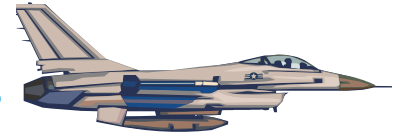


THE SPEED OF SOUND



The positioning of the UK Starters is in full compliance with IAAF Rule 129.3. However, due to the speed at which sound travels...

...in each race, is the Starter's positioning actually placing the athlete in LANE 8 at a disadvantage?

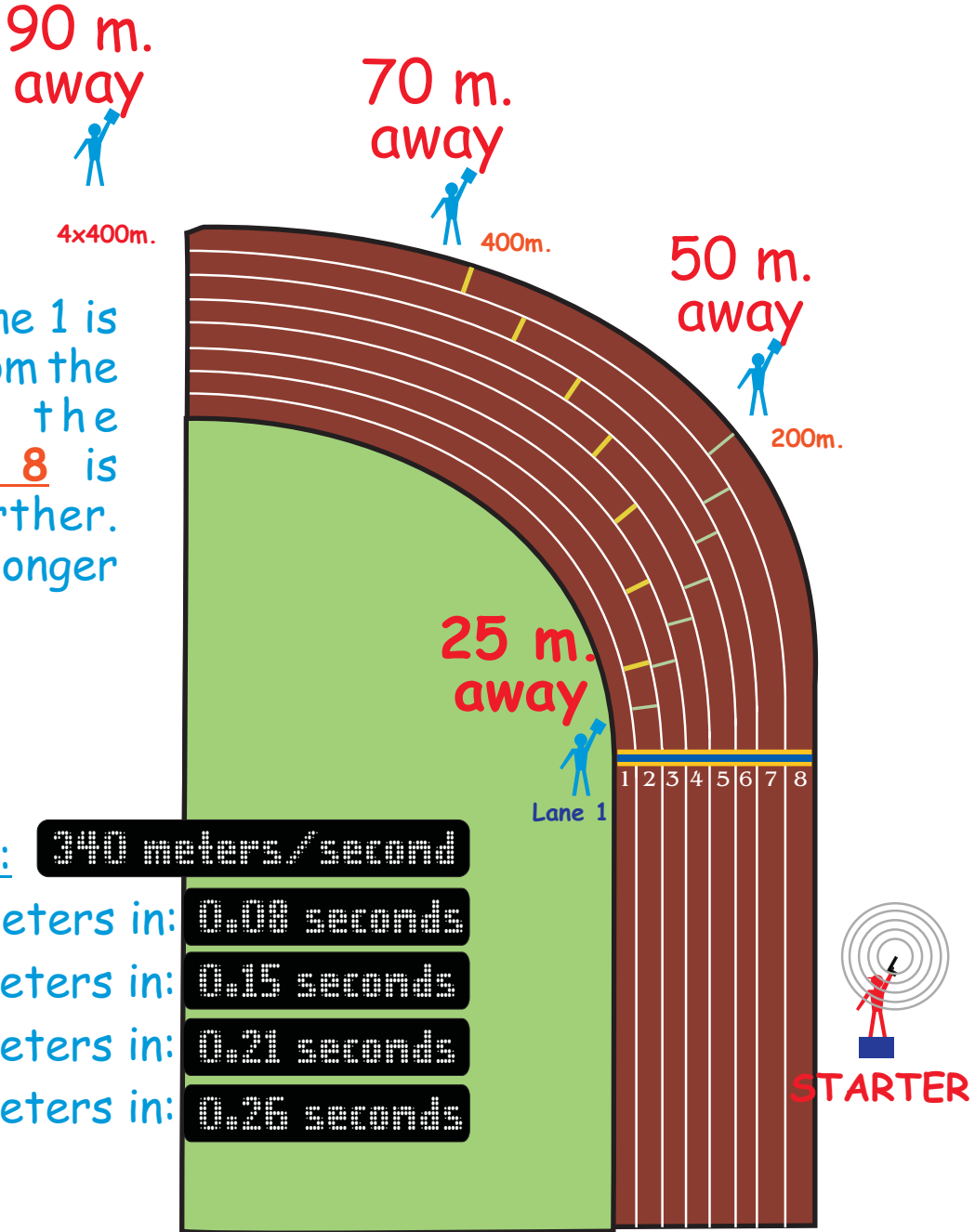


THE SPEED OF SOUND

The athlete in Lane 1 is only 25 meters from the Starter. But the athlete in Lane 8 is significantly farther. Thus sound takes longer to arrive there.

SPEED OF SOUND: **340 meters/second**

Sound travels 25 meters in:	0.08 seconds
" " 50 meters in:	0.15 seconds
" " 70 meters in:	0.21 seconds
" " 90 meters in:	0.26 seconds



In the 400m. relay for example, the athlete in Lane 1, hears the gun instantly after the smoke. But the athlete in Lane 8 won't hear it for 2/10 second.

SO, IF THE AVERAGE REACTION TIME OF THE ATHLETES WAS **0.20 seconds** THEN...

In the 200 Meter Dash...

Lane 1 leaves the blocks... **0.28 seconds** after the gun.

Lane 8 leaves the blocks... **0.35 seconds** after the gun.

In the 400 Meter Dash...

Lane 1 leaves the blocks... **0.28 seconds** after the gun.

Lane 8 leaves the blocks... **0.41 seconds** after the gun.

In the 4x400 Meter Relay...

Lane 1 leaves the blocks... **0.28 seconds** after the gun.

Lane 8 leaves the blocks... **0.46 seconds** after the gun.

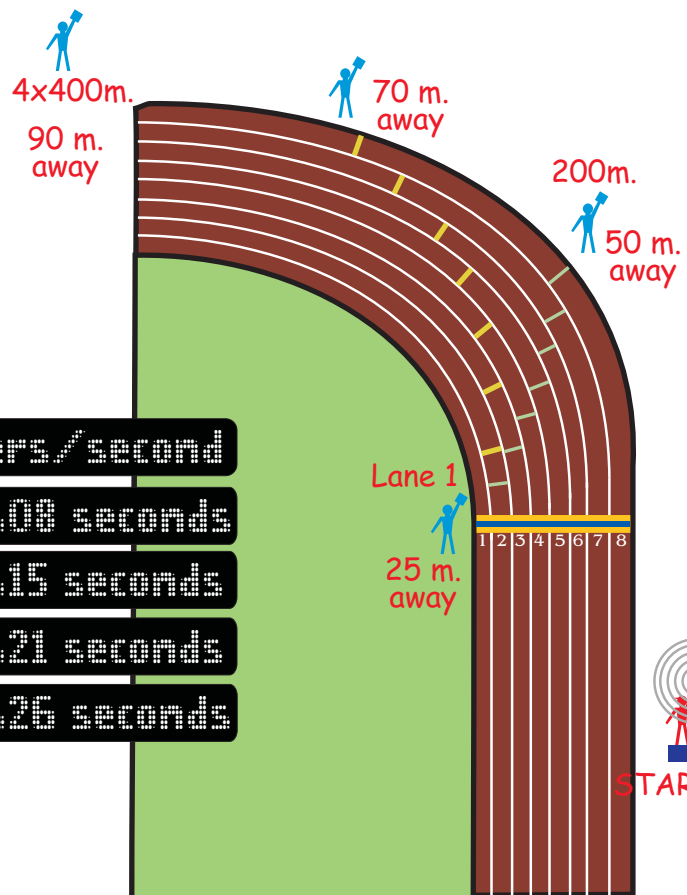
SPEED OF SOUND: **340 meters/second**

Sound travels 25 meters in: **0.08 seconds**

" " 50 meters in: **0.15 seconds**

" " 70 meters in: **0.21 seconds**

" " 90 meters in: **0.26 seconds**



STARTER

SO WHAT IS LANE 8'S DISADVANTAGE?

LOOK AT IT THIS WAY:

If 2 perfectly identical athletes, with identical reactions and identical speed run side by side in a straight line for 400 meters... both will start at the same time, and both will cross the finish line in exactly 50 seconds.



But what if the "B" athlete was forced to leave the starting line 0.13 seconds LATER than "A"? Athlete "B" must now run 0.13 seconds FASTER than athlete "A" in order to cross the finish line in the exact same time of 50 seconds. This disadvantage is equivalent to forcing athlete "B" to run just over 401 meters.



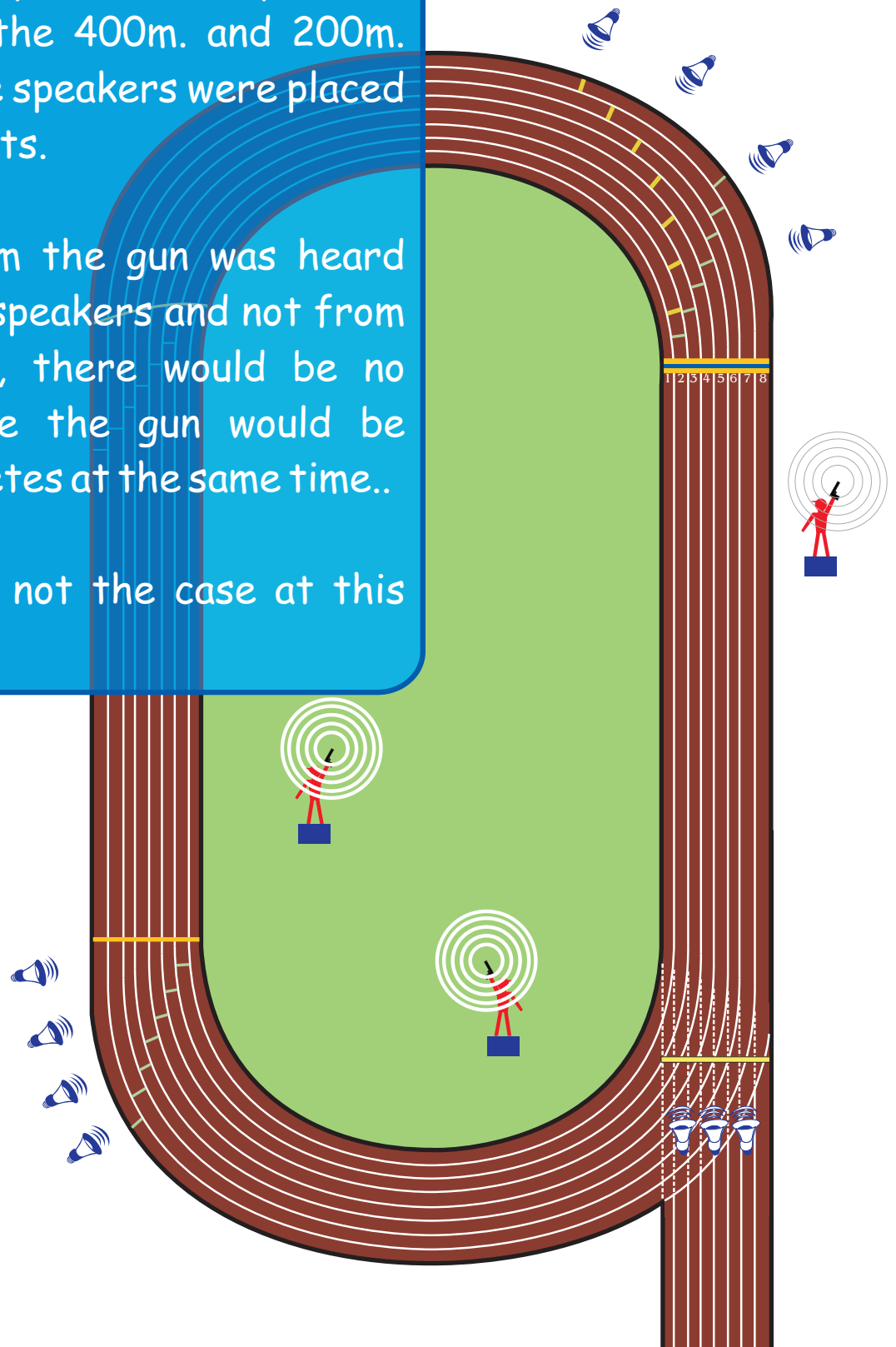
Each and every time the 400 meters is contested, this is the disadvantage the athlete in lane 8 is facing when sound reaches him 0.13 seconds later than lane 1. The average female world-class sprinter runs the 400m. in 50 seconds. The average male world class sprinter runs it in 45 seconds. In the MEN'S case, the "B" athlete will need to scoot back an additional meter.

What about using a speaker system???

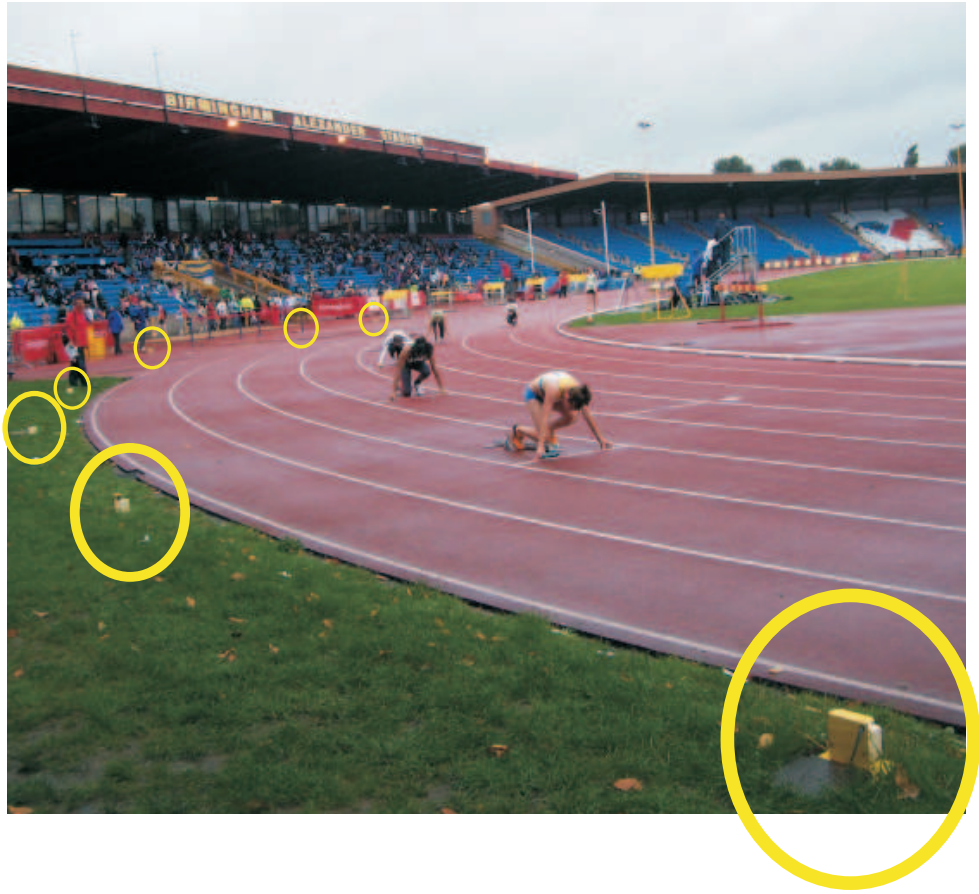
At this stadium, permanent speakers were installed at the 400m. and 200m. starts, and movable speakers were placed at the straight starts.

If the "bang" from the gun was heard ONLY from these speakers and not from the Starter's gun, there would be no disadvantage, since the gun would be heard from all athletes at the same time..

However, this was not the case at this meet...



What about using a speaker system???

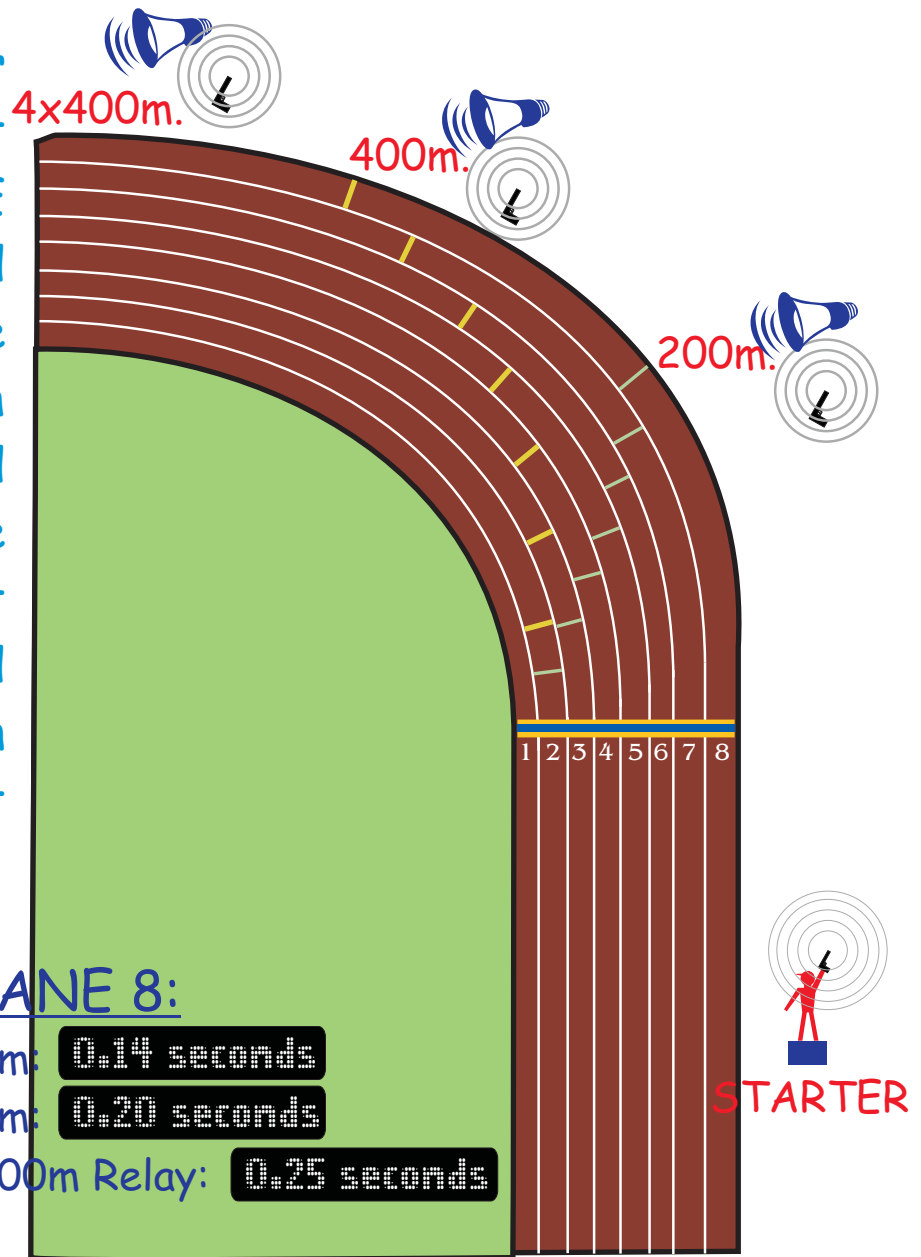


What about using a speaker system???

At this meet, the Starter shoots ONE GUN, but produces TWO SEPARATE SOUNDS. First is the sound of the gun through the speakers. It travels to each speaker at nearly the speed of light, and reaches the athlete in Lane 8 almost instantly. The second sound is the "bang" of the gun traveling through the air. It travels MUCH slower.

FOR THE RUNNER IN LANE 8:

Time between sounds in the 200m: **0.14 seconds**
Time between sounds in the 400m: **0.20 seconds**
Time between sounds in the 4x400m Relay: **0.25 seconds**



The 2 sounds are very different, also. The sound through the speakers produced a "tick", while the sound through the air produced a "bang". The athlete in Lane 8 would be wise to react to the "tick" from the speaker rather than the "bang" from the air, but likely won't -- fearing a Recall Starter might unfairly charge the athlete with a false start since the athlete left before the "bang".