

## Experiment HE-12: Targeted Exercise with iWire ROAM (ECG)

“Get Your Cardio On”

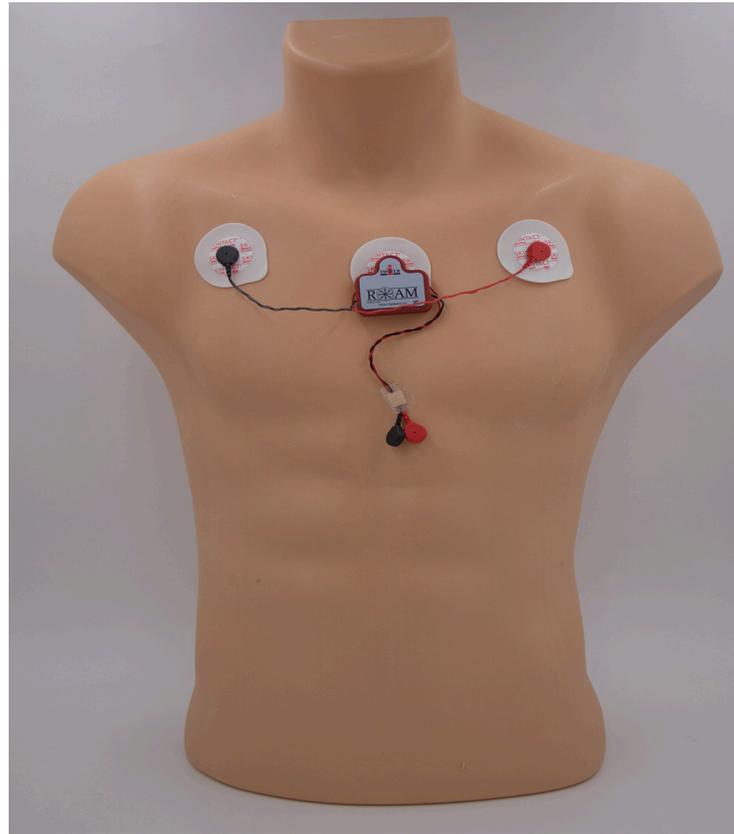
### TA and ROAM Setup

1. Locate the TA and the ROAM ECG unit.



Figure HE-12-S1: The ROAM and the TA.

2. Disconnect the ROAM from the dock and position the electrodes as shown.



***Optional Equipment Needed for Additional Experimentation***

***If testing Aerobic Fitness, VO2Max, RER, or other labs such as EMG activity while exercising, you will also need these equipment plus the equipment shown in each of those labs. You will need to open the other lab exercises.***

## Experiment HE-12: Targeted Exercise with Remote Electrocardiogram (ECG)

### “Get Your Cardio On”

#### Exercise 1: Remote ECG and Heart Rate

**Aim:** To measure the heart rate of a resting subject.

Approximate Time: 30-60 minutes depending on the exercise chosen

#### *Procedure*

1. Make sure the Actiwave Cardio logger unit is attached to the subject's chest correctly as shown in the Set Up documentation.
2. Have the subject take their pulse and record their resting heart rate. Also have the subject figure out their Target Heart rate and choose an exercise routine they would like to participate in.
3. Noting the start time that was programmed into the Cardio set up, make sure to start the actual experiment at that start time.
4. Immediately after the start time, have the subject sit still for 10 minutes and record a good, resting ECG.
5. After the 10 minutes of recording a resting ECG and heart rate, have the subject begin the chosen exercise protocol/routine to be recorded by the Actiwave Cardio. This is the time to “Get Your Cardio On” and get active.
  - If you are using the Cardio unit in conjunction with another iWorx lab – open that lab at this time and follow the directions for doing the recordings necessary. **The Actiwave Cardio unit will continuously record remote ECG and heart rate during any experiment.**
5. As the subject exercises, have them periodically take their pulse and record heart rate. A partner should write down the time, physical activity being performed, and the subject's heart rate at that point. Heart rate should be taken at least three (3) times during the recording of data.

#### *Data Import and Analysis*

Once the data are collected using the Actiwave Cardio, the file must be exported from the unit and saved as an EDF file. Once this file is saved, it can then be imported, opened and analyzed using LabScribe3.

1. Insert the Actiwave Cardio into the Cardio dock.
2. Open the Actiwave software by clicking the desktop icon.
3. Click on the read button. The data will be downloaded as an EDF file and added to the list of other Actiwave files that have been previously exported from the unit.

**NOTE:** The recorded data in the Actiwave Cardio device is **not erased** after the download. It is only erased if the unit is set up again.

4. Once the EDF file is saved, Open LabScribe by clicking on the desktop icon.

**NOTE:** It will help to save the EDF files to a folder on your Desktop for ease of finding the files.

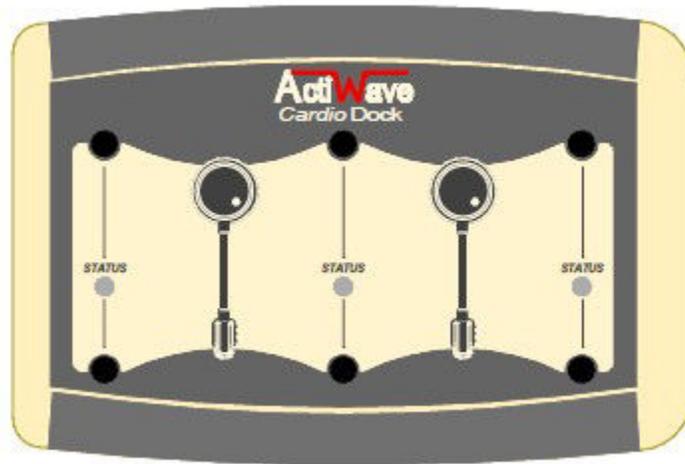


Figure HE-12-L1: Actiwave Cardio dock.

5. Choose the either IX-TA or the IWX-214 from the list of units that pops up (if the unit is already plugged in and turned on, this menu will not appear). Click OK.
6. If using the IX-TA, click OK to the second pop-up window; iWire Devices to emulate: iWire B3G. If using the IWX-214, there will not be a second menu item.

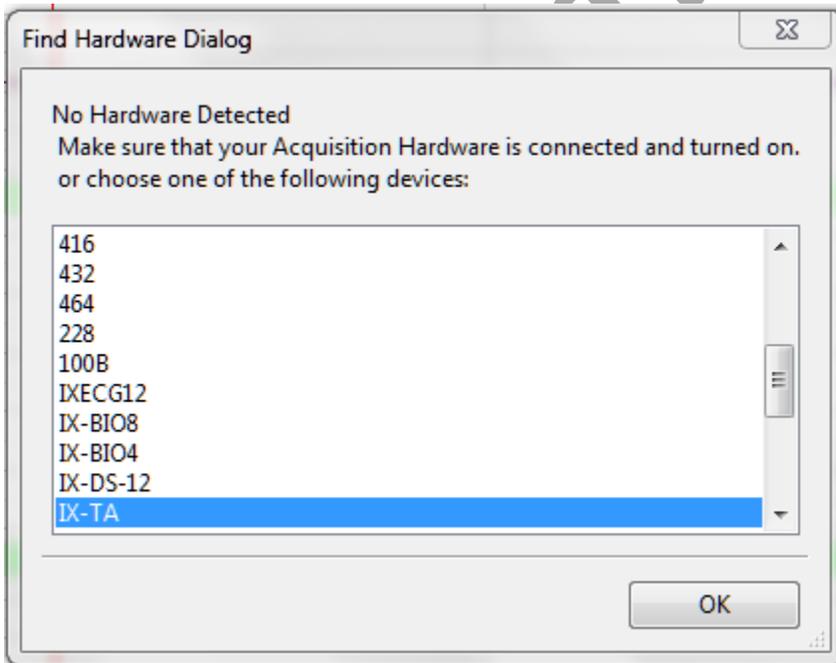


Figure HE-12-L2: Menu options for choosing the hardware type for importing the Cardio EDF file.

7. Make sure to load the Human Exercise – TargetedExercise settings if it has not already been selected.
8. Click File → Import from the menu.

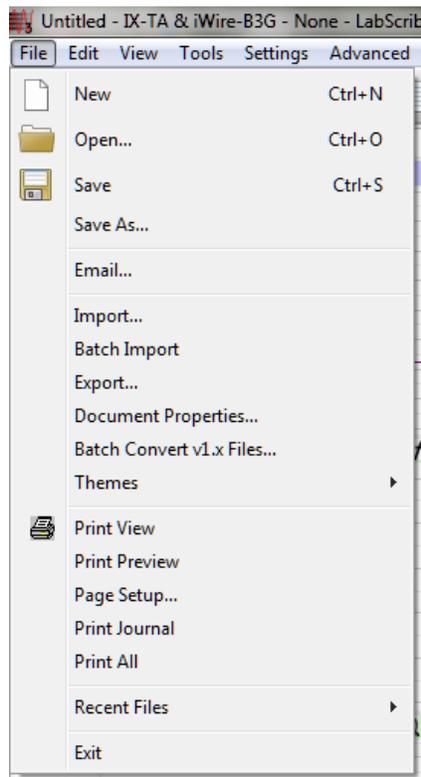


Figure HE-12-L3: File → Import screen.

8. A new window will open, navigate to where the EDF files have been saved, preferably in the folder you created on your Desktop.
9. Choose the file you wish to open and click Open. You can also double click the name of the file.
  - If this is the first time using the Import feature, you will be asked for your User Name and Serial Number.
  - Enter these into the appropriate blanks. This information only needs to be entered once.
10. Choose “Yes” when asked to Use Current Settings for Import?

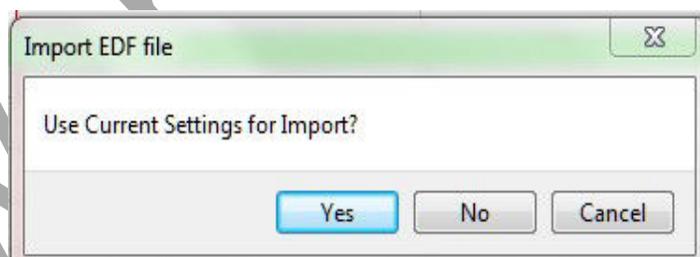


Figure HE-12-L4: EDF Import Settings selection dialog.

11. Once the file has been imported, the data should show ECG, Activity and Heart Rate Channels.

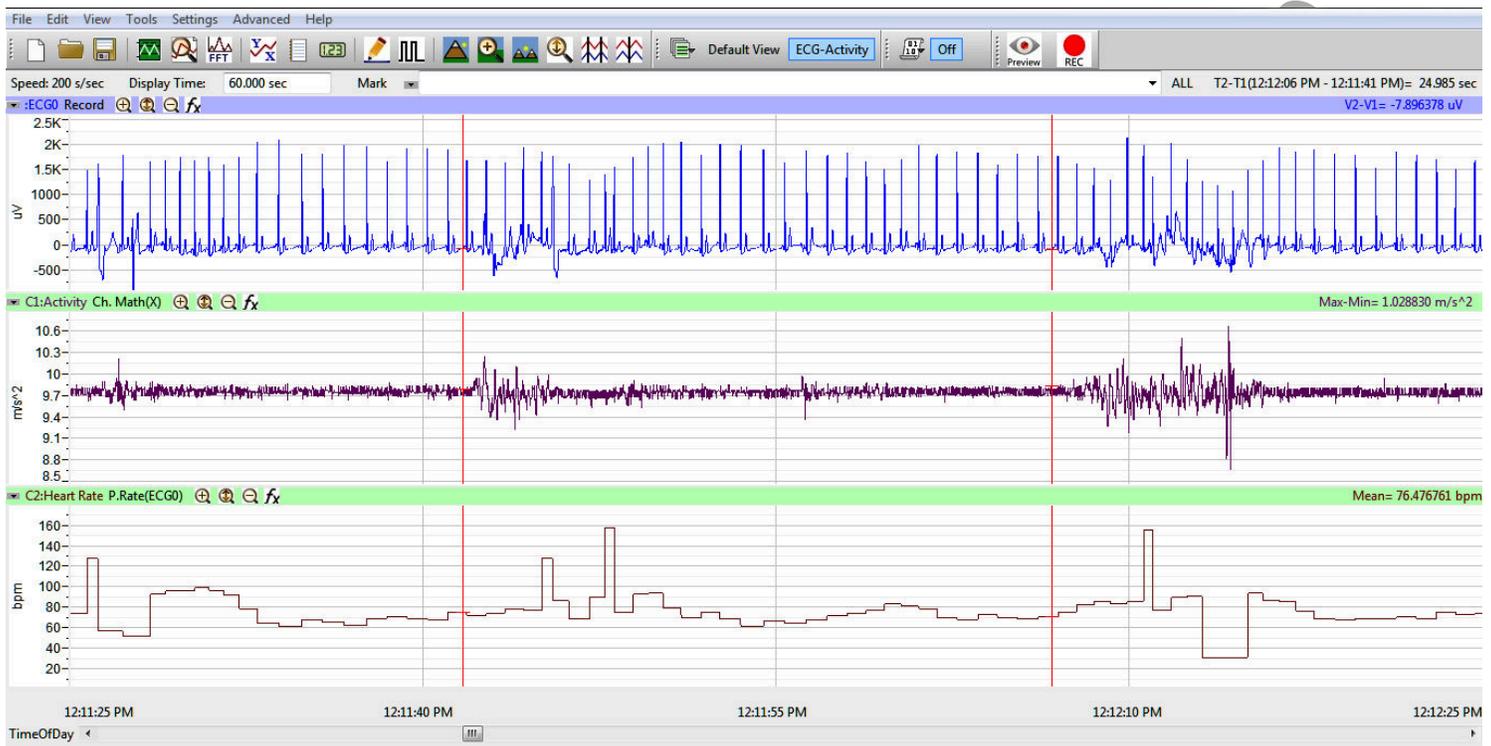


Figure HE-12-L5: Cardio data file showing ECG, Activity Level and Heart Rate.

12. Sixty (60) seconds of data will be shown on the screen. Display time can be adjusted by clicking the double or half display time icons on the LabScribe Toolbar or typing in the display time in the Display Time box.

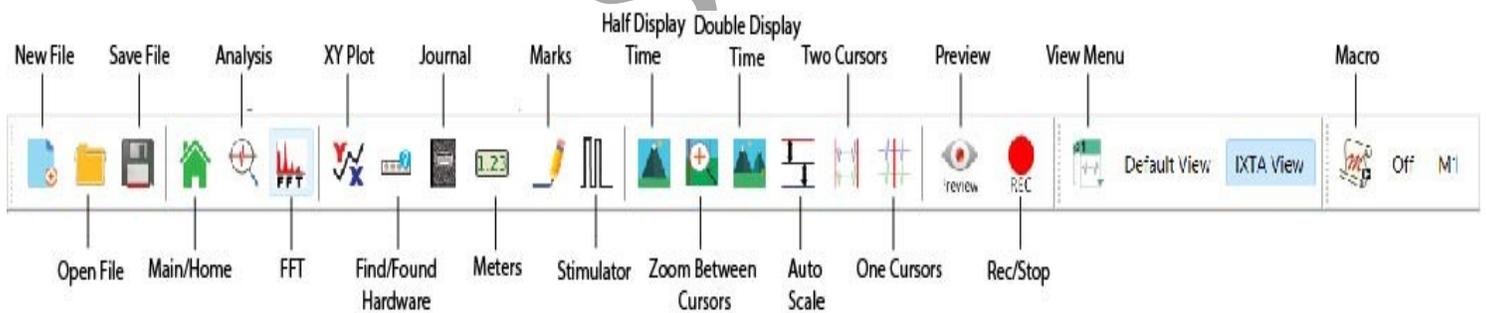


Figure HE-12-L6: The LabScribe toolbar.

13. Click on and move the two vertical cursors to areas of interest in the data recording.

- Move the cursors to the first few minutes of the recording to determine the subject's Resting Heart Rate.

- Place the cursors at least two minutes (120 seconds) apart by doubling the display time and moving the cursors to either side of the recording. The value, **Mean**, on the right side of the Heart Rate channel will state the subject's mean heart rate in beats per minute (bpm) as bracketed by the cursors.
- Also look at the Activity channel. The **Max-Min** value will show a measurement of the subject's activity. During resting, the activity level should be low.
- Scroll through the recording to the beginning of where the subject started actively exercising. Place the cursors at least two minutes (120 seconds) apart by doubling the display time and moving the cursors to either side of the recording. The value, **Mean**, on the right side of the Heart Rate channel will state the subject's mean heart rate in beats per minute (bpm) as bracketed by the cursors.
- Also look at the Activity channel. The **Max-Min** value will show a measurement of the subject's activity. During the start of the exercise routine, the activity level should still be low, but should show an increase.
- Continue to scroll through the recording while the subject was actively exercising. Periodically, approximately every 2-3 minutes of recording, repeat the analysis of Heart Rate and Activity. If the exercise routine was longer than 30 minutes, data can be taken every 5-10 minutes.

14. Fill in the data table below for the subject's heart rate and activity levels at each time interval.

### Questions:

1. What was the subject's resting heart rate? Did the resting heart rate calculated by the Actiwave Cardio match the subject's measured resting heart rate? If not, what could be a factor contributing to this?
2. What was the subject's activity level while resting?
3. What is the subject's maximum heart rate based on age and fitness level?
4. What is the subject's target heart rate? Remember this is 50-85% of maximum heart rate. Keep in mind that if the subject is not physically fit, the level should be closer to 50%; if the subject is very fit, it should be closer to 85%.
5. What was the subject's heart rate at the beginning of the exercise routine? Activity level?
6. What was the subject's heart rate and activity level 3-5 minutes into the exercise routine? 6-10 min? 9-15min? Etc...
7. Did the subject reach his or her target heart rate? Could the subject stay within the target heart level while doing the exercise routine that was chosen?
8. How did this exercise routine compare to a different type of exercise?
9. Do these different types of exercise allow the person to maintain their target heart throughout the entire exercise routine or does the heart rate fluctuate?

10. How does keeping to a target heart rate improve exercise quality compared to a heart rate that moves in and out of range?
11. Is there one exercise routine that does this better than others?

**Table HE-12-L1: Heart Rate and Activity Level while Resting and Exercising**

Time Interval	Heart Rate	Activity Level
Resting		
Beginning Exercise		
Exercise 3 min		
Exercise 6 min		
Exercise 9 min		
Exercise 12 min		
Exercise 15 min		
Exercise 18 min		
Exercise 21 min		
Exercise 24 min		
Exercise 27 min		