

THE COST OF A STEP.

*A Running Mechanics
Field Manual*



DIAZ

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WHY I WANTED YOU TO GET THIS

This Field Manual wasn't created as a promotion. It wasn't designed to sell you anything. It exists for a different reason.

Because most runners never actually learn how running works.

- + They follow plans
- + They log miles
- + They work harder

But something never quite clicks. Not because they lack effort—but because they're building on something they don't fully understand.

This manual is meant to change that.

Not completely.

But enough to shift how you see what's happening beneath each step.

What you're about to read is focused and deliberate. It's not a system. It's not a progression. And it's not the full picture.

It's a narrow window into something much deeper.

You'll start to see:

- How force moves through your body
- Why inefficiency feels like effort
- Where performance is quietly gained—or lost And if it resonates... you'll also start to realize something else:

This is just the surface.

What this is—and what it isn't

This is not a replacement for **RUN**.

It's preparation for it. **RUN**. doesn't give you a plan. It gives you the understanding that makes every plan work. It connects the pieces most runners never see—and once you see them... your training, your movement, and your effort begin to change naturally.

One more thing before you begin

If this way of thinking resonates with you... I'd like to stay connected.

I'll be sharing deeper insights, breakdowns, and applications that build directly on what you're about to read.

No noise. No filler. Just clarity.

Let's get started.



— Richard

COST OF A STEP

STEP 1

STEP 2

STEP 3

STEP 4

THE COST OF A STEP

If I asked you why runners slow down, you'd probably give one of the usual answers.

- + They didn't train hard enough.
- + They went out too fast.
- + They weren't fit.

Those answers make sense. They're also incomplete. Because every step you take is a transaction. And most runners are overpaying—without realizing it.

You don't slow down because you stop producing force. You slow down because too much of that force never makes it forward.

This is the cost of a step.

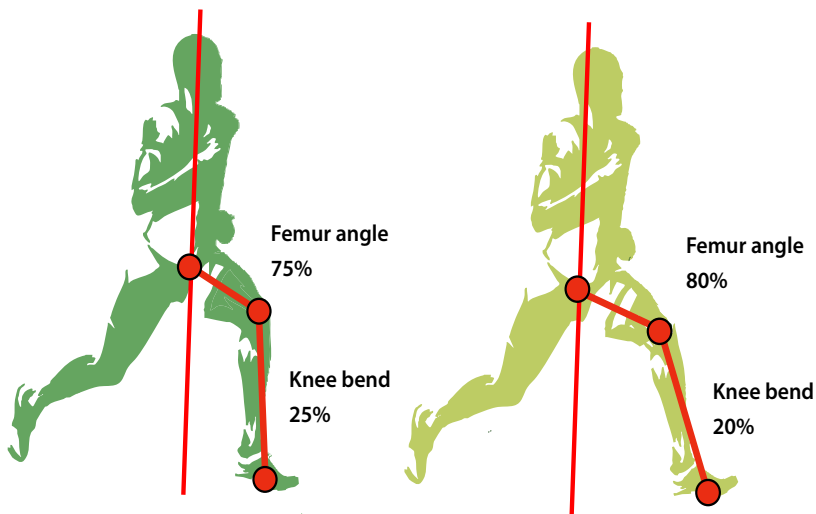
Before we talk about cadence, pace, or training, we need to slow this down and look carefully. The images on the next two pages are not about right versus wrong.

It's about how small mechanical changes quietly compound.

All four runners are working. All four want the same outcome. Only one of them is paying the correct price per step.

FOOT PLACEMENT & ENERGY LOSS

How Overstriding Increases Cost Per Step



8:00 avg / mile pace

8:15 avg / mile pace

How an 8 minute mile can be compromised by overstriding alone. As foot contact moves ahead of the knee & center of mass, braking increases, elastic return drops, pace slows and muscular cost rises. Femur angle is measured relative to vertical COM line.

OPTIMAL ALIGNMENT

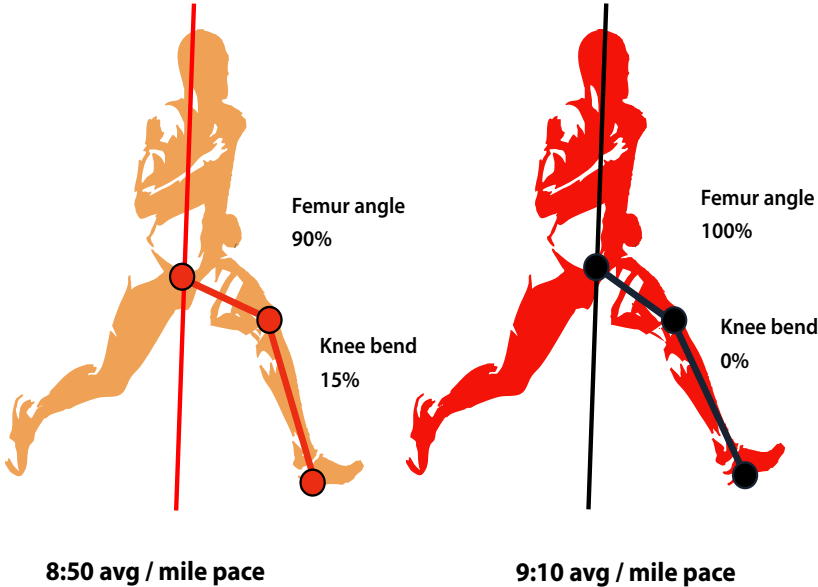
MILD BRAKING

PREMIUM CONTACT

ACCEPTABLE DRIFT

FOOT PLACEMENT & ENERGY LOSS

How Overstriding Increases Cost Per Step



HEAVY BRAKING	SEVERE BRAKING
MECHANICAL COMPROMISE	OVERSTRIDING

How to Read What You're Seeing

(Read this after you've looked at the images)

Before we talk about cadence, pace, or effort, take another look at the runners on the previous pages.

At first glance, they don't look dramatically different.

They're all moving forward.

They're all "running."

But the outcomes they're headed toward are very different—and the reason has nothing to do with motivation or fitness.

It's geometry.

Every angle you see in these images tells a story about how force is handled—whether it's captured, redirected, or quietly wasted.

Let's walk through what matters.

Start at the center of mass, everything begins here.

The center of mass—roughly located near the pelvis—is the point the body is trying to move forward.

When the foot contacts the ground close to this point, the ground reaction force supports motion.

When it lands too far in front of it, the ground pushes back.

That's braking.

So the first question these images answer is simple: Where does the foot land relative to the center of mass?

As you move from left to right across the spread, notice how the foot gradually migrates forward—away from the body, away from the center of mass.

That one change sets off everything else you're about to see.

In the first image, the foot lands under the knee with the tibia close to vertical. This allows the ankle and knee to load eccentrically, sending force upward into the femur. The femur doesn't reach for the ground—it receives load, becoming part of a spring-like system.

As the images progress, the tibia begins to reach forward. The foot contacts the ground ahead of the knee, knee flexion decreases, and the timing of elastic loading is disrupted. When this happens, the femur no longer receives elastic force from below. Instead of acting as part of a spring, it is forced to generate force later through muscular effort.

The loss of efficiency doesn't begin at the hip. It begins at the foot and tibia. Once the lower limb reaches, the spring is gone—and everything above it becomes more expensive.

The Knee: Spring or Lever

In the most efficient position, the knee is flexed enough to behave like a spring. It can load quickly, store energy, and return it.

As foot contact moves farther ahead, knee flexion decreases. The leg stiffens. What was once a spring becomes a lever.

And levers don't store energy—they transmit force abruptly. This is where elastic return is lost and muscular cost quietly rises.

The runner doesn't feel slower yet.

They just start paying more per step.

The Tibia and Ankle: Preparation or Braking

Finally, look at the lower leg and foot.

In the earlier images, the tibia is close to vertical and the ankle is prepared—neutral to slightly plantarflexed. This positions the foot to load, not collide.

As overstriding increases, the tibia angles forward and the ankle becomes more dorsiflexed. The heel approaches first.

The body is no longer preparing to accept force—it's bracing for impact.

This is where braking impulse becomes unavoidable. Not because the runner is doing something "wrong," but because the geometry leaves no other option.

Why the Cost Rises Faster Than You Expect

Here's the most important takeaway from these pages: Energy loss does not increase linearly. A small forward drift of foot placement produces a small increase in cost. A larger drift produces a rapid escalation.

This is why runners can "get away with it" early, and why breakdown later feels sudden and confusing.

Nothing suddenly failed.

The bill simply came due.

What the images are really showing you isn't about perfect form, It's about probability.

Certain angles make it more likely that:

- + Braking will occur
- + Elastic return will be reduced
- + And muscular re-acceleration will be required

The runners in the images aren't trying harder or less. They're just organized differently and organization determines cost.

One Quiet Reframe Before You Move On

If you take nothing else from these images, take this: Running economy isn't decided by effort. It's decided by where and how force enters the body. Once you see that, cadence, pacing, and training decisions begin to make sense.

Now we can talk about Home.

HOME



HOME

Why Step Frequency is Structural—and Why Precision Matters

After understanding the cost of a step, the next question becomes obvious: How do you protect against that loss?

This is where step frequency enters the conversation—and where many runners become confused, frustrated, or discouraged.

You’ve probably heard the number before: 180 steps per minute. For some, it’s treated like a myth. For others, it’s treated like a suggestion.

And for many, it’s something they tried briefly, found exhausting, and abandoned.

So let’s be clear from the start. 180 is not a range. It’s not a guideline. And it’s not a goal you “get close to.” It’s a structural reference point.

That’s why I call it Home.

What Home Actually Does

Home has nothing to do with speed. It has everything to do with organization. At 180 steps per minute, the timing between steps becomes fixed. That fixed timing does something important: it removes the space where inefficient mechanics hide.

At Home:

- + Overreaching becomes difficult to sustain
- + Foot contact is biased closer to the body
- + Braking is minimized inherently
- + Elastic loading becomes possible again

Home does not create efficiency. It exposes inefficiency and forces correction. That is its value.

Clearing Up the Biggest Cadence Myth

One of the most common misunderstandings in running is the idea that higher cadence shortens stride length.

It does not—when mechanics are correct. Stride length does not disappear, at Home it reorganizes.

When cadence is held at 180 and the foot lands near the center of mass, stride length is free to expand and contract behind the runner, not in front of them.

Speed does not come from reaching forward. It does not come from pulling harder. And it does not come from spinning faster.

Speed comes from elastic expression after contact.

As pace increases:

- + The foot continues to land in the same relative position
- + Cadence remains stable
- + Stride length increases behind the body through greater hip extension

As pace decreases:

- + That elastic expression reduces
- + The stride contracts—again, behind the runner

Nothing reaches.

Nothing pulls.

The structure stays the same. Only the elastic output changes.

This confounds many runners because it contradicts how they've been taught to run. But it is a repeatable, observable reality.

Why Slower Cadence Creates Problems

Most runners do not struggle because their cadence is too high. They struggle because it's too low. A slower step frequency requires longer steps to maintain pace. Longer steps increase the likelihood of the foot landing ahead of the body. When that happens, braking is unavoidable.

This isn't opinion.

It's geometry.

As cadence drops into the 170s and below, overstriding becomes easier to maintain, braking becomes harder to avoid, and elastic timing is lost.

The runner doesn't immediately feel slower.

They simply begin paying more per step.

This is why slow cadence often feels comfortable early on. The cost is hidden—until it accumulates.

Why I Don't Teach "Close Enough"

For novice runners, approximation creates confusion. Most beginners are not trying to down-regulate from a high cadence. They are not over-spinning. They are not efficient runners who need refinement.

They are almost universally:

- + Running with a slow step frequency
- + Overstriding habitually
- + Braking every step
- + And unaware of how costly their gait actually is

In this context, telling someone to get “close to 180” becomes permission to stay exactly where the problem lives.

176 is better than 170. But both allow the same errors to persist. For learning to occur, the target must be clear.

Precision simplifies adaptation.

Why Frustration Appears When Runners Try 180

When runners attempt to hold 180 without changing how they land, frustration shows up quickly.

Heart rate spikes.

Breathing becomes strained.

The effort feels unsustainable.

The mistake is assuming this means cadence is wrong.

It doesn't.

It means the runner is asking their body to tolerate a higher workload without resolving the mechanical debt underneath it.

Cadence does not fix poor mechanics. It exposes them.

More steps per minute means less braking per minute—because the landing changes.

The First Instruction: Stick the Landing

Before cadence matters, landing matters. If the foot is landing too far in front of the body, 180 will always feel near impossible.

So the first instruction is not: “Run faster,” or “Spin your legs.”

It’s this:

Stick the landing.

That often requires slowing down—not as a setback, but as a reset.

Slowing down allows the runner to:

- + Reduce overreach
- + Feel where contact occurs
- + Restore elastic loading

Once landing improves, runners often discover something unexpected: There is a pace where 180 suddenly becomes manageable—sometimes even natural.

The rhythm appears because the mechanics finally support it.

Home Is Productive, Not Restrictive

Home is not a cage.

It is a place of learning.

It teaches runners:

- + How to land
- + How to load
- + How to allow stride length to express itself behind them

Once this skill is learned, cadence can rise deliberately—during surges, racing, or tactical moments—without corrupting form.

Home is not about limitation. It is about earning speed instead of buying it.

The Takeaway

Home is not about hitting a number. It is about protecting the integrity of each step. Most runners need to come up to 180—not settle below it.

Slower cadence allows errors to persist. Higher cadence increases cost only when mechanics remain unresolved. When landing improves, cost drops.

When cost drops, 180 becomes sustainable. And when 180 is sustainable, speed becomes available—without urgency or waste.

Home is not where you force speed. It's where you learn how to keep it.

THE JAB



THE JAB

Using Frequency as a Competitive Weapon

Up to this point, cadence has been framed as protection. Home—180 steps per minute—keeps mechanics honest, cost controlled, and speed sustainable. It's where runners learn to move efficiently and where most racing should live. But competition introduces a different requirement.

At some point, speed at Home is no longer enough. And when that moment comes, cadence changes roles. It stops being a safeguard. It becomes a weapon.

Frequency Is the Last Lever

There are only three ways to go faster:

- + Reach farther forward
- + Apply more force
- + Increase frequency

The first option is a mechanical failure. The second has limits and consequences. That leaves frequency.

When speed at 180 has been fully expressed—when stride length is already expanding behind the runner and mechanics remain intact—the only remaining path to greater speed is greater step frequency.

This is not a mistake.

It's a decision. And like all good decisions in racing, it should be made deliberately.

Why More Frequency Is Expensive

Increasing cadence doesn't break good mechanics. It increases cost per unit time.

More steps per minute means:

- + Higher heart rate
- + Greater neural demand
- + Faster accumulation of fatigue

This is why frequency cannot be used casually. It is metabolically loud, even when mechanically clean. That's also why runners who rely on frequency too early often fade late. They spend the most expensive currency in the first half of the race.

The mistake isn't using cadence. The mistake is using it too soon.

The Jab: What It Is (and What It Isn't)

I teach elite runners to think of increased cadence the way a boxer thinks of a jab. A jab is not a knockout punch.

It's a message. It tests. It disrupts. It forces response.

In racing, a brief increase in cadence:

- + Raises pace without dramatic form change
- + Forces competitors to spend energy
- + Creates psychological pressure
- + And then—it disappears.

The jab is not sustained. It's applied and withdrawn. That restraint is what makes it effective.

What the Jab Accomplishes

Used correctly, a cadence surge does three things:

- + It increases speed without reaching
- + Mechanics stay intact. The foot still lands where it should.
- + It increases cost for those around you

Competitors who are already near their limit are forced to respond.

It reveals who is in control

The runner who can return to Home smoothly owns the race. The power of the jab isn't how fast it is. It's how comfortable the person delivering it remains.

Why Most Runners Use It Wrong

Most runners treat cadence like a throttle. They increase it and hold it—hoping fitness will carry them through.

That approach almost always backfires.

Sustained high frequency:

- + Drains reserves quickly
- + Increases the chance of late-race breakdown
- + Turns a tactical advantage into a liability
- + Frequency is not meant to replace efficiency. It is meant to capitalize on it.

When to Use the Jab

There are only two appropriate times to deploy increased cadence:

- + Mid-race disruption - A brief surge to test the field, force decisions, and expose weakness.
- + Late-race commitment - When the finish is close enough

that the remaining cost is acceptable—and confidence is high that the surge is not premature.

Anything else is gambling. Good racers don't gamble with cadence. They invest it.

Why Returning to Home Matters

The true mark of skill is not how fast cadence can rise. It's how quickly it can come back down.

After a jab:

- + Cadence should settle
- + Breathing should recover
- + Mechanics should feel unchanged

If frequency can't return to Home, the jab was too long—or used too early. Control is what separates tactics from panic.

BEFORE YOU GO

If you've made it this far, you've already done something most runners never do. You slowed down enough to look at "how" you run—not just how much or how hard. You learned that speed isn't limited by effort first, but by cost.

That cadence isn't a cure, but a structure. And that frequency, when used deliberately, can change the outcome of a race.

That's not a complete system. It's a lens.

The goal of this Field Guide was never to replace the work ahead. It was to give you a way to "see" running differently—so that when you open **RUN.**, the ideas land deeper and make more sense.

The book is where these concepts expand. Where they're applied across distances, intensities, terrain, age, and competition. Where mechanics, physiology, and strategy are woven together deliberately.

This guide was meant to be read once, then returned to when something feels off. The book is meant to be lived with.

So take what you've learned here.

Apply it lightly.

Notice more.

Force less.

I am proud of **RUN.**

I dedicated a lifetime to prepare it for you. A full 400 pages that is designed to serve you on your journey as a runner, once you have a copy, you'll understand why it was written the way it was.

Thank you for trusting the process.

We'll go deeper soon.

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