

THE AEROBIC LED TRAINING SYSTEM

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Foreword

CHRIS WARDLAW

Run a lot. Seek improvement. Be patient.

These are essential lessons from the world of distance training as outlined in this powerful article by Bruce Jones.

Bruce Jones in The Aerobic Led Training System has gathered in one place, and has distilled, important and lasting themes about training for middle-and-long distance running. The messages herein add up to a great deal of wisdom which is available to current runners.

There is often a question about whether sound theoretical and empirical evidence-based systematic training can be directly transferred and learned by any runner, regardless of background or level of motivation or do we all need to learn as we navigate the challenges of improving as a runner? My answer to that is that executing the practices outlined by Bruce Jones can significantly reduce the trial and error that coaches and athletes often go through and guide them to the most likely improvement path.

A declaration of interest! Bruce and I are long-time friends and began our exploration of training together on the Melbourne High School oval doing 400m repetitions. We were also rivals (I won in the end!). Bruce was instrumental in getting me back to running at Monash University. We have continued to discuss training across the ditch.

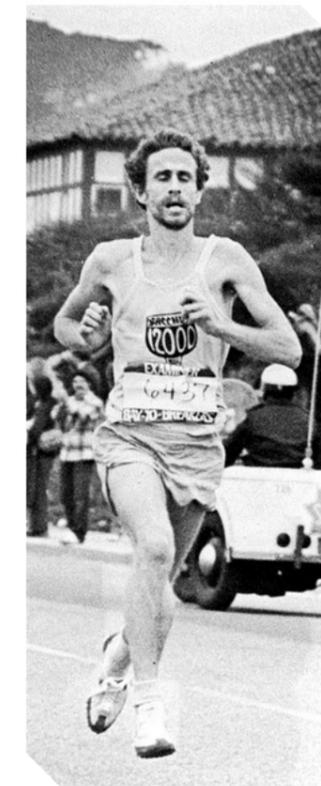
Bruce includes a very practical and contemporary understanding of the scientific basis for aerobic led training. But Bruce equally relies on empirical evidence gained from athletes he has coached and the experience of others.

Bruce and I share the great traditions of Australian and New Zealand coaches and athletes. Bruce has expertly drawn on the learnings of the pantheon of these coaches in a direct line of sight from Arthur Lydiard. I had the advantage of Pat Clohessy as my coach and

Bruce, Arch Jelley. All of us in the end stand on the shoulders of those giants before us. Distance running is clearly a global sport but the traditions we have in New Zealand and Australia are celebrated here.

Any ambitious distance runner, anyone wanting to improve on the time that they may have achieved so far, or anyone out there wanting to 'finish' can learn a lot from reading *The Aerobic Led Training System* while resting on the couch after the Sunday long run! The lessons are there for anyone wanting to run regardless of level. We are all runners, some just run faster than others.

Chris (Rab) Wardlaw OLY



1976 Bay to Breakers winner Chris Wardlaw

Arch Jelley



Arthur F H Newton was an English born long distance runner who settled in Sth Africa and won the Comrades Marathon five times. In 1935 he published a book entitled "Running." The message he was preaching was the forerunner to the theories later propounded by Arthur Lydiard and Percy Cerutti - theories which revolutionised middle distance running throughout the world. Here is a quote from Arthur Newton's book:

"What most of us still fail to realise is that it is always the distance, never the speed, that has to be acquired; just as it is always the speed, never the distance that kills.

You may run yourself to a standstill in a mile or less, but you could walk or trot fifty times that distance if you were allowed sufficient time to do so. Except in the case of sheer sprinting actual speed doesn't enter into the matter at all; every man already has all the speed he needs, the only difficulty being his inability to keep it up long enough.

If Jack Lovelock were running a mile in record time there is hardly a man who could not run

faster alongside him for a matter of twenty or thirty yards, perhaps even further; but lack of the meticulous training, and of the mental and physical desirabilities interwoven to form the necessary action, would quickly bring about his retirement - proof positive that the speed was there all the time, but that he was beaten only because he was unable to sustain it."

Coaches who fail to adhere to this basic principle do so at their peril.

Arch Jelley



Arthur Newton; Image is from his book titled "Running" (1935)

The Aerobic Led Introduction

The Aerobic Led Training System (ALTS) is focused on building aerobic endurance/ strength to maximise a middle distance and distance runner's performance along with carefully crafted anaerobic workouts. An understanding of aerobic capacity, aerobic power, anaerobic capacity and anaerobic power is essential for explaining the purpose of the workouts that are behind maximising a runner's performance.

1. Aerobic Capacity

Aerobic means with oxygen. Building aerobic endurance/strength is all about increasing an athlete's aerobic capacity (or oxygen uptake). Aerobic capacity is the measure of the ability of the heart and lungs to get oxygen to the muscles so as to improve performance. Running at easy, marathon, half marathon and 15km paces* increases aerobic capacity and all of these paces in the aerobic capacity zone are powered purely by oxygen and are the least stressful on the body. *Paces are explained later in this article under the heading Setting an Athlete's Running Paces.

2. Aerobic Power

If the aerobic capacity zone is where the engine is built then the aerobic power zone is converting the engine fuel to premium quality. The aerobic power zone houses the endurance booster workouts, the steady state workouts and the powerhouse workouts all of which propels, not only the building of endurance (and therefore aerobic capacity) to the highest possible levels, but also significantly improves both running velocity and the consumption of oxygen. Put another way, these workouts are the source for the increases in aerobic power where an athlete can run further for the same effort (running velocity) and also take in more oxygen and deliver it to the muscles enabling them to run faster (consumption of oxygen).

The workout paces in the aerobic power zone are not intense and are mildly stressful on the body thereby allowing body adaptation. The paces fall between 3-5km and 15km pace and are no longer purely aerobic. They will incur some oxygen debt and consequently a relatively

mild build up of acidosis. However the body learns how to tolerate the mild acidosis build up at these paces and as a result this increases anaerobic capacity i.e. increases the body's ability to deal with and remove acidosis from muscle tissue. This is significant, for when the faster 800m/1500m/3km paces are introduced, the body has been trained to better cope with the impact of acidosis which allows an increase in run time at the faster paces before fatigue will set in.

3. Anaerobic Power

Anaerobic means without oxygen. We have just seen in the aerobic power zone the first onset of acidosis (mild doses) with the body learning how to tolerate it thereby increasing anaerobic capacity. When we move training to faster speeds like 800m and 1500m paces it is possible to further the body's ability to endure at these high speeds - training that increases anaerobic power. It is where an athlete gets out of breath in just a few moments but can keep running by drawing on the powerful short term glycolytic energy system that keeps the body moving since glucose is broken down to yield energy. Its development allows athletes to sustain top end power for longer periods of time. Anaerobic power zone workouts are needed to fully realise the potential in middle distance runners but they must be used wisely. Waste products will increase at an exponential rate in these anaerobic power workouts and eventually the build up of acidosis forces the athlete to slow. Do too many workouts or spend too long running at anaerobic paces in these workouts will bring on systemic acidosis and reduce anaerobic capacity and power.

Stressing the Body and Adaption

Any running puts some sort of stress on the body whether it is running at an easy pace or running at 800m pace. The best way to improve any bodily function is to put that function under stress with a building block approach that ensures a sensible and progressive developmental programme. Gradual adaptation is key to a long athletic life for running is a long game and like many things it cannot be rushed. Go too hard too early is a classic mistake made by very good junior athletes who fail to make their mark in the senior ranks due to specialising too soon and following adult training schedules that are foisted on them.

So what is the right amount of stress that allows the body to gradually adapt to the stress put on it?

In building up aerobic strength and endurance the runner should spend nearly all of their running

time (except for any races) in the aerobic capacity AND the aerobic power zones where oxygen is the dominant source of energy. Adaptation by the body to stress can be more easily managed when it is aerobically led.

The stress on the body when running in the anaerobic power zone is at its greatest and to get the maximum anaerobic power care is required in setting the quantity, paces and recoveries so stress adaptation becomes possible.

Intense faster paced training definitely has a place but should not to be overdone.

Stressing the body is all about adaptation, moderation and balance and it is not about going to the extremes and shocking the body with a lot of fast gut wrenching anaerobic repetitions where there will be no adaptation by the body to the stress put on it.



In 1966 Australian great Ron Clarke, wearing the England vest, raced against 7 school teams in a 4 x 880yds relay at Scotch College, Melbourne. Ron ran the full 2 mile distance and came second in 8:42.5.

From the left: Graham Wise, Bruce Jones, Clarke and Hugh Wilson.

Six Influential People

I would like to acknowledge the following six outstanding coaches for their contributions to developing my ideas that make up the Aerobic Led Training System. Wherever possible I acknowledge in the article any material that has been directly taken from previously published works and I apologise in advance for any oversights in this regard. In addition my ideas have also been developed from my own experience from a lifelong involvement in athletics as a competitor and coach.

1. Arthur Lydiard



Although very much a believer in Arthur Lydiard's training principles of focusing on the aerobic foundation as the base of what comes later the ALTS

differs in the structure or phases of training. Lydiard believed 'each phase of training had a particular purpose and a time frame in which to achieve the intended results. He didn't like to introduce new things until a phase had been largely completed and the body was ready for the next step' (p77 Healthy Intelligent Training by Keith Livingstone). For example, the first phase was the build up or endurance phase and all running was in the aerobic zone. In the hill work phase the focus was on hill work although aerobic work (long runs, easy pace runs) continued. Then in the anaerobic phase the focus was on running anaerobically along with some aerobic running. These phases became known as periodisation. The key for Lydiard was to develop the aerobic systems to their utmost in the first phase.

The Lydiard training principles are core to the ALTS but they have been adapted so there is not a total focus on peaking for one brief window of championship races. The reason for this is that there are many races or opportunities for a runner to peak during a year so their schedule needs to be flexible to allow this to happen. In addition the aerobic focus and speed theme

flows through all phases which is not the case with a pure Lydiard training system. There is no separate hill phase in the ALTS and another significant difference is that the anaerobic phase in the ALTS is less intense with a greater emphasis on recovery sessions i.e. there is more aerobic running and less anaerobic running in the track preparation phase and competition season.

2. Arch Jelley



Arch is a living legend and a master at adapting the Lydiard aerobic build up, along with the late UK coach Frank Horwill's 5 pace system, to produce world

class athletes such as John Walker and Neville Scott. I was fortunate to be coached and heavily influenced by Arch. I am also greatly indebted to Arch for giving his time in recent years to answer my questions and to forward his presentation notes 'Is There a Better Way?' He has also directed me to other valuable resource material such as two time Olympian Robbie Johnston's outstanding article 'The Times - They Are A Changin'' comparing the training methods of John Walker and Hicham El Guerrouj.

3. Pat Clohessy



The Clohessy complex training programme in Australia involves the same weekly format all year round with a mix of aerobic conditioning and an athlete's speed component. However, during certain times of the year the emphasis of the training does differ in the sense that during the off season there is a concentration on endurance and strength building, whilst before races there is a lightening of the workload and a greater emphasis on the speed component of the programme in order to allow the athlete to relax, sharpen and peak for races. Clohessy trained with Snell, Halberg, Davies and other Lydiard coached athletes and is a great admirer of Lydiard's training methods. Pat was the coach of legendary 4 time Olympian Rob De Castella, winner of the 1983 World Marathon Championship and a Commonwealth Games double marathon gold medallist. I taught and coached with Pat at Xavier College, Melbourne, in 1980-81.



Rob De Castella

4. Chris Wardlaw



Chris was a 10,000m finalist at the Montreal Olympics, ran the marathon at the Moscow Olympics and is highly sought after in Australia for his extensive athletic knowledge which is imparted with a lot of passion and humour. Chris was also the Head Track Coach for the 2000 Australian Olympic team and has coached many National Champions and Olympians including Steve Moneghetti who won the 1990 Berlin marathon in 2:08.16 and Commonwealth Games double marathon gold medallist Kerryn McCann. Through our years together at Melbourne High School and Monash University we became great friends and not only developed a fierce athletic rivalry but also training methods that continue to be discussed over a coffee whenever I return to Melbourne. Overall his influence on my thinking and the way I coach has been significant to say the least. Off the track Chris has had an outstanding career in the education field both in Australia and overseas. He also was the most prominent voice in leading the fight for Australia's participation at the 1980 Olympics in Moscow. It looked at the time as if the Australian Olympic Committee (AOC) would bow to pressure from the Australian Government to withdraw the Australian team from Moscow and join the USA led boycott because of the Soviet Union's invasion of Afghanistan. Chris motivated a number of athletes to take up the fight and lobbied the AOC to not be swayed by political interference. The AOC voted 6 to 5 to go to the Olympics and when interviewed straight after the vote Chris stated it was a victory for the little guy. Malcolm Fraser was also interviewed and his comments were starkly different and unbecoming of a Prime Minister of Australia when he stated that if World War 3 breaks out then it would be on the heads of the young Olympians. So what has all this to do with training you may well ask? Actually quite a bit for if you are not prepared to stand up for your right to compete in an environment free of

political interference then you are losing sight of what sport is all about and opening yourself up to be manipulated for the political gain of others. Sport is not just a physical activity but also a means of educating and bringing people together for greater understanding and friendship - exactly what the Olympic Games strives to do.

5. Dick Quax



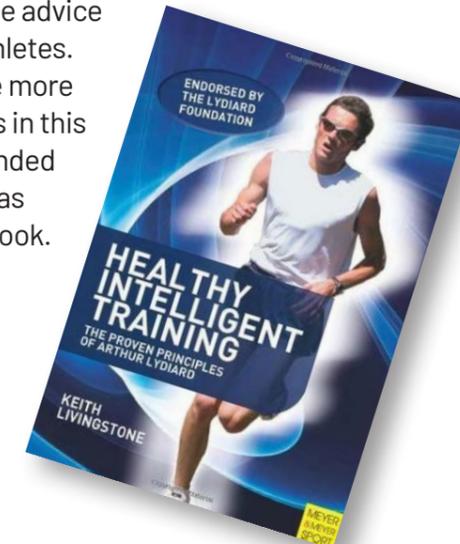
Dick was a long time friend who I spent many hours with discussing training methods. Dick was a former world 5000m record holder and Olympic 5000m silver medallist coached by another Olympic medallist John Davies. Dick, like John, coached his athletes according to Lydiard principles and if there was one thing that Dick kept emphasising was that a lack of mileage was the greatest threat to an athlete's progress. I would like to thank Roxanne Bakke for allowing me to make use of material that became available after Dick's death in 2018.

6. KEITH LIVINGSTONE



Keith is one of the most genuine and insightful commentators about our great sport in both New Zealand and Australia where he now lives. His book

Healthy Intelligent Training, The Proven Principles of Arthur Lydiard has the official endorsement of the Lydiard Foundation and has been my go to book for sensible advice for coaching athletes. A number of the more scientific points in this article are grounded on what Keith has outlined in his book.



BUILDING STRENGTH and ENDURANCE with Aerobic Capacity and Aerobic Power workouts

Building aerobic strength is the most fundamental part of a runner's training programme and is often referred to as building a base and is where the body is put under the right sort of stress in order to improve its use of oxygen. Arthur Lydiard pointed out: **'aerobic running leads to gaining better muscular capillarisation allowing for better utilisation of oxygen i.e. more blood flow which means that more oxygen can be pumped to the working muscles'**.

In fact, many of the benefits of aerobic running are a function of stressing the muscle fibres and by running in the aerobic capacity and aerobic power zones it is easier to stress the muscle fibres for longer than it is by running at a hard and intense pace. Limiting the stress increases the efficiency!

An aerobic base applies to all runners and there are no exceptions. It is essential for high level performance and as Chris Wardlaw says **'...you have to be fit before you can train'**.

Speed is important but without a large aerobic foundation it does not matter how fast a runner is because they are not going to be around to use it when it matters.

THE AEROBIC CAPACITY ZONE - the engine!

Easy, Marathon, Half Marathon and Half Marathon-15km paces. Every week of the year.

The pure aerobic paces in the aerobic capacity zone are solely fuelled by oxygen with no resultant oxygen debt.

The easy pace runs, the long runs and the aerobic pace tempo runs build aerobic capacity since they improve the efficiency of the heart and cardiovascular systems capacity to perform their most important task of supplying oxygen and energy to the entire body. Building aerobic capacity really is like building an engine and the greater the aerobic capacity the greater the size of the engine. Size matters for the volume of mileage covered by an athlete (or the lack of it) often explains why the athlete is performing or under performing.

The long run, commonly run on a Sunday, can be at an easy pace all the way however there comes a point when time on an athlete's feet makes it no longer easy! A long run is a relative term but is usually anything from 70 minutes to 2.5 hours and brings benefits such as developing mitochondria which produces more energy in the body's cells than any other type of running. The long run should be at talking pace on undulating courses and run at an easy pace building up to a stronger pace (e.g. marathon pace) over the latter stages of the run. The midweek long run will be less in duration and less hilly. In the main track racing season the duration of the long runs will slightly shorten, be over flat terrain and an emphasis on not pushing too hard. However they must be done every week all year round - no exceptions, no buts!

The **aerobic pace tempo** runs at half marathon and marathon paces are where the pace builds up from easy to a more sustained effort and at the end of the run the runner should be pleasantly tired however able to do more if required. Talking is possible but not recommended as

concentration is required to keep the steady pace flowing for some time, especially over the latter stages.

There are four types of aerobic pace tempo runs with one of them to be done most weeks of the year:

- i. the **marathon** pace tempo run (the long steady tempo run) that can last up to an hour
- ii. the **half marathon** pace tempo run that is around 30 minutes
- iii. the **acceleration** pace tempo run where the first 2/3rds is at marathon pace and the final 1/3rd is at half marathon pace
- iv. the **12-16 lap** track tempo run where the first 1/3rd is at half marathon pace, the 2/3rd is at 15km - half marathon pace and the final 1/3rd is at 15km pace.

Note: An added bonus for the middle distance runner in particular is that a long run at a pace that is faster (e.g. 20-30km at marathon pace) than the normal long run activates fast twitch fibres* after the slow twitch fibres (aerobic characteristics) have been depleted.

*There are two types of fast twitch fibres:

Type 11A fast twitch fibres that have aerobic and anaerobic characteristics and Type 11B fast twitch fibres that have anaerobic characteristics and are huge and powerful. They are not easily trained (i.e. recruited first) UNLESS the slow twitch and Type 11A fast twitch fibres are taken progressively to exhaustion by prolonged endurance exercise. If they are then this triggers the massive Type 11B fibres to be recruited to maintain momentum.

Fibre type ratios are genetically ordained but they can be changed with specific training. Slow twitch fibres cannot acquire fast twitch characteristics BUT some fast twitch fibres (Type 11B) can certainly acquire fatigue resistant short term characteristics with prolonged endurance running.

In order to kick start an athlete's track season by firing up some powerful Type 11B fast twitch fibres it is recommended that a runner runs at a hard constant pace for an extended time (e.g.

20-30km at marathon pace or two long runs on consecutive days) two-three months or so before wishing to peak on the track. The athlete runs to the limit of their slow twitch fibre capacity and then exhausts the glycogen stores in the fast twitch fibres. After the run the athlete can then recover the glycogen reserves slowly with easy running for a week or so. The training effect will be to force some fast twitch fibres to adapt. Type 11B fast twitch fibres, acting as Type 11A fast twitch fibres, emerge with aerobic endurance characteristics as well as very large anaerobic glycolytic potential. In other words, the athlete is changing the ratios and training the powerful fast twitch fibres. This potential is only realised with a variety of fast anaerobic workouts and races that capitalise on the emergence of the Type 11B fast twitch fibres (Source: Healthy Intelligent Training by Keith Livingstone)

THE AEROBIC POWER ZONE - the engine ROOM!

3-5km, 5km, 10km and 15km paces
Most, if not all, weeks of the year.

The paces in the aerobic power zone are mainly fuelled by oxygen however there is some resultant oxygen debt. The high quality aerobic power workouts improve tolerance of acidosis, running velocity and consumption of oxygen.

The endurance booster workouts, steady state workouts and the powerhouse workouts propels the build up of aerobic capacity like no other workouts. Such **aerobic power** workouts directly contribute to improving the cruising pace of the athlete through the body adapting to using oxygen under stress. It is where the athlete rolls up their sleeves and stokes the engine fires with high octane petrol. There are multiple benefits to be had with increases in aerobic capacity, anaerobic capacity, running velocity and the consumption of oxygen.

The high quality aerobic power workouts are worth their weight in gold. The BMC News, the Official Journal of the British Milers' Club, Spring 2006 edition, published an article headed

The Golden Pace written by legendary coach Frank Horwill, who co-founded the BMC. In it he quoted Peter Coe, father and coach of Sebastian Coe (12 world records within four years plus Olympic medals) as saying 'Training at 5km pace in the winter is golden' and he was referring specifically to maintaining a high level of endurance with 5km pace workouts. Also in the same article Horwill stated that '...the world's greatest physiologists agree that endurance is more efficiently accrued when workouts are run between 88 to 100% of the maximum heart rate'. As 85% of MHR is 15km pace, 90% is 10km pace and 95% is 5km pace then the aerobic power zone is where strength and endurance is optimised.

Why is the 5km pace so golden? Horwill does not actually address this, but as we will see later, 5km pace (and 10km pace for that matter) takes the intensity out of any repetition work but keeps it honest with short recoveries. This turns the focus onto improving oxygen use so the athlete can take in more of it. This is only possible at 5km (and 10km) paces since they are not deeply anaerobic and adaptation is more easily achieved. Seb Coe, in a 5km pace session conducted by Frank Horwill, ran 7 x 800m in 2:02 with a 100m (30secs) jog recovery. This may sound fast but remember 2:02 was 20 seconds slower than his 800m PB. The total distance of this high quality workout was around 6km and very much an aerobic power workout.

Does the golden 5km pace eradicate the need for big mileage as Peter Coe believed? There is no doubt that the 5km (and 3-5km and 10km) paces are high quality workouts that contribute significantly to an athlete's strength and endurance but they certainly can't be done every day or every second day unlike pure aerobic runs can be. What worked for a super athlete like Seb Coe (90kms a week) is not necessarily going to work for another super athlete like John Walker who found his quality mileage was in the range of 110-135km per week (this is not big mileage). What is common though is that both runners discovered their optimal mix of quantity and quality workouts for the middle distances they

focused on. And that is true for any runner - their mix of quantity and quality workouts will be determined to a large extent by the event they are specialising in and what works for them.

Improving Tolerance Of Acidosis:

The commonly referred to anaerobic threshold line (15km pace) is where the amount of oxygen is just enough to meet the energy demands of the athlete i.e. the oxygen debt line. Any pace slower than 15km pace is aerobic where there is no oxygen debt and consequently no build up of acidosis. Any pace faster than 15km pace is anaerobic where something more than just oxygen is needed to meet the energy demands of the athlete with a progressive build up of acidosis the faster the athlete runs.

In the aerobic power zone oxygen is still the most influential factor for powering the athlete through their workouts along with some low level anaerobic energy systems. Only at the powerhouse 3-5km pace does the heart beat at its maximum with no more oxygen becoming available. At this pace the workout is 50% aerobic and 50% lactate.

The high quality endurance booster workouts, the steady state workouts and the powerhouse workouts keep adding to the size of aerobic capacity since the runs are still mainly fuelled by oxygen. Such workouts will produce low doses of acidosis and as a runner does more sessions the body gets stronger and adapts to the increased production of acidosis i.e. improves the body's ability to buffer and tolerate acidosis. This continual ability to adapt and tolerate is increasing anaerobic capacity which allows the body to better deal with the higher levels of acidosis in the track season.

Improving Velocity:

The **endurance booster** workouts (*Arch Jelley refers to them as speed endurance workouts*) involves paces that start out around 15km pace and finishing at 10km pace or even 5km pace. The **steady state** run starts out at around 10km

pace, or even 5-10km pace, and holds that pace for the duration of the workout.

Such workouts train the athlete to sustain their speed for longer by boosting their endurance.

There are three recommended endurance booster workouts with one of them to be done once every second week (alternate with the powerhouse workout):

- i. 6km run at 15km pace for 3km then increasing to 10km pace for the next 2 or 3kms with the option of running the final km at 5km pace. The recommended time for a single effort for this tempo is around 20-25 minutes or 25-35 minutes if it is broken into intervals e.g. 3 x 10 minutes at an average less than 15km pace with a 1-2 minute recovery

or

- ii. 5 x 1km with a 45-60 sec/200m float recovery with the first two at 10-15km pace, the next two at 10km pace and the final repetition at 5km pace

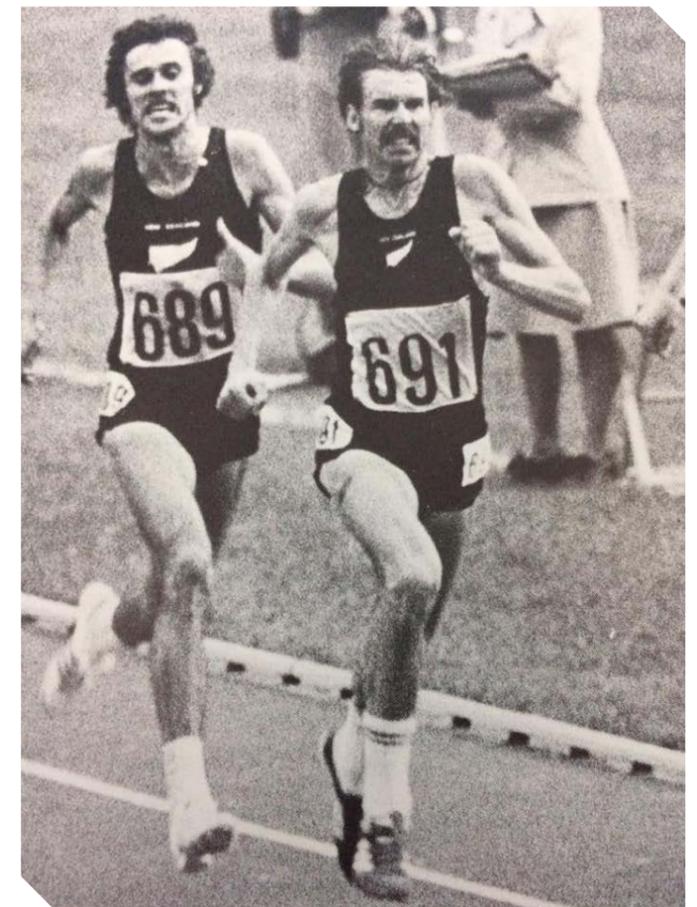
or

- iii. Hill circuit such as a 8km loop with 3-4km uphill at around 15km pace (which does not mean sprinting up the hills!). An alternative is running 4-6 x 3 minute hills at 15km pace with a jog back recovery

Over time an athlete completing these workouts will be able to move along faster and for longer e.g. through decreasing the anaerobic threshold 15km pace from say 4:10 per km pace to 4:00 per km pace the endurance booster workout improves running velocity - the athlete can run faster for the same amount of effort or longer without the legs giving up. With the anaerobic threshold 15km pace getting faster this means by definition that the aerobic capacity zone must be getting larger - the foundation or base is growing. The old 4:10 per km anaerobic threshold 15km pace now belongs in the aerobic zone.

Just a lesson or two based on personal experience. I arrived in New Zealand in December, 1973, after a very successful year in Australia where I had run a 3:43 1500m PB in

placing 3rd in the National 1500m Championship, won the National Cross Country Championship and dominated the training pack. In 1974 I ran some 16km training runs with John Walker and Dick Quax that ended up being hard out runs at 15km pace or faster in around 52 minutes with hills included. In other words I was pushing the boundaries to the extreme by running nearly at my 15km pace for 50+ minutes (remember around 20-25 minutes is the recommended maximum at 15km or faster pace). Moreover, my follow up runs with Dick were too fast so I was not recovering. A recipe for disaster and not surprisingly I lost form, got sick and had a poor track season. Dick and John could handle the session for the cruising pace of these two world class athletes was much faster than my cruising pace - based on PB's I was on average 2 seconds a lap slower than Dick and John over 5000m. I went from the dominant runner in the pack to the dominated all in the space of a few months! The moral of the story is that impressive training efforts that yield a fast series of times might look great for the



diary but are actually not great for the body.

The **steady state** workouts are a high end extension of the endurance booster workouts in that it takes place on the track over 6-10 laps and starts out at 10km pace, or 5-10km pace, and holds that pace. The maximum time for any single effort in the steady state workout is around 10-12 minutes or half the maximum time for a single endurance booster workout (20-25 minutes). It is a sustained effort where there is no place to hide because it is on a track with lap timing ensuring honesty of effort. This type of steady state workout is a big plank in an Arch Jelley training schedule.

Lydiard said you could determine an athlete's event by getting them to run a flat out 200m. A slow 200m meant you were bound to be a distance runner. A 200m in 23 secs put you in the 800m camp.

Likewise for me, an 8 lap track effort at a runner's 10km, or 5-10km pace, is the best aerobic fitness indicator you can find. If a runner cannot manage it comfortably then they need further aerobic workouts before progressing to race on the track over any distance. This is the go to session any month of the year and a great measuring stick. I like to call this workout the **humming** pace workout for it shows the engine is running smoothly!

Improving Consumption of Oxygen:

The **powerhouse** workout is run at 3-5km pace for a short time of around 5 minutes in a single effort or 10 minutes of 3-5km pace running if using repetitions with recoveries less than the time of the workout/effort.

There are four recommended powerhouse workouts with one of them to be done once every second week (alternate with the endurance booster workout):

- i. 8 x 400m at 3-5km pace with a 45sec/200m float recovery

- or
- ii. 12 x 200m at 3-5km pace with a 45sec/200m float recovery
- or
- iii. 3 x 1km at 3-5km pace with a 45 sec/200m float recovery
- or
- iv. 2km run at 3-5km pace

The powerhouse workout will stress the body more than the endurance booster and steady state workouts. By running at the demanding 3-5km paces the heart is beating at just on 100% and the athlete is using in equal amounts oxygen and anaerobic energy systems to power along.

The workout seeks to improve the consumption of oxygen when the heart beat is at its maximum since it will then become possible to take in more oxygen and deliver it to the muscles in order for the athlete to run faster. The best way to improve bodily function to maximise oxygen consumption is to stress that function at 3-5km pace. The intensity has to be close to maximum heart rate and the recovery rate of a 200m float in 45 seconds in the set of 8 x 400's will bring about the right result of stressing the aerobic maximum. If the recovery is too long then the heart rate will drop too far below its maximum and in the next 400m repetition too much time is spent getting back up to the maximum heart rate. In other words, the runner needs to keep close to the 3-5km zone for as long as possible in order to keep the intensity as close to the maximum heart rate as possible. Faster or slower paces will not do it. If the athlete runs at say 1500m pace the stress is too great on the body for it to adapt and there will be no conditioning of the athlete's ability to consume oxygen i.e. the body is too stressed at fast paces to improve oxygen use.

TRACK PREPARATION with Anaerobic Power workouts

It is pointless training for anaerobic power if the athlete does not have a high aerobic base and completed the aerobic power workouts. The athlete has to earn the right to get onto the track and do high end anaerobic work. This is so for the aerobic energy system provides the strength preparation for the anaerobic power workouts and the tolerance preparation for the onset of high levels of acidosis - vital ingredients for effective anaerobic power workouts.

Such anaerobic power workouts aim to develop large oxygen debt levels in order to stimulate the body's metabolism to create a buffer against fatigue. To ensure such large oxygen debt levels will require careful crafting of the number of repetitions, the pace to run them at and the duration of the recovery between the repetitions. Getting this right will stimulate and develop the faster producing anaerobic energy systems which allows the athlete to sustain top end power for longer periods of time. Such workouts will be intense and the key here is to control the intensity by keeping a lid on the quantity or number of repetitions otherwise overdosing on a series of gut wrenching repetitions opens the door to systemic acidosis which is a condition in which too much acidosis accumulates in the body. In such a situation the athlete will lose form, become lethargic and negatively impact on their aerobic capacity.

For a middle distance athlete running 4 x 400m, for example, at 1500m race pace (assume 60 seconds per lap is race pace) with a 45-60 second 200m float recovery will do the job of developing the required oxygen debt levels without the risks associated that comes with running say the popular 10 x 400m session at 1500m race pace with a 3 minute/one lap recovery. In fact the oxygen debt levels will end up being higher due to the short recoveries. Furthermore the fewer 400's and short recoveries approach means considerably less total time on the track - in this case 8 laps/8 minutes as opposed to 20 laps/40 minutes - 20% of the

time on the track for better outcomes! Finally, adaptation to the most intense session a runner will do in training is far more likely with the 4 x 400m session which develops the ability of the body to extract as much oxygen as possible at high speed without overdoing it.

It is essential to intersperse the anaerobic power workouts with a mix of modified, or full, low intensity aerobic capacity (e.g. a 20 minute tempo at marathon pace) and aerobic power workouts (e.g. a 6 lap steady state run at 10-15km pace) in order to keep the relevant strength inducing energy systems in a highly trained state and to aid overall recovery. Over distance aerobic workouts are the perfect foil to the more intense anaerobic power workouts and for keeping all the energy systems highly trained since the athlete will be drawing on them in a race, especially in the final stages. Active recovery after an intense anaerobic power workout becomes more important than any other workout since acidosis will be greater and the pressure on the cardiovascular system more extreme. Total rest does not work but active recovery does for it restores the body's normal blood pH which can be lowered if too much acidosis builds up from the intense anaerobic power workouts. Only one or two of these anaerobic power workouts should be done in a week. The balance (spacing or timing) of all the different paces/energy systems requires careful consideration. Specifically, aerobic tempo pace runs and aerobic power workouts such as steady state workouts are to be interspersed between the

anaerobic power workouts along with, of course, the long runs and easy paced runs.

An example of a 2 week sequence is below which may have to be individualised with additional easy pace runs. In addition the long runs should be slightly shorter, be over flat terrain and an emphasis on not pushing too hard:

Long run

Easy pace run

Anaerobic power workout i.e. longer repetitions

Easy pace run

Modified aerobic power workout

Easy pace run

Anaerobic power workout i.e. shorter repetitions

Long run

Easy pace run

Anaerobic power workout i.e. longer repetitions

Easy pace run

Modified or full aerobic tempo run

Easy pace run

Anaerobic power workout i.e. shorter repetitions

THE ANAEROBIC POWER ZONE

the engine performance!

3km, 1500m, 800m and 400m paces

Limited time i.e. the track season

The **anaerobic power** workouts are based on previous recommended workouts completed in the aerobic power zone (listed below in italics) but are now fewer in number, at a faster pace and recoveries the same or slightly longer in duration based on the individual's ability and maturity:



5 x 1km with a 45-60 sec/200m float recovery with the first two at 10-15km pace, the next two at 10km pace and the final repetition at 5km pace

* 3 x 1km at 3-5km pace with a 45 sec/200m float recovery i.e. repetitions to improve the consumption of oxygen

*** 2 x 1km with a 60sec/200m float recovery e.g. the first one at 3km pace and the second one at 1500m-3km pace i.e. repetitions to develop large oxygen debts**

* 8 x 400m at 3-5km pace with 45sec/200m float recovery

* 12 x 200m at 3-5km pace with a 45sec/200m float recovery

*** 4-5 x 400m at 1500m pace with a 45-60sec/200m float recovery (or finishing the last one or two at 800-1500m pace)**

*** 2-3 x 400m at 800m-1500m pace with a 45-60sec/200m float recovery (or finishing the last one at 800m pace)**

*** 6-8 x 200m at 1500m or 800-1500m pace with a 45-60sec/200m float recovery**

Note: Before any of the anaerobic power workouts, and after the warm up, a modified aerobic power workout of 4 or more laps at 10km or 15km pace could be run in order to add in a non-stressful extra workout that is aerobic based and will add to the reservoir of completed higher end aerobic paces. This is important especially in the track season due to the limited opportunities to keep the aerobic energy system highly trained. Moreover it will help start the purpose of the session which is to develop large oxygen debts since any pace faster than 15km pace creates oxygen debt. In fact the modified aerobic power workout could even be done as part of the warm up by finishing the last 5-6 minutes of the warm up at 10km or 15km pace.

Training in the track preparation phase on the track will involve a progression to 1500m and 800m paces which allows the body to adapt to the stress of training at faster paces so the likelihood of maximum anaerobic power being achieved is increased i.e. it is best to start by

running say 4 x 400m at 1500m-3km pace rather than running at 1500m pace the first time the athlete commences their track preparation.

In addition, to get the best training effect it is best to ensure the repetitions get slightly faster as the workout goes on. For example in a 4 x 400 session at 1500m pace the first 400m should be the slowest and getting progressively faster so the last one is the fastest. In other words increasing the pace slightly under conditions of fatigue with short recovery simulates how big races are run. So don't go too fast in the early reps but don't go too slow either otherwise the training effect is under-valued. In addition, accelerate in the final stages of the repetition rather than starting too fast and fading. Even when running tempo pace runs and long runs it is important to control the pace to ensure the pace is picked up throughout the run rather than starting out too fast, slowing down and feeling exhausted.

As we have seen throughout this article workouts need to have a purpose rather than an athlete randomly going out the door thinking a bit of pain will bring about some desired result.

Any workout needs to be done in a way that the body adapts to the stress put on it and none more so than in the anaerobic power zone. It is best to try to gain the maximum amount of benefit from the least amount of stress rather than try to gain the maximum amount of benefit from the most amount of stress! For example, the purpose of an upcoming training session may be for an 800m runner to replicate race conditions by running 4 x 200m at race pace. If Runner A runs the first two 200s too fast (e.g. at 400m pace) then it may not be possible to run the remaining two 200m at 800m pace. So there is no training effect for there is little or no time spent running at Runner A's actual race pace. The session may be hard work but that is because of too much acidosis in the system. In this example there is no body adaptation to the stress put on it.

Speed Development

A very common question is - how do I increase my speed? Unfortunately the commonly given answer is 'run lots of track work' i.e. do more anaerobic power repetitions. Anaerobic training is not speed training and will not make a runner any faster over 100m. How many sprinters do you see running 200m or 400m repetitions on the track? An athlete's speed is a given - given to them by their parents and no amount of track repetitions is going to make any significant difference.

The correct answer is in fact counterintuitive! The greatest emphasis has to be on developing aerobic capacity to ensure the athlete can use their given speed when they need to. Let me illustrate: when I came from last place in the 1973 Australian 1500m Championship to finish 3rd I was able to run down runners much faster than me such as Peter Fuller whose 800m best was well over 6 seconds faster than mine. In fact I was the slowest runner in the field over 400m and 800m but relied on my aerobic strength so I could

run close to my top speed when I needed to over the latter part of the race - 41 seconds for the last 300m (against my 400m PB of 53.4 seconds) after running 3 laps in 3:02 was indeed close to my top speed.

In general there is little point being fast over 100m or 200m if the athlete is exhausted and not in contention, or in contention but too exhausted with 200m to go in an 800m or 1500m race i.e. lacking in aerobic endurance.

The greatest emphasis has to be on developing aerobic capacity to ensure the athlete can use their given speed when they need to for that is where the greatest gains can be made compared with small incremental gains from speed development workouts.

However we cannot ignore entirely outright speed development, especially for middle distance runners, since it contributes to the efficient cadence/rhythm of the runner across all their workouts AND gives the athlete the confidence to compete at different stages in a race.

Speed development is where the focus is on outright speed, form and rhythm with running that is no longer than 80 metres/14 secs and with full recovery between efforts. Very short bursts lasting only a few seconds is called alactic exercise and is ideal as there is no acidosis involved. It is free speed and like borrowing money from a bank where no interest is paid.



A jubilant Peter Watson (WA) holds off a straining Graham Crouch (Vic) to win the 1973 Australian 1500m Championship from Bruce Jones (Box Hill) 3rd and Peter Fuller (Vic) 4th.

The benefits of speed development are:

- i. if an athlete does speed development workouts over many months then this will improve their outright speed and also it helps with the efficiency of movement at all paces
- ii. speed development workouts are very useful in the last week when peaking for a major race since it keeps the body free of high levels of acidosis
- iii. having the alactic energy system tuned up can be an advantage at different stages in a race. At the start it pays off when sprinting to get a good position or the next lap to get a better position... see the Appendix for Chris Wardlaw's 1500m race model. Even for a distance runner it could be sprinting to latch onto the pack in a 10,000m race or if getting passed to turn it into an opportunity to hitch a ride (and at the same time to break the mental block of feeling tired). At the end of a race, especially a slow race, this powerful energy system can really come to the forefront.

Speed Development Workouts:

Acceleration Sprinting - a gradual acceleration from striding to sprinting at 90%.

It is recommended all year round on one of the athlete's track or park days where they run 4-6 leg speed drills over 100m. Running the first 40metres at striding pace and then running the last 60m at 90% of top speed pace i.e. start out the 100m at striding pace and then pick it up over the last 60m. Keeping it nice and smooth with arms relaxed and good knee lift and do not throw the body about trying to sprint flat out. The key is to stay relaxed and comfortable and not straining. Make sure there is plenty of recovery between each effort. A 300m slow jog or a walk back is recommended.

Hill Sprints

Pat Clohessy was a master coach who loved hill running. When I was coaching at Xavier College with Pat we often took the squad, in Pat's words, 'to bowl a few hills'. Not long grinding steep hills but short and slight hills that were about 70-80m and favourable for faster running e.g. 6 x 70-80m hill sprints making sure of going reasonably hard (90%) but keeping good form and knee lift. A full recovery from the hill sprint by walking down the hill and jogging around before tackling the next hill. The purpose of this type of hill work is similar to the 100m acceleration sprinting i.e. that in the long term over many months it will improve outright speed. However in this case the hill acts as a resistant force and consequently develops upper leg strength which is so important for developing speed and also it helps with the efficiency of movement at all paces.

Step Running

The aim of running steps is not to go hard out but to run the steps at speed with good knee lift and being relaxed and running with good form and rhythm. Full recovery between the step efforts. The number of steps should not be any more than say 10-14 seconds of running so as to be sure it is an alactic workout.

Recovery in the acceleration sprinting, hill sprints and step running is critical and may include walking. This will ensure sufficient recovery to run at speed during the next effort. Remember we are seeking to develop outright speed in these particular workouts. Insufficient recovery will mean fatigue sets in, the efforts get slower and it becomes an anaerobic power workout where the athlete is adapting to running at a more intense effort rather than improving their speed. A long slow warm down is recommended after any alactic exercise.

COMPETITION and PEAKING

During the main part of the competition season the training pattern does not change however the anaerobic workload lightens and there is more recovery time in order to allow the athlete to recover from high level racing and also to peak for major races. Competition races are what you train for so do not continue to train hard and any fast training should be small in volume. Keep sharp and fresh is the goal.

The quantity of aerobic running does not drop away significantly when sharpening for major races however care is needed on the long runs and other easy pace runs to keep the blood pH high in order to improve recovery from the demanding races. In addition further active aerobic running is necessary to maintain fitness and form as the workload lightens and the best way to do this is to run light endurance booster pace runs and/or light steady state workouts even with only a handful of days before a championship race.

Pat Clohessy was big on relaxation as an underlying principle of his training methods. For Pat it was long runs, recovery runs and relaxation in training with quick, sustained fast efforts over shorter distances as opposed to intense sessions and being overly competitive. If the preparation has been done then the athlete will be confident and relaxed in their ability to perform in major races. In the competition season plenty of relaxed aerobic work with short bursts of speed was the Clohessy way. Tension and pressure was not! The short bursts of speed (or quick, sustained fast efforts) would be taking an anaerobic power workout and modifying it e.g. 3-4 x 150m at 800m-1500m pace but working towards 800m pace with a 250m slow jog or walk recovery. Such short bursts are close to being alactic workouts so will not be contributing very much to acidosis levels (if at all) and are a long way from being a pressure workout with lots of tension. The athlete enters the competition race fully loaded.

So active aerobic running and short bursts of speed that requires enough effort from the athlete to keep all the body's energy systems

highly trained without the negative acidosis effects is all that is necessary when peaking.

An example of a single workout 4 or 5 days out from a championship race may look like this:

4 laps at 10-15km pace
Full recovery
4 x 200m at 800-1500m pace with a 200m/60sec float recovery
or
4 x 150m at a strong pace but under control with a 250m walk/jog recovery

Setting an Athlete's Running Paces

The ALTS uses the 4/5 or the 5/6 seconds per lap rule for setting an athlete's running paces. The paces are an approximate guide.

Usually for a male runner 4/5 seconds are added per lap as the distance moves from say 800m to 1500m to 3km to 5km and so on.

Usually for a female runner 5/6 seconds are added per lap as the distance moves from say 800m to 1500m to 3km to 5km and so on.

However the paces may have to be adjusted for the ability and maturity of the athlete. For example a strong male endurance elite runner may have only 4 seconds per lap added to their 10km pace in order to get their 15km pace. However a younger male athlete may need to add 5 seconds or more per lap as their endurance capacity may be relatively limited.

Example for a male runner whose 1500m PB is 3:58 which is approximately equal to 4:16 for 4 laps of the track. Therefore their 1500m pace is 64 secs per lap.

400m 56 sec
800m 60 sec
1500m 64 sec
3km 68 sec/2:50 per km pace
5km 72 sec/3:00 per km pace
10km 76 sec/3:10 per km pace
15km 80 sec/3:20 per km pace
Half marathon 84 sec/3:30 per km pace
Marathon 88 sec/3:40 per km pace
Easy pace is around 10 secs slower per lap than marathon pace
i.e. 98 sec/4:05 per km pace

Example for a female runner whose 1500m PB is 4:28 which is approximately equal to 4:48 for 4 laps of the track. Therefore their 1500m pace is 72 secs per lap.

400m 62 sec
800m 67 sec
1500m 72 sec
3km 77 sec/3:12 per km pace
5km 82 sec/3:25 per km pace
10km 87 sec/3:37 per km pace
15km 92 sec/3:50 per km pace
Half marathon 97 sec/4:02 per km pace
Marathon 102 sec/4:15 per km pace
Easy pace is around 10 secs slower per lap than marathon pace
i.e. 112 sec/4:40 per km pace



Setting Recoveries - they do matter!

At Melbourne High School the athletics coach, Barry Meagher, was enthusiastic, supportive of his young charges and in return was highly respected. Once after Box Hill High's Peter Fuller demolished us MHS boys in a race around the Tan circuit Barry removed all the notices off the school's athletic notice board. He then placed a small notice in the middle of the deserted notice board. It read: More 400s!! So at the next training session after school our squad smashed out multiple 400s with a lap recovery in the universal belief that this was going to make us better runners.

Chris Wardlaw and I often talked over our training in the years after we had left school for neither of us were coached athletes. We were doing okay with our training methods but always strove to do better. Chris suggested that rather than belt out 400's with a lap recovery we should take the intensity out of the pace of the 400m and reduce the recovery. He had been reading that this is what Frank Shorter did in training. So that is what we did once a week - 8 x 400m at a less intense pace (around 3km pace) with a 45 secs/200m float recovery. The less intense 400m was one side of the key with the short recovery of 200m in 45 seconds being the other side.

Chris never wavered in running them week in week out. Not perhaps the secret session but a great complementary session to all his other running. The rest is history as they say.

What Chris came up with was in fact very similar to the 5km golden pace running of Seb Coe. Both had the same outcome of taking the intensity out of the workout **and** ensuring the recovery was not long in duration (30 secs in some of Coe's workouts). Sure Coe may have run his repetitions over longer distances (800m/1km) and at a slightly slower pace but both are great examples of setting an exercise so the body can more easily adapt to the stress put on it. Put another way - reduce the intensity and reduce the recovery to get better adaptation. These sessions totalling only 15-20 minutes are quality aerobic power workouts that build endurance in a way like no other workout.

Frank Horwill had the following to say about recoveries '...the sessions must replicate the conditions of the race distance. There is not much point in running one 400m at your race pace and having a cup of tea and a bun before running the next one' (BMC News, 2006 Spring edition).

Recoveries need to be fit for purpose and designed to fit in with what the workout is seeking to achieve. Here are three examples:
Recovery shorter than the time taken to run the repetition:

The purpose may be to run the high quality powerhouse workout so as to increase an athlete's consumption of oxygen under a mid level of stress. It also has a cross over into the anaerobic zone in terms of building anaerobic capacity since oxygen debt is existent. This is best done by running the 400m repetitions at 3-5km pace (i.e. taking the intensity out of the pace of the 400m) with a short 45 sec/200m float recovery so the athlete can move quickly back to the 3-5km pace for the next 400m repetition. The longer in the 3-5km zone the better for achieving the dual purpose of the workout of an increase in consumption of oxygen (aerobic power) AND an increase in anaerobic capacity.

Such workouts where the intensity has been taken out of the workout along with short recoveries, whether it is 400m repetitions or 1km repetitions, is the approach favoured in the aerobic led training system for most weeks of the

year. Unlike the next two examples below which are absolutely necessary but are limited basically to the 4-8 week anaerobic power zone i.e. a limited time.

Recovery around the same time taken to run the repetition:

The purpose may be to run a workout that develops big oxygen debts as well as simulating and testing 1500m race pace in order to prepare the athlete for upcoming races e.g. 4 x 400m with a 60 sec/200m float recovery. Note the number of 400's is around the race distance and enough to test the athlete's race pace in training. An equivalent recovery does not allow too much recovery time and means the simulation to race conditions is roughly preserved. This anaerobic power workout does not knock the socks off the athlete but is enough to increase the body's ability to endure at race pace. Running a greater quantity of 400's with longer recoveries will not replicate a race environment and will seriously increase the risk of high levels of acidosis that the athlete may not recover from. A relatively long recovery encourages this risk since the athlete will feel fresher and be tempted to run the next 400m faster than race pace. If Chris's 400s were taking the intensity out of the workout then here with the intense anaerobic power workout we're taking the quantity out of the workout!

Recovery longer than the time taken to run the repetition:

The purpose may also be to increase anaerobic power by getting the athlete accustomed to the pressure of sustained fast running. Arch Jelley sometimes gave for his distance and 1500m runners a 2 x 4 lap session at around 3km pace with 10-15 minutes recovery. Arthur Lydiard gave time trials such as 2 x 600m for 800m runners and 2 x 3 laps for 1500m runners at faster than race pace, also with long recoveries. Both Arch and Arthur used these sessions sparingly. Another example for an 800m specialist would be running only two very high quality near maximal 400m repetitions with long recoveries (e.g. 2 x 400m at 400-800m pace with a 12 minute/4 lap recovery). The aim here is the

same plus the fast 400s will increase the ability of the body to endure a very fast first 400m in a 800m race. The long 12 plus minutes recovery will allow the body to recover in order that the repetition can be repeated again at the same, or slightly faster, pace. In this way the athlete gets a quality training effect at a fast pace rather than an ineffective one where the repetition gets slower due to inadequate recovery.



Flora Brocherie winning the 2013 Canterbury Cross Country Championship

THE INNER CIRCLE OF AEROBIC LEADING PACES and allowing the body to dictate them

Now with all this information we come to a crunch point in the Aerobic Led Training System. A system for high performance delivery is based on the following **aerobic leading inner circle paces**: marathon, half marathon, 15km, 10km, 5km and 3-5km paces. Completed higher end aerobic paces make up the reservoir of **inner circle paces** and over time building a larger reservoir will directly improve an athlete's running times.

There are paces outside the inner circle such as easy pace running, 3km, 1500m, 800m and 400m pace running that are important however they are not the paces that are going to make the difference in training for a runner to maximise their performance.

An athlete can run too slow or too fast in training so it's important to control the running paces to between marathon and 3-5km paces in order to get the greatest amount of benefit from putting the body under stress - the **inner circle paces**. Running at an easy pace up to marathon pace will make up a considerable part of an athlete's exercise time especially in terms of recovery. However for building aerobic capacity and endurance it is limited for the stress on the body at such easy paces is too light and does not greatly extend the use of oxygen. At the other extreme, running fast hard paces will create desired large oxygen debt levels but it is limited to the track season where body adaptation is possible but difficult and full of dangers such as acidosis, injury and illness.

Training consistently at appropriate levels of intensity truly tests the use of oxygen under stress and as a result boosts endurance/aerobic strength since the athlete will come close to their maximum oxygen uptake when running the **inner circle paces**. These highly efficient paces overarch the aerobic capacity and the aerobic power zones and bring benefits that are not possible by running at either too slow

a pace or too fast a pace. Benefits such as increased aerobic capacity, increased running velocity, increased consumption of oxygen and increased tolerance of acidosis (anaerobic capacity). Research has shown that utilisation of these **inner circle paces** in training has a direct correlation to high levels of performance. However such aerobic led paces require patience and the high end aerobic cruising or training paces evolve over time and cannot be forced or rushed. Ron Clarke set 17 World Records which were built on amazing aerobic conditioning both in terms of volume and quality. The bulk of Clarke's running was close to his anaerobic threshold - steady pace running for sustained periods of time.

Training strictly according to a running schedule is all very well however it can hold back the athlete's development for it is impossible to have a pre-determined schedule that lines up exactly with how the athlete is feeling on a particular day. For example, the athlete's schedule may be to run at an easy pace for 50 minutes on a Thursday but on that day the athlete may be feeling good when they start their run. Do they stick to the schedule, as most would, and run at an easy pace for 50 minutes or do they use their initiative and pick up the pace so it progresses from say easy pace to marathon pace to 15km pace or even onto 10km pace over the last 20 minutes or so? Absolutely they should for as long as they are comfortable, controlling the pace and have



something left over after 50 minutes then such a session is adding to the reservoir of **inner circle paces**. The last 20 minutes at say marathon to 15km pace will not be noticeable to the level of the reservoir but such small increments do make a difference to an athlete's endurance levels and over time the athlete's cruising pace will get faster without the athlete noticing it. This will not compromise in any way the specified training sessions to come in the week for the increased

pace will not leave a fit and aerobically trained athlete worse for wear especially as the body is saying it is OK to train at this pace.

Allowing the body to dictate the pace of a run is often overlooked as an integral part of developing an athlete for it is throwing the onus back onto the athlete when faced with a non specified workout to control their training paces by perhaps moving their training into the realm of the overarching **inner circle paces** when they are

feeling ready for it. There is nothing dangerous about giving a runner some independence - after all when they go to the start line they are on their own. Knowing if and when to gradually pick up the pace on a training run because the body is feeling fine can only be learnt from practice including knowing for how long to run at their own marathon or 15km or 10km pace. It may only be for a handful of minutes however do not underestimate the value of consistent small increments every time the higher end aerobic paces are employed by an athlete who is listening to their body and dictating the pace they run at.

Even within the aerobic capacity zone increasing the pace from easy to marathon pace in the latter stages of a long run can be hugely beneficial due to the duration of this workout. As we know long runs are best for improving the utilisation of oxygen which is why long runs are so important.

By increasing the pace up to around marathon pace in the latter stages then the athlete is boosting that utilisation to even higher levels allowing even more oxygen to be made available to the body. It is really maximising the efficiency of the long run and just another example of the benefits of utilising oxygen when the body is put under the right sort of stress which adds to the reservoir of **inner circle paces**.

Finally a word of caution for there are times when an athlete does need to listen to their body and back off and run at an easy pace all through a workout session - they may be genuinely tired especially after say an anaerobic workout or a race or any other reason. It is better to take some downtime and lock in the benefits of consistent training at the inner circle paces than to push on regardless and walk the wrong side of the line.



The three Wilson brothers have the unique distinction of having all won the New Zealand Secondary Schools Senior Boys individual title during their years at Auckland Grammar School - Declan (2010, 2011), Finn (2013) and Conal (2015). This is the first time a family has achieved such a feat at the nationals since the event began in 1972. All the boys have been coached by Bruce Jones

THE AEROBIC LED SUMMARY

Aerobic led training is the safest and most intelligent way to train for any athlete wishing to run at their best for distances ranging from 800m through to the marathon. Many athletes train hard but do not reach their potential for they, or their coaches, choose to ignore the aerobic principles of Arthur Lydiard. Consequently they head in the wrong direction and will learn the hard way or they will continue to underachieve. Pushing long lasting aerobic boundaries and not pushing short term anaerobic boundaries is the best advice a coach can give to an athlete.

Sub 2:20 marathoner and Melbourne based athletics correspondent, Len Johnson, highlighted in an article in the The Age newspaper in November, 1988, that '...success as a junior is not necessarily an indicator of success at senior levels. In some cases, the two have an inverse relationship... in the 1967 All Schools mile Chris Wardlaw was seventh in a race won by Rod Hill from Eddie Elderhurst, Peter Fuller, Bob Walczak, Tony Williams, Bruce Jones and Wardlaw. Though Peter Fuller narrowly missed Olympic selection... Wardlaw, Williams and Jones did best as seniors.' This, I believe, is very much linked to young bodies not going through the adaptation process since many parents and school coaches push their charges with tough training programmes in order to bring glory for all the wrong reasons. Aerobic led training does not bring instant results

so is overlooked in favour of intense anaerobic workouts. The sport is littered with champion school athletes who disappear once they leave school or continue in the sport but no longer excel.

General cardiac efficiency develops over many years through running at appropriate levels of intensity on a progressive basis that allows the body to adapt to the stress put on it. Gradual adaptation leads seamlessly to an improvement in cruising or training pace which in turn leads to top level performances.

Dr William Harris is the current Auckland marathon champion whom I have been coaching for a number of years. He emailed me recently and included in the email was a sentence that I thought deserved the last word.

'... the consistent layering on of stress and allowing the body to absorb and adapt to said stress really nails what the goal of training in distance running should be.'

Dr William Harris



APPENDIX TO THE AEROBIC LED TRAINING SYSTEM

The Chris Wardlaw Model for Running the 1500m

*Assumption: all runners are of equal ability.
Divide the race into three 500m sections.*

First 500m:

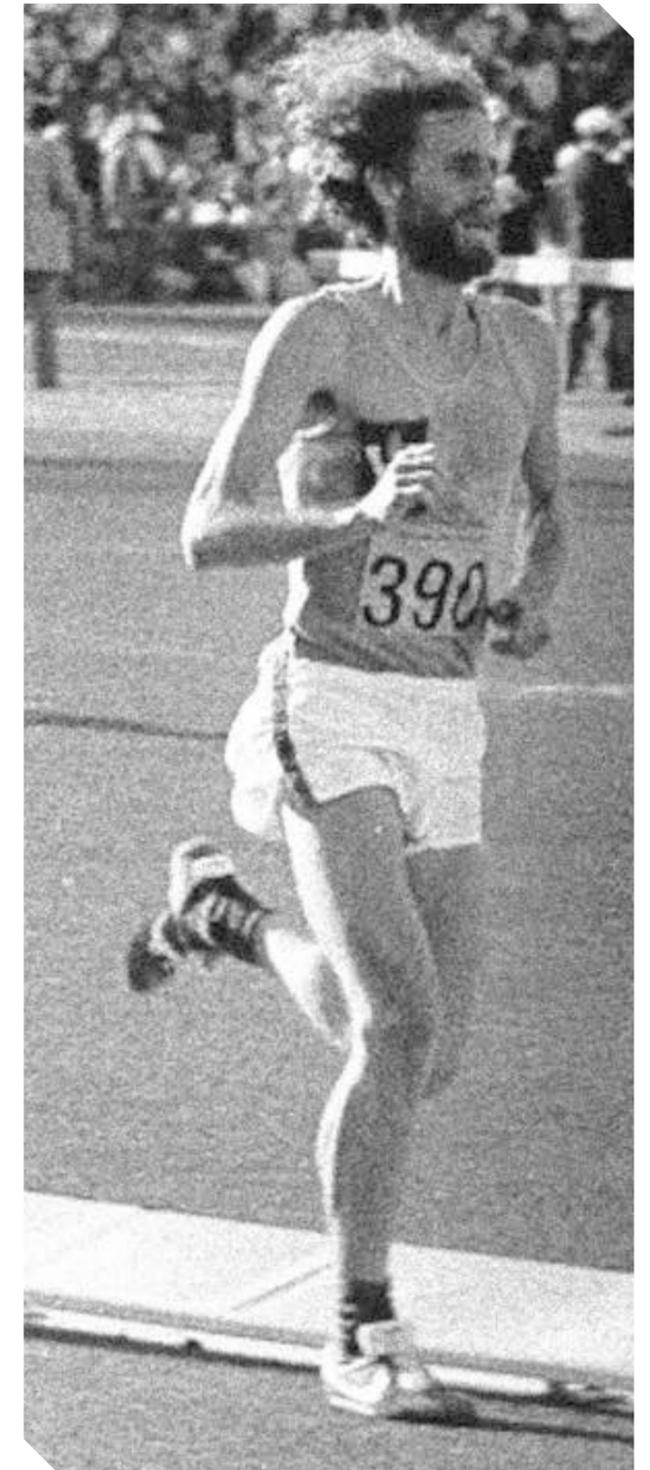
After the first 100m of the race accept your position. Do not try and improve your position because you will use up valuable energy reserves.

Second 500m:

You have one chance to improve your position and it must be done in the straight. If the race is fast then you may not wish to change.

Third 500m:

In the 100m before the bell position yourself so you can be in the best position to strike in the last lap.



An email sent to me in April, 2020 by Arch Jelley

John Walker's Training in his Twilight Years 1990 - 1991

A great deal of misinformation has been placed online concerning John Walker's training. Recently I came across this very accurate account online which was written by two time Olympian, Robbie Johnston. Robbie had joined our squad when he transferred from Dunedin to Auckland. In Dunedin he had been coached by top coach Alistair McMurrin and thus he arrived in pretty good shape. Robbie's description of the training he and John did at this particular time is spot on and illustrates how the main emphasis was on strength training. Even before we hit the track, both John and Robbie were in very good shape and both were capable of running a sub 4 minute mile, a sub 8 minute 3000m or a sub 14 minute 5000m.

Regards Arch

I had the good fortune (and sometimes misfortune) to train with JW in the last year of his career. He was 39 at the time, I was 24 with best times of 3:43 1500m and 13:57 5k, and when it came to rep sessions he would certainly smack me around!

Training went a bit like this: First month or so just building up mileage - for JW this was about a max of 85 miles p.w. Most at a reasonable clip. I was getting up to 100-105 miles at max.

Then would start doing a few tempo runs on the Auckland waterfront over 6k every second week. For me they became more like time trials as we used to just run them hard out. Started off at 18 mins or so then after a few sessions down to low 17 mins. JW sometimes struggled on these and I was able to put him away a few times.

Also, around this time (about 6 weeks into the

build up) we would start doing 1km reps - 5 of them - in the Auckland Domain. This was on the road with a bit of a rise on the course, speed bumps e.t.c so not super quick running. This was a stock standard JW session for a number of years. 1km x 5 with 2-3 minutes recovery. We would start off running them around 2:45-48, after a number of sessions we would be running them around 2:39-42, although JW would hit out a few 2:36-37. He was tough to hang with doing this work.



Robbie Johnston running the North Harbour XC, 2012

We also did the usual Sunday run - JW would do no more than 15 miles at this time, although I did a few 2 hour runs.

After about 10 weeks of the above the rationale was that you were strong and relatively fast - that we could run 14 minutes 5km or close to 8 minutes 3km off that sort of work, and JW could even smack out a reasonable 1500m/mile.

We would then hit the track - basically one day longer reps 800m x 4-5 (2-3 minutes recovery), 1600m x 2 (10 minutes recovery), 1km x 3 (5-6 minutes recovery).

One day shorter anaerobic stuff: 400m x 10-12 (60-90 sec recovery), 200m x 10-12 (90 sec or so recovery) e.t.c.

One day steady state type efforts 6 laps, 8 laps, 12 laps (hated those!)

JW would generally smack me in all of this stuff - he was just so strong at any decent sort of pace, but when it came to longer steady state efforts I could handle him.

JW would always smack the last couple of reps. This was actually his final demise as we were doing 400s and he smacked the last one about 30m ahead of me and blew out his achilles for good. This was a month before he was to have a crack at the "sub 4 at 40".

I have no doubt that he would have easily done that because I myself ran 3:39 a month or so later as well as a 13:25 5km.

At the end of the day I don't think there was anything over complicated about our training - it was just consistency and good solid work. Everything came back to being strong. JW thrived on the 2 seasons a year thing and seemed to get back into shape amazingly quickly after a break as well.

Robbie Johnston PB's:

1500m 3:39.94
5000m 13:20.15
10000m 27:42.17
Marathon 2:15.34



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