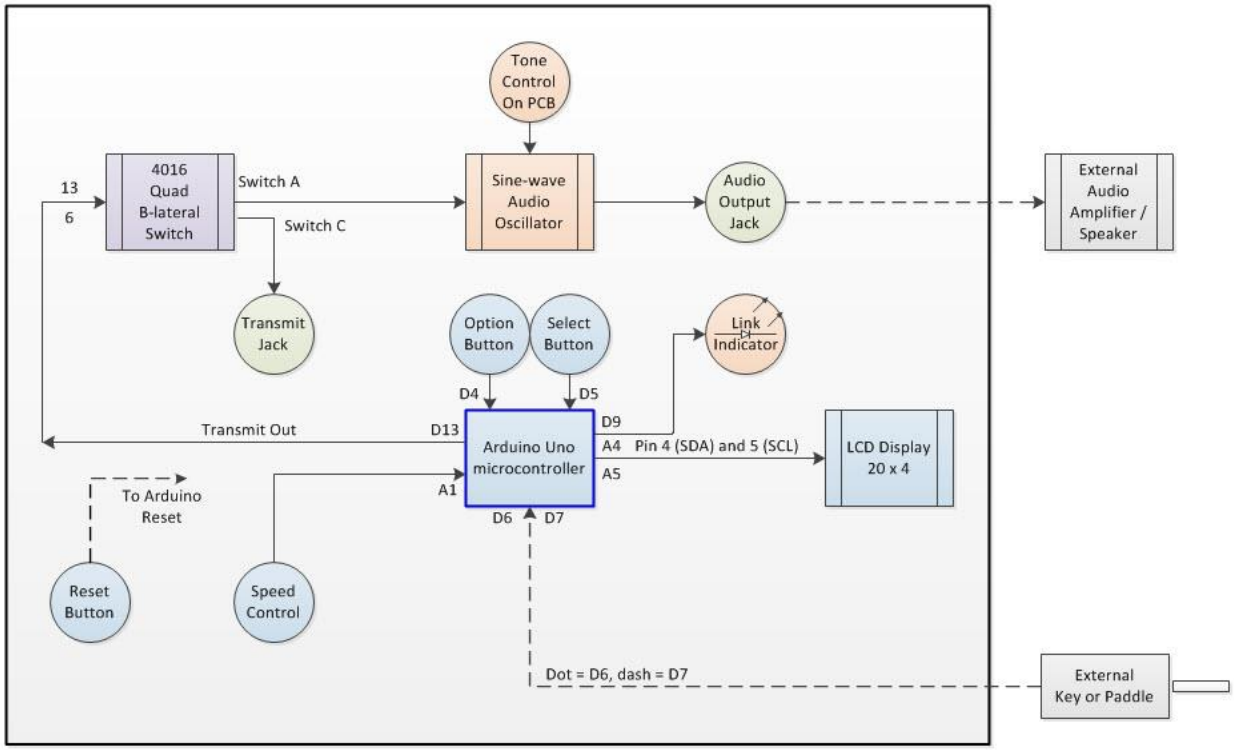
NetMOAK

Two minor changes were made to the MOAK device (hardware modifications). One was more-or-less necessary, an LED that indicates when the MOAK has entered computer-control mode. The other change is for convenience. A reset button permits the device to be reset without recycling power (removing and reattaching the USB cable). This button performs the same function as the Arduino on-board reset. These two changes are illustrated in an edited MOAK block diagram:



The computer control indicator LED (labeled 'link indicator' in the diagram) illuminates on HIGH, so its cathode should connect to ground through a current limiting resistor (e.g. 330 Ω or 470 Ω). It is suggested to install this LED near the MOAK command button. The reason for this placement is made clear in sub-paragraph 2d on page 5.

If a reset button is added to the device it should be placed where it will not be pressed accidentally. Alternatively use a recessed button for this function, or omit it.

Installing Software

1. Arduino MOAK sketch: A revised Arduino sketch for the MOAK (version 1.0.4.2) may be found here. This sketch preserves all previously implemented MOAK features and adds support for communication with the Windows NetMOAK application. The Adruino IDE may be used to compile and upload this sketch to the MOAK. Arduino IDE version 1.8.2 was used for development of the sketch. However, the sketch should compile in any subsequent version, provided the named #include libraries are accessible to the compiler.

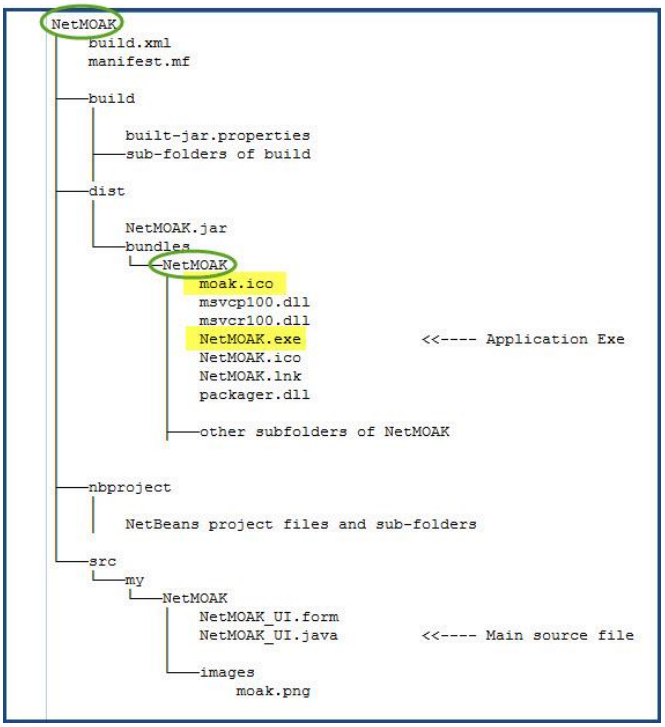
2. Windows NetMOAK application: NetBeans 8.0.2 was used to develop the NetMOAK application for Windows platforms. RXTX (LGPL) was used for serial COM support (event listener, reader, writer, etc). All this has been packaged into a runtime bundle in hope of facilitating easier deployment.

    a. NetMOAK.zip is an archive of the NetBeans development project, including Java sources, but not including the RXTX library and dll, which should be downloaded separately if it is desired to modify or otherwise experiment with the application in NetBeans. (~ 136 KB)

```
/**
 *
 * @author Lloyd
 * Hybrid application interfacing NetBeans Java UI application with Arduino MOAK
 *
 * Serial COM based on -
 * http://rxtx.qbang.org/wiki/index.php/Event_based_two_way_Communication
 *
 * American English word frequencies from the 5000 word list at:
 * https://www.wordfrequency.info/free.asp
 *
 *
 * Dependencies such as RXTX and the corpus of Contemporary American English
 * have their own license terms. A link to the RXTX license and GPL is included
 * with the this application's runtime archive.
 *
 * Anything that is not otherwise licensed (i.e. my part) may be considered
 * public domain.
 *
 */
```

    b. NetMOAK-runtime.zip is a much larger archive, including runtime files that were created by the NetBeans project menu 'Package as, Image only' option. (~ 58 MB)

3. To run the NetMOAK Windows application, *without* NetBeans, do the following:
    a. Unzip the 2b archive. This will create a tree of folders containing many files.



b. Notice a sub-folder under NetMOAK/dist/bundles that has the same name as the main folder. This sub-folder contains the application's .exe. A custom icon and a shortcut to the RXTX (serial port interface) license have also been placed in this folder.

c. Right-click NetMOAK.exe and select 'Create shortcut'. This will make a shortcut in the same folder called 'NetMOAK.exe – Shortcut'.[1] Rename this shortcut to NetMOAK. Note that the .exe by itself is non-functional. It requires many DLL's (runtime/bin folder) and other files, so do not change the structure of the NetMOAK storage tree.

d. Right click the shortcut that was created in step 'c' above and pick 'Properties'. Under Properties click 'Change icon' and in the 'Change icon' popup click 'Browse'. This will display contents of the current folder. There are two icon files. The automatically generated one (Java image) is named NetMOAK.ico. The other icon file has the application-meaningful Morse code image and is named 'MOAK.ico'. Select this one and then click OK, and OK, to change the icon and exit.

e. The NetMOAK shortcut should now display the selected icon. Copy or move the shortcut to a convenient location, i.e. wherever you want to run the application.

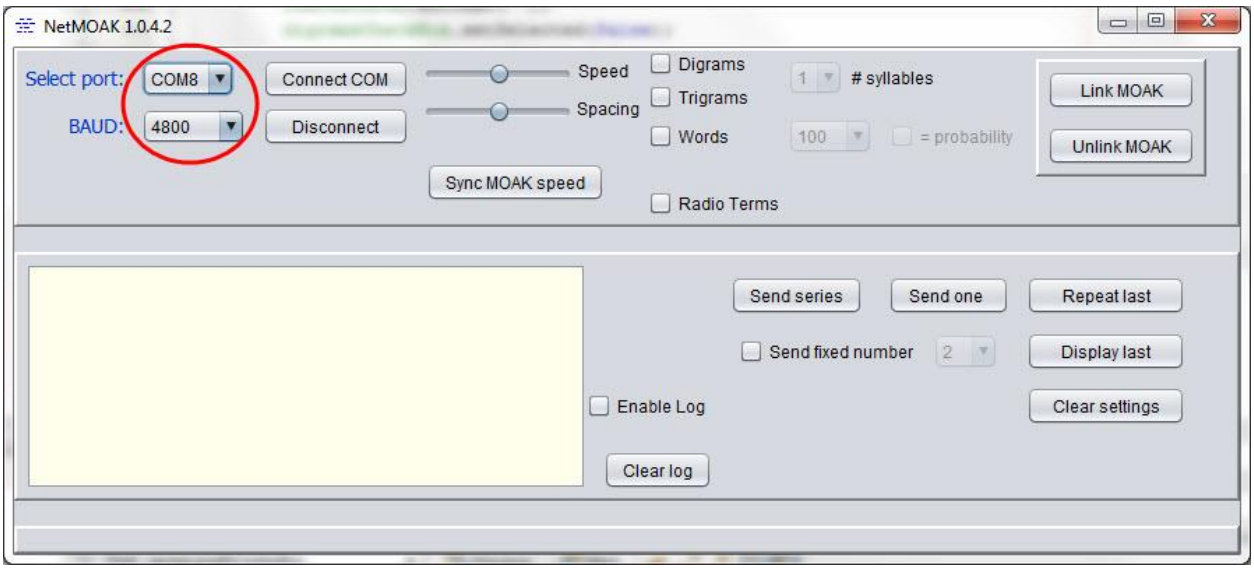
[1] Other ways of creating and placing a shortcut are equally acceptable.

Connecting and Linking with the Computer Application

1. Starting the MOAK: Connect the MOAK to a computer USB port socket that supplies 5 VDC. Normally the MOAK can be powered from a 5-volt DC brick, without connecting to a computer. However, to use the NetMOAK computer application it is necessary for the MOAK to be connected to the computer that will be running the program. At this point the MOAK should start up normally, displaying its title and version screen, followed by the default 'Electronic Key' option, and then its startup Morse speed.

2. Establishing Communications:

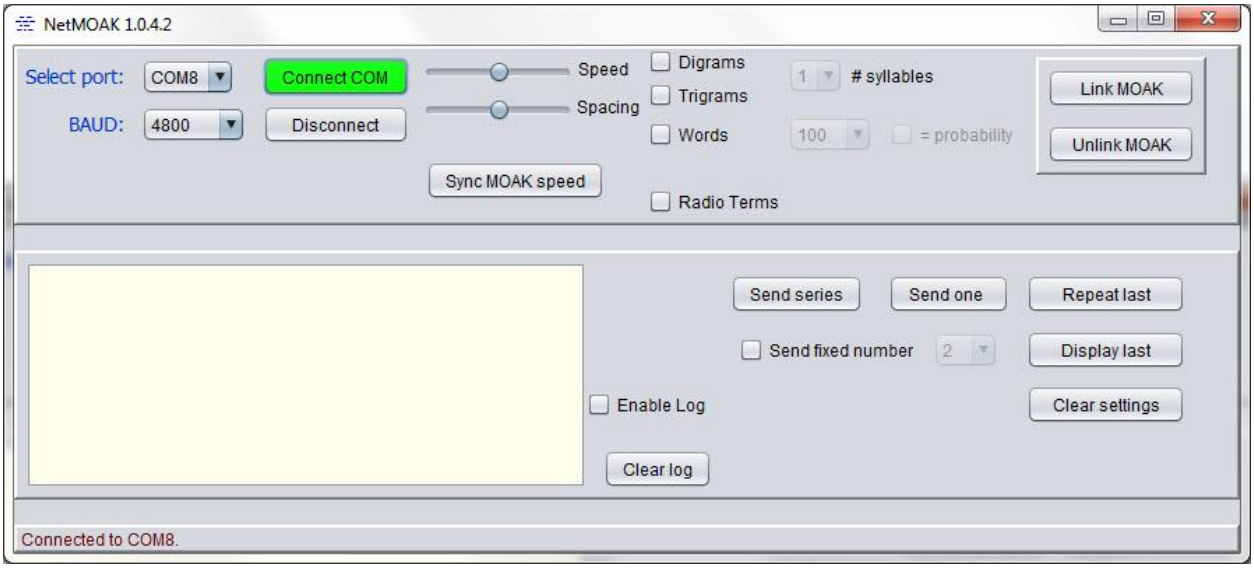
   a. Using the previously-created shortcut run (open) the NetMOAK application on the computer.



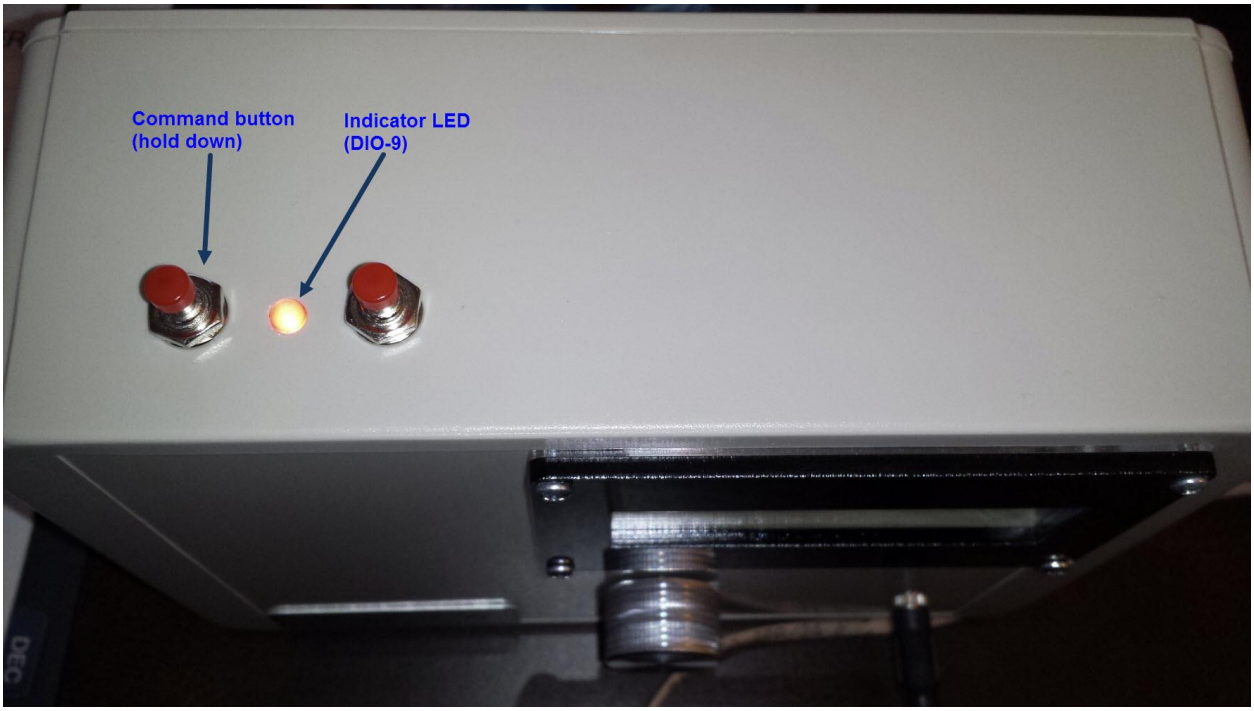
   b. If the MOAK is the only COM device, its port number will be selected automatically. However, if other COM ports exist, it will be necessary to choose the one to which the MOAK is connected. (The Arduino IDE (Tools menu, Port) can identify which port belongs to the MOAK.) The default value for BAUD corresponds to the value that is also specified in the Arduino sketch (as distributed) for initializing its serial channel.[2]

   c. Left-click the Connect COM button. The Connect button will turn green and if sound is enabled the MOAK will respond with 3-beeps indicating that it is resetting.

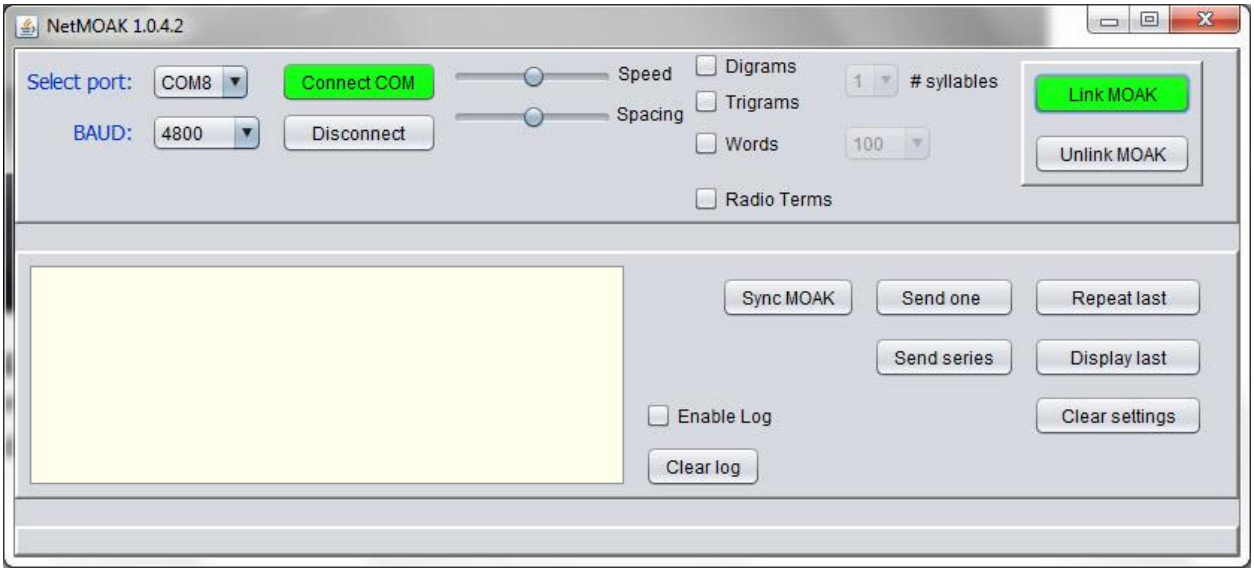
[2] Of course, the data rate can be changed on both ends, although there seems no particular reason to do this.



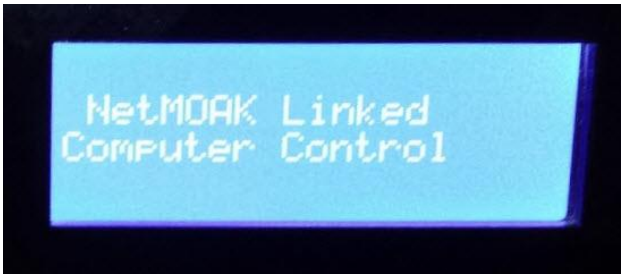
d. When the MOAK title and version screen displays on startup, press and hold the command button. Continue to hold the button down while the remaining start-up screens are displayed: current option name and startup speed setting (same sequence as when MOAK is off-line). After 10 to 15 seconds, when startup is complete, the MOAK's computer control indicator LED will illuminate. At that point the command button should be released.



3. Linking: Once the LED has illuminated and the command button is released, the computer program and MOAK are almost ready to be used together. In the computer program left-click the 'Link MOAK' button. It should turn green almost immediately.



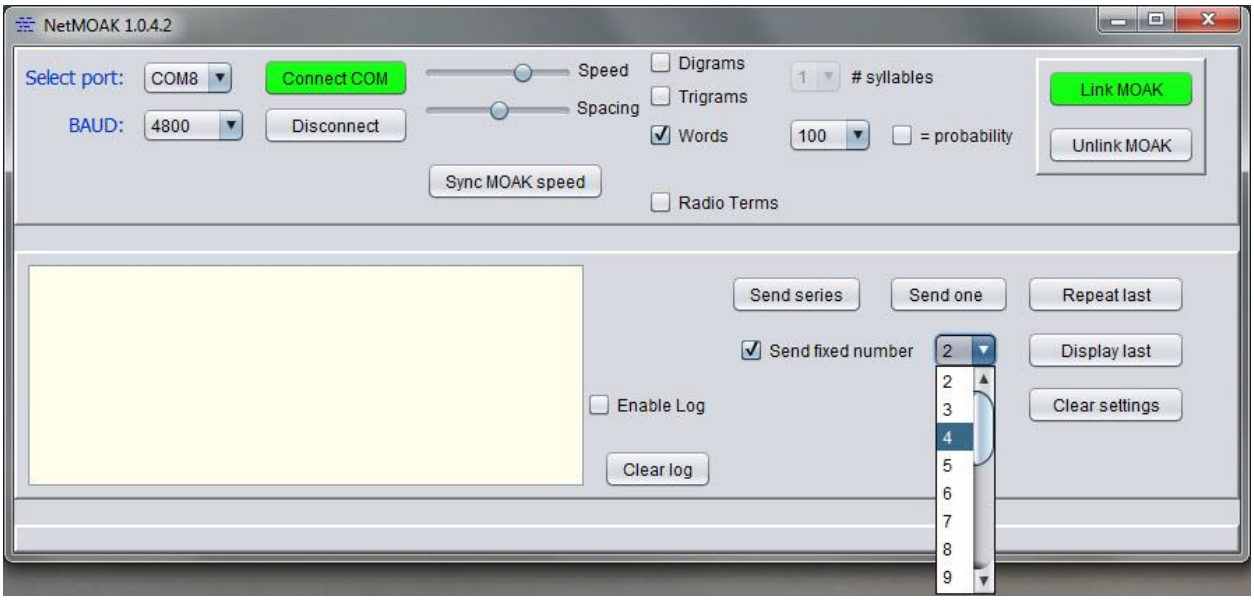
At the same time the MOAK device LCD display will display the message below:



1. Word practice[3]: To become familiar with application options it is best to experiment. Two slider controls permit independent adjustment of Morse code speed and spacing between practice words. Since speed is controlled in the MOAK it is necessary to click the 'Sync MOAK' button after setting the speed slider in the computer application. It is not necessary to Sync MOAK after adjusting the spacing between words. Spacing is controlled at the computer level. It is simply a delay inserted between words (or other selected text fragments) as they are being sent from the computer to the MOAK.

2. Concepts: In subsequent discussion the term "word" refers to any sort of text, either natural language or syllables or radio terms. To practice listening to words without decomposing them into characters, set the speed at least 5 to 10 WPM higher than your current copy speed, and start by using the 'Send one' button to sound words one at a time. Don't worry about the spacing slider. Words will only be sounded when you click either the 'Send one' or 'Repeat last' button. If you cannot name the word after several tries, click 'Display last' and then sound it again before moving on to another word.

3. There are two 'series' practice modes. In one, the MOAK is requested to send a specific number of words or terms at the selected speed and spacing. In the other series mode the MOAK sends continuously (at the selected speed and spacing) until it is stopped by pressing and holding the MOAK command button until the 'Send series' button returns to its undepressed color.



To reiterate, unless the 'Send fixed number' check-box is checked, the 'Send series' button starts a continuous practice session that can only be paused or stopped by pressing and holding the MOAK command button. When 'Send fixed number' is checked, the number selection combo

[3] See "Learning CW at 70, by Words - Like a Child" by Nizar Mullani K0NM, 2018, *CQ* , September. pp. 38-40.

box is enabled. This box allows choosing a number of words (or syllables or radio terms) to send. The range is 2 to 20. More than 20 would be similar to continuous practice, so 20 is the maximum selectable fixed series length.

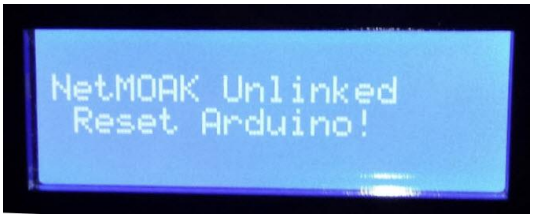
4. Terms: Digrams and trigrams are 2- and 3-letter syllables. These can be presented individually or in combination. Either or both types may be checked. To sound more than one syllable as a compound term, choose a value from the '# syllables' box. This number determines how many syllables are concatenated into a pseudo-word for sounding. Regardless of whether presented singly or in combination, each digram or trigram is equally likely to be chosen (i.e., the probability distribution is rectangular, not in proportion to the syllables' frequency of occurrence in natural language).

5. Words: In contrast to the case for digrams and trigrams, in order to select American English words in a random rectangular fashion it is necessary to check the '= probability' box. If this box is not checked, words are presented in proportion to their actual frequency of occurrence in American English. Thus the word 'the' will occur much more frequently than the word 'well' (the 100th word in order of occurrence in natural language).[4]

6. Radio Terms: As is the case for digrams and trigrams, the probability of each radio term is equal. Thus, 'es' (&) and 'QSO' (conversation) will be presented about equally often in the long run.

Ending a NetMOAK Session

1. To return to normal (off-line) MOAK usage, click 'Unlink MOAK' in the computer application and then reset the device as indicated:



If you do not reset the device, clicking 'Link MOAK' again relinks the device. However, it would have been pointless to unlink, simply to relink. Assuming the intention of returning MOAK to its off-line functionality, the device may be reset by pressing its reset button or recycling power.

[4] The 1000 most frequent American English words are included in version 1.0.4.2 of this program. This list may be expanded in subsequent revisions.

It is also possible to reset the MOAK to its off-line state from within the computer application by clicking ‘Disconnect’ and then ‘Connect COM’ but without holding down the MOAK command button.

It is recommended to close the computer application when using MOAK off-line.[5]

Troubleshooting

1. MOAK indicates that it is linked, but does not respond to ‘Send one’ or ‘Send series’. Try NetMOAK unlink then relink.
2. ‘Send series’ does not stop. Hold MOAK command button down through two complete words. If it still fails to stop then kill the process.
3. Windows performance monitor indicates excessive CPU utilization. Close NetMOAK. Restart and reconnect, etc.

[5] Excess CPU utilization has been observed in preliminary testing when the application is not closed after unlinking. This problem is being studied.