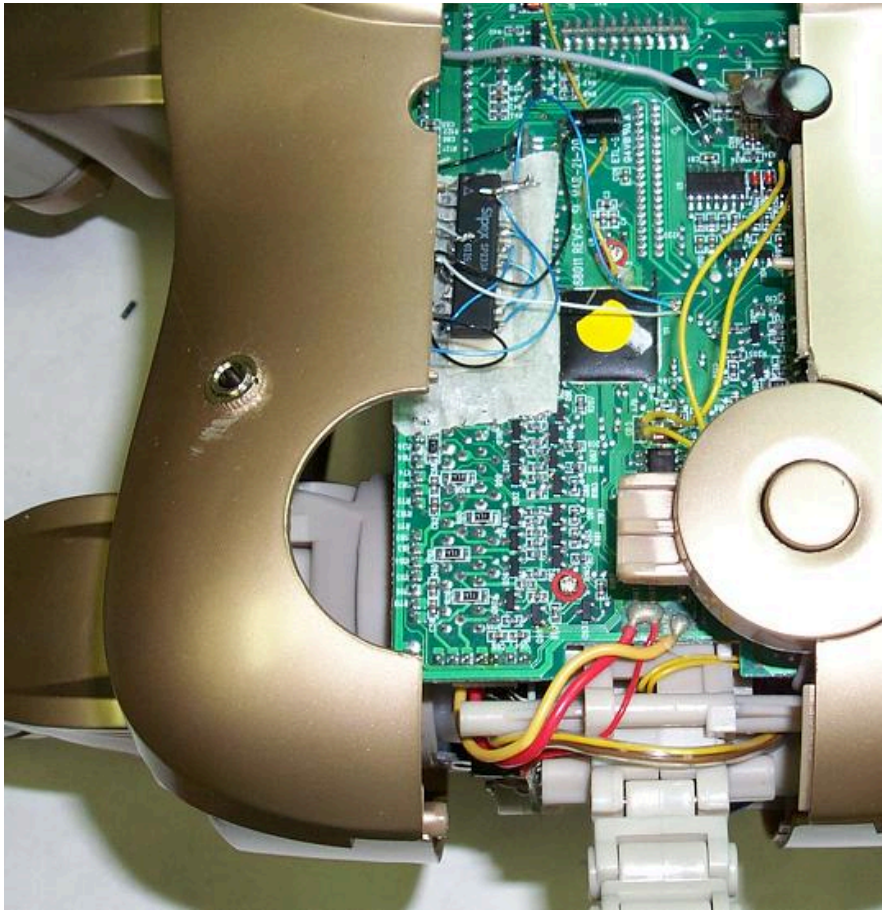
The following are the instructions for installing an RS-232 port into your ICybie. After the RS-232 serial port is working, and CROM is installed (see below), your mild-mannered ICybie will be a "Super ICybie".

Step 1 - remove the ICybie Shell

NOTE: Perform this step first (even before you buy the parts). If you don't have the heart to take apart your ICybie, stop right here.

You need to separate the two sides of ICybie's main body shell. OPTIONAL: you can remove the leg shields to give yourself more room. You will need two triangular screwdrivers (or otherwise improved tools). If you only want to do the Super ICybie upgrade, you don't need to bother.

To separate the main shell, you must remove **seven** phillips (cross shaped) screws holding the body together. On the dog's left side, there is only one screw. On the dog's right side, there are **six** (one for each hole).
About half are visible, and can be easily removed. The other half are hidden under plastic covers/caps. Stick a long wood screw in the remaining holes, and give them a small turn - gently pull out the screw and the plastic cap should come out with it. NOTE: there may be two plastic caps in the same hole.
Once the plastic cap is removed, throw it away (it is not needed), and remove the phillips screw like all the rest.
The sides will easily move apart. If the sides are still stuck together, you probably forgot a screw, or didn't remove one completely.

Take a look around, and decide where you want to put your phone plug. If you don't have all the parts, reassemble ICybie until you do. Once the plastic caps are removed, it is very easy to take ICybie apart again.

Step 2: Get Parts, Borrow/Download a cartridge with the CROM installer on it

Get all the parts required before moving to the next step.

The MAX233 (or 233A) chip is recommended (single chip, no external capacitors), even though there are cheaper alternatives. For the phone plug/jack, a 1/8" stereo phone plug/jack is recommended. The smaller 3/32" size is harder to fit through the ICybie plastic shell so is not recommended. These can be found at Radio Shack stores or other electronics sources. Any three conductor plug/jack will work, limited only by your imagination and how well you can fit it into the ICybie case.

To finish the installation, you need to run the "CROMINST" installation cartridge once. You can borrow one of these cartridges, or if you have a SilverLit downloader, you can download the CROMINST cartridge software yourself.


Step 3: The hardware modification

> **WARNING: This design is over 10 years old. Many computers don't come with RS-232 Serial/COM ports anymore.**
>
> **Instead of installing an RS-232 level shifter inside of the iCybie, you can use a USB to 3.3 volt RS-232 adapter based on the "FT232RL" or other similar chips connected outside the robot. The adapter can be plugged directly into your computer's USB port, and appears as a virtual Serial/COM port. A common adapter board is available at SparkFun. If you use this approach, you won't need a MAX233 or 232 chip or a 9 pin DIN plug. This simplifies some of the construction, but the difficult steps remain unchanged:**
>
> - **You must wire directly to the iCybie main board, and bring out the RX, TX and Ground pins to the FT232RL board.**
> - **You must find/buy/build a working iCybie cartridge, initially programmed with "CROMINST".**

If not already apart, repeat Step 1 to separate the two halves of ICybie's shell.

Schematic
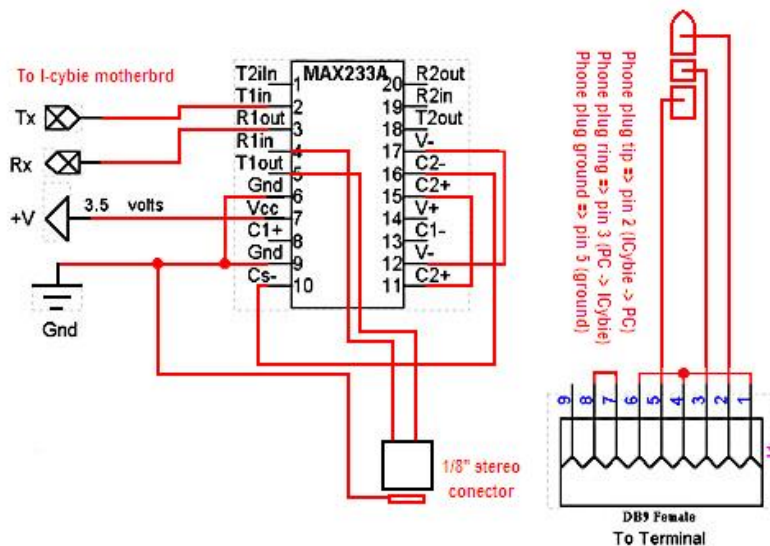
Thanks to Juan for the schematic.

Step 3A: the phone jack

Find a location in ICybie's shell where you want to install the phone jack. The location shown in the photo is very tight for a 1/8" jack. You may want to place it on the side or bottom of ICybie instead.
NOTE: be sure it is a stereo jack (ie. 3 conductors).
Drill the proper sized hole and install the jack. It will be connected in step 3C.

Step 3B: the MAX Chip

Take the MAX233 chip, and wire it up as shown below. If you are comforatble soldering directly to an IC chip, it is rather easy. If you would rather build a small circuit board, be my guest - but don't make it too big, size is at a premium inside the ICybie shell.

```
MAX233 (or MAX233A)
```

```
                        +------+
            nc -  1 |      | 20 - nc
to TxD0 of CPU -  2 |      | 19 - nc
to RxD0 of CPU -  3 |      | 18 - nc
to ring of jack -  4 |      | 17 - to pin 12
 to tip of jack -  5 |      | 16 - to pin 10
        Ground -  6 |      | 15 - to pin 11
         +3.6V -  7 |      | 14 - nc
            nc -  8 |      | 13 - nc
        Ground -  9 |      | 12 - to pin 17
    to pin 16 - 10 |      | 11 - to pin 15
                        +------+


        +3.6V from ICybie motherboard (see photos below)

        There are 4 ground wires all connect together
            Two from MAX chip (pins 6 and 9)
            One from phone jack (ground - base part of jack)
            One to ICybie motherboard (see photos below)
```
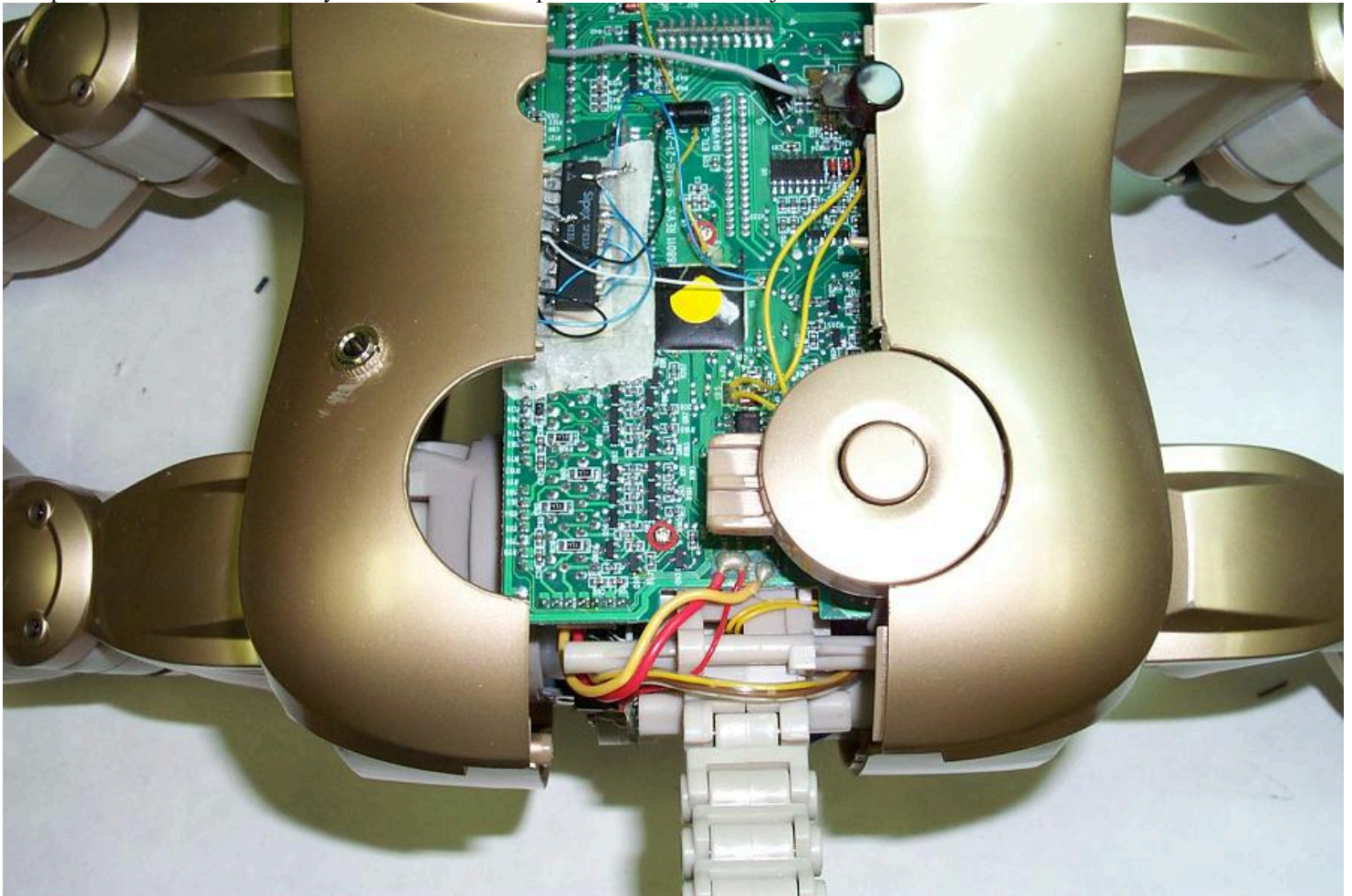
Step 3C: wiring it together

Find a location where you want to put the MAX chip. I put down a little masking tape to prevent electrical shorts and put the chip directly on top of the main board. You may decide to do a more professional installation job.


The phone jack is easy to wire up.

You must get power and ground from the main board. An easy place to solder is the connector to the system ROM.
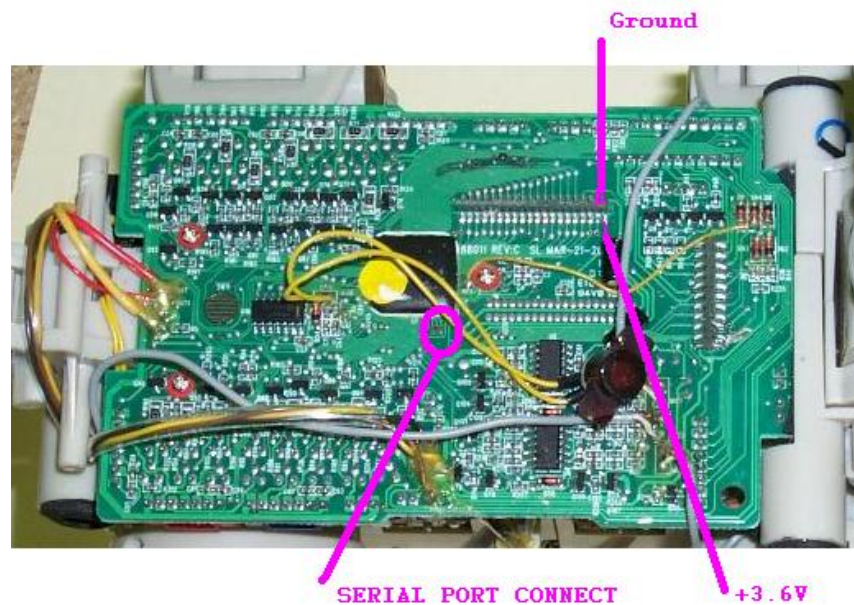
The top right corner of the photo shows two pins soldered together - this is ground. Right below that (the lower right corner) has one pin that is +3.6 volts. You can solder on the connector or the capacitor next to it (the black thing below it in the photo).
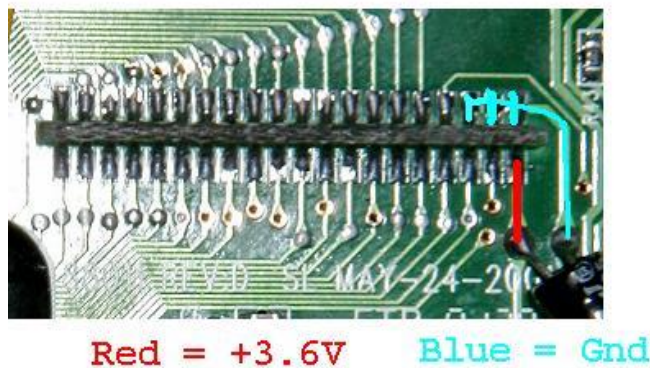
Step 3C cont'd: Revision C or Revision D?

The next step is wiring the two leads to the pads right next to the CPU. There are two revisions of board, Revision "C and Revision D (clearly marked on the board). With the Rev C board, soldering to the small pads is very difficult. You need thin wire-wrap wire, a fine and clean soldering iron, and a steady hand. With the Rev D board, soldering to the large pads is very easy.
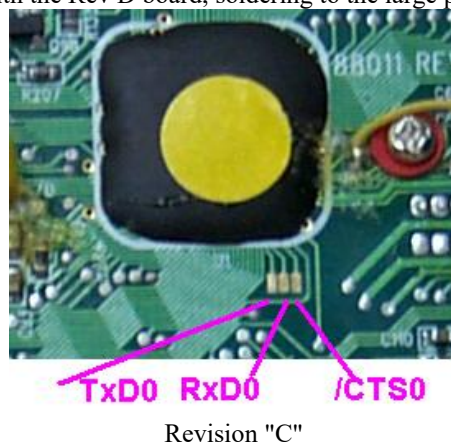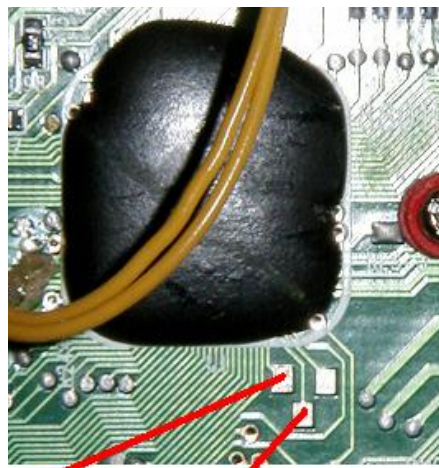
Revision "C"

Revision "D"

In either case, leave the "/CTS0" pin unconnected. After soldering, inspect with a magnifying glass for solder bridges.

Step 3D: the RS-232 cable

This is the easy part. Connect the three wires of the phone plug to the RS-232 connector that will attach to your computer (usually a 9 pin female DIN plug). If you have a camera with a serial interface that connects to your camera with an 1/8" stereo plug, you may already have a compatible cable.

```
Phone plug ground => pin 5 (ground)
Phone plug tip => pin 2 (ICybie -> PC)
Phone plug ring => pin 3 (PC -> ICybie)
```

You should check the voltage on pins 2 and 3 to make sure they are connected properly.
The tip of the jack from ICybie, and pin 3 on the PC side should both be RS-232 transmit signals (measuring -10 volts or so with a voltmeter)
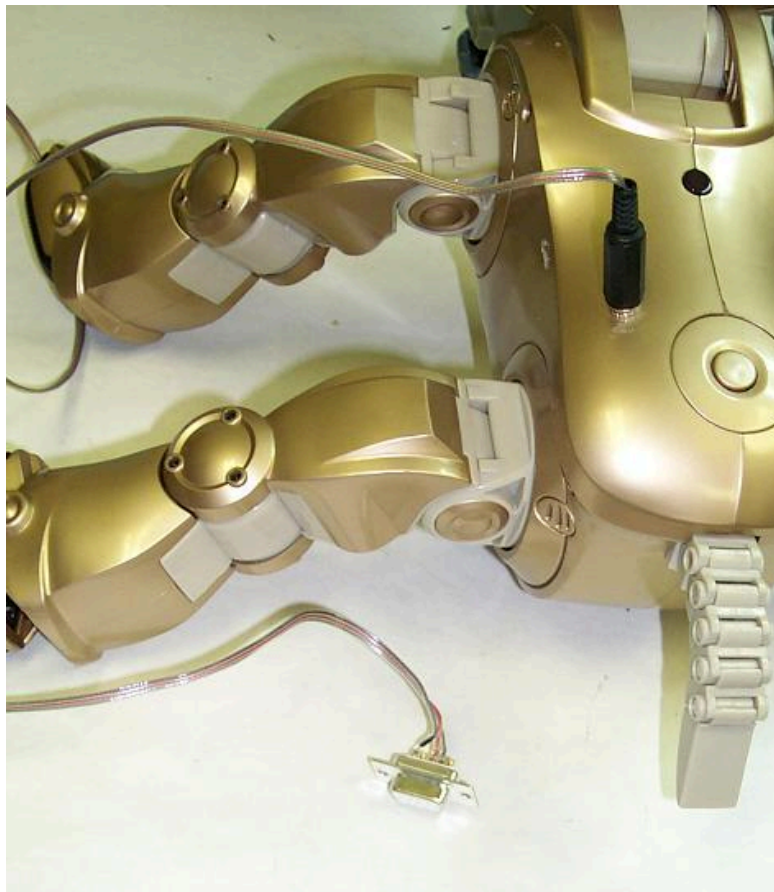
Step 4: CROMINST

Step 4A: Test the serial port

Ok, let's try it out (keep the shell open during this test).

- Connect your cable between ICybie and your PC.
- On your PC, start a terminal program (eg: HyperTerminal) and set it to 9600 baud, 8 data bits, no parity, no handshake.
- Place the CROMINST cartridge in the side of your ICybie (press it in tightly)
- Connect up the battery. You don't have to worry about the battery door.

If you see a bunch of "U"s on your terminal program - congratulations the serial from ICybie to your PC is working. If not please check your connections.

When you see a bunch of "U"s, press any key on your keyboard. If the serial connection from your PC to ICybie is working, the "U"s will stop and you will get the CROMINST menu.

```
    I-Cybie CROM Installer (version 1.1)
    (c) 2002 ICybiePet

    Sending $55 ('U') forever until I receive something
    UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
    UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
    UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
    ....
    UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
    UUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
    STATUS CHECK
      + OLD ROM will be upgraded
      + CROM will be installed
        ==> Ready to install <==

    CROM Installer Commands:
        I = Install (whatever needed)
        U = Uninstall CROM

    Enter Command >
```

If you don't get this far, you are on your own debugging the hardware connection.

Step 4B: Installation

CROM Installation

- Read the notice at the top. If Installation is not recommended, please email me and go no further.
- Type "I" to install CROM and any other upgrades. If you are ready to take the plunge, type "YES" (in upper case).
- It will take a very short time and then tell you it is done.
- Unplug the battery
- Remove the cartridge
- Plug in the battery again, close the battery door, and make sure ICybie is still sane.

Type: "I" =>

```
    WARNING: installing new firmware on your ICybie voids the warranty.
    Uploading new software may permanently break your ICybie.
    Using the Super ICybie modification is AT YOUR OWN RISK!
    If you understand what you are getting yourself into,
        answer 'YES' in upper case

    Are you sure you wish to continue?
```

Type: "YES" =>

```
     -- ok
    Installing CROM...INSTALLED!
    Installing New ROM...INSTALLED!

    STATUS CHECK
```

```
==> Nothing to install <==

CROM Installer Commands:
    I = Install (whatever needed)
    U = Uninstall CROM
```

Step 4: Use it

Try some of the YICT202 images.