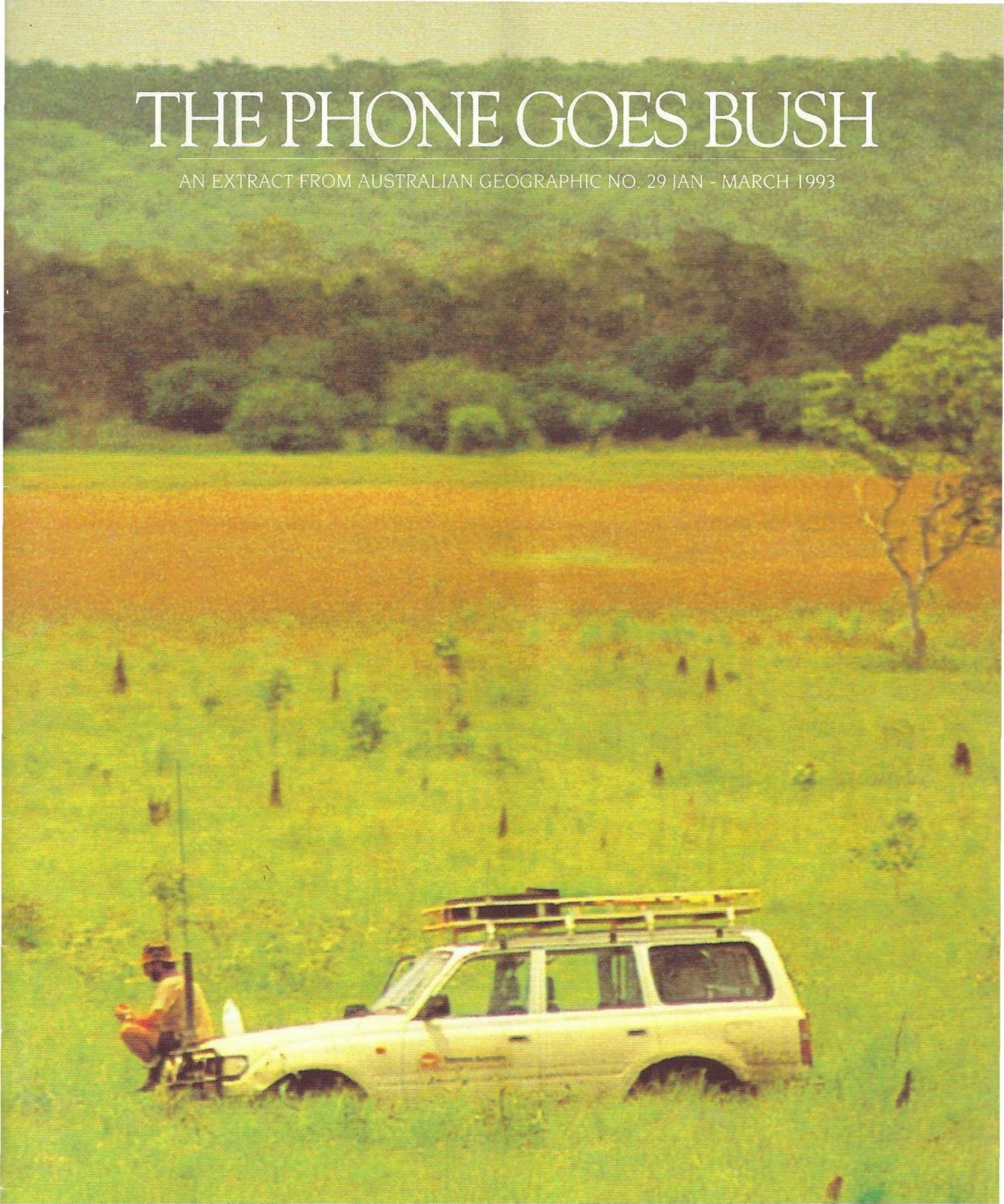


THE PHONE GOES BUSH

AN EXTRACT FROM AUSTRALIAN GEOGRAPHIC NO. 29 JAN - MARCH 1993



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A photograph of a woman wearing a wide-brimmed hat and a light-colored shirt, leaning on a rustic wooden fence. In the background, there is a long, dark building with a corrugated metal roof, identified by a sign as the Middleton Hotel. The scene is set in a remote, arid landscape under a clear sky.

The phone goes bush

Thanks to a project begun in 1984, remote Australia now has a modern, reliable telephone service. While some people are jubilant at the ending of isolation, others mourn the passing of an era. What is certain is that things in the outback will never be the same again.

TEXT BY KEN BRASS - PHOTOGRAPHY BY MIKE LANGFORD

Middleton, Queensland, has a single building and two residents. But though remote, the settlement is not out of touch. It has two telephones, one private and one public, and Telecom's new outback phone system enables businesswoman Pamela Busite, half of Middleton's population, to control her commercial interests more effectively.

DEATH had divided the Gapuwiyak community. Suicide, they called it, but it might well have been murder. By late afternoon, when photographer Mike Langford, Telecom's local technical chief Peter Roberts and I drove cautiously into the town, the young man's body had been taken away. Painted men with spears crowded the streets chanting and dancing to the clatter of clicking sticks. Women and children waved, but as we turned towards the house where we were to stay, a blazing petrol drum blocked our way. As with a crossed telephone line, we were caught, I thought, in a story that wasn't ours.

I was wrong. The proof I was after – that modern telecommunications were up and working in remote Australia – was right there before my eyes. This was Arnhem Land, in the Northern Territory. This was the Wet. But the storm on the horizon was nothing beside the emotional lightning in Gapuwiyak, 110 kilometres south-west of the rust-red bauxite town of Nhulunbuy, on the Gove Peninsula.

People were "very upset", according to Richard Whittington, director of the Gapuwiyak Homeland Resource Centre. He had never seen the Aboriginal town like this. We were to keep our doors locked and windows closed. Definitely no photographs. There was incessant talk among the Aborigines of reasons for the shooting, of causes, and of revenge, of "payback".

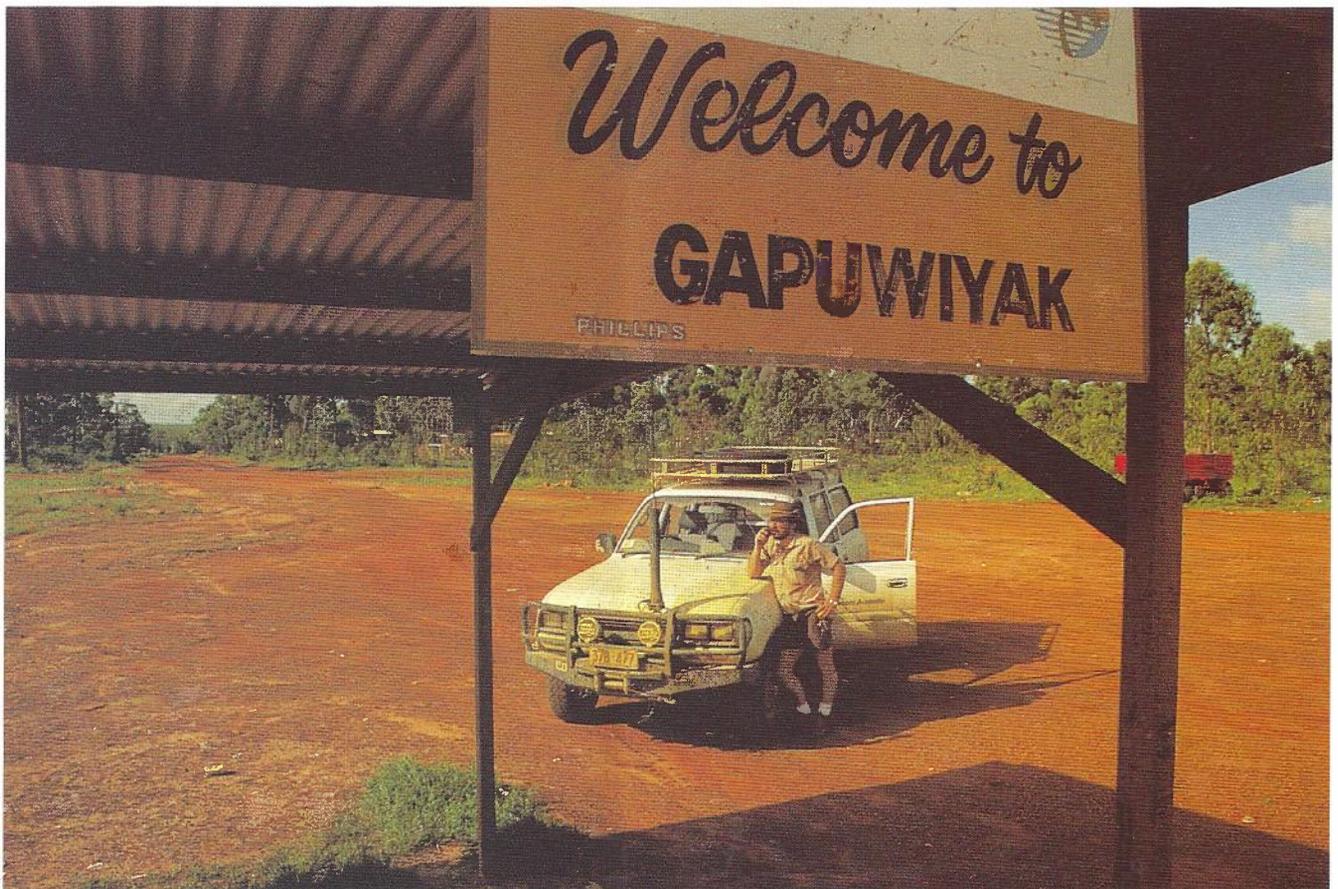
The phones, which had come to Gapuwiyak late in 1990, were running hot. There were 22 private connections and four payphones in the town. Reliable telecommunications had made it possible for the community of 750,

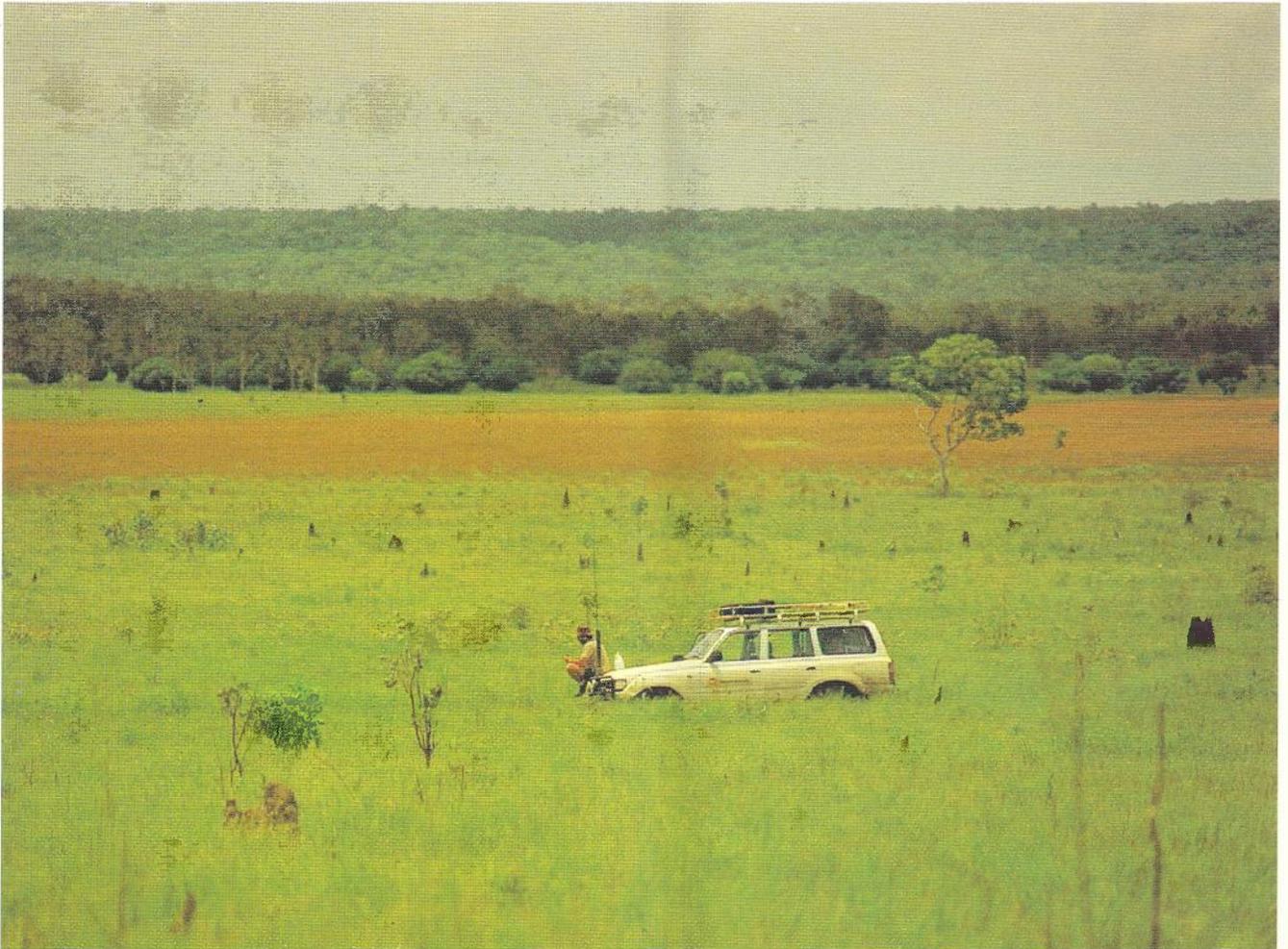
including those in its 14 out-stations, to begin establishing a mud-crab industry, whose success would depend on quick response to market demands. There were fax machines in the school, the resource centre and the council office.

But if positive proof were really needed that modern telecommunications had come to Gapuwiyak it was in their use to intervene in an issue of extreme sensitivity. In this community, divided family by family over the death, the phone had been used to summon a mediator from Elcho Island in the Arafura Sea. Like many other tribal leaders, he was coming by plane. An incoming call told of truckloads of warriors on the way, armed with spears.

I HAD GONE into Arnhem Land, generally closed to all but its Aboriginal inhabitants, in search of a revolution. Unbeknown to most Australians, life in the remotest parts of the country has been changed utterly by the arrival of a device most of us take for granted – the telephone. Telephones that work, and work all the time. Aboriginal communities and Torres Strait islanders are among Telecom's best new customers.

At Gapuwiyak, in Arnhem Land, local Telecom technical chief Peter Roberts radios the corporation's Nhulunbuy facility 110 km to the east. A death had caused turmoil in Gapuwiyak before Peter, photographer Mike Langford and I arrived. While men with spears danced and chanted in the streets to the clatter of clicking sticks, the community's phones ran hot, summoning elders to mediate.





Finding faults. Peter Roberts takes a break while driving us from Gapuwiyak to Mirrngadja out-station, whose public phone is out. Earlier we'd gone to check a phone fault in Gangan, a 300 km trip, and found a bent 50c piece stuck in the slot. Peter (right) shows community leader Harry Waturriguma the coin.

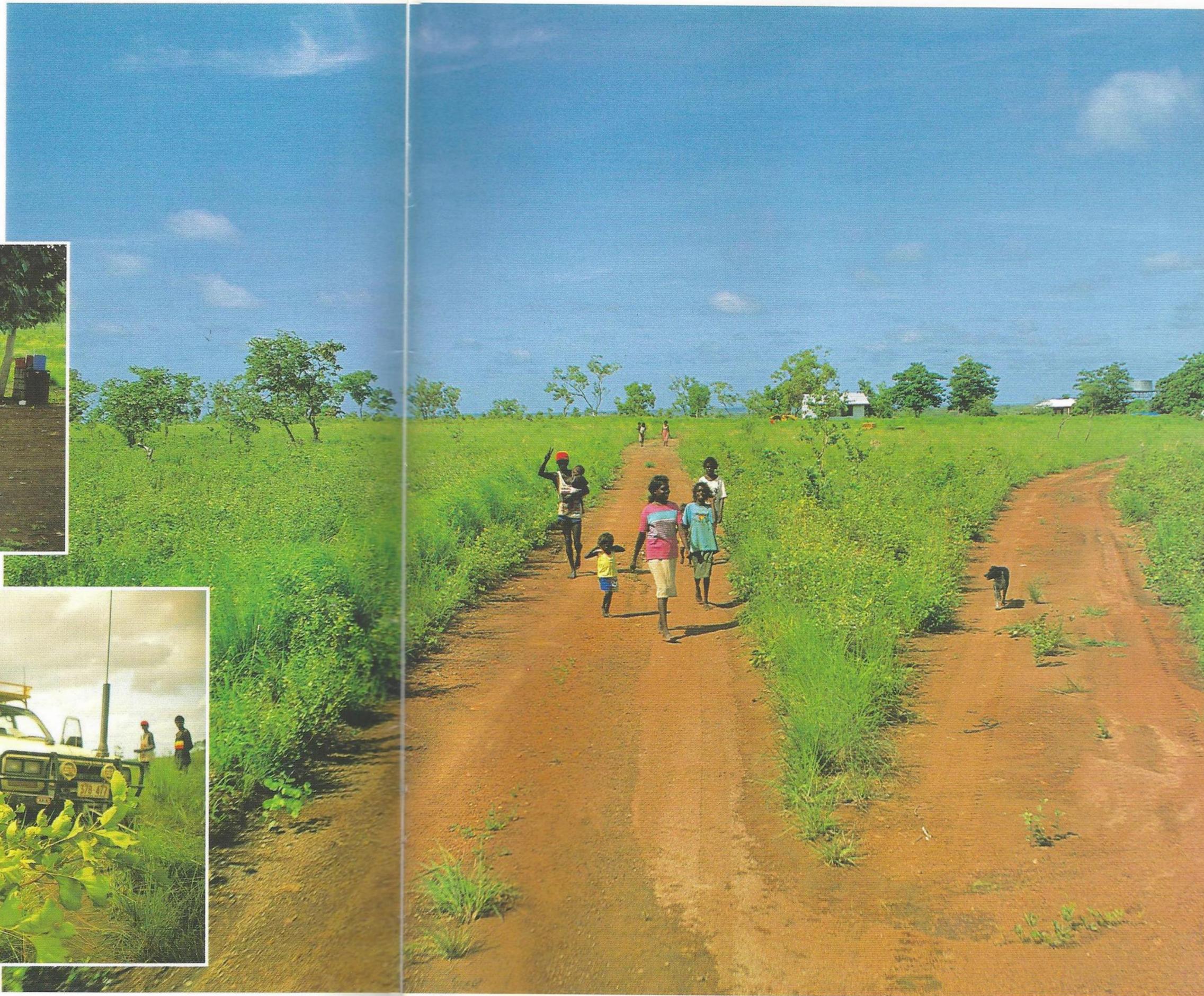
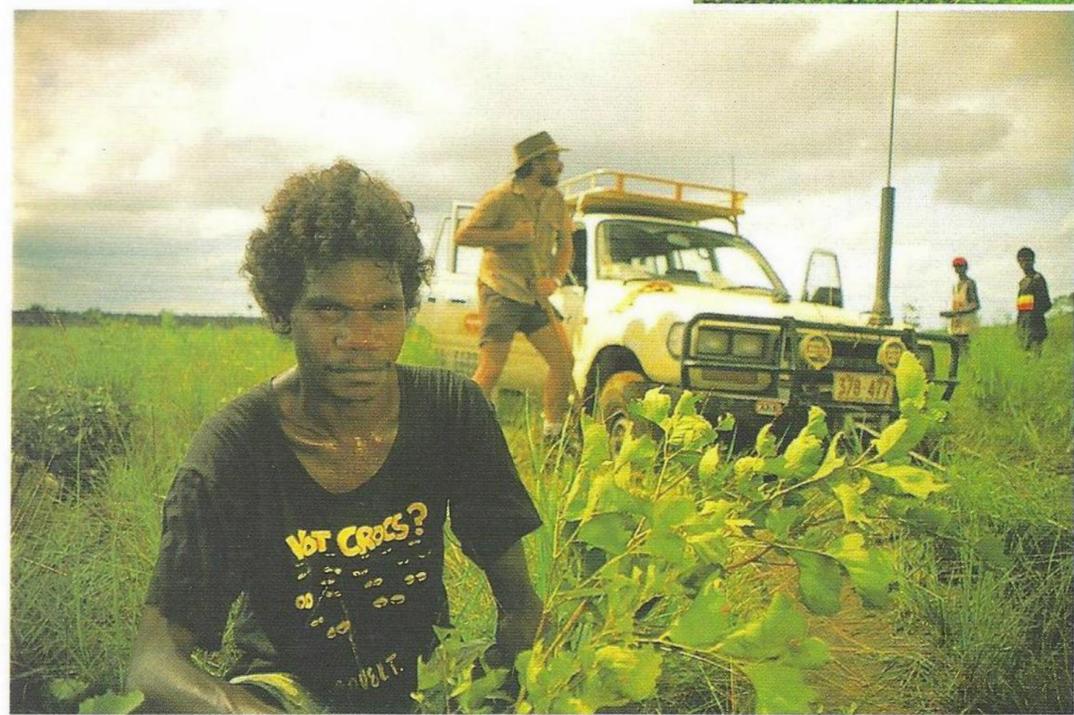
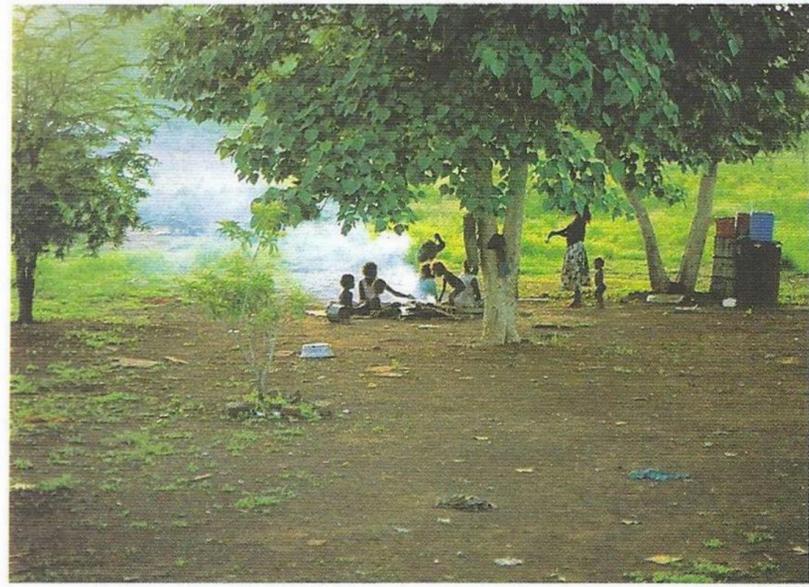
It was a time of change. Telecom and the Overseas Telecommunications Commission had merged to become the Australian and Overseas Telecommunications Corporation. Competition had arrived on Australia's telecommunications scene in the form of the private enterprise carrier Optus. And a project that began in 1984 was nearing completion.

Its aim had sounded straightforward enough: every Australian who wanted access to a modern, automatic telephone service (and the things that go with it, like facsimile machines and computer modem links) should have it. But making it happen was to be comparable to building the Overland Telegraph in the last century. Nowhere in inhabited outback Australia was to be more than a telephone call from anywhere in the world. I wanted to test the project's success.

The \$530 million Rural and Remote Areas Program, as the project was called, started out with objectives like automating the 26,000 lines that still went through manual exchanges.



Between violent storms, life at Mirrngadja (right and below) continues out of doors during the Wet. When we reached the out-station's three houses (there had been four, but one was destroyed by lightning), Peter checked the phone and said: "This has been exploded. Lightning too, most likely." A few hours previously we had bogged and had to be rescued by Terry Guyula (bottom) and other residents. They used tree trunks to lever our wheels out of the mud so that solid material could be packed under them. Later we bogged again and had to abandon the vehicle and fly out.



In central western Queensland in 1950 my late father-in-law, Bob McKenzie, and his brother Alistair had built their own 80 km telephone line to Aramac, their nearest town. More than 10,000 privately erected lines like this were to be replaced by automatic services. And 7700 new services were to be provided in areas like Arnhem Land that had never had phones at all.

My mother-in-law, Jan McKenzie, knows how well the program has worked for her. The old party-line phone used to go dead whenever it rained. Since the automatic phone came, she has been marooned alone by flood for a fortnight, but she could have chatted through it all to a mate in Manhattan.

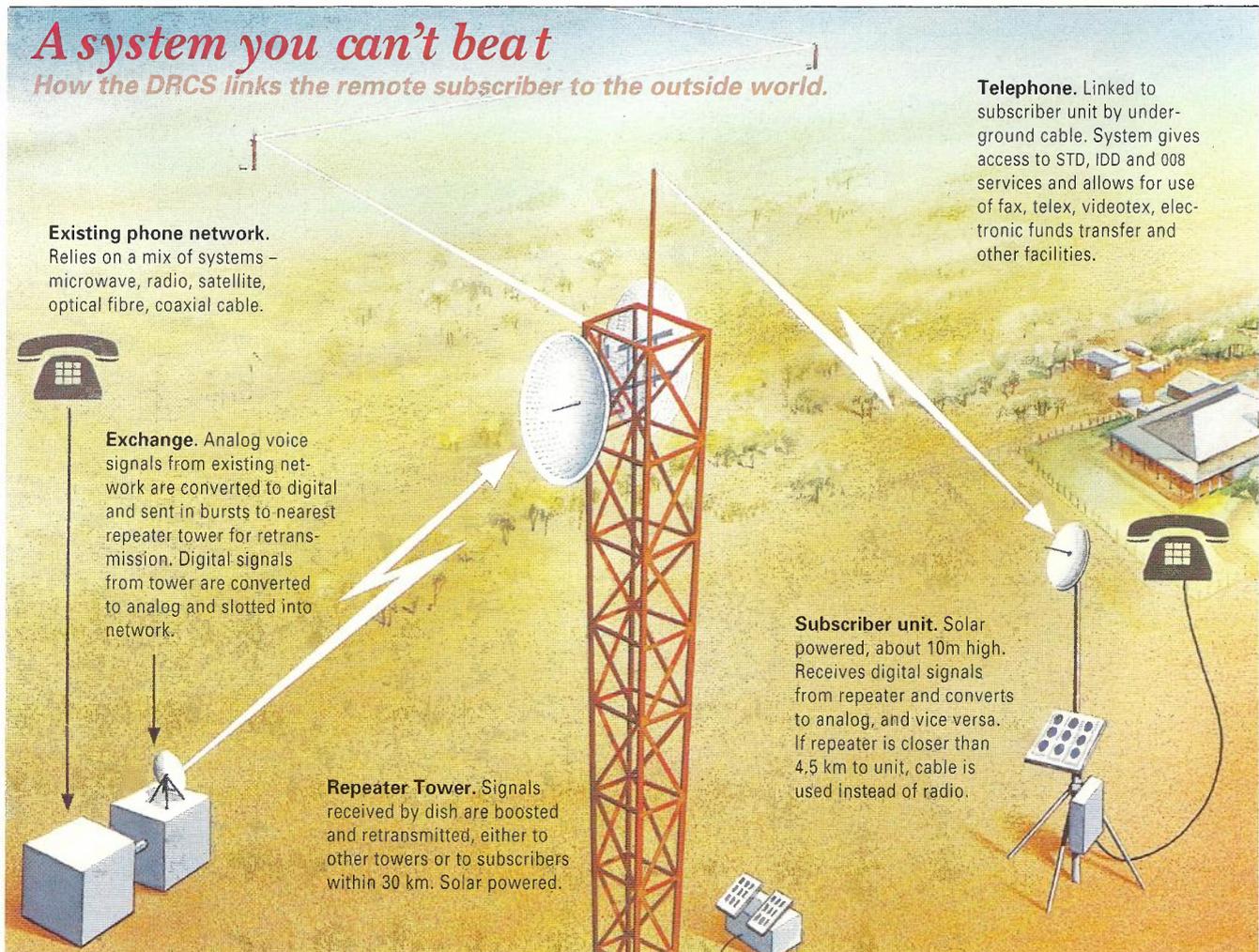
At the core of Telecom's \$530 million program to bring modern telecommunications to the outback is the Digital Radio Concentrator System (DRCS). Specially developed by Telecom for sparsely settled areas, the system uses radio signals beamed in concentrated bursts to link remote customers with their nearest automatic exchange, where calls are slotted into the national phone network. Between the exchange and the subscriber are repeater towers 40–50 km apart that boost and retransmit the signals. Up to 13 repeaters are used in any single DRCS line, giving a maximum of 600 km between exchange and subscriber.

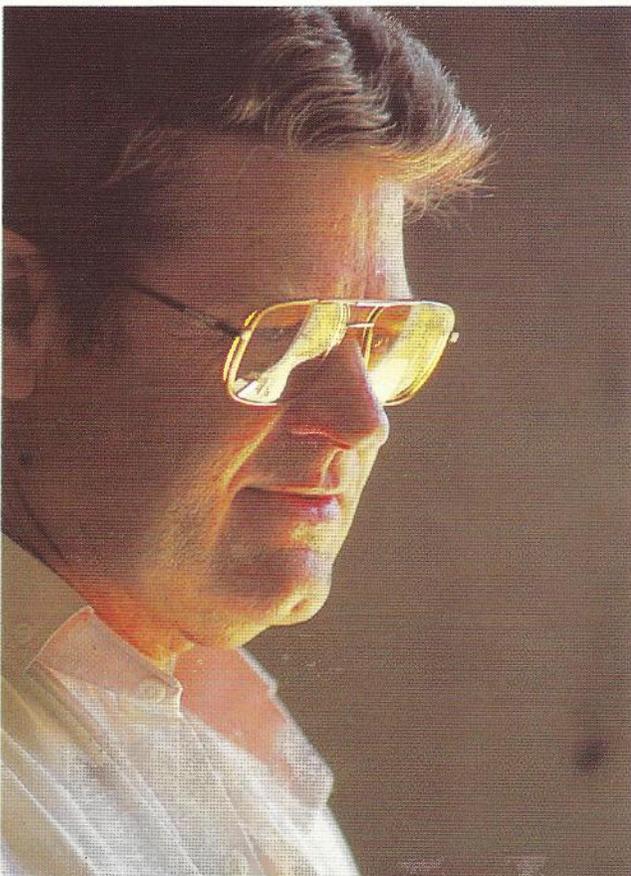
ONE OF THE FIRST THINGS I discovered on my journey was that the outback telecommunications revolution was not based on one modern system replacing a series of outdated systems. Different systems – microwave, radio, satellite, optical fibre and coaxial cable – have been, and will be, used for different situations, but the most important innovation has been the Australian-designed and assembled Digital Radio Concentrator System (DRCS). This plugs the last gap in Australia's inland telecommunications network.

I had witnessed modern telecommunications dramatically at work in ancient Arnhem Land. I realised that this was another chapter in a story as old as Australia itself, the overcoming of distance, of isolation. I should have been aware, however, that even bloodless revolutions have their costs. For some of Telecom's 45,000 remote subscribers, one high cost has been the loss of a sense of community.

Before leaving Sydney, I had phoned Rob Barrett at his 300,000-hectare property, Beverley Springs, in Western Australia's Kimberley region. He's had a phone since 1987. Before that, communication was through the Royal Flying Doctor Service radio.

"Every word you uttered was broadcast over an 800 km radius," he said. "If I had something private to say I had to go to a telephone." That meant Fitzroy Crossing or Derby, Rob's nearest commercial centre, a 200 km flight away or 300 km by road.





Tennant Creek Telegraph Station, in the NT, was one of 13 repeater and relay stations along the Overland Telegraph (OT) line between Darwin and Port Augusta, completed in 1872. Telecom's John Cooper (left) supervises the laying of today's equivalent, the optical fibre lines in SA and the NT.

He is much more confident of getting through in a medical emergency now but regrets the loss of community spirit. "The radio network kept isolated people in touch with each other. We had mates we'd never seen. The phone has tended to isolate people even more."

Rob told me of the time his five-year-old daughter, Alison, got lost on a distant part of the station. His wife, Judy, had a portable radio with her and raised the alarm. "Before you knew it, there was a helicopter, and people were coming in from neighbouring stations, some on horseback. They'd do the same today, but it'd be a lot harder by phone."

A few days after flying out of Nhulunbuy (the only way to leave during the Wet) I stood with John Cooper in the enervating air of a concrete bunker known as the Three Ways Repeater, 25 km north of the NT goldmining town of Tennant Creek. Locals call Tennant Creek the centre of the universe, so perhaps I should not have been surprised to learn that I was at the hub of a figure of eight drawn over the map of Australia's future telecommunications network.

John is the Telecom engineer in charge of optical fibre



Optical fibre cable: Contains up to 120 fibres. An optical fibre is a strand of hi-tech glass that carries signals in the form of laser light pulses. A pair can carry 7680 simultaneous telephone conversations, or a mix of TV and telephone. A typical cable is 12 mm in diameter and contains eight pairs of fibres. Telecom has more than 44,000 km of such cable in its network.

Coaxial cable: Contains 2-18 coaxial tubes, each consisting of a copper wire conductor 2.6 mm in diameter held inside a 9.5 mm copper tube by insulating discs. The copper tube is wrapped in stainless steel and a layer of insulating paper. A pair of tubes carries 2700 simultaneous conversations. Telecom uses about 14,000 km of coaxial cable in its network.

Microwave radio: Used in Australia since 1959, when it was installed between Melbourne and Bendigo. Microwave repeaters must be within sight of each other. The microwave system spans more than 200,000 km using some 4000 transmitter-receiver sets. Owing to shortage of space, not all microwave links in south-east Australia are shown.

Digital Radio Concentrator System: Integral to the Rural and Remote Areas Program, the DRCS was specially developed by Telecom. It uses radio signals beamed in bursts by solar-powered repeater towers 40-50 km apart. The DRCS covers more than 2.8 million sq. km with about 1000 repeaters. An enhanced version, known as the High Capacity Radio Concentrator, is also available.

Satellite: Telecom's Iterra system uses an Aussat satellite in geostationary orbit about 36,000 km above the Earth. Microwaves are beamed to the satellite by main earth stations at Bendigo and other centres and relayed to the dishes of about 65 customer earth stations serving about 2000 customers around the country.

Australia's phone network

How our calls are carried around the country

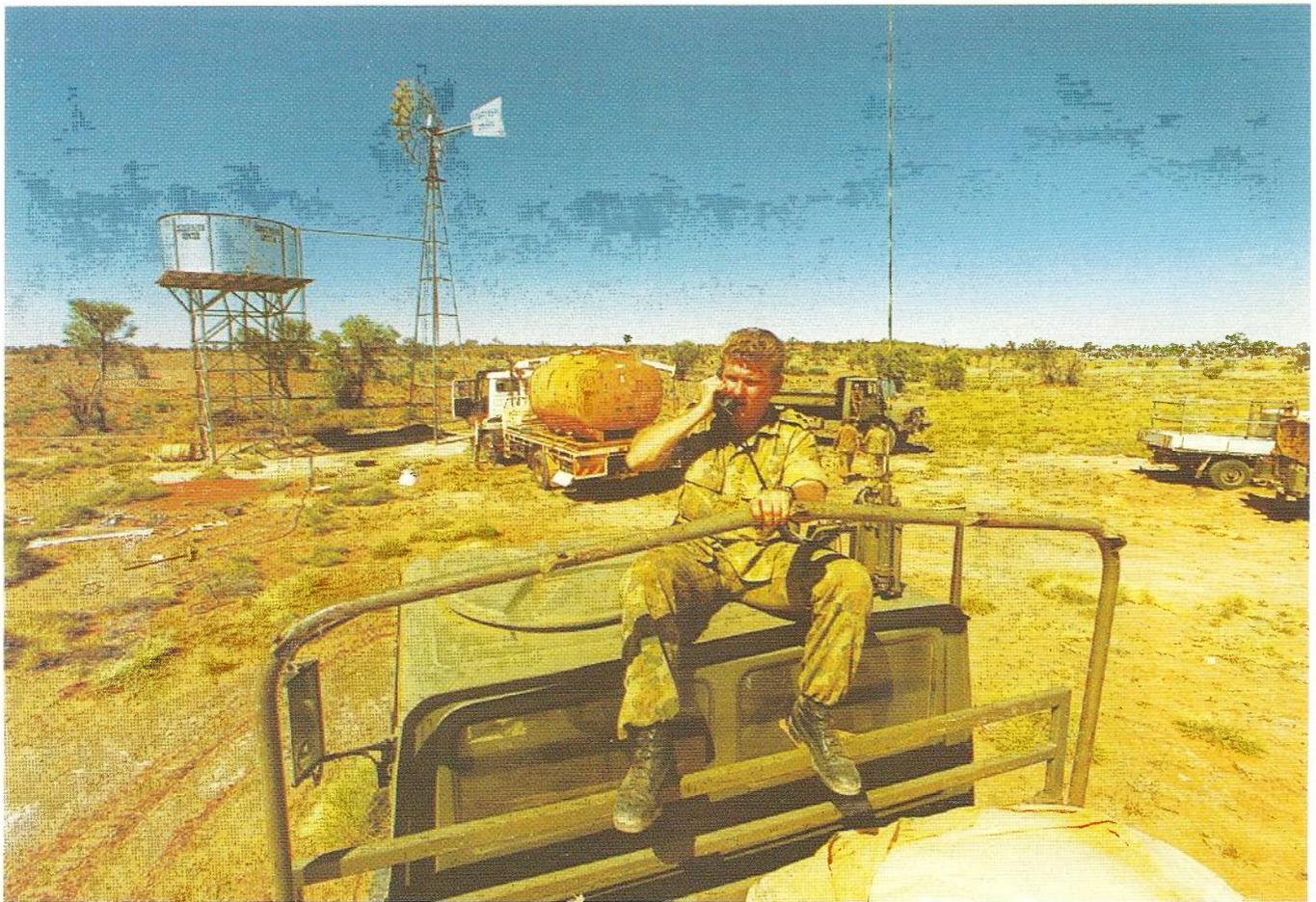


TELEPHONE

TELEPHONE

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AUTOMATIC TELEPHONE EXCHANGE

PHONE



Lacking the right vehicles for the job, Telecom called in the army to transport building materials for the DRCS installation at Kiwirrkurra, an Aboriginal community in Western Australia's Gibson Desert. Lieutenant Rod Farrar (above), of the Darwin-based 7th Logistic Company, radios his unit's base near the community, having just overseen the delivery of a load to a repeater tower site. At \$3 million, the Kiwirrkurra DRCS link was the most expensive in Telecom's program. On average, DRCS installation works out at \$20,000 per customer. Telecom has pegged installation fees at \$1501 for new subscribers and \$624 for existing ones, which means the system has had to be subsidised by other parts of the national network. At May Downs station, the Lord family (left) can see the Mount Isa chimney from their DRCS subscriber unit. James and Marjorie and their sons Archie, right, and Darcy, were linked to the DRCS in 1990.



their 243,000 ha property, May Downs. Beyond the hills we could see the landmark chimney of Mount Isa. The DRCS came to May Downs in 1990.

"Till you've got a phone you don't know how badly off you were," said James. "I had some forms to sign and send to three different banks the other day. I did it in about 10 minutes on the fax. I reckon it would have taken weeks otherwise. And now when we order a part, we get the right one. You just tear a page out of the book, mark the part and put it on the fax."

Anton Lane, an engineer who worked on the design of the DRCS in north Queensland, told me how helicopters had been used to determine the best positions for the repeater masts. These masts gather the signals from surrounding properties and send them skipping from one repeater to the next to the exchange, where they are slotted into the national network.

A helicopter with a transmitter would hover at the proposed site while another carried a receiver and antenna to the properties. At each the helicopter would raise and lower

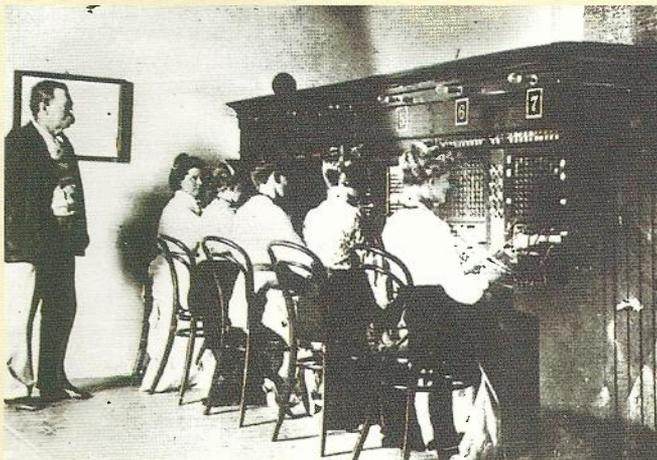
It all began 120 years ago...

OVERLOOKING Darwin Harbour, near the corner of Cavenagh Street and Harry Chan Avenue, a small plaque marks the site of the first of the 36,000 poles of the Overland Telegraph. In 1872, when the cable went into the sea to take morse messages to England via Java, India and Europe, Australia's isolation officially ended.

Just four years later, on 7 March 1876, the US scientist Alexander Graham Bell patented the telephone. Within two years, experiments with telephony in Australia had been successful and, in September 1880, the privately owned Melbourne Telephone Exchange Company began operating.

Australia took to the telephone eagerly: by 1911 there were 100,000 in use. In 1912 Australia's first public automatic exchange (and the first in the Southern Hemisphere) was installed in Geelong, Victoria. The first automatic country exchange came in 1925, and by the late 1930s the pedal wireless of the Royal Flying Doctor Service had been adapted for voice transmission. In 1966 subscriber trunk dialling (STD) was introduced to the Australian network, and in 1976 international subscriber dialling (ISD) became available.

The microwave radio system, whose towers on remote hilltops still symbolise the shrinking of distance, was introduced between Melbourne and Bendigo in 1959, and the first interstate coaxial



COURTESY: TELECOM AUSTRALIA HISTORICAL COLLECTION

Conditions at the Melbourne Telephone Exchange (left) may have been trying, but the equipment was the latest. The exchange opened in 1880, eight years after the OT line was completed. Stations on the line, like the Peake Telegraph Station – whose ruins (below) stand near Lake Eyre – boosted the signals. At bottom is the telegraph station at Port Darwin.



DICK SMITH



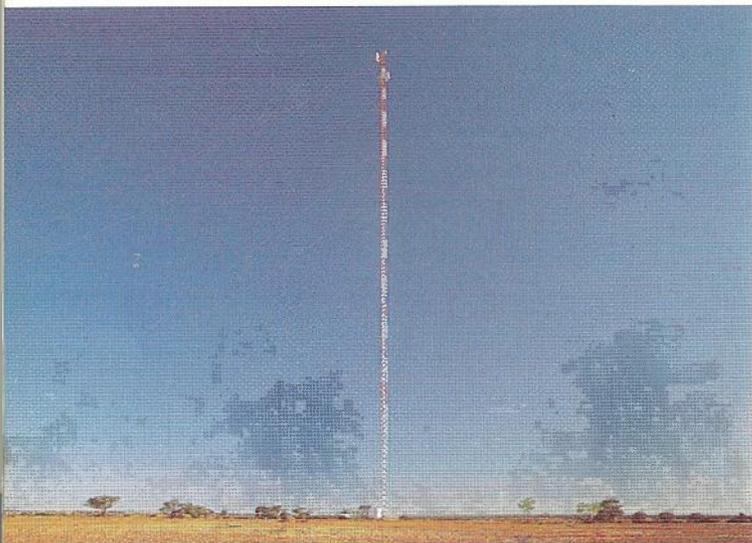
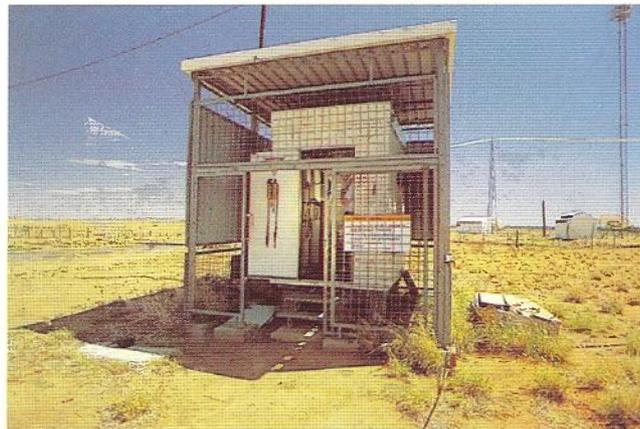
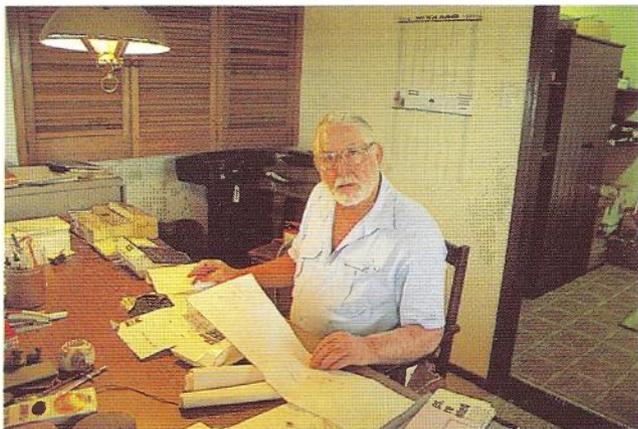
COURTESY: TELECOM AUSTRALIA HISTORICAL COLLECTION

cable, with hundreds of telephone and telegraph channels, linked Melbourne

and Sydney in 1962.

The first long-distance optical fibre cable, poten-

tially the most important telecommunications innovation in 100 years, was laid between Darwin and Katherine in 1985. At 8 a.m. on 12 June of that year, in the Daly River district of the Northern Territory, Noni Morris called her son's family in Brisbane. It was the introduction of the Digital Radio Concentrator System, the Australian-designed and built technology at the core of Telecom's Rural and Remote Areas Program.



From his office on Magowra station, 25 km south-west of Normanton, Wallace Logan (above left) looks after substantial pastoral interests in northern Queensland. His properties are linked by 10 separate lines and he acknowledges that the fax has revolutionised his job. It's a far cry from his days at Rolleston, in central Queensland, when his link with the outside world was a 65 km line made of fencing wire strung from tree to tree. "It went out as soon as it rained," he said. The DRCS, as symbolised by the repeater at Bedourie (above) and the 150 m high tower at Badalia station (left), will be cheaper to maintain than the systems it has replaced, Telecom says. It will also be cheaper than satellite communication, the capital cost of which works out at about \$55,000 per subscriber but which will nevertheless still be used for facilities such as mines and ocean drilling platforms.

the antenna until it found the ideal reception.

"That way we didn't go out and build a 100-metre mast and then find out, too bad, it's in the wrong spot," said Anton. "We could survey a system that might have 60 properties and six repeaters in three weeks. By truck it would have taken months."

SOME 25 KM OUT of Normanton, in the grasslands of the Gulf of Carpentaria, the road to Burketown passes Magowra station, home of Wallace and Dorothy Logan. Dorothy made pumpkin scones for Mike and me for afternoon tea.

"The fax has revolutionised my job," Wallace told me. "You don't have to be sitting on the phone all day."

He regularly faxes his accountant, bank manager and solicitor and uses the fax as an answering machine. "You get all your figures over the fax," he said. "I can make a deal for a line of bullocks and straight away it's on the fax. Once you had to wait a week for a letter to get around."

For many, the fax is replacing the post. If this eventually means the end of regular mail runs in the bush it will be another unsuspected cost of the telecommunications revolution. The "mail" is the Cobb and Co. of the bush, carrying to remote properties not only letters, but everything from spare aircraft parts to fresh bread as well.

Almost as an afterthought, Wallace told me that near the homestead was the site of Camp 119, Burke and Wills's

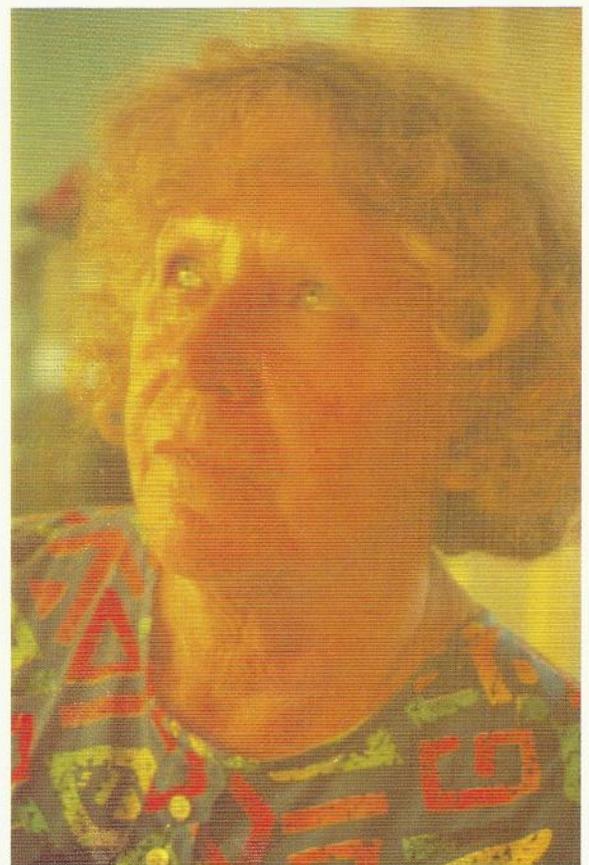
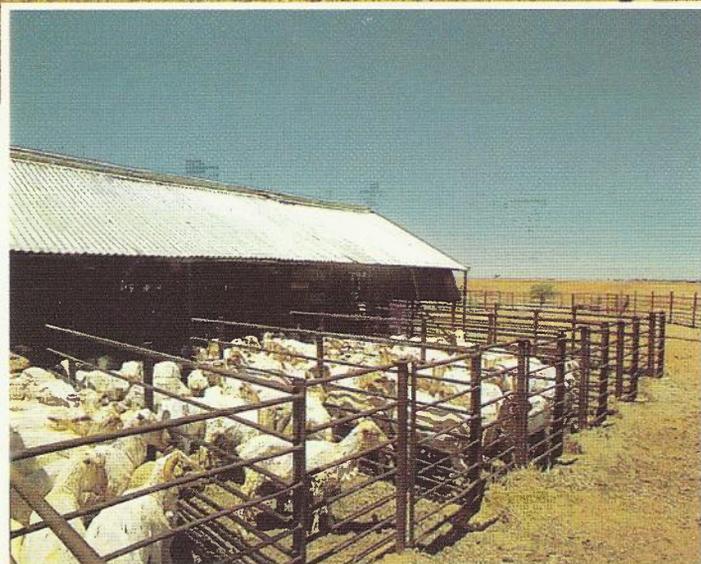
northernmost camp. My attention quickly turned from telephones to an attempt to conquer rather than come to terms with a formidable continent. Burke and Wills reached Camp 119 with John King and Charlie Gray in February 1861 after making the first south-north crossing of Australia. From there they began their ill-fated return to Melbourne, now seconds away by telephone.

WE TOO TURNED SOUTH HERE, our destination Middleton, a dot on the map between Boulia and Winton. Western Queensland in particular was the land of the home-built telephone line, often made of fencing wire, that swung from tree to post, along fences and over gates, to the manual exchange in town.

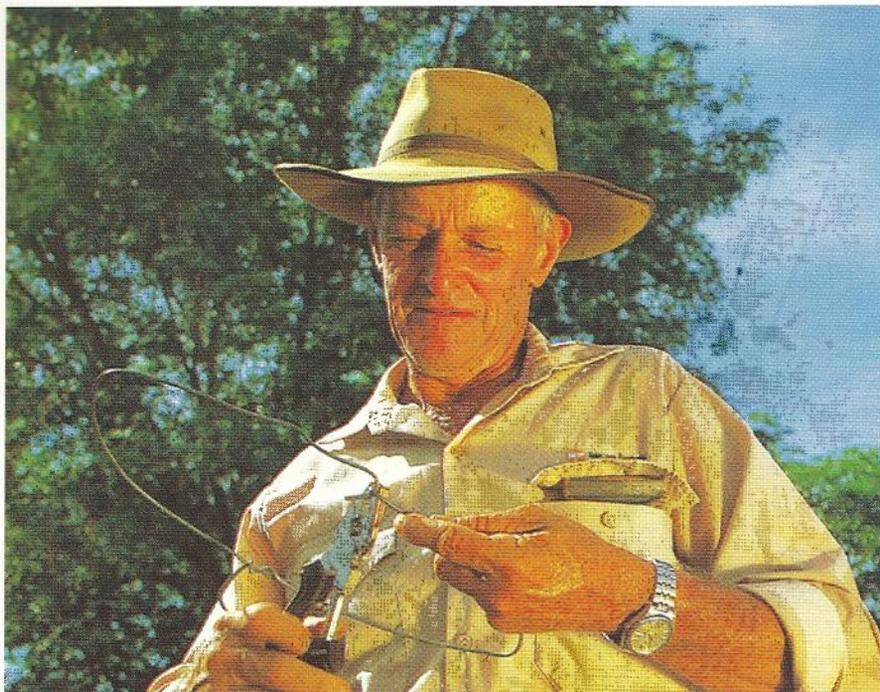
The longest of them that Vida Beauchamp – who was on the switchboard for seven years in Winton and 10 in Boulia – could remember went for more than 200 km, from Lucknow station to Winton.

"I tell you," she said, "you had to yell!"

I'd interrupted the shearing at Stockport station, where Vida now lives, 20 km north of Boulia. She told me an exchange operator was a VIP whose status fluctuated between that of Florence Nightingale and Tokyo Rose. "I think of the good old days every time the phone stops just before I get to it and I can't ring the exchange to see who it was," said Vida. "Lonely people out on the properties would

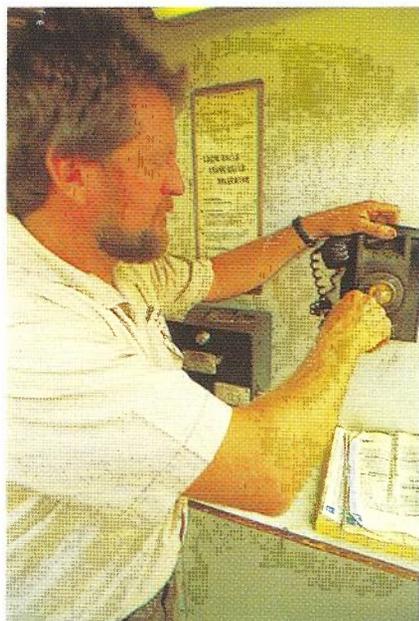


Like many remote properties, Stockport station (top), north of Boulia in Queensland's central west, has a modern phone, but because power comes from a generator that is switched on only when necessary, options like a fax and an answering machine are of only partial benefit. Shearing is in full swing (inset) when we reach the property to talk to former switchboard operator Vida Beauchamp (right). Vida worked for seven years on the switch at Winton and 10 at Boulia. Her Winton stint ended when she married. "That was the rule; they didn't employ married women," she said.



Telecom veteran Jack Smerdon (left), who once rode a horse 230 km from his Normanton base to change a fuse, shows how home-made phone lines were repaired. While Judy Howchin (below) takes the last call on Australia's last manual exchange in 1991 at Wanaaring, NSW, technical officer Harry Lodge (below left) disconnects the last manual public phone.

School's in (opposite, above) at Badalia station, where Nina McGlinchey helps daughter Alanna with her School of Distance Education music lesson. In the post office at Dajarra (opposite, below), western Queensland, Rainer Hujanen talks fondly of how he operated the switchboard 12 hours a day, seven days a week.



PHOTOS: BRENT MELTON



ring in and have a bit of a chat. There was one old lady in Winton who'd ring the exchange and ask, 'Who died today?' She could see the morgue from her place."

I phoned Judy Howchin to ask how her life had changed since she lost her job on the switchboard at Wanaaring, 190 km north-west of Bourke in north-western New South Wales. I'd been there that grey day in December 1991 when Australia's last manual exchange was, in the jargon of the trade, "cut over and killed".

Hers had been a seven-days-a-week job, from early morning until late at night, every day of the year. It was nice not to be woken in the middle of the night with emergency calls, she told me, but she missed the personal contact.

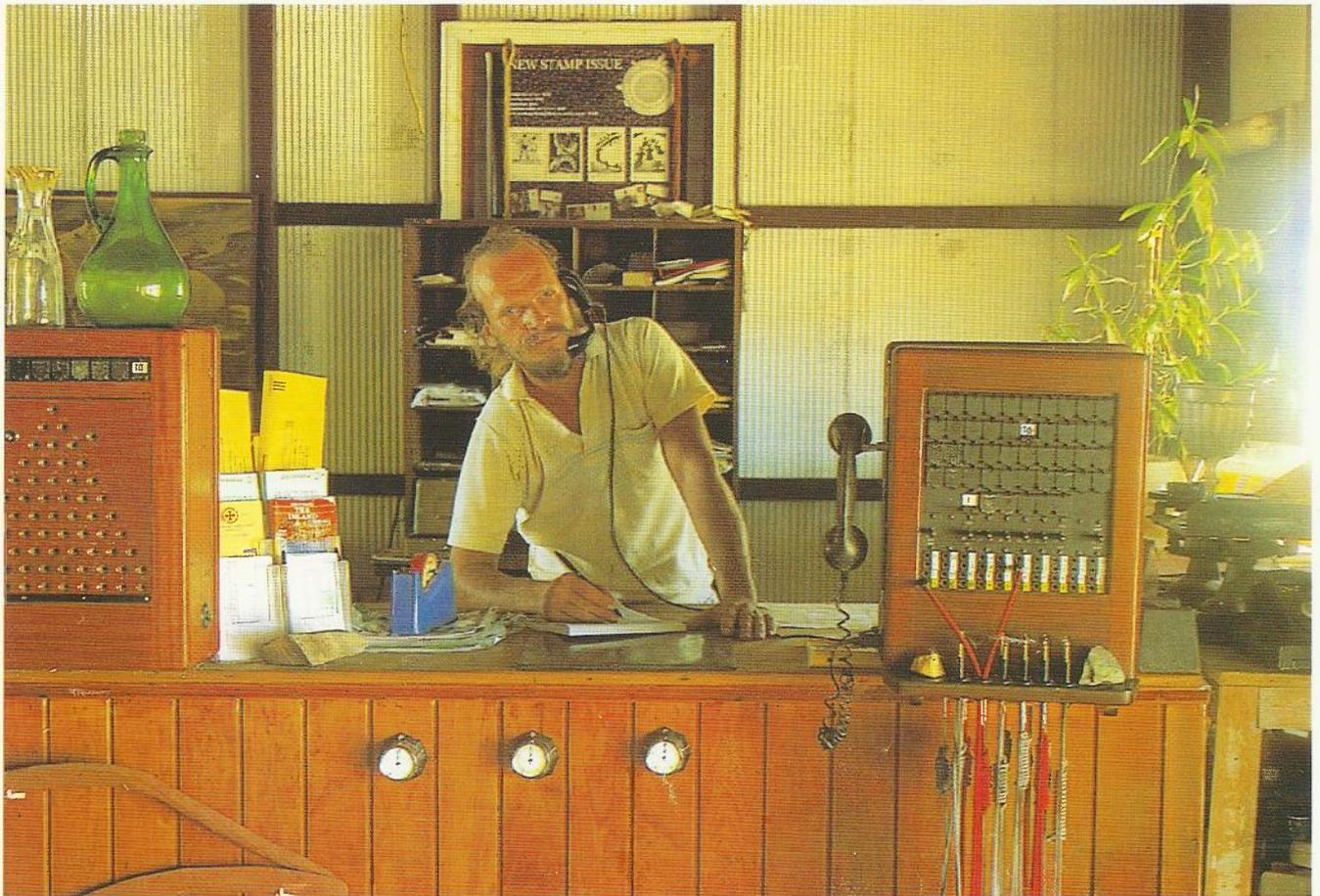
"Before, if you wanted to know if the Paroo was rising, you'd ask the operator. Now you have to make about six calls to find out. It's progress, I suppose, but people are still

getting used to having an answering machine instead of an answering person."

Nina McGlinchey, at home on Badalia station, 40 km west of Boulia, said one advantage of the manual system was that the operator always knew where rain had fallen. Among the many disadvantages, she told me, was that you probably couldn't ask her about it because the phone didn't work about 98 per cent of the time during the Wet.

The way to find a fault was to go out with a mobile telephone, cut the line and see if you could ring home. If you could, then the fault was farther down the line. Nina said her husband, Shayne, had cut the line so many times finding faults that "there were about a million joins in it".

With her children, Alanna, 9, and Brook, 7, studying through the School of Distance Education, she had found the reliable DRCS phone meant she was never out of touch



Lightning storms and Christmas trees

AMELBOURNE suburb and the Western Australian Christmas tree made unlikely starting points for my journey into remote Australia. As I drove into the imposing Telecom Research Laboratories (TRL) in Clayton, I was already aware that the Digital Radio Concentrator System was developed here. This, I knew, was entirely in line with the labs' mission to make Telecom, quite simply, the best provider of telecommunications services anywhere.

The Christmas tree, however, was new to me.

The DRCS customer units and the repeater stations are solar-powered as, increasingly, are the repeaters on the main trunks of the national network. Doug Kuhn, a TRL energy expert, pointed to a chart showing solar-powered telecommunications routes and said:

"Whether it's radio or optical fibre, you need repeater stations about every 50 km. These use electricity. Solar costs more in the beginning, but because it needs so little maintenance, it works out cheapest."

He pointed to the Nullarbor Plain. "Along here, on one of the longest solar-powered optical fibre trunk links in the world, we have 60 repeaters," he said. "On a sunny day our solar-powered sites around the country would be generating more than 2 megawatts of electricity, enough for a small town."

I had long wanted to meet "Doctor Lightning", as Ed Bondarenko, principal physicist of the High Voltage Group, is dubbed.



Among other things, Ed's group deals with problems caused by electrical stress on the network and equipment. DRCS masts, microwave dishes and repeater towers, even underground cables, are all vulnerable to lightning strike.

"I've always been fascinated by lightning storms," he told me.

I could believe it. In his hangar-like laboratory I watched anxiously as he sent miniature bolts of lightning arcing through the air from a device called an impulse generator, used to simulate lightning

strikes under controlled conditions.

And the Christmas tree?

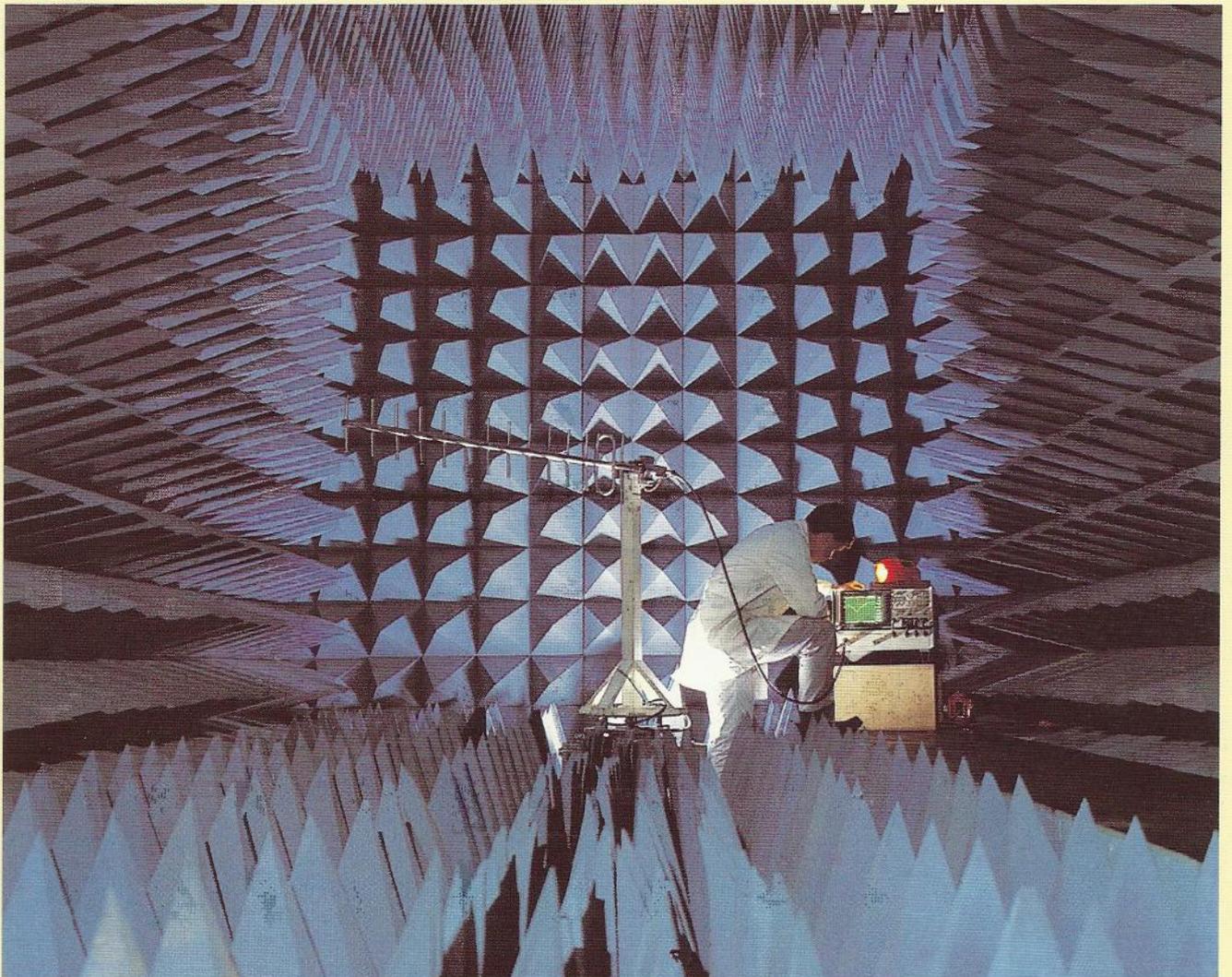
Like cockatoos, rabbits, hairy-nosed wombats, rats and termites, Christmas trees love cables. Because the trees are parasitic, their roots treat cables like other plants' roots, tapping into them in search of water and nutrients and eventually cutting them.

The manager of the Polymer and Chemistry Section, Bruce Chisholm, told me one solution is to lay thicker cables in WA's south-east corner. Another is to bury them deeper.

"Dr Lightning", also known as Ed Bondarenko, principal physicist with the High Voltage Group at the Telecom Research Laboratories, studies the damage lightning causes to the phone network. In his lab he simulates strikes to test their effect on equipment like masts, dishes and even underground cables. "As a boy I used to get car ignition coils from the tip and wire them up," he said. "I'd get shocks, but I don't get any from the equipment I use now!"



Know your enemy. Researchers Craig Frost (left) and technician Louisa McLorinan examine a termite through a scanning electron microscope at the Telecom Research Laboratories, part of a study to find environmentally sound solutions to some of the threats that nature poses to the outback telephone network. Technical officer Geoff Bail (below) tests an antenna in an anechoic chamber. The blue pyramids lining the walls and ceiling are made of carbon-impregnated foam and absorb stray radio waves, thus helping to ensure the accuracy of the electrical instruments.



with their teachers. Clever phones are expected to have an enormous impact on education for isolated children. The fax, loud-speaking phones and conferencing facilities already available are likely to be complemented by new technologies bringing together voice and data networks.

John Burgin, a project leader in the switching section at the Telecom Research Laboratories, had told me about some of the possibilities, such as multimedia workstations with windows showing the teacher, documents and other students as well as the student at her station.

"Amazing!" said Nina when I told her. "Let's hope it becomes reality."

ONE LEGACY of Australia's telecommunications monopoly, I had been told at the laboratories, was a uniform system, making it far easier to implement new technology than in, say, the United States, with its diverse systems. However, at Middleton, Queensland, I learnt there had been private competition for decades.

The Middleton Telephone Company was established in 1914 by local graziers who ran a single wire to the Winton exchange, some 160 km to the east. In its heyday the company had four party lines and 13 subscribers.

It had its headquarters in the Middleton post office-store, which unfortunately burnt down in 1968. Kevin Harness's hotel, once a Cobb and Co. staging post, is now the only building in "town". A private telephone was installed inside and a public one outside in November 1991. In its first two weeks of operation, the public phone took \$400 from callers apparently as fleeting as the mysterious tourist attraction, the min min light, which sometimes appears in the night sky here and was last seen some 12 years ago.

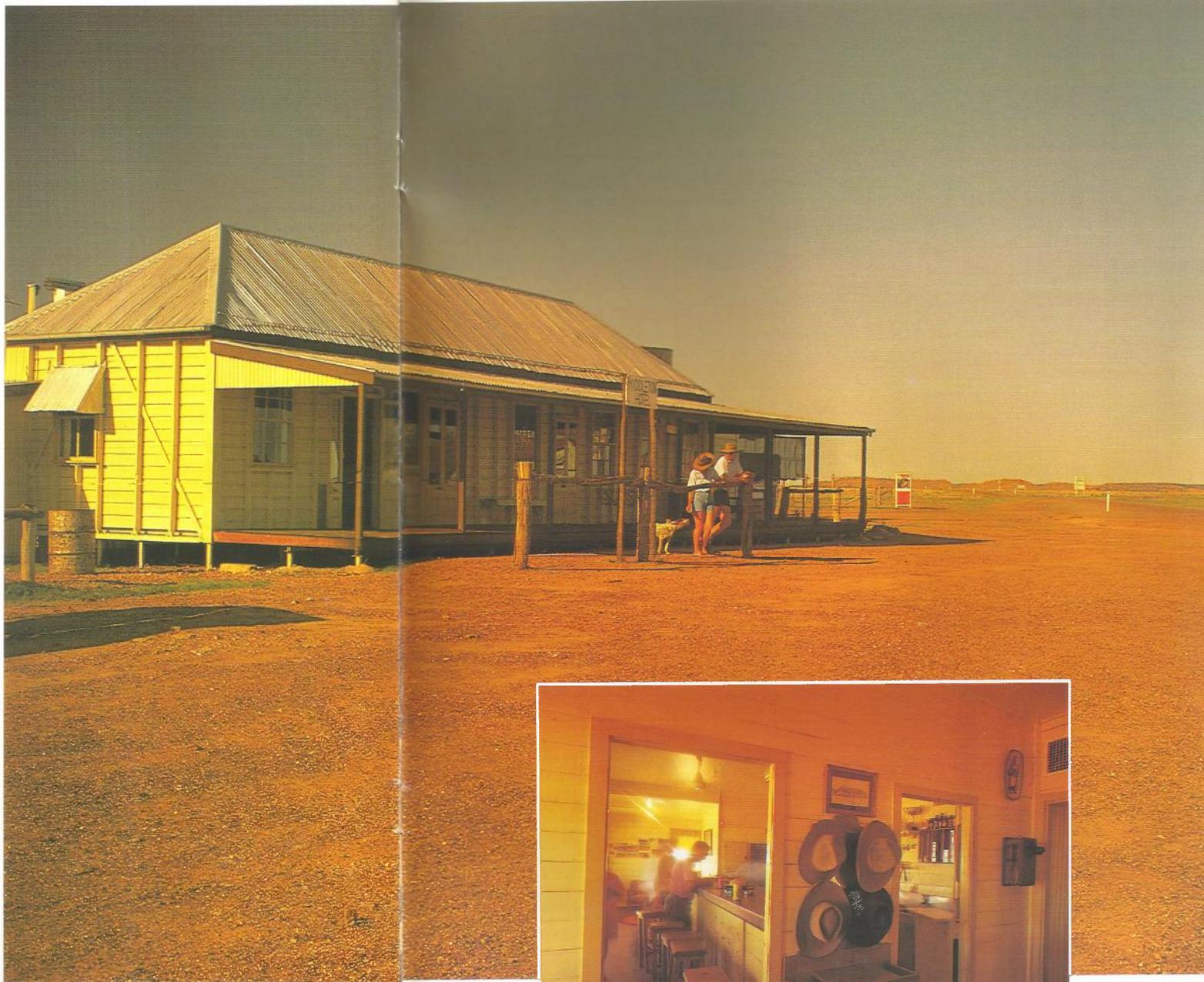
I thought back to the clicking sticks and burning fuel drums of Gapuwiyak, and remembered the mammoth achievement of the builders of the Overland Telegraph. I had witnessed a revolution. Isolation may have gone forever, but there were hidden costs. With a tinge of regret I realised that remote Australia would never be the same again.

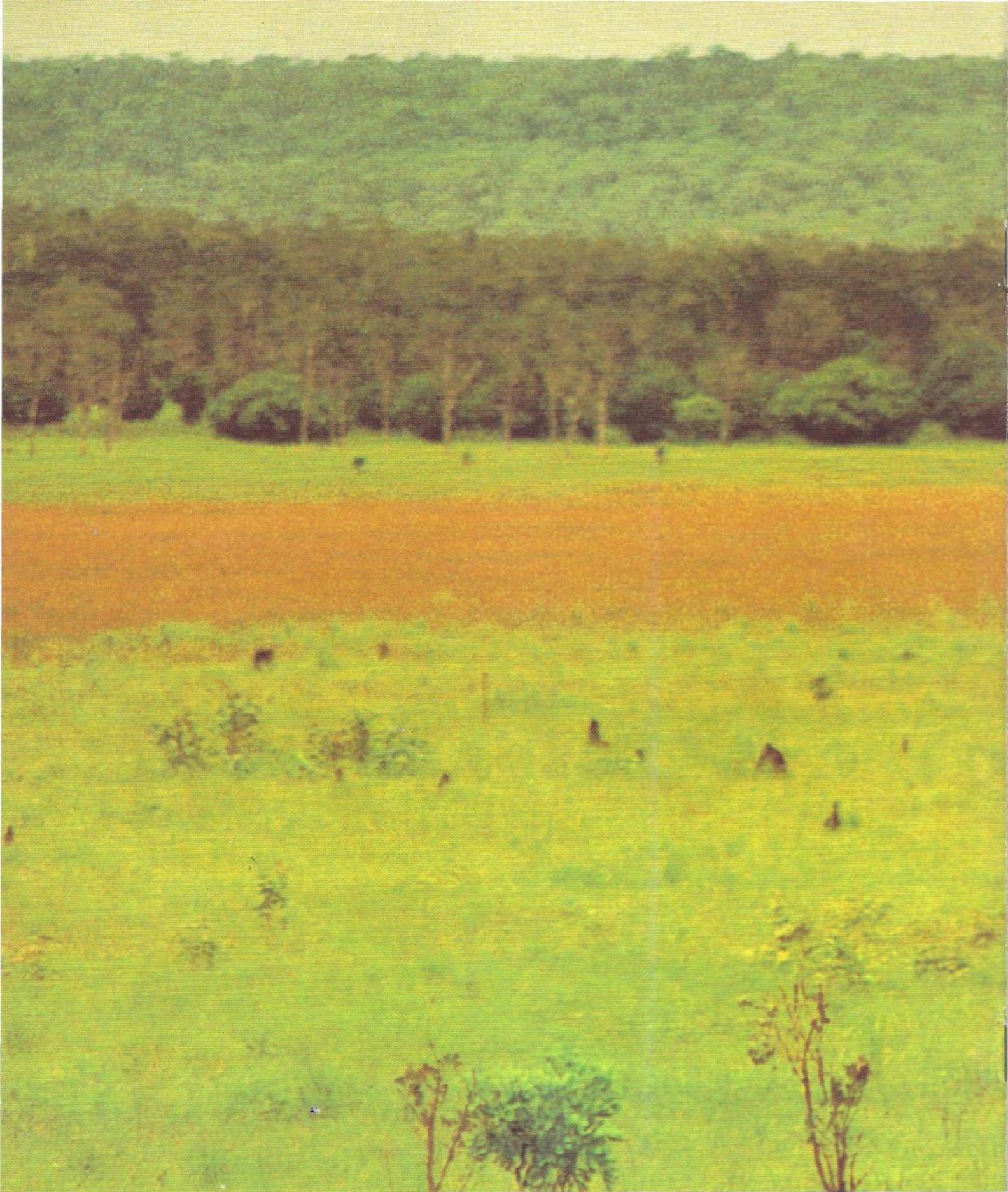
I picked up the familiar handpiece, fed in two dollars and, from Middleton (pop. 2), talked to my son, Richard - in London.

Callers pumped \$400 into the public phone outside the Middleton Hotel in the week after it was installed in 1991. The hotel is home to Pamela Busite (shown with Telecom engineer Anton Lane) and publican Kevin Harness. Inside the hotel (inset), a phone from a bygone era decorates a wall. Elsewhere in the building, a radio-telephone is a memento of days when, as Pamela put it, "nothing was private". It is still used to contact vehicles carrying two-way radios and by the State Emergency Services when they are in the area.

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*Telstra was known as Telecom Australia





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