by-hold accounts are contained in separate climbers' guide-books and this one can concentrate on more general matters, such as a new systematic coverage of all the hills. It carries out this task remarkably well. The non-quotation of a price seems to align with modern practice. Is the price likely to rise so fast that it cannot be pin-pointed? If so, buy now, for it will never be cheaper. Or is the system designed to enable sellers to charge what the traffic will appear to stand? It would be much more satisfactory if the price were guaranteed for a specified period.

Equipment and Technique 1976

T. M. Connor

The use of chalk, mentioned in these pages last year, still continues to be a subject of debate and a series of letters have appeared in the pages of *Mountain* and elswhere which exhibit most of the possible shades of opinion on this subject. There seems no doubt that its use has to some extent become a fad, so that it is frequently employed when not really necessary. Also, in spite of its protagonists' claims, it can spoil climbs for those following by marking and clogging holds. It also can create a considerable eyesore and rain is evidently not a very effective agent for its natural removal, in spite of claims to the contrary. However, there is also no doubt that chalk is here to stay and that it has been instrumental in allowing aid to be cut on certain climbs. One hopes that a climate of opinion will develop among climbers which will lead to a natural restriction of its use to occasional holds where it is really vital. Overliberal use of chalk should be regarded in the same light as too great a reliance on aid, i.e. as climbing in bad style.

A number of useful reviews of equipment have appeared this year in *Climber and Rambler.* Methods of attaching a rope to a climber using waistlines and the various types of harness were reviewed in the February issue (p. 21). Subsequently there was some correspondence about the use of sit harnesses which some believe can be dangerous, since if a climber is knocked unconscious in an accident he will almost inevitably fall in an inverted head-down position. In fact there is probably no best solution to cover all eventualities and there is no doubt that harnesses have in general considerably improved the chances of survival of climbers involved in falls—one climber was rescued after hanging for 9 hours in mid-air in a harness after a fall on the Main Wall of Cyrn Las. In the March issue (p. 39), Rohan salopettes (which are in fact climbing overalls) were mentioned. These evidently have their advocates: Joe Tasker used them on his ascent of Dunagiri and seemed very pleased with them although he indicated that certain modifications were necessary to allow a practical means of satisfaction of one's natural functions at high altitude. A big advantage is the elimination of heat loss caused through clothes parting at the waist. The October issue (p 25) contains a survey of the various types of sleeping bag currently available.

A note in *Off Belay* (February 1976, p 37) describes some safety tests carried out on a number of lightweight stoves used by mountaineers. It appears that many models produce a considerable concentration of carbon monoxide e.g. 10 parts per million, when the pan is placed over the stove in the position dictated by the design. This could lead to carbon monoxide poisoning if the stove is used in a closed tent; it is suggested that many cases of so-called mountain sickness are in fact caused by such poisoning. It was found that the level of carbon monoxide produced could be considerably reduced if the pan was held in a position about one inch higher than normal. It is suggested that an additional pan support be fashioned out of heavy wire if it is proposed to use such stoves in a closed tent. Stoves using alcohol as a fuel were found to produce large amounts of carbon monoxide irrespective of where the pan was placed.

The International Standards Organization is addressing itself to the problem of standard performance specifications for skis and bindings with the objective of improving the safety of these vital items. Whilst this move will primarily be of concern to piste skiers rather than mountaineers, it is obviously of importance to the increasing numbers of people who like to get away from the crowds and use their skis for touring

or for ski-mountaineering. Failures or malfunctioning of ski equipment can lead to much more serious situations in these circumstances than is the case on the piste, so that any move which improves safety factors without hampering new developments too severely is to be welcomed. A further item of interest to the ski mountaineer is a review of the various models of skin and attachment mechanism which are currently available (*la Montagne 4*, 1975, p 197)

A recent trend which is the result of the ever increasing cost of mountaineering equipment is the appearance of do-it-yourself kits which enable the climber to make his own gear. Judging from the frequency of advertising, this potential market seems to be better developed in the United States than in this country, although recently some English firms have started to sell kits. The high cost of down has made duvet and sleeping bag kits the most popular items. A review of American kits was given in *Backpacker 17*, 50.

The contributions made by equipment to the success of the Everest SW Face Expedition were mentioned last year. One interesting further detail concerns the use of solar cells; these have tended to be employed in situations where money is no object e.g. as power supplies for satellite instrumentation. It now appears that smaller versions are available to satisfy more mundane needs. Ferranti are producing solar cell modules (MST 100) which can be used for battery charging, some of which were used on Everest to charge camera batteries. The output under maximum solar illumination is 8 volts at 0.21 amps—as the sunlight decreases the current drops, but the voltage remains approximately constant, an ideal characteristic for battery charging.

To conclude on a less than serious note there follows a quote from an advertisement which appeared in the magazine *Alaska* for November 1976, which is self-explanatory:

> 'Winter sportsmen who want to avoid the miseries of cold feet depend on battery-heated Lectra-Sox to keep their feet warm in icy weather. Long favoured by hunters, ice fishermen and winter sports spectators, D-cell battery powered Lectra-Sox, with snap-on snap-off heat controls supply all the comforting heat your feet ever need in the cold outdoors. Special Thermal-knit in stretch sizes to fit all.'

Did the Everest team know about these technological miracles?

The following note has been kindly provided by Ryszard Rodzinski and Marek Brniak:

Mountaineering and motor-bikes For a long time now, since 1966 to be precise, most Polish mountaineering expeditions have used their own lorries, minibuses, sometimes cars or even motor-bikes as means of transportation. It would be difficult to mention here all the expeditions involved because we organize about 10 of them a year to various mountain ranges on all the continents.

Of course there is nothing strange or new about the use of motor transport in the field of mountaineering. Lots of expeditions before availed themselves of hired trucks and many enjoyed the advantage of having their own transportation. However, it was never done on such a large scale as the Polish climbers do. Employing vehicles capable of carrying the whole of an expedition together with its gear and members, we have worked out our own system of organization, based on very scrupulous economic calculations with regard to vehicles.

Expeditions aiming for the mountains of Central Asia cover distances of some 20,000–25,000km while the 'Expedicion Andina Polaca–73/74' travelled 30,000km and, thanks to having their own independent transport, they were able to operate in 4 different mountain groups situated one very far from another in 3 different countries. A great advantage of such expeditions is the very limited cost of transport. It brings a saving of 50–80 per cent compared with the charges for other means of carriage including hired vehicles, shipping or aerial conveyance. In the Polish case the savings are particularly high because our parties are given the vehicles free from testing divisions of the motor works and these are then shipped free on cargo boats of the Polish Ocean Lines. All this has been possible thanks to our climbers enjoying a good reputation with the public, the Government authorities and in industrial circles.

Properly planned expeditions should produce not only sporting achievements, but also good results in the fields of science and propaganda, points of great importance to those sponsoring them.

The only fault of expeditions using their own vehicles seems to be a fact that they

107 The 1972 Polish Andean expedition vehicle and motor-bikes (Photo: W Maczek)

108 The 1974 Polish Patagonian expedition vehicle, with Sajama, Bolivia (Photo: R. Rodzinski)

take much more time. This is not such a problem, however, for the Polish climbers who, in most cases, are allowed fully paid leave of many months. Apart from the financial factor such expeditions enjoy a complete freedom of movement and are able to escort their equipment, otherwise exposed to some danger of being stolen, lost in the mails or blocked in the customs. They also learn much more about the geography of the countries visited.

It was not so long ago when we were on the verge of pooh-poohing a project employing motor-bikes but, before long, were surprised to discover how well they withstood all the tests. These were used in the course of our expeditions to the Andes in 1972 and to the mountains of Patagonia in 1973/74. The goal of one of these parties was a reconnaissance into some regions unknown to Polish climbers to derive information for possible future expeditions. The bikes employed proved to be very useful as they afforded possibilities for fast, synchronized activity by small groups in different regions. They also enabled us to penetrate along the valleys to a distance of about 10km from the base camps established on the spots accessible to the lorries. During these adventures some of the bikes reached a height of over 5300m. Being much faster and more manageable than the lorries they are also extremely helpful in reconnoitring badly marked tracks and roads in the course of long rides of several days. They are indispensable when looking for bivouac sites, inquiring for or buying food. They are economical and easy to park and so help a lot to get about big towns when dealing with the unavoidable formalities.

In the course of our many expeditions plenty of vehicles of various Polish makes were used. Among those worthy of mention are the splendid, 6 wheel 3 axle driven lorries (Star 56 and Star 266)—capable of forcing water obstacles 1.80m deep. As for the motor-cycles, the light sports models WSK 175 Sport and WSK 125 Sport proved to be unfailing and most reliable on the roadless, mountainous tracts of South America.

Of course, it is necessary to have an expert mechanic on such an expedition, but nowadays it is very easy to find specialists in all the fields of human knowledge among alpinists.

Wandering a bit away from the point we would like to stress that an immense development in mountaineering during the past 20–30 years took place thanks only to the adoption of the modern techniques, materials and equipment and to an increasing trust in their efficiency. Planes and helicopters have been tried already. Now we should be prepared for further progress by employing newer and newer means of transport like specially designed tractors or hovercraft.

Science Notes 1976

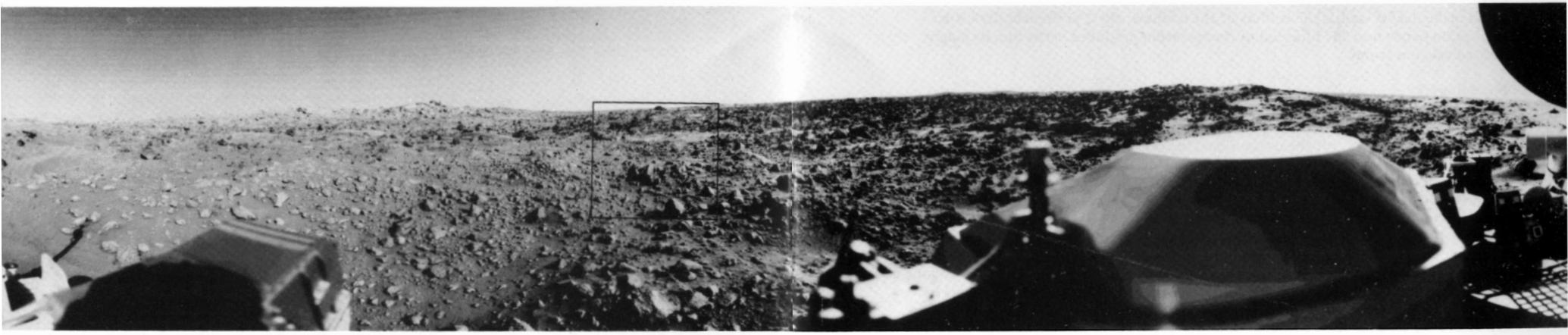
Peter Stubbs

Undoubtedly the scientific event of 1976 was the doubly successful voyage of the 2 Viking spacecraft to Mars, and the landing of the 2 soft-landers in separate regions of Mars. Man's first close-up look at our neighbouring planet revealed boulder-strewn surfaces interspersed with sand dunes and gravel patches resembling a typical desert of the kind found in the western USA. The surface was truly red, and the boulders angular and often pock-marked, implying a volcanic origin; rocky outcrops appeared to be formed of lava. The soil of the undulating landscape was much shallower than that of the Moon. There was little sign of the smaller craters typical of the lunar surface, though the rims of larger ones could be made out in the distance

In the Martian summer at Chryse, the landing site of Viking 1, and Utopia, the site of Viking 2's landing, winds reached a mere 5 to 25 mile/hour—small beer compared to the 200 to 350 mile/hour winds which apparently run riot in the unfavourable season, and probably shape much of the Martian topography. Surface temperatures measured by the Vikings ranged from -86°C to -30°C and the atmospheric pressure close to the surface was a mere 7.7mbar. In the high atmosphere, temperatures recorded between 250km and 135km were substantially lower than on Earth at comparable heights.

The Vikings proved that Mars contains some 2.7 per cent of nitrogen and less than 2 per cent of argon in its atmosphere—both factors important in deciding how the planet evolved (95 per cent of the atmosphere is carbon dioxide). The presence of nitrogen raised hopes initially that life forms might be found on Mars and, indeed, the first experiments of the life-seeking equipment looked decidedly hopeful. However, the biochemists were misled by exotic chemical processes of unknown origin in their surface soil samples and the final conclusion about life on Mars turned out to be a negative one: there was no photosynthesis on Mars.

Other new results won from the Viking missions were the surprise that the Martian poles are glaciated with water-ice, not frozen carbon dioxide as supposed. Temperatures recorded by the orbiters' infrared detectors were too high for solid carbon dioxide. In fact, it begins to look as if Mars may be completely coated in a permafrost mantle of water-ice beneath its rocky surface. Certainly there is no extensive reservoir of carbon



109 Martian panorama (Photo: NASA)