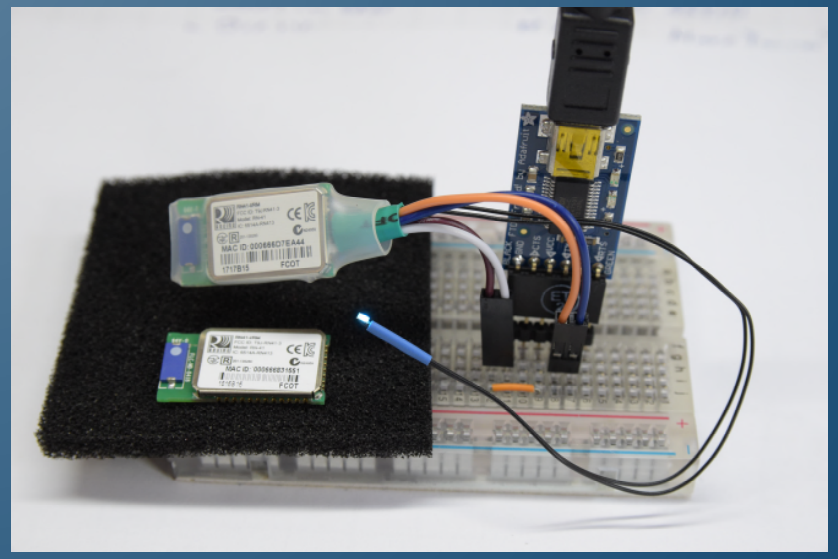
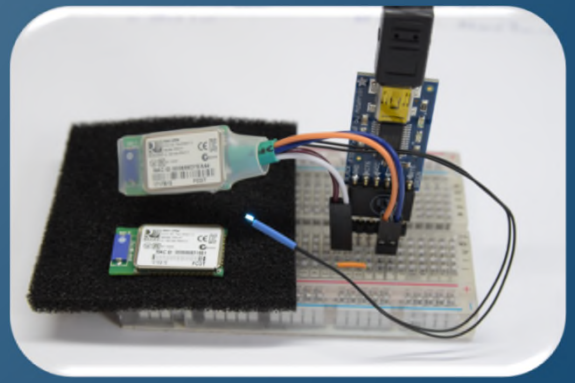
BLUETOOTH MODULES

TTL LEVELS
QUALITY
RANGE
STATUS LED



BLUETOOTH FOR TELESCOPE HANDCONTROLLERS

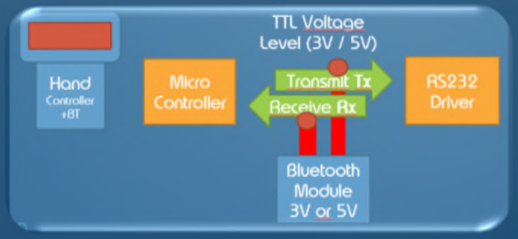


ALL INFORMATION, DOCUMENTS & VIDEOS

HANDCONTROLLER UPGRADE BIBLE

https://astro.marxram.de/handcontroller-upgrade-bible/

Version 1.0 (22.9.2018)



MY FREE APP:

SCOPE FRIEND

AVAILABLE @ GOOGLE PLAY STORE

Synchronize

Time

Date

Location

https://play.google.com/store/apps/details?id=de.marxram.astro.scopefriend

DISCALIMER

- This document is ment as a reference only
- It may also contain some errors like incorrect labels or voltages
- Please doublecheck if possible, check the electronic devices documentation, try to trace electricity (e.g. GND, VCC,…)
- To manipulate your Handcontroller may break it, or it's capabilities to communicate
- You should be experienced in soldering, before you start
- Everything you do, you do at your own risk!

T T L – TRANSISTOR TRANSISTOR LOGIC

- Voltage Levels of Microcontrollers
  - Common voltage levels: 5V 3,3V 1,8V
  - Microcontrollers and other chips „Talk“ this voltage levels
  - If connecting 5V and 3,3V Controllers → Voltage levels need to be shifted!
- Handcontrollers using 5V:
  - SynScan V3, NexStar, Meade AUTOSTAR I
- Handcontrollers using 3,3V:
  - SnyScan V4, NexStar+, NexStar+ USB, StarSense, StarSense USB

➢ **Chose a suitable Bluetooth Module**

BLUETOOTH MODULES WITH BT-SPP*

*SERIAL PORT PROFILE

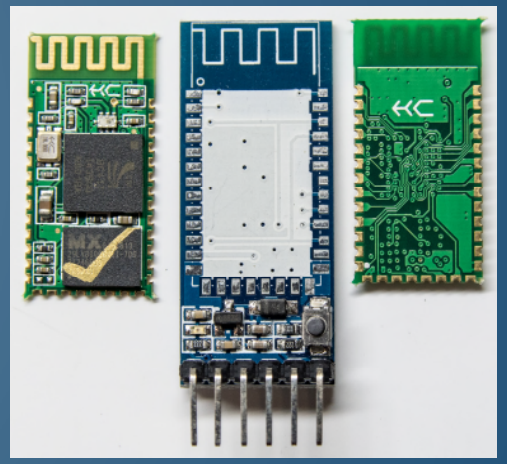
	HC-05	RN42	RN41	LM780
VDD	3,3V	3,3V	3,3V	5V
TTL	3,3V~(5V)	3,3V	3,3V	5V
Imax	~100mA	~100mA	~100mA	~100mA
BTClass	2 ~ 10m	2 ~ 10m	1~100m	2 ~ 10m
Price	2-10 $	20-40 $	30-50 $	20-40 $
	Very Robust	High Quality	High Quality	High Quality

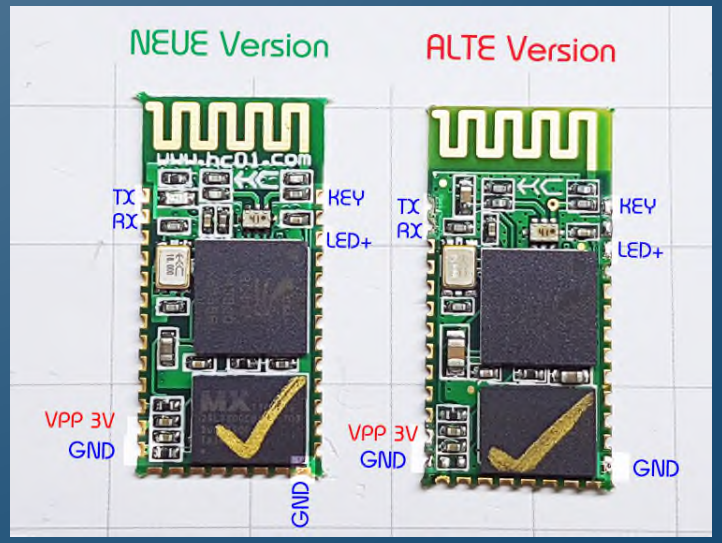
HC-05

CHEAP BT-MODULE FOR MANY PURPOSES

HC-05

- Cheap ~ 2-10$
- VCC - Input Voltage: 3,3V
- TTL Level: 3,3V (RX and TX tolerate ~5V)
- Adapter PCB reduces VCC from 4-6V to 3,3V
  - Does not shift logic levels!
  - Switch to enter programming mode
  - Status LED → State Pin (if LED pad soldered correctly)





PROGRAMMING HC-05

1. Power On + „KEY“ PIN HIGH
   - Adapter Board: Hold button down while connecting to VDD
2. HC-05 enters AT Mode
   - LED blinks slowly (2 seconds)
3. Now connect @38400 Baud

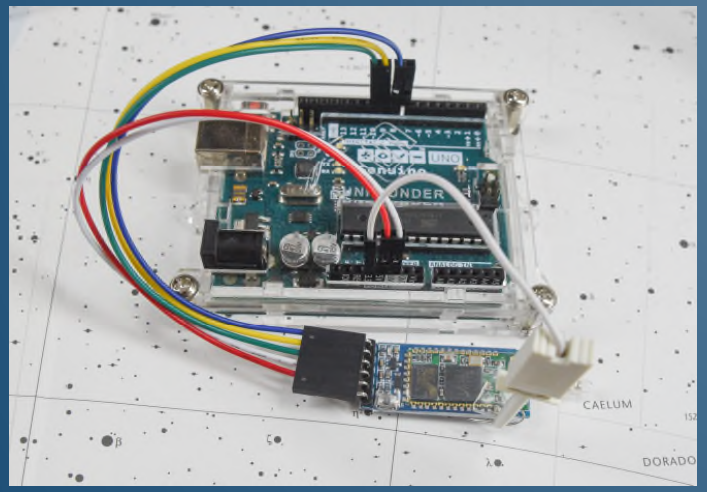
- HC-05: Commands are performed, after entering „CR+LF“
- *Notice:*
  HC-06: Commands are perfomed directly → Need for speed or tool

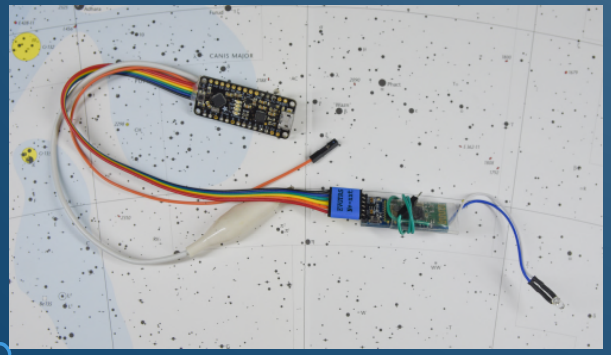
Commands & Answers

Check Connection:	AT → OK
Set Name:	AT+NAME=„My New Name“ → OK
	Needs „...“ if blank characters used
Set PIN:	AT+PSWD=0000 → OK
Set UART:	AT+UART=9600,0,0 → OK
	sets Baud = 9600, Stop Bit = 1, Parity = 0
Get Name	AT+NAME? (Works only if „Key“ is HIGH)
Get PIN	AT+PIN?

ARDUINO SERIAL BRIDGE

Data forwarding via Arduino





BT_Device-AT-Programming-Trinket_Pro_USB_Minimal

```
#include <SoftwareSerial.h>

#define RxPin      10      // Connects to Tx Pin on HC-0X Module
#define TxPin      9       // Connects to Rx Pin on HC-0X Module

SoftwareSerial BTSerial  (RxPin, TxPin); // Software Emulated Serial port (RX | TX)

void setup()
{
  Serial.begin(9600); // Start Serial Connection to computer
  BTSerial.begin(38400);  // Start Serial Connection to BT-Module (must be in AT Mode)
}

void loop()
{
  if (BTSerial.available()){  // If a byte is available on BT side
    Serial.write(BTSerial.read()); // Send it to the computer
  }
  if (Serial.available()){ // If a byte is available from the computer
    BTSerial.write(Serial.read()); // Sendi it to the BT-Module
  }
}
```

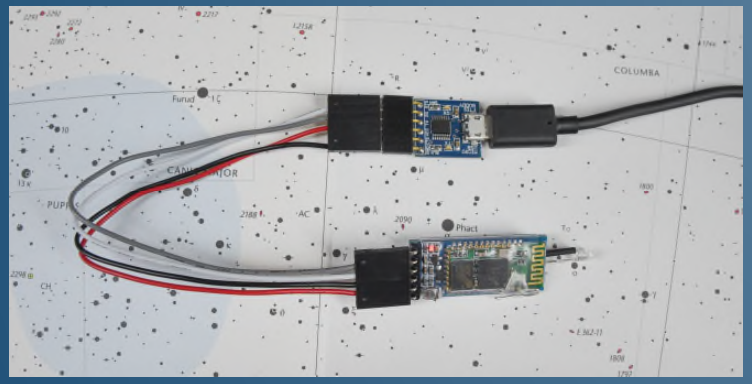
COM3

AT+NAME="MARXRAM Node2" Senden

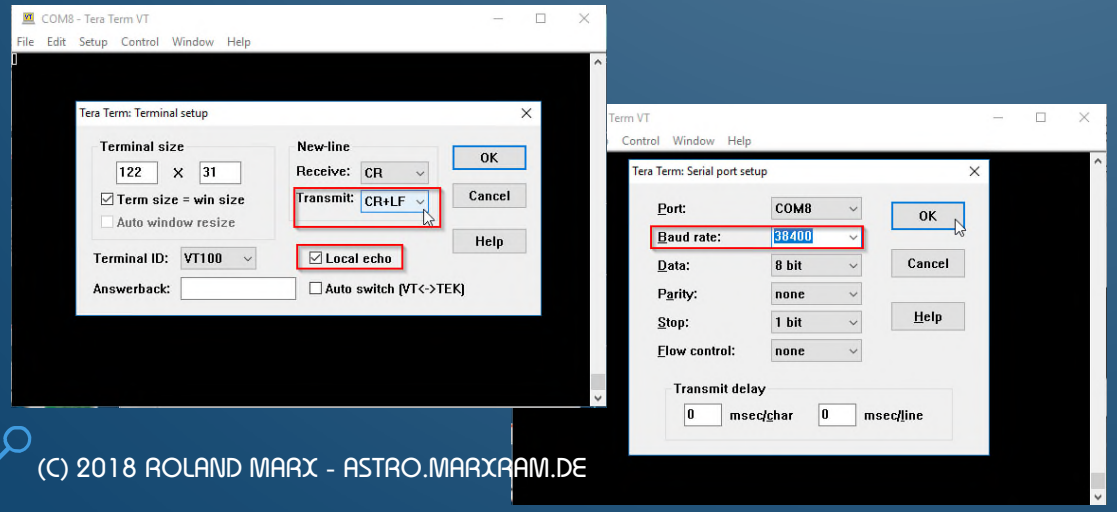
```
OK
OK
```

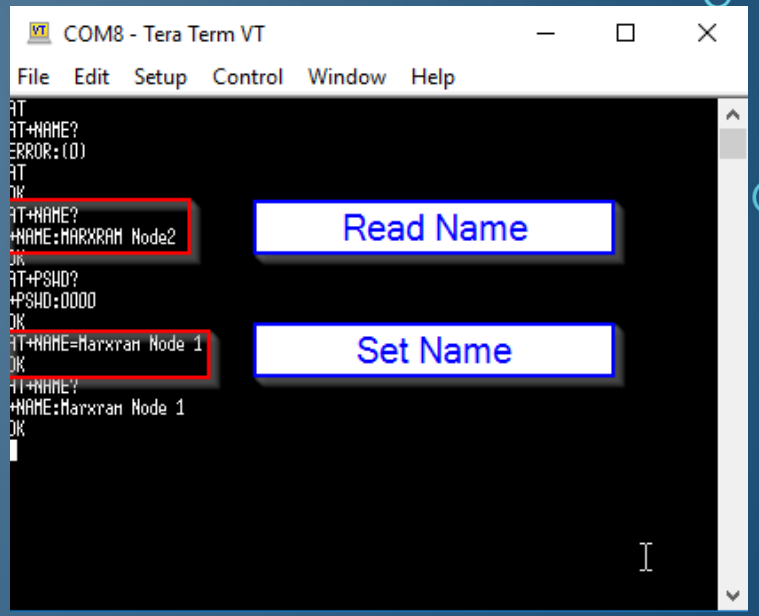
Autoscroll | Sowohl NL als auch CR | 9600 Baud | Ausgabe löschen

FTDI DIRECT PROGRAMING



Direct transmit via FTDI Adapter
(only HC-05, not suitable for HC-06)





Attention:
Every Character you type, is sent directly to the BT-Module! Using „DEL-Key" will result in Error Messages.

Solution:
Just Type „AT" + Enter to get in a correct state.

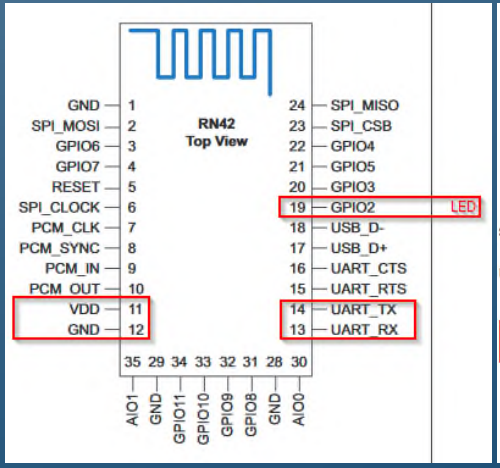
RN 41 / RN 42

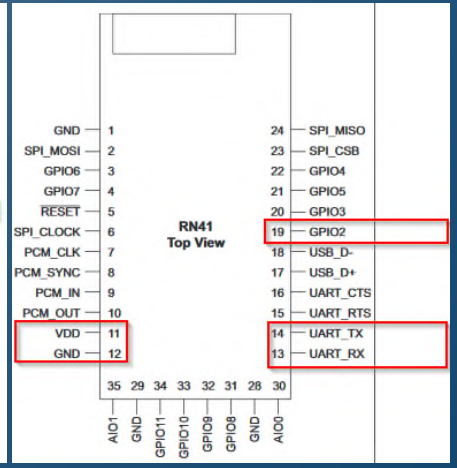
HIGH QUALITY MODULES WITH SHIELDING

MORE RANGE WITH BT-CLASS 1 (RN-41)

BLUETOOTH MODULES
RN-41 & RN42

- Cost 20-50$
- High quality and certified
- VCC - Input Voltage: 3,3V
- TTL Level: 3,3V
- Change command mode via „$$$“





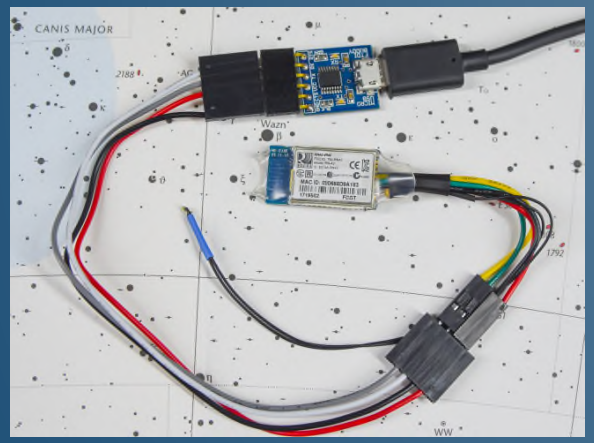
PROGRAMMING RN41 / RN 42

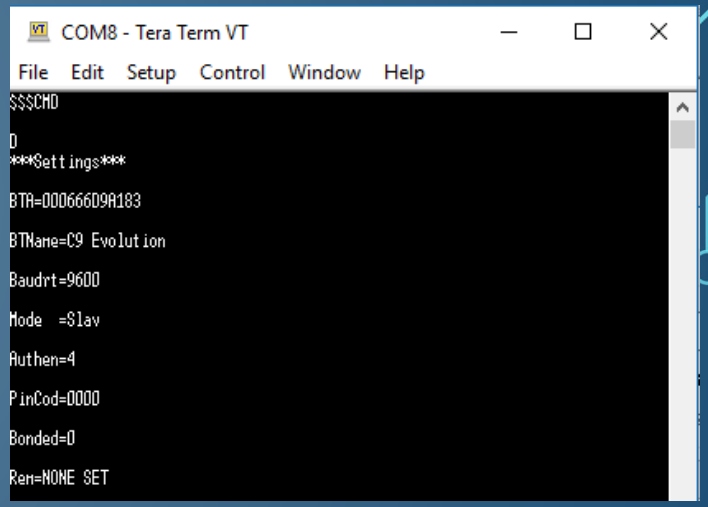
1. Connect @115200 BAUD
   - If you changed the rate, use the new one afterwards!
2. Type „$$$“ to enter Command Mode

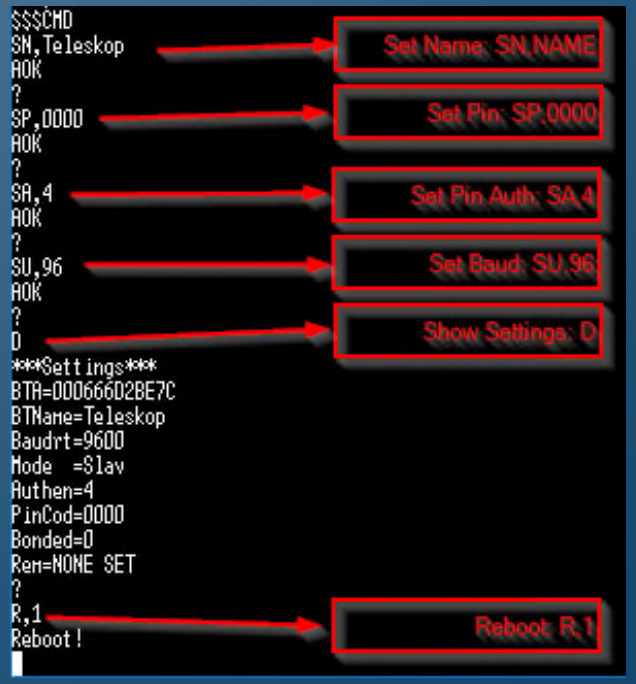
Commands & Answers

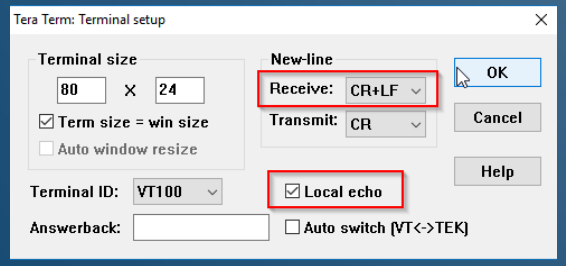
Command Mode	`$$$` → CMD
Get Device Info:	`D` → „***Settings*** .....“
Set Name:	`SN,My New Name` → AOK
Set PIN:	`SP,0000` → AOK
Set UART:	`SU,96` → AOK
	sets Baud = 9600, Stop Bit = 1, Parity = 0
Set PIN Authentication	`SA,4` → AOK
Set UART:	R,1 → Reboot !

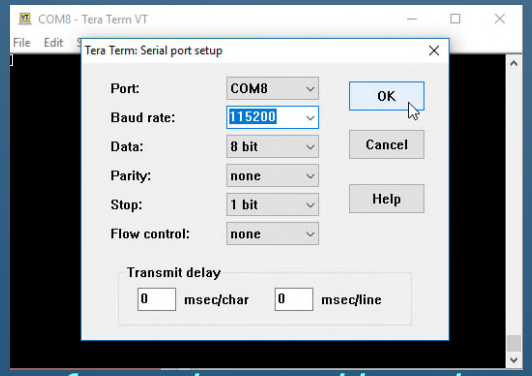
FTDI DIRECT PROGRAMING











if you changed baud rate, use the new one!

LM780

TRUE 5V TTL LEVELS

DISCONTINUED, BUT SOME STILL AVAILABLE

BLUETOOTH MODULES
LM780

- Cost 20-40$
- High quality and certified
- VCC - Input Voltage: 5V
- TTL Level: 5V
- Production Discontinued

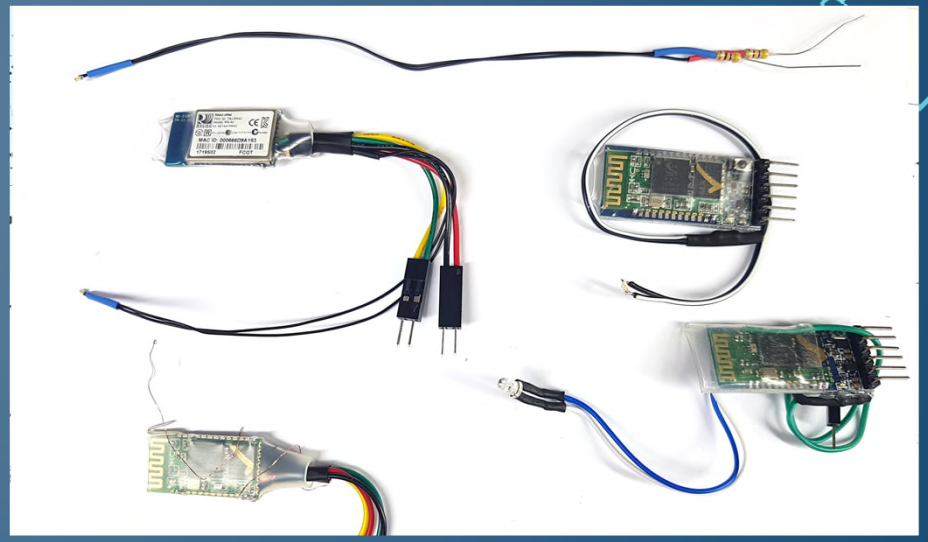
STATUS LED


ESC
UTILITY 3
RATE 2
NGC 5
USER 9
TOUR 1
M 4
OBJECT 8
PLANET 7
CAPRICORNUS

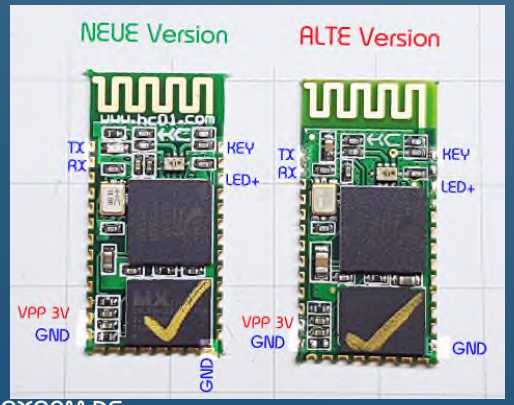
CONNECTION STATUS LED

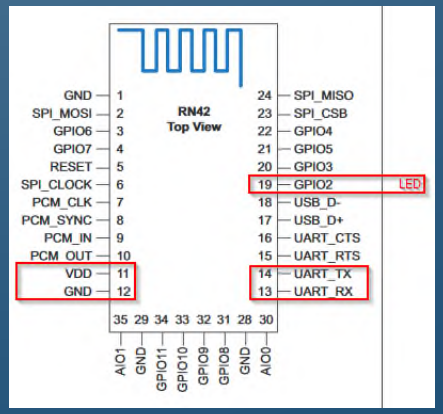
- Electrical Parameters
  - Blue LED → V ~ 3V
  - We want dim LEDs → I ~ 1mA
  - Driving with 3,3V
    - Use Resistor R ~ 800 OHM
    - I commonly use 2x 470 OHM
- Connection
  - GND
  - LED

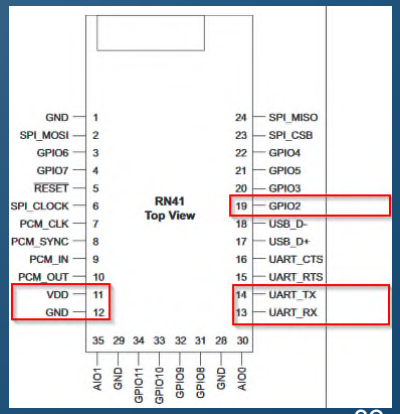
    see diagrams



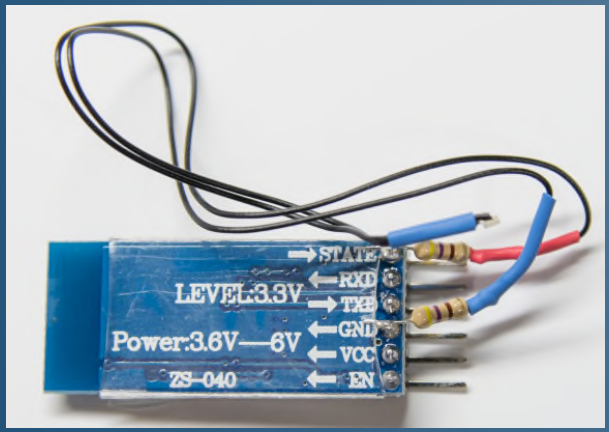
Different LED types

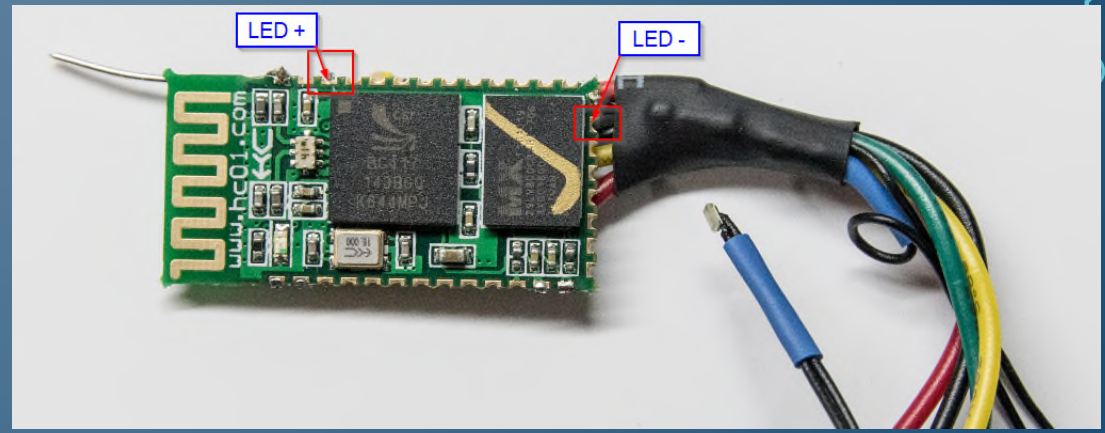


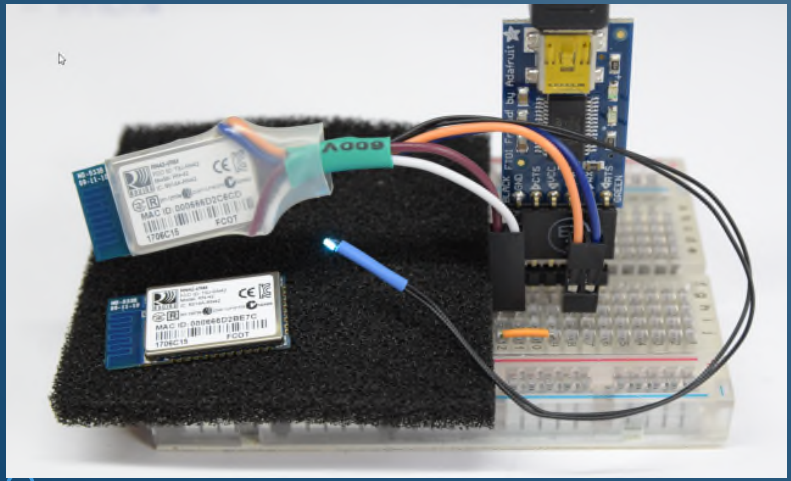


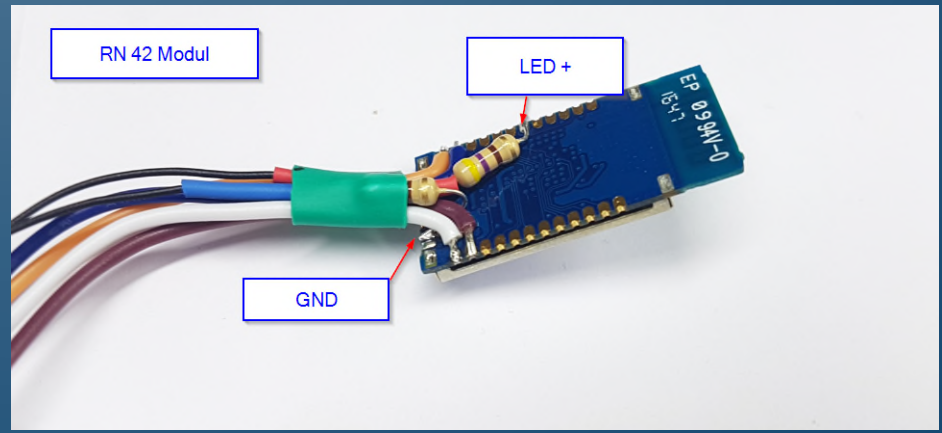


EXAMPLES


STATE
RXD
TXD
GND
VCC
EN
LEVEL:3.3V
Power:3.6V—6V
ZS-040

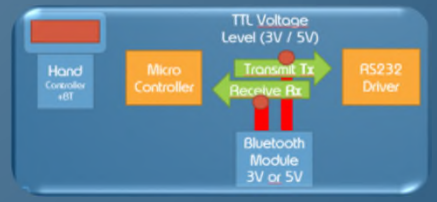

LED +
LED -
www.hc01.com



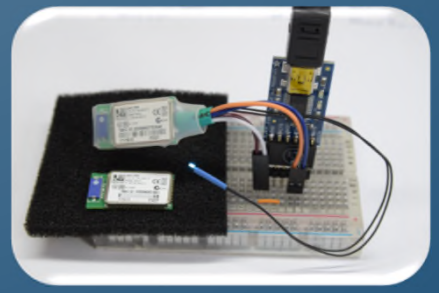

RN 42 Modul
LED +
GND

More Videos and Documents

https://astro.marxram.de/handcontroller-upgrade-bible/



1. General Information on Upgrading to BT



2. Bluetooth Modules
   - Specs
   - How to program BT Name, Pin ...
   - Status LED

3. Hand Controllers in detail
   - Skywatcher, MEADE, Celetsron
   - HowTo solder guide

GOOD LUCK, CLEAR SKIES & THANKS FOR WATCHING

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