



# IMPROVE YOUR 2 MILER TRAINING PACK





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# THE 2 MILER

## WHAT IS THE 2 MILER ?

The '2 Miler' is a best effort loaded march / Tab / yomp / ruck), found in every promotion course and the British Militaries Pre Parachute Selection (P Company). It is practised and tested to simulate moving at speed to outflank the enemy or rapidly move to secure the perimeter of a lodgement and repel enemy counter-attacks.

## WHAT ARE THE CURRENT STANDARDS FOR THE 2 MILER?

The Infantry Battle School (IBS) currently use a grading system to score the 2 miler. Anything over 18:00 is considered a fail. However, you can still gain points to add toward your overall fitness score. It is important to note that P Coy utilise a different scoring system. See below table for IBS grading system and points:

A	A-	B+	C	F
<15:00 (100)	16:01- 17:00 (90)	17:01- 18:00 (70)	18:01- 19:00 (40)	>19:01 (0)

## WHAT ARE THE LAWS.

The Three Laws of Motion, famously developed by Sir Isaac Newton, have been used to explain the basic principles of physical movement for centuries. You'll notice as sports scientists we use these laws of physics in most of our thinking because we are yet to find a counter to his work.

## WHY ARE THEY IMPORTANT

These laws are therefore applicable to not only motion without load (running) but also to the realm of Tactical Athletes, when moving with load (tabbing). When we understand the laws and how to use them, they can be used to enhance performance on a 2 miler.

## ABSTRACT

The Three Laws of Motion developed by Sir Isaac Newton are incredibly relevant to Tactical Athletes looking to improve their performance during a 2 miler. Strong and powerful legs are essential to withstand the force coming back up through the body while carrying a load and to apply enough force to the ground to move forward.

Proper running technique is also vital to minimize lateral movements, optimise energy expenditure, and maximise efficiency. By incorporating strength and power training, plyometrics, speed drills, and proper running technique, tactical athletes can improve their 2 miler performance to smash that promotion course or bag 10 points on P Company.





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# GAIT ANALYSIS

During the 2 miler, the distance between each step and the speed at which they are taken play a critical role in how well you will perform. One of the fundamental aspects that is often missed is the athlete's gait. Gait refers to the pattern of movement of an individual's limbs while running, including the distance between steps, the length of the stride, and the frequency of steps taken.

To increase speed while carrying a load, Tactical Athletes need to improve and optimise their gait. Elite runners can take strides of over 2 meters in length. However, the misconception is that this is primarily due to genetics and leg length. The truth is, the primary determinant of stride length is the amount of force produced by the legs into the ground, allowing them to propel themselves forward.

Therefore, Tactical Athletes require adequate leg **strength** and **power** to produce enough force into the ground with each stride, enabling them to cover more distance per step. It's important to appreciate where your foot lands in relation to your body. Bigger strides can often misplace you and the load.

Whilst running, your body and your kit (consider them as one) must be above the forward foot during landing, this maintains efficiency of the stride. If you are behind or in front of your lead foot, then it will cost you more energy to 'power through' each stride, because as the load gets heavier, more force is required to push off the ground with each step, making it even more crucial for tactical athletes to not only have strong and powerful legs, but to maintain proper running **technique**, including an optimal gait, to ensure maximum efficiency during a 2 miler.

## 1. Strength

Focus on heavy compound lifts like squats, deadlifts, and lunges to increase leg strength. Prioritise progressive overload and lower rep ranges to enhance force production during each stride.

## 2. Power

Incorporate plyometric/ballistic exercises, such as box jumps, broad jumps, and power cleans, to improve explosive leg drive. Train for maximal effort to develop ground reaction force and stride efficiency.

## 3. Technique

Practice running drills, such as A-skips, bounding, and cadence work, to optimise stride mechanics. Ensure proper foot placement under the body, especially when running with load, for maximum efficiency.





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# NEWTONS 3RD LAW

This is due to Newton's Third Law of Motion, in which he states that for every action, there is an equal and opposite reaction. In the case of running, every time your foot lands on the ground, there is a force pushing back up on your body. This is exaggerated with kit. The heavier the kit, the more significant this force will be. Therefore, tactical athletes require more single leg strength to withstand this force whilst moving with load and more power to keep applying force to the ground to move forward. You spend 100% of your time on 1 leg during the 2 miler, so single leg strength is key.

## 1. Hill Sprints with Load

To simulate the intensity of a loaded run, incorporate hill sprints while carrying kit. This will build both leg strength and cardiovascular endurance, preparing you for the added resistance of the kit on varied terrain. Focus on short, intense bursts of effort followed by controlled downhill recovery.

## 2. Build Aerobic Capacity Under Load

Perform steady-paced, long runs with your full kit to build your aerobic base. This will improve your ability to sustain a faster pace over the full 2 miles, even with the additional weight. Start with lighter loads and gradually increase over time as your endurance and strength improve.

## 3. Single-Leg Strength and Power Work

Since a loaded run involves extended time on one leg during each stride, prioritise exercises like Bulgarian split squats, step-ups, and weighted lunges. These will develop the single-leg strength and power needed to keep applying force to the ground efficiently, especially under load.





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# NEWTONS 2ND LAW

So we can agree that strong and powerful legs are essential for tactical athletes to move loads at speed; and they are a key component of a fast and successful 2 miler. This is where Newton's Second Law of Motion comes in, stating that the acceleration of an object is directly proportional to the force applied and inversely proportional to its mass. In other words, the heavier the load, the more force is required to move it at a certain speed. Therefore, increasing leg strength and power is crucial for increasing acceleration, overcoming inertia, and achieving the necessary speed while carrying a load.

## **1. Improve Acceleration Under Load**

Focus on explosive acceleration with your kit from a standing start or slow jog. Include short, sharp sprints with load in your training to practice hitting race pace quickly, especially after a slow-down due to obstacles or terrain. This will help you maintain momentum and reduce the time spent building back up to speed.

## **2. Maintain Speed on Varied Terrain**

Practice maintaining speed during terrain changes, especially when transitioning from inclines to flat surfaces or uneven ground. Agility and balance drills under load will help you minimise loss of momentum during these transitions, keeping you moving efficiently through different environments.

## **3. Enhance Recovery Between Bursts**

During a loaded run, periods of intense effort (like finishing sprints, bursts past the person in front or uphill sections) will require effective recovery to maintain overall pace. Incorporate active recovery during longer runs with your kit to condition your body to recover more quickly, allowing you to sustain a higher average speed over the full 2 miles. After the burst of pace, the first thing to control is your breathing. Get that under control and back to 'normal' as quickly as you can.





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# NEWTONS 1ST LAW

Moreover, Newton's First Law of Motion states that an object will remain at rest or in uniform motion in a straight line unless acted upon by an external force. In the context of tactical athletes, this law highlights the importance of proper running technique. Enter the core. With a strong core, you can control the load better, maintain technique. Good control and technique will reduce lateral movements, enabling the athlete to move in a straight line with minimal energy expenditure, resulting in a more efficient and faster pace. Without a strong and stable midline, a tactical athlete will waste energy moving laterally or in zigzagging motion as they can't control the kit, resulting in decreased efficiency and increased energy expenditure. The optimal running technique requires maintaining a straight line and minimising lateral movements, ultimately leading to more efficient use of energy and improved performance during the 2 miler.

## **1. Increase Endurance Capacity with Load**

Build aerobic endurance by incorporating long-distance runs with your kit, focusing on maintaining good posture and core stability throughout. This will allow you to sustain effort over the full 2 miles while efficiently controlling the load, reducing energy wastage from lateral movement.

## **2. Focus on Consistent Pacing**

Learn to pace yourself during the early stages of the run, maintaining a steady, efficient rhythm that conserves energy. Practising even pacing with a strong core will help you avoid unnecessary zigzagging and keep your stride smooth, allowing you to save energy for any final sprints or obstacles.

## **3. Manage Fatigue by Strengthening the Core**

Fatigue can lead to poor posture and loss of control over your self and the load. Incorporate core-strengthening exercises and interval training with minimal rest to simulate fatigue while maintaining efficient technique. This will help you stay in control of your kit and reduce energy loss due to poor form during the later stages of the 2-miler.





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# TRAINING RECOMMENDATIONS

To apply Newton's Laws of Motion to the tactical athlete's performance during a 2 miler, a comprehensive training program should include exercises that focus on strength and power training, plyometrics, speed drills, and deliberate practice! (to improve your sport, do you sport!). Strength and power training exercises should focus on lower limb muscle, such as squats, deadlifts, lunges, and step-ups. Plyometric exercises, such as bounding, box jumps, and single-leg hops, can improve explosive power and speed while carrying a load.

Speed drills, such as sprint intervals, shuttle runs, and ladder drills, can help improve running mechanics and increase speed while carrying load. It's essential to focus on proper running technique to reduce the risk of injury and increase efficiency. Tactical athletes should concentrate on maintaining good posture, driving the arms (or single arm if carrying a weapon system), and pushing off the ground with the balls of their feet.

## 1. Mental Toughness Training

Endurance isn't just physical; it's mental. Incorporate long-distance loaded runs or extended circuit workouts to build mental resilience. These challenges will teach you to push through discomfort, fatigue, and physical barriers, helping you stay focused and motivated during the toughest parts of the 2-miler, especially when fatigue sets in towards the end.

## 2. Fuel and Hydration for Loaded Runs

Your ability to sustain effort during a 2-mile loaded run depends heavily on proper nutrition and hydration. Fuel up with a balanced mix of carbohydrates and electrolytes before your run to maintain stable energy levels. Proper fuelling will help you combat fatigue, especially when carrying a heavy load over uneven terrain.

## 3. Breathing Techniques Under Load

Controlled, deep breathing is key to efficient oxygen intake, especially when carrying a load. Practice breathing techniques during training to stay relaxed and composed under stress. This will help delay fatigue, improve endurance, and allow you to maintain a consistent pace throughout the 2-mile loaded run.



# DOCTORS RECOMMENDATIONS

Dr Ash spent 13 years in the British Army earning the right to wear the coveted Green Beret and British Military Parachute Wings. In the later stages of his military career, he went on to qualify as an Exercise Rehabilitation Instructor (ERI) and refined his practice working as an ERI attached to Headley Court, The Special Boat Service (SBS), The Gurkhas, Commando Forces and The Parachute Regiment.

Dr Cox has a history within elite sport as a national and international competitor in weightlifting and powerlifting. After helping redesign the rehabilitation and treatment pathway for P Company candidates, Dr Cox pursued a PhD in sports, exercise, and health science. As well as individual recommendation throughout, Dr Ash would like to offer you 5 overarching key recommendations that can help you enhance your performance and achieve the next level of excellence in the 2 miler.

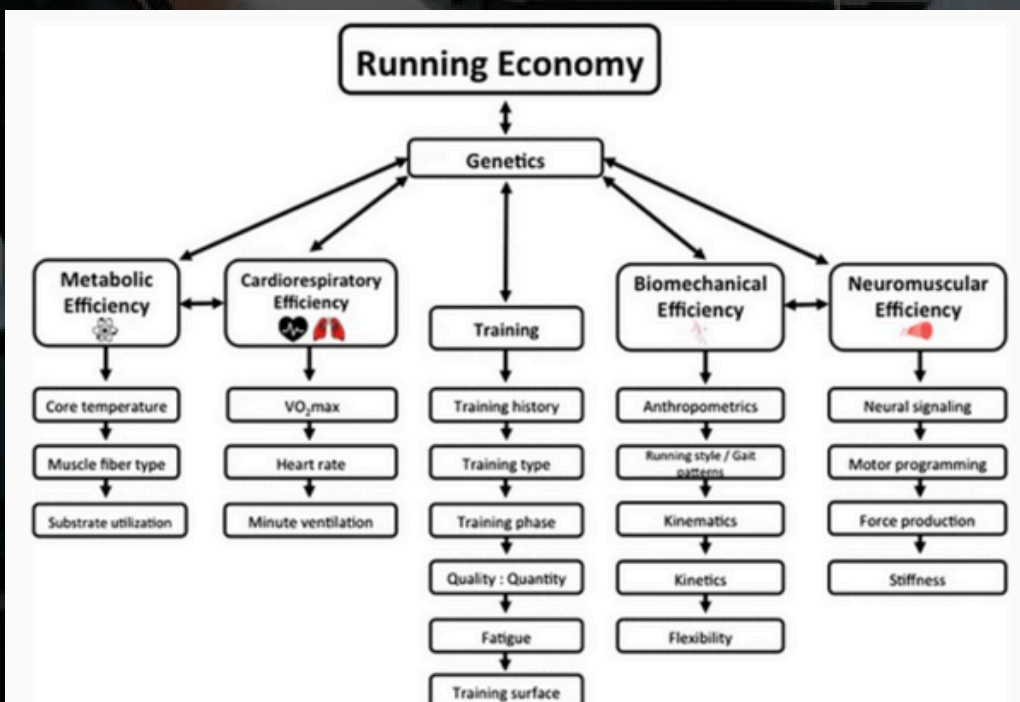
## How to Improve Your Running Economy

Ready to boost your RE? Here are some tips to get you started:

- **Hit the Weights:** Strength training, particularly for the lower body, can improve your running efficiency. Focus on exercises that enhance muscle power and tendon stiffness.
- **Drill It Down:** Running drills that emphasise good form and technique can help you develop a more economical gait. Think high knees, butt kicks, and strides.
- **Run Regularly:** Consistent training helps improve your overall aerobic capacity and running efficiency. Remember, practice makes perfect – or at least more economical.

## The Bottom Line

Running economy is the unsung hero of loaded marches as much as it is for running. It's the difference between feeling like you're flying and feeling like you're slogging through mud. By focusing on form, muscle efficiency, strength training, and the right gear, you can unlock new levels of performance and make your loaded marches feel smoother and more effortless.



**Factors affecting running economy.**



# DOCTORS RECOMMENDATIONS

- **1. Strength and Power Development:** Tactical athletes should prioritise heavy compound lifts (e.g., squats, deadlifts, and lunges) and plyometric exercises (e.g., box jumps, power cleans) to enhance leg strength and explosive power. This will improve ground reaction force and stride efficiency, enabling faster and more powerful movements while carrying a load.
- **2. Optimising Running Technique:** Proper running form is critical for energy efficiency. Athletes should focus on stride mechanics, ensuring the foot lands under the body during each step to minimise energy waste. Drills such as A-skips and cadence work can help refine running technique.
- **3. Gait Analysis and Improvement:** Optimising gait is essential for performance in the 2-miler. Increasing leg strength will allow for longer strides and more efficient use of energy. Athletes should ensure that their body and kit remain above the forward foot during landing to maintain efficiency.
- **4. Aerobic Capacity and Interval Training:** Incorporating steady-state cardio to build aerobic endurance, alongside interval sprints to improve speed and recovery, will help athletes maintain a fast pace throughout the test. Efficient turns and active recovery between sprints are also important.
- **5. Core Stability and Control:** Strengthening the core is vital for maintaining control of the body and load during the test. A stable midline reduces lateral movement, allowing athletes to conserve energy and maintain a straight, efficient path.

**These recommendations aim to enhance performance while reducing the risk of injury during the military 2-miler test.**





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