Texas Department of Public Safety

Concept 2 Row Test

Administrator Training

Revised June 2025

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Concept 2 Rower / VO2 Introduction

The Concept 2 Rower develops all three energy systems of the body:

- ATP-PCr,
- Anaerobic Glycolysis (LAT System), and
- Oxidative (Aerobic System); it primarily focuses on conditioning the aerobic and anaerobic states of the human body.

The Rower is the only tool to measure the VO2max from the horizontal plane outside of water. This is significant due to the ability to target exercise options that focus on low-impact and support efforts to further reduce injuries. VO2max is a measure of the body's capacity for aerobic work and, thus, can be a predictor of a person's potential for endurance. VO2max is a scientifically accepted measure of cardiorespiratory fitness. Of course, other factors come into play: the individual's training, genes, body weight, muscle volume, etc. A person's age is also a factor, as most people see a decline of 1% a year in VO2max after age 50.

Technically, VO2max stands for maximal oxygen uptake and refers to the amount of oxygen the body can utilize in one minute. The units are ml O2/kg-min—VO2max generally requires the collection and analysis of exhaled gases during exercise to exhaustion **(V.02 Max)**. This is usually done in a lab, and always under the supervision of professionals.

Due to the extensive research and development of the Concept 2 Rower, it is possible to get a very good estimation of a person's VO2max simply by rowing his/her best 2000 meters on the Concept 2 Rower. Using the 2000-meter time, combined with **weight, age, and gender**, a person can calculate his/her VO2max with a small error factor (as compared to the **V.02 Max** measurement in a laboratory). The age, weight, and gender formula is based on thousands of real data points collected by Dr. Fritz Hagerman of Ohio University. Over the years, Dr. Hagerman performed VO2max tests using gas analysis on many subjects. He also had the same subjects row a max 2000m test piece on the indoor rower. He then correlated the two tests to create the formulae used in this prediction tool.

Safety & Maintenance

Using the Detachable Monorail:

1. Important Safety Notes:
    a. Always have the frame lock in the locked position when the flywheel and monorail sections are connected. Failure to do so may result in injury if the unit is lifted or moved.
    b. To avoid possible injury, use caution while attaching the monorail section to the flywheel section and while operating the frame lock.
    c. DO NOT stand the rower up on end as the rower may tip over.

Using the Handle Hooks:

1. Place the handle in the handle hooks to make it easier to reach when you are seated on the rower.
2. **NOTE**: It is best to let the handle rest against the fan cage rather than in the handle hooks when the machine is not in constant use (i.e., overnight; between workouts). This will prolong the life of the shock cord.

Concept 2 Rower Parts:

1. Use of this machine with a worn or weakened part, such as the chain, sprockets, chain/swivel connector, handle U-bolt, or shock cord, may result in injury to the user.
2. When in doubt about the condition of any part, Concept 2 strongly advises that it be replaced immediately.
3. Use only genuine Concept 2 parts.
4. Use of other parts may result in injury or poor performance of the machine.
5. To avoid possible injury, use caution while attaching the monorail section to the flywheel section and while operating the frame lock.
6. The machine should be used on a stable, level surface.

Safety while Rowing:

1. Do NOT let the handle fly into the chain guide.
2. Place the handle against the chain guide or in handle hooks before letting go.
3. Pull straight back with both hands.
4. Never twist the chain or pull from side to side.
5. Do not row with one hand only. Abuse of the chain can result in injury.
6. Keep clothing free from seat rollers.
7. Keep children and fingers away from seat rollers. Seat rollers can cause injury.
8. Perform proper maintenance as described in the maintenance section of this manual.
9. ALWAYS PUT THE FRAME LOCK IN THE LOCKED POSITION BEFORE USING OR MOVING THE INDOOR ROWER.

Maintenance:

1. **DAILY:**
   a. Wipe MONORAIL with a damp cloth or non-abrasive scouring pad after use.
   b. Wipe SEAT, HANDLE, and monitor BUTTONS down with disinfectant wipes after each use.
2. **Every 50 hours of use (Weekly):**
   a. Clean and lubricate the chain with 20W 3-in-1 oil or 20W Motor oil.
3. **Every 250 hours of use (Monthly):**
   a. Inspect the chain for stiff links. If thorough lubrication does not help, the chain should be replaced.
   b. Inspect the chain-handle connection for wear. If the hole has become elongated or the U-bolt is worn halfway through, the entire connection should be replaced.
   c. Tighten the shock cord if the handle does not return all the way to the fan enclosure.
   d. Check the socket screws used to install the front legs for tightness.
   e. Loosen or tighten the nuts on the performance monitor arm joints as necessary.
   f. Check for dust inside the flywheel with a flashlight. Vacuum if needed.
4. **IMPORTANT – The Monitor:**
   a. The monitor is a sealed unit. Do not take apart. Any attempt to disassemble may void the warranty.
   b. Contact Concept 2 for problems with this part.

PM-Monitoring System

The PM allows you to access the menu option for training and testing:

1. **Change Units**:
   a. Allows you to select meters, pace, watts, or calories.
   b. Push this button at any time while setting up a workout, rowing, or viewing results.
2. **Change Display**:
   a. Allows you to choose another display.
   b. Push this button any time while rowing.
   c. Each time you press CHANGE DISPLAY, a new display is shown.
3. **MENU/BACK**:
   a. Turns on the monitor and displays the Main Menu or the previous menu.
   b. After a workout, press this button to end the workout and return to the MAIN MENU.
4. **Battery Information**:
   a. The PM uses two (2) alkaline D-Cell (LR20) batteries.
   b. When you are rowing, the flywheel provides a portion of the power to extend battery life.
5. **Cleaning the PM**:
   a. Use a cloth lightly dampened with water only.
   b. DO NOT spray with a cleaner or leave it in the rain.
6. **Troubleshooting**:
   a. If the PM malfunctions or does not "wake up", try one of the following:
      1. Insert a paperclip into the reset hole on the back and press LIGHTLY.
      2. Remove the batteries for 30 seconds and insert two (2) new alkaline D-Cell (LR20) batteries.
   b. To change language:
      1. Press MENU/BACK until the screen stops changing.
      2. Press the fifth grey button on the right, then press the second grey button on the right twice, and select your language.
   c. If your computer does not recognize that your PM is connected to it, try one of the following:
      1. Use another computer and/or USB cable.
      2. Remove batteries for 30 seconds, then reinsert batteries and try again.

Training on the Concept 2 Rower

Before your first row:

1. Consult your physician. Be sure that it is not dangerous for you to undertake a strenuous exercise program.
2. Carefully review the rowing technique. Improper technique, such as extreme layback or jumping off the seat, can result in injury.
3. Start each workout with several minutes of easy rowing for a warm-up.
4. Start your exercise program gradually. Row for no more than 5 minutes on the first day to let your body adjust to the new exercise.
5. Gradually increase your rowing time and intensity over the first 2 weeks. Do not row at full power until you are comfortable with the technique and have rowed for at least a week. Like any physical activity, if you increase the volume and intensity too rapidly, fail to warm up properly, or use poor technique, you will increase the risk of injury.
6. The best damper setting for a great cardiovascular workout is in the range of 3-5. Rowing with the damper setting too high can be detrimental to your training program because it may reduce output and increase your risk of injury. For more on Damper setting, see below Damper Setting Section below.
7. Aim for a stroke rate of between 24 and 30 strokes per minute (SPM).

Proper Rowing Technique

There are two parts to the rowing stroke, the DRIVE and the RECOVERY, but the movements are blended to make the stroke smooth and continuous. There should be no stopping at any point in the stroke. Improper technique can lead to injury.

1. **The CATCH**:
    a. The rower reaches forward with knees bent, arms extended, and body leaning toward the flywheel.
    b. The DRIVE begins with the legs and the back doing all the work.
    c. NOTE: The arms are straight, and the shoulders are relaxed.
2. **The DRIVE**:
    a. During the DRIVE, the rower straightens the legs and swings the back through the vertical position.
    b. Halfway through the DRIVE, the arms are still straight and the shoulders are relaxed.
3. **The FINISH**:
    a. At the finish of the DRIVE, the handle is pulled by the arms and shoulders into the abdomen.
    b. The legs are straight, and the body is leaning back slightly.
    c. NOTE: The height of the handle is neither at the chest nor in the lap.
4. **The RECOVERY**:
    a. The RECOVERY is begun by extending the arms and swinging the body forward at the hips.
    b. This puts the handle in front of the knees to avoid interference between the knees and hands as the seat moves forward.
5. **The CATCH**:
    a. The body is drawn forward with the legs to the starting position for the next stroke.
    b. The rower is now ready to begin the next drive.
    c. Remember that your body should never come to a complete stop.

Workout Intensity

The harder you pull, the more resistance you will feel. This is because the Concept 2 Rower uses wind resistance, which is generated by the spinning flywheel. The faster you get the wheel spinning, the more resistance there will be.

You can row as hard or as easily as you wish. The indoor rower will not force you to row at any set intensity level. It is up to you. As you put more effort into your rowing, you will go faster, produce more watts, and burn more calories. All these outputs will be measured and displayed by the PM- Monitoring System.

The damper setting is like bicycle gearing. It affects the feel of the rowing but does not directly affect resistance. The recommended damper setting is 3-5 for the best aerobic workout.

You can view your performance in pace, watts, and calories. The PM displays your output in a choice of units and display options.

Damper Setting

- Higher damper settings allow more air into the flywheel housing. The more air, the more work it takes to spin the flywheel against the air. More air also slows the flywheel down faster on the recovery, requiring more work to accelerate it on the next stroke or pull.
- Lower damper settings allow less air into the flywheel housing, making it easier to spin the flywheel.
- For more information on damper settings:
    - https://www.dps.texas.gov/sites/default/files/documents/etr/docs/damper_setting.pdf

Training and Resources

- **Tabata Protocol** – a cardiorespiratory training method of intense exercise (work) followed by short, slower exercise or rest periods repeated multiple times in a row. The link/QR code provides a Tabata series focused on the 2000m test:
    - https://www.dps.texas.gov/ETR/docs/concept2RowerTabataSprntTrng.pdf

- **Texas DPS Rowing Workouts** – additional row training resources can be found on the Texas DPS website at:
    - https://www.dps.texas.gov/section/training-operations-tod/concept-2-rower-evaluation-and-rowing-workouts

- **Rowing Form Video** – to review or improve your form:
    - http://www.concept2.com/indoor-rowers/training/technique-videos

- **Concept 2 Rower Training** – workout of the day training options from C2:
    - https://www.concept2.com/training/wod

Testing

Equipment:

- **Scale** - It is recommended to utilize a medical-grade scale such as the Vevor SF-891 Portable Medical Scale or the Tanita WB-800S.
    - The link/QR code below provides more information on the Vevor SF-891 and provides the option to purchase on Amazon:
    - https://a.co/d/0raA6Gr

    - The link/QR code below provides more information on the Tanita WB-800S and provides the option to purchase online:
    - https://tanita.com/products/wb-800s-plus-digit

- **Automated External Defibrillator (AED)** - When conducting any physical testing, a current non-expired AED will be present, and the operator will be current on his or her AED/CPR certifications. AED/CPR/First Aid Training that deals with signs and symptoms of distress is relevant and will also be applied when any PFT testing is being conducted; and actions will be taken that are necessary to deal with the distressed situation. All Certified Row Test Administrators shall possess current, active CPR/AED certifications or the Department-approved equivalent (GM 08.14.02.01.f).

Stopping A Test:

When to stop a row test: A certified row test must stop when any of the following are observed:

1. An employee cannot stay balanced on the seat
2. An employee begins to exhale with a whistling sound
3. Skin turns ashen and displays signs of other health complications
4. Employee is compromising form and technique that elevates the risk of injury
5. Employee is no longer rowing with a continuous flow

If a tester stops a row test for health concerns, the employee should be recommended to see their primary care physician. *This list is not all-inclusive.*

Protocol:

1. Before engaging the protocol, the certified test administrator **must** view a valid TOD-162 Preventative General Health Screening from the employee to ensure that he or she has been medically cleared to participate in PFT testing. After recording the date of the employee's TOD-162 on the TOD-164 Physical Fitness Test Score Sheet, the certified test administrator shall return the TOD-162 to the employee. Certified test administrators should **not** retain or submit TOD-162s. See TX DPS General Manual Chapter 08.14.02.02 for more details.
2. After recording the date of the TOD-162, the certified test administrator **must** weigh the employee and record the employee's weight on the TOD-164.
    a. If the employee removes his or her shoes before stepping on the scale, then the certified test administrator will record the weight as it appears on the scale.
    b. If the employee steps on the scale with his or her shoes still on, then the certified test administrator will deduct 2 lbs. from the displayed weight and record this value on the TOD-164.
3. After weighing the employee and reviewing TOD-162 for medical clearance, the certified test administrator should allow the employee sufficient time to complete a warmup before beginning a row test.
4. The employee can choose the damper setting for the row test they are attempting. The certified test administrator **must** record the damper setting chosen on the TOD-164.
5. The certified test administrator will set the PM Monitor as noted in the Test Screens Section (2000-meter p.15, 500-meter p.16, 4-minute p.17).
6. The certified test administrator will instruct the employee to begin the test and to utilize maximum effort to complete the physical fitness row test.
    a. *In order to reduce the risk of injury and to prevent falling off the seat of the rower, when conducting this test, the employee performing the test should focus on form and technique. The more efficient the technique and form, the more power is produced.*

b. *This test should <u>not</u> be performed in a manner that causes the flywheel end of the rower machine to lift off the ground. If the flooring does not provide for traction to prevent the rower from sliding, then a certified row tester may provide resistance to prevent the sliding.*

    i. *Do not stand to the side of the flywheel where the damper is located. Stand on the opposite side.*

7. The certified test administrator will record the results of the physical fitness row test on the TOD-164.
8. The certified test administrator will complete the TOD-164 and **accept** the TOD-164 results via digital acknowledgement or signature.
9. After the certified test administrator accepts the results, the employee will **accept** the TOD-164 results via digital acknowledgement or signature.
    a. If the employee notices an error or other issue, the employee can reject the results and consult with the row test administrator to clear up the error.
10. The employee will receive a final result notification. The employee is encouraged to save the results for their records.

NOTES:

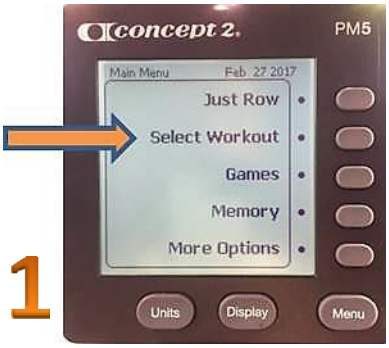
A certified Row Test Administrator cannot test himself or herself for purposes of meeting the required testing (GM 08.14.02.01.d).

- DPS Certified Row Test Administrators can review General Manual Chapter 8 on DPSnet: https://dpsnet.tle.dps/
- All other agencies can be provided a copy of the current TX DPS GM Chapter 8.14 policy by request via email to PhysicalFitness@dps.texas.gov.

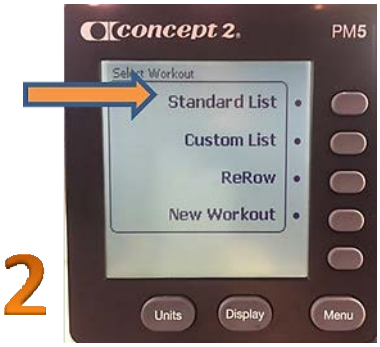
PM Monitor Test Screens:

- **<u>2000-meter Row Test</u>**

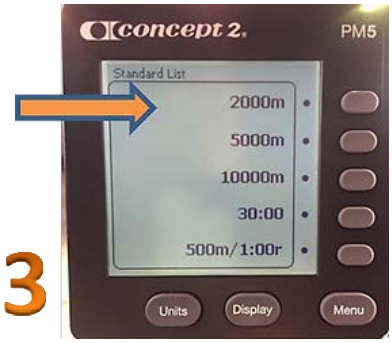
  In order to have a successful 2000m Row test, the certified tester administrator will set up the testing screen on the PM-Monitor System. The following is the procedure for setting up the 2000m testing screen:



Press "Select Workout" button



Press the "Standard List" button



Press the "2000m" button

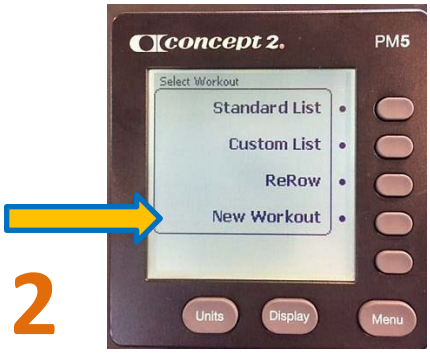
This is the 2000m testing screen

A 2000m test cannot be completed on any other screen than that shown in picture 4. If a 2000m test is completed on any other screen, the test will be voided and considered a failed attempt.

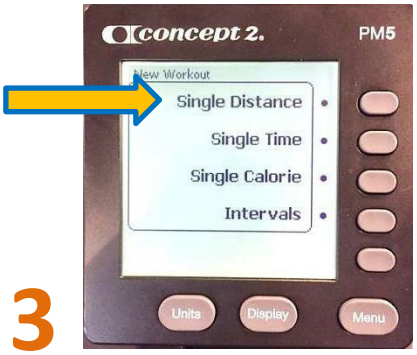
- **<u>500-meter Row Test</u>**

  In order to have a successful 500m Row test, the certified tester administrator will set up the testing screen on the PM-Monitor System. The following is the procedure for setting up the 500m testing screen:

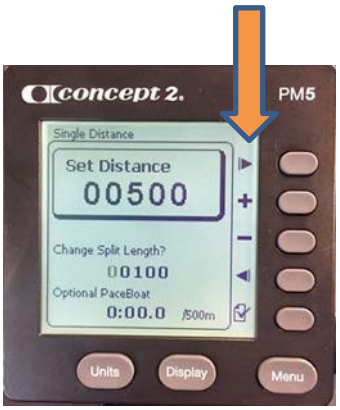
Press "Select Workout" button



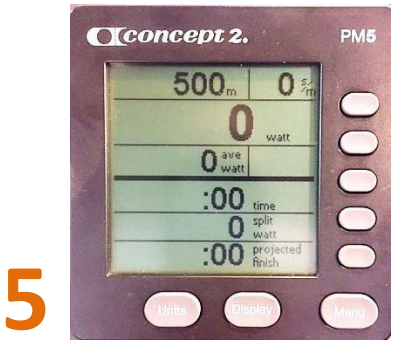
Press the "New Workout" button



Press the "Single Distance" button



Use the right and left arrows and the plus or minus button to select "500." When complete press the Check Mark ✔ button.



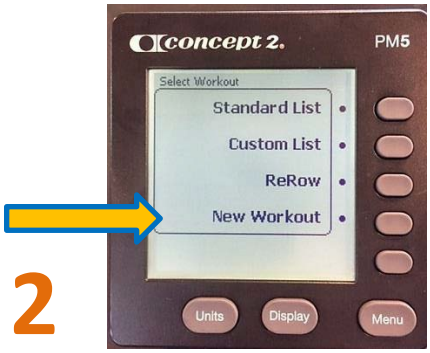
This is the 500m testing screen

A 500m test cannot be completed on any other screen than that shown in picture 5. If a 500m test is completed on any other screen, the test will be voided and considered a failed attempt.

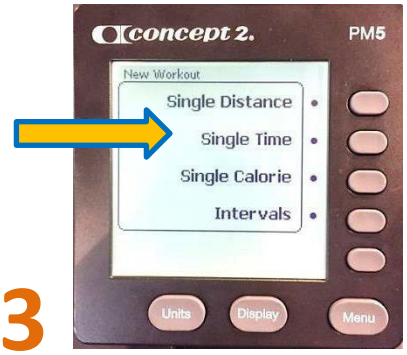
- **4-minute Row Test**

  In order to have a successful 4min Row test the certified tester administrator will set up the testing screen on the PM-Monitor System. The following is the procedure for setting up the 4min testing screen:

Press "Select Workout" button



Press the "New Workout" button



Press the "Single Time" button

Use the right and left arrows and the plus or minus button to select "4:00." When complete press the Check Mark ✔ button.

This is the 4min testing screen

A 4min test cannot be completed on any other screen than that shown in picture 5. If a 4min test is completed on any other screen, the test will be voided and considered a failed attempt.

Row Test Fitness Standards:

- The 2000-meter Row Test is an Age, Gender, & Weight test. To determine desired results, you can utilize the 2000m Row Test calculator found here:
    - https://www.dps.texas.gov/apps/tod/fitnesswellness/concept2RowerCalc.htm

- The 500-meter Row Test is an Age, Gender, & Weight test. To determine desired results, you can review the 500m Row Standards here:
    - https://www.dps.texas.gov/sites/default/files/documents/etr/docs/500m-row-leo-norms-age-gender.pdf

- The 4-minute Row Test is an Age, Gender, & Weight test. To determine desired results, you can review the 4min Row Standards here:
    - https://www.dps.texas.gov/sites/default/files/documents/etr/docs/4minrowchart.pdf

Exemptions and Awards:

If an employee chooses to participate in the Incentive Package Option, the following Policy will be followed:

General Manual Chapter 8.14.06 – Awards and Exemptions

> *"The Department shall grant administrative leave on a progressive award scale of no more than four (4) days or 32 hours per fiscal year for commissioned and non-commissioned employees who exceed the minimum PFT fitness standards. (See TOD-164) An employee may earn administrative leave for their single best performance in both the fall and spring testing cycle not to exceed 32 hours. The amount of administrative leave granted to non-commissioned employees under this section may be reduced if the employee has been granted administrative leave for other reasons during the fiscal year. All leave must be used within 12 months from the day leave was earned. A commissioned employee must also be in compliance with the Command Presence Requirement to earn the appropriate administrative leave award."*
>
> *"If a commissioned employee scores 80% or above on the fall fitness assessment and is in compliance with the Command Presence Requirement the employee will be exempt from PFT and Command Presence Requirement testing in the spring testing period. This exemption will only apply to the fall testing cycle. An employee that participates in the spring test cycle may not earn exemption from the fall testing cycle."*

Current DPS award hours table can be found in GM 08.14.06.01 or on the Texas DPS Fitness Testing Website:

- https://www.dps.texas.gov/sites/default/files/documents/etr/docs/award_hours.pdf

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