STN1110 RN-42 Kit Assembly Instructions

Note: Please read over all of these instructions before assembling the kit.

1. Carefully open the kit when you get it. There is an antistatic bag w/ the sensitive parts in it, and a Ziploc bag that has a pirce of folded paper in it that has additional small parts. Carefully unfold the paper as saran-wrapped parts (w/ labels) are taped to the paper. You'll need to cut the parts free with an exacto knife or similar when you need them.

2. Download the source files from here: http://batman.homelinux.com/blog/obdii/STN1110_RN-42_R2.zip and http://batman.homelinux.com/blog/obdii/STN1110_Driver_Board_R3.zip and extract the zip files to separate folders. You'll need the BOM and assembly drawings for each PCB found in each of the two folders you extracted stuff to.

3. In each folder, the BOM is located here: \Release 1.0\[board name]\Generate Files\Reports and the assembly drawing is located here: \Release 1.0\[board name]\PDF Drawings It can be helpful to print both off when assembling the boards. Use the pictures on the OBDII page to determine which board is the driver board and which is the Bluetooth board (if it's not totally obvious). Each board is labeled in small text with the PCB name and the PCB revision. Be sure the PCB revision matches the revision number shown in the BOM and all other documents for that PCB.

4. If you haven't soldered small surface mount parts before, this tutorial is helpful before starting: http://www.sparkfun.com/tutorials/96

5. First off, solder down U1 on the driver PCB. This part can be hard to solder if the small parts surrounding it are soldered first. Pin 1 on all ICs is shown in the assembly drawings as a dot in one corner. Likewise, the PCB also has a small dot indicating pin 1.

6. Next, solder all the resistors, capacitors, LEDs, transistors, FETs, and diodes to each of the PCBs. Refer to the BOM and assembly drawings to determine what reference designator corresponds to what part in the BOM. Parts in the kit are labeled with either their part number (2n7002 for a FET for example) or their reference designator if there is only one of those parts. For single resistors and capacitors, their value is labeled on the part's packaging.

    a. For the diodes, the "bar" marking on the diode needs to correspond to the bar or thickest end of the silkscreen on the PCB. For instance, the diode "bar" for D9 needs to be placed so that it is **closest to Q4**, D8 and D10 should be placed so that their "bars" are **closest to Q1**, and D1 needs to be placed so that its "bar" is **furthest away from R5**.

b. For the LEDs on the Bluetooth board, they should be places to the clean lenses point out to the sides of the PCB. These are right-angle LEDs. There are little green bars on the backs of the LED to show where the cathode of the part is. These green bars correspond with a little bar that is tough to see in silkscreen on the PCB. So for D3, D6, and D7, these LEDs should be installed so that the little green bars are **closest to C4** (these 3 LEDs are oriented the same way). For D4 and D5, these LEDs should be installed so that the green bars are **furthest away from U3**.

7. Next, solder the somewhat larger parts to the PCBs, such as X1 on the Bluetooth board, and L1, U2, U5, and U6 on the driver board.
8. Lastly, solder the largest parts to the Bluetooth PCB: U1 and U3. Make sure that all the pads are adequately soldered on U1 as some can be tricky to solder.
9. This is where some minimal power supply testing gets done on the driver PCB. It is extremely hard to troubleshoot the module when everything is soldered into a complete unit. You will need some sort of power source, such as a bench top supply, or even a PC power supply. In either case, apply +12V to the Pin-16 hole of J1 (where the OBDII connector attaches), and place the ground wire at Pin-5 of J1. Turn the power on, and quickly measure the DC voltage across C8. This should read 5VDC. Now, measure across C16. This should read 3.3V. If those tests pass, proceed to the next step. If not, check to make sure all polarized devices are oriented correctly, all solder joints are connected to the PCB, and there aren't any solder bridges/jumpers. Don't apply power to the PCB in this state for more than a minute or so as certain parts heat up due to current flowing through them without the Bluetooth board installed.
10. Now, solder the two 7-pin headers to the driver PCB (J2 and J3). These should be placed such that they stick out perpendicular to the top of the driver PCB (the top of the driver PCB has U1, L1, and U5 on it). It will help to place the Bluetooth board on to these headers to make sure enough header sticks out of the driver board to be able to solder the Bluetooth board to the headers later on. Solder the headers from the back of the Driver PCB (but remember the header sticks out of the top of the driver PCB).
11. Clean off the solder flux on both sides of the PCB. Depending on the solder you use, cleanup can differ. For rosin-core solder, isopropyl alcohol and a toothbrush can be used for cleanup. For no-clean solder flux, flux remover and a toothbrush will remove the flux. Rosin core flux should be removed for long-term reliability, and no-clean flux should be removed for a more professional look if that is desired.
12. Now, place the driver PCB onto the OBDII connector. Match up the rounded-corner square hole on the PCB to pin 1 of the ODBII connector (numbers are molded into the PCB side of the connector). The top of the driver PCB should be facing away from the OBDII connector; likewise, the back of the driver PCB should be touching or nearly touching the plastic in the OBDII connector. Solder each of the 16 pins on the OBDII connector to the driver PCB. Be patient when soldering these pins as they need a lot of heat, so don't be afraid to leave your iron

on these joints for 10 seconds or so to allow the whole joint to heat up enough to make a good solder joint.

13. Clean off all the flux as in step 10.
14. Next, place the Bluetooth board (RN-42 module side facing up) on top of the headers. Slide this PCB down so that U3 on the Bluetooth board touches L1 on the driver board. Level the board, and then solder all the header pins via the top of the Bluetooth board.
15. Clean off the flux that resulted from the previous step.
16. You can now plug the unit into your vehicle or better yet, attach a power supply to pins 5 and 16 of the OBDII connector as you did in step 9. When power is applied, you should see each of the 5 LEDs blink, and then one LED will continue to blink non-stop. Now proceed to the programming section.

Programming the OBDII Module

1. Power the OBDII module up, and pair with it over Bluetooth using your laptop or a smartphone w/ a Bluetooth terminal application installed (laptop is preferred). No pairing PIN is required at this point. On the PC, tera term is the recommended terminal application (http://ttssh2.sourceforge.jp/). Once the PC is paired with the OBDII module, a virtual COM port will be created. Your Bluetooth software will either tell you what it is, or you can find it in Windows' device manager. This COM port number will be used in most of the following steps.
2. Power cycle the adapter, and then in tera term, open up a connection using the COM port number that was found in the previous step. Once the terminal window appears and window looks to be connected, type in three dollar signs ($$$) in the terminal. You will see a response from the Bluetooth module indicating that it is now in command mode. All of step 2 must be performed within 60 seconds or you will have to power cycle the adapter again as you can only enter command mode for the Bluetooth module within 60 seconds after power up.
3. Now that you're in command mode, send the following commands (press the "Enter" button after each line:

```
+
SU,9600
R,1
```

4. The last command will reset the Bluetooth module. Close tera term, and re-launch it again connecting to the COM port number found in step 1. For the next step, click "Setup->Terminal" from the menu bar in TeraTerm. Change "Receive" from "CR" to "CR+LF". Click the OK button.
5. In this step, you'll program the baud rate of the STN1110 chip. You can take as long as you like to program everything in this step. There aren't any timeouts. Press enter in the terminal window a few times to make sure communications with the STN1110 work properly. You should see a question

mark and a command prompt show up in the terminal window every time you hit the enter key. Now, send the following commands (press enter at the end of each line):

```
STS@1 Designed by Andy Honecker 2011
AT PP 0C SV 23
AT PP 0C ON
STSLXWT 50
STSLXP 0
STSLXST 3000
STSLX on, on
STSLUIT 60
STSLU on, on
```

6. Power cycle the module. Close the teraterm window, re-launch teraterm, and connect to the COM port found in step 1. Go into command mode again by sending three dollar signs ($$$) within 60 seconds of power up. Once you are in command mode, send the following commands to the Bluetooth module (pressing return after every command):

```
+
S-,STN1110 OBDII
SU,115K
SA,1
SP,1234
SC,0008
SD,0500
SY,0004
SI,0100
SJ,0100
R,1
```

7. If you want to change any of the Bluetooth module commands (such as the pairing PIN code) view the RN-42 manual here for command descriptions: http://www.rovingnetworks.com/files/resources/Bluetooth-RN-UM.pdf Likewise, STN1110 commands can be found here: http://www.scantool.net/scantool/downloads/98/stn1100-frpm.pdf
8. Once step 6 is completed above, the module is ready to be used with any software that supports the ELM327, such as Torque for Android or ScanXL for the PC.