FASTEST RESCUE SYSTEM

Efficiency is fundamental in an avalanche emergency. This is the fastest search strategy, combining the avalanche beacon and the fully electronic avalanche probe (iProbe).



04:08	02:09	00:58
Ø SEARCH TIME, STANDARD PROBE	Ø SEARCH TIME, IPROBE	Ø SEARCH TIME, IPROBE + PARTNER

INTRODUCTION

EVERY SECOND COUNTS

In the early 1990s, a high probability of survival was assumed for companion rescue within up to 15 minutes. In 2025, after evaluating further current data, this time was corrected to 10 minutes!!!

In a real emergency, searching for completely buried people with an avalanche beacon always involves a high level of stress. Consistent, swift work under time pressure is required, because in companion rescue **every second counts!**

The key questions are: **where can time be saved effectively during the search for buried people, and where can modern technology give the user the best possible support?**

Today nobody questions the recommended standard emergency equipment: avalanche beacon, avalanche probe and avalanche shovel, first aid kit and bivy sack (which can be shared within a group). In addition, an airbag system can reduce the risk of a complete burial. In the following we focus on the ideal combination of the **avalanche beacon** and the fully electronic avalanche probe (**iProbe**).

At the beginning of the season, many winter mountaineers get reacquainted with their avalanche beacon: new batteries are inserted, a device check is carried out and, if necessary, a software update is installed (for older models outside the manufacturer's warranty, an inspection by the manufacturer in summer or fall is strongly recommended). Then the conscientious user starts the first training session, ideally right in the snow.

At that time of year the snow cover is often still shallow, and people settle for a burial depth of 20–30 cm. That is fine for a first session, but proper preparation requires a wide range of burial depths, and we are talking about **at least one meter!**

Only from this depth does it become clear whether you have really mastered the search technique. From countless exercises and training sessions (including with prospective instructors, coaches and mountain guides) we know how hard it can be to achieve a successful "probe strike" quickly at a burial depth of one to two meters. After all, the user has to feel whether the probe tip is actually on the buried person. This often takes minutes!

In professional mountain and ski guide training, too, we regularly see that with a standard probe it often takes our candidates several minutes to achieve a successful "probe strike" on a deep burial (1.5–2 meters), when it should be a matter of seconds. In exams, many are also surprised how large a 50 x 50 meter field really is once it is measured out precisely with a tape measure.

Another element of a holistic training approach is that the complete emergency equipment is packed back into the backpack after every single training session or exam. This is the only way to make quick access and fast deployment of the equipment automatic: knowing what is where in the pack (emergency compartment, e.g. probe on the right, shovel shaft on the left, etc.). Note: this used to be handled differently and was carried over unchanged into general training, but it no longer fits a modern, holistic approach. Fine search and pinpointing as a team of two are still very rarely taught, even though they save a great deal of additional time.

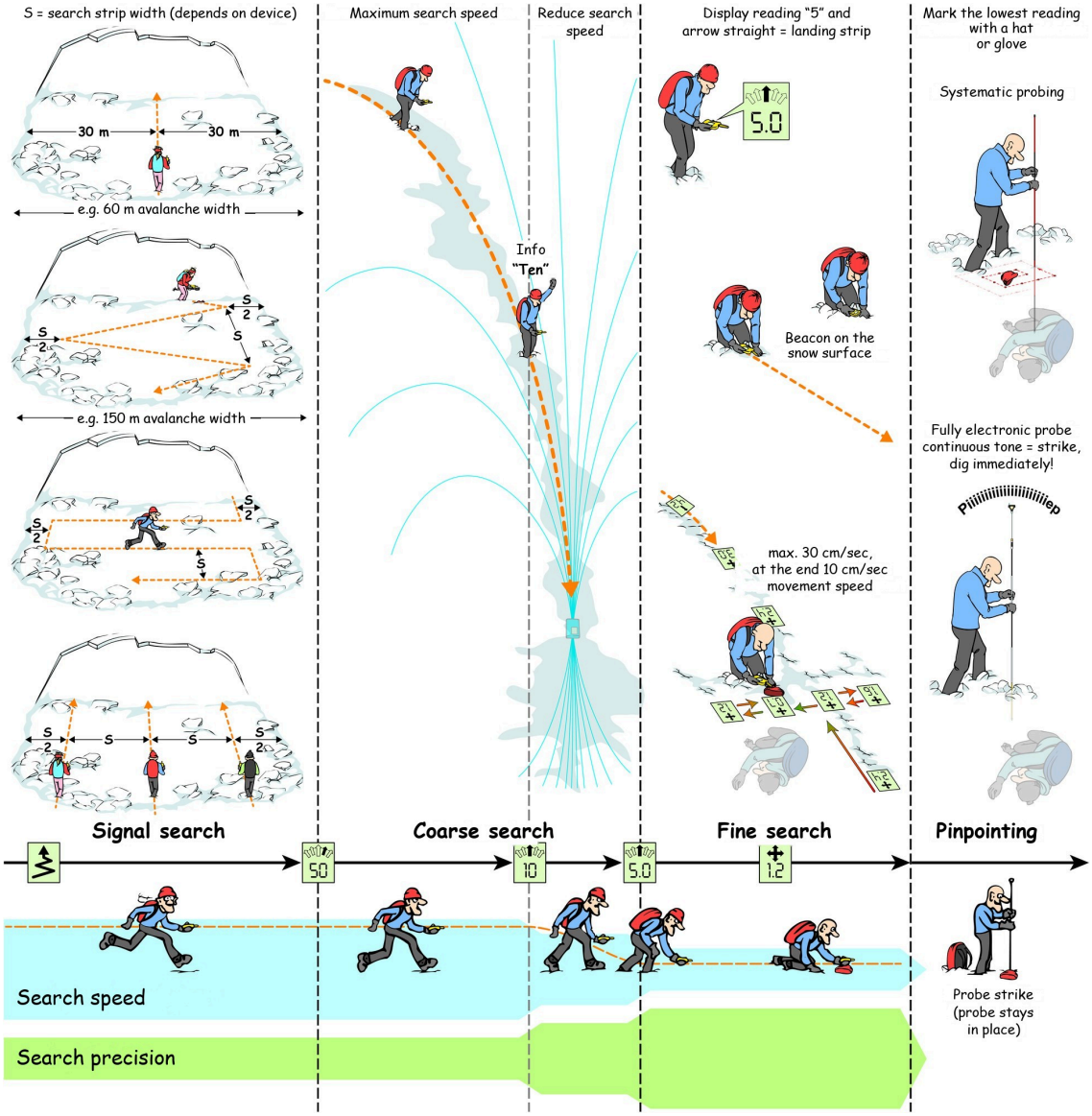
BASICS

THE FOUR SEARCH PHASES

Powerful three-antenna beacons have been in use since 2003. After a short introduction, these devices generally allow every user to get close to the buried person very quickly.

According to the international division into four search phases (signal search, coarse search, fine search, pinpointing), the signal search and coarse search already work very well in the vast majority of cases, and the beacons support the user optimally. Fine search (searching for the lowest distance reading) and pinpointing are where users need the most training and background knowledge, and where most mistakes happen.

OVERVIEW OF THE SEARCH PHASES, SEARCH SPEED AND SEARCH PRECISION


S = search strip width (depends on device)
30 m
30 m
e.g. 60 m avalanche width
e.g. 150 m avalanche width
Maximum search speed
Reduce search speed
Info "Ten"
Display reading "5" and arrow straight = landing strip
5.0
Beacon on the snow surface
max. 30 cm/sec, at the end 10 cm/sec movement speed
Mark the lowest reading with a hat or glove
Systematic probing
Fully electronic probe continuous tone = strike, dig immediately!
Piii

THE SYSTEM

"FASTEST RESCUE SYSTEM" FOR OPTIMIZING FINE SEARCH AND PINPOINTING

This search technique makes full use of all technical possibilities and saves a huge amount of search time (up to 60% in fine search and pinpointing). The system can be used by a single rescuer and works perfectly as a team of two.

In 2008 an electronic probe (**iProbe**) was presented and launched for the first time. It has been continuously improved in the following years and now plays the central role in the **"Fastest Rescue System"**.

BACKGROUND: HOW THE ELECTRONIC PROBE (IPROBE) WORKS



With a fully automatic electronic avalanche probe it is no longer necessary to hit the buried person directly with the probe tip!

The great uncertainty of whether the probe is really on the buried person disappears.

HOW IT WORKS

When the probe tip is less than 50 cm from the transmitting avalanche beacon of the buried person (depending on the coupling position, usually between 20 cm and a maximum of 50 cm), the probe's electronics provide support: it emits a continuous tone and the two LEDs on the probe head light up blue (continuous light signal).

From this moment on you know for certain that you are close enough to the buried person and can start digging immediately. This saves an enormous amount of time, because no further probing is needed.

COMPATIBILITY

The electronic avalanche probe **iProbe** is **compatible with every standard-compliant avalanche beacon on the 457 kHz frequency (EN300718), regardless of the manufacturer!**

IPROBE

SWITCHING ON, SELF-CHECK AND INDICATORS



1 SWITCHING ON & SELF-CHECK

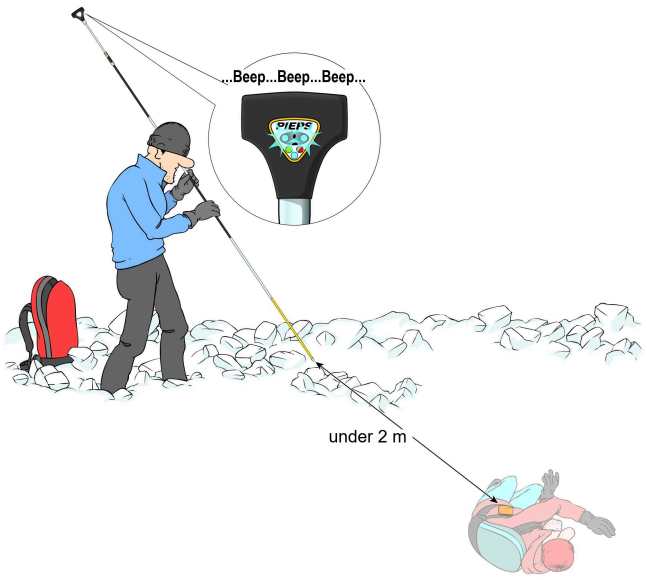
The probe is thrown out while the top probe section is held with one hand. With the other hand, the probe is tensioned at the handle / head until the quick-lock clicks into place and the probe is stiff and stable along its full length.

A continuous tone sounds for one second (beeeeeeeeeeep).



2 FUNCTION CHECK

> **Important:** After tensioning, both green LEDs on the probe head must light up briefly for one second (self-check "OK") and then flash alternately (probe is switched on and ready for use).



3 PROXIMITY INDICATOR

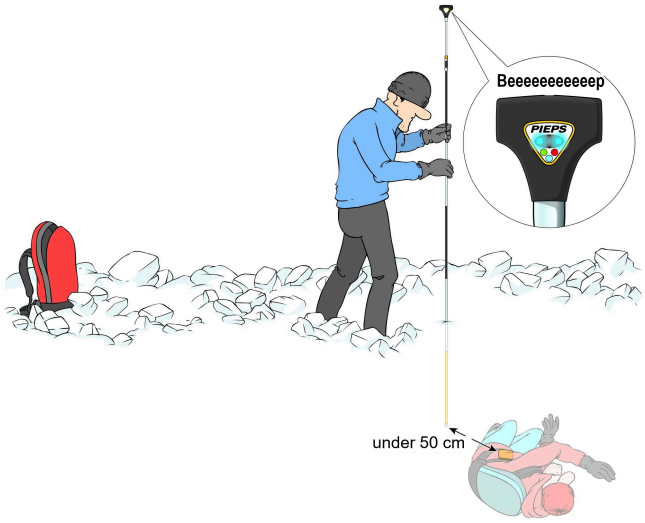
When you search for the transmitter of a buried person with the **iProbe**, you get maximum visual and acoustic support.

When the probe tip is within a distance of 2–0.5 meters from the transmitting antenna, the iProbe responds

- visually with two flashing blue LEDs and
- acoustically with regular "beep" tones in the interval of the transmitting beacon

PRACTICAL TIP

If you hear regular beeps, you are close to the buried person. If the tones suddenly stop, you are moving away, so return the probe immediately to the area where you heard the beeps!!!



4 STRIKE INDICATOR

When the probe tip is at a distance of approx. 50 cm–10 cm from the transmitting antenna, the iProbe responds

- visually with the two blue LEDs lit continuously and
- acoustically with a continuous tone ("beeeeeeeeeeeep..")



THE METHOD

EFFICIENT FINE SEARCH AND PINPOINTING

The Fastest Rescue System puts the background knowledge to use, eliminates unnecessary steps and uses all the technical possibilities of the iProbe at the right moment.

We distinguish between one person searching alone and a search with support from a second person (search as a team of two).

OPTION A

ONE PERSON SEARCHES

Pages 7–9

OPTION B

SEARCH AS A TEAM OF TWO

Pages 10–12

OPTION A

"FASTEST RESCUE SYSTEM", ONE PERSON SEARCHES

1 COARSE SEARCH

From a distance reading of 10 on the display, the search speed is reduced significantly (on the PRO IPS the arrow is no longer completely black, only the arrowhead = visual cue to reduce search speed).

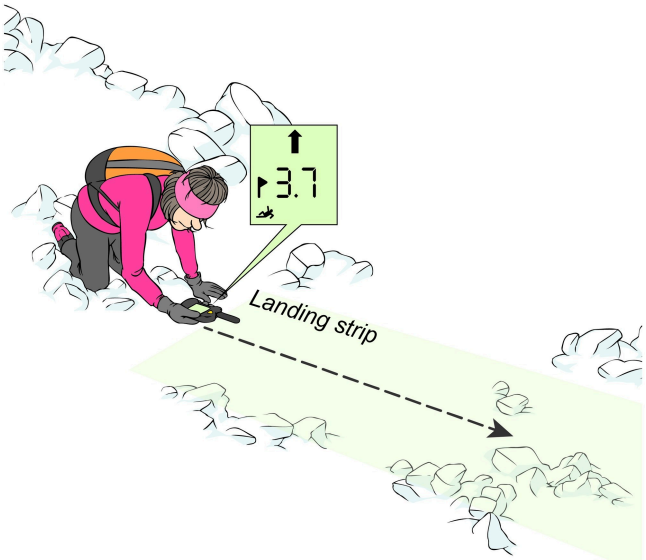
When the display shows a value of 4-5, the exact direction is determined. The arrow points straight ahead, and the beacon is still at about hip height. The arm is almost fully extended.



2 FINE SEARCH

The fine search starts with the landing on the snow surface. The device is moved from hip height down to the snow surface, like an airplane touching down with its wheels. The search speed is reduced dramatically.

You no longer move forward on foot **but on your knees** (extremely important, because this makes the crucial reduction in speed much easier). The distance reading is three or less.



The back of the hand holding the beacon touches the snow and acts as an additional brake. The speed of movement now drops from 30 centimeters per second to 10 centimeters per second. This is necessary because a transmit signal is only received about once per second. The beacon is guided along the snow surface while looking for the lowest distance reading.

OPTION A · ONE PERSON SEARCHES

3 MARK THE LOWEST READING

As soon as the distance readings increase again, the position of the lowest reading is marked with a non-conductive object, for example a hat or a glove. To be sure, move the beacon about an arm's length further along the landing strip to check that the reading really does rise again.

> ! If the search speed is too high in the heat of the moment, the results will inevitably be wrong. This has a direct impact on the success of the search and is one of the most common mistakes when searching with an avalanche beacon.



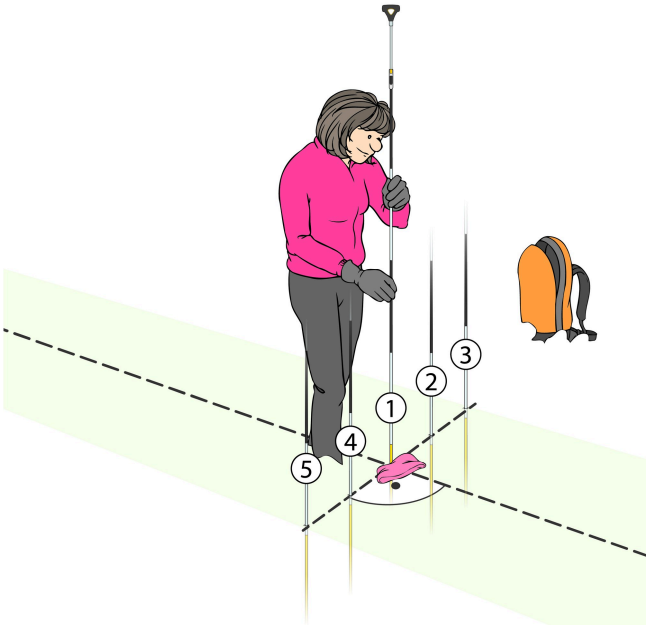
4 BRACKETING WITH THE IPROBE



With the Fastest Rescue System, however, the bracketing is no longer done with the avalanche beacon as with a standard probe. Instead, the bracketing is done directly with the iProbe!

OPTION A · ONE PERSON SEARCHES

5 PROBING PATTERN



The first probe strike is made directly at the marked point 1, ideally at an angle of 90° to the snow surface. If a continuous tone sounds immediately and both blue LEDs on the probe head stay lit without interruption, this signals a successful find.

If the first probe strike at the marked lowest distance reading does not produce a hit, the search with the iProbe continues at a right angle to the landing strip. Starting from the first probing point, probe twice to the left 2 3 at distances of about 30 and 60 centimeters from the center. If there is still no continuous tone indicating a hit, probe twice to the right 4 5 on the same axis at the same distances (30 and 60 centimeters from the center).

If the work is done accurately, this system leads to a successful find in 99 percent of cases. If not, the probing area is extended systematically with the iProbe from the marked point at intervals of about 30 centimeters, in a spiral or grid pattern.

ADDITIONAL INFO

If no more beeps can be heard while probing, there is no need to continue probing on that side: switch directly to the opposite direction (if the probe tip is more than 1.5 to 2 meters from the transmitting avalanche beacon, there are no beeps).



6 STRIKE/FIND !!!!

START DIGGING IMMEDIATELY!

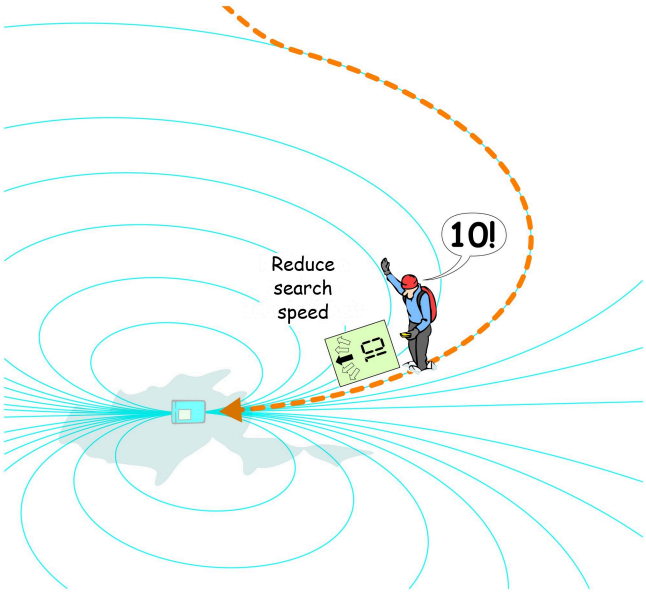
OPTION B

"FASTEST RESCUE SYSTEM", SEARCH AS A TEAM OF TWO

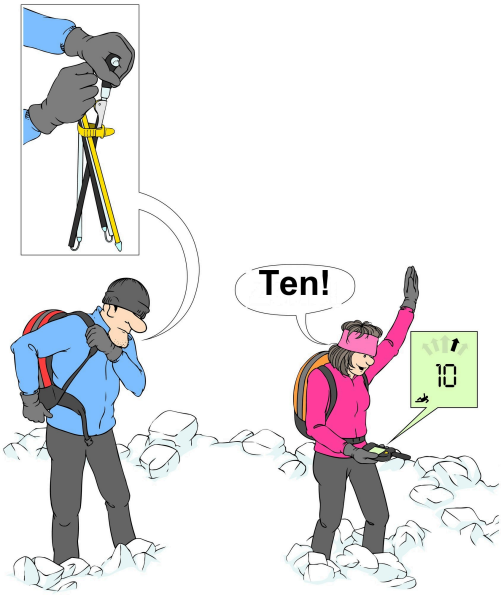
1 COARSE SEARCH

From the first signal, the reading on the beacon is called out **loudly** to the second person at regular intervals. Once the distance reading is below 15, the second person can take the iProbe out of the backpack.

At a distance reading of 10 on the display, the search speed is reduced significantly and the searcher calls out: **"Ten!"**



2 GET THE IPROBE READY



The person following throws out the **iProbe** and tensions it, and the probe runs its self-check. After tensioning, both green LEDs on the probe head must light up briefly for one second (self-check "OK") and then flash alternately.

> ! This check is important: it tells you that the probe is correctly switched on and ready for use.

OPTION B · SEARCH AS A TEAM OF TWO

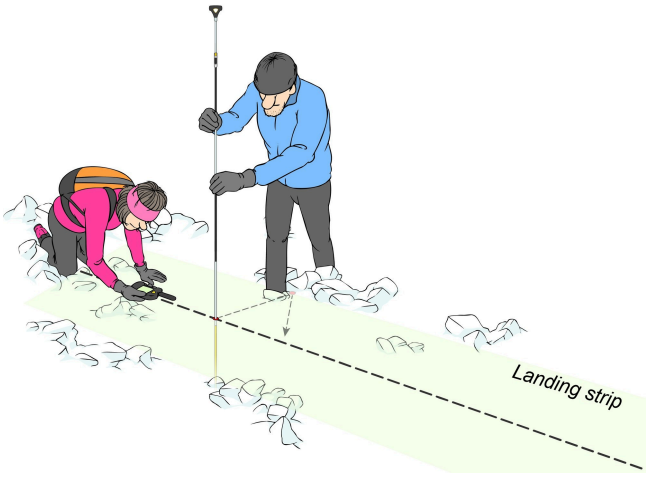
3 ALIGN THE LANDING STRIP AND CALL OUT THE READINGS

Meanwhile, the person searching with the beacon has reduced the search speed significantly once more, and the display shows a value of 4-5. Now the exact direction is determined ("aligning the landing strip"), and the direction is best shown to the second person with the hand. The arrow points straight ahead (possibly with a small correction of the landing strip if the arrow still changes).

From now on, the readings are called out loudly and continuously: 5 .... 4 .... 3 .... At first the beacon is still at about hip height; it is brought down to the snow surface by moving about one meter forward and down.

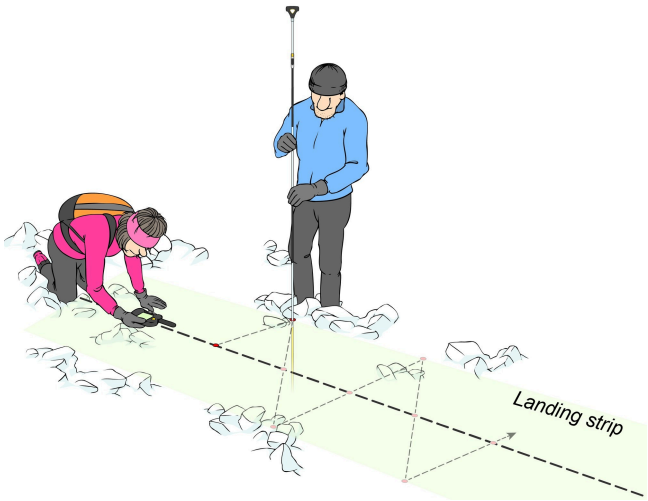
You no longer move forward on foot but on your knees. The reading is now in the range of three and below. The back of the hand holding the beacon touches the snow and acts as an additional brake. The speed of movement now drops from 30 centimeters per second to 10 centimeters per second. The beacon is guided along the snow surface while looking for the lowest distance reading.

4 PROBING ALREADY DURING THE FINE SEARCH



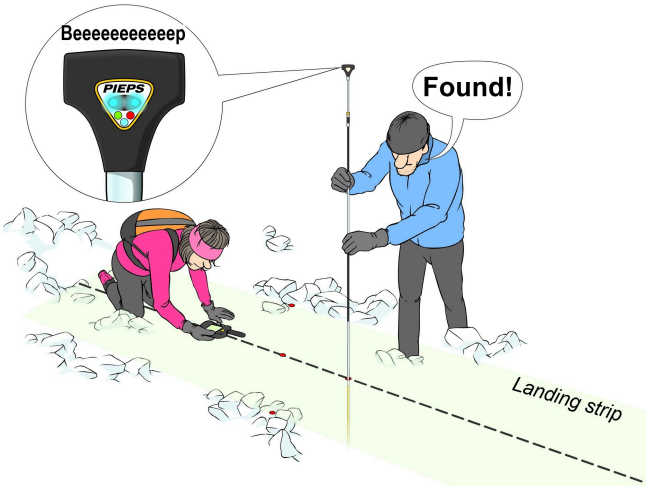
Unlike a search with a standard probe, the second rescuer now starts probing actively with the iProbe along the landing strip, ahead of the person with the beacon, while the fine search is still in progress.

The straight landing strip is the reference line. In a corridor about 80 centimeters wide, probing starts in the middle, then on the left side, in the middle, on the right side, in the middle and so on (in a zigzag pattern), until a continuous beep on the iProbe indicates a successful find.



OPTION B · SEARCH AS A TEAM OF TWO

5 A STRIKE, OFTEN BEFORE THE LOWEST READING



If the correct forward speed with the beacon has been maintained, the iProbe will usually indicate a strike even before the lowest reading along the landing strip has been found.

Searching as a team of two saves even more time and is the perfect method for anyone who wants to optimize their avalanche rescue system.

More on the actual time savings on the following pages.

FROM THE FIELD

COMMON MISTAKES

Here is some field experience from a professional, gathered over many courses and exercises: where training is needed and how mistakes can be avoided.

FINE SEARCH STILL OFTEN TOO FAST IN THE HEAT OF THE MOMENT / UNDER STRESS!!!

Pay particular attention to consistently maintaining the correct search speed. The back of the hand holding the beacon touches the snow and acts as a brake. The speed of movement now drops from 30 centimeters per second to 10 centimeters per second.

NO POWER-ON CHECK WHEN TENSIONING THE IPROBE

Only when the self-check "OK" and the flashing green LEDs appear is the probe switched on.

SEARCH TIMES COMPARED

"EVERY SECOND COUNTS"

STANDARD SEARCH AND "FASTEST RESCUE SYSTEM"

In the winters of 2022 to 2025, Pauli Trenkwalder and Heli Mittermayr measured the search times up to a successful probe strike, comparing a standard avalanche probe with the iProbe ("Fastest Rescue System"), during continuing education courses for instructors of the German Alpine Club (participants: Trainer C ski mountaineering, Trainer B ski touring, additional qualification snowshoe mountaineering) and continuing education for mountain guides. Around 400 to 500 people took part in these courses.

THERE WERE THREE SERIES EACH TIME:

1

In the first series, one person searched with an avalanche beacon and a standard avalanche probe.

2

In the second series, the same procedure, but using the iProbe.

3

In the third series, the search was done as a team: one person with the avalanche beacon, the other with the iProbe.

Each series began with a demonstration of the search method with a detailed explanation.

All further attempts were observed by a second person, who stopped the time.

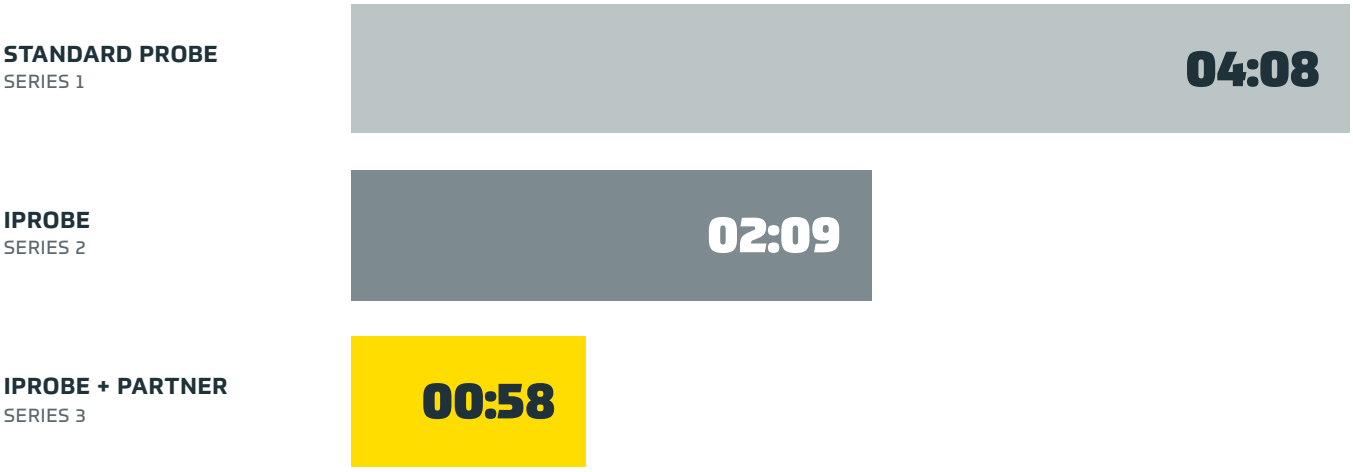
TRAINING / SETUP

- PIEPS training pads (50 x 50 cm) with integrated air cushions were buried.
- The burial depth varied: 80–150 cm of snow cover, with 8 to 10 different prepared spots each time (very large area)!
- The start was about 25-30 meters away and was marked with a flag.
- Times measured: from the start (switching the beacon from transmit to search) to the successful probe strike or the continuous tone of the iProbe.

SEARCH TIMES COMPARED

THE RESULTS

AVERAGE, TIME IN MINUTES:SECONDS



The measured times speak for themselves, considering that every second counts in an avalanche burial (complete burial) and that **using the iProbe ("Fastest Rescue System") can practically halve the search time, which means a time saving of 2 minutes**, or one more minute when searching as a team.

> **For a completely buried person, a time saving of 2 to 3 minutes means getting oxygen 2 to 3 minutes sooner!!!**

Please try it out yourself and put this enormous time saving into practice, always hoping that you will never need it and never have an avalanche accident.

HELI MITTERMAYR, OCTOBER 2025

PIEPS

PROTECTING YOU SINCE 1968