

# *Interval Training*







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***Interval Training***

**BY NICK COSTES**

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**COVER:** Author Nick Costes' thesis is that to race fast one must train fast. All these milers use intervals. (Jeff Johnson)

# PREFACE

To me, the most amazing fact about the athletic career of Nick Costes is not that he became a world class distance runner despite his great lack of speed. At his best he could sprint a quarter-mile in 58.8, strictly a slowpoke by varsity standards. After six hard years of training he managed a mediocre mile in 4:29. At six miles he was a mite better, at 30:50. Yet he vaulted into world class at the Boston marathon in 1955 in his third attempt at the distance, breaking a 13-year American record with 2:19:57. A month later, he broke another record, winning the national marathon at Yonkers, N.Y.

The truly amazing fact about Nick is that he was the first American to break into world class in the marathon. Add to this one more fact: he achieved the feat in a single year of specialization, during 1954-55.

Why was Nick the first? Why, when so many before him who were far more talented and who had the experience of numerous marathons behind them failed to duck under 2:25? I think it is because Nick developed a superior training program.

Now, I admit that all Nick's success cannot be credited to his mode of training. On guts alone he went a long way, but until he drastically altered his training, his performances fell far short of world class. Here is a brief history leading up to his big breakthrough in the 1955 Boston marathon.

Nick Costes was born in 1926 in Farrell, Pa. There was no track program to speak of in Farrell. He began running as a junior in college in 1949, at Slippery Rock State. Within a year he won the Tri-State cross-country championship for small colleges. His best mile was 4:44, and his two-mile, 10:18.

Upon graduation, he was drafted a second time. He found himself on the other side of Korea with the occupation forces in Germany. There he became all-Army 10,000-meter champion. While in the Army, he met George Terry who became his arch rival and best friend. Terry was the 1950 Connecticut state mile champ, and brother-in-law of America's best marathoner, John J. Kelley, a student at Boston University.

After being discharged from the Army, Terry enrolled as a freshman and Nick as a graduate student at Boston University so that the three, Kelley included, could train together. They roomed in the same apartment but, because of schedule conflicts, they seldom trained as a group, except on weekends.

At the same time, Josy Barthel of Luxembourg enrolled at Harvard to work on a masters in sanitary engineering. Barthel was regarded as the world's top miler, having won the 1500 meters at the Olympic Games in Helsinki the previous year.

By way of Billy Smith, Boston University's miler (and now head coach there), Nick met Barthel. For the next seven months they trained together around the environs of Harvard Yard. Nick became very impressed with Barthel's systematic approach. He learned that guts were not enough to excel. Brain power was needed, too. Bit by bit, Nick pieced the puzzle of progressive conditioning into a meaningful whole, carefully recording every workout, analyzing the results. He translated Barthel's German script training diary



and, with the benefit of personal experience, modified the basics to fit the marathon. The rest is known.

The marathon world was stunned, to say the least, to see a hitherto unheralded American break up the mass of foreign supremacy which each year excluded domestic runners from the top finishers in the Boston Marathon. Nick was swamped by sportswriters, TV appearances and banquets. He tried verbally to detail his training, giving due credit to Barthel. Much was misquoted or distorted. So he published a condensed version of his thesis, based on Barthel's methods. The article was printed in the *Amateur Athlete*, November 1955. This led to a flood of letters from aspiring runners who wanted more information. Individual reply was impossible. And since that time Nick has always desired to write his version of interval training.

Perhaps the timing is opportune, because interval training finds itself the butt of severe criticism from numerous circles. Indicted as a dehumanizing way to train runners, no strong authority has risen in its defense. Certainly, in the hands of an ignorant coach a beleaguered runner may justifiably acquire a loathing and a dread of it.

Yet, interval training in one form or another is used (and abused) by more athletes than any other conditioning program. It works—no doubt about that—judging from fantastic improvements made by distance runners the world over and the continual upgrading of standards and breaking of records.

Unlike other books on the subject, the material here is not compiled from references. Nick speaks for himself. He cuts a clean swath through what at first is a maze of complexity, and gets to the "meat" of the thing.

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The author wishes to express his gratitude to Josy Barthel of Luxembourg and John A. Lucas of Pennsylvania State University.

To Josy Barthel, the 1952 Olympic 1500-meter champion, the author owes a life-long debt. For seven fruitful months the author trained daily with Barthel around the environs of Harvard, learning the basics of interval training which, in no small way, launched a new era of instant world class runners, first in the marathon and later filtering down to the shorter distances.

To John A. Lucas, former track coach and now professor of sports history at Penn State, the deepest gratitude is acknowledged. Lucas was chiefly responsible for the author's return to New England where both taught in the public schools of Natick, Mass. On countless evenings at various sites around Boston, Lucas freely gave his time to assist the author in numerous ways. His presence, stopwatch in hand, had much to do with lightening the burden and breaking the monotony of a long, tedious workout.

# INTRODUCING INTERVALS

## A 440-YARD TRACK

Most tracks measure 440 yards in circumference. To be exact, a track is constructed to measure 440 yards one foot out from the inside curb. Tracks are oblong, theoretically divided into 110-yard sections. In other words, each straight is 110 yards, as well as each curve. This makes computation of distances easy, because accumulating distance comes out to even fractions of a mile or to whole miles. For example, 110 yards are one-sixteenth of a mile; 220 yards, one-eighth; 440 yards, one-fourth, etc. To carry this further, four laps equal a full mile; eight laps, two miles; 40 laps, 10 miles.

## INTERVAL TRAINING

The word "interval" means repetition in respect to track athletics. Interval training, then, means repetition training, in which specific distances are run over and over again. An interval usually is run at a brisk pace. In order to recover before starting the next interval, a short or long recovery phase is required. Recovery may be in the form of a slow jog, a walk or a rest, or a combination of all these.

## DISTANCES OF THE INTERVALS

Favorite distances range from 110 yards to one mile, but 440 yards tends to dominate. When it suits the purpose, odd distances are run, such as 170s, 280s, 330s, etc. However, computation of accumulating distance is more difficult. In order to round the workout to whole miles, the required distance is slowly jogged.

Obviously, short distances are run faster than longer distances, the former emphasizing speed, the latter stamina. Seldom are distances below 110 yards done, or above one mile.

## SPEEDS OF THE INTERVALS

There are three basic speeds: easy, fairly fast, and fast. An easy speed is faster than a jog. An average high school or college male student does 20 seconds for 110 yards and 40-42 seconds for 220 yards; a female does a 110 in around 25 seconds, and 220 in 50-54 seconds. Fairly fast speeds are at full stride but not straining at all, except when many intervals are completed. For males, approximate clockings are 17-18 for 110, 35-37 for 220; females: 19-20 for 110, 40-44 for 220. A fast speed means a notch below a sprint, which is an all-out effort. Males: 15 seconds for 110, 30-32 seconds for 220; females: 17 seconds for 110, 35-37 seconds for 220.

Speed abilities vary from individual to individual. A born speedster may find 30 seconds for 220 yards fairly fast, while an average person extends himself to go fast to hit that clocking. The concept of speed alters in respect to physical condition, age and sex.



## **LANGUAGE OF INTERVAL TRAINING**

To outline workouts track athletes and coaches have developed verbal shortcuts, like algebra. For example, a coach may tell his runner to do eight times 110 fairly fast, 110 jog between. This is written: 8 x 110 yards (fairly fast), 110 yards jog. What the athlete does is this: he runs the straight of the track at a fairly fast speed, jogs the curve, and repeats the routine until he completes eight brisk 110s, interspersed with slow recovery jogs over the same distance.

In another workout he may do sets of 110s. For example, 16 x 110 yards (fairly fast), 110 yards jog; done in two sets of 8, and jog 440 yards after each set. As above, he completes eight 110s fairly fast, jogging slowly 110 yards between the brisk runs. But after completing the jog following the eighth 110, he continues to jog 440 yards, comprising the set. In other words, he actually jogs 550 yards. He then launches into the next eight 110s of the second set.

Workouts may be arranged in a multitude of ways. Sets are mixed; single, irregular intervals done; pyramiding; up and down the ladder, etc. To list even a few of these complicated routines at this time would serve to confuse and unduly enlarge the subject.

## **PURPOSES OF INTERVAL TRAINING**

The primary purpose is to improve a runner's physical condition. The focus is on strengthening and expanding the capacities of the heart and lungs. By doing this, a runner builds stamina. Virtually every organ and tissue of the body receives benefits. If the runner is already fit, the attempt is to make him fitter. If he has suffered a heart attack and survived, he can undergo a carefully supervised program to restore the vitality of his heart. If fat, he can lose weight; and if lean, he can gain.

Another purpose of interval training is to show a logical sequence in progression. Naturally, when beginning the program effort must be easy and non-tiring. As strength grows, so does confidence, and workouts become challenging. Finally a point is reached where exhaustive routines are included.

## **VARIATIONS OF INTERVAL TRAINING**

It is not necessary to form rigid guidelines with interval training. At the beginning, however, it is wise to use simple patterns until the rhyme and reason of progression is learned. In fact, unless boredom interferes, simple patterns prove superior to complex or nebulous routines.

Nor is it imperative that all running be on a track. Any type of terrain is fine, within reason. Golf courses, woods and roads are popular. Nevertheless, it is advisable that a runner at least know approximate distances of the intervals on unmarked terrain.

Speeds will vary, depending on several factors. A cold, windy day, poor track conditions, etc., produce slow times. Tail winds, damp and cool weather favor fast times.

## **PITFALLS OF INTERVAL TRAINING**

No training program is without pitfalls. But it appears that interval training contains very few. Nevertheless, some must be admitted.

Boredom eventually enters the picture. This is true when, during a tedious workout of many intervals or over a long season, mind and body



show signs of staleness, inability or unwillingness to expend more effort.

Escalation of workouts often provokes apprehension before and during the ordeal. A runner, after attaining a specific number of intervals at the expense of great fatigue is reluctant to try and top that performance next time around.

Racing instead of pacing the stopwatch is forever a daily problem. Novices fall prey to this pitfall, trying to impress the coach with their exuberance. Quickly such eagerness fades as the workout progresses; clockings get slower and more painful.

### **FIVE BASIC INGREDIENTS OF INTERVAL TRAINING**

1. **Quantity.** The term refers to an interval which is run at a fairly fast speed. The recovery phase is usually jogged slowly, and is the same distance as the interval. For example, 440 yards (fairly fast), 440 yards jog.
2. **Quality.** Refers to an interval which is run at a fast or sprinting speed. The recovery phase, if jogged slowly, is much longer than the interval. For example, 440 yards (fast), 880 yards jog.
3. **Variety.** Refers to an interval which, like quantity, is run at a fairly fast speed. The recovery phase when jogged is less than the interval. For example, 440 yards (fairly fast), 220 yards jog.
4. **Recuperation.** From an athlete's viewpoint, refers to a light day of activity. For a runner who is fit, slow jogging from three to five miles is the custom; others prefer to do more.
5. **Rest.** The term is self-explanatory. No running or any type of exercise is done.

### **MODIFIED RECOVERY PHASES**

As was stated, the recovery phase is usually a jog over a distance identical to the interval; in other words, a brisk 440-yard interval is followed by a 440-yard jog. In this case it takes an average male runner from two to two and a half minutes to jog 440 yards. He may, if he prefers, walk or rest between intervals. He must not consume more than 2½ minutes in recovering. For 880 yards the recovery phase is between four and five minutes; 220 yards, 1:00 to 1:15, etc.

In quality, the recovery phase is much longer than the interval—in order to permit more rest and keep the intervals fast. If the jog is prescribed to be 880 yards after each 440-yard interval, the time consumed during recovery is about five minutes.

In variety the recovery phase is intentionally reduced. After a 440-yard interval, instead of jogging 220 yards, recovery in whatever form must not exceed the time it takes to jog 220 yards, or 1:00 to 1:15.

Most runners prefer to jog after intervals because accumulated waste products in the muscles are more quickly dissipated. The added distance of the jog scarcely tires them. For the health runner, it may be advisable to walk or rest between intervals, for the added distance of the jog may increase his fatigue instead of dissipating it.

### **MIXING QUANTITY, QUALITY AND VARIETY WORKOUTS**

These three ingredients were previously described in the purest sense. They can be mixed in any way desired if it suits the purpose.

The following routines are a combination of quantity and quality:  
8 x 110 yards (fast), 110 yards jog; 8 x 110 yards (fairly fast), 220 yards jog.  
These are quality-variety types: 8 x 110 yards (fast), 55 yards jog;  
4 x 220 yards (fast), 110 yards jog.

### **DOMINATING ROUTINES**

A dominating routine tests a runner's fitness within the workout, as distinguished from a race or time-trial, which is an all-out effort over a specific distance. The distance of 440 yards tends to dominate many programs, particularly in the fall during the cross-country season. The distance is short enough to apply a measure of speed, yet long enough to tire a runner and develop stamina. The routine is in the form of quantity 440s, jogging during recovery, with the purpose of increasing the number of intervals while keeping prescribed clockings the same. For the average trained runner this is around 65 seconds per 440-yard interval. The routine is spaced to occur weekly, but as the season progresses and the number of intervals increase, this spacing spreads to 10 or 12 days, creating a cycle. The highest number of intervals (and hence the hardest workout of the season) is gauged to occur about 10 or 12 days before the peak or championship race of the season.

In spring, during the height of the track season, many routines may dominate but quality definitely is stressed. The aim is to polish and refine a runner's physical condition, built from a foundation of solid work during the previous cross-country season.

### **COMPLEMENTARY ROUTINES**

A complementary routine supports a dominating routine in any way possible that will assure the improvement of the latter. Any distance at any speed is fine, if it does the job. It does not test a runner's state of fitness, however, nor does it intend to unduly tire him. Its only purpose is to build strength, not tear it down by testing it.

During the fall or cross-country season most of the workouts are complementary, that is, buildups. They are spaced according to need. In spring or the track season, quality workouts are stressed. Here complementary routines must be carefully gauged to prevent staleness, injury or premature peaking.

Complementary routines are actually adjustments which are designed to achieve an objective. For example, a runner may lack speed. Obviously to get speed he must practice it. But in order to avoid unduly tiring himself in the process, he runs short distances, 110 or 220 yards. He wants to do a respectable number of intervals and, to avoid any slowdown, he does them in sets with adequate rest between. On the other hand he may lack stamina. He can run long distances slowly, paying no attention to time consumed. Or he may drop down to doing miles and two-miles a bit faster, with plenty of rest between intervals.

### **CORRELATION**

Correlation means that a specific workout has improved. Improvement may be in the form of an increase of intervals, the average clocking of the intervals unchanged. For example, on a certain day a runner completes 4 x 440 yards (65.0 seconds), 440 yards jog. On another day he does 8 x 440 yards (65.0), 440 yards jog. Improvement may also be in the form of a faster time



despite a reasonable decrease in the number of intervals. A runner achieves 8 x 440 yards (65.0), 440 yards jog. Later, intending to improve his average clocking, he does 6 x 440 yards (64.0), 440 yards jog.

### REGRESSION

Regression means that a specific workout gets worse. Regression may be in the form of a decrease in intervals, the average clocking of the intervals unchanged. For example, a runner does 8 x 440 yards (65.0), 440 yards jog. On another day he cannot progress further than 6 x 440 yards (65.0), 440 yards jog, usually due to excess fatigue. Regression may also be in the form of a slower time even though the previous total of intervals has been equaled. On a certain day a runner does 8 x 440 yards (65.0), 440 yards jog; but later, though completing eight intervals, his average clocking is 66.0 seconds.

### THE TAPERING BLOCK

The tapering block is a period of days, usually four, in which activity gets lighter in order to store energy for the race. The first day of the block is reserved for a final, but not hard quantity-quality workout which adds its last-minute polish to one's physical condition. On the second day easy jogging is done for five to seven miles. The third day is very light, one to two miles jogging. The fourth or final day is scheduled for the race. Often, on the day before a very important race, a runner may rest altogether.

### THE BREAKTHROUGH

This is a workout of the highest intensity, producing utmost fatigue. Only very fit and mature runners use it, and then as a last resort. The workout may last for several hours until the runner is literally staggering from incoordination due to overwhelming fatigue.

A favorite distance for the workout is about 550 yards, most of it up a gradient of 20 degrees. The odd distance plus the gradient make the flat 440-yard interval feel like child's play when returning to it on the track. In fact, all distances from 100 yards to the mile on the track likewise seem less chal-





lenging, despite the speed.

The purpose of a breakthrough workout is to extricate a runner from an apparently hopeless plateau of fitness. When improvement fails to occur, following standard procedure or even resting to replenish reserves, a breakthrough is indicated.

Frequency of breakthrough workouts in the training schedule is debatable. It is not used when improvement is noted at an expected rate. Once, perhaps twice a year is the most it should be tried.

The breakthrough varies in its effect. Some runners benefit instantly, others get worse. It may be exhilarating to some, deleterious to others, especially the day after the workout. In short, its results are unpredictable.

### **BREATH-HOLDING**

Simply stated, a runner holds his breath for specific distances. A beginner holds his breath for 50 yards while jogging, not straining to do so. He repeats this off and on as comfort allows. Veteran runners breath-hold during intervals for short distances. When doing fairly fast 110s, for example, the breath is held for 50 yards every other interval. As lung capacity adjusts, the attempt is to increase breath-holding time.

Theoretically, breath-holding routines seem to expand the lungs. If this is true, then more oxygen is respired, and hence more oxygen transported to the working muscles. As yet, research has not confirmed the benefits of breath-holding.

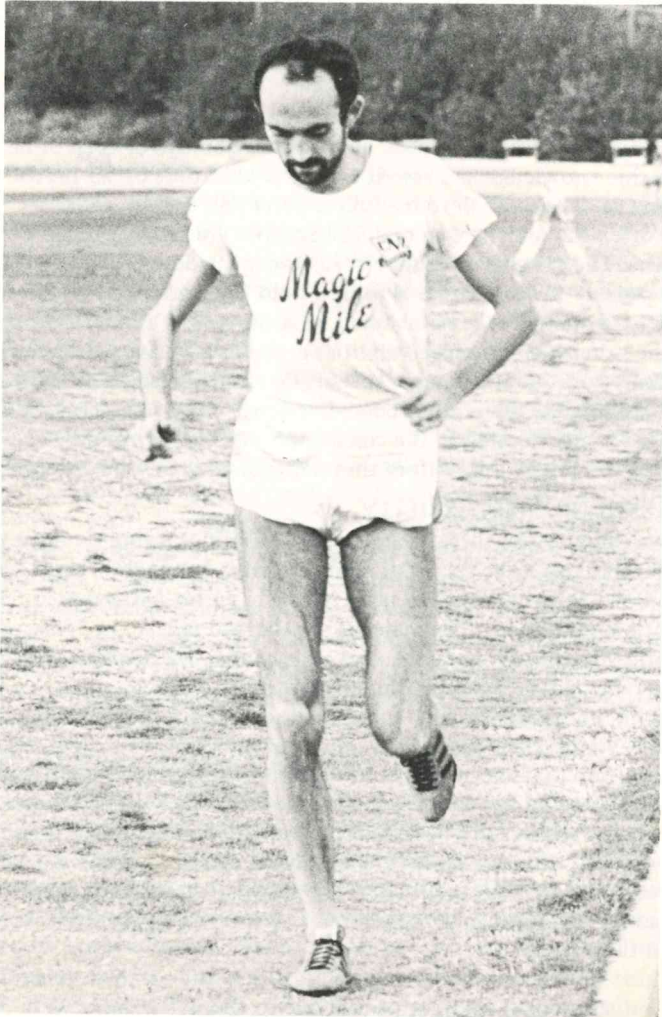
### **THE TRAINING RECORD OR DIARY**

Every runner, novice, veteran or jogger should keep a training record of some sort. Besides the satisfaction it provides, the training record is an excellent source of self-analysis. Workouts are appraised not only on a daily basis, but compared over a period of weeks, months and years.

Information included in the record may vary from the plain facts to a vivid description of workouts. The following at least are important inclusions: date; time of day; warmup; details of the workout; track conditions; weather; daily, weekly and monthly mileage, plus noteworthy comments.

**Chapter One**

***Speed and  
Stamina***



**STAN PANTOVIC PHOTO**

# STARTING ABILITIES

Everyone is born with a certain amount of speed which is hard to change. Without any track training a person may sprint 100 yards in 12 seconds. With a lot of training that same person may improve a mere second. Because of this hereditary limitation, track coaches agree that "sprinters are born, not made."

On the other hand, any normal person can improve a good bit in stamina. Without any training an average college male runs an all-out mile in 6:30. After training for three months or so he can put together two such miles without stopping. Unlike sprinters, distance runners are "made, more than born."

There is no problem in determining the speed ability of sprinters, for they fall into a narrow category: all are fast. But as distance increases—from one mile to 26 miles—determining speed abilities among a multi-group of runners becomes important. All are not fast, average or slow.

A wise coach knows the speed and stamina abilities of each of his runners. With this knowledge he prescribes precise workouts on an individual basis, hoping to develop each to his fullest potential.

Too often the multi-group of speed abilities are lumped together into a general mass. The stress is on team effort; everyone does the same workout at the same speed. A fast runner is told to hold back, to help his slower teammates. Such a policy, if it remains fixed, retards the fast runner's progress.

At the other extreme, speed abilities are ignored. Here, too, everyone does the same workout at the same speed. The fast runner easily outdistances his slower teammates. He is admired and coddled. His teammates receive less attention, inevitably coming to the conclusion that they "just don't have it." Many quit at this point, long before they can realize their true potential.

## CLASSES OF SPEED ABILITY

Let us examine the three common speed abilities found on most track teams of notable size. The factor of stamina ability will not be considered at this time. One of the boys on the team is able to sprint 440 yards in 50 seconds, which is very good. The majority do the 440 in around 55 seconds. The remaining few barely manage to hit 60 seconds. All of these boys are distance runners by nature, habit and predisposition.

A coach, unconcerned with speed abilities, assigns the following workout: 8 x 440 yards (fairly fast—65 seconds per interval), 440 yards jog. He reminds the group that this workout intends to test their level of fitness.

As expected, the fast boy completes the workout with no trouble. He should, because he ran each 65-second interval 15 seconds slower than his best. The majority find the workout fairly hard, but not exhausting. They run 10 seconds slower than their best. The slowpokes find the ordeal exhausting; some fail to finish it. They run each interval a bare five seconds slower than their best.

By these results, coach and athletes conclude the obvious. The fast boy is in excellent shape, and so on down the line to the slower boys who are in poor condition. However, when these boys meet in a race, the preordained pecking order collapses. A slowpoke in training becomes a winner in competition, causing no small surprise to all as well as disappointment to the coach



and to prerace favorites. The coach's judgment is seriously questioned, and the morale of the team threatened.

Apparently all of the team did not progress at the same rate. Before plunging any further into the mystery of speed abilities and rate of progress, it is worthwhile to clearly classify each runner in respect to how fast he can run an all-out 440 yards. Most boys fall into three categories, but four are listed to cover the exceptional few or "elite." It is reiterated that these boys are distance runners by nature, not sprinters.

<b>slow:</b>	57-60 seconds
<b>average:</b>	53-56 seconds
<b>fast:</b>	50-52 seconds
<b>elite:</b>	49 and under

### **SPEED ABILITY AND RATE OF PROGRESS**

In a healthy situation, a coach recognizes speed abilities. He uses this tool to regulate the rate of improvement of his team. He wants everybody to improve steadily, so that they are at their best when it counts. This does not mean that he favors any one group or any one person.

Take the same workout assigned previously: 8 x 440 yards (65.0 seconds), 440 yards jog. The object here is to test fitness—not exhaust the runner. The clocking, 65.0 seconds, is designated for the majority of the team, the average group. The fast runner should hit his intervals a few seconds below, and the slow runners a few seconds above 65.0. In other words, all groups will clock between 8 and 12 seconds above their best per 440.

As a matter of precaution to insure that eight intervals will be completed, the runners are warned to ease their way into the intervals, instead of blasting off. Each should hit the first one or two intervals slightly slower than the final average clocking. Near the end, the attempt is made to hit slightly below. The average clockings may look like this upon completion of the workout: fast runner, 62.0; average group, 65.0; and slow ones, 68.0.

Of course, under this system of controlled speed training, slower runners feel shortchanged. "How can we," they wonder, "meet faster runners on even terms in races when they train faster than we do in the first place?" The reflex reply that "Coach knows best" seldom is convincing. Nor does a long, detailed explanation fare better. But doubts eventually evaporate when they see themselves improving from race to race, instead of prematurely peaking at low levels.

### **DETERMINING STAMINA ABILITY**

It was stated that speed ability is largely determined by heredity. Brute or innate speed is found by running a short distance such as 100 yards all-out. Trained speed is similarly found over 440 yards. Speed ability, obviously, is easy to ascertain. Prolonged training has really little effect on improving it.

Stamina ability, in one respect, benefits from heredity. In the crudest sense it may be termed "guts." Stamina ability is evident over long distances, from one mile up.

Untrained or naive stamina is clearly seen in a typical physical education class where the mile is used as a test of fitness. In a class of 50 male students, one or two may duck under 5:10 for the distance. The next five 5:40 or better. The majority will hit between 6:10 and 6:40, while tailenders lag in at

7:00 or more. The time differential among the multi-group of stamina abilities increases if the distance is extended to two miles.

Stamina ability, in great contrast to speed ability, improves tremendously by training. Heredity poses almost no restriction on the limits to which one can develop stamina, especially in long distance running. An average male who on his first attempt runs a mile in 6:40, can with regular training over a period of three months put two such miles together.

### CLASSES OF STAMINA ABILITY

In most physical education classes on the high school and collegiate levels the mile run is used to test fitness. Actually, the scope of fitness here refers to cardio-pulmonary fitness, not strength in general. The mile, long as it seems to the uninitiated, is still relatively short to test true stamina ability, as it favors the faster boys more than the slower ones. One and a half or two miles is better, but few untrained individuals can cope mentally with anything above the mile. So the mile has been arbitrarily employed.

Four classes of stamina ability are listed. These are slanted toward potential track candidates, and do not include the mass of male students. (In a later section the non-athlete, both male and female, is categorized in a different way.)

slow:	6:00
average:	5:30
fast:	5:15
elite:	5:00

Stamina ability by itself does not guarantee future fame as a miler. Many boys who show promise fail to materialize. Others who lack stamina but who have innate speed often catch and surpass the stamina boys after a few months of training. It may be a compensatory trait that, having innate stamina, one usually lacks speed. But any boy who can run a mile in five minutes without any previous training must have innate speed, too. The chances are that he can do the 440 under 54 seconds—enough speed to achieve renown as a distance runner.

### THREE GRADES OF STAMINA

Stamina denotes the ability to maintain an activity for a prolonged period of time with a degree of efficiency. In respect to running it means holding to a reasonably fast pace for long distances, from one mile upwards.

The word stamina, whether it refers to innate or developed stamina, is broad and vague. It is commonly synonymous with physical fitness, but this does not tell much either. To clearly comprehend its meaning and scope, the term needs to be broken down into simple parts.

Disregarding the nuances of the term, three basic grades of stamina are noted:

- (1) low grade, composed of jogging,
- (2) medium grade, essentially quantity routines,
- (3) high grade, a preponderance of quality or sprint routines.

It is necessary to dwell a while on these three basic grades of stamina. The main reason for this, aside from clarification, is to reduce (and possibly end) the controversy raging among track people about which grade of stamina



is best, in order to produce top performances in races. Now, no varsity track program is composed of only one basic grade of stamina, though a coach or runner may incline more toward one grade than another if it works well. Controversy exists regarding the proper mixture of the three grades. Before that problem can be solved, each grade is treated separately.

### **LOW GRADE STAMINA—JOGGING**

Low grade stamina is obtained by jogging. Jogging is a mild form of exercise, hardly taxing the heart or lungs. It does strengthen the legs and to an extent tones many of the muscles of the upper body as well as the blood vessels. It is excellent as groundwork for athletes who resume training after a layoff, preparing them for harder work. It is beneficial to the health runner who desires to attain a modest level of fitness above that of the sedentary mass of non-exercisers. It is therapeutic to the convalescent and heart victim who wishes to regain normal and even above-normal strength and well-being.

The pace of a jog varies with each individual, but all go slow and easy. A varsity athlete ambles along between seven and nine minutes per mile. An adult male health runner goes slower, around 10 to 12 minutes, and an adult woman still slower, 12 to 15 minutes. No attention is paid to speed. All that is desired is to gently "work up a sweat," without getting tired in the process.

Because jogging is a mild activity, with regular outings an average person of no talent may cover long distances. Five, 10, 15 or more miles are entirely possible if legs and feet are conditioned. Fit distance runners, instead of taking a day off to rest before or after a hard workout, like to jog for five miles or so to recuperate.

Some coaches insist that daily jogging over long distances for several months produces medium- and even a semblance of high-grade stamina. Such is not the case, however, for the heart and lungs are not challenged. A quick check of one's pulse after a long jog will confirm the fact, along with the obvious lack of ventilatory symptoms. Unless the jog is mixed with varying speeds, no claim can validly be made that a jogger is highly fit. No runner of note has ever produced nor can produce fast times at any distance from the marathon on down by solely concentrating on jogging in training.

### **MEDIUM GRADE STAMINA—STRIDING**

Medium-grade stamina is obtained by striding, a pace neither fast or slow. The heart and lungs are worked, but not taxed to the point of inefficiency. In fact, these organs seem to benefit from striding more than from any other rate of speed. The rest of the body likewise thrives. After a series of striding intervals a runner feels much better than he does from merely jogging the same distance.

The pace for all distances is fairly fast. In the case of a fit varsity runner of average speed ability, he does repeat 220s in 32.0, 440s in 65.0, and 880s at 2:17-2:20. Longer distances of a mile and up are judged by the response of the body, rather than overall speed. When the pace begins to strain, as in racing, then it is too fast. For the average high school or college male specific times are not important. What matters is that he strides comfortably. If timed, he would hit 220 yards in 35.0, 440 in 75.0 and 880 yards around 2:40, rarely faster. For the average woman, her 220 is around 40.0-45.0, 440 in 1:50. Anything longer will unduly tire her, unless she resorts to a jog.

The bulk of interval work for varsity runners contains striding. It forms the solid frame of training, to which are added final touches or polish on one's physical condition. It brings the runner 90% of the way, but falls short of total fitness. It cannot produce high-grade fitness by itself, despite the distance covered. This applies to all: miler to marathoner, health runner to the convalescent.

### **HIGH GRADE STAMINA—SPRINTING**

High grade stamina is obtained by sprinting—theoretically speaking. This would be true in an imaginary situation where a runner trains purely by sprinting all-out at various distances. For the distance runner this is impossible, because his body and mind cannot stand that sort of pressure. Any attempt to maintain a diet of daily sprint work over a period of several weeks leads to premature staleness or injury. Even the most fanatic cannot survive under such a regimen. And the sprinter who specializes in the short dashes must sacrifice stamina to perfect his innate speed. Compared to the distance runner, he covers much less distance.

Speed-oriented coaches assert that only through many short, fast intervals can true high-grade stamina be obtained. To achieve this end and yet prevent staleness, workouts are modified in a way that allows a runner to catch his breath while practicing speed. Instead of absorbing (or trying to absorb) one massive dose, he splits the workout into physically digestible portions (sets). He runs a specified number of fast intervals nearly to the point of exhaustion. He then jogs or rests so as to repeat the process. In this way he accumulates many intervals.

Still, speed training in any manner cannot itself produce high grade stamina. Fatigue always deters. Few runners can do two or three speed workouts in succession effectively. If they try, mileage is usually sacrificed. A sure side-effect is that the legs go dead, the bounce is lost, signs of inefficiency.

The major purpose of speed workouts is to get that last 10% of peak fitness which striding workouts cannot get. Naturally, speed training must be carefully distributed in the total program. It is almost always emphasized near the end of the season.

### **STAMINA ABILITY AND RATE OF PROGRESS**

On a team of 10 or 12 runners, several may pose problems to the coach. One runner may have adequate speed but lack stamina, while another has stamina but little speed. The fast boy coasts through much of every workout, giving the impression that it is easy. Then, abruptly, somewhere about halfway he "hits a brick wall" and falls behind the others. The stamina boy strains almost from the beginning to keep up. He races every workout instead of pacing. Both runners tire excessively, and unless their problems are remedied they will peak at low levels.

Consider the fast runner first. The workout of 8 x 220 yards in 32.0, 220 yards jog is primarily designed to develop stamina. All goes well with him until the fifth 220. At that point he unwittingly slows to 34 seconds; each succeeding interval gets worse. His average 220 clocking for eight intervals is 34 seconds. Predictably, if he continues to respond this way to every quantity workout, his level of stamina will be lower than the others.

Solving the problem is simple. He begins the 220 intervals at 34 seconds instead of 32 seconds—to assure that he will complete the required amount



without undue fatigue. If he feels all right near the end, he can judiciously run faster. But he must resist the urge to force the pace during quantity workouts intended to upgrade stamina, even at the expense of speed.

The slow stamina runner is harder to work with because he impatiently tries to rise above his handicap. He believes that hard work alone is the solution to his lack of speed. In the early part of the season he shows dramatic progress, placing high in races. This confirms his belief and encourages him to train still harder, creating a cycle. By the middle of the season he plateaus, and many whom he beat before now beat him. He has no alternative plan to improve, and his persistent efforts in training fail to produce desired results, causing irreversible damage to his morale.

This runner lacks speed, not stamina. Though straining, he can pound out a stream of intervals without much deviation in clockings. Even 33-second 220s are not slow to him. But forcing him to slow down in training so that he will not strain does not solve his problem. He needs fast stuff, despite the hazard of increasing strain during the workout. However, the fast stuff must be arranged to help, not hurt him.

Take the workout previously outlined: 8 x 220 yards (in 32.0), 220 yards jog. As stated this is a quantity workout intended to develop stamina. Instead of doing this workout as prescribed, he can modify it by splitting the intervals into pairs. He hits each 220 in around 31 or 32 seconds, jogging 220 yards between. After the second fast 220, he jogs a full 440, or if preferred, 880 yards to assure recovery, prior to starting another pair of fast 220s. He repeats the process until he completes eight fast 220s.

The slow stamina runner will not reach his potential if he is fed a balanced diet of quantity workouts like the rest of the team. He can, since he needs extra speed work, substitute a fast workout now and then for a quantity routine. A good ratio to try is two-to-one: instead of three quantity workouts when they come up, the third is altered to doing speed. After a few rounds of this he should find quantity routines feeling more comfortable.

When both runners (the one lacking stamina, the other speed) are tested in a quantity workout of 440s, they, like everyone else, try to get the best average clocking for the intervals. They run the first one or two 440s a second or two slower than the anticipated final average clocking. As confidence increases, each succeeding 440 can be run faster.

Stamina and speed ability vary greatly from runner to runner. As a result rates of progress differ as well. A coach, however, wants his runners to improve continuously so that they are at their highest level of fitness when it counts. He may need to slow some and speed up others by individualizing workouts. After all, the purpose of coaching at its best is to get the most out of the majority. If he achieves this, team morale stays high and confidence in the coach remains steadfast.

**Chapter Two**

# ***The Initial Buildup***



**STAN PANTOVIC PHOTO**

# FALL TRAINING PLAN

A sequence of training is a step-by-step method by which a conditioning program evolves. Generally speaking, workouts at the beginning are easy. As the body grows stronger and accustomed to the daily chore, workouts get harder. Finally, near the end of the training cycle they become intense. A high point of fitness is reached: the peak. After this, a short layoff is indicated before resuming training with the intention of topping the previous peak.

A simple sequence involves five ingredients of interval training: (1) quantity, (2) quality, (3) variety, (4) recuperation, (5) rest. Although there is no fixed rule on the order of these ingredients, the most acceptable is this: (1) quantity, (2) quality, (3) variety, with recuperation and rest inserted among these when needed.

To understand the sequence, let us examine a schedule outlined for a beginning high school runner. A general plan, as shown in Table 1, covered ten weeks of a four month cross-country season. The season begins in August (pre-preparatory period) and terminates at the end of November.

During the first two weeks the runner jogs, a mile the first day, and gradually works up to five miles non-stop. The buildup is staggered instead of linearly increased. This is a typical work-up: 1st day, 1 mile; 2nd day, 2 x 1 mile; 3rd day, 2 miles; 4th day, 2 x 2 miles, etc. After the fifth day, the daily distance run alternates, with long and short workouts.

Easy quantity workouts begin the third week, and most of them gradually get harder. Minimal standards are set at various times throughout the season. By the end of the sixth week, for example, a runner should complete at least one of the quantity workouts shown in Table 1. Note that in Table 1 no specific times are listed under "speed." It is assumed that coach and runner can adjust interval-speed for those who vary from the average. The 440s here are 65 seconds, the 220s between 31 and 32 seconds, but the 110s are seldom timed, and may be estimated at slightly faster than 220 speed, or about 15 to 15.5 seconds.

By the end of the 10th week (mid-October), intervals have increased all along the line, but clockings are constant. It often is not possible to squeeze in each routine within this short period of three weeks. The tendency is to favor the 440s.

Quality workouts are introduced about the fifth week, and should reach a reasonable minimal standard by the 10th week as shown in Table 1. The 440s and 220s are clocked, but not the 110s. Each 440 interval ought to be run around 60.0 to 62.0, as geared to average speed ability, and each 220 about 28.0 to 30.0. From the 10th week on quality workouts cannot escalate like quantity workouts, because they would unduly exhaust the runner. In order to keep fatigue levels within reasonable bounds, these fast workouts are best done in sets. During the cross-country and winter seasons (if no indoor meets are held), quality serves chiefly as a complementary routine.

During the fifth week, variety is introduced. Its minimal standards are set to coincide with those of quantity and quality workouts in the tenth week. Variety, like quality, tires a runner quickly. And so, like quality, it is complementary most of the time, and is done in sets after the tenth week.



## LOGIC OF THE SEQUENCE

A danger that any training program faces is getting in a rut. Mind and body love a smooth rhythm. Habits are thus easily formed. Unless a change is introduced periodically the runner inclines to resist change. He may even become lethargic and stay on a fitness level well below his potential. To get them out of a rut the mind and body must be jolted.

To understand the logic of the sequence of quantity, quality and variety, consider a program which contains only quantity routines. As a starting point, 4 x 440 (65.0), 440 jog. The 65-second clocking per interval is regarded as fairly fast for a runner of average speed ability. To match this workout he does eight 220s and 16 110s fairly fast. He intends to increase the intervals all along the line. Because he has no other speed for comparison, his concept of "fairly fast" gradually begins to feel "fast and hard." Each succeeding workout assumes a dominant role with no support from any source.

On the other hand, a program with quality routines judiciously inserted jolts a runner out of his desire to become complacent. After a solid quality workout done in sets to prevent undue fatigue and either preceding or following a quantity workout, a runner basks in relative comfort when he returns to intervals in fairly fast times. He gets the impression that, with quantity, maintaining a fairly fast speed poses no great problem. He concentrates purely on increasing intervals.

When variety is added to the sequence, it reduces the gap between quantity and quality. Variety's speed is, in most cases, like quantity: that is, fairly fast. Variety simulates race conditions because its recovery phase is cut to half that of quantity. Very fit runners sometimes almost eliminate recovery. Quantity and variety benefit from the complementary effect of quality. And variety itself is a weak complementary force to quantity.

The key to the sequence is quality. Of the three, quality is the most intense ingredient. Variety is the next hardest, with quantity the easiest if all factors are equal, especially if the same number of intervals are done.

Now, it must be admitted that the sequence just described, sound as it appears, fails to answer many questions. No formula or ratio of balanced routines can hope to satisfy everyone, especially if speed ability (not to mention stamina ability) varies so much among distance runners. Some of the obvious questions are briefly listed. Should a fast runner concentrate more on quantity? A slow runner on quality? What are the frequency and type of quality workouts for the average runner at different times of the year? Frequency and type of quantity and variety workouts? And so on.

At first glance these questions seem to be answered by common sense. Yes, a fast runner should concentrate on quantity routines—if he improves as a result, as most do. Yes, a slow runner should concentrate on fast stuff. But the other questions are not so easily answered. How much and what type of quantity workouts should be prescribed for the fast runner: 440s, miles, marathons? How often ought he to do these, and how hard should they be? The same applies to the slow runner who uses quality routines.

Frankly, a novice runner or a coach who labors with a large squad cannot know the answers. At best, they operate on trial and error. Unless a clear-cut system is used, a sequence based on logic and not conjecture, they may never know. The most common mistake is overdoing it—overly emphasizing

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**TABLE 1****Minimal Standards For A Beginning High School Distance Runner****Jogging (1-2 weeks)**

Start with one mile, and gradually increase the distance to five miles non-stop at the end of the 2nd week. Stagger the buildup like this: 1; 2 x 1; 3; 2 x 2; etc.

**QUANTITY (3-6 weeks)**

<b>Intervals</b>	<b>Speed</b>	<b>Recovery</b>
4 x 440	fairly fast	440 jog
8 x 220	fairly fast	220 jog
16 x 110	fairly fast	110 jog

**QUANTITY (7-10 weeks)**

<b>Intervals</b>	<b>Speed</b>	<b>Recovery</b>
8 x 440	fairly fast	440 jog
16 x 220	fairly fast	220 jog
32 x 110	fairly fast	110 jog

**QUALITY (7-10 weeks)**

<b>Intervals</b>	<b>Speed</b>	<b>Recovery</b>
2-4 x 440	fast	880 jog
4-8 x 220	fast	440 jog
8-16 x 110	fast	220 jog

**VARIETY (7-10 weeks)**

<b>Intervals</b>	<b>Speed</b>	<b>Recovery</b>
4 x 440	fairly fast	220 jog
8 x 220	fairly fast	110 jog
16 x 110	fairly fast	55 jog

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the ingredient which is intended to improve the runner. It may be compared to a physician who, wanting to make certain he cures the disease, injects an overdose of antitoxin into the patient—killing both disease and patient. In a runner's case, it means hitting a peak too soon or else breaking down from an injury. This error rubs fiercely into psychological wounds, especially when a known superior runner is beaten by one who is inferior—at a time when it counts.

**SEQUENCE IN DETAIL**

Table 1 shows a sequence of routes with minimal standards to be reached during the third to the tenth week of cross-country in the fall. The table is actually an outline, not a detailed day-by-day schedule.

In Tables 2 and 3, two weeks are extracted from the training diary of a beginning runner. These Tables are intended to show the detailed sequence.

The section in Table 2 covers seven days between the fourth and fifth weeks, from September 1 to 7. The first two workouts are quantity. The next is quality. In fact, this is the first quality workout of the season. Finally, variety is introduced on the 5th. Daily mileage is low at this stage, totalling 26 miles for the week, an average of just under four miles a day. No races are run during this period.

Another seven days from deeper into the season are examined in Table 3. This period covers part of the eighth and ninth weeks from September 22 to 28. Only three interval workouts are done because they are now getting harder. The workouts are quantity on the 22nd, quality on the 24th, and var-

TABLE 2

September Day	Workout	Miles
1.	Warmup 1 mile; 3 x 440 (65.0), 440 jog; cool down ½-mile. (By cool down it is meant that the runner jogs to even his distance to miles.)	4
2.	Warmup 1 mile; 12 x 110 (fairly fast), 110 jog; cool down ½-mile.	3
3.	Jog 4 miles.	4
4.	Warmup 1 mile; 440 in 60.0, 880 jog; cool down ¼-mile.	2
5.	Warmup 1 mile; 4 x 220 (31.0-32.0), 110 jog; cool down 440.	2
6.	Jog 6 miles.	6
7.	Jog 5 miles.	5

ity on the 25th. Three days are devoted to recuperation, while on the 26th, a long run of eight miles strives for low grade stamina by over-distance. No races were scheduled.

Total miles for the week ending the 28th reached 34, an average of almost five a day. Each routine escalates linearly, indicating improvement. But from here on, simple escalation cannot continue overall without unduly fatiguing the runner.

### AFTER THE TENTH WEEK—SETS

Glancing back to Table 1, we are reminded that the 10th week of the season is a peak? From the beginning, all routines escalated in simple linear fashion. Intervals increased, while clockings were kept fairly constant. For example, the quantity workout of eight 440s, each in 65.0.

If the runner reaches the 10th week without a serious hitch, attaining the listed standards, he soon finds it very hard or even impossible to continue linear improvement all along the three types of workout. There is just not enough time in a four-month season to concentrate equally on each routine. Even if the season were longer, equal concentration on quantity, quality and variety would prove unproductive. Too much pressure builds up, making daily training tortuous.

To keep a training program healthy and to assure steady, smooth progress, a single routine (or at most two) is selected as the standard to gauge fitness at various stages. Whether by accident or purpose, runners and coaches favor quantity 440s. Aside from the ease of timing a 440, perhaps the distance is short enough to enhance speed and long enough to develop stamina. Other popular distances are 220s and 330s.

Once a dominant routine is selected, almost all others become subordinate. The subordinate routines are by no means inferior in value, for they serve



to improve the dominant routine. Hence they are "complementary," a term more appropriate than "subordinate."

The sole purpose of a complementary routine is to build strength, not to test it. Probably the best way to do this, without devaluating its worth, is to split the individual workout into sets.

As an example, consider a workout of quality 110s. Assume that a runner who reached the 10th week of training was able to complete 16 fast 110s with a 220 recover jog between intervals. The workout nearly exhausted him. When this workout comes up again later he intends to add a few intervals. Judging from the previous workout, he modifies the routine to avoid fatigue. He does this: 18 x 110 (fast), 220 jog; done in three sets of six, and jog 440 after each set. In other words he did consecutive 110s fast, with a 220 jog between each fast interval. After finishing the sixth fast interval he jogged a full 440 instead of the usual 220, completing a set. He then did two more sets.

In Table 4, 15 days in October are lifted from the diary of a beginning runner, to show how complementary routines fit into a realistic schedule. The period covers the 5th to the 19th.

On the 5th (a Tuesday), a dominant routine was done: 8 x 440 (65.0), 440 jog. The workout was tough, exhausting. Indications are that the runner is nearing a peak. The next dominant workout is set for the 19th (also a Tuesday), 13 days later.

Within this period of 15 days two races are run on consecutive Saturdays, the 9th and 16th. Eight days are consumed by the standard tapering-off procedure for these races, each tapering block accounting for four days, from the 6th to the 9th, and from the 13th to the 16th.

There remain only five days for complementary routines and recuperative workouts. Unless the normal sequence is disregarded, only two days can be adequately designated for complementary workouts: the 11th and 12th. As the 10th and 17th occur after races, the runner needs a breather for recuperation. And as the 18th precedes a dominant workout, a mild day is indi-

**TABLE 3**

September Day	Workout	Miles
22.	Warmup 1 mile; 6 x 440 (65.0), 440 jog; cool down 1 mile.	5
23.	Jog 5 miles.	5
24.	Warmup 1 mile; 12 x 110 (fast), 220 jog; cool down ¾-mile.	4
25.	Warmup 1 mile; 6 x 220 (31.0-32.0), 110 jog; cool down ¾-mile, plus 220.	3
26.	Jog 8 miles.	8
27.	Jog 5 miles.	5
28.	Jog 4 miles.	4

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**TABLE 4**

October Day	Workout	Miles
5.	Warmup 1 mile; 8 x 440 (65.0), 440 jog; cool down 1 mile.	6
6.	Warmup 1 mile. 8 x 110 (fast), 110 jog; cool down 1 mile.	3
7.	Jog 4 miles.	4
8.	Jog 1 mile.	1
9.	Warmup 1 mile; race over 3 miles.	4
10.	Jog 5 miles.	5
11.	Warmup 1 mile; 18 x 110 (fast), 220 jog; done in 3 sets of 6, and jog 440 after each set; cool down 440.	5
12.	Warmup 1 mile; 10 x 220 (31.0-32.0), 110 jog; done in 5 sets of 2, and jog 440 after each set; cool down ½-mile, plus 220.	6
13.	Warmup 1 mile; 8 x 110 (fast), 110 jog; cool down 1 mile.	3
14.	Jog 4 miles.	4
15.	Jog 1 mile.	1
16.	Warmup 1 mile; race over 3 miles.	4
17.	Jog 6 miles.	6
18.	Jog 3 miles.	3
19.	Warmup 1 mile; 9 x 440 (65.0), 440 jog; cool down ½-mile.	6

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cated for storing energy.

On the 11th, a complementary quality routine of 18 110s was done in three sets of six, previously described. The workout tired the runner but did not exhaust him, for he could have run a few more intervals if necessary. In short, he did not "push" himself to do the workout.

The next day he did another complementary workout, using a variety routine. But because of the previous day's workout which left him a bit tired, he significantly modified this one to be sure of not overdoing it so close to a race. He ran 10 220s between 31.0 and 32.0 seconds, alternately jogging 110 yards after the odd intervals, and 440 yards after the evens. In other words, he did five sets of two fast 220 intervals.

### THE PEAK OF FITNESS

The peak of fitness is a point at which the runner is at his very best. He

has topped his toughest workouts and undergone stresses never realized before. He is now physically, psychologically (and in not a few cases, spiritually) prepared to run the greatest race of his life. He knows he is *there*. His buildup was timed right and his body adjusted beautifully. He is tuned fine, like a violin, but in reality he feels like a bomb, ready to explode for the big race.

Actually, there are two distinct phases to the peak: the workout peak and the peak race. The workout peak will be described in detail, leading to the race which involves merely an all-out effort.

The workout peak is set to hit around 10 or 12 days before the peak race. This does not mean guessing the apparent date, but actually fixing the deadline. If the workout peak comes two weeks before the race—which is too soon—sharpness may be lost. If it is late—one week before—full recovery may not occur. Timing the workout peak to arrive 12 days before the race, and not less than 10 days before, seems to work fine in most cases.

During cross-country, the workout peak stands out more clearly than it does in the late part of the track season. Concentration is on quantity 440s in the fall (if this routine is dominant), and an all-out attempt is made to complete the greatest number while keeping the clockings fairly constant. Logically, if a runner succeeds in topping his best 440 workout near the end of a four month span of training, from August to November, he considers himself at peak strength.

To set the workout peak date, assume that the peak race is scheduled for November 30th. Count back 12 days. This sets the workout peak on November 19th. If weather conditions are unfavorable, the workout can be moved to no later than the 21st or 10 days before the race. The last hard 440 workout is done; in fact, it should be the hardest workout of the season. A first year runner may be able to complete 10 440s or even 12, and this is excellent. However, if a runner fails to top his best previous 440 workout, he may have plateaued or regressed. It would be foolish to squeeze in another 440 workout after this time. No hard, exhausting workout can follow the workout peak, whatever the results. To try this is to gamble, with the chips stacked high against the runner.

If all has gone well up to and after the workout peak, a final, non-exhausting fast workout will add one last touch to form. The date is set six or seven days before the peak race, and about four or five days after the workout peak. Here, the polish workout comes on November 24th.

The polish workout is best done over 280 or 330 yards. Both distances are short enough not to unduly tire a runner. If 330s are selected, a first year runner of average speed ability ought to get a least six, preferably eight, averaging 46-46.5 seconds per interval. This pace is equal to 61.2-62.0 440. Depending on how he feels, a runner has the option to jog whatever distance is necessary to recover for the next interval. Usually, because a runner is supremely fit, he jogs a distance identical to the interval.

So far three of 12 days in the countdown have been accounted for: the workout peak, the polish workout, and the peak race. Now, another three are added, composing the tapering block. Working backwards: November 30th, peak race. November 29th, rest. November 28th, 3 miles easy. And November 27th, a final quantity-quality workout of eight or 10 110s.

Six days remain unfilled in the 12-day span. Four blank days occur be-



tween the 19th and 24th. With a conservative plan, the 20th and 21st are devoted to recuperation, jogging four to six miles on each day. On the 22nd a set workout of quantity 110s or 170s is suggested, such as: 24 x 110 (fairly fast to fast), 110 yds jog; done in 3 sets of 8, and jog 440 or 880 after each set. An alternative routine is 2 x 1320 (3:35.0) 440 jog and rest 10 minutes after each. Or for the sake of variety, 110s with a 1320 run can be mixed. It is very important to remember that at this point of training the runner must not be overly fatigued.

On the 23rd, preceding the polish workout, another recuperative workout of three or four miles is best to store energy for the fast 330s. Recuperative workouts for the 25th and 26th are safe approaches to the long taper for the big race on the 30th.

For a quick over-view, these 12 days in the countdown to the peak race that ends the cross-country season are depicted in Table 5.

Now a word of warning. One of the traps into which a runner may fall is to misjudge the wonderful feeling he had during these final 12 critical days. He feels so good that he may try to squeeze in one more hard workout. Or he may jog too fast during recuperative workouts. These careless flirtations squander precious energy so painfully built up during the long season. The chances are practically nil that getting greedy this late in the game will cut a few more seconds from one's time. It won't. The exact opposite is more like-

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**TABLE 5**

<b>November</b>		
<b>Day</b>	<b>Workout</b>	<b>Miles</b>
19.	Warmup 1 mile; 12 x 440 (65.0), 440 jog; cool down 1 mile.	8
20.	Jog 4 miles.	4
21.	Jog 6 miles.	6
22.	Warmup 1 mile; ¾-mile (3:35.0), 440 jog; rest 10 minutes; 16 x 110 (fairly fast to fast), 110 jog; done in 2 sets of 8, and jog 880 after each set.	5
23.	Jog 4 miles.	4
24.	Warmup 1 mile; 8 x 330 (46.0-46.5), 330 jog; cool down 1 mile.	5
25.	Jog 5 miles.	5
26.	Jog 4 miles.	4
27.	Warmup 1 mile; 8 x 110 (fast), 110 jog; cool down 1 mile.	3
28.	Jog 3 miles.	3
29.	Rest.	0
30.	Race.	4

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ly to happen. The rule is to “goof off” during recuperative workouts and not push in any workout except the quantity 440s.

### AREAS OF TRAINING OMITTED

The sequence of training as outlined in this chapter is just one way to train distance runners. Certainly no claim is made that this is the best system. But it cannot be denied that the sequence follows a logical plan, and is designed to get the runner in the best possible shape to meet deadlines in the athletic calendar. The sequence is flexible. In most cases only minor adjustments are needed. And most important, guessing is kept to a minimum.

Since the sequence of training revolves around a beginning distance runner—one between the ages of 15 and 18—a number of training techniques were either omitted or barely touched upon. It is impossible to include all of them in one chapter, not simply because of bulk but because of confusion. It is best to learn the basic plan well before adding extras and frills. Though these techniques will be discussed later, a bit can be said about them now.

- **Hill work.** Everyone agrees that hill work is very important. And virtually every runner gets his dose of hills at one time or another. But there is no agreement on a time-table for hill work. Some stress hills during the cross-country season; others go heavy in winter; a few even maintain the pace into spring. What is known is that too much shortens muscle, kills speed, stunts the stride. Offhand, one day a week of hills during cross-country is plenty, substituting it in the place of quantity 220s or 330s. Killing two birds with one stone, a runner can get fast hill work along with a long jog on the road. Sand-dune workouts are not popular, because this type of terrain is limited to desert and beach. Hill work should rarely exhaust a runner, though most believe the opposite. Hill work should be complementary, making flat running appear that much easier.

- **Overdistance.** Prior to 1950, a miler or two-miler considered overdistance any mileage above his specialty. Usually six miles of jogging was done. Modern concepts, however, regard six miles of jogging as mere recuperation—an active rest day. Now overdistance for milers and six milers means jogging at least 15 miles. It is common for a beginning high school distance runner, after about seven months of training, to work up to 15 miles in a single workout. For most programs, a bi-monthly long run is ideal during cross-country, more often in winter, and less during spring.

Resistance running. This includes such routines as bucking head winds, forging through shallow water at a brisk pace, carrying or wearing weights while running, pulling or pushing a load, etc. Resistance running is not universally accepted. It is exhausting, and the dividends derived from such effort are questioned by many coaches. Nevertheless, to get into top shape a runner must absorb diet balanced with extra-rough stuff. Like hill work, resistance running should be complementary, and not generally exhausting.

**Chapter Three**

***The  
Stamina Season***



**JOHN GOEGEL PHOTO**



# MID-WINTER RUNNING

For more than three months, from late November to early March, much of the United States is buffeted periodically by icy gales and blizzards. Roads and tracks are usually unfit to run on.

Daily training is a grind in winter, and many a runner has second thoughts whether it is really worth the effort. But the tough ones stick to it, rarely missing a day, and the majority find a host of excuses to forego training. Parents of young runners seldom encourage their offspring to brave the elements.

Much of the discomfort of winter training is reduced by proper precautions. A silk mask with slits for the eyes, nose and mouth protects the face. On sub-zero days, a handkerchief tied loosely over the mouth warms inhaled air. Cotton plugs stuffed into the ears block out icy winds. A thick towel wrapped around the neck and front of the chest keeps throat and lungs comfy. Two loose pairs of sweats (pants and tops) afford good insulation. A jacket and mittens complete the uniform.

Naturally, with all this extra gear speed work cannot be done effectively. Speed work can be scheduled on a day-by-day basis when the weather is favorable. Temperatures above 40-degrees F are fine, provided wind velocity is below 15 miles per hour. On cold days when the temperature falls below 35-degrees F speed work is dangerous, unless a runner is acclimatized. Most of the winter calendar is filled with jogging and striding, anyway.

On the whole, winter training is not conducive to good performances. It is not simply the discomfort of cold, or being bogged down with heavy clothing. Body physiology responds poorly. Muscles fail to loosen adequately, in spite of a lengthy warmup, with stretching and limbering exercises. Running action is forced as a result, stilted and choppy, and pounding cannot be avoided instead of gliding over the ground. Fatigue comes quickly.

During fast intervals, lungs chill when gulping cold air. Sweating is profuse. During the recovery jog, the lungs feel scorched, and cooling occurs almost instantaneously. Pneumonia is a constant threat.

Add to this misery soggy feet from treading on waterlogged ground; sprained ankles from slipping and running in the dark; athletes' feet; and heel tendon aches, aggravated by the cold and unduly tight calves. Surely, it takes a hardened, determined athlete to persevere and to survive.

## THREE PHASES OF WINTER TRAINING

The three phases of winter training are designed to fit the American athletic calendar. Winter training, having its unique purposes, fills the gap between fall cross-country and spring track. Up until the early fifties, most runners took a long layoff before resuming training in March. Now, practically every runner who hopes to be in top shape in the spring logs many miles in winter to create a solid base of stamina. These three phases, however, exclude those few who train hard right on through winter, preparing to engage in a heavy indoor campaign.

The first phase is called the "breather," and starts at the end of cross-country. The "breather" is a drastic slowdown of training, lasting one month. Most boys relish this short vacation after a long buildup to a peak at the end

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**TABLE 6**  
**Winter Season—Average Mileage Buildup**

December 15-21	Main buildup begins to peak; 7-8 miles average per day. <b>7-week span</b>
February 1-7	Theoretical peak; 12-13 miles average per day. <b>3-week span</b>
February 22-28	Reduced mileage to spring track; 7-8 miles average per day.

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of the fall. If December begins the winter training season, its first two weeks consist of easy jogging, starting with two miles a day and working up to five miles at the end of the period. The remainder of the month is also fairly light, having some interval work, but distance is increased to five and 10 miles a day. In the last two weeks a long race of 10 miles is set.

The second phase is dedicated to overdistance—stamina development. Actually, this is the most opportune time to pile up mileage. Theoretically the second phase begins in January and lasts for five or six weeks. For a high school runner, it is well to get between 10 and 15 miles a day in one outing. Such prodigious mileage was unheard of a few decades ago, but nowadays the practice is common among schoolboys. Nevertheless, a first-timer is naturally apprehensive about covering long distances, and his initial experience is usually unpleasant. To cushion the effects of the workload, novices should run with veterans. Though a bulk of the running is easy jogging, a respectable portion is devoted to variety-type routines. In the second phase, two long races are scheduled, preferably at 12 and 15 miles. These races are two weeks apart to allow adequate recuperation.

The third and final phase is the transition period—smoothing the way to spring track which consists of much quality work. The last three weeks of February take care of this. Mileage is reduced to where it was in the second two weeks of January, namely, five and 10 miles a day. Fast stuff and modified time-trials emerge. One more long race is scheduled, about six or seven miles, and is set at the end of the second week.

### **STAGGERING THE MILEAGE**

A runner who covers the same amount of miles each day soon finds training a bore. But strangely enough he prefers it that way, instead of abrupt changes in his routine. This is because the body and mind love a smooth rhythm, and so it is natural to resist change. Nevertheless, change is a must, or a runner will slip into a deep rut which could ruin his potential for a season. In winter especially, there is an overwhelming desire to hurry the day's workout so as to get out of the cold and into a warm house. The danger of stagnation is greatest at this time.

To reduce the tendency to fall in a rut, one's solution is to stagger the total daily miles. This helps to keep the runner alert and eager, as well as to make winter training an integral part of the whole program of conditioning. Assume that the average miles run each day are 10. Over four days, the total

is 40. A simple stagger shows this amount run on four consecutive days: 8-12-8-12. This, too, may become a rut if practiced continually. Modify the stagger as follows: 8-12-6-14. Or, 10-10-8-12. Any number of ways are fine, provided the runner recovers adequately before doing long runs.

### MILEAGE BUILDUP

The buildup in winter is not identical to that of the fall. In the fall, simple escalation of miles and intervals is the mode, leading to a peak. In winter, mileage builds to past mid-season, and then rapidly declines. The theoretical peak occurs around the ninth week, allowing three weeks for transition afterward. Nor are there the pressures of the fall, meeting deadlines to be fit for races. The four road races in winter merely give training a meaning and make it fun, and for the athlete who has his eye on spring track they are merely complementary.

Now winter training should not be sloppy or irregular. Handled rightly, it leads to a smooth transition into spring track, and develops the runner's full potential. To do this, the following three-phase plan is suggested for beginners:

- Start with the first week of the track season, say March 1st, and count back three weeks; in other words, the last three weeks in February. This will be the third phase—the transition period.

- Go back to the time when cross-country ends, say the last week in November. Devote the next three, or preferably four weeks to a “breather” or the first phase.

- Left in the middle are six or seven weeks, comprising the second phase—the period for stamina development.

For the next step estimate the average miles to be run during the buildup to the theoretical peak (which occurs at the end of the second phase). Most schoolboys should reach a high-point average of 12 or 13 miles a day. Work this mileage back to the beginning of the third week in December, reducing the average to 7 or 8 miles a day. This covers a span of six or seven weeks, plenty of time to allow for stamina development. From the highpoint at the end of the second phase, to 7 or 8 miles a day at the start of spring track. The span here is about three weeks. Table 6 shows the plan at a glance.

### INTERVAL BUILDUP

The interval buildup is casual when compared to the fall, and as pressureless as possible. There are no strict deadlines to meet, such as conference championships. Because weather often interferes to upset interval work, a lot of long jogging is done. Interval workouts are scheduled when weather is reasonably favorable.

Emphasis shifts to variety type routines; that is, the recovery jog is less

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TABLE 7

#### Interval Buildup of Variety 220s

December 15-21	8 x 220 (fairly fast), 110 jog.
January 8-14	20 x 220 (fairly fast), 110 jog.
February 1-7	40 x 220 (fairly fast), 110 jog.

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than the interval. There are several reasons for this switch. Variety routines favor stamina development. The intervals are fairly fast, but not exhausting. The short recovery jog prevents rapid cooling. And interval speed is more than adequate in preparing for a 10- or 15-mile race.

In a loose sense, variety 220s assume a dominant role. This choice of routine is based on the reasons just given. The 220s are spaced 10 or 12 days apart and slightly longer as the intervals increase later in the season. The spacing pattern is similar to the quantity 440s which prevailed in the fall. The first variety 220 workout is set for the third week in December, with 8 x 220 (fairly fast), 110 jog. The second such workout comes in the last week of December, doubling the intervals. Escalation continues, adding four or eight intervals each workout, until a high point is reached during the first week in February. Many novices are able to do 32 or 40 220s.

Each interval is run fairly fast, according to speed ability. The fast boy does his in 33 seconds, an average boy in 35 seconds, and the slowpoke at 37 seconds. These clockings are about two seconds slower all along the line than the variety 220s of the fall.

To assure proper spacing of variety 220s, arrange a timetable. Split the chronology into three parts, showing the starting point, mid and high points. Write in the number of 220s intended to be run at each point.

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**TABLE 8**

December	Workout	Miles
Day		
15.	Warmup 3 miles; 8 x 220 (35.0), 110 jog; cool down 1½ miles.	6
16.	Jog 10 miles.	10
17.	Warmup 5 miles; 8 x 110 (15.0), 110 jog; done in 2 sets of 4, and jog 440 after each set; cool down ½-mile.	7
18.	Warmup 3 miles; 2 x 880 (2:40.0), 880 jog; 2 x 1 mile (6:00.0), 1 mile jog.	8
19.	Jog 5 miles.	5
20.	Jog 10 miles.	10
21.	Warmup 3 miles; 4 x 440 (75.0), 440 jog; cool down 1 mile.	6
22.	Jog 12 miles.	12
23.	Warmup 3 miles; 8 x 110 (15.0), 110 jog; done in 2 sets of 4, and jog 440 after each set; cool down ½-mile.	5
24.	Warmup 4 miles; 16 x 220 (35.0), 110 jog; cool down 1½ miles.	8

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## COMPLETING THE TRAINING SCHEDULE

The rest of the training schedule is filled with workouts which complement the variety 220s. These complementary workouts should not exhaust the runner, unless there is reason to depart from the basic plan. The day before the dominant workout, taper slightly. Either jog slowly to store energy, or do a set workout of quality 110s. The fast 110s make the 220s appear easy because of the change of pace. On the average two long runs a week are good. But do not crowd them too close to a race or a dominant workout.

As the second phase approaches its climax, more jogging than interval workouts is best, even at the peril of sacrificing speed, as this is the last opportunity to concentrate on stamina development. To minimize feeling sluggish during a long jog, do intermittent pickups of 50 to 100 yards at varying speeds to keep circulation brisk. Fatigue, nevertheless, is greatest in this phase because of the huge amounts of miles covered.

Ten workouts are listed in Table 8 for the end of the "breather" period, from December 15-24. The clockings of these intervals are geared to the runner of average speed ability.

The high point of winter occurs at the end of the second phase, around February 1st to the 8th. The runner is actually training like a marathoner, no longer afraid of long distances. On the other hand, in reaching the high point, he is not overly confident about crowding such massive workouts together. He is under pressure, no doubt. But he consoles himself with the knowledge that soon his mileage will be cut as he enters the transition phase.

A week of workouts is listed in Table 9, ending at the high point of the second phase. Only two interval workouts are done, the rest is long jogging.

## TRANSITION

Three weeks at least are allotted for the transition phase. For most training schedules, this occurs during the last three weeks in February, assuming the first track meet is set for the third week in March. That allows five weeks for a runner to sharpen.

To help smoothen the changeover from marathon training to quality routines, use set type workouts. At the beginning stick to short intervals, such

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TABLE 9

### February

Day	Workout	Miles
1.	Jog 15 miles.	15
2.	Jog 12 miles, with 10 pickups of 50-100 yards.	12
3.	Warmup 5 miles; 10 x 440 (75.0), 440 jog; cool down 1 mile.	11
4.	Jog 15 miles.	15
5.	Jog 13 miles, with 10 pickups of 50-100 yards	13
6.	Jog 8 miles.	8
7.	Warmup 3 miles; 40 x 220 (35.0), 110 jog; cool down ½-mile.	11

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as 110s, 220s and 330s. Split the workout into digestible portions, to assure a fast pace and yet not exhaust the runner. Allow adequate time between sets for full recuperation.

Insert longer intervals as soon as the runner exhibits good running form and rapid recovery. Include these intervals no later than the last week in the transition phase. Intervals from  $\frac{3}{4}$  mile to  $1\frac{1}{2}$  miles are fine, but they are not run all-out. Instead, they act as modified time-trials.

One last long race of six or seven miles on the road is run. Schedule it for the end of the second week in the transition phase. Compared to racing over 15 miles, a seven-miler is a welcome relief. And the seven-miler, short as it now seems, makes the prospect of running one, two or three miles on the track seem practically a snap.

In Table 10, a week of workouts is suggested for transition, leading to the final long race. Note that all the interval speeds are equal to a 64-second 440.

### RUNNING INDOORS

Many northern and a few southern schools and colleges sport comfy indoor tracks in huge field houses. Getting the boys out of the cold is the main idea behind installing these tracks under a roof. And the boys like it, because it seems novel and plush.

Indoor facilities, however, are meant to be temporary centers of refuge, and not for daily use. But runners quickly become spoiled. They refuse to train outdoors in winter even when the weather is reasonably tolerable. They prefer to pound around a midget track, preferring monotony and physical torture to the hilly outdoors.

Superficially, training indoors does not appear bad at all. Learning the tricky turns on a cramped eleven- or twelve-lap to the mile track is not hard. The runner leans early around the banks and straightens up late, and thus maintains a decent speed. With a few weeks of practice most every runner becomes an expert.

Physically, it is ruinous. At high speeds, the banked turns force an un-

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TABLE 10

February

Day	Workout	Miles
8.	Jog 6 miles.	6
9.	Warmup 1 mile; 24 x 110 (16.0), 110 jog; done in 4 sets of 6, and jog 440 plus rest 5 minutes after each set; cool down $\frac{1}{2}$ -mile.	6
10.	Jog 8 miles.	8
11.	Warmup 1 mile; 8 x 330 (48.0), 550 jog, and rest 2 minutes after each; cool down 1 mile.	6
12.	Jog 8 miles.	8
13.	Jog 4 miles.	4
14.	Warmup 1 mile; 7-mile race.	7

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conscious braking, putting heavy pressure on joints and sockets. The leg suffers most, as the head of the femur (global part of upper leg) grinds into the hip socket at an awkward angle. Continued training produces chronic inflammation which often incapacitates the runner. Knees and ankles fare no better. Blisters are common. And muscles pull frequently.

Aside from the physically harmful effects which daily training indoors engenders, the timetable for developing stamina is either compromised or omitted. Many spring training programs actually begin in winter, with the emphasis shifting abruptly to quality. Long runs are discouraged because of the fear of impairing speed. The indoor meet schedule contains short races, the longest being the three-mile which is rarely run.

Any runner who hopes to attain his potential simply cannot afford to delete marathon-type training in winter, preparatory to spring or summer competition.

Modern training trends have forced changes in American distance habits. In order to cope with the superiority of European athletes who opened what looked like a yawning chasm, US runners did what was inevitable: they copied their rivals. In doing so, performances indoor slackened, much to the chagrin of promoters, who, bucking for larger and larger gate receipts, promised world records on a weekly basis.

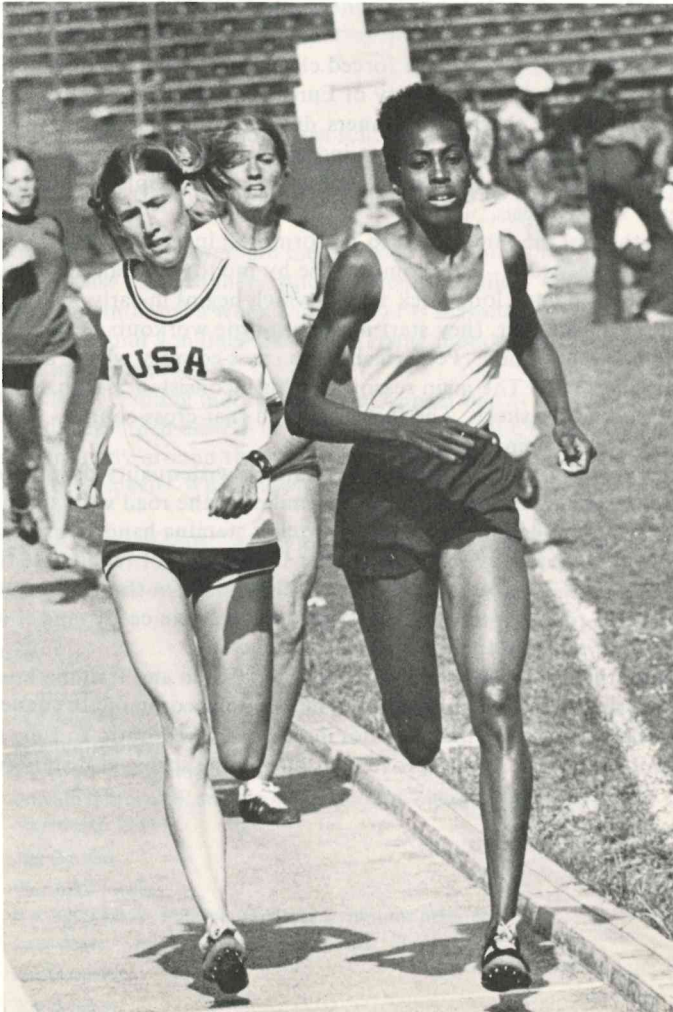
Nevertheless, the temptation to perform well indoors is still strong, especially among the stars. They compromise by modifying training patterns. After finishing the long, long track season which begins in early winter and ends in later mid-summer, they start marathon-type workouts in the fall with hardly any breather period. Performances in cross-country waver, sometimes good, sometimes bad. The main reason for this inconsistency is that the build-up is too fast and too short. The fact is ignored that cross-country forms a basis for winter, like a stepping stone.

Other vets combine marathon-type training with quality during the indoor season. They alternate huge doses of miles on the road with sharp quality stuff on the track. The object here is to develop stamina hand in hand with speed. This practice is very risky. A runner's body cannot recuperate on a jog of 15 miles and up after a previous day of sprints. On the contrary, when a runner returns to fast intervals, reluctant muscles strain easily, and if unduly fatigued, pull away from their bony attachments.

Despite the sundry ills which indoor competition and training breeds, more and more schools are building field houses to accommodate runners and provide a heavy meet schedule. Injuries increase in direct ratio to time spent on the cramped tracks. And improvement during the spring at distances above two miles is practically nil.

**Chapter Four**

***The  
Speed Season***



**STAN PANTOVIC PHOTO**

# PEAKING ON THE TRACK

The entire training cycle is geared to the track season. For seven months, from August to February, body and mind are groomed for the big bash in spring.

Of the three seasons, spring track is the hardest. Mileage is not very high, but quality routines are run often. On most days, effort is severe and fatigue great. A runner gets his chance to really test his mettle.

Understandably, at the start of the season clocking do not come easy. Running form is sluggish, a carryover from the long buildup of fairly slow intervals during the winter phases of stamina development. A 64-second quarter, for example, is hard and tiring. At this stage, a runner naturally gets mad and worries over his inability to run fast and smoothly. He blames marathon-type training for slowing him. He grows impatient to regain his speed, and unless carefully coached he may overload himself before his body is ready.

To avoid premature peaking (which leads to staleness) and to limit the danger of injury from excess fatigue early in the season, a simple, safe pattern of progress is used for many intervals, especially at distances above 220 yards. Speed is all-important, and must not be compromised. Therefore, more recovery between intervals is allowed during early spring, with less as the season rolls on. A general rule is that long intervals require long recoveries, short intervals short ones. All-out runs have no time limit on recovery.

## SHARP VARIATION—UPS AND DOWNS

Even when the runner is using the best methods in pursuit of speed, performances will suffer sharp variation. One day a runner floats effortlessly through fast clockings, amazing himself. Another day he struggles to hit mediocre times. On his good day he feels peaked—on the bad, stale. Occasionally he enjoys a short period of good runs, expecting no end to his physical euphoria. Then abruptly he slumps for three or four days.

Excluding external factors, these sharp variations are due to a temporary depletion of the body's reserves. Speed work burns energy fast. This forces the body into see-saw competition of depletion and restoration. If the see-saw barely tips, eating up only a little energy, depletion is slight. If it dips low, variation is greater in speed.

Yet, as many runners have experienced, variation in performances is not so clean-cut. A runner may complete a terrific workout, apparently totally exhausted. Logically he should be bushed the following day. But what happens? He still feels great, and does another tough workout. He may similarly run two fine races on two consecutive days. The body has, it seems, been able to bounce back faster than expected.

There is, nevertheless, a pattern to these sharp variations. Though the pattern is not precise or infallibly predictable, it holds true for perhaps 60% of workouts. This is enough to make it statistically significant. The pattern unfolds more clearly over a ten day period (a mini-cycle) than within a shorter one, such as a week. Assuming that an athlete trains hard as often as his body will permit, wanting to derive the greatest benefits over 10 days, rationing his energy and concentrating on speed work, his body may respond as shown in Table 11.



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**TABLE 11**

<b>Workout</b>	<b>Results</b>
1. Very hard	Excellent
2. Moderate	Good
3. Moderate	Poor
4. Easy	Average to poor
5. Hard	Average
6. Easy	Average to poor
7. Easy	Average
8. Moderate	Average to poor
9. Easy	Average to good
10. Very hard	Excellent

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To scrutinize the pattern in Table 11 with the intention of developing the powers of a fortune teller is really not that important. Each athlete has a unique pattern of variation, and a coach working with large number of boys must accept this fact. What is important is that both coach and runner understand that variation is common during spring track, and that if a boy can point out one or two great workouts in 10 days, he is making good progress.

### **THE SEVEN DAY CYCLE**

Like it or not, most training programs are based on a seven day cycle, ending on Saturday with a race. Few coaches work Sunday, but they instruct their athletes to either jog five or six miles to recuperate, or do fartlek—which is jogging mixed with irregular intervals at varying speeds. No definite workout is planned. And this, frankly, is wise.

Monday is hard. But Tuesday is very hard. The idea is to get two stiff workouts done well ahead of the upcoming race. Wednesday is usually moderate, with a view to retaining sharpness. Thursday and Friday are for tapering off.

Nothing appears to be wrong with this setup. No time is wasted, each day is used efficiently. This is the way it has been done for a long time, and there is scant evidence that things will change in the future.

But examine these seven days. What have you? A rigid battery of cramped workouts, fit to coincide with the school's schedule. Week in, week out it is the same. Ignored are the body's reactions to an inflexible routine. If a runner is tired on Tuesday, he still tries to get in a very hard workout. If he feels exhausted on Wednesday, he must still try to sharpen. His reserves are seriously depleted, and are allowed a mere two days to fully recuperate.

There are other complications. Training becomes a rut and performances are mediocre. Improvement, when it occurs, is strictly hit or miss. Sooner or later athletes begin to question their coach, and if satisfactory answers are not found, they argue with him and eventually defy him. Finally, tired and stale athletes accrue a dread for workouts, and their confidence to compete is shaken.

Stuck with a seven day cycle, a coach is compelled to make the best of it. Here are some alternatives. Schedule a weak team one week, a strong team the next. Use the standard approach for the weak team. Prior to competing against the strong team, go easy on Sunday and Monday. Work very hard Tues-

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**TABLE 12**

<b>March</b>		
<b>Day</b>	<b>Workout</b>	<b>Miles</b>
25.	Jog 7 miles.	7
26.	Warmup 2 miles; 24 x 110 (15.0), 110 jog; done in 4 sets of 6, and rest 5 minutes after each set; cool down 1 mile.	6
27.	Warmup 2 miles; 3 x ¼-mile (3:40.0), 440 jog; and rest 10 minutes after each; cool down 1 mile.	6
28.	Jog 4 miles.	4
29.	Warmup 2 miles; 10 x 330 (45.0), 110 jog; and rest 3-4 minutes after each; cool down 1½ miles.	6
30.	Jog 3 miles.	3
31.	Warmup 1 mile; race over 2 miles.	3

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day, and drastically taper from Wednesday on. Now there is no guarantee that this will work consistently, but at least 60% of the time it will.

From the athlete's standpoint, a seven day cycle of training is generally unproductive. A healthy schedule shows workouts spread over 10 or 12 days, allowing adequate time to prepare for each meet. But to do this, meets would have to fall in the middle of the week. Teachers scorn the practice of excusing a student from class to compete in athletics, especially on the high school level. Scheduling meets every two weeks severely curtails the overall program. Until someone comes up with a secret formula, the seven day cycle is here to stay.

### **EARLY SEASON**

By late March most boys have adjusted to speed routines. Clockings come easier; running form is smooth, loose and strong. Workouts are not so intense as to break a runner down, but they are still reasonably hard, and they hurt.

In preparing for a meet with a weak team, a hard bout of workouts is scheduled to avoid wasting training time on the seven day cycle. Assuming that chances of winning are good, the runners can be worked extra hard, realizing, however, that they will not perform at their best. Beginning on Sunday, the day after a meet, the following workouts are suggested.

The workouts in Table 12 were assigned again, this time for the strong team, a week after the 31st. Two good workouts, on the 26th and 27th, and one excellent workout on the 29th, were completed within seven days, plus the race itself on the 31st, totalling four. This was a very productive week.

With a tough opponent on April 7th, the team must be in top shape

**NEXT PAGE:** The object of all racing—sprinting to marathoning—is speed, maximum speed, the speed interval training produces. Trained-in speed gives a racing edge. (Tony Duffy photo)







**TABLE 13**

April		Workout	Miles
Day			
1.	Jog 7 miles.		7
2.	Jog 4 miles.		4
3.	Warmup 2 miles; 2 x 880 (2:20.0), 440 jog, and rest 7-9 minutes after each; 6 x 440 (64.0), rest 5 minutes after each; cool down 1 mile.		6
4.	Warmup 2 miles; 8 x 110 (15.0), 110 jog; cool down 1 mile.		4
5.	Jog 4 miles.		4
6.	Jog 2 miles.		2
7.	Warmup 1 mile; race over 2 miles.		3

and well rested. Playing it safe, only one hard workout is set for the upcoming week. The standard tapering block eats up four days; work backwards from the 7th to the 4th. Now there is a choice of days for the hard workout: the 2nd or 3rd. If the 2nd is selected, will the boys be recovered from the race the previous Saturday, allowing them only one day—the 1st—for easy jogging? Probably not. Then it has to be the 3rd.

**MINIMAL STANDARDS**

Compare Tables 10 and 12. The first covers the transition period in February, and the second late March. Note a gradual speedup of clockings. This pattern will continue to the end of spring.

Guidelines for minimal standards are projected for a runner of average speed ability during the months of March, April and May, in Table 14. Intervals listed cover 110 yards to 3/4 mile. Longer intervals are omitted, because they are usually run as time-trials.

The workouts in Table 14, classed as minimal standards, are certainly not easy. The hardest intervals are the 330s which translate to sub-60-second pace for 440 yards if the runner kept on going. For example, a 45-second 330 equates to a 60-second 440; a 44.0 330 to a 58.4 440; and a 43.0 to a 57.2.

**TABLE 14**

**MINIMAL STANDARDS FOR A BEGINNING HIGH SCHOOL DISTANCE RUNNER**

Intervals	March	April	May	Recovery
24 x 110	15.0	14.5	14.0	110 jog; 4 sets of 6
16 x 220	31.0	30.0	29.0	220 jog; 4 sets of 4
8 x 330	45.0	44.0	43.0	110 jog; rest 4 min.
6 x 440	64.0	63.0	62.0	Rest 5 min.
3 x 880	2:20.0	2:18.0	2:16.0	Rest 7-9 min.
3 x 3/4-mi.	3:40.0	3:35.0	3:30.0	Rest 10-15 min.

**TABLE 15**

Day	Workout	Miles
8.	Jog 5 miles.	5
9.	Jog 12 miles, and run 10 hills fast.	12
10.	Warmup 2 miles; 4 x ¼-mile (3:35.0), 440 jog, and rest 10 minutes after each. cool down 1 mile.	6
11.	Jog 4 miles.	4
12.	Warmup 2 miles; 8 x 330 (44.0), 110 jog, and rest 3-4 minutes after each; cool down 1 mile.	5
13.	Jog 3 miles.	3
14.	Warmup 1 mile; race over 2 miles.	3

Since a runner of average speed ability runs an all-out 440 yards between 53 and 56 seconds, each 330 feels like top speed, especially when he is tired. The short intervals are run in sets most of the time, acting as complementary routines. To try and combine them into larger sets imposes too heavy a workload and increases the chances of either slowing down from fatigue or pulling muscles. Even a veteran finds 24 110s (14.0), 110 yds jog a rough experience if done consecutively. The long intervals, 880s and ¾-milers, are in a sense pace trials, but they surely fatigue a runner a great deal.

The impression given in Table 14 is that only one type of interval is run in a single workout. For a novice it is wise to simplify training methods so that grading is clear-cut. But veterans often mix routines to retard boredom and jolt the body and mind from slipping into a rut. Table 13 shows the workout on April 3rd a simple mixture. Once a beginner fully understands proper sequence, he too may delve into the luxury of mixing intervals to suit his purpose.

### PLATEAUS AND ADJUSTMENTS

When a runner's progress is drawn on a graph, a line theoretically passes smoothly upward. At first the line shoots upward steeply, and then gradually levels.

In reality, progress is not smooth and consistent, especially at the beginning of any cycle. During transition into quality routines, running form is un-gainly and results mediocre. After a week or so a spurt in improvement is noted. But it levels quickly, followed by another spurt. As the season grows older, improvement slows until a plateau is reached. At this point a runner fights to cut tenths of a second from his time.

No one complains if a plateau arrives at the end of a season. If it comes at mid-season, there is cause to worry. Is the plateau temporary or permanent? If it is permanent, not much can be done, except to hold on any way possible. In other words, stick to the original plan, and perhaps include more light jogging in the weekly schedule to avoid backsliding. If it is temporary, an adjustment of some kind is necessary.

Consider the case of a runner who has lost the edge of his stamina, having concentrated on speed routines for two months. To restore good balance, he needs distance. How much? No one knows. Insert a long run of 10, or bet-



ter yet 12 miles during the hard week prior to competing against a weak team. Jog the distance to be sure of completing the workout, but bomb the hills. The course should have at least 10 hills.

At the other extreme a runner fails to improve his speed. He has stamina, finishing every workout. But his times stagnate, especially at 330 yards. Instead of hitting each 330 near 44 seconds, he labors at 45 seconds. For this boy prescribe more speed work at short distances. Return to Table 15. Substitute this workout for the 9th of April:

24 x 110 (14.5), 110 jog; done in 4 sets of 6, rest 5 minutes after each set.

8 x 110 (14.0), 110 jog; rest 2 minutes after each.

On the 12th of April do this:

16 x 220 (30.0), 220 jog; done in 4 sets of 4, rest 7-9 minutes after each set.

8 x 55 (all-out), 55 jog, rest 2 minutes after each.

Adjustments, varied and unlimited in scope, serve to get by sticking points. No miracles are expected. The idea is to improve clockings by any margin.

In desperate situations, a training schedule is drastically altered. A runner who is very fit, but fails to respond to doses of extra hard work, is headed toward staleness. To prevent this, change to easy stuff such as jogging for a week or so, with a polish interval workout now and then.

### THE SPRING PEAK

The spring peak is ill-defined, and all too often quite frustrating. Because the runner trains harder and harder as the season goes on, there are sharp variations in workouts, but race times improve by mere tenths of a second. Finally, after he becomes irreversibly worse, he realizes that his peak has passed.

A year later, looking back, a runner anticipates his future peak, comparing workouts and race times. He can pace himself and peak at a desired time.

As in the fall, a conference or state championship meet concludes the season. For most high schools this occurs at the end of May or in early June.

TABLE 16

May	Workout	Miles
Day		
26.	Warmup 2 miles; 6 x 330 (45.0), 110 jog, and rest 2-3 minutes after each; cool down 1½ miles.	5
27.	Warmup 2 miles; 8 x 110 (14.5), 110 jog; cool down 1 mile.	4
28.	Jog 5 miles, with 4 pickups of 50 yds.	5.
29.	Jog 3 miles.	3
30.	Rest.	0
31.	Warmup 1 mile; race over 2 miles.	3

One similarity exists between peaks during fall cross-country and spring track peaks: no meets are scheduled 10 or 12 days before the big affair. These last few days are devoted to training and mentally preparing for the final big blast of the entire year.

The taper for the big race is extended to five instead of the usual four days, as a precaution to be well rested. Work backwards from the race, and set the last quality workout of 110s on the fifth day. The day before the 110s a moderate workout is fine, preferably interval 220s or 330s. Anything longer may strain. Table 16 shows the last six days.

During these last 10 or 12 days, a runner tries to improve his speed any way possible before he tapers. He should not add intervals at the expense of speed, diluting quality for quantity. It is too late for that. He must not test his stamina with time trials, because energy is squandered too close to the peak. A miler, for example, should shun distances above 880 yards, and a two-miler not venture above  $\frac{3}{4}$  mile. Prior to 1960 many US coaches still assigned long time trials within this critical period. Of course, there are exceptions to the rule of improving performance, but to guess or to overly sharpen often spells doom.

When a runner plateaus, feels stale and stays tired, he may extend the taper to six or perhaps seven days before the peak. He jogs daily to tone muscle. No workouts of any kind are to be changed. Since he has spent an entire year getting fit, there is little fear that he will significantly regress. Seven days appear to be sufficient to restore full strength, but a longer taper dulls the edge.

### THREE PARADOXES OF QUALITY TRAINING

#### 1. Training every other day improves a runner faster than daily training.

Anyone who makes the radical change from an inactive to an athletic life soon feels overloaded. The impact is great when doing quality routines. A runner gets tired physically and mentally awfully fast, and despite orders to the contrary, he cuts workouts. When he returns he is fresh and eager, trains hard and gets bushed. He resists the idea of training the next day, cuts again, and repeats the process indefinitely.

The off and on runner improves fast. This pleases and convinces him that intermittent training is best. His teammates inch along, because they cannot fully recover when training daily, while he, resting every other day, improves.

Intermittent training, however, is a fly-by-night scheme of short duration. It works well for about eight weeks. After that, continued hard training brings staleness. A runner who rests every other day actually tapers before workouts, an unfair advantage to hold over another who trains daily. The daily trainer builds a larger foundation to scale higher peaks, and when he tapers, the body replenishes itself more fully.

Finally, intermittent training was the custom up to 1950. From the mile to the marathon, runners believed that frequent rests were essential to retain freshness and vigor. World records stagnated. The mile stayed above four minutes, and no one ran the marathon much below 2:25. When training regimens changed to daily training, plus double workouts, records fell like tenpins.

#### 2. Jogging, too, produces speed.

Speed and stamina abilities were discussed in chapter one. A brief recap:

brute speed is evident over 100 or 220 yards. It cannot be improved much, even with a great amount of training. Stamina (or trained speed) improves to a fantastic degree. This is obvious at distances of a mile and up.

Jogging at a rate of seven or eight minutes per mile is the slowest rate of speed for a fit runner. It does not exhaust unless great distances are covered. It indirectly aids speed recovery by allowing a runner timely respite during a taper before racing, or when staleness threatens. Outside of that, it hinders speed development.

Arguments wage hot over testimonies of runners who have, after abandoning speed routines, become faster by jogging. A point not clearly revealed is that these runners have lapsed into plateaus, and that speed work failed to improve times. Jogging afforded a respite, allowing the body to replenish its depleted reserves. Hence, times improved.

Strictly speaking, jogging is temporary in effect. When done over a long period of time, speed suffers.

### **3. Weight-lifting inhibits speed.**

Not until the mid-fifties did weight-lifting spread among runners. A common belief was that weights make you tight or muscle-bound. This kills speed. Few challenged the idea, and those who experimented with weights never were sure whether or not this was true. Scarcely anything was published on the subject for runners. But by the mid-fifties weight-lifting was adopted by coaches of football, basketball and swimming, and it was not long afterwards that it caught on with runners.

An unsupervised novice, trying weights for the first time, usually does too much. For the next few days his muscles are sore and tight, and he labors to run even moderate speed workouts. He prematurely concludes that weights are detrimental.

Veterans, too, make mistakes. A common fault is to forget that weights are a complementary adjunct to running, not an equal. Delighting in new-found strength, the veteran falls for the illusion of muscle size, emulating the body builder who glorifies a bulging biceps. Soon a chronic tightness sets in, unaffected by massage or loosening calisthenics.

For most runners, weight-lifting is beneficial. Speed will improve if a balanced diet of lifts is used. Weights tone muscles far better than running can. Rear leg drive power increases and the stride lengthens. But as a runner gets fitter, weight strength naturally weakens. At this point a veteran may err by trying to equalize the two. When this is done, speed is inhibited.

## **THREE PITFALLS OF QUALITY TRAINING**

### **1. Racing in training.**

Quality training is always fast. The line dividing a hard from an all-out effort is thin. So it is not unusual that boys tend to race each other.

Frequent racing, besides being exhausting, produces premature peaks which lead to staleness. Novices must understand this fact. The primary aim in training is to complete the workout first with the fastest average clockings.

To reduce the hazard of racing, run the first few intervals slower than the predetermined time, before assuming the proper speed. Go slightly faster—but do not race—over the last few intervals.

### **2. Abusing set workouts.**

Set workouts often abused are those over short distances, 110 to 330



yards. Most of these workouts are complementary, and as such should not exhaust a runner. The purpose is to divide a speed workout into physically digestible portions, assuring that the runner holds a fast pace for each interval.

The main pitfall is to stick to the day's workout at all costs. For example: 16 x 220 (30.0), 220 jog; done in 4 sets of 4, and rest 5 minutes after each set. The runner completes two sets. On the third, he finds the first two intervals unusually tough. If he continues to finish this set he may be forced to slow from excess fatigue. Do not do it. Modify the workout by splitting the remaining six intervals into three sets of two.

Set workouts are not always complementary. Slowpokes more than anyone else use them to develop speed. In a slowpoke's schedule sets pop up often, becoming co-dominant with other routines. Once in a while everyone bombs through a series of sets to total exhaustion.

### **3. Drastic changes**

Quality training tunes a runner fine like a violin string. After the long buildup to spring, he is 90% fit. With quality he now tries to get that last 10%. Though his body is highly efficient, his muscles are delicate, prone to injury.

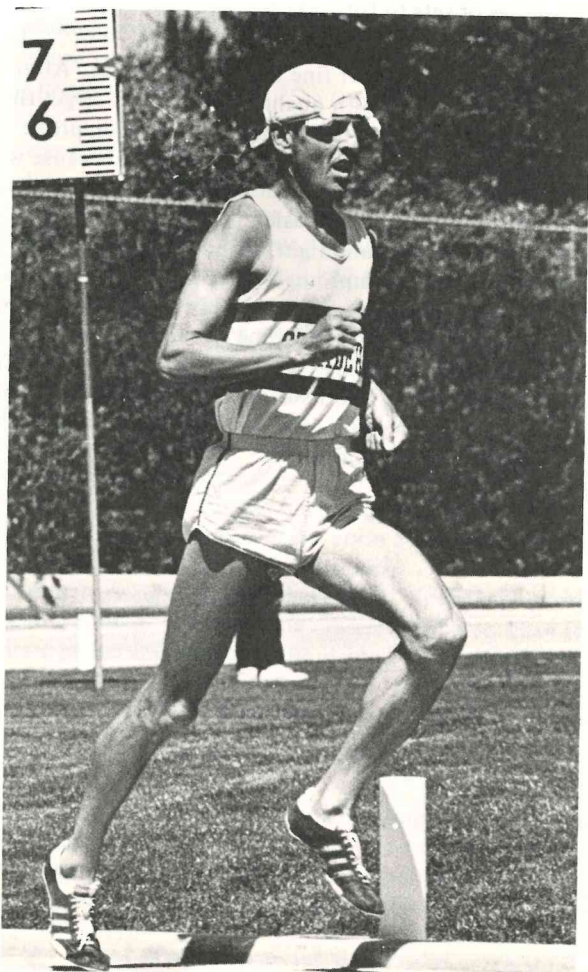
Quality training itself poses a hazard to the runner, because workouts are fast and hard. Muscles pull when over-doing speed work. And any drastic changes in routine make muscle injury easier.

When muscles become sore and tight, speed work ought to be stopped or postponed. To ignore these symptoms is to court disaster. It is a stupid gamble to continue training so close to the end of the season, when a day of light jogging can be substituted without losing the edge.

The following are drastic changes which cause leg soreness: staying in spikes too long, training hard on a soft surface and then abruptly going to a hard one, a long slow jog on one day, followed by a sprint workout the next, excessive hill work, overdoing weight-lifting.

**Chapter Five**

***Advanced  
Workouts***



**STAN PANTOVIC PHOTO**

# MORE FOR THE VETERAN

The veteran runner is one who has at least five or six years of experience, has competed in 50 or 60 races, is between 20 and 25 years old, employed or in college an upper classman.

He no longer is naive. He is inquisitive, is harder to convince, hesitates to try new schemes and will argue debatable points.

Whether in college or employed, he is exposed to a host of alternatives. Running may not be all-important. Studies, making a living or supporting a family assume priority. Recreation, dating, fraternity affiliation, etc., loom as competitors to athletics. He finds it mentally rougher to sacrifice the goodies.

The veteran who is sold on running, carefully balancing environmental distractions, trains seven days a week, often twice a day. He runs a few miles before breakfast, and gets his main workout in the late afternoon. The true enthusiast arranges his studies or work around his running.

Each year his mileage piles up to levels three or four times higher than when he was a novice. A veteran miler reaches an average of 10 miles a day; excluding the taper before a race, he totals 70 miles weekly. A three- or six miler averages 12 miles a day, and a marathoner 15 miles.

Having survived high school athletics, he now meets a tougher crop of opponents. Standards skyrocket. Keeping pace, workouts get tougher. His body falls prey to chronic aches, and the fear of injury transforms him into a mild hypochondriac. Finally, if he qualifies, he reaches a momentous crossroads: whether or not to continue into world class.

## YEAR-ROUND TRAINING

A veteran who hopes to stay apace with his opponents believes strongly that he must train year round, almost without letup of intensity. He makes running an integral part of his personal culture. Every day, rain or shine, he pounds the turf or road, not just for the love of it, but because he dreads losing ground if he misses a workout now and then. Insidiously inner pressures build. When lazy or bored, he shakes off the torpor by reminding himself that now is the time to make the most of it, for he may never get the chance again.

In summer, tradition helps the runner stay occupied. Road races at various distances, begun around 1900 in New England and the eastern metropolitan areas, have spread like wildfire since the mid-sixties. No runner needs to travel more than 100 miles now to find a race. Every week some sort of race is staged, with entries open to all. Each affair has its unique glamour and camaraderie, along with publicity and awards.

Ignoring the stigma of heresy and the sneers of those who insist on training hard through summer, a sizeable population of runners yearns for a breather, or at least a waning of effort. They argue that unrelenting training in summer leads to premature peaking in the fall. In this they are right, especially in the case of the college runner who is obligated to be at his best at the end of fall.

Four alternatives are offered to college (and year-round high school) runners who point for cross-country in the fall:



1. No training during July.
2. Jog low mileage only.
3. Easy intervals now and then.
4. Mixture of easy and hard intervals.

A runner who is fed up or who is irreversibly stale, be he novice or veteran, should consider a total layoff for at least a month in summer. A good rule is to taper in June, reducing mileage and intervals to zero by July. Run not a day in July. A runner who cannot accept a total layoff, but who resents doing intervals, jogs to keep toned. Others do intervals as impulse dictates.

### **DOUBLE WORKOUTS**

Up to 1950, very few ran twice a day. There are a number of reasons why this was so, but the main reason was laziness. Modern concepts, however, changed training ideas overnight. Runners the world over emerged from the dark ages of conservatism, plunging into realms unknown. Double workouts are offsprings of this experiment.

In a short time, results confirmed that the experiment of doubled sessions worked. Standards improved so rapidly that both runners and fans were shocked. Formerly the best US high school miler rarely ducked under 4:15. Now more than a dozen do so every year, and the record is under 4:00. The most dramatic improvement occurred in the long distances. Virtually every national and world record fell in the fifties. Nothing and no one was sacred.

In many instances, super-charged runners carried the experiment to extremes where it got out of control. Originally only jogging was done in the morning. Mileage was low. Later, trying to outdo one another, many increased the dose to 10, and in a few cases for a short time, to 15 miles. Eventually intervals were added, until the morning workout stood nearly equal to the afternoon's heavy session. Those who survived these self-imposed ponderous workloads received such slim rewards that they quickly gave up the sport or reverted to orthodox methods.

A sensible approach to double workouts is to go easy in the morning, jogging three to five miles each outing. Five morning workouts a week is fine, reserving the weekend for long runs or races. Stagger the morning sessions if boredom or staleness interferes. Do two or three straight, then skip a day, etc. If performance weakens during the heavy afternoon workout, discontinue or reduce mileage in the morning.

### **MIXING THE WORKOUT**

Anyone who uses the same training program for two or three years gets sick of it, no matter how good it is. Mind and body grow sluggish. Boredom becomes a major problem—knowing exactly what is coming up day after day. Many promising runners, after a brilliant start, fail to reach their potential—burned out. And the big reason usually is too much monotony.

With a bit of imagination, plus fore- and hindsight, workouts can be mixed any number of ways. Arrange the ingredients of quantity, quality and variety to suit the daily needs and keep interest high. A dash of hill work and resistance running can be thrown in, even overdistance in some cases. Think like a chef, serving delightful surprises.

Now, it is admitted that mixing a workout also adds a grain or two of confusion. Indiscriminate mixing is total confusion, a real mess. This comes from guessing, habitually making up a workout on the spur on the moment.

The result is that a runner plateaus too early in the season.

Reduce confusion by asking a question: is today's workout intended to be exhausting or complementary? This leads to another question: what does a runner need most at this particular time—stamina or speed? An experienced runner then makes the proper adjustments.

### TRANSLATING QUANTITY 440s

In chapter two, quantity 440s were selected as a dominant routine for cross-country in the fall. Their function was to gauge progress in training, rather than to rely solely on race results. The dominant routine was set to occur every 10 or 12 days, comprising a cycle. The 440s escalated in number, but clockings were kept fairly constant. The greatest number were set to hit around 10 or 12 days before the final meet, the conference championship.

The scheme works fine with novices. But it revolts most veterans. They hate the torment of pounding out 440s, knowing full well that when the workout comes up again, they must top it. They become anti-interval-conscious, refuse to train on the track, and suffer from what is known as the escalating syndrome.

Solve this problem by carefully mixing the next dominant routine. Camouflage the quantity 440s with a foliage of other routines which, in sum, top the previous dominant workout. Try this mixture, Table 17:

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**TABLE 17**

8 x 110 (15.0), 110 jog; rest 5 minutes.  
4 x 440 (65.0), 440 jog; rest 5 minutes.  
¾-mile (3:30.0), 440 jog; rest 5 minutes  
8 x 110 (15.0), 110 jog.

---

The sum of the intervals in Table 17 totals 11 440s. But because the workout is split into four parts with rests between each, the translated workload equals perhaps nine in-and-out 440s at 65.0 per interval. The effort, in other words, is nearly the same for the mixed workout as for the nine 440s. If the rest periods in Table 17 were eliminated, the workout becomes much harder. It would then probably be equal to at least 11 quantity 440s.

The beauty of a mixed workout, whether it is dominant or not, is in its healthy change of pace. The initial 110s make the 440s comfortable. The long interval (1320s) tires the runner, but in comparison to the fast runs before it, the pace feels unusually slow. The 110s at the end are refreshing.

A simple escalation of the workout in Table 17, whenever it is rescheduled, is to add two, three or four 440s to the second part. If four are added, the sum equals 11 440s. In fairness to a runner who suffers from the escalating syndrome, this workout ought not to be used more than twice.

At mid season during cross-country, a veteran should reach a respectable level of quantity 440s. In the pure form, he ought to be able to do 20 x 440 (65.0), 440 yards jog. Mix this workout to suit the needs of the runner. If he is slow, insert fast stuff; if average, balance the workout; if fast, longer intervals.

To an imaginative mind, there is no limit to mixing workouts properly, Table 18 offers a partial list of a few alternatives.



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**TABLE 18**

1. **Pyramid:** start long intervals, and descend to short ones.
  2. **Reverse pyramid:** No. 1 in reverse.
  3. **Bow-tie pyramid:** Combine Nos. 1 and 2.
  4. **Contrast:** alternate a long interval with a short one.
  5. **Contrast in sets:** alternate a set of long intervals with a set of short ones.
  6. **Contrast terrain:** mix hills with track work.
  7. **Contrast effort:** mix resistance running with other routines.
  8. **Radical contrast:** overdistance first, then track work. Reverse process later.
  9. **Time-trials and intervals.**
  10. **Amorphous:** irregular intervals, with no specific order.
- 

All 10 types of mixture are excellent for cross-country. The long track intervals should rarely exceed two miles, and the short ones 110 yards. Mixtures 6, 7 and 8 are emphasized in winter. But mixture 10 is the most popular.

Let us return to the problem of mixing 20 quantity 440s, each interval at 65.0. Try mixture 10, as it is easy to use. Begin with a base: 8 x 440 (65.0), 440 jog. Insert a long interval for balance, a mile in 4:40. This adds four 440s, giving a total of 12 so far. Include some fast stuff: eight 220s, 31.0 each. Now there are 16 440s. How about two 880s around 2:15 apiece? Fine. Grand total: twenty 440s.

Arrange the workout so that no clear pattern is evident, to keep it amorphous. Consider this setup, Table 19.

Certainly the workout in Table 19 is rough. Too rough, compared with twenty 440s. Everything goes well until the 220s are finished. Only 220 yards recovery are allowed before starting the mile. The workout equals perhaps 24 440s. A five minute rest prior to the mile corrects the discrepancy.

The worth of the workout in Table 19 decreases when rest periods are inserted between the routines. How much the workout loses is debatable. As yet no universal formula has been presented on the subject, and it is doubtful that future mathematicians will trouble themselves to invent one. The only recourse is to rely on experience and make a good guess.

Assume that five minute rest periods are inserted at the completion of each routine in Table 19, as was done in Table 17. Without any rest periods in table 19 the total of translated 440s equals 24. In other words, the effort required to run the first two parts (two 880s and eight 440s) and the last two (eight 220s and the mile) is the same, or nearly the same. Inserting a five minute rest period after the last 220 jog prior to the mile corrects the total to 20.

Take the two 880s and the eight 440s, and place a five minute rest between them. This reduces effort and hence results in 10 translated 440s.

But now the five minute rest prior to the 220s further devalues the workout. Adding the rest between the 220s and the mile, the effort no longer is the same as in the first two parts. At most, the last two parts are worth eight or at least seven translated 440s. Grand total of translated 440s (with



five minute rests between routines) is 17 mathematically, 18 by the runner's effort.

Some will say that the amorphous workout, with a rest period of five minutes prior to the mile, is easier than 20 quantity 440s in 65.0. Others will say it is a reasonable translation. Still others will insist it is harder. Adjustments are easily made to suit all parties, assuming that critics honestly appraise the workout. If it is too easy, add a few intervals, and vice versa.

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**TABLE 19**

<b>Amorphous Workout</b>	<b>440s</b>
2 x 880 (2:15.0), 880 jog.	4
8 x 440 (65.0), 440 jog.	8
8 x 220 (31.0), 220 jog.	4
1 mile (4:40.0).	4
Total 440s	20

---

Of course, a runner need not bother to translate any dominant workout if it already varies the sequence of simple escalation. He may train on impulse and conjecture, and hope for the best. This hit or miss policy makes analysis of results impossible. Peaks are unpredictable.

The aim of mixed workouts is to avoid the boredom which interval training often produces. A change of pace and distance offers an alternative to doing the same interval over and over, always hitting a precise time. But there are those who, by nature or habit, get to hate interval training. This prejudice develops from continually circling a track, claustrophobia in the confines of a stadium, poor results, neurosis, fear of the stopwatch, dehumanization, etc. Such a runner would be well off on his own, composing a program in harmony with his idiosyncrasies.

### **FALL STANDARDS FOR CROSS-COUNTRY**

At the end of a race, many of us have a strong urge to talk to the winner. How does he train? How often? Does he have any secrets? Obviously these questions are too general to be answered on an instant's notice. Even if the winner had time, he would find a verbal explanation tedious.

What most of us really want to know about the winner is a few or at least one of his best workouts prior to the race. The reply is usually in the form of intervals: "I did 30 in-and-out 440s in 65.0." That satisfies our curiosity. No wonder he ran so well.

The winner's 30 440s set a standard. Also-rans hoping to beat him must likewise train as hard, one way or another. Some will try to duplicate the workout; others will mix it and translate the effort into quantity 440s.

Standards shot up fast in the decade of the '60s. Veteran runners now have a clear idea of what a fair, good or world class workout is. Table 20 sums up these standards, using quantity 440s as a measure. To read the table easily, the first abbreviated line indicates 20 x 440 (65.0), 440 jog. The second 30 x 440, etc. Letter grades were assigned to each category. The letter C means average; B good, and A world-class. Unfortunately, the categories are sharply divided in Table 20. Performance is not so sharply defined. For example, 25 440s rates C plus. These standards are geared to the runner of average speed ability who has been in year-round training for at least five years.

**TABLE 20**  
**STANDARDS FOR A 5-6 YEAR DISTANCE RUNNER (QUANTITY 440s)**

Intervals	Speed	Grade
20	65.0	C
30	65.0	B
40	65.0	A
10	63.0	C
20	63.0	B
30	63.0	A

### WINTER TRAINING

A self-coached veteran is apt to stagnate in winter. He thinks mostly of covering miles, planning his program shabbily. He falls into the rut of jogging too much, doing the same distance daily. He runs the long races half-heartedly because he is not a specialist at the distance. As a result, he fails to derive full benefits from winter training. Rather than repeat the pitfalls which every runner faces, it would be worthwhile to re-read chapter three.

During the heavy part of winter training, a miler averages 15 miles a day, a three- or six-miler or marathoner, 18 to 20 miles. The miles are staggered from day to day, sometimes less, other times more. No clear pattern is evident.

To reduce worry over the distance, run with a buddy. Do pickups (accelerations) of 50 yards to as much as one mile. Surprise one another enroute by these changes in pace—keep them irregular. But do not race to exhaustion, unless there is good reason to do so.

Once a week run hard and steady over various distances. Stagger the runs like this: 8–15–6–10–18–7. The runs are not time trials with a clock at all-out effort. Just hold the best possible pace. Do not taper much prior to the runs. If the racing schedule is heavy, reduce or eliminate the runs.

In a loose sense, there is a workout peak in winter. The aim is to develop a lot of stamina, and prevent a runner from stagnating. Mileage gradually increases to a high level around the first week in February. Schedule a long race, say 20 miles, 10 or 12 days after the hardest interval workout of the season. The race gives purpose to the peak.

Veterans like to mix routines in long, hard workouts. For the workout peak the object is to spend about three hours on one's legs, the time it takes to jog a marathon. Jogging, however, at this time is useless. The idea is to run many intervals at fair speeds, before slipping into a plod. The more routines inserted the better. Intervals distances longer than a mile should be avoided—the only restriction—because a rate slower than 75 seconds per quarter approaches marathon pace. Table 21 shows one example of a workout peak.

The countdown from the workout peak to the 20-mile race is similar to that of the fall. Mileage decreases and the few workouts in the 10- or 12-day cycle are easy. The polish workout is the only exception, and it, too, can be made easy if the runner has not recovered from the workout peak. Set the polish workout about six, no less than five days before the race. Six days is safe; that is, do it on Monday if the race is on Saturday. Run a quantity routine of brisk 330s, at 48.0 per interval (64.0 440 pace). Really goof off dur-

**TABLE 21**

**WORKOUT PEAK IN WINTER**

**Morning**

5 miles.

**Afternoon**

Warmup 5 miles.

8 x 110 (18.0-17.0), 110 jog;

rest 5 minutes.

8 x 110 (17.0-16.0), 110 jog;

rest 5 minutes.

8 x 440 (70.0), 220 jog;

rest 5 minutes.

$\frac{3}{4}$ -mile (3:30.0), 440 jog;

rest 5 minutes.

4 x 220 (33.0), 220 jog;

jog 880.

4 x 220 (32.0), 220 jog;

jog 880.

2 x 880 (2:16.0), 880 jog;

8 x 110 (16.0), 110 jog;

cool down 1 mile. (23 miles.)

ing the tapering block, to be sure of being fully rested. For example, on Wednesday in two workouts jog 5 and 5; Thursday 3 and 3; and Friday 2 and 2; or 1 and 1.

**A THOUSAND MILES FOR A SECOND OR TWO**

Face it. A veteran middle distance runner (880 and mile) cannot expect a big improvement in his times every spring. A two-, three- and six-miler may have slightly higher hopes. The miler is glad to chop off a second from his best previous time; the others at the longer distances may perhaps reduce theirs by no more than a dozen seconds. These paltry improvements really discourage a lot of people, especially after adding 3-4000 to their last year's total. The fact is that, unless training is radically changed in the right direction, all a veteran can do is chip away bits of time from year to year.

To illustrate this point, take the case of Josy Barthel, the 1952 1500-meter Olympic champion. Josy, called the Luxembourg Express, dwelt solely on interval training. His career stretched over 13 solid years, beginning serious training in 1943 at the age of sixteen, and ending in 1956 at age twenty-eight. He never piled up much mileage, being of the pre-marathon school of middle distance men. He averaged about seven or eight miles a day at his peak.

Josy belongs to an elite group of speed merchants, having clocked 48.8

**TABLE 22**

**Josy Barthel's Progress Record**

Year	400m.	800m.	1500m.
1943	56.2	2:02.5	4:16.4
1944	53.0	2:00.8	4:09.0
1945	52.2	1:59.0	
1946	50.8	1:54.2	3:58.4
1947	48.6 R	1:51.0	3:51.0
1948	49.6 R	1:53.6	3:53.4
1949	49.8	1:53.2	3:51.5
1950	50.6	1:55.7	4:00.6
1951	48.8	1:53.3	3:52.6
1952		1:52.6	3:44.1
1953		1:55.5	3:49.2

R=relay



for 400 meters (49.0 at 440 yards). At 19 he did 1500 meters in 3:51.00 (4:08 mile). He could not improve this until he was 25, when he won the Olympic gold medal in Helsinki with 3:44.1 (4:01 mile).

Table 22 shows Josy's progress for 11 years. In 1954 he could only manage a 4:04 mile, and at the trials in Melbourne at the '56 Games he failed to qualify for the finals, with 3:45.0 at 1500 meters. Three distances are depicted in Table 22, 400 meters (add 0.3 for 440 yards), 800 meters (0.7 to 880 yards), and 1500 meters (17.0 to the mile).

Barthel hit his peak at 25. Most milers do. But this is not a physiological age-barrier. A motivated runner continues to improve into his early 30s. What stops many milers is the distasteful slowness of improvement, putting in so much work to get back so little.

With the advent of the marathon-type miler who, during winter, logs tremendous amounts of mileage, performances have taken a sharp upswing. The four minute barrier is regularly broken now all over the world. Another gain in training has been made in the right direction, but at the cost of a fantastic price. Yet it seems worth it.

### STANDARDS

No one knows better than the veteran what needs to be done in training during spring track. Crudely stated, it is to run the fastest intervals over and over with hardly any recovery. A good trick—even for a supremely fit athlete.

Those who specialize from the mile to three miles are compelled to think like sprinters and perform like marathoners. These men are a new breed, still wary but unafraid to forge toward strange horizons because they see no end or limit to improvement. They suffer torture their predecessors only dreamed of. They complete workouts hitherto considered humanly impossible. They are more than willing to expend a vast amount of time and energy to slice a precious second or two from their previous best clocking.

A top miler today, for example, is able to sprint and hundred yards close to 10 seconds. And, allowed the luxury of slowing a few tenths, he is able to do repeat 100 yard dashes a half dozen times with a few minutes rest between efforts. It is not unusual for him to complete two sets of 10 such sprints around 11 seconds each, with 100 or less yards jogging between intervals.

Three-milers are no slowpokes either. Often a three-miler gets his start as a miler before moving up. Workouts for both are basically the same. A good college three-miler clocks 4:10 or better for the mile, and world class three-milers are all sub-four-minute men.

TABLE 23

STANDARDS FOR VETERANS OF 5-6 YEARS EXPERIENCE

Workout	miler	3-miler	6-miler
24 x 110, 110 jog; done in 4 sets of 6	11.5	12.0	12.5
16 x 220, 220 jog; done in 4 sets of 4	24.5	25.5	26.0
8 x 330, 110 jog; rest 4 minutes	38.0	40.0	42.0
6 x 440, rest 5 minutes.	53.0	55.0	57.0
3 x 880, rest 7-9 minutes.	1:55.0	2:00.0	2:05.0
3 x ¾-mile; rest 10-15 minutes.	3:05.0	3:10.0	3:15.0

Six-milers, too, are fast. Three-mile specialists often double in the six. A good college six-miler under 4:20 for the mile, with not a few under 4:10. World class six-milers are four minute men, and under.

Standards for five- or six-year veterans are listed in Table 23. The workouts (but not the times) are identical to Table 14 in chapter four. This offers a means to compare progress.

A runner who is unable to meet the above standards has a poor chance of advancing to world class. He can, if not too slow, make the big jump to the marathon. Once the standards in Table 23 are met, add more intervals or decrease recovery.

The 110s in Table 23 translate to 100 yards by subtracting about one second. For example, 11.5 seconds for 110 yards indicates a runner passes 100 yards around 10.5 seconds. All the intervals up to 440 yards are done from a running start, not from the blocks. This provides an advantage to achieve a fast time, plus reduces the danger of pulling muscles.

A runner who has trouble clocking fast times over short distances will probably not find longer intervals easy either. In most cases, the faster a distance runner becomes the more comfortable he feels at longer intervals. Nowadays, from the mile to the marathon, just hanging on to a fast pace is not enough. A good man is capable of a final kick.

The workouts in Table 23 are terribly hard. They have to be at this stage of the game. It is a matter of opinion which of the six listed workouts is hardest. Perhaps the 330s own an edge on the rest. To appreciate the workout of eight 330s, assume the runner kept on going at the same speed to 440 yards. A 38-second 330 equates to 50.4 at 440; 40 to 53.2; and 42 to 56. What of the  $\frac{3}{4}$ -mile workout? The 3:05.0, 3:10.0 and 3:15.0 clockings average 61.6, 63.3 and 65.0 per 440 yards. At the same pace, another 440 yards added to the  $\frac{3}{4}$  produces miles of 4:06.4, 4:13.2 and 4:20.0. Of course, a runner is not expected to maintain the same pace when distance is added. These translated times show the difficulty of a workout more clearly when the intervals are made to equal an even fraction of a mile or a full mile.

## THE BREAKTHROUGH

When a runner plateaus near the end of a season, he worries because his times fail to improve. He hits close to his best almost indefinitely. Having trained very hard up to this point, he finds it impossible to further extend himself. When he eases a bit to replenish reserves, there still is no improvement. It seems that his plateau will drag to the bitter end.

In desperation he may try a breakthrough-type workout. This is a last resort, and is done only by veterans who are very fit. The breakthrough is a hellish experience. It intends to totally exhaust a runner, to rid him of as much inhibition as possible, and elevate him instantly to a higher plateau.

Within the course of the workout, the runner becomes so fatigued that he staggers and feels faint. He often gets a splitting headache; his vision blurs and his ears ring. His entire body is pricked by a million invisible needles. He eventually goes numb and may fall to the ground. Temporarily recovering, he starts anew until he cannot begin an interval on the run. Then, finally, this masochistic torture ends. Depending on the type of workout, the ordeal may last several hours.

A suggested interval distance for the breakthrough is 550 yards. The



reason for this is that, when returning to the track, a 440 seems easier. Shorter distances, 330 yards and under, are too bumpy in the breakthrough, and the danger of pulling muscles is greater.

The 550 is run up a grade of 20 or 25 degrees. A golf course is excellent terrain. The grade need not be straight up, but undulating to force speed changes.

Start the 550 sprinting, after a gradual pickup of 20 yards. Hold on as long as possible. Most runners reach 150 yards before they tie-up. But keep fighting hard after the tie-up right to the finish. Do not be tempted to pace the intervals when tired, but start each one sprinting all-out.

A real gutter may last perhaps 40 550 intervals. The runner passes through stages of overwhelming fatigue and surprising fresh periods. He does not set a limit on the total number of intervals, but keeps struggling until he cannot begin a final one on the run.

Like any major workout, the breakthrough is planned and not decided on impulse. A runner mentally prepares for it, knowing it is coming at least a week ahead. He psyches up for it. A few days before it, he tapers slightly. On the day of the breakthrough, he warms up leisurely, stretches and massages his muscles thoroughly. He continually reminds himself that this workout is to be the hardest of his life.

The breakthrough is run on a cool, windless and overcast day, or late in the afternoon when the sun is at a low angle. Do not run it on a hot day, or when very windy.

Though the breakthrough is a very rough workout, its dividends vary. A runner may, on the following day, feel terrific. His muscles are loose and strong. He is jubilant over his ability to push past pain barriers he never believed existed. He becomes confident, unafraid of a fast pace and eager to test his new found prowess in competition. Or he may be so bushed that he gets sick, has a fever, along with tight, sore muscles. He loses confidence and has no desire to compete or train. In a nutshell, the results of a breakthrough are unpredictable.

There are perils, too. Extreme exertion may damage organs. The kidneys really catch it. They shrink and their function is temporarily slowed. Toxic substances accumulate in the blood. This causes more or less complications and may require medical attention. In less severe cases, there is a desire to urinate frequently. The urine burns, and blood is often passed in it. Arches and heel tendons ache for a few days. A headache may persist, along with a loss of appetite, insomnia, anxiety, etc.

When the breakthrough fails to improve a runner's state of fitness, the only recourse left is to lay off for a few weeks or months to replenish reserves. A new annual cycle is begun with a fresh attitude and a proven body.

### **BREATH-HOLDING**

The mania to excel at all costs has led into many queer areas. Research is constantly discovering new ways to improve fitness, branching into the unethical use of drugs, diet control and, of late, whole blood doping. As long as research comes up with a gimmick which definitely makes a man run faster, athletes will, one way or another, try it.

One gimmick, not at all fully researched and certainly not considered unethical, is breath-holding. Simply described, it is to hold one's breath while



running. The value of breath-holding is questionable, no doubt, but logic indicates that if a runner carefully deprives his muscles of oxygen, especially under stress, he develops the ability to suck in more under normal circumstances. The lungs, of course, cannot store oxygen the way the liver stores sugar, but breath holders insist that the body somehow overcompensates and more oxygen is fed to working muscles.

An average person can sprint up to 75 yards or longer while holding his breath. With training, he extends it to 150 yards. A fit runner holds on for another 50-60 yards. Evidently the lungs are benefitting by either taking in more oxygen or expanding.

A distance runner who exploits breath-holding combines it with intervals. He uses it to suit his fancy. He may, while doing 110s for example, hold his breath for the first 75 yards, below straining effort. For a few workouts he breath-holds every other 110 interval; finally every interval. Eventually he increases breath-holding to 100 yards on 220 or 440 intervals. He records these details as well as the total breath-holding time of the workout in his diary.

Breath-holding is a complementary device, and should not exhaust the runner. Once every 10 days is plenty. There must not be an overt attempt to escalate this feature, rather one must allow lungs and body to dictate the intensity of the workout.

**Chapter Six**

***Intervals  
and  
Marathons***



**"Interval Training" author Nick Costes**

# GOING LONGER, FASTER

The marathon is a race run on the road over 26 miles, 385 yards. It is regarded as the most severe event of the track and field program. At the Olympic Games, held every four years, it is conducted as a finale, the climax of athletic achievement.

The marathon is symbolic of courage. How else can it be explained when a runner endures more than two hours of self-imposed torture, even risking death in the process. The sight of a frail, haggard athlete staggering after the long ordeal toward the finish is traditional. There is a saying in the athletic world that no one suffers so much and appreciates life as well as the marathoner.

Originally, the marathon was purely a stamina event. A runner did not need to be fast, just gutsy. If he could average six minutes per mile the whole way he usually won. A final time of 2 hours, 36 minutes was considered good. It was inconceivable that the human body could run much faster over so long a distance.

With the renewal of the modern Olympic Games in 1948, athletes resumed serious training. In the '50s, virtually every distance world record was broken. The marathon was brought down to 2 hours, 20 minutes. This became a barrier, but, before the decade ended, a few runners ducked a bit below. During the '60s, it fell to 2:10. This, too, became a barrier. Again it was broken. Now the two-hour barrier is envisioned.

An elite marathoner today who clocks 2:10 averages five minutes per mile for the route. This pace is good enough to win most college six-mile races, and many high school two-mile runs. Attention has shifted to the two-hour marathon. To accomplish such a feat a runner must average 4 minutes, 37 seconds per mile. Certainly, the runner of the future who hopes to achieve this will have innate speed and stamina talent. Along with the advantage of heredity, he will have great desire and strength to absorb this fantastic workload without damaging his body. Though the two-hour marathon seems far off, there are men today preparing to meet the challenge.

## BUILDING A BACKGROUND

With a few amazing exceptions, the marathon is an event for an athletically mature and very fit runner. Statistically the best age is around 27 years. Not many last long after that, despite the fact that the career peak extends to 30 years. Late starters have blossomed in the mid-thirties. Since the marathon requires more training than any other event, most world class runners wilt under the pressure of three or four years' training.

A potential marathoner needs five solid years of training, accumulating about 10,000 miles (5-6 mile average per day). Of course, this does not mean simply jogging, but balanced routines of quantity, quality and variety. Like anybody else, he starts with low mileages, and then gradually works up. He is exposed to speed early in his career and, like it or not, learns to cope with it. He specializes at short distances, one to six miles.

During these five years, he spends his winters building stamina, training and competing over long distances. Winter training at this time is really complementary to spring track. But it also serves as an incipient base for the mara-



thon later. Buildup races of 10, 15 and 20 miles help adjust the mind and body to the marathon. However, the winter phase, lasting less than three months, is too short to enable a runner to do well at these distances. The aim, nevertheless, is to run 20 miles in two hours—six minutes per mile.

Once the decision is made to specialize in the marathon, three, perhaps four years are necessary for concentrated training. The first year is experimental. The athletic calendar is arranged to include many more long races and to peak for important ones. The second year compares results with the first. Progress is evaluated and adjustments made. The remaining two years refine the training program and gear for supreme performances.

## MARATHON STANDARDS

Anybody who runs or jogs a marathon sets some kind of a standard for himself. The idea at first is just to finish. No importance is placed on the time. Initiated novices try to break three hours; if successful, they shoot for 2:36. Potential specialists aim for a world class 2:25 (5:34.6 mile pace). After that, the only goal remaining is to get as low as possible before retiring.

Those who aspire to world class would like to know, if possible, how far down they can get prior to undertaking serious training. Many great potential marathoners shy away in view of the chance that, despite honest effort, their career peaks will fall well below expectations. Well, no one, not even a computer, can supply a pinpointed answer for everyone. There are too many human imponderables. By the same token, there are ponderables which give an indication how good one may become in the marathon. Here are a few:

- Innate speed and stamina—the faster you are at short distances, the better.
- Strength—ability to absorb heavy workloads without breaking down.
- Background—the right buildup in training and races.
- Number of years as a marathon specialist—at least three are necessary for proper analysis.

Based on these ponderables, Table 24 lists potential marathon standards, related to a runner's best mile time.

Do not misunderstand. Table 24 lists potential performances, not limitations. A 4:25-4:29 miler ought to be able to clock a 2 hours, 30 minute marathon in his third year of specialization. If he does not, something is wrong. Slower milers occasionally do better, getting down to 2 hours, 25 minutes. Of course, the fast milers hold an advantage, but not many of them take the marathon seriously.

## THE MARATHON CALENDAR

Over the last 20 years, this writer has spoken, trained and competed with hundreds of marathoners. One fact learned from such a prolonged experience is that very few actually take the marathon seriously. Purposely or not, they treat it as a sideline. The marathon is squeezed into the racing schedule without much thought of peaking for it. A respectable number of these runners are fast, with best miles ranging from 4:01 to 4:15. They have plenty of experience, are strong and gutsy. Yet only a trickle made good at the marathon, despite honest efforts.

To run a good marathon, a runner must get serious about it. He has to regard other events as less important and complementary to the marathon.

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**TABLE 24****Potential Marathon Standards**

Best mile time	Marathon time
4:25-4:29	2:30
4:20-4:24	2:25
4:15-4:19	2:20
4:10-4:14	2:16
4:05-4:09	2:12
4:00-4:04	2:09

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He cannot compromise, as many do, by allowing the six-mile to share equal importance. The training gap between six and 26 is great. In short, a marathoner's mind is focused continually on the marathon.

To specialize, plan a marathon calendar. Split the year into three parts: (1) speed phase, (2) stamina phase, (3) breather. The first two phases last five months apiece, give or take a week or two. The breather varies, but is usually less than two months. (See Table 25.)

The annual cycle begins with the speed phase. Mileage is relatively low, intervals fast. It makes no difference here if a runner is by nature fast or slow. Everybody does speed work. For a slowpoke (with a best mile of 4:25 or slower) this phase is of utmost importance. The better he performs at this time, the faster he will run a marathon. Many of his intervals must be all-out. The aim is to peak by the end of the five-month period.

The stamina phase follows the peak of the speed phase. Mileage is high, intervals slower. Fast intervals are run, however, at appropriate times. On a solid background of speed, transition into this phase is easy. Intervals here are still brisk enough to make a fast marathon pace (5:10-5:20) feel slow and comfortable. By all means, one must peak or at least try to peak by the end of the five-month period. A well-timed peak occurs 10 or 12 days before the marathon.

The annual cycle ends with the breather. It lasts two months or less, depending on the race schedule. The breather phase does not mean goofing off, but merely a gradual tapering. Actually, there is a letdown following a marathon. It takes about two weeks to recover, and attempts to regain form too rapidly for upcoming races increase the danger of pulling muscles.

The three-phase setup, as explained, was used by the writer in preparation for the Boston marathon in 1955. Since he is a slowpoke (4:29 miler),

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**TABLE 25****Marathon Calendar**

Speed phase	Stamina phase	Breather
1. June	1. November	From April 19th.
2. July	2. December	All of May
3. August	3. January	
4. September	4. February	
5. October (peak)	5. March	
	To April 19th. (peak)	

Note—months arranged backwards from April 19th.

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great emphasis was placed on the speed phase. After five months of solid quality work, peaking and going stale, transition into the stamina phase was delightful. The slowdown, despite the increase in mileage, felt very easy. The change was quite pleasant. Yet the writer was running intervals at speeds faster than his opponents. This proved a great advantage.

### THE SPEED PHASE—FIVE MONTHS OF IT

The marathon calendar begins with speed work. The runner naturally is fit, but the previous half dozen or more months of competing in long races have stunted his speed. Like a car nearly out of gas, the runner needs to refuel with high octane—speed work.

The speed phase lasts five months. This may appear excessive, especially to gifted runners who clock sub-4:10 miles. One fact is certain: without a base of speed work any pace above jogging soon feels faster and harder than it is. Even with five months of speed work the comfortable carryover feeling into the stamina phase soon fades. Speed work must be sensibly inserted at that time to polish form and keep from slipping into a rut.

A question often asked about the speed phase is this: How hard should one train during these five months? A quick but not complete answer is this: hard enough to peak at the end of the period. To be sure that speed is not sacrificed, mileage cannot be high. The range is between eight and 10 miles per day. When two workouts are done a day, each session is made easier. There are two pitfalls into which a novice may fall: pulling muscles from an improper warmup or doing speed work when unduly tired or becoming impatient, increasing mileage too fast at the expense of speed.

Getting down to specifics, two weeks of June 1954 are lifted from the writer's training record and detailed in Table 26. Prior to resuming speed work in June, the writer was passing through a breather period, having had a heavy year of long distance competition, mostly in road races. All workouts took place at the ash track (which was in poor shape) in his hometown, Farrell, Pennsylvania. As I am a slowpoke the intervals were not appreciably fast compared to today's standards. Faster runners desiring to emulate the workouts should reduce the times.

As is evident in Table 26, the writer used the interval system in the simplest way. Intervals increased by the end of the month, along with slight improvements in times. Offhand one would think that this buildup was boring. It definitely was not. Almost every workout proved enjoyable, despite fatigue and a poor track.

The first few workouts in June felt extra rough, because speed was stunted from running many long races. On the 2nd for example, it was hard doing four 440s around 65.0 each. To avoid undue exhaustion in one session, the same number were done that afternoon. By the 20th seven 440s were done, expending no more effort than on the 2nd. Real speed came by way of the 330s on the 5th and 24th, plus a sprint workout of 100s on the 28th.

No races were run in June because there were none to be found within 400 miles. In fact, for the entire three months, June to August, the writer competed in only two races, both in Pittsburgh: the National 25 kilometers (15½ miles) and a track three miler.

By the end of the speed phase, late October, the writer was going stale



TABLE 26

June 1954

Day	Workout	Miles
1.	No training.	0
2.	Morn. 9:55. Track. 4½ miles (40 min.)	
4.	4 x 440 (fast), 440 jog; (68.0, 67.3, 66.2, 61.8. Average 65.8. (6½ miles.) Aft. 3:00. Track. 2 miles (16 min.) 4 x 440 (fast), 440 jog; 66.0, 66.9, 64.8, 66.8. Average: 66.1. Cool down ½-mile. (4½ miles.)	11
3.	Morn. 2 miles (17 min.) 2 x 1½ miles (fast), 15 min. rest between. 7:28 (77-2:31-3:46-5:00-6:15-73). 7:30 (75-2:29-3:43-5:00-6:15-75). Cool down ½-mile. (5½ miles.) Eve. 7:30. 3 miles plus.	9
4.	No training.	0
5.	Morn. 10:00. 8 miles (1 hour). Aft. 3:30. Warmup 2 miles. 8 x 330 (all-out), 3 min. rest between Cool down ½-mile. (4 miles.)	12
6.	After. 4:45. 6 miles (48 min.) 2 x ¾-mile (fast), 10 min. rest between. 3:35.5 (72-2:24-71.5). 3:35.0 (71-2:22-73).	7½
7.	Morn. 11:00. 8 miles (1 hour); Aft. 6 miles barefoot on infield of track.	14
24.	Morn. 11:00. 8 miles. Aft. 3:30. Warmup 1 mile. 5 x 330 (fast), jog and walk 550 between. 44.4, 44.7, 44.6, 44.4, 44.8. Average: 44.6. (2 miles.)	10
25.	Morn. 11:15. 8 miles.	8
26.	Morn. 10:15. 8 miles. Aft. 3:00. 3 miles barefoot on grass, with a 220 pickup.	11
27.	Morn. 10:15. 8 miles jog (54:25). Aft. 3:30. Warmup 1 mile. 660 (fast) in 1:39.8 (67-32.8). Rest 5 minutes. 440 (fast) in 65.0. Windy. (2 miles plus.)	10
28.	Morn. 10:15. 8 miles. Aft. 3:00. Warmup 1 mile. 20 x 100 (near sprint, 13-14 sec.), 340 jog between. Note: wore heavy sneaks. (6 miles.)	14
29.	Morn. 10:15. 8 miles. Aft. 3:00. Warmup 1¼ miles. 3 x 660 (fast), 220 jog and rest 5 minutes between. 1:37.6 (65-32.6), 1:35.5 (63-32.5), 1:35.2 (63-32.2). Average: 1:36.1. Cool down ½-mile. (4 miles.)	12
30.	Morn. 10:45. 8 miles. Aft. 3:00. Warmup 1 mile. 3 x ¾-mile (fast), 440 jog and rest 10 minutes between. 3:28.5, 3:25.8, 3:29.0. Average 3:27.7. (4 miles.)	12

after steady improvement all along the line. Bad days became more common. Mileage was still low, around 10 a day in two sessions. Thus far, everything was proceeding as planned. Peak workouts for September and October are listed in Table 27.

### THE STAMINA PHASE—MORE MILEAGE THROUGH INTERVALS

The stamina phase prepares a runner for the marathon by increasing daily mileage through intervals. Of course, to do this intervals must be a bit slower. Granted, pounding out a large number of intervals is boring, but the accumulated speed is of great benefit. However, many potentially fine marathoners fall into a trap: to get more mileage they simply jog more. As was said in an earlier chapter, jogging produces low grade stamina. Any plodder can jog 20 miles several times a week. Few are able, on the other hand, to compile the same distance by doing forty 440s, say between 70 and 75 seconds, with a 440 jog. At this stage, top grade stamina is needed.

The writer operated from a base of 15 miles a day in two sessions, a pre-breakfast seven miles and an afternoon eight miles. On fair afternoons a typical workout looked like this: warmup 6½ miles; 16 x 220 (33.0-35.0), 220 jog; cool down 1½ miles, the distance from the track to home. Total days distance: 19 miles.

A question which always pops up is how much mileage should a marathoner get during the main part of the stamina phase? Assuming that a training program contains intervals and not all jogging, the range is between 15 and 20 miles a day, usually in two sessions. On good interval days, mileage hits

TABLE 27

#### September 1954

Day	Workout	Miles
2.	Morn. 8 miles. Aft. Warmup 1 mile. 5 x ¼ (all-out), 440 jog, and rest 12-15 minutes between. Average: 3:25.6. (6 miles.)	14
10.	Aft. Warmup 3 miles. 2 x 1½ miles (all-out), 15-20 minutes rest between. Average: 7:05.5. Cool down 3½ miles.	10
29.	Aft. Warmup 4 miles. 3 x 1 mile (all-out), 440 jog, and rest 10-12 minutes between. Average: 4:39.6. Cool down 2 miles.	9

#### October 1954

6.	Aft. Warmup 6 miles. 12 x 440 (very fast), 440 jog. Average: 63.3. Cool down 2 miles.	14
21.	Morn. 6½ miles. Aft. Warmup 5 miles. 8 x 330 (all-out), 550 jog. Average: 43.5. Cool down 1½ miles. (10½ miles.)	17

**TABLE 28**

	1954-55		1955-56	
	A	B	A	B
November	336	11.2	469	15.6
December	302	9.7	524	16.9
January	386	12.4	461	15.0
February	387	13.8	435	15.0
March	480	15.5	483	15.6
April	430	14.3	418	13.9

A=monthly mileage  
B=average per day

around 21 miles, and anything above that is considered excellent. But when mileage hurts interval speeds, the runner is overdoing it.

In Table 28, monthly mileages are extracted from the writer's training record. The period covers November through April for 1954-55 and 1955-56. During the span of 1954-55 the writer competed in races about twice a month, resulting in less mileage due to tapering. For 1955-56 a muscle injury sustained in the summer of '55 curtailed competition up to the Boston marathon, and mileage was higher. Note that the mileage in Table 28 is by today's standards just ho-hum, but up to 1954 no American had compiled so much distance over such a prolonged time.

The heaviest part of the stamina phase occurred in April. The highest number of intervals were completed, trying not to sacrifice too much speed. Table 29 shows three hard workouts plus the peak workout during the first nine days of April 1956. The peak fell on April 9th, ten days before the Boston marathon. On the other days in this period, recuperation was done as usual; in other words, jogging seven miles in the morning, eight in the afternoon, for 15 miles each day.

The countdown to the race on the 19th went by the book. Working

**TABLE 29**

**April 1956**

Day	Workout	Miles
2.	Morn. 7 miles. Aft. Warmup 6½ miles; 20 x 440 (73-74), 220 jog; cool down 2 miles. (16 miles.)	23
4.	Morn. 7 miles. Aft. Warmup 6½ miles; 40 x 220 (33-35), 220 jog; cool down 1½ miles. (18 miles.)	25
6.	Morn. 7 miles. Aft. Warmup 6½ miles; 24 x 440 (68-72), 220 jog; cool down 1½ miles. (17 miles.)	24
9.	Morn. 7 miles. Aft. Warmup 6½ miles; 52 x 220 (33-35), 220 jog; cool down 1½ miles. (21 miles.)	28



back from the deadline, the tapering block began on the 15th. The polish workout took place on the 13th. The other days were easy fillers. The details are shown in Table 30.

### RACE SCHEDULE

How often should a distance runner compete? Generally speaking, as often as will improve him. But really, no one can say how much without considering the time allotted to prepare for each race. Too few or too many races dull enthusiasm. This fact serves as a clue.

During the track season which stretches from mid-March to early June or later, middle distance runners (milers and three-milers) may race almost every week. This is heavy, and sometimes races are spaced irregularly to prevent staleness. Six-milers race less, around five times every two months, unless dropping down to shorter distances. A marathoner who competes at 15 miles and up does well to average two races a month.

Long races should be carefully scheduled throughout the speed phase,

TABLE 30

April 1956

Day	Workout	Miles
10.	Morn. 7 miles. Aft. 8 miles.	15
11.	Morn. 7 miles. Aft. Warmup 6½ miles. 7 x 440 (74-76), 220 jog; rest 3 minutes. 660 in 1:44 (71-33); cool down 1½ miles. (11 miles.)	18
12.	Morn. 7 miles. Aft. 8 mile .	15
13.	Morn. 7 miles. Aft. Warmup 6½ miles; 12 x 440 (fast), 440 jog. Average: 68.4. Cool down 1½ miles. Note: windy, track soft. (14 miles.)	21
14.	Morn. 7 miles. Aft. Warmup 6½ miles. 8 x 440 (73-75), 220 jog; cool down 1½ miles. (11 miles.)	18
15.	Morn. 7 miles. Aft. Warmup 6½ miles. 8 x 110 (fast), 110 jog; cool down 1½ miles. (9 miles.)	16
16.	Morn. 6 miles. Aft. 4 miles.	10
17.	Aft. 4 miles.	4
18.	Morn. 2 miles.	2
19.	Morn. 1½ miles easy. Noon. Warmup ½-mile. Boston marathon. 4th place: 2:18:01. (26½ miles.)	28

which lasts five months. Four races of 15 miles and up are a bit too much; three, or even two are suggested. The reason is that long races interfere with training at this stage. No marathon is to be run, because, as was said, the let-down afterward kills two weeks. It also requires some stamina type training. If a marathon must be scheduled, allow six weeks special preparation for it. An optimal race schedule for the speed phase shows staggered distances, ranging from one mile to 15 miles at this ratio: five short and two long races.

Race setup for the stamina phase is very important, keeping the marathon in mind as a peak performance. Stagger the races to a ratio of one to one, having four short and four long prior to the marathon. The short races are between four and six miles, the long ones between 10 and 22 miles. Do not compete in any races within a month of the marathon. The final race—prior to the marathon—ought to be a 20-miler with acts as a tuneup. Of course, a superior six-miler may race at his specialty, and then two weeks later bomb a good marathon. For most who hope to do well, a wise approach is to use the buildup shown in Tables 29 and 30.

When two important marathons, such as qualifying and an Olympic trial, are set, they ought to be at least six weeks apart. Even with a two week letdown, the runner's physical condition is still high. With four weeks preparation he can be ready. With a longer spread between marathons, for example 10 weeks, use the first week or two after the letdown for speed, and the final five or six for stamina.

Two marathons a year are optimal; three, questionable. This puts a marathoner in a fix during an Olympic year. He must compete in two trials and, if he qualifies, in the Olympic race. It takes an iron man to run three good marathons in a year and a magician to juggle training methods to peak for each. The odds are against it. Worse still, these three marathons pop up on one side of the calendar, usually within a five month period.

The marathon, because it is so long, is a tough event to schedule properly to assure that the best US runners will qualify and do well at the Olympics. AAU officials are constantly on the spot trying to please everyone, but every Olympic year spawns new arguments and creates hard feelings.

This writer agrees with the two-race setup, using the first to reduce the field. However, the first trial ought to be over a shorter distance than the marathon to avoid the pitfalls which three marathons produce—namely, mental and physical staleness. To favor the marathoner, 30 kilometers (18¾ miles) is suggested. Previously it was stated that 20 miles is a fine distance for a final tuneup, but this was geared for only one peak marathon. When two marathons are scheduled, a semi-final trial over 30 kilometers is ideal because slowpokes are easily weeded out. The pace is faster and the survivors benefit, regarding the race as a speed tuneup.

## Chapter Seven

# Conditioning Courses



STAN PANTOVIC PHOTO



# CLASSES IN INTERVALS

A course featuring running as a basic conditioner to strengthen heart and lungs is found in very few curricula of physical education. This glaring omission exists despite the fact that American students in high school and college are aerobically unfit. In stamina tests our students score low, compared to European and Asian kids. Our culture is blamed, and justifiably so. American society abounds with labor-saving devices which do an innumerable amount of chores, from the electric can opener to the ubiquitous auto. Certainly they are wonderful, but we have become overly dependent upon them and are paying for it insidiously. Our muscles, hearts and lungs are growing softer and weaker. Nevertheless, even though this situation is obvious to physical educators, there is a remarkable reluctance to overcome this trend. Probably not more than a dozen schools in the entire country have taken steps to include running in their curricula.

Some of the blame, aside from cultural laziness, must be shared by tradition. Is it audacious to accuse physical educators of having inculcated in students the idea that running *per se* is not fun, unless associated with games or sports? Hasn't running been used to punish, by compelling an errant student to do a few laps around the gym? Hasn't it been given a low and nearly meaningless status, used as a brief warmup at the start of class, and a dash at the end of it? Has it not been demeaned when the physical educator himself, typically overweight and unfit, refuses to engage in running because it is unpleasant? Surely, when viewing all these facets, tradition in physical education is negatively disposed to creating a pure course of running.

Even if traditional attitudes make an about-face, and a running course is universally instituted to remedy the ills of culture, survival of the course is questionable. The foremost obstacle is the scarcity of trained personnel. Yes, simple as the act of running is, trained personnel are imperative, for it is not the act but the ability to sell the program to students, to put before them a logical sequence of progress and through that provide enjoyment. But how can this be done when not one in a dozen physical educators has either desired or qualified to compete on a varsity track team as a runner? And how can interested personnel be trained if no course exists in the curriculum in the first place?

## A RUNNING COURSE: A CURRICULAR NECESSITY

The majority of physical educators agree that our students need more exercise, especially in the form of running. It is not solely to improve their state of fitness, but also to make up for time lost. Nowadays kids ride buses and cars to school, day after day for 12 years. Their parents walked. Until the advent of television, children played outdoors for hours, much of the time running. Now the average child spends more than an hour a day sitting in front of the TV. Add to this all the other conveniences which daily "save" physical effort, the amount lost totals (in running terms) a prodigious distance.

Nor does a background of hard work guarantee a healthy body in adulthood. The generation of the twenties and thirties was, compared to youth today, superbly fit. They walked or rode bikes to school—some as far as five miles one way. After school they played instead of sitting. Others worked

in the fields or part-time in factories. They were always on the go. But the modern era with its conveniences drastically changed habits. The oldsters grew soft and flabby. And now they are dearly paying for it by dying from the greatest degenerative ill known to man: heart disease.

And what of future generations who may find living still easier? Will curricula of physical education be watered down to accommodate weak bodies and flaccid hearts? Will passive activities such as softball, archery, dancing, golf, bowling and flycasting make up the programs? Or will curricula be reversed and upgraded to include more running, swimming and, perhaps, cycling? The trend, whichever way it goes, is largely governed by physical educators. They can apathetically yield, allow sedentary habits to become ingrained, and contribute nothing to strengthening the fiber of the nation's youth. Or they can resist cultural indolence, redefine objectives and unashamedly assert that the primary goal of physical education is to develop a reasonable state of fitness for every student, chiefly by running.

If running is eventually adopted as a vital part of physical education curricula designed to meet the needs of the average student, such a course could hardly include physically subnormal students. Always present in a class are debilitates rendered partially crippled by accident or disease. These people are generally sheltered by their parents. Because of their disabilities which are individually unique, they are excused from taking part in physical education, especially running. Like it or not, they tend to lead lack-lustre lives, have vegetable-like bodies and exhibit degrees of demoralization. Certainly if any group desperately needs exercise, remedial or otherwise, it is this one. And since their hearts and lungs are grossly underdeveloped, what they need most is running. However, programs must be individually oriented and carefully supervised. This naturally adds to an instructor's load, and may present an unwelcome responsibility. There is the hazard of injuring a debilitate and facing a malpractice suit. Despite these drawbacks the fact remains that physically subnormal students are human, and deserve equal attention. Every means should be used to improve their state of fitness, because this, after all, is what a physical education instructor is trained to do.

### **ORGANIZATION OF THE RUNNING COURSE**

A physical educator can make a running course effective and enjoyable if he considers the following facts when dealing with the average (non-athletic) student:

- The student lacks motivation to run. He has had unpleasant experiences in the past, partially due to faulty teaching techniques.
- He has formed a negative attitude. He has little speed or stamina, and cannot excel in games requiring running.
- He is in poor physical condition.

Now if these shortcomings are recognized squarely and honestly, the worst way to correct them is to impose coaching methods. To coerce, nag or even ridicule a student to improve his state of fitness is the best way to permanently alienate him. If the instructor persists he may antagonize the student and, like an infection, his antagonism will spread to others in the class.

Logically, a very different approach is needed in teaching a running course. A soft sell has a better chance of success than traditional policy. No



goals are set, no deadlines or strict adherence to guidelines. No student fails. All receive passing grades, unless one is absent from class an inordinate amount of time. Informality is the rule; everything proceeds almost casually. Emphasis is on the individual. And fitness through fun is the motto.

In order to cater to all interests and abilities, the class is divided into three groups for each sex, six altogether. These are designated A, B and C, or Red, White and Blue. Debitates are put in a group by themselves, and can be titled as Special. A student may choose any group to run with, and he can shift from one to another as he deems best for himself. The main distinction among the groups is that A does the most running, B less, and C still less. The Special group does what it can, and is constantly supervised.

At the beginning of the class the instructor distributes a workout sheet to each student. The sheet contains a series of workouts, three for boys and three for girls, plus one for the Specials. All workouts are basically the same, except that they get easier in descending order. These workouts are detailed in Chapter Seven.

The first few workouts are designed to educate the class about time and distance, and thus develop an appreciation of the purpose of running. The first workout, for example, is identical for all groups except debilitates. It consists of 4 x 110: first two jog, third fairly fast, last fast ("fairly fast" and "fast" defined below), 110 yards walk between. Each interval is timed. The average male jogs 110 yards in around 30 seconds, the female slightly slower. Note that a jog is the slowest speed used by almost everyone including varsity athletes who average eight minutes per mile during the warmup. The "fairly fast" speed (at full stride) corresponds to 17-18 seconds for males, 19-20 for females. "Fast" does not mean all-out sprinting, but a pace one would hope to hold for a personal best over 440 yards. Over 110 yards males hit around 15 seconds, females 17 seconds. Excluded in the workout is the "easy" speed which is a bit faster than the jog, but slower than "fairly fast." Debitates who can run are not timed, but checked to see if they are able to do two or four 55-yard intervals at a jog, walking 55 yards between. Those who cannot run walk fast 55-yard intervals and return leisurely the same distance.

Naturally workouts get harder as students become more fit. The instructor, however, should resist the temptation to subtly force students to meet pre-set goals. Unlike highly charged athletes, these students lose interest quickly when the going gets tough. No doubt there will be "goofing off" here and there. It must be tolerated. The instructor's ultimate objective, now that he has painlessly introduced running to his students, is to keep them running as often as possible, so that many will continue this healthful practice well into adulthood.

Once a month, a time trial is scheduled, but it is strictly optional. The time trial, as students should see it, is not a race. The purpose of the trial is to find out how fast one can run a specific distance without straining. Some, as expected, will go all out, and this is commendable, but their example ought not to be foisted on the others.

The trials are run in sections to avoid the confusion of mass numbers in one race. Girls are first, boys acting as officials. Starting with the slowest, the first section of girls includes the Specials and the C group. The Specials, if possible, run 220 yards, while the C group continues to 440 yards. The second section contains both girls' A and B groups, who run one-half mile.



The same order applies to boys, except that the distances are longer. The third section has the Specials going 440 yards, the C group one-half mile. The final section of boys' A and B groups covers one mile.

For those who aspire to earn a grade higher than the guaranteed C, reasonable standards are set. Girls in the half-mile who clock 3:15 and under score a B, and 3:00 under an A. Boys in the mile who clock 5:20 and under score a B, and 5:10 and under an A. Normally, about 20% of each sex can achieve these standards even without extra training on their own outside of class. Actually the standards slightly favor the girls, because they are not by nature as active as boys. No standards are set for the Specials or the C groups. They automatically make a C grade regardless of their rates of improvement. Creating standards for grading them would become hopelessly confusing and simultaneously opens a pandora's box of argument between student and instructor. In order to qualify for a higher grade, a student must compete over one-half mile for girls, or a mile for boys.

Time trial results are compiled, Xeroxed and distributed to the class. A written test, based on interval training for the health runner, concludes the course.

### **DEATH OF A CONDITIONING COURSE**

In 1961 the Department of Physical Education of Troy State University introduced a "conditioning" course designed to develop physical fitness through running and weight-lifting. The class met two days a week for a school quarter, or about 10 weeks. Conditioning was an elective with students voluntarily enrolling. Not even physical education majors were required to take it. For the first few years the course was open only to men; the activities were thought too severe for women.

Of the two weekly meetings, one session was spent lifting weights, and the other running. Progress was slow. Most of the students showed little improvement in either area, because one day a week for each activity appeared insufficient. Despite pleas by the instructor, students would not train on their own outside of class.

Ignoring individual abilities, and adhering to tradition, activities were somewhat militarized. To prevent idling while a few enthusiasts lifted weights, everybody was strenuously exercised en masse. Carrying this idea over into running, all were subjected to the same workout. Needless to say the results were dramatic; improvement skyrocketed.

The course, however, developed an unfavorable reputation. Because it was hard, compared to other less active offerings such as golf, archery, dancing, etc., students shunned it. Class enrollment rapidly decreased to a point of having three or four students who were usually already quite fit. The course was reluctantly dropped from the curriculum.

A hard lesson was learned—not by the students, but by the instructor. These facts emerged: 1) the conditioning course, militarized to achieve fitness goals, cannot survive as an elective; 2) the majority of students are not motivated toward fitness; 3) few adopted the basics of the course as personal habit after leaving.

### **REBIRTH BY COMPROMISE**

Though the conditioning course died, it was not buried. Its value in the curriculum was unquestioned, for it offered more healthy activity than any

other course. But, in its former state, it proved unworkable, compelling students to exercise solely on the basis of the instructor's desire and leadership.

Compromise was necessary. The class needed reorganization which amounted to greatly watering it down. Many of the changes were cited earlier in the chapter, but, to recap briefly, these are the most noteworthy; no goals are set, each student doing as much as he likes once exposed to the rhyme and reason of progressive conditioning of the body; every student passes, none failing unless unexcusably absent from class too often; informality is the rule; and fitness through fun is the motto.

The conditioning course, as it is now, is ideal and works well. Girls are enrolled, breaking tradition. This innovation attracts boys to the class who in turn attract girls. Weight-lifting was out from the program, but light calisthenics are still used to supplement the warmup and to reduce the hazard of injury to muscles when doing sprints. Emphasis is on a heart-lung development and control of weight. Instead of simply assigning workouts without explanation, there is an attempt to teach the basics of interval training to encourage a carryover into later life. Students learn to appreciate effort in respect to time and distance, giving them a choice of fitness levels.

Students voluntarily select the ability group in which they want to run. The groups are classified A, B and C for both sexes. The main distinction is that group A does more running than the other, while C does the least. Debitates are placed in a Special Group, carefully supervised by the instructor

Often a student departs from the assigned workout, whether for reasons of sickness, laziness or exuberance. From a training record which the student brings to class, the instructor is able to spotcheck and prescribe individual workouts.

To give meaning to training, and provide some excitement and fun, time-trials are held twice a quarter. These are definitely not compulsory and have no effect on a student's grade if he refuses to run. He earns a passing grade regardless. But there are those who wish to strive for a higher grade than a C. They yearn to compete against their equals, not having had the opportunity in the past. For their benefit, reasonable standards are set:

Boys' mile	Girls' 880 yards
5:20 and under: B	3:15 and under: B
5:10 and under: A	3:00 and under: A

These standards are slanted to favor girls who have not had the same physical upbringing as boys. An average student, training four days a week (two days on his own), develops enough to meet the standards. However, about 20% of each sex in the class meet the standards without extra training.

The C groups are not neglected if they, too, want to be tested in a time-trial. The C boys run 880 yards instead of a full mile. Many in this group are obese and generally in poor fitness. The C girls run 440 yards, and the Specials do only 220, if permitted. Unfair as it appears, they automatically make a C grade, unless they move up to the mile and half-mile respectively. To make allowances otherwise—that is, to grade them on the rate of improvement despite their failure to meet the above standards—creates a chaotic situation, leading to never-ending arguments between students and instructor.

As can be expected, the conditioning course has its shortcomings. Occasionally a student takes unfair advantage of the casual atmosphere of the



class. He does very little and complains too much. Unfortunately this behavior affects other students in his company. Whatever damage is done is short-lasting, for the instructor realizes that these misfits will not be with him longer than a school quarter. On the other hand an obese student, running to near capacity, expects miracles. He grows disappointed in his inability to lose weight. Proper diet must be painstakingly explained, even listing foods to be avoided in his training record. And there are those few "breakdown specialists" who develop various forms of aches and injuries, usually shin splints, arch and tendon trouble, skin irritations and blisters. This group, by nature and habit have probably never undergone any form of vigorous activity in their entire lives. To them, exercise is anathema. The instructor should be thankful for whatever little they are able to do. Yet, despite these shortcomings, about 20% of the students re-enroll for the course, staying the maximum three quarters, and not a few audit it after that. Overall, by compromising some principles, large gains are being made in the right direction.

### INDIVIDUALIZING THE CONDITIONING COURSE

An instructor who has had varsity track experience will be astonished when working with average college adults. He soon finds that it takes practically nothing to exhaust them. The physical gap between them and even untrained varsity track athletes is fantastic. For example, an athlete who has not trained for a month or so starts back very easily. He jogs three to five miles the first day. An average college male who has trained twice a week in the conditioning class is able, with great effort, to jog non-stop for three miles by the end of the school quarter. He considers this a feat. Girls are lucky to do 1½ miles.

Allowing for this sad situation, workouts have to be modest. Interval speeds conform to the class's desire and ability. A pace considered fairly fast here is easy for trained varsity athletes, and so on up the line. Mileage per session is very low. Within the span of forty minutes, the average male covers less than two miles, and a female about three-quarters of a mile. There is much walking and resting to avoid undue slowdown in the intervals. Unlike varsity athletes who complete workouts with the specific intention of improving fitness, the conditioning class strives to enjoy the workout first, and not worry about getting fitter.

Stress, therefore, is on the individual and his response to a workout. Whether he is first or last is not important. What he does is. This stress on the individual becomes apparent when he brings his training record to class and duly writes the results of his workout. In his eagerness or his concern, he may proudly display it to the instructor, seeking praise or advice.

To keep the course healthy and individualized, racing among students is to be discouraged for most workouts. So much unhealthy emphasis has been placed on the motto of "win at all costs" that even excellent second raters feel like hopeless failures. In a conditioning class where the student is of average physical ability (meaning no athletic talent whatever), an attempt to cultivate a competitive attitude instantly distracts the student from his own rate of progress, focusing attention on the top dog. Quickly a pecking order forms. And, because of it, the degree of failure grows worse for individuals near the tail end. The instructor must prevent this from happening. He monotonously reminds the groups at the start of every interval that they are not to race, but



run at the speeds suitable to themselves. Even when time-trials are scheduled, racing is optional.

### **USING THE INTERVAL SYSTEM**

The workouts used in the conditioning class at Troy State are based on the interval system of progression. However, these are on a very low level compared to varsity track standards.

Why the interval system? Why not something else? Actually, any system is permitted. A student who wants to do nothing but jog is not restricted. A few prefer to just walk. But most seek something more. For these the interval system is offered. It proves exciting, because of the change of pace; offers a rhyme and reason to training, giving a student a choice of fitness levels. It makes effort meaningful in relation to time and distance, and so is considered scientific in its approach.

In the Troy State course, we use 20 different workouts. During a school quarter not all may be used, for bad weather now and then forces the class indoors. All workouts are based on the principles outlined in earlier chapters, but are adjusted to the abilities and needs of average students.

The workouts are numbered one to 20, indicating progression. They tend to get harder as the quarter rolls on, but the difficulty of each workout does not increase linearly, as this proves impossible over an extended period. Progress is really irregular. The basic ingredients of the interval system—quantity, quality and variety—are inserted discreetly to enrich the program.

The workouts are designated A, B and C for each sex. Group A, after the first few meetings, does more than the others, and naturally group C does the least. A student selects his group, but may shift up or down as he likes. An athletically inclined girl is allowed to train with any of the boys. Each does as much or as little as he wants.

The special group which is composed of debilitates is not included in the standard group workout. Since they require constant supervision, at least for the first half dozen workouts, each progresses at a different rate depending on his disability. The special group will be dealt with at the end of the chapter.

Oldsters over 30 who, for the first time in their lives, adopt running as a healthful activity, are grouped with the specials. Many of them begin training unsupervised, afraid and reluctant to extend themselves. They, too, can become self-reliant by following certain common sense rules. They can, like everyone else, enjoy interval training.

### **TAPERING OFF FOR TIME-TRIALS**

Twice a quarter, as was said, time-trials are run. These are optional, of course, but most students run very hard out of curiosity as well as eagerness to record a good clocking. Arrange the workouts preceding the time-trial to assure that everyone is at his best. If the time-trial occurs in the middle of the week, say Wednesday, do a light quality workout on Monday. Rest Tuesday. If the time-trial is scheduled on a Monday, some students may overwork themselves during the weekend. Explain to the class how most should taper; Table 31 shows one way.

On the day of the time-trial, each student jogs between 110 and 220 yards. Muscles are gently stretched and massaged to loosen them. A few short

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**TABLE 31**

Fri.	Quality workout.
Sat.	Jog 1 mile.
Sun.	Rest.
Mon.	Time-trial

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pickups of 20 to 30 yards add final touches. Rest at least five minutes before the trial.

### **YOU CAN RUN, TOO**

The specials and oldsters (those over 30) have much in common. They are usually physically unfit, either by disease, accident or habit. Worse still, they do not know what to do about it. Problems facing the specials have already been briefly discussed in chapter two. Suffice it to say that curricula in physical education offer them very little, except to keep them occupied for an hour during the schoolday passively playing shuffleboard, golf, bowling, cards, etc. They are oversheltered by parents, and severely restricted by physicians. Oldsters, on the other hand, become isolated from supervised physical education when they graduate from high school or college. All too quickly they get fat (or at least overweight), mired in sedentary occupations. The older they grow, the more their muscles atrophy and aging transmutes their lives into prolonged physical degeneration.

Over a span of 12 years ending in 1971, about 100 debilitates and oldsters have enrolled in Troy State's conditioning course. This number, however, is a tiny fraction of those who matriculated at the school. An early case was that of an asthmatic. He did so well in class that he qualified for the track team as a distance runner. In his last two years of varsity athletics he was undefeated in the half and mile runs. A 19-year-old female rheumatic gingerly began running for shorter distances under constant supervision. She was about 50 pounds overweight for her small frame. After two months of low grade jogging she showed dramatic improvement on the electrocardiograph. Without dieting, she lost 10 pounds. A 20-year old orthopedic patient who had several thoracic vertebrae fused and a leg slightly shorter than the other as a result of an auto accident was able, with a built-up shoe, to run at near sprinting speeds. Two polio cases did as well. The author's mother, short and grossly overweight, began running at the age of 67. After nine months of gradual progress utilizing the interval system her weight went from 205 pounds to 152. Blood pressure readings decreased from 200/95 to 150/80, and resting pulse from 95 to 80 per minute.

The benefits obtained from running are not doubted by physicians or laymen. Most everyone admits it is an excellent way to lose weight, strengthen heart and lungs and retard the aging process. But it is not clear to these people how much running one should do. The bugaboo is over exertion. Physicians take a very conservative attitude about their patients exercising on their own, and are hesitant to release them even to trained therapists. Oldsters whose muscles are soft and weak find that initial workouts, despite their easiness, leave them sore and tight. They falsely accuse themselves of being "over the hill"—meaning beyond help. These people must be convinced, somehow, that patience is the key word in the pursuit of fitness. And that exercise, in whatever form, is for a lifetime.



## THINK AND TRAIN

A debilitate or an oldster can jog or run on his own if he wants. He needs no respirator or electrocardiograph to record his breathing or heart rate. Common sense is enough in most cases. But it is wise, for the sake of security, to jog with a companion, or at least have a friend nearby. No one, however, except yourself really knows how you respond to activity. When you think about effort in relation to distance and, later perhaps, time, any sensible person can plan his own workouts to suit his ability.

"How shall I start?" is the opening question. Try this safe routine. Walk 100 yards. Now check your pulse. Say it reads 90 per minute. Near normal. Now walk another 100 yards a bit faster. Check your pulse again. It quickens to 100 per minute. Not bad. Breathing near normal, too. Any heart pains? Of course not. If there are, cut your next semi-fast walk to 50 yards.

Start interval training by walking 110 yards—for the sake of approximating distance to equal fractions of a mile—doing one at a normal pace, another slightly faster. Do 4 x 110 (fairly fast walks), each followed by a 110-yard normal walk, totalling a half-mile. Check your pulse at the end of the workout and record the data in your training record.

In a month or less, work up to 16 x 110 (fairly fast walk), 110 yard normal walk. This totals two miles, or eight laps around a standard 440 yard track. Add more distance if preferred. Walking routines, however, take a lot of time, and the benefit is not as great as one gets from jogging.

The next step is to begin jogging—not fast walking. Ordinarily one would consider fast walking the next step. It isn't. In fact, a person must be reasonably fit before doing any amount of fast walking, because it is more strenuous than easy jogging.

Now, carefully jog 55 yards. How do you feel? Hardly breathing, and no detectable increase in pulse rate. Walk 55 yards. Repeat this routine three more times, showing a completed workout of 4 x 55 yards (jog), 55 yards walk. Total distance: 220 yards jogging. In a day or two, do two sets of the same routine. If you circle a 440-yard track, you get four 55-yard jogs completed, interspersed with four walks per lap. Gradually increase the intervals to 32 x 55-yard jogs, totalling eight laps or two miles.

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TABLE 32

### A Training Program For Specials and Oldsters (Walking)

Week	Intervals	Speed	Recovery	Mile(s)
1.	4 x 110	fairly fast	110	½
4.	16 x 110	fairly fast	110	2
<b>Jogging</b>				
5.	4 x 55	easy	55 walk	220y*
9.	32 x 55	easy	55 walk	2
10.	4 x 110	easy	110 walk	¼
14.	16 x 110	easy	110 walk	2
15.	4 x 220	easy	220 walk	½
19.	16 x 220	easy	220 walk	2
20.	4 x 440	easy	440 walk	1
24.	8 x 440	easy	440 walk	2

\*Note: only jogging distance accumulates, not the walks.

---



Beginning in the third month you may try extending the intervals to 110 yards. Follow the same procedure as before: 4 x 110 (jog), 110 walk. Work this up to 16 x 110 (jog), 110 walk—two miles. Then do the same with 220s, 440s, 880s, etc. Table 32 shows the buildup at a glance.

Eventually the idea is to jog a full mile. How much a person wants to do after this depends on his temperament and disability. Since the early '60s when jogging caught on with oldsters, dozens throughout the country have run up to 26 miles under four hours. Literally thousands jog three to five miles a day.

Jogging, however, is not the ultimate form of healthful physical activity. Higher grades of fitness are obtained by running faster speeds. Naturally, the faster the speed the more intense the workload. For debilitates, there is always the element of danger. A rheumatic, for example, could suffer severe consequences. A stenosed mitral valve allows little blood to flow into the left side of the heart. Vigorous exercise may produce cardiac anoxia and lead to a heart attack. A diabetic on insulin may upset his blood sugar, causing collapse. Virtually every debilitate takes a chance when imposing greater workloads upon himself. It is wise, before trying anything harder, to fully understand one's body in respect to light activity. And at least three months of basic training are essential to convince oneself as well as the examining physician that, perhaps, new horizons in physical activity may be tried.



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