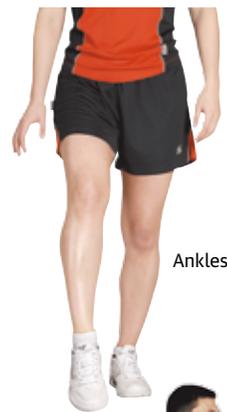


Aerobic fitness is integral to the performance of most physically demanding military tasks – whether it's marching all night, taking the 1.5-mile running test or shifting heavy boxes of equipment. Good aerobic (or cardiovascular) fitness also reduces the time it takes soldiers to acclimatise to extreme climates and to recover from injury.

Running is one of the Army's most common forms of aerobic training, and this booklet introduces you to some of the running strategies used to build, improve and maintain soldiers' cardiovascular fitness. You'll also find useful information on technique and injury prevention – plus a varied running routine to use when you've finished the 16-week basic fitness programme.

THE BENEFITS OF RUNNING

- Reduces risk of heart disease
- Burns lots of calories, helping you lose excess body fat
- Improves your aerobic capacity
- Makes you more fatigue-resistant
- Strengthens muscles, ligaments and tendons in your lower body



Ankles



Knees



Hips

LOWER BODY MOBILITY EXERCISES

See Booklet 1 (Warm-up & Flexibility) for a detailed explanation of each exercise.

Six specific warm-up routines for running

You learned about the importance of warming up before doing any kind of exercise in Booklet 1. So before you start running, perform stages 1 and 2 of that general warm-up routine, focusing on the lower body if you are short of time (see examples, left).

After that, try two or three of the following Army warm-up drills to get you properly warmed up for running. Aim to do one or two repetitions of 20 metres per drill ...

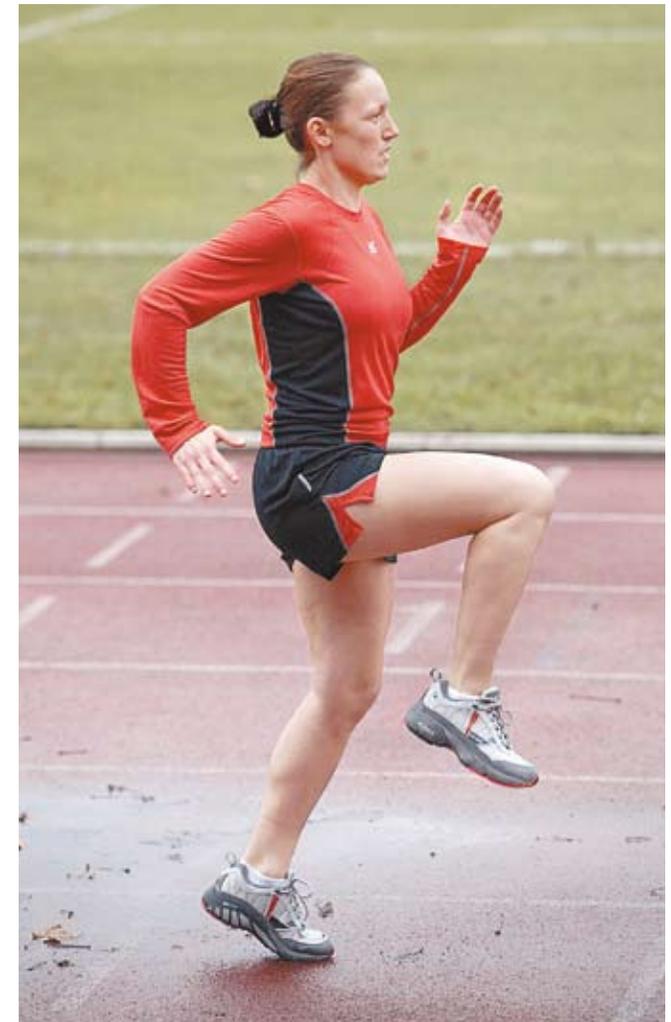


CONTROLLED LEG SWINGS ▲

Either holding on to a surface at your side, or just using your balance, swing your leg in a controlled manner backwards and forwards. Keep your torso upright and bend at the knee as your leg comes through to the front. (Note: unlike the other five warm-up drills that follow, this is a stationary drill – try doing 1-2 sets of 20 repetitions for each leg.)

FAST FEET ►

For the first of the moving drills, stand with your feet together, then lift them quickly off the floor one after the other – as if you were running over hot coals. Travel forwards but keep your focus on moving upwards.





HEELS TO BUM

While at jogging pace, put your hands on your bottom and then bring your heels up to meet them one after the other as you jog for a further 20 metres.



HIGH KNEES

From jogging, bring your knees up to hip height in front, without leaning back.

DID YOU KNOW?

Muscles have a tendency to shorten if they are not fully stretched after you exercise. This, over time, can reduce your joint mobility.



SIDE SKIPPING ▲

Facing sideways, take a big step out to the side with one leg, then quickly draw your other leg towards it in a galloping motion. After travelling 20 metres, turn around and repeat, leading with your other leg.

HIGH-KNEE SKIPS ◀

This is an exaggerated skipping motion. Skip forward on to one foot, lifting your knee high up in front and using your arms in a running action. Aim to spring up as high as possible as you skip from foot to foot.



HOW TO COOL DOWN

When your run is finished, don't come to a sudden stop. Gradually slow down to a jog or walk for 2-3 minutes, then finish off by performing the following stretches (all of which are outlined in Booklet 1 of this fitness programme), holding each stretch for 10-15 seconds and repeating at least twice.

- Hamstrings
- Quads
- Hip flexors
- Groin
- Glutes
- Calves



How to improve your running technique ...

Everyone runs slightly differently, but here are a few key pointers that should help to make your running style as smooth and efficient as possible



RUNNING FORM

Your running gait or “cycle” is divided into two main phases – the “swing” phase, when the foot is in the air – and the shorter “stance” phase, when the foot is on the ground. Running at a relaxed pace, ground contact time is around 0.2 seconds and “flight” time is 0.5 seconds. There is a brief moment when both feet are in the air, as one comes down to land just after the other has taken off.

When your foot lands, it rolls slightly in and forward, and the arch flattens, to help dissipate the impact (this is called *pronation*). The knee then bends and the opposite leg pulls through, the body passing over the supporting foot to roll off the toes. By this time, the foot has moved into a “supinated” position (the arch stiffens, to give leverage) in which the pressure is predominantly on the outside edge of the foot. Many muscles are involved in this process, both in stabilising the joints and facilitating forwards motion – that’s what makes running such a great form of exercise. Try to think about the following when you run ...

HEAD

Your head weighs 4.5-5kg, so if you move it around a lot when you run you are wasting precious energy. Look slightly ahead, rather than down at the ground immediately in front of you, to maintain good posture.

SHOULDERS

Keep your shoulders drawn back but don’t hold them rigid – keep them relaxed.

ARMS

Move your arms, bent at around 90 degrees at the elbow, in unison with your legs, but don’t allow them to swing across the body.

HANDS

Keep the hands relaxed – don’t clench your fists, which can cause unnecessary tension in the neck and shoulders.

ABS

Keep your abdominal muscles gently pulled in and your trunk upright. Do not bend forward from the waist.

KNEES

Try to keep your knees and feet in line and think of your overall movement as being forward, not up and down or side to side.

FEET

Allow your feet to land underneath your body, not way out in front, which causes a “braking” action.

IF THE SHOE FITS ...

The choice of footwear used by the Army is specific to the activity they are performing. Heavy-duty boots are used for marching – but running shoes are always used for running, to reduce the risk of injury.

What should you look for in a running shoe? Cushioning, stability, responsiveness, durability and comfort are the main factors.

As well as being designed specifically for running, the shoe must fit the size and shape of your foot correctly (you may have to go up or down a shoe size) and be in good condition – worn-out or damaged trainers will not provide the essential support and protection you need. It’s best to buy your running shoes from a specialist retailer to ensure you get the best advice and choice.



YOUR SHOE IN DETAIL

- **Outsole:** the rubber outer layer that sits under the shoe. “Lugs” on its surface help to enhance traction and grip.
- **Midssole:** the most important part of the shoe – made from EVA, which is lightweight and a good shock absorber (giving more cushioning and support).
- **Upper:** the bit that encases the foot and holds the lacing case, with reinforcement in various places to ensure a snug fit. It is usually made from a tight weave mesh, which adds strength and durability but still allows the foot to breathe.
- **Insole:** a removable layer inside, primarily for comfort.
- **Heel counter:** this should cup the heel comfortably but not dig into the Achilles tendon.
- **Reflective strips:** help with night visibility.

For more information, go to www.ukgear.com – UK Gear is the Army’s official supplier of performance footwear

... and vary your training routine

If you're following the Army's 16-week fitness programme, you'll notice that the length and difficulty of the runs progresses as the weeks go on. It's essential to vary your running programme – in terms of speed, distance and terrain. Here are some ways the Army rings the changes

STEADY RUNS

Steady-paced runs at an easy-to-moderate intensity (you should be able to hold a conversation) should make up the bulk of your training – particularly in the early stages. These provide the aerobic base which underpins more specific and demanding training later on.

FARTLEK TRAINING

“Fartlek” is the Swedish word for speed play and is a fun, unstructured way of progressing from steady running. It entails running at different speeds, using landmarks such as trees, lampposts or variations in the terrain to increase or decrease pace. The Army also uses “Parlauf” or “pair running” in training, in which two runners take turns to set the pace. It keeps soldiers on their toes, as the runner at the back is the one who dictates the pace.

INTERVAL TRAINING

This entails faster bursts of effort interspersed with recovery jogging



DID YOU KNOW?

Running on softer surfaces such as woodland trails, grass and sand – although more physically demanding – reduces the loading on your joints, and helps to prevent overuse injuries. It also improves strength and proprioception (awareness and stability) in the lower body muscles. But take care when running on uneven surfaces and run in daylight, or in well-lit areas.

PTI TIP

Alternate high- and low-intensity running sessions for a balanced programme with sufficient recovery.



or complete rest – so that you can work harder than normal, but only in limited bouts. This is one of the most effective methods of elevating your fitness level. During each running interval, you should be working hard enough to make talking difficult.

HILL RUNNING

When running up hills you are resisting gravity, and so improving leg strength as well as your aerobic fitness. Aim for a short, quick stride with a good knee-lift and maximum range of movement at the ankle. Running down hills is also good training – helping to strengthen the connective tissues and improve your leg turnover and technique. But opt for shallow slopes and only introduce downhill running gradually, to avoid muscle soreness.

Hill training helps to ...

- develop muscle elasticity
- improve stride frequency
- develop coordination, encouraging the proper use of arm action
- improve muscular endurance
- develop speed and strength

TEMPO RUNNING

Sometimes called “threshold” running, this is a continuous run performed at a brisk pace just below the “lactate threshold” – the point at which lactic acid builds up in your muscles faster than it can be cleared away. Working just below this threshold helps to push it up, so you can run faster without fatiguing. To start with, it's fine to break down tempo runs into stages – like extended intervals.

THE NEED FOR SPEED

The Army uses a number of techniques to improve running speed among its recruits:

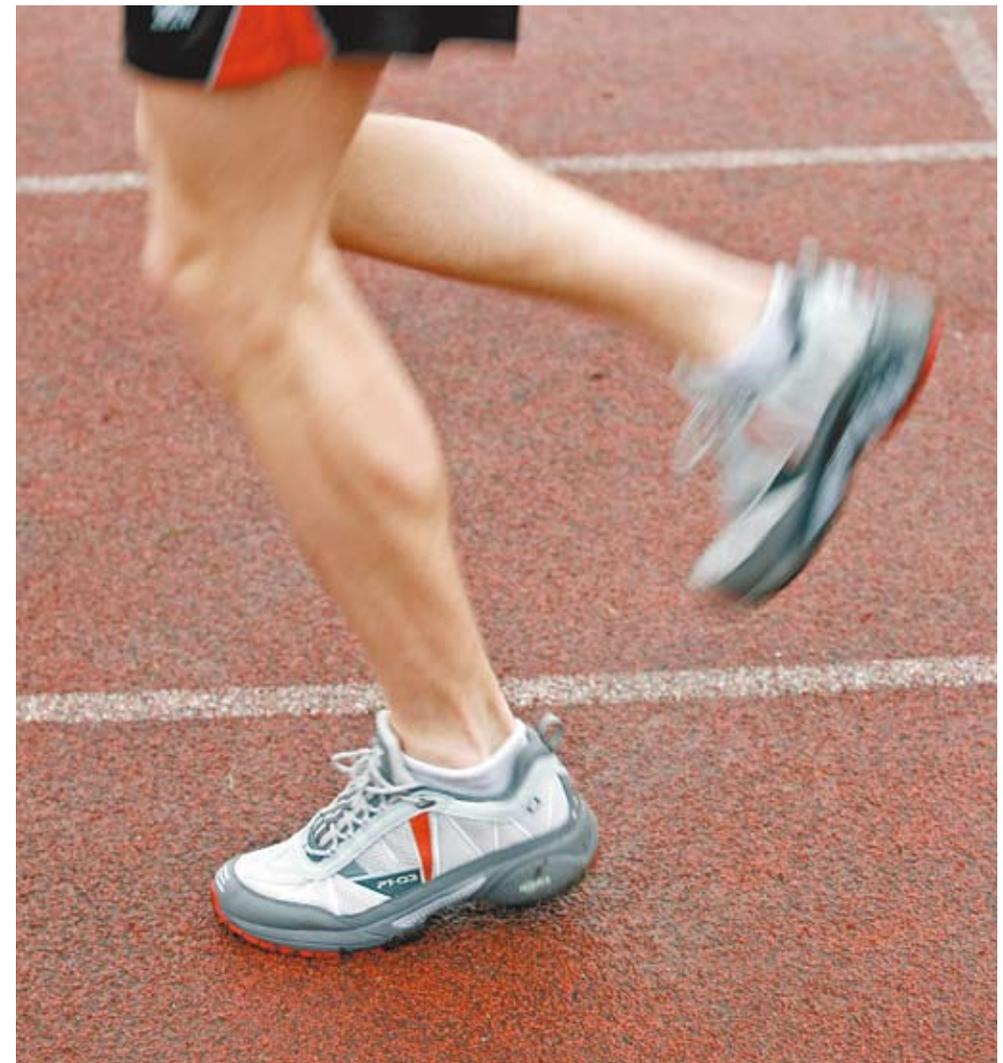
- Sprint-assisted training drills such as downhill running and treadmill running, all of which help to increase soldiers' stride frequency.
- Sprint-resisted training drills which include uphill running, running wearing weighted clothing, towing objects such as tyres (pictured), and running in sand or snow. These all increase strength, aerobic and muscular endurance.



Once you are comfortable doing a steady run for 30-40 minutes, try some of these more challenging sessions. Turn over for an Army running plan – a great follow-up to the basic 16-week programme ...

If you've completed the Army's basic 16-week fitness programme and want a new regime to improve your speed, strength and running technique, try this fun and varied six-week programme

	Session 1	Session 2	Session 3	Session 4
WEEK 1	15min warm-up 6 x 200m hill repeats (jog back down between each) 15min cool-down	Steady run for 30-40min	Fartlek session: off-road 30min	Slow, steady run for 45min
WEEK 2	15min warm-up 6 x 200m hill repeats (jog back down between each) 15-min cool-down	Steady run 30-40min	Fartlek session: off-road 35min	Slow, steady run for 50min
WEEK 3	15min warm-up 8 x 200m hill repeats (jog back down between each) 15min cool-down	Steady run 35-45min	Tempo training: 4 x 5 mins with 2 min rest recovery	Slow, steady run for 50min
WEEK 4	Fartlek session: off-road 40min	Steady run 35-45min	Tempo training: 4 x 5min with 2min recovery between each	Slow, steady run for 55min
WEEK 5	Tempo training: 4 x 6min with 2min recovery between each	Steady run 40-45min	10min warm-up Interval training: 8-10 x 60sec hard running, 60sec jog recoveries 5min cool-down	Low-impact alternative to running such as rowing, cycling or swimming: 45 min-1 hour
WEEK 6	Tempo training: 3 x 8min with 2min recovery between each	Steady run 40-45min	10min warm-up Interval training: 8-10 x 60sec hard running, 60sec jog recoveries 5min cool-down	Slow steady run off-road for 1 hour



HOW HARD SHOULD I WORK?

When you are jogging or warming up for a run, you should still be able to talk comfortably (this is known as "conversation pace" running). This also goes for "recovery bouts". On steady runs, you should be able to talk in short sentences. On harder runs, your breathing should be heavy and it should be difficult to say more than a few words at a time. In general, the shorter the bout of running, the harder your effort should be.

STRIDE LENGTH AND SPEED

How fast you run is a product of how big your strides are and how many you take. The easiest way to determine your stride rate is to count the number of times your right foot lands in one minute. If you're in the region of 90 (ie. 180 steps per minute in total), you're doing well. If your rate is less than 90, concentrate on taking quicker, lighter steps – but stay relaxed and don't change the way your feet strike the ground. To speed up, aim for a higher stride rate rather than increasing your stride length.

PTI TIP

Running is thirsty work, so make sure you stay hydrated by drinking before, during and after your workout. As little as 2% bodyweight loss in the form of fluid can severely affect your running performance.



How to stay injury free

Running gets a bad name in the injury stakes because, often, people try to do too much too soon. You're already on the right road in developing your fitness through a progressive training programme – but here are a few other steps worth taking to help minimise the risks

10 WAYS TO REDUCE YOUR RISK OF INJURY

- Don't run every day. Mix your sessions up with low-impact activities such as swimming, cycling and rowing
- Alternate hard sessions with easier ones
- Warm up properly, cool down and stretch each time you run
- Don't try to progress too quickly – allow your body to adapt to the new challenge being placed upon it
- Wear the right footwear for your individual needs and the

- surfaces you are running on
- Try to find a mixture of surfaces, rather than always running on tarmac or concrete
 - Build up the strength of your muscles, tendons, ligaments and bones through strength training
 - Stay well hydrated
 - Only increase your mileage/running time by 5-10 per cent each week
 - Don't ignore aches and pains. Running through pain can cause a full-blown injury

If you are unlucky enough to sustain an injury, the first thing to do is rest. If the problem persists, get advice from a specialist (eg. a physiotherapist) as soon as possible.

KNEE PAIN

Patellofemoral syndrome, or "runner's knee", is often a result of the kneecap maltracking, causing inflammation and pain beneath it. **Prevent by ...** strengthening your thighs (see Booklet 4, Lower Body training), stretching regularly and wearing appropriate running shoes.

ANKLE SPRAIN

"Turning" your ankle may just result in a slight stretch of the ligaments while a full-blown sprain will actually tear the tissues, causing swelling and bruising. **Prevent by ...** watching your step, particularly on uneven ground, and strengthening your ankles using single-leg balance exercises or a wobble board.

PTI TIP

Military studies show that smokers suffer from a higher incidence of musculoskeletal injuries than non-smokers. Smoking hinders your recovery, too, so make an effort to stub out the habit.



SHIN SPLINTS

This term broadly describes inflammation of the connective tissue that attaches to the main shinbone, the tibia. It causes a general tenderness or bruised feeling.

Prevent by ... changing your shoes regularly, not running on hard surfaces all the time, stretching and strengthening the lower legs.

PTI TIP

If you do get laid up with an injury, the benefits you have accrued during your running programme will start to decline. You can, however, minimise the effect by cross-training. This means doing any activity that doesn't aggravate the problem – non-weight bearing or low-impact exercise is the best choice. Swimming (or other water-based exercise), cycling and cardiovascular machines such as the cross-trainer are good options. Just bear in mind that your calorie output will be lower with these activities, as you are not supporting your body weight as you are when running.



ILIOTIBIAL BAND (ITB) SYNDROME

The ITB is a band of connective tissue that stretches from the hip to just below the knee, along the side of the thigh. It can become overtight and inflamed, causing it to pull on or rub against other surrounding tissues.

Prevent by ... strengthening the glutes (see Booklet 4), avoiding too much downhill running or cambered surfaces and correcting "overpronation" (when the foot rolls in too much on landing).

HAMSTRING TEARS

Muscle tears result from excessive strain on the muscle, either as a result of a sudden movement or a repeated pattern of movement (an "overuse" injury).

Prevent by ... warming up thoroughly, working on your technique, stretching, and not building up your training too quickly.

ACHILLES TENDINITIS

This is inflammation of the Achilles tendon along the back of the lower leg. You may feel stiff and tender at the back of the heel, particularly in the morning and when rising up on to your toes.

Prevent by ... stretching your calves, wearing the right running shoes, performing calf raises (Booklet 4).

The Army's 1.5-mile running test

The 1.5-mile run, which you will perform as part of your 16-week basic programme, is one of the tests the Army uses to assess the fitness level of potential recruits. It gives a good indication of cardiovascular fitness – and is an excellent way of monitoring progress, as your speed will improve as you get fitter.

So what kind of results does the Army expect? Men and women all need to achieve a time under 14 minutes – quicker for those joining the infantry – before they begin basic training. Use this table to see how you compare to others of your age and gender, to set targets for yourself, and to monitor your progress throughout the programme and beyond ...

Performance levels	Under 30		30-34		35-39		40-44		45-49	
	Male	Female	M	F	M	F	M	F	M	F
Excellent	8:15	10:00	8:30	10:30	9:00	11:00	9:15	11:30	9:30	12:00
Very good	8:16	10:01	8:31	10:31	9:01	11:01	9:16	11:31	9:31	12:01
	9:45	12:00	10:10	12:30	10:40	13:00	11:05	13:30	11:30	14:00
Good	9:46	12:01	10:11	12:31	10:41	13:01	11:06	13:31	11:31	14:01
	10:30	13:00	11:00	13:30	11:30	14:00	12:00	14:30	12:30	15:00
Average	10:31	13:01	11:01	13:31	11:31	14:01	12:01	14:31	12:31	15:01
	11:15	14:00	11:50	14:30	12:20	15:00	12:55	15:30	13:30	16:00
Poor	11:16	14:01	11:51	14:31	12:21	15:01	12:56	15:31	13:31	16:01

ARE YOU IN THE ELITE?

Approximately 1 per cent of the military attains the “excellent” standard shown in the table above. Those that do become members of the revered “300 Club”.

THE BLEEP TEST

The infamous indoor alternative to the 1.5-mile test is the gruelling multi-stage fitness or “bleep” test. Participants perform a series of 20-metre shuttle runs at increasingly fast speeds, in time with a series of pre-recorded beeps. They continue to run faster and faster, without a break, until they can no longer keep up with the pace of the beeps.



Other aerobic activities

Running isn't the only form of cardiovascular exercise. Cycling, swimming and rowing are great complements because they work your heart and lungs just as hard but without the repetitive impact of running – and because they use your muscles in a slightly different way, presenting a new challenge. But anything that gets your heart beating faster and makes you breathless counts as cardiovascular activity – walking, aerobics classes, circuit training, dancing ...

Aim to perform 5 x 30-minute sessions per week



CORBIS (2)



CYCLING

The Army uses cycling and indoor cycling (“spinning”) to add variety to training and to help develop aerobic fitness to a high level. It's particularly useful for people who have been inactive for some time, or soldiers who are injured, as the bike supports much of the body's weight. Cycling is a great way to firm and strengthen the muscles of the thighs, bottom and calves.

SWIMMING

Water-based exercise is widely used in the Army – from swimming to pool-based circuits or aerobics and hydrotherapy for injury and fitness rehabilitation. Note that the main stroke employed by the Army is breaststroke – that's because it's the only stroke that allows a soldier to see continually above the water-line, plus it's quieter and easier to perform when wearing clothing.

ROWING

This demanding but low-impact form of cardiovascular exercise is popular with the Army, and many soldiers compete in indoor rowing competitions. As well as working most of the body's major muscle groups, it is one of the few aerobic activities where the effort comes from pulling backwards rather than pushing forwards – this is beneficial to posture.

PTI TIPS

CYCLING

When cycling, keep your upper body relaxed and regularly change hand position to avoid tension in your arms and shoulders. Keep your upper body and head still, and adjust your saddle height so your hips stay level when pedalling. Maintain a constant pressure on the pedals all the way around the pedal stroke – rather than just pushing downwards. Keep your cadence (the number of pedal strokes per minute) high rather than trying to push heavy gears slowly – this is more efficient.

SWIMMING

Keep each stroke as long as possible: you'll get faster by increasing the distance you travel with each stroke, not by increasing the number of strokes you make. Keep your shoulders back and try to bring your shoulder blades together at the end of the arm pull. Complete each stroke by bringing your feet together. Keep your abdominal muscles pulled in and don't overarch the back. Keep your hips high in the water to avoid dragging your legs behind you.

ROWING

Keep your back straight throughout the stroke. Initiate the pull with the legs before pulling with the arms. Don't lock out your knees and elbows when they are extended.

