WHITE BOOK

AVALANCHE AWARENESS PROVIDED BY RECCO
GETTING CAUGHT IN AN AVALANCHE IS NOT SIMPLY BAD LUCK. AVALANCHES HAPPEN FOR PARTICULAR REASONS AT SPECIFIC PLACES AND AT SPECIFIC POINTS OF TIME.

“Knowledge and information about snow and avalanches are the key to preventing avalanche accidents.”

BY DALE ATKINS, AVALANCHE RESEARCHER AND EDUCATOR, COLORADO. DECADES OF MOUNTAIN RESCUE AND PROFESSIONAL SKI PATROLLING. LONG-TIME US REPRESENTATIVE TO THE ICAR (INTERNATIONAL COMMISSION FOR ALPINE RESCUE), SEARCH AND RESCUE COMMITTEE CHAIRMAN, AMERICAN AVALANCHE ASSOCIATION. AWARDED 2006 BY THE MOUNTAIN RESCUE ASSOCIATION FOR “OUTSTANDING CONTRIBUTION TO AVALANCHE EDUCATION AND SAFETY”.

AVALANCHE SAFETY

Avalanche safety and survival requires you to gain knowledge and experience of snow, avalanches and rescue. Avalanches are a danger for anyone who enjoys snow. Anyone who is slightly athletic can easily find himself or herself in avalanche terrain. Many avalanche accidents occur near ski areas when someone ventures out-of-bounds in search of powder snow and untracked slopes.

Staying alive in avalanche terrain not only involves learning about avalanches but also travelling with experienced and practiced companions, carrying rescue equipment and knowing how to use it, obeying ski area signs and warnings, being flexible about when and where to go, and lastly, being able to say “not today”.

This little booklet contains information and tips that can help you and your friends stay safer in avalanche terrain.
BRUNO JELK,
HEAD OF MOUNTAIN RESCUE IN ZERMATT, SWITZERLAND, SINCE 1970.
PRESIDENT TERRESTRIAL COMMISSION, ICAR (INTERNATIONAL COMMISSION FOR ALPINE RESCUE). ONE OF THE WORLD’S MOST EXPERIENCED AVALANCHE RESCUERS.

“Thanks to cell phones, avalanche alarms are given more quickly today than in the past. Last year, in Switzerland, we received 80% of all alarm calls via cell phones. A quick avalanche alarm is one thing, but searching the area and finding those who are buried has to be done as well. Rescue systems such as transceivers or RECCO are decisive for this.

The third critical factor is the time it takes to dig. A study by SAC (the Swiss Alpine Club) showed that four cubic meters of snow have to be moved in digging out a person buried under one meter of snow. That is the equivalent of one and a half to two tons of snow. It is common sense that this is almost impossible without good equipment.

Last year in Switzerland, 75% of all avalanche victims who were completely buried and carried transceivers were dug out by the organized rescue services.

WHAT IS AN AVALANCHE?

An avalanche is a mass of snow sliding down a mountainside. Avalanches come in all sizes.

Small avalanches can fracture less than 30 centimeters deep, be 20-30 meters wide and travel at 50 km/hour.

Medium avalanches may fracture 1-2 meters deep, have a width of 100 - 500 meters and travel at 100 km/hour.

Large avalanches can be 2-3 meters deep, or deeper, have a width of 1000 meters or more, and travel at speeds of over 150 km/hour.

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TYPES OF AVALANCHES

There are two basic types of avalanches: loose snow and slab. Loose snow and slab avalanches can both release in dry snow, damp snow, or wet snow.

LOOSE SNOW avalanches occur in snow that lacks cohesion, such as fresh, new snow that has not bonded, or wet snow that has lost its cohesion because of thaw. Loose snow avalanches are sometimes called point releases, because the avalanche starts at a point and spreads out into a triangle as it slides down the mountainside. Loose snow avalanches tend to be small in size and seldom cause injury.

However, the consequences of even a small loose snow avalanche can be very serious or even fatal if you are swept into a terrain trap.

SLAB avalanches occur when one or more layers of snow have bonded into a cohesive slab. The slab can stay in place until the downhill stress exceeds the snow’s strength. The downhill stress is caused by gravity steadily pulling on the snow, and this stress can be increased by the added weight of new or wind-blown snow, or the weight of a person. When the slab fractures, cracks shoot out through the slab, and the snow breaks loose from its anchors at the top, sides and bottom. The snow slab material can vary greatly. The slab can be very soft (excellent powder skiing) or very hard, like a wooden floor. Slab avalanches are the most dangerous for people and property because they can move large amounts of snow at high speed.

“An avalanche has four ingredients: a steep slope, a slab, a weak layer in the snow cover and a trigger.”

JEFF GRElla, VANS EQUIPMENT DIRECTOR OF RESEARCH AND DEVELOPMENT VANS SNOW, SWITCH, AGENCY, PRO-TEC BRANDS.

“At Vans we build equipment that embodies the free spirit personified in the youth culture of today’s riders. That’s why we feature Recco reflectors in select Vans and Pro-Tec models.”

ANDREAS WIIG, TEAM VANS SNOW.

“During the season I spend a lot of time freeriding, and I’m always exploring new spots in the backcountry, whether it’s in the resort or way out in the wilderness. You never know what’s going to happen next, especially when it comes to avalanches. I always keep that in mind when I’m out there, and we have to do our best to be prepared. Wearing the Vans boots and outerwear with the Recco system makes it easier focus on the fun part of snowboarding, and still feel safe.”

CHRIS COULTER, TEAM VANS SNOW.

“Every season more ski resorts are getting the Recco system. I feel just a little bit safer wearing my Vans outerwear and boots. Avalanches are a real danger and you never know for sure when one is going to happen.”
BERND ZEHETLEITNER, MOUNTAIN GUIDE AND RESCUER WITHIN BERGWACHT, GERMANY. RESPONSIBLE FOR AVALANCHE RESCUE TRAINING.

“During the last few years Bergwacht has shown that it is possible to find avalanche victims quickly and thus save their lives, thanks to modern technology. Rapid localization increases the chance of an avalanche victim surviving, and also reduces risk to the rescuers. Although minutes are important in an avalanche rescue, people survive under snow for long periods. We always work on the assumption of finding people alive. For example, I was present when we dug out a snowboarder who had been covered by an avalanche for 11 hours.

Unfortunately, most people who are dug out from avalanches have neither Recco reflectors nor transceivers.”
Water of the avalanche accident reached the ski patrol three minutes after the slide and their response was immediate. In one additional minute, two ski patrollers reached the top of the 5-meter-wide by 20-meter-long avalanche and started a transceiver search and a Recco search. Events continued to happen fast. After one minute of searching the patroller with the Recco detector received a signal. The patrollers probed the spot and quickly confirmed the victim’s exact location. After 10 minutes of digging, the victim’s head was uncovered from under 1.5 meters of snow. He was breathing and conscious after the 17-minute burial. Three more ski patrollers arrived and joined in to free the buried rider. Entombed in a sitting position, his feet—still attached to his board—were two meters beneath the snow surface. A doctor provided initial treatment while awaiting the rescue helicopter. The victim was evacuated by helicopter to the regional hospital where he arrived with no apparent injuries and in only a slight hypothermic state.

JOEL GOMEZ, SESSIONS FOUNDER AND CEO.

“Sessions has one of the longest-standing relationships with Recco within the ski and snowboarding industries. For over a decade we have prided ourselves on the fact that we are always the first to introduce value-added technologies into our outerwear in an effort to give our customers the premium selection that they deserve. By bringing Recco reflectors into our entire range, we can offer a renewed sense of safety to our customers that many of our competitors cannot. Primarily used in avalanche rescue, the Recco system is equally valuable to those who brave the backcountry and out-of-bounds areas at resorts worldwide. What has potential to be a desperate situation can be greatly reduced by something as small and inexpensive as the Recco reflectors in Sessions outerwear.”
The Recco System is now an integral tool that we use for avalanche rescue. The system is used in all initial searches in our resort and also in the backcountry. It is an additional tool for us to use as rescue workers and gives the avalanche victim one more chance, the chance of surviving when completely buried. I’ve been working with the Recco Avalanche Rescue System since 1985, and the latest technology improvements in the Recco System gives our rescue groups confidence that if avalanche victims are equipped with reflectors, we will be able to find them.”

WHEN ARE AVALANCHES MOST LIKELY TO OCCUR?

The risk of an avalanche increases during major snowstorms and periods of thaw. More than three-quarters of avalanches release during or just after large snowstorms. There is no rule of thumb on how much new snow will cause conditions to become dangerous, but the greater the snowfall, the greater the stress, the greater the danger. While most avalanches occur during a storm, many avalanche accidents occur shortly after a storm when the weather is nice but the snow remains unstable.

The faster the snow falls, the faster the danger increases. For example, 30 cm of snow falling in six hours is far more dangerous than 30 cm falling in 24 hours.

Someone once said, “The building blocks of an avalanche are made of snow, but wind is the builder.” This is especially true at higher elevations. Here, the wind can transport tremendous quantities of snow onto steep leeward slopes. The wind can strip snow off windward slopes and deposit it onto leeward slopes at a much faster rate than snow falling from the clouds. When winds cause blowing snow the avalanche danger can quickly increase on leeward slopes.

Snow stability can be significantly affected by changes in snow temperature that create strong or weak layers of snow. Snow temperatures affect the rate at which snow gains or loses strength. Snow temperatures are strongly influenced by air temperature and solar radiation.

Temperature trends are much more important than a single temperature reading. In a cold snowpack, unstable snow conditions persist because the strengthening process is slowed down, or unstable conditions can even worsen when the snowpack loses strength. Thus, dangerous avalanche conditions can persist for days or even weeks after a storm.

When snow is warm it typically settles quickly and becomes stronger and more stable. However, melt caused by intense warming, especially in the springtime, turns the snow wet and melts bonds between snow grains and snow layers. This can rapidly increase the risk of avalanches.

A slope that is stable in the morning can become unstable by afternoon.

“Someone once said, ‘The building blocks of an avalanche are made of snow, but wind is the builder.’”
WHERE DO AVALANCHES OCCUR?

Avalanches occur on steep slopes that make for great skiing and snowboarding. Slope angle is the most important factor leading to avalanches. As the slope angle increases, so too does the stress exerted on the snow. Most avalanches (about 90%) release on slopes of 30-45 degrees. When the snow is very unstable it is possible to trigger an avalanche from shallow or even flat slopes below steep slopes. The fractures can start at the bottom of the slope and then propagate upslope, releasing the slab. It is akin to pulling out the bottom log from a woodpile.

Avalanches release most often on leeward slopes (facing away from the wind). Winds strip away snow from windward slopes and deposit the snow as a slab layer on leeward slopes. The way in which a slope faces the sun is also important. Slopes facing away from the sun (north aspects) have a colder and weaker snowpack, and this is more apt to avalanche than south-facing slopes. However, south aspects (facing the sun) can be more prone to wet avalanches during periods of thaw.

If the slope is steep enough and the snow weak enough, avalanches can run on any slope no matter how short or how long. Trees, bushes, and rocks tend to anchor the snow but do not necessarily prevent avalanches. Once an avalanche releases it can flow through trees and rocks.

Most avalanches occur in the backcountry, outside developed ski areas. Within ski areas the ski patrols use a combined program of monitoring, compaction, and explosives to make for a safe and enjoyable experience. However, off piste or out-of-bounds, there is no such program. By simply passing under a 6-millimeter strand of rope one goes from a safe and managed environment to the uncertainty of the wilderness.

“Avalanches occur on steep slopes that make for great skiing and snowboarding.”

PY LEBLANC, TEAM ATOMIC

“Being a good skier doesn’t mean that you are safe in the mountains. Knowledge and having the right gear makes your backcountry adventure much safer. As a passionate big mountain skier, I am always pushing my limits. Being smart and having the right gear is key for survival. When I am heli-skiing, I feel that the Recco technology is the safest, fastest and most accurate tool in case of an avalanche.”
“Last winter in the Alps I experienced my greatest fear when skiing, Avalanche. Skiing in the backcountry with an avi danger of only 2-3 and well equipped with beacon, shovel and probe, I felt pretty safe. Mother Nature proved me wrong and I got buried in an avalanche unable to move or even breathe. I could feel that my breath would not last very long if I was not found soon. This time I was lucky and my friends were able to dig me out within minutes. By wearing my The North Face clothes, which contains Recco reflectors, gives me an additional sense of security knowing that professionals will help me out if I should need it.”

KARINA HOLLEKIM, TEAM THE NORTH FACE FREE SKIER AND B.A.S.E JUMPER.

HOW TO KEEP FROM GETTING CAUGHT IN AN AVALANCHE

You can reliably avoid avalanches by recognizing and avoiding avalanche terrain. But this recommendation is not practical for many people who enjoy steep slopes and powder snow. Recreating in avalanche terrain is all about taking risks, and taking risks must be tempered with good judgment.

You cannot eliminate all risk if you travel in avalanche terrain, but you can minimize risk by using good technique, such as:

- climbing, descending, or crossing avalanche areas one person at a time;
- climbing or descending the edge of a slope rather than the center;
- crossing a slope at the very top or bottom, if possible;
- carrying avalanche rescue gear; and
- knowing how to use it, and turning back or altering your route if you detect signs of unstable snow.

HOW TO RECOGNIZE AVALANCHE TERRAIN

Most large avalanche paths are obvious: an open slope, bowl, or gully above timberline that leads to a swath through the trees. But small avalanche paths in the trees can be just as dangerous. Slope angle is the most important factor, so you should carry a slope meter or inclinometer to measure slope angles. You also need to observe snow deposition patterns and the effects of anchors such as rocks or trees that might prevent avalanches on some slopes.

Finally, bent or damaged trees are good clues that show where avalanches have run in the past.
HOW CAN YOU RECOGNIZE UNSTABLE SNOW AND DANGEROUS AVALANCHE CONDITIONS
Certainly any time the weather conditions are adding stress (new snow, blowing snow) or reducing strength (prolonged cold or thaw) the avalanche danger may increase. When the snow cover is very unstable, nature often broadcasts clear danger signals.

Recent avalanches are the best clue. Snow that cracks, collapses, or makes “whumpfing,” or hollow drum-like sounds is also unstable. Weak layers that can be found by digging snow pits are signs of unstable snow. Snow that has become wet from thaw or rain can be dangerous.

Even if you find no signs of unstable snow, you should always travel using the techniques listed earlier in How To Keep From Getting Caught In An Avalanche.

WHAT RESCUE GEAR SHOULD YOU CARRY?
The essential rescue gear that everyone should carry when going into the backcountry is an avalanche beacon (or transceiver), shovel, and a collapsible or ski-pole probe. You and your friends should practice frequently so as to be proficient in using your beacon. Albeit the beacon is the primary rescue tool for backcountry skiers, RECCO reflectors should always be used.

Even for people venturing far into the backcountry the RECCO System saves significant search-time when a rescue team responds.

BRYAN IGUCHI, VOLCOM PRO.
“You can never be too cautious in the mountains. In addition to my avalanche transceiver knowing that I have the Recco system in my gear. It gives me a little more reassurance while riding the Jackson Hole Mountain Resort. A lot of ski resorts are now equipped with the Recco detectors. A great thing about the systems is that it’s always there for you. You don’t have to turn it on or off and it doesn’t require any batteries.”

MARK LANDVIK, VOLCOM PRO.
“Being in the backcountry you always want to be prepared for anything that could happen. With the Recco system becoming more mainstream in resorts throughout the US and around the world, it’s nice to have the Recco system in our line.”
WHAT ARE SOME COMMON MISTAKES MADE BY AVALANCHE VICTIMS?

Perhaps the most common mistake is simply not thinking about avalanches. Most people never experience an avalanche. They ski and ride steep slopes and never experience an avalanche, but they do remember the experience of fantastic powder. Over a winter or many winters, people repeat this process of riding steep slopes and not experiencing avalanches. Past experiences become representative of what they expect to happen today. Their memories reveal no avalanches in the past, so there should be no avalanches today. If you do not understand snow and avalanches but keep venturing into avalanche terrain, you are playing a deadly game of Russian Roulette.

Eventually your luck will run out. Here are more common mistakes made by avalanche victims:

• Rushing for first tracks.
• Thinking the snow is safe because they are in the trees.
• Thinking they’re safe because they are with an expert skier or rider; just because someone is an “expert” skier or rider, does not also mean they are an avalanche expert.
• Thinking the snow is safe because others have gone before them.
• Thinking they’re safe because they have been here before, or in familiar terrain.
• Thinking the slope is safe because it is too small to avalanche.
• Thinking their rescue gear will let them survive an avalanche.

MINIMIZE RISK, AND SURVIVE AVALANCHES

Most avalanche victims, or someone else in their group, trigger the slide that catches them. Therefore, most accidents are preventable. Accidents usually happen because of ignorance, arrogance, overconfidence, or distractions.

• Ignorance can be overcome by avalanche education and by reading the avalanche bulletin.
• Arrogance can be overcome by recognizing that even you make a mistake.
• Overconfidence can be overcome by expecting the unexpected.
• Distractions can be overcome by focusing on the terrain, weather, and snow conditions.

“Quiksilver firmly believe in the technology and benefits of the Recco system for our customers. The product enhances the value of our garments, which is crucial to our goal as a company within the board-sports industry. We support all actions in the promotion of safety and avalanche awareness that are taken by Recco.”

DAVE ROSENBERGER, VICE PRESIDENT SALES, QUIKSILVER WINTERSPORTS.
WHAT TO DO IF YOU ARE CAUGHT IN AN AVALANCHE!

Surviving avalanches depends on luck; therefore, it is always better to avoid them in the first place. Remember that only about one of three buried victims survive.

If you are caught:
• Try to escape to the side, or grab a tree or a rock.
• If you are knocked down, get rid of your poles and skis.
• Get your hands in front of your face to create an air pocket. Fight the avalanche by rolling to the side.
• If buried, try thrusting up a hand or a foot.

"As The North Face continues to encourage our consumers to Never Stop Exploring, the Recco system helps them do it more responsibly and confidently. The Recco system is a powerful avalanche recovery tool and The North Face is proud to offer it in our Snowsport Collection."

LETITIA FERRIER, STRATEGIC MARKETING MANAGER, THE NORTH FACE.

"For MILLET—faithful to the Climbing Spirit—it is important that every rider, expert or not, respect their own safety and that of their fellow riders. We encourage every safety means and the new Recco reflectors, with their proven effectiveness, will be equipped in our Ride-On collection that is specially designed for free riders."

FREDERIC DUCRUET, DIRECTEUR GÉNÉRAL, MILLET.
WHAT CAN YOU DO IF YOUR FRIEND IS CAUGHT?

• Watch your friend closely to establish a last seen area.
• If possible, alert rescue services by telephone by dialing 911 in North America and 112 in Europe, but do not go for help prematurely. Stay and search for as long as possible. In the wide-open spaces of North America, cellular telephones may not always work. It is vital that you and your companions carry and know how to use avalanche rescue gear.
• Mark the spot where your friend was last seen and search down slope from this spot.
• Use your beacon and watch for clues. If no beacons, spot probe, then coarse probe likely burial areas.
• Quickly and carefully dig out your friend.

Be ready to treat for asphyxiation, impact injuries, shock, and hypothermia.

Death can come in as little as a few minutes, but some victims survive for many hours under the snow. The longest survival in North America is 25.5 hours. All buried victims deserve the benefit of the doubt that they might be the next survivor.

VINCENT RAVANEL, MOUNTAIN GUIDE IN CHAMONIX, FRANCE. RESPONSIBLE FOR SAFETY WITHIN THE COMPAGNIE DES GUIDES DE CHAMONIX.

“When I take my customers off piste or backcountry, we carry transceivers, shovels and probes. I always wear reflectors, and I advise my customers to do so as well. More and more people in Chamonix go off piste. Many of them are unaware of the dangers, some did not even plan to go off piste that morning. Rereflectors are the only way of systematically equipping everybody with a permanent and efficient search system.”

JON OLSSON, PROFESSIONAL FREE RIDER. ONE TIME GOLD MEDALIST, TWO TIMES SILVER MEDALIST AND THREE TIMES BRONZE MEDALIST AT WINTER X GAMES.

“Life is all about calculated risk-taking. RECCO reflectors give one more chance.”
SOmE fINAL tHOugHtS

Just because the sky is blue, the snow soft and deep, and you are with capable and rescue-equipped friends, does not mean you should ski or ride that steep slope. Even before you reach that slope, you should be “thinking avalanche.” Pay attention to the three other ingredients for a slab avalanche – you are the fourth ingredient. Are they present? Are other clues that indicate unstable snow and avalanches present, too? Discuss the situation with your companions. If you decide to go-for-it, stop and consider why your judgment might be wrong. This check might reveal something you missed or dismissed earlier in your decision-making process. Lastly, evaluate conditions from the perspective of an avalanche. What may be important to you is not important to the avalanche. Remember avalanches don’t care about your friends, your goals, or schedule, or how skilled or knowledgeable or how well equipped you are, or even that you are familiar with the area. If you think like an avalanche and think this might be a good place for an avalanche, it is time to look for a less-steep slope or perhaps even to turn around.

LEARN ABOUT CURRENT AVALANCHE CONDITIONS

Throughout North America and Europe avalanche forecast centers prepare bulletins providing current and forecast snow and avalanche conditions. Some centers even prepare detailed mountain weather forecasts, too. Links to this information is available over the Internet at www.avalanche.org or by recorded message on telephone hotlines.

ERIN COMSTOCK, ROXY, TEAM SNOW.

“Living and riding in Utah I am always concerned about avalanches. I try to stay prepared by wearing a beacon but it also brings a piece to mind knowing I have the Recco system in my outerwear. The resorts use this system as another way to help in a rescue, so when I am snowboarding on a fresh powder day, I feel a bit safer in my Roxy Outerwear.”

AMBER STACKHOUSE, ROXY, TEAM SNOW.

“Many hazards exist in the backcountry, so it is a comfort to know I have the extra protection of the built-in Recco system.”

AMBER STACKHOUSE, ROXY, TEAM SNOW.

“This information is for trip planning only but it does give you an idea of what to expect. Once in the backcountry, you may encounter different conditions and may have to alter your routes or plans accordingly in the interest of avalanche safety.”
The RECCO® Avalanche Rescue System is an avalanche rescue system utilized by more than 500 rescue organizations worldwide to assist in the efficient location of burials. First introduced in 1983, the technology was developed by Magnus Granhed with the cooperation of Stockholm’s Royal Institute of Technology in response to his personal experience with an avalanche tragedy. Since then, the system has proven itself effective in the field and been adopted by an extensive network of major ski resorts, helicopter skiing operations and search-and-rescue organizations in Europe, Japan and North America.

The RECCO System enables rapid directional pinpointing of a victim’s precise location using a reflective principle integrated into apparel, helmets, protection gear or boots. There is no learning curve for use of the RECCO Reflector. The piece can’t be forgotten since it is permanently attached and it needs no batteries to function. The manufacturer has taken responsibility for incorporating the reflector into their design, so no additional investment is required of the consumer. RECCO reflectors do not prevent avalanches nor do they guarantee location or survival in the event of a burial, but they do assist organized rescue crews in pinpointing the burial location.

Although similar in search procedure to transceivers, the RECCO System is not intended for companion rescue and is not an alternative to transeiver use in the backcountry. Complementary in function, the system is an additional tool that does not interfere with other rescue methods such as avalanche dogs, transeiver searches or probe lines. The RECCO System facilitates a faster pinpointing of a victim’s location.

The RECCO Avalanche Rescue System is now in place in more than 500 areas throughout the world, and is the only system for rescuing avalanche victims specifically designed for the average skier. The company was established in Sweden by Magnus Granhed in 1983, but the RECCO story actually began back in 1973, with a fatal avalanche...

It was December 30, 1973, in Åre, up in the Swedish mountains. The snow had become much deeper during the month, and this was followed by a period of cold weather with light snowfall. Then, three days before the accident, there was a sudden switch to milder temperatures with occasional rain and snow.

After lunch that day, Magnus Granhed, the founder of the RECCO System, took the lift up to the popular Mörvikshummeln. He was halfway up, when he heard a tremendous roaring sound. After passing the last rise he saw that an avalanche from the Svartberget mountain had come to a halt in a ravine.

People nearby were shouting: “There’s been an avalanche!” But as so often in the aftermath of an avalanche, nobody knew how many people, or who, had been swept away in its path. “We started to search with our ski poles,” recalls Magnus. Later, probes and avalanche rescue dogs were brought to the site; in those days that was the only help available. “I felt so utterly helpless poking a ski pole into the snow in an area as large as 100 meters by 100 meters.”

Locating and digging out the two skiers took about three hours, by which time the Swedish mid-winter darkness had already descended upon Åre. They were both dead. And it turned out that one of them was a friend of Magnus. “I felt absolutely dreadful. I knew that he had a wife and a child. You are not prepared for this sort of thing. There you are out enjoying skiing in the sunshine, and then suddenly somebody is dead.”

Through his work with the RECCO project, he has met many people who have lost relatives or friends in avalanches. They often talk about trying to understand how somebody who has been regarded as being very responsible could be killed in an avalanche. “I can hardly think of a more tragic accident than when a person is killed in the prime of life, leaving parents as well as children to mourn.”

ARE THERE BETTER SEARCH METHODS?

The accident in Åre set him thinking about the possibility of an electronic locating device which could trace people buried under avalanches. Magnus Granhed had just graduated with a Master of Science degree, and turned to Professor Bengt Enander, Department of Electromagnetic Theory at the Royal Institute of Technology in Stockholm.

Bengt Enander led a research project in radiometry that included a study of the thermal radiation of the human body to see if it might be possible to detect cancer tumors.

Could this be a way to locate buried skiers? A number of tests were undertaken in the Swedish mountains, but it soon became clear that snow was too heterogeneous a medium to enable a rescuer to locate a buried body with the help of radiometry. So then they moved on to try out other techniques.

Work on this took about two years, and finally led to a PhD within Enander’s...
research team. The thesis contained a presentation of the technique that came to form the basis for the RECCO System. If you could not locate a buried body with the help of radiometry, then why not provide every skier with some sort of reflector, so the researchers reasoned. Transceivers had been introduced in the late-1960s, and there had been talk of creating a passive system, as the transceivers were considered to be too expensive and too complicated to be used by everyone. Work was carried out in this field, for example at the University of Grenoble, but none of the projects resulted in a functional product.

THE PROBLEM WAS SOLVED WITH HARMONIC RADAR

At that point, the best option seemed to be what is known as harmonic radar. With that technology it had become possible to create a directional receiver which could locate a reflector worn by the avalanche victim. Just as is the case today, the reflector consisted of a diode that generates a harmonic when it is hit by the radar signal from off and being able to hear the rustling of leaves being raked together just close by,” says Magnus, and continues: “At first, we had a range in air of 5 meters, and now we can manage more than 200 meters. I don’t think anybody would have thought we’d ever be able to optimize the system to that extent.”

PURPOSE-BUILT EXPERIMENTAL LABORATORY IN ÅRE

In those days, knowledge of harmonic radar was limited and little was known about the behavior of microwaves in snow. In the winter of 1978-79, an experimental laboratory was set up in Åre in order to find out more. Every two hours, signals of different frequencies were sent through the snow.

“It gave us an understanding of how temperature and moistness of the snow affect the signals,” says Granhed.

THE FIRST MODEL WEIGHED 16 KG

The first prototype was constructed in the winter of 1980-81, and field tests were carried out. For the first time, a rescue team was able to do a search and hear the confirming sound signal when the search antenna was directed straight towards a buried reflector, just as with the current RECCO System. And the closer they came to the target, the louder the signal became.

The first equipment for commercial use was introduced in 1983. It weighed all of 16 kg — the model in use today weighs only 1.6 kg.

“We started testing the system in Zermatt in 1984,” says Granhed. The explanation for the growing interest in the RECCO System was a combination of lower price and the fact that the search equipment had become much lighter and easier to handle. This was thanks to the mobile telephone industry, which developed increasingly smaller components for cell phones during the mid and late 1990s.

REFLECTORS INCORPORATED INTO OUTERWEAR

Following the lead of the increasing number of ski areas that have acquired RECCO search equipment, at present more than 500 ski areas worldwide. A growing number of manufacturers of outerwear, ski and snowboard boots, protection gear and helmets incorporate reflectors in their products. And it is not only the search equipment that has been continuously developed and improved, having progressed through six generations since the start; the reflectors have also gone through major developmental stages. “Twenty years of work lie behind today’s small reflectors. Despite their size they are a considerable improvement on the clumsy things we used in the beginning”, explains Granhed. Has there been a change in attitudes to safety since the avalanche at Åre thirty years ago?

“Oh, definitely,” says Magnus. “Among skiers as well as at ski areas. Somebody once said that off-piste skiing isn’t dangerous, but skiing in avalanche-prone areas is. It has taken a generation for that attitude to take root.”
Yes. The RECCO® System is a useful tool for helicopter-based search efforts.

DO I EVER NEED TO REPLACE A BATTERY IN THE RECCO® REFLECTOR?
No. It is a passive device that does not require a battery for operation.

CAN I USE A RECCO REFLECTOR INSTEAD OF A TRANSCEIVER?
No. The RECCO System is a great complement to - but not a replacement for - a transceiver.

CAN SKI PATROL USE BOTH TRANSCEIVERS AND A RECCO® DETECTOR SIMULTANEOUSLY IN A SEARCH SITUATION?
Yes, since their function is complementary they can both be used at the same time in the same search area.

CAN THE RECCO SYSTEM BE USED FROM A HELICOPTER?
Yes. The RECCO System is a useful tool for helicopter-based search efforts.

WHAT IS THE RANGE?
The RECCO® System’s maximum range through the air is 200 meters; the working range through snow is approximately 20 meters.

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