

# APPLE-1 WI-FI MODEM 9600 BAUD OPERATIONS

This document describes how to increase the speed of communication between the Apple-1 and the Wi-Fi Modem when used in conjunction with the External Serial Terminal described on the page:

<https://p-l4b.github.io/terminal/>

The communication speed, originally limited to 600 Baud, can be increased to 9600 Baud.

## PRELIMINARY NOTES:

- What is described in this document is offered AS-IS, NO WARRANTY can be given.
- Operation (even at 600 baud) may be negatively affected by the presence of the terminal card, due to the known ringing/crosstalking problems that afflict the Apple-1 BUSES. They worsen when using more than one expansion cards at the same time.
- If you experience problems such as missing characters or other unusual behavior:
  - if you use BUS extenders, try moving the position of the various cards.
  - if you have the modem with PCB version 1.10, try relocating the ACIA mapping (and consequently also the EEPROM page) as described in section 3.
- 9600 operations will only be available after reprogramming the 28C64 EEPROM of the Wi-Fi modem board with the file available on the project page: <https://p-l4b.github.io/wifi/> .
- Make a backup of the EEPROM content before updating it.

Before operation, take the usual measures to protect against electrostatic charge build-up, as described in the main manual.

## 1. FIRMWARE UPDATE

Reprogramming of the firmware must be done with a programmer suitable for rewriting the 28C64 EEPROM; detailed discussion of this procedure is beyond the scope of this document.

Once the EEPROM has been reprogrammed, place it back on its socket, taking care to ensure the insertion direction is correct and that the pins have not been bent.

## 2. OPERATIONS

The original terminal programs, set up for 600 Baud communication and already available at entry-points:

- C000 → with local *echo* generated by the program itself
- C100 → without *echo*

remain available in the same way.

The following programs have been added, **set up for 9600 baud**, whose entry-points are at the addresses:

- C090 → with local *echo* generated by the program itself
- C190 → without *echo*

To set the Wi-Fi modem to operate at 9600 Baud you will have to:

- Open a terminal session to Apple-1 using the terminal board.
- Execute the desired terminal program with C000R (or C100R) followed by ENTER key (from now on indicated as {ENTER}).
- Once in communication with the modem issue the following command:

```
AT$SB=9600 {ENTER}
```

- The following message will appear on the screen:

```
SWITCHING SERIAL PORT TO 9600 IN 5 SECONDS
```

At this point the current terminal won't be responsive, so don't give any command.

Now:

- Reset the computer with RESET button or with the CONTROL-R key combinations.
- Execute one of the 9600 Baud enabled programs, either C090R {ENTER} or C190R {ENTER}.
- Now give the command:

```
AT {ENTER}
```

The following message should appear:

```
OK
```

*From now on, your modem will communicate with the Apple-1 at a speed of 9600 Baud, the original video terminal will remain inactive, and communication with the modem will only take place via the external terminal.*

If you wish to make the change of speed to 9600 Baud permanent, and thus avoid having to perform this procedure every time you switch it on, give the command:

```
AT&W {ENTER}
```

In case of problems, the modem's 'native' command interface will always remain available through the modem's USB connector, after disconnecting it from the expansion board.

### 3. DIFFERENCES BETWEEN THE DIFFERENT MODEM VERSIONS

With Revision 1.10 of the board, changes were introduced for compatibility with Briel Computers' Replica-1 Plus. Please refer to the project documentation for details, however, we would like to remind you of the differences in ACIA addressing in the different modem versions:

PCB ver.	EEPROM BANK	ACIA ADDRESS
1.0	fixed	\$7000
1.10	BANK 0	\$B000
1.10	BANK 1	\$8000

If you experience glitches at 9600 Baud, and you have version 1.10, you can try changing the EEPROM bank and ACIA Address by moving the jumpers accordingly. Make sure that the new addressing you have chosen does not conflict with other external peripherals, if any.

### 4. CUSTOMIZE SPEED

If you would like to change the communication speed of new programs to one of your choice, you will find listed here the EEPROM absolute locations to be modified with any hexadecimal editor. If you have PCB version 1.0 (which means without Bank Switching) enter the new value in all four memory locations listed below.

PROGRAM	ACIA ADDRESS	LOCAZIONE EEPROM	DEFAULT
\$C090	\$B000	\$0094	\$1E
\$C190	\$B000	\$0194	\$1E
\$C090	\$8000	\$1094	\$1E
\$C190	\$8000	\$1194	\$1E

The range of allowed speeds and the corresponding hexadecimal values are listed in this table (source: <https://www.westerndesigncenter.com/wdc/documentation/w65c51n.pdf>):

VALUE	\$11	\$12	\$13	\$14	\$15	\$16	\$17	\$18	\$19	\$1A	\$1B	\$1C	\$1D	\$1E	\$1F
BAUD	50	75	109.9	134.6	150	300	600	1200	1800	2400	3600	4800	7200	9600	19200

As can be seen from the table, the value \$1E corresponds to 9600 Baud. Choose the value best suitable for your experiments -which is also supported by the Modem's firmware- before reprogramming the EEPROM.

## 5. ALTERNATIVE LOADING

If you can't rewrite the EEPROM, you can still use the 9600 modem by entering the following program, taking care to adapt the bytes highlighted in yellow to the mapping in use for your ACIA, i.e.:

- 70 if your ACIA is mapped at address \$7000 (i.e. if you have PCB version 1.0)
- 80 if your ACIA is mapped to address \$8000 (jumper in position "8000" - PCB version 1.10)
- B0 if your ACIA is mapped to address \$B000 (jumper in position "B000" - PCB version 1.10)

*Before entering and running the program, follow the instructions in section 3.*

Instead of running the program at address C090 and C190, which you will obviously not have on your EEPROM, type in the following program. Take care to replace all bytes highlighted in yellow with the value appropriate to your configuration:

```
0600: a9 1e 8d 03 B0 a9 09 8d 02 B0 58 20 11 06 4c 0b
0610: 06 ad 11 d0 10 fb ad 10 d0 29 7f 20 1f 06 60 8d
0620: 00 B0 ad 01 B0 29 10 f0 f9 d0 e6
0000: 48 a9 08 2c 01 B0 f0 fb ad 00 B0 8d 12 df 68 40
```

The entry point of the program is \$0600, so run it with the command:

```
600R {ENTER}
```

Now type in the following commands (you may not see what you write: proceed anyway):

```
AT {ENTER}
```

If the following answer appears:

```
OK
```

you can start using the modem at 9600 Baud. If you typed the **AT** command "blindly" issue the command **ATE1** {ENTER} to see what you type from now on.

If the correct response to the **AT** command does not appear, recheck the program you just wrote and redo the procedure.

If you are using Linux, you can also copy-paste the above program into a text file and load it with the `sendfile.sh` script downloadable from the Terminal project site.

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We hope you will enjoy your *Apple-1 Wi-Fi modem!*

**APPLE-1 MODEM WI-FI**

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