



How To Compile the Ada Runtime Libraries (RTL)

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Abstract: Guideline to compile the Ada Runtime Libraries shipped with Linux distributions such as OpenSuse. The example here shows how to fix a bug in the serial communication package. A simple makefile is provided.

Keywords: Makefile, serial communication, flow control, GNAT.Serial_Communications, bug, bugfix

I appreciate every feedback that helps to improve this document !
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Thank you !

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1 The Problem

Users wish to modify, extend or just to fix a bug within the Ada runtime libraries (RTL). But there is no Makefile provided in order to re-compile them.

In the following sections I describe how to fix and compile an RTL by an example case.

2 Bugfix in GNAT.Serial_Communications

The following scenario has been discovered in the GCC 4.8 package, in *OpenSuse* distributions from version 13.1 up to 42.xx *Leap* (not older than one year). Other distributions may suffer the same problem since the root of the issue seems to trace to the maintainer of the code. The bug should have been fixed in later GCC versions.

GNAT.Serial_Communications is important when you need to communicate via serial interfaces like USB-Serial converters or legacy RS232 interfaces with peripheral devices. See <http://www.ftdichip.com/Products/Cables/USBRS232.htm>.

2.1 Where are the Runtime Libraries ?

On a 32bit machine, the runtime library source files live in

`/usr/lib/gcc/i586-suse-linux/4.8/adainclude/`

On a 64bit machine, the files are in

`/usr/lib64/gcc/x86_64-suse-linux/4.8/adainclude/`

However, the files end in `*.ads` (specification) and `*.adb` (implementation or body).

2.2 Bug Description

The serial communication with devices `/dev/ttyUSBx` or `/dev/ttySx` does not work if **hardware flow control** is enabled (CRTSCTS).

Since the file `s-oscons.ads` dictates a wrong integer for CRTSCTS in line 157, all bits in variable `Current.c_cflag` (in `g-sercom.adb`) flip to "one" when hardware flow control enabled, thus making all other bits in this "register" turn on. This causes some more strange effects on the interface ...

I found the correct number `16#80000000#` by counter-checking with a C-program which also confirmed the octal ! number specified in `termbits.h` (line 161).

2.3 Bugfix as Proper Solution

The file **s-oscons.ads** or the process that generates it should be fixed by the maintainer.

2.4 Bugfix Makeshift

As a makeshift I modified the body **g-sercom.adb** in line 237 and use it as "self written" library. See

https://github.com/Blunk-electronic/M-1/blob/master/src/lib/bugfix_sercom/g-sercom.adb

The specification **g-sercom.ads** does **not** need modification. See

https://github.com/Blunk-electronic/M-1/blob/master/src/lib/bugfix_sercom/g-sercom.ads

A makefile is required and should be saved in the parent directory

/usr/lib/gcc/i586-suse-linux/4.8/

See the Makefile at:

https://github.com/Blunk-electronic/M-1/blob/master/src/lib/bugfix_sercom/Makefile

In that directory type "make" then "make install". The newly compiled RTL should be updated now.

The Makefile can be adopted to other source files. See lines 17 through 23.

3 References

(1) <http://www.ftdichip.com/Products/Cables/USBRS232.htm>

4 Links

- ◆ find updates of this document at www.blunk-electronic.de
- ◆ Simplify manufacturing fault detection, hardware bring-up, debugging and system tests with *System M-1* the Boundary-Scan Test System at <http://www.blunk-electronic.de/products.html>

5 Disclaimer

This document is believed to be accurate and reliable. I do not assume responsibility for any errors which may appear in this document. I reserve the right to change it at any time without notice, and do not make any commitment to update the information contained herein.