**Program Notes**

**General**

For periodic sensor modules, the communication module takes the first measurement 5 seconds after having been started.

The SD card is optional and can be inserted or left out without any additional configuration. The SD card can also be inserted when the communication module is already running. The SD card can be removed from a running communication module, however the tasks will draw a bit more energy from then on (reason unknown, seems to be something in the SD card library for Arduino) and the SD card cannot be reinserted (Unless the communication module is reset using the reset button).

**Startup LED Indicators**

At the start, the LEDs indicate successful initialization:

* LED 1 (bottom, red) turns on when the RTC has been initialized successfully
* LED 2 (middle, green) flashing while XBee is trying to join network, stays turned on when network successfully joined
* LED 3 (top, orange) turns on when SD card successfully initialized. (Or if no SD card is inserted the LED also just turns on)

After two seconds all the LEDs turn off.  
After two more seconds, the sensor module is checked. LED 1 (bottom, red) lights up when the sensor module is asked for a measurement. Then either of the other two LEDs will light up for 1 second:

* LED 2 (middle, green) if the sensor module is an interrupting one, meaning we will not ask it periodically but it will interrupt the communication module when an event happens
* LED 3 (top, orange) if the sensor module is one that we wake up periodically to take a measurement.

If no LED lights up after LED 1 (bottom, red), then something with the sensor module or the communication is not ok.

**Debug Mode**

To enter debug mode, the slide switch must be on the east position when the communication module is started. Debug mode cannot be entered while the communication module is already running. Debug mode can be disabled while the communication module is running by putting it into the west position. In the debug mode, the LEDs indicate the status as follows:

For Periodic Sensor:   
In the Debug mode, a measurement is taken, transmitted via XBee and written to the SD card (if inserted) every 10 seconds (actually every 10 seconds plus time it takes for the task). When exiting the debug mode, the configured parameters for “measurement every x minute” and “transmit/SD write every x times” will be applied.

* LED 1 (bottom, red) turns on when the RTC interrupt occurs
* LED 2 (middle, green) turns on when all data has been received from the sensor module
* LED 3 (top, orange) turns on when the data has been transmitted via XBee
* The LEDs turn off after 2 second when the SD card write has been successful (or if no SD card is inserted the LEDs will also just turn off after 1 second). If the SD write has caused an error, the LEDs will just stay turned on.

For Interrupting Sensor:

* LED 1 (bottom, red) turns on when the sensor module’s interrupt has woken up the communication module
* LED 2 (middle, green) turns on when all data has been received from the sensor module
* LED 3 (top, orange) turns on when the data has been transmitted via XBee
* The LEDs turn off after 2 second when the SD card write has been successful (or if no SD card is inserted the LEDs will also just turn off after 1 second). If the SD write has caused an error, the LEDs will just stay turned on.

**Low Battery**

When the configured low battery voltage is reached, one warning message is sent via XBee and then the module stays in sleep mode; it does not wake up or take measurements anymore to save battery.