INTRODUCTION

The purpose of this weather station is to provide an easy to read LCD for users to get up to date information on real time meteorological conditions. The weather station will include a remote station for monitoring the weather, and a base station to display data. The remote would include two sensors. The first will measure the current temperature and relative humidity; the second will measure the wind speed. The information generated by the two sensors will be transmitted to the base station.

HARDWARE DESCRIPTION

The hardware for the weather station is broken into two main parts: the remote station and base station.

REMOTE STATION

POWER SUPPLY

For the desire to reduce the hardware there is no battery or transformer that power up directly the remote station. Its power comes from the base station via the RS232 communication port.

MC9S12C32 (U2)

The remote station uses a 9S12C32 microcontroller unit (MCU) from Motorola at its core controlling the connected peripherals. The power is supplied to the microprocessor using pin 47(VDDX) and pin 45 (VSSX). The serial peripheral interface input PM4 and the clock PM5 from PORT M will be used for the temperature and humidity sensor. PT0 will be used also for the wind speed. The resources that are not used are marked (nc).
RS232 COMMUNICATION PORT (J1)

The communication between the two stations is going to be made using the serial communication (SCI). On the connector only pin 1, 2, 3 and 5 are used.

WIND SPEED SENSOR (SEN1)

The TX15U is an analog wind speed that uses the principle of count relay. It generates a pulse train which frequency is proportional to the speed of the wind. Since the signal generated is already a digital signal that the MCU can process, its output is connected to Port PT0 which can be configured as a timer system input capture.

HUMIDITY / TEMPERATURE SENSOR (U1)

The temperature and humidity measurement are made using a single chip the SHT11 from SENSIRION. VDD (pin 4) is connected to a 5v DC and the ground is connected to pin 1. The measurements are converted with a 14 bit onboard analog to digital converter and transmitted to U2 using a digital two wire interface. The interface includes the data line and a clock line. Data is connected to PM4 which is the SPI and since the SHT11 requires a signal clock, I will use PM5 for serial clock. Resistor R2 is used to pull the data line high since the sensor use the open collector technique.

BASE STATION

The base station uses Motorola’s MC9S12DP256B and from the schematic it is labeled U1. The 9S12 receives data sent by sensors using the serial communication port (RXD, TXD). It also receives input from the four buttons UP, DOWN, MENU, and ENTER. These buttons are connected to PORT B (0-4). PORT A and K on the
controller are used to control the output on the LCD module. Input from the RTC is connected to the SPI and is used to keep track of the time.

**POWER SUPPLY**

The system uses a wall transformer that converts 120 V AC to 9V. Then it is input to the LM2931T – 5 regulator that gets a steady 5V DC output. The 5V is used on the 9S12 and also many of its peripherals.

**LCD MODULE (U2)**

The LCD module used is the HD44780A00, it is a 2X16 character LCD screen. It is shown on the schematic as U2. The LCD receives data from a total of 11 pins from the 9S12. It is connected to PORTA (0-7) and also PORT K (0-2). It is also connected to VCC of the microcontroller. VSS is connected to ground and VEE is connected to the potentiometer, which is illustrated in the schematic as R9 10 – 20K.

**USER INPUT (K1)**

The prototype of the system will have a entire 4x4 key pad but I will only be using four buttons which will be labeled menu, enter, up arrow, and down arrow. These buttons will be connected to Port B (0-4). These buttons are used to navigate through the user controls on the LCD. Menu will scroll through the menus, enter will select the menu option and the up and down arrows will scroll through number values for time.

**BDM (PL1)**

Since the system could need some changes down the road it is essential to have a means of updating the system. It is connected to the E clk and Reset pins on the microcontroller. It is used to communicate with the 9S12 and the BDM is designated as PL1.

**REAL TIME CLOCK (U3)**
This is U3 and it is the DS1305 Real time clock. This chip counts seconds, minutes, hours, date of the month, month, day of the week, and has leap year compensation valid up to 2100. This is connected to the SPI pin on the 9S12 and also SDO pin is connected to master out slave in pin and the SD1 is connected to the master in slave out pin. The chip enable is connected to the SS0 pin on the 9S12 as well. To select the SPI mode on the chip the SERMODE is connected the VCC. This chip will only be used to give me the real time. It is also backed by a 3V battery that keeps track of time even when power is out.