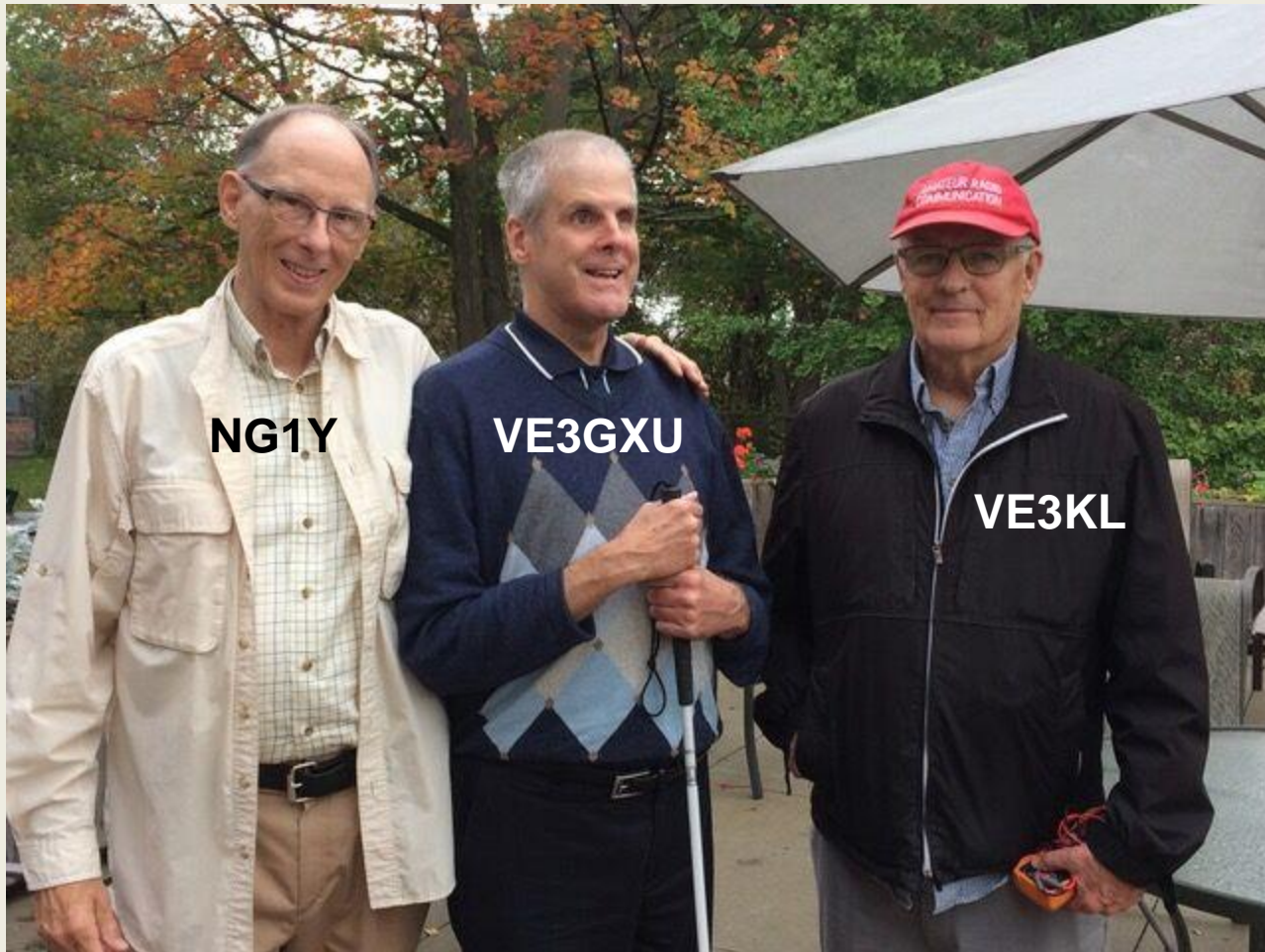


Helping Blind Hams to Use Modern Radios

Eight Year Case Study with Duncan VE3GXU

- **What are his skills and needs?**
- **New radios are extremely complex: Kenwood TS 590S**
- **Ergonomics and Simplicity: the key elements**
- **Audio Feedback Necessary: CW and Voice**
- **Touch: Is the radio heat sink hot?**
- **Use a datum point to orient the operator**

Jim, Duncan, Dave



Unitarian House of Ottawa

Duncan VE3GXU

- **Born Blind**
- **Father, VE3DMC, taught him Ham radio: HF**
- **Main interests: CW and some SSB nets**
- **Lives in a seniors his rise : HF antenna on roof**
- **Has a well equipped HF station: 80, 40, 30, 20**

Duncan VE3GXU Skills

- **Braille for reading and writing**
- **CW: hand key plus a paddle 18 WPM**
- **Music: Singing in a choir, takes lessons**
- **Very complex radios present a tactile challenge: Kenwood TS 590S**
- **Duncan does not like earphones: he needs audio feedback from surroundings.**

A Bit About Braille

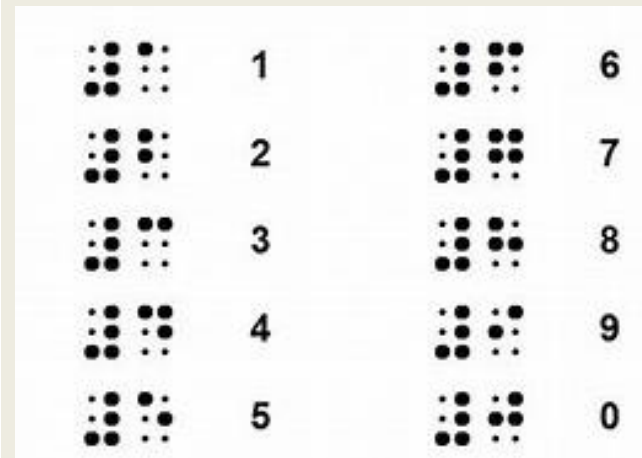
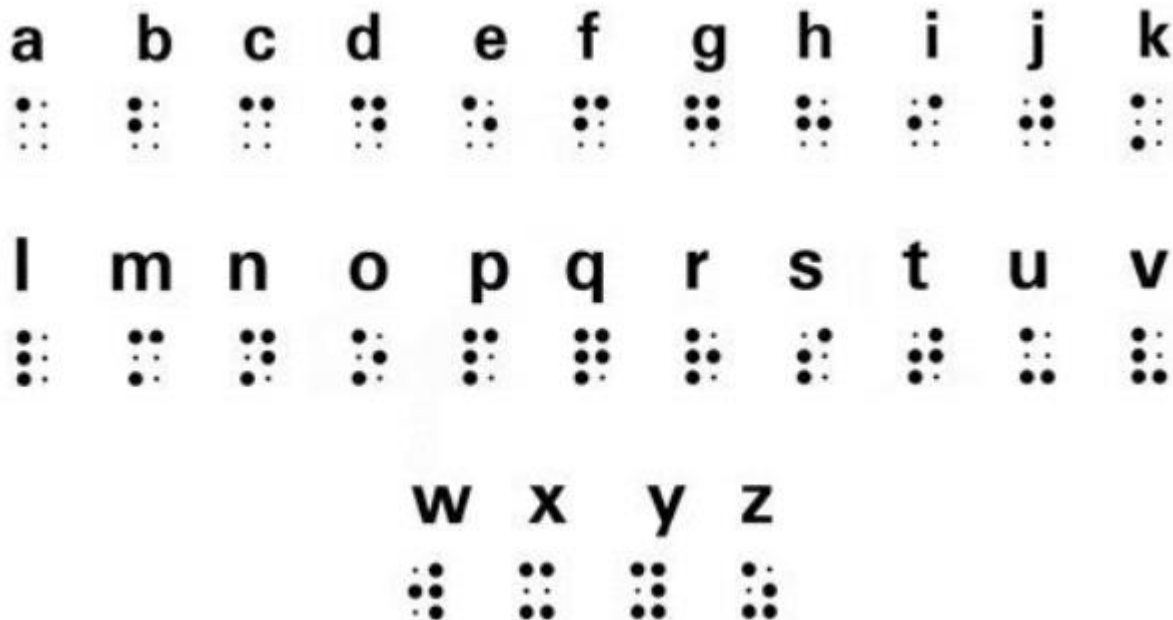
A 3 by 2 matrix

Letters a to j use only the top two rows: easy to learn

Letters k to t same as, a to j ,with one raised dot added to bottom left row

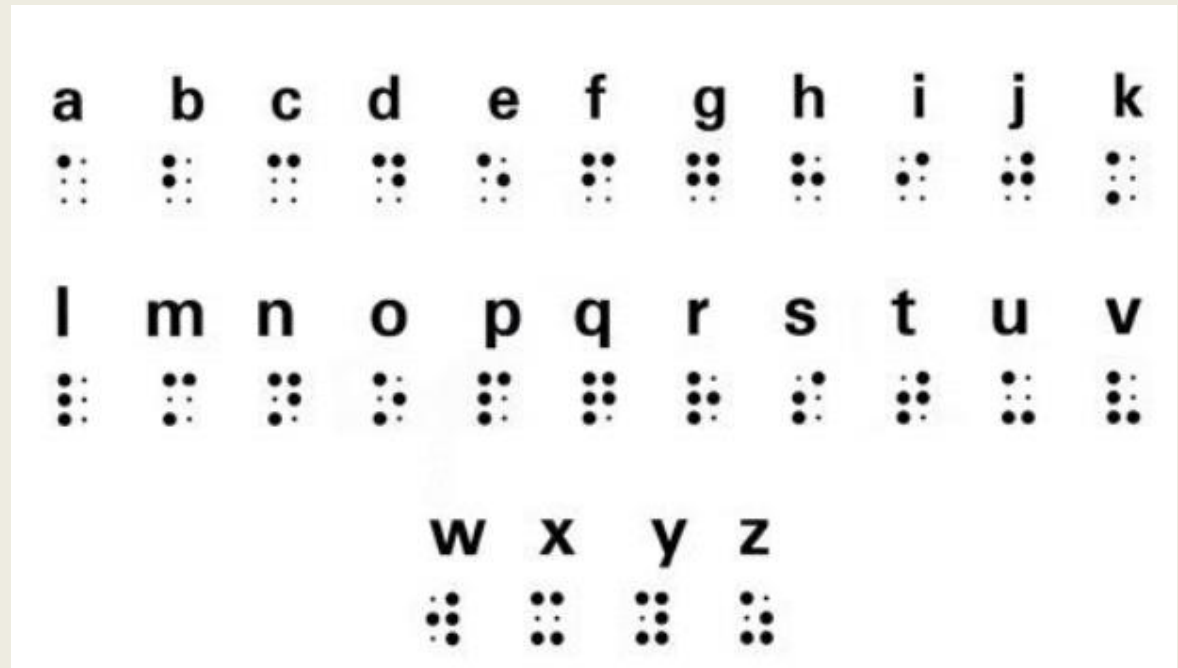
Letter u and v repeat with two dots added to bottom row

Letters w, x, y and z are unique and rarely used in French



A Bit About Braille

- [Louis Braille](#), who was blinded at the age of three, invented the system in 1824
- Invented Braille at age 15
- Easy to grasp for CW operators
- Braille readers take to CW readily
- A Braille labeller comes in handy to label radio hardware.



What Radio to Use?

- **None are designed for Blind Operators**
- **Some have better access for vision impaired**
- **Not much literature to help in any practical way**

TS 440S

Used by VE3GXU for Many Years



- All Manual Operation
- No RS232 Control
- Audio Synthesizer for Frequency Read-Out
- Most buttons have **no audio feedback**: RIT, SPLIT, Antenna port, Keying.....
- Not recommended: Too old and easy to touch the SPLIT button

Kenwood TS 480S

My Recommendation

- **Simple Interface**
- **Voice readout**
- **RS232 serial control: freq, dsp, power, mode.....**
- **Can be used without microcontroller control if necessary**
- **Very cost effective... Best Choice for Blind Hams**



Kenwood TS 590S

- Approximately **55 buttons** and knobs: multifunction and colinear
- Very deep Menu: 87 items
- **Voice readout**
- **RS232 serial control: freq, dsp, power, mode.....**
- Good if used with a microcontroller
- Can isolate “dangerous” buttons with acrylic shield
- Very hard to use manually: just too complicated



Assembling/Building The Station



The Station..VE3GXU



Dynamic Mic

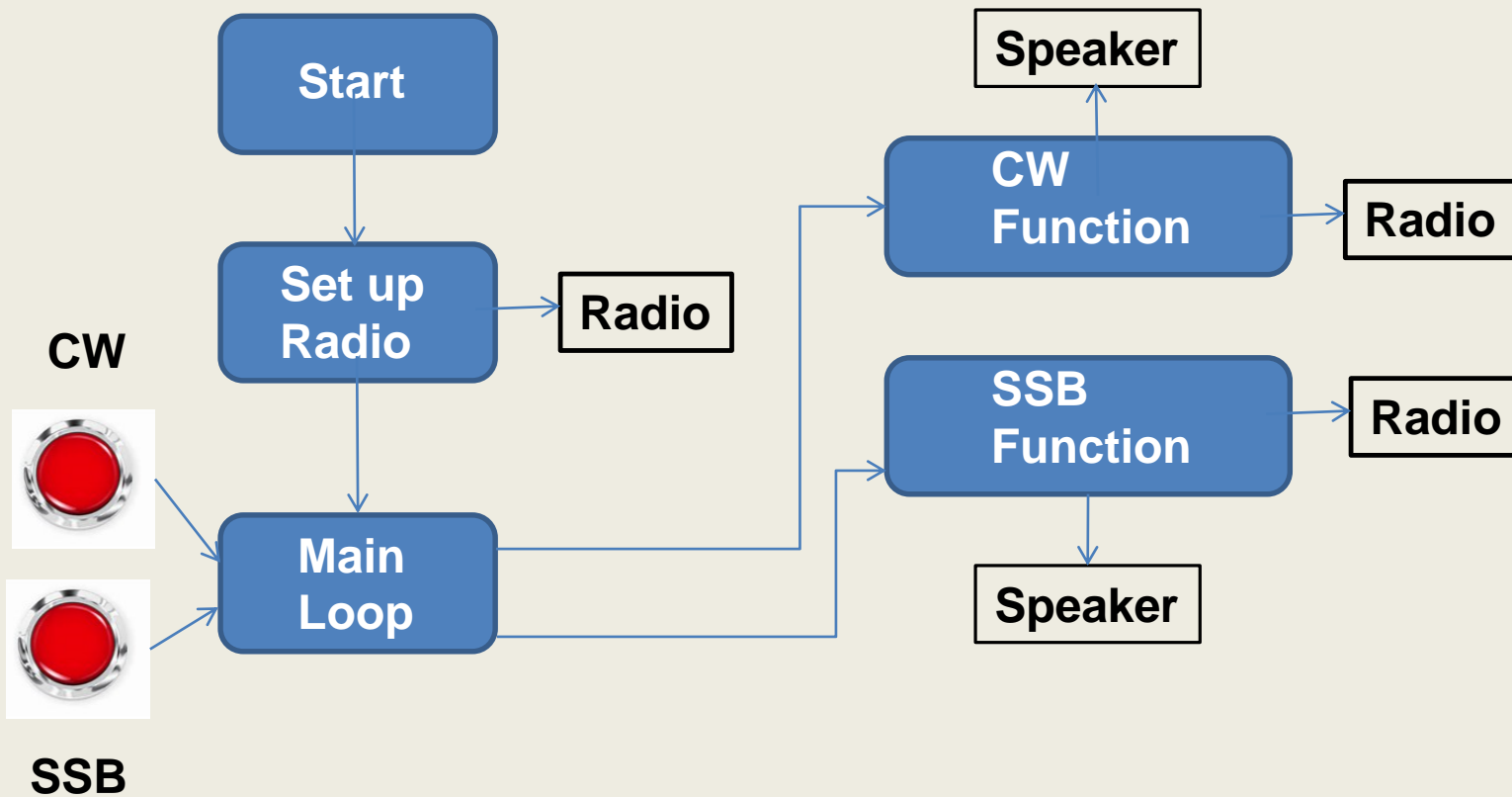
Paddle/ Straight Key

13.8 V Power Supply

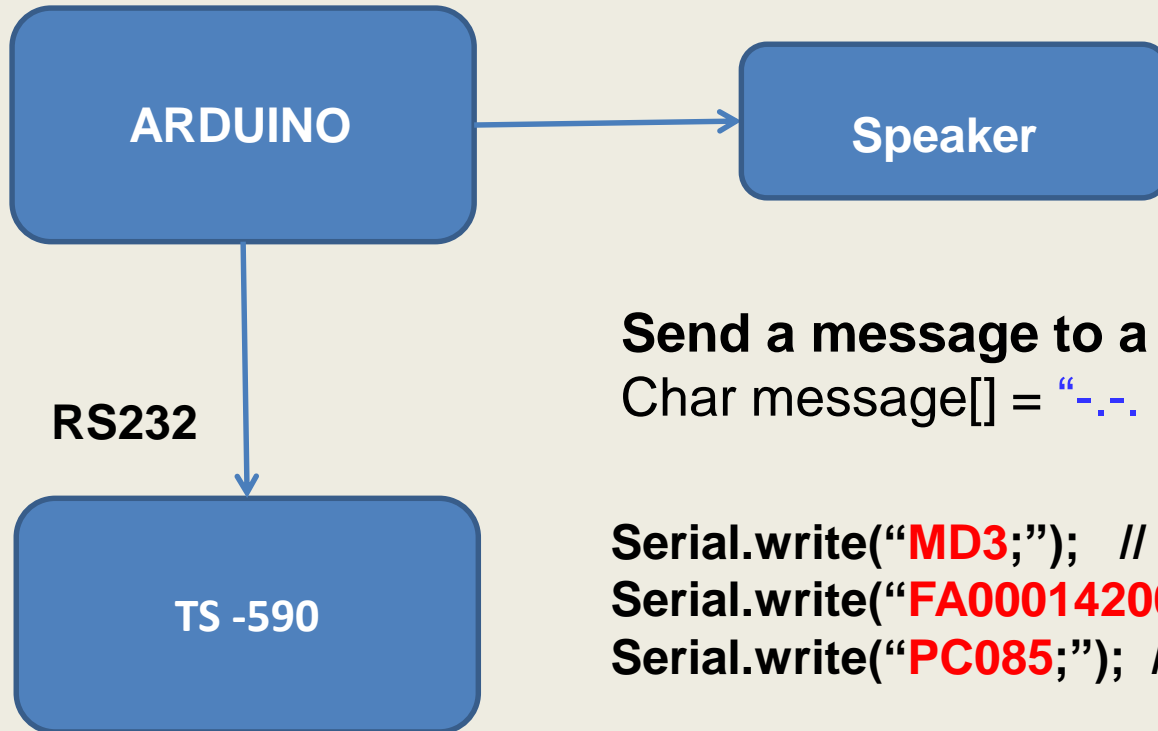
Control Box

TS 590 S

Arduino Software Block Diagram



Arduino/**Kenwood** Code Snippets



Send a message to a speaker

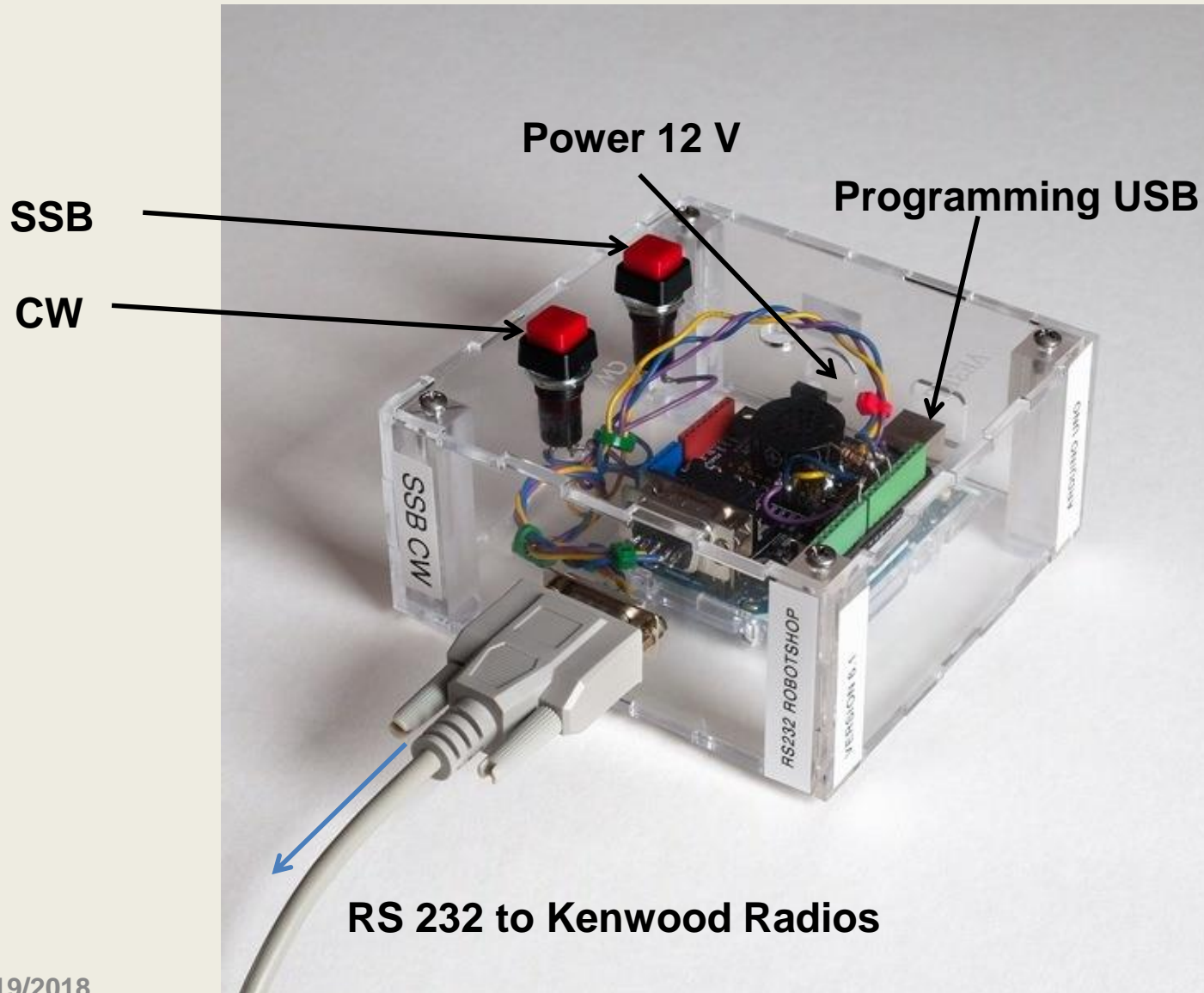
Char message[] = “-.-. .-”

```
Serial.write(“MD3;”); // sets mode to CW  
Serial.write(“FA0001420000;”); //14.2 MHz  
Serial.write(“PC085;”); // 85 Watts
```

Kenwood TS 590S Control Arduino

- Power Level (85W)
- Antenna Tuner, Receive Attenuator, Receive Preamp: **OFF**
- DSP Filters (600 Hz CW)
- Antenna Port #1...set once only to avoid switching in an Arduino loop.
- Initial Frequency 20m CW and SSB
- Band coverage 80, 40, 30, 20
- Sunrise and Ontars 80 m SSB nets

Control Box Arduino/RS232 Shield



My Test Station

Thanks Tyler



Power System

- **Simple Supply: one switch, no meters. Samlex 1235 30A Switching**
- **Power Pole Distribution for radio, control box and ATU**



Antenna Tuner...Automatic

- **Must use an automatic antenna tuner**
- **Manual tuner with cross needle display not useable**
- **Turn off radio's internal tuner on set-up**

The LDG AT-200ProII is a general purpose automatic tuner suitable for any amateur application. It covers 1.8-54 MHz, and features a two-position antenna switch allowing instant switching between two antennas. The AT-200ProII requires



General Comments

- Not much has been done...mostly voice output (talking Watt meter)
- HamPod have a product: a text to speech device



<http://www.hampod.com/>

<http://blind-ham-products.com/>

<http://www.hamradioandvision.com/>

<http://www.arrl.org/files/file/Technology/tis/info/pdf/8710027.pdf>

<http://www.arrl.org/access-to-amateur-radio-for-the-disabled>

Vy 73

Dave VE3KL

Thanks for your help:

- **Duncan VE3GXU** Providing feedback on his needs
- **Jim NG1Y** Contributions from the Sunrise net: TS 590S donation
- **Bryan VE3ZRK** Plastic box fabrication
- **Greg VE3Y TZ** Donated a Heil foot switch
- **Tyler VE3DGN** Loaned a Kenwood TS 480 radio for a test bed
- **Wayne VE3CZO** Power Pole wiring
- **Dave VE3TLY** Help with C/C++ programming
- **Sunset 80m SSB Net**
- **Ottawa Public Library** Laser cutting facility