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to spin the rotor at the speed necessary to keep the blades spread. If that happens, the blades may fold upwards—and that's that. It's known as "coning" of the blades. A free-wheel clutch, which permits the blades to go on spinning without power, prevents this happening as long as the air speed is over 20 m.p.h. In that case the machine can glide forward like an autogyro (in which the blades spin freely). As long as it has wheels, it can then be landed safely.

What Could be Done?

Now when you look at all those conditions and limitations, you can see that no operator in New Zealand could justify the expense of running a helicopter (and providing spare pilots) for ordinary transport work. I doubt whether it would be worthwhile for the jobs that are done by the P.W.D. and Internal Affairs Department—which are co-operating for the control of wild life and soil erosion. Even for sending supplies to the most inaccessible spots, the cost of running a helicopter would not be justified.

Nor would the State Forest Service be likely to have enough work for one at present—or the Marine Department (for rescues, and servicing lighthouses). *But*—these various uses, plus the rescue of mountaineers, could all be worked in together if there was a helicopter in each island, maintained and flown by the R.N.Z.A.F. (thus giving some pilots a kind of training that is likely to become essential in due course).

An analysis of mountain rescues over the last 25 years proves (what is fairly obvious anyway) that the danger spots in the North Island are Egmont, Ruapehu, and the Tararuas. Ohakea is centrally placed for those.

In the South Island, the accidents all happen between points a bit south of Mt. Cook, and a bit north of Arthur Pass—or Arthur's Pass as most people call it. Wigram aerodrome is strategically situated for that region.

And the point about the helicopter is this—that although most of the time you think twice about the cost of the thing, against the use you're likely to get out of it, there comes the time when you would give anything to have one at hand. Actually helicopters are no good for urgent missions involving long distances. For the rescues of air crash victims near Gander in Newfoundland last year, helicopters were dismantled and carried from New York to Newfoundland in big transport planes. Then they were reassembled in four hours to do their mercy flights.

But in New Zealand, two helicopters placed as I've suggested could handle all the likely work, as well as being ready for emergency missions. And if it happened that there was an emergency that called for a helicopter doing several hours' flying *without* its usual maintenance, no one is likely to worry about the machine's life being shortened for the sake of saving human lives. You *can* fly a helicopter beyond its usual limits if you have to. It just wears out sooner if you do.

Air-Sea Rescues

One place where a third helicopter might be justified would be Auckland, where most of the yachting accidents happen. A helicopter fitted with a power winch can hover over a capsized crew, and haul the victims aboard without landing on the water.

And there is a way by which a helicopter can carry a load far exceeding its payload. When it is very near the ground, a helicopter sits on a cushion of air of its own making—the downwash swirls up again from the ground, and gives the craft much more lift than it has at a greater height.

That explains why the Sikorsky company is able to advertise its helicopters with a photograph showing a helicopter with men hanging on to it. In an extreme emergency, a helicopter fitted with pontoons could pick up and carry a number of men to land by skimming low across the sea on this cushion of air.

Crop-dusting is another use for the helicopter that might become practicable in New Zealand. In the United States a great deal of crop-dusting is done from ordinary planes, but that is possible there because in a continental climate there are plenty of flat calm days. Here the air is seldom calm enough to make the job economical. But the Americans have found that there are two very good reasons in favour of the helicopter for this purpose. One is that its operating expense is offset by the fact that you don't have to fly away to a landing ground to take on a new load. You can simply drop down in a corner of the field you are working on and reload. That cuts out a lot of dead flying. The other reason is that the downwash swirls the dust or spray into the foliage, and does a far more effective job than an ordinary plane, which has to let the stuff drift on to the crop by its own weight—with a good deal of waste if there is any breeze at all. In the United States it has been found that crop-dusting can go on under what the Americans would call windy conditions. In most parts of New Zealand "normal" conditions are similar to what the Americans call windy. So if crop-dusting is ever going to be considered here, the helicopter is the machine to do the job.

Two major difficulties remain. One is common to all helicopters anywhere in the world, and the other is a special one arising out of New Zealand's climate. The first is that no one has yet devised satisfactory flight instruments for the helicopter, particularly for blind-flying. At present the helicopter can only fly under "contact" conditions. At night, or in cloud, where there are no reference points for the pilot to check his height and direction, the helicopter will quickly get out of control. The second difficulty is that pressure-altitudes in most parts of New Zealand are high. For the purpose of flying, the "altitude" at sea-level (in terms of air pressure) varies from place to place. At Wellington it is usually 900 feet. That's to say, a helicopter taking off from Rongotai is already at a pressure-altitude of 900 feet. And if it had to land on or take off from a Wellington hilltop 1000 feet high, it would be as if the altitude were really 1,900 feet—all of which affects the behaviour of a helicopter fairly considerably when taking off or descending vertically.

So there are some problems still to be thought out. Budding New Zealand inventors can get to work if they like and try to devise flight instruments that will work in a helicopter.

And perhaps some day the helicopter will be able to cope with those two problems that still vex the handyman about the house—replacing a broken halyard on a 40-foot wireless pole, and getting out of the corner of the living room when all the rest of the floor is varnished.