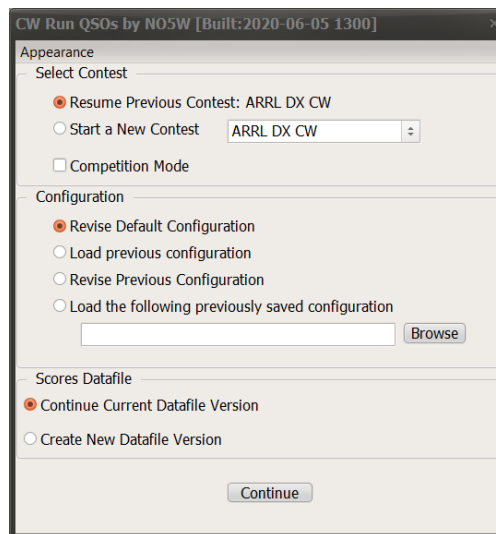# Notes for Using the Simulator

Overview of the Simulator – As shown in the following diagram the Simulator consists of three main parts:

- an application running on the PC which provides the logging and control interface for the user;
- an application running on the Arduino Nano that generates Morse in response to commands received over the USB connection from the PC application;
- a signal conditioning subsystem consisting of three digital potentiometers and a buffer amplifier that provides the final audio to the user headphones.
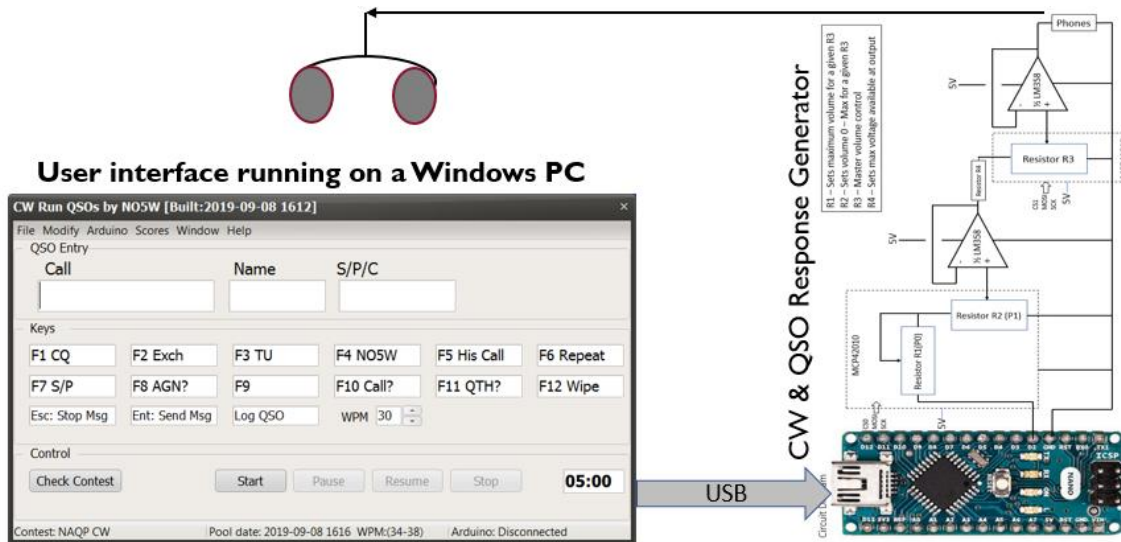

Configuring the Simulator -

1. On the first use you will need to personalize some settings by revising the configuration that is included in the install package. To do this you should choose the **Revise Default Configuration** option shown below. Continue with the ARRL DX CW contest and leave the Competition Mode box unchecked.

2. When you start from either the **Revise Default Configuration** or **Revise Previous Configuration** options, clicking on the Continue button will result in the following dialog where you will have the opportunity to perform a global replace on call sign and/or name. There will still be items in the configuration you will want to change but this will take care of most of them.
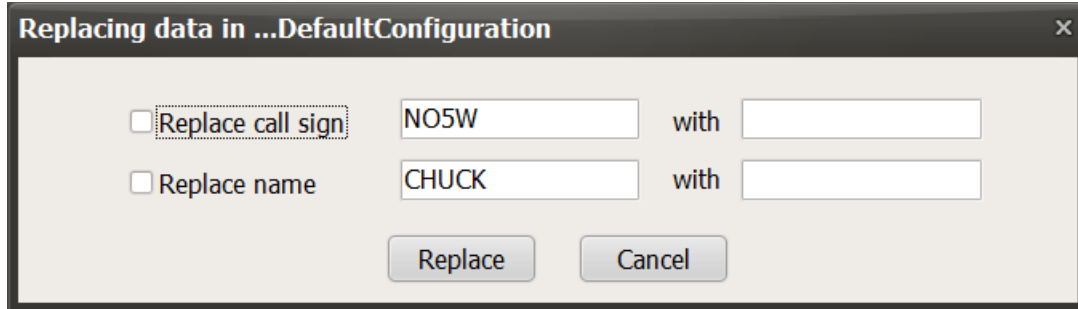
3. After clicking on the Replace button the configuration form will open and you can make additional changes as necessary.
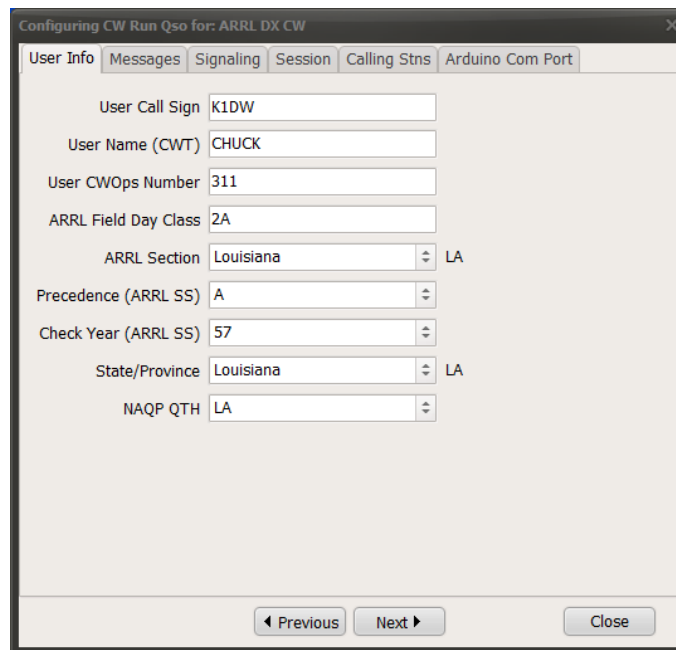
4. Once you are satisfied with the User Info click on the Messages tab to access the page where you will setup your messages. On this page you will see there is a separate tab for each contest. In many cases all you will need to change is the call sign which you may have already done using the replace function described in item 2 above. Also note that you can elect to vary your TU/QRZ message sending the TU/QRZ+ID after a specified number of QSOs using the TU/QRZ message.

5. Once you are satisfied with your messages click on the Next button to access the Signaling page where you will setup sidetone parameters as shown below. The meaning of each field is self-explanatory. Use the drop downs to change values as desired. Once the connection to the Nano is established we will test the parameters by listening to the sidetone and will have the option to change them.

6. Clicking on the Next button will access the following Sessions page. The checkbox labeled "Allow Completion of QSO" will allow logging of any QSO started before the session ends. In those contests

where a name is involved you can track your ability to prefill the name if that is of interest. To avoid memorizing the QSOs it is a good idea to check the randomize box. If you are starting out and want to practice with more space between characters you can set the Farnsworth Percentage which sets the overall speed to a percentage of the character speed of each caller as well as your own sidetone.
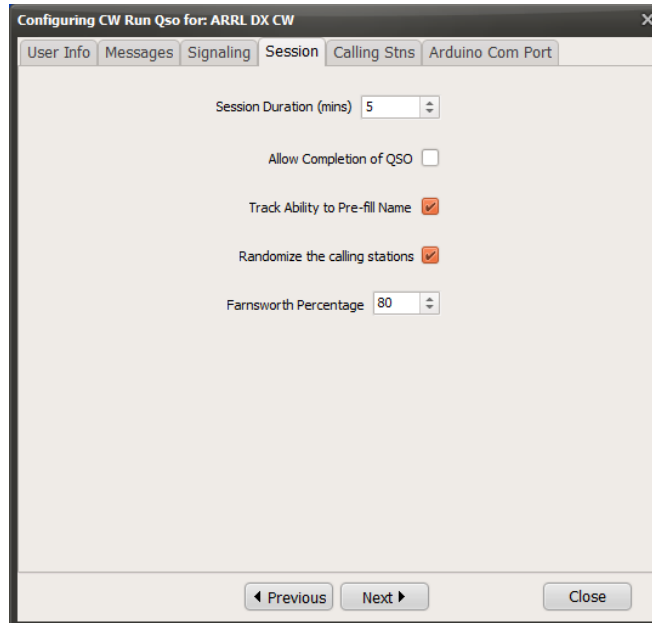
7. Click on the Next button to access the Calling Stations dialog where you can build a pool of calling stations of specified size from the identified source file of stations that have been active in the given contest. The Bandwidth of the pool is the spread of pitches that the calling stations will have where the center of the bandwidth is the pitch of your sidetone. You can also specify the range of signal strengths (Volume) from 0 – 100 and the range of code speeds (15 – 40 wpm) that will be assigned randomly to the calling stations. Click on Populate to build the pool of callers.
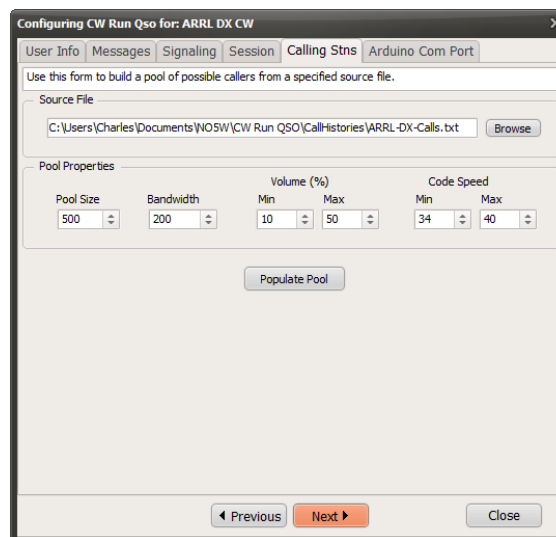
8. Click on the Next button to advance to the page for connecting to the Nano. Use the Port dropdown to select the port, leaving all items but the port number unchanged.
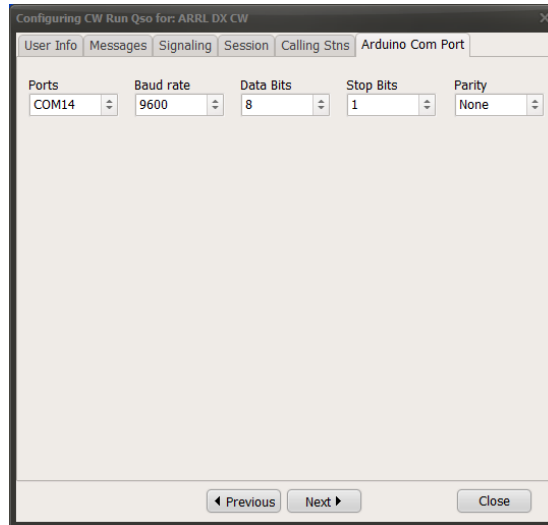
9. Click on the Close button to end the configuration setup. You will be asked whether you want to save the configuration values for later use.
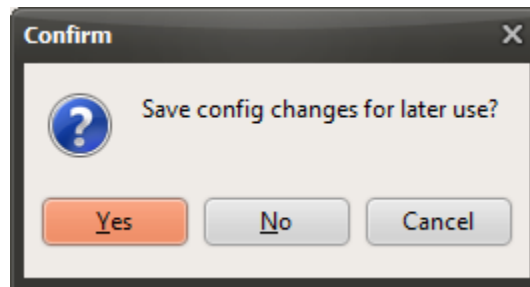
If you click on Yes the configuration values will be saved in a file whose name and location are chosen by you for later retrieval and use when you start the program. If you click No the configuration values that you have entered or accepted will be saved across a restart of the program so they will not have to be redone unless it is desired to make changes, but they will not be saved in a named file for later retrieval. Clicking on the Cancel button is the same as clicking on the No button.

10. On closing the Confirm dialog the following dialog for setting up the Arduino Connection will be presented. The port number should be the one you entered during the configuration step. If not, select it from the dropdown and leave the other items unchanged.
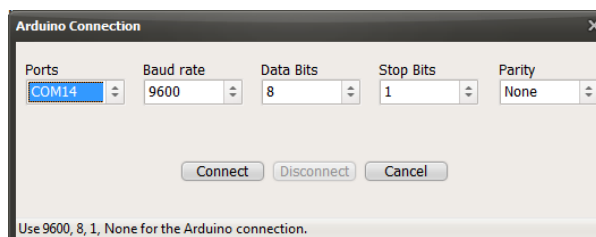
11. Clicking on the Connect button will allow access to the main form for QSO entry and access to menus.
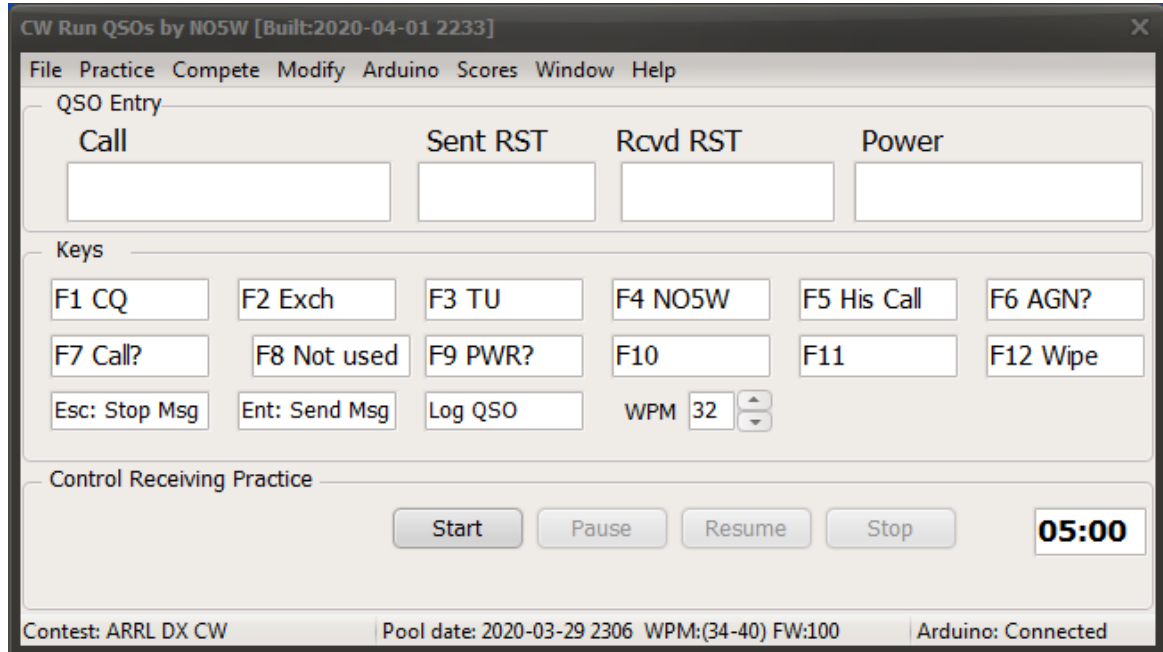
Across the bottom of the dialog you should see the current contest, the pool date, speed range, Farnsworth Percentage (FW), and the status of the Arduino. There are two modes of Practice available: Receiving Practice and Sending Practice. Emphasis is on the former so check that "Control Receiving Practice" is showing and note that the clock in the lower right-hand corner is showing the time remaining in the session. If desired, use the Modify menu to change settings of User Information, Messages, Signaling, and Sessions.

Running a Session: To run the simulation, do the following

- Click on the Start button and you will hear QRL?
- Press the Enter (or F1) key to send CQ
- Once your CQ is over type the calling station's call into the Call box and press the Enter (or F2) key.
- Your exchange will be sent and you should listen for the reply of the other station.
- If you have entered his call correctly, the other station will just send his exchange but if you have busted his call, he will send his call twice before sending his exchange.
- Type in his exchange and make any needed corrections and press the Enter (or F3) key.
- Your TU/QRZ message will be sent soliciting the next caller.
- Repeat for the next caller until the session ends

Running a Competition: This is similar to Running a Session but with a few differences.

- On starting the program be sure that the correct contest is selected
- Make sure that the Competition Mode box is checked

- If a participant is ready to play they should use the menu item Compete | Sign In where they will be asked to give their call sign and other information depending on the contest being used. In some club-based competitions like BWQP, CWT, CWO the call sign will be used to search club data for additional information.
- Prior to starting the competition the participant may elect to conduct a dry run of 1 or 2 minutes.
- Once any dry run is over a competition run can be started and played in the same way as a regular session.
- At the conclusion of the competition session the participant will receive their score on a form like the following:

- At this point the player can elect to post the score to the scoreboard or discard it. If it is desired to post the score a scoreboard like the following will be shown.

Scores for the CWT Challenge

Player	Start	End	Calls	Na...	Nu...	Tot...	Bonus ...	Score
N3JT	2020-06-13 2223	2020-06-13 2228	18	17	17	52	3	208
k1dw	2020-06-13 2033	2020-06-13 2038	13	13	13	39	4	195
n5hz	2020-06-19 2105	2020-06-19 2110	15	15	15	45	3	180
k1dw	2020-06-13 2151	2020-06-13 2156	15	12	15	42	3	168
NO5W	2020-06-19 2057	2020-06-19 2102	12	12	12	36	1	72

Score = Total*(1+BonusMult) where Total is the number of correct Calls, Names and Member Numbers and Bonus Mult is the number of pre-entered names
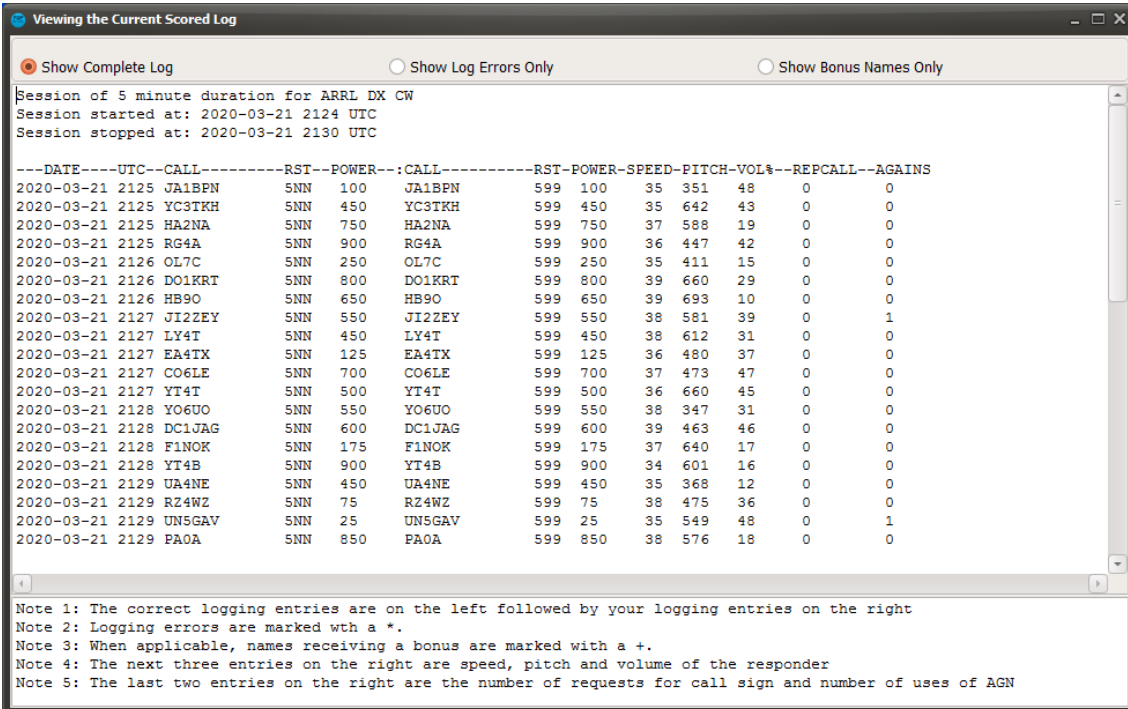
Function Keys – Here is a brief description of the roles of the function keys as indicated on the QSO Entry window. Note that the role of some of the function keys is dependent on the contest being simulated due to the different exchanges required.

- F1 will always send CQ, but the Enter key can also be used to send CQ
- F2 will always send the exchange, but the Enter key can also be used for that purpose
- F3 will always send the TU/QRZ message but the Enter key can also be used for that
- F4 will always send your call. It is primarily a placeholder and is not currently used
- F5 will always send the other station's call. It is a placeholder and is currently not used
- F6 will always request a repeat of the most recent message sent by the other station
- F7 will always ask for a repeat of the other station's call
- F8-F11 will request a repeat and are contest-dependent. Their function will be shown in their associated window.
- F12 will always clear the QSO Entry windows.
- Enter key is used to Send CQ, Send Exchange, or Send TU as appropriate. In addition, the semi-colon key can be used to perform these functions
- Escape key is placeholder and is not used in the current version.

Menu Functions – The purpose of most of the menu items should be self-explanatory. Here is a brief description of each

- Use **Scores | View Current Scored Log** to access the following form:

Scroll down to see an analysis of how you did

```
                    ○ Show Complete Log              ○ Show Log Errors Only              ○ Show Bonus Names Only

Summary analysis of QSOs:
  Number of attempted QSOs:20 for an hourly rate of:  240
  Number of error-free QSOs:20 (100%) for an hourly error-free rate of 240
  Number of fill-free QSOs:18(90%)
  Fill requests: 2 [0 FKey requests 2 F8 agains]
  Fill requests were required on the following QSOs:
    Call,Speed,Pitch,Volume,Fills
    JI2ZEY,38,581,39,1
    UN5GAV,35,549,48,1

  Average speed on attempted QSOs:36
  Average pitch on attempted QSOs:530
  Average volume on attempted QSOs:32%

Your sending parameters
  Speed setting: 36 wpm
  Sidetone pitch: 500 Hz
  Sidetone level: 25%


Pool information:
  Source file: C:\Users\Charles\Documents\NO5W\CW Run QSO\CallHistories\ARRL-DX-Calls.txt
  Pool created: 2020-03-20 2104
  Pool size: 500
  Pool bandwidth: 200
  Speed range: 34 - 40 WPM
```

Scores | View History: Use this item to bring up the following display showing past results for the current contest. If you have just completed a session and want the results to be included in the history, you will be prompted to first save the log report. Once you have accessed the history display you can (left or right) click on a given column header to sort the results from low to high or vice versa. To view a log report, select a row of data and click on the Log Report column header to access the Scored Log for the chosen session.

Viewing history from ARRLFD_Scores_v2

I...	Player	Start Time	Duration	Error-free Rate	Total Errors	Fill-free Rate	Total Fills	Avg Speed	Log Report
6	NO5W	2020-05-27 0220	5	252	0	240	1	36	NO5W-2020-05-27-0220-Test
7	NO5W	2020-05-27 0406	5	240	0	228	1	36	NO5W-2020-05-27-0406-Test
2	NO5W	2020-05-26 1804	2	240	0	210	1	36	NO5W-2020-05-26-1804-Test
9	NO5W	2020-05-28 0419	5	228	1	228	2	36	NO5W-2020-05-28-0419-Test
5	NO5W	2020-05-27 0212	5	228	1	216	2	36	NO5W-2020-05-27-0212-Test
3	NO5W	2020-05-27 0158	5	228	0	204	3	36	NO5W-2020-05-27-0158-Test
4	NO5W	2020-05-27 0205	5	228	0	180	6	36	NO5W-2020-05-27-0205-Test
8	NO5W	2020-05-27 1449	5	216	0	180	6	36	NO5W-2020-05-27-1449-Test
1	NO5W	2020-05-26 1644	2	210	2	180	2	36	NO5W-2020-05-26-1644-Test

To see where the errors were made or the types of fills you requested along with other information on a session, double-click on the row of the History View to obtain a display like the following.

```
History Detail                                                    ×
Index:              14
Player:             NO5W
Contest:            ARRL DX CW
Start:              2020-06-01 1548
End:                2020-06-01 1554
Duration(mins):     5
AvgCallerSpeed:     38.00
Logged QSOs:        16
Error-free QSOs:    15
Error-free Rate:    180
Score:              45
Fill-free QSOs:     9
Fill-free Rate:     108

Call Errors:        0
Power Errors:       1
Total Errors:       1
Errors Per QSO:     0.06

Call Repeats:       1
Power Repeats:      3
Agains:             5
Total Repeats:      9
Repeats Per QSO:  0.56

Log Report File: C:\Users\Charles\Documents\NO5W\CW Run QSO
\Logs\ARRLDXLogs\NO5W-2020-06-01-1548-NewCalc.log
```

Scores | View the Competition Scoreboard: Use this item to call up the scoreboard for the latest competition for the current contest. The scores will be shown in descending order.

Player	Start	End	Calls	Na...	Nu...	Tot...	Bonus ...	Score
N3JT	2020-06-13 2223	2020-06-13 2228	18	17	17	52	3	208
k1dw	2020-06-13 2033	2020-06-13 2038	13	13	13	39	4	195
n5hz	2020-06-19 2105	2020-06-19 2110	15	15	15	45	3	180
k1dw	2020-06-13 2151	2020-06-13 2156	15	12	15	42	3	168
NO5W	2020-06-19 2057	2020-06-19 2102	12	12	12	36	1	72

Scores for the CWT Challenge

Score = Total*(1+BonusMult) where Total is the number of correct Calls, Names and Member Numbers and Bonus Mult is the number of pre-entered names

Notes for Using the Simulator

File | New Contest: Use this item to change to another contest. The latest pool of callers for the selected contest will be used or you can use the following menu item to create a new pool.

File | New Pool of Callers: Use this item to generate a new pool of callers for the current contest. Be careful to use the appropriate call history file as the source.

File | Import a Configuration: Use this item to load a previously saved configuration.

File | Export the Current Configuration: Use this item to save the current configuration.

File | Save Session Log: Use this item to save the log of the current session

File | Start a New Competition: Use this item to start a new competition for the current contest.

File | Exit: Use this item to terminate and close the program.

Practice | Receiving: Use this item to enter the contest simulation mode

Practice | Sending: Use this item to operate the program as a code practice oscillator for dual or single lever paddles.

Compete | Sign In: Use this item to sign-in for competition in the current contest. The competition mode is primarily intended for group meetings where attendees each run the simulator for a short (e.g. 5 minute) session of a given contest and scores are tallied and kept on a scoreboard. In those contests (BWQP, CWO, CWT, NAQP) where the exchange includes the operator's name the program allows multipliers to be awarded if the participant is able to fill in the name before the other station sends it. See the notes available on the Sign In form for details.

Modify | User Information: Use this item to change the information on the user as seen on the corresponding page of the config dialog.

Modify | Messages: Use this item to change the messages for the current contest.

Modify | Signaling Parameters: Use this item to change the sidetone pitch, volume, and speed as well as the keying mode when doing Sending Practice.

Modify | Session: Use this item to change the session parameters including duration, Farnsworth speed, etc.

Arduino | Connect: Use this item to establish the connection to the Arduino

Arduino | Disconnect: Use this item to terminate the connection to the Arduino

Arduino | Setup and Test: Use this item to set and test the volume, the volume range, and to play a test message. Challenge yourself by allowing for very weak callers using small values for the Min volume.

Scores | View the Current Scored Log: Use this item to call up the scored log of the current session once the session has ended.

Scores | View a Previous Scored Log: Use this item to call up a previously saved scored log.

Scores | View the Current Scoreboard: Use this item to call up the scoreboard for the current contest. This is currently only implemented for the BWQP but plans are to implement it for the other contests.

Window | QSO Log: Use this item if it is desired to see the log during a session.

Help | Construction Notes: Use this item to access a pdf file of notes for building the simulator.

Help | User Notes: Use this item to access a pdf file of these user notes.

Help | Arduino Source: Use this item to obtain a listing of the source code for the Nano. This would prove useful if it becomes necessary to reload the Arduino. See the section in the Construction Notes entitled "**Compile and Upload the RunQso Simulator Code to the Arduino**" for how to use the source.

Help | Enclosure 3D Print File: Use this item to obtain an STL file for printing the enclosure or submitting it to a 3D print shop.

Help | Digital Potentiometer Data: Use this item to obtain the data sheet for the MCP-41020 and MCP-42010.

Help | Operational Amplifier Data: Use this item to obtain the data sheet for the LM-358 op-amp.

Help | About CWT: Use this item to access the website of the CWT contest. Similar menu items are available for the other supported contests.

Help | Check for Updates: Use this item to check the webpage

Help | About: This item provides information about the PC application.