THE PHOENIX

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NEW PHOENIX COIL LIGHTER, SMALLER

Phoenix has developed a new MT coil, model MTC-50, to replace model MTC-48. The new coil is 10% shorter and 40% lighter than the previous model but still gives the same excellent low-frequency performance.

The MTC-50 has several advantages over the MTC-48. At just 10.5 kilograms, it is about six kilograms lighter than the MTC-48. This light-weight portability is especially important for MT surveys in mountainous and remote regions where equipment has to be backpacked into the survey area.

The new coil is also approximately 12 centimetres shorter and the diameter considerably less than the old model. This smaller package makes the coil easier to transport and carry into the field.

The calibration and signal cables have been combined into a single cable, eliminating the calibration connector and separate calibration cable. The coil is easier to manufacture, more reliable and waterproof.

Upgrade to MTC-50
with Trade-In Credit

Owners of MTC-48 coils can receive a trade-in credit for their units if they wish to upgrade to the new MTC-50 coils.

Photo courtesy of Dr. Ron Kurtz

Exploring a near-surface anomaly: University of Toronto graduate student, Carlos Flores and Dr. Ron Kurtz of the Geological Survey of Canada investigate geothermal zone at Meager Mountain, British Columbia in the 1980s. Exploration rule #1: there's always a rock at the bottom of the hole.

Lighter, smaller MT coil: Gerald Graham (Senior Engineer) and Christine Thompson (Field Technician) hold aloft the old and new Phoenix coils.

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MESSAGE FROM THE PRESIDENT

The story about Len Collett (see page 5) brings back good memories for those of us who were with Phoenix in the early 1980s. It was during that period that Phoenix first developed MT equipment with the aid of seed money, technical expertise and supervision from the Geological Survey of Canada. Phoenix also contributed time and resources, of course, but the GSC's contribution was the catalyst that propelled us to such success.

While government spending cuts have made such grants for equipment development a thing of the past, the principles which guided Len Collett remain as valid as ever.

Geophysical instrumentation is a highly export-oriented business and our export earnings in the last 15 years have multiplied the original grant more than 40 times.

In addition, geophysical instrumentation is extremely highly leveraged into the world economy. Improvements in geophysical techniques are frequently key factors in the discoveries of rich, deep, new occurrences of natural resources — oil, gas, metals, groundwater and geothermal systems. The value of even one of these discoveries can easily be thousands of times more than the value of the geophysical instrumentation or service used to find the deposit. This is an impressive return by any standard.

As Mr. Collett pointed out, the true legacy of Canadian geophysics to the world community is the many billions of dollars of natural resources that it has discovered, much of it in developing countries.

We dedicate this issue to Mr. Len Collett who, with clear vision and foresight, knew exactly what he was doing for the world when he directed modest grants to Canadian geophysical companies during his years at the Geological Survey of Canada

FROM THE EDITOR

It's always a pleasure to meet our readers in person when I work for Phoenix at various trade shows — and a fringe benefit is that I have the opportunity to urge many of you to send me pictures and story ideas. Thank you all for your contributions, but especially Stewart Sandberg and Bernard Giroux for their input in this issue.

Many of you have told us you want your personal copy of The Phoenix mailed direct; if you aren't already on our direct-mail list, let us know. We're mailing many copies of this issue without envelopes. If your copy does not arrive in good condition, please take a moment to call and tell us.

Audrey Hutchison

CASE HISTORIES AVAILABLE

Sharing case histories is a valuable form of exchange among earth scientists. Below are listed just a few that are available from our offices.

* V-5 System, Time Domain EM, Case History #3, Cambridge, Ontario. MulTEM Sounding at Proposed Sand/Gravel Excavation Site
* V-5 System, Transient EM, Case History #4, Simcoe Area, Ontario.
* A Geothermal Reservoir Revealed — Magnetotellurics and Data Management Techniques in a Potent Combination; Errol Anderson, Renato Jacobo and Greg Ussher; Geothermal Energy New Zealand Limited, Auckland and Comision Ejecutiva Hidroelectrica del Rio Lempa, El Salvador.

Imaging the deep aquifer of Senegal with Phoenix's MTequipment. Dr. Michel Chouteau and doctoral student Bernard Giroux of Montreal's Ecole Polytechnique, aided by Michel Ritz and Marc Descloitres of ORSTOM-Senegal (the French Overseas Scientific Institute) and Magatte Niang, a doctoral student at the U. of Dakar, took nine soundings over a 300 kilometre profile. The upper photo is of Dr. Chouteau intent on reading data from his V-5; lower shows the Senegalese camp. Do you want more information? Giroux says it's all in his thesis!

Photos by Bernard Giroux

EMPLOYEE NEWS

Eric Edwards

Eric Edwards moved to Toronto from Guyana in 1969 to enrol in a two-year general electronics course at George Brown College.

After graduation in 1971 he began work with a theatrical lighting company. The job included providing and setting up lighting for Toronto stages such as the O'Keefe Center and Roy Thomson Hall. A career highlight was Eric's trip to Montreal in 1976 when the company lit the closing ceremonies of the Olympics.

Eric took a purchasing course at Seneca College and in 1982 joined Phoenix as purchasing manager always trying, he says, "to get a deal and save money for the company".

In 1971 he returned to Guyana to marry Pamela. She is now stockroom supervisor for a large electronics company. They have four children. Sean, 22, is taking a law enforcement course at Seneca College; Christina, 18, Nicole, 15 and Neil, 12, are all in public school.

An avid fisherman, Eric travels to the lakes and rivers of Ontario in search of bass and pickerel, often accompanied by Nicole and Neil.

ON THE ROAD

As usual, our employees are doing their part to keep the airlines in business. It isn't possible to enumerate the trips our personnel have been on in the last few months — it would take up our whole issue!

Our Vice-president, Mitsuru Yamashita, is one of our most frequent fliers. Mits spent a good part of April and May visiting clients in Peru and Chile and attending the Tecnomin show in Lima. He also spent several weeks in China and Japan (see accompanying photos) and is likely there now as you read this.

President Leo Fox met with many of our readers as he travelled from the SEG in Los Angeles, to SAGEEP in Orlando, Florida ; from the World Geothermal Congress in Florence, Italy to the EAEG in Glasgow, Scotland. You're sure to see him in your part of the world sometime this year.

Our field crews are out and about, too — from the northern reaches of Canada to the tropics of the Philippines. You can read more about their travels in the next issue.

Professor Shi Kunfa of the Chinese Academy of Science Geophysics Research Institute, Beijing checks out the T-30 transmitter with James Kok.

In the field with members of the Ministry of Railways First Design Institute, Lanzhou, Gansu, People's Republic of China; Phoenix personnel Tim Butt and James Kok, standing left and right and Mr. Mitsuru Yamashita, working on his laptop computer, all visited China in recent months. They visited Lanzhou to update equipment and provide training.

Photos by Tim Butt

GSC AND PHOENIX ALLIES

Dr. Ron Kurtz

"A close collaboration for many years" is how Dr. David Boerner describes the relationship of the GSC (Geological Survey of Canada) to Phoenix. Boerner, along with Dr. Ronald Kurtz (both have their physics doctorates from the University of Toronto), remembers testing the first V-5 in the middle of a February snowstorm at Turkey Point, Ontario.

Kurtz, along with his boss, Dr. Ron Niblett, were the scientific authorities during the development of the first Phoenix MT system (the MT-16) 15 years ago. The next generation, the multi-purpose V-5 system, was overseen by Dr. Alan Jones, Kurtz and Len Collett. Kurtz and Collett (see Mr. Collett's profile, page 5) visited Toronto periodically to oversee the project and to ensure the government's grant money was well spent.

"Then when the MT-16 became avail-

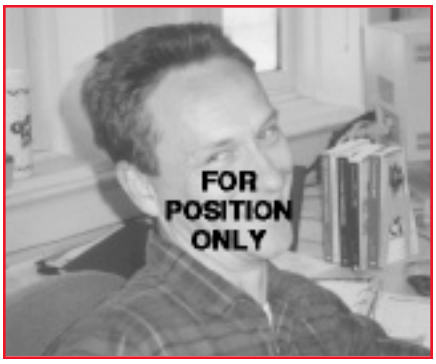
Dr. Dave Boerner, Computer Expert

able in 1982, we scraped up enough money to buy it," Kurtz recalled in Ottawa recently. "We'd never had such a nice piece of MT equipment before. We spent most of the '80s in the field, everywhere from Quebec and Ontario to Vancouver Island.

Our first survey in the Val d'Or/Matagami area of Quebec looked at the electrical structure of the earth's crust, from several meters to 50 and 60 kilometres deep. We wanted to understand the crust and how it relates to mining problems."

A second survey, in conjunction with Atomic Energy of Canada, looked at techniques for locating sites for disposing of radioactive waste. Once surveys are completed, GSC personnel interpret the data, write articles and publish them in scientific journals.

"Phoenix has done a large number of MT and CSAMT surveys for the GSC in recent years," says Kurtz, "and Phoenix people have always done their utmost to get

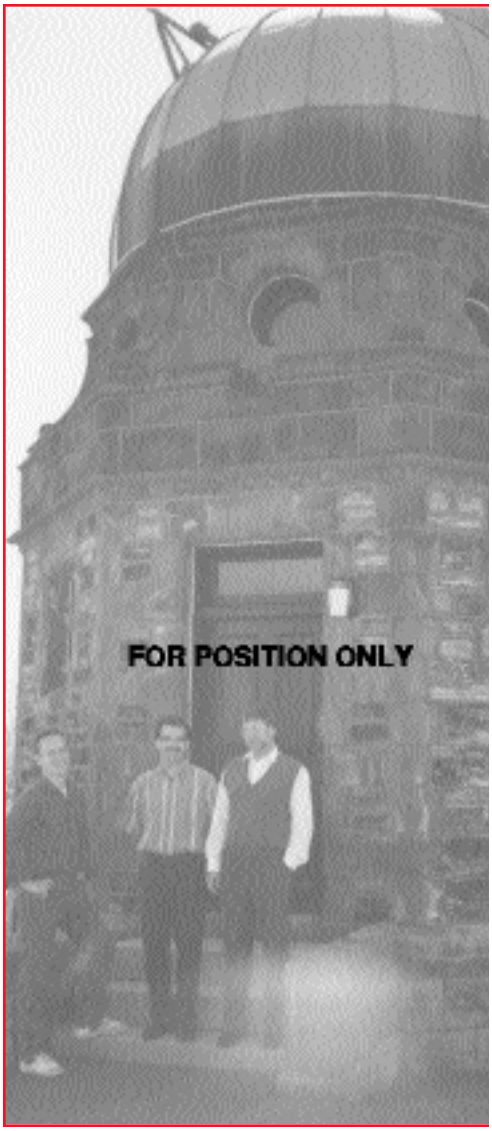


Jim Craven

the best data available."

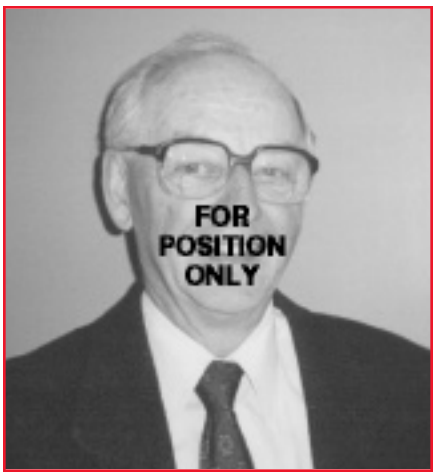
These surveys were conducted from coast to coast in Canada, from Newfoundland to British Columbia, as part of the ongoing LITHOPROBE project (an investigation of Earth's "inner space", the dense lithosphere reaching 100 kilometres deep to the roots of our continent). Phoenix is proud to be part of this collaborative research.

Dr. Alan Jones of the GSC has worked most closely with Phoenix for the past two years but his Ottawa office sits empty these days — he is in Tibet probing the deep crust with Phoenix's LRMT system, our version of the GSC-developed LIMS (Long Period Intelligent Magnetotellurics System). Look for an interesting story and great pictures in our next issue!



In front of the old Dominion Observatory, L-R, Jim Craven, Dr. Dave Boerner and Dr. Ron Kurtz

LAURELS TO LEN COLLETT



Len Collett

Leonard S. Collett inspired — and saved! — many small companies (Phoenix included) and their dedicated employees during his years with the Geological Survey of Canada (GSC), especially during the later years when he helped evaluate proposals for grant money.

"I saw geophysics as a small 'cottage' industry", he explained when The Phoenix talked to him recently in Ottawa. "I saw that you could give a small grant and these guys would work their butts off, doing their own thing. For very few dollars you could get a lot of work done — they worked 24 hours a day."

Collett earned his BSc in Physics and Chemistry from McMaster University in 1945 and his Masters in Geophysics from the University of Toronto in 1948. "I had no money left after that, so that was the end of school," he says. Practical experience came next when Dr. Arthur Brant, the "dean" of Canadian mining geophysics, invited Collett to work in Arizona monitoring research into Induced Polarization. (Besides discovering how IP worked, Collett also met his wife in Arizona. Genice, a graduate of the University of Arizona who taught in the Ottawa School Board, has been married to Collett since 1953.)

That same year Collett joined the GSC. His career, spanning more than 30 years, was many-faceted. The early days included research into near surface seismic sounding with George Hobson; in the early 1960s the electrical methods section was set up to research rock properties (Collett was one of the five original researchers measuring electrical properties of lunar rocks); radar sounding came in the '70s and finally, his role of "scientific watchdog" through the 1980s with IRAP (Industrial Research Assistance Program) and the Unsolicited Proposal Program.

"There was a fair amount of research at universities and there were these entrepreneurial/research types around — government funding was needed to bring the universities and geophysicists together," Collett says. "I was responsible for the Geoscience proposals and I went to bat for people who had good ideas. We did not want the National Research Council to waste taxpayers' money but I would always find money for the deserving who needed it."

A true research scientist, motivated by the quest for knowledge, not money, Collett says that part of the legacy he leaves is the untold wealth produced by mining companies he supported scientifically.

"I never felt I was a public servant nor a bureaucrat," he says, "but a scientist helping others achieve their goals."

Collett retired in 1987 at age 65 and then stayed on part-time for two and a half years as an IRAP representative. He and Genice live on a farm outside Ottawa where, among their many activities, they plant trees, harvest them and build furniture with the wood.

With a mischievious laugh, Collett confesses that he's proud to still be working with nuts — he's now vice-chair of the Eastern Chapter of the Society of Ontario Nut Growers.

CANADIAN NEW PRESIDENT OF EEGS

Dr. Susan Pullan was elected president of the Environmental and Engineering Geophysical Society (EEGS) in April during SAGEEP (Symposium on the Application of Geophysics to Environmental and Engineering Problems).

Dr. Pullan did her undergraduate work at the University of Western Ontario and her doctorate at the Australian National University. She joined the Geological Survey of Canada in 1982 as a research scientist in shallow seismic reflection techniques. She is married to fellow GSC geophysicist Dr. James Hunter and is the mother of two young daughters.

Dr. Susan Pullan

This international organization, formed in 1992, held this year's meeting in Orlando, Florida; Keystone, Colorado is the site for SAGEEP, April 28-May l,1996. A new European chapter will hold its first meeting in Turin, Italy, Sept. 25-27, 1995.

PHOENIX SPONSORS JOURNAL

Phoenix is one of the sponsors of the first issue of the Journal of Environmental and Engineering Geophysics (JEEG). This international publication is the official journal of EEGS and will be published quarterly beginning this fall. JEEG welcomes manuscript submissions documenting advances in geophysics. Contact EEGS at P.O. Box 4475,

V-5 APPLICATIONS, DRESDEN GROUNDWATER RESEARCH CENTRE

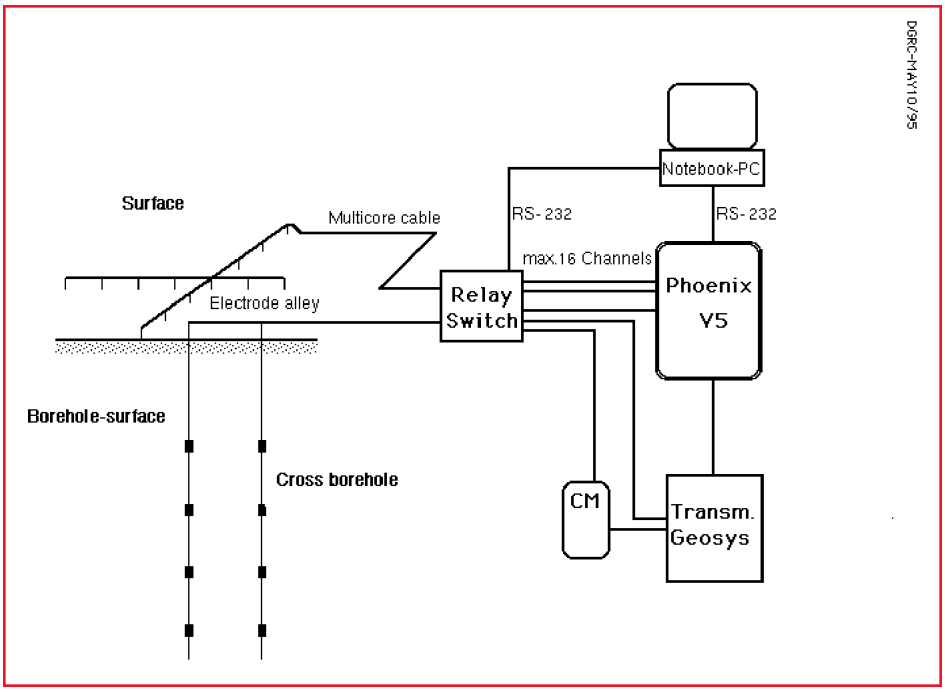
The Phoenix V-5 is at the Dresden Groundwater Research Centre, Germany, according to the V-5 happy operator, Dr. Frank Börner.

Chief engineer James Kok visited Dr. Börner in April to discuss environmental applications for the V-5 and to modify SIP software. Kok and Börner conducted small scale measurements at the Centre's test site in Leuna, East Germany and proved the V-5 can collect SIPdata under difficult industrial conditions.

The V-5 was recently installed in Stuttgart, West Germany as an integral part of the VEGAS-Research project. The project is supported by the Federal Ministry of Research and Technology (BMFT) and the Ministry of Environment of the State Baden Wurtternberg.

The project's objectives are to check and enhance known in situ decontamination technologies and to develop new technologies. Work will also take place to develop techniques for evaluating hazardous substances and the fluid distribution in the unsaturated zone.

Geophysical methods are used to monitor the fluid phase distribution in space and time. Using a V-5 controlled via PC and a multi electrode array, a 3-D complex soil conductivity distribution will be recorded.



The above figure is from the Dresden Groundwater Researcvh Centre, showing the Phoenix V-5 Receiver in an experimental setup for the VEGAS Project, April, 1995.

Abstracts Available

Two abstracts are available from our offices for your further information:

* Contamination Indications Derived from Electrical Properties in the Low Frequency Range (F. Börner of Dresden; M. Gruhne of the Mining Academy, Freiberg, Germany and J. Schön of Johanneum Research, Leoben, Austria
* Low Frequency Complex Conductivity Measurements of Micro crack Properties (F. Börner and J. Schön, see above)

PHOENIX V-5 MULTIPURPOSE GEOPHYSICAL RECEIVER

Phoenix V-5 Receiver

The V-5 is a versatile and cost-effective tool for shallow groundwater investigations.

** combines IP (Induced Polarization), Resistivity and Fast Transient Electromagnetic techniques in a single receiver unit*
** cheaper and more versatile than individual specialized receivers*
** multi-channel input for faster surveying*
** compatible with Geonics Transmitter (EM-37, TEM-47 and TEM-57)*
** emulates Geonics PROTEM receiver*
** Time-domain AND* Frequency-domain IPincluded
** narrow-band frequency-domain IP gives superior performance in high noise areas*
** compatible with all commonly available IP transmitters*
** emulates Scintrex (IPR-8, IPR-ll) and Huntec (Mark 4) IP receivers*

T-3/ AC3006 or AC3007 IP/CSAMT/TDEM TRANSMITTER
Ideal Companion to the V-5 Receiver

** extremely lightweight (only 12 kg.)*
** maximum power 3Kw*
** uses 50/60Hz or 400Hz motor generators or mains power;or 12V batteries*
** can be used for resistivity,IP and EM-37 compatible transient EM*

NEW GEOPHYSICAL RESEARCH GRANT INVOLVES PHOENIX

With philosophical shifts and declining numbers of geology majors, many traditional geology departments have expanded into environmentally-oriented programs.

The University of Southern Maine is no exception — four years ago it added a hydrogeology position and began expansion into environmental geophysics. Adding another faculty member seemed remote until a proposal jointly developed by the Maine Geological Survey and the university won approval for an EPSCOR (Experimental Program to Stimulate Competitive Research) research grant from the U.S. Department of Energy.

Dr. Stewart K. Sandberg, formerly with Roy F. Weston, Inc. was selected and took up his new position in the fall of 1994.

The grant involves a collaborative research group consisting of the new geophysicist, a structural geologist, a hydogeologist and a geologist, all from the U. of S. Maine and a hydrogeologist and an environmental geologist from the Maine Geological Survey. The six will work towards a better understanding of fractured-rock aquifer systems in general, with specific applications to Maine.

Projects underway include investigating azimuthal electromagnetic and induced polarization (IP) methods compared to standard azimuthal resistivity surveys to determine lateral anisotropy in the earth's physical properties. This anisotropy in electrical properties is being related not only to structural geologic measurements, but more appropriately toward anisotropy in hydraulic properties associated with groundwater flow.

Also under investigation are surface geophysical methods for detailed mapping and delineation of the geometry of high-angle fracture zones — they include spontaneous polarization (SP), gradient-array resistivity and IP, mise-a-la-masse and electromagnetic measurements obtained in the slingram configuration and in the large-loop profiling configuration.

Dr. Stewart Sandberg visits with Phoenix president Leo Fox at our SAGEEP booth in Orlando, Florida

AV-5 receiver and a T-3 transmitter, both from Phoenix, and a Geonics TEM-47 transmitter were purchased to collect resistivity, IP and transient electromagnetic (TEM) data for the projects. The research group also has access to Geonics EM-34 and EM-31 terrain conductivity systems, a Worden gravimeter, a Geometrics magnetometer and a Geometrics 12-channel seismograph.

An educational component is part of the research grant. A graduate student and a summer student intern from the university and two summer student interns from the Survey will be funded.

A new course for the Fall 1995 Semester is "Environmental Geophysics Field Methods". Students will perform geophysical surveys at selected field sites, reduce the data in laboratory sessions and prepare geophysical consulting reports.

20th Anniversary

Left to right: Bob Norris, Phoenix office manager; Jerry Price, freight co-ordinator for Sea-Air; George Balint, our senior engineer; Braden Fox; our Chief Engineer James Kok and Phoenix technician Yi Lu.

Presidents gather to examine the hot-off-the-press third issue of The Phoenix celebrating the company's 20th anniversary: Ivan Hrvoic of Gem Systems, Alex Walcer, Walcer Geophysics and Frank Bottos, Urtec Instrument Sales.

Several guests enjoyed Phoenix's hospitality at our 20th anniversary party held during the Prospectors and Developers Convention in Toronto in March.

HOPING TO SEE YOU...

* Rio'95, Rio de Janeiro, August 20-24: Phoenix will have a booth at The First Latin American Geophysical Conference and Exposition of the Latin American Geophysical Union and the Fourth International Congress of the Brazilian Society of Geophysicists.

* Look for us at SEG/Houston (the Society of Exploration Geophysicists International Exposition and Sixty-fifth Annual Meeting), October 8-13. We'll be there with issue #5 of "The Phoenix."

* We're planning to attend the International Geophysical Conference and Exposition in St. Petersburg, Russia, July 10-13.

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