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Many Advantages to New TXU-30 Transmitter

The new TXU-30 multifunction geophysical transmitter has several advantages over previous-generation technology. It is compatible with any suitable motor generator, is very energy efficient and is 60% lighter; it also has a separate control panel with a 10-metre cable, permanent GPS synchronization and automated frequency sweep.

Many units have been ordered, and deliveries to clients will begin soon.

Any suitable MG can be used: the most important improvement allows the TXU-30 to be powered by many different motor generators, including the 400kg Phoenix MG-40A 400 Hz/3 Phase/208V 40kVA motor generator which is popular because of its high power-to-weight ratio. Any other 400Hz/3 phase/208V to 240V unit (such as the Hobart 400Hz aircraft GPUs, or Honda EB11000) can be used. As well, any suitable 50Hz or 60Hz three phase/208 volt unit can be used.

Energy efficiency: The actual output power of the TXU-30 is limited by the MG



Phoenix engineer Liang You looks on during a field test as geophysicist Yann Avram and technician Steve Wilton easily lift the new light-weight TXU-30, also pictured at right.



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unit. For applications requiring only low power, an MG unit as small as 8 HP (5 kVA) can be used (for example, the Honda EZ3500C). The high efficiency of the TXU-30 electronics means that little energy is used for internal control, and most of the MG's output is converted into useful transmitter power.

For high power applications, 50Hz or 60Hz units up to 50kVA can be used.

Lighter Weight: The new TXU-30 weighs a full 60 percent less than previous models. The excellent power-

to-weight ratio provides a maximum output power of 20kW, although the transmitter weighs only 53kg (compared to about 125kg for earlier models).

Precise GPS timing: This permits unlimited receiver stacking of weak signals. The TXU-30 timing utilizes GPS synchronization and it is fully compatible with the Phoenix V8 receiver (*see Issues 31, 32, 33 & 38*). GPS timing replaces

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TXU-30 Transmitter, *continued from front page*

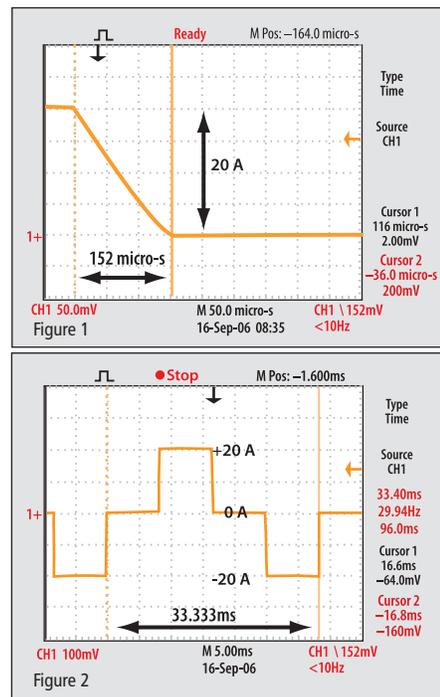
less accurate quartz oscillators, and provides more precise and unlimited stacking of controlled source waveforms. This is important wherever the receiver encounters weak signals, such as in the highly resistive surface of the Chilean desert, where it is difficult to inject current.

Separate control panel with a 10-metre cable: This feature permits the operator to control the TXU-30 away from the acoustic and EM noise of the MG unit. Radio communication (if required) with other members of the field crew is more reliable even a short distance away from the TX/MG combination. The control cable also permits the operator to sit in a climate-controlled location, such as the cab of a pickup truck.

Multifunctionality: The TXU-30 can transmit into either grounded dipoles or loops and can be used for various Time Domain or Frequency Domain geophysical techniques, including CSAMT, Time Domain IP, Spectral IP, and Time Domain EM (TDEM).

Figure 1, top right, shows a typical TDEM waveform into an equivalent 200 m x 200 m loop. The turnoff waveform is a well-controlled near linear ramp, as required by the TDEM technique.

Figure 2, right, shows a typical frequency domain waveform (30Hz) into the same load. The waveform is clean, with little ripple, and provides high current even at high frequencies into inductive loads.



NEWS FROM RUSSIA



Above: A field crew from St. Petersburg State Mining Institute (SPMI) loads an ATV onto a raft; heavy rains during their summer survey turned narrow, shallow streams into wide, deep rivers.

- Yugorsk University in the Khanty-Mansi region, Western Siberia, in the heart of Russia's most prolific oil- and gas-producing region, has acquired a V8 system for teaching and research.
- Northwest geophysical company of Moscow acquired a 4-station, 20-channel AMT/MT system in April 2006.
- KavkazGeolSyemka, of Essentuki (Caucasus Region) added five channels to their MT system in June.
- Avers1, a geological and geophysical service company in Petropavlovsk (Kamchatka, Russian Far East), purchased a V8 multifunction system for exploration.

- The Novosibirsk Geology and Geophysics Research Institute acquired a Phoenix MT system for research and teaching.
- IrkutskGeophysica of Irkutsk, Baikal Region, a Phoenix client since 2001, has purchased a new natural source/controlled source system with a V8 multifunction receiver and several MTU receivers. IrkutskGeophysica was involved in the discovery of Verkhne Chonskoye and Kovitinskoye, two large Siberian oil and gas deposits that will soon be connected to Japan and China by pipeline.



Phoenix's Carlos Guerrero and Gerald Graham are shown with participants at the Sixth Joint Phoenix/Nordwest/Moscow State University Field School at Alexandrovka in May; the group included geophysicists from two Colombian companies, Colombia GeoFields Ltd. and Agua de la Sabana S.A.

NEWS FROM AROUND THE WORLD

Turkey

West Japan Engineering Consultants Inc. (WestJEC), in co-operation with Phoenix and Turkey's Mineral Research and Development Organization (MTA), conducted a geothermal survey near Tuzla, Turkey, in June.

Right: Yucef Mete of the Izmir office of MTA works with the V8 receiver.

Far Right: Geologist Yoshio Soeda and geophysicist Mitsuru Honda, both of WestJEC, in Tuzla village

Below Right: Crew members in the field



Canada

We welcome the return of Quantec Geoscience of Toronto as a Phoenix client. Quantec has purchased 18 Phoenix MTC-50 magnetic sensors to be used for MT surveys with their data acquisition systems.

Antarctica

Dr. Shin'ya Sakanaka of Akita University's Resources Engineering Department carried out an MT survey near the Japanese Syowa base.

Below: A scientist augers into the snow near a Japanese Antarctic Research Expedition snow tractor.

Right: Dressed for the frigid temperatures, a scientist operates the Phoenix MTU receiver.



Japan

Gerry Graham and Mits Yamashita, with co-operation from Nittetsu Mining Consultants, installed a new MT remote reference station in Kyushu, West Japan. It will provide remote reference data over the internet to Phoenix clients.

Below: Mits Yamashita stands beside the new station near Kagoshima. It is located in the 60Hz area of Japan; another station, installed earlier near Sawauchi, Honshu, is in the 50Hz area of Japan (see Issues 30, 31 & 35). The new station will also be used by our Korean clients. It is very difficult to find a quiet reference site in Korea as there are high levels of man-made EM noise everywhere.



NEWS FROM AROUND THE WORLD

Indonesia

Phoenix geophysicist Yann Avram (at right in light suit) welcomes five visitors to our booth at the SEG International Meeting in Jakarta in August. The visitors work for several of our Indonesian clients, including PT Elnusa Geosains, the Indonesian Geological Research & Development Center (GRDC) and PT Pertamina.



India

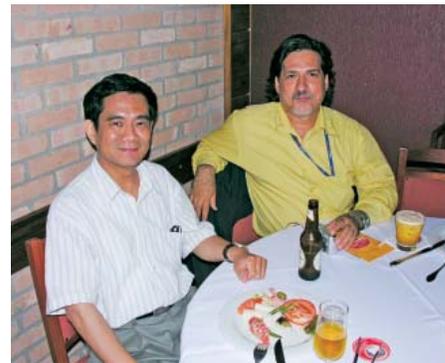
- Phoenix welcomes the National Geophysical Research Institute as a new client. NGRI has ordered a V8 system with GSM cellular communication.
- The Indian School of Mines has upgraded their MT system by replacing the V5 receiver with 24-bit MTU receivers.
- The Indian Institute of Geomagnetism, Mumbai, has purchased two new MTU receivers.

Brazil

Lu Yi visited Brazil to provide service on UENF's CSEM system, purchased in 1995.

Right: Lu Yi and Abel Carrasquila of UENF.

Below right: Sometimes getting to a survey took extra time when field crews had to wait for cowboys and their cattle to pass.



Ukraine

- PivnichGeologiya of Dnipropetrovsk upgraded their V6A receiver to a V8.
- DniproGeophysica of Dnipropetrovsk and PGE of Novomoskovsk acquired Phoenix MT and controlled source equipment under the STCU (Scientific and Technical Cooperation Unit) program.



Iceland

Below: Crew members from Moscow State University and the Iceland GeoSurvey co-operated on two geothermal projects using Phoenix equipment. One was for the International Deep Drilling Project. More information at: www.iddp.is



USA

Phoenix's Gordon Thompson and Gregoria Torrico operated land-based reference stations for Schlumberger-AGO, during an offshore MT survey in the Gulf of Mexico.

Below: Gregoria digs trenches for Phoenix coils.



New Russian Kimberlite Discovered with MT and AMT

Moscow Research Institute (SNIGRI) discovered a new kimberlite pipe in the Arkhangelsk region of their licence area in northwest Russia in late 2005.

The drilling target, a conductive anomaly in the host rock, was discovered during an AMT/MT survey carried out by Northwest, a Moscow-based geophysical surveying company that used Phoenix AMT/MT equipment.

This was the eighth kimberlite pipe discovered in the region, and only the second since 1991, in spite of considerable exploration expenditures. The area is covered with 20m to 80m of Quaternary glacial sediments that can be conductive (clay) or resistive (till); there is no permafrost here. Previously, conventional airborne and ground EM and magnetic techniques were not definitive.

This discovery resulted from a new methodology: MT was used to map the deep faults and then 3-D AMT was used to detail the many magnetic anomalies on or near the faults. In addition to SNIGRI, several large diamond companies, including Alrosa, use MT widely for kimberlite prospecting. ■

Every discovery of a new kimberlite is significant because they are so rare. Only about 4,000 have ever been discovered worldwide; of these, only 14% contain diamonds and only 3% are economic.

Diamonds are formed at depths greater than ~150km and rise rapidly to the surface in volcanic rocks called kimberlites. Kimberlite pipes are mini-volcanoes that break through to the surface along, or near, deep faults. (See *Issues 15 & 23*)

Diamond demand has exceeded supply since 1999 and is projected to do so for the foreseeable future, sparking a diamond exploration boom. Even so, the ratio of worldwide reserves to annual production has declined consistently in recent years.

New kimberlite exploration methodologies are therefore required; SNIGRI's new discovery indicates that MT and AMT will play an important role.

www.nrcan.gc.ca/ms/cmy/content/1999/26.pdf

www.iti.gov.nt.ca/diamond/pdf/diamondfacts_2005.pdf

Vector field points to epicenter of anomaly

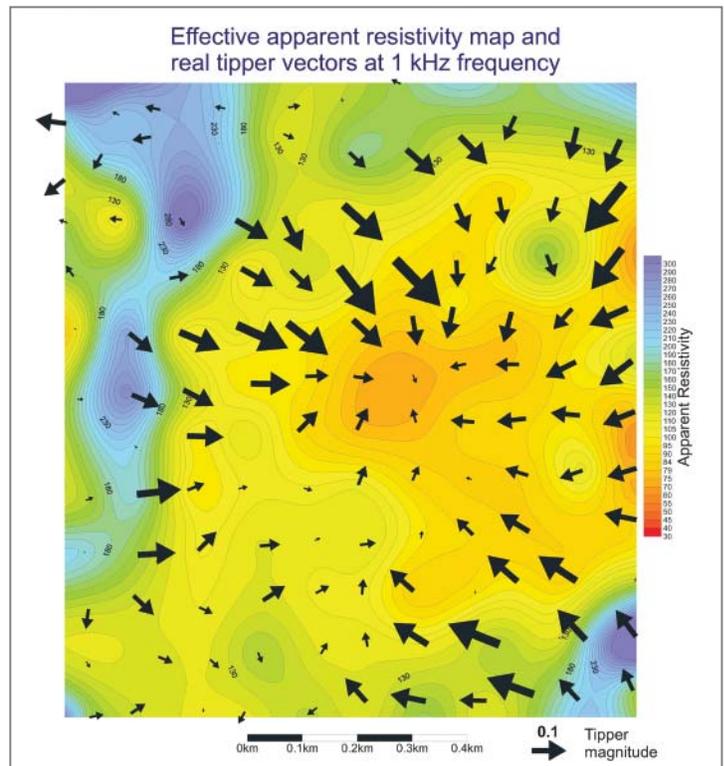
The figure at right shows the Real Tipper Vector field around the new discovery. For a discussion of the Tipper, or Induction Vector (IV), an MT parameter obtained from measurement of the three components of the magnetic field, see *Issue 31*.

The discovery hole was drilled at the center of the closed resistivity low (light orange color, < 79 ohm-m); note this is also the focal point of the Induction Vector field.

The spatial behavior of the IV field shows that the kimberlite is sensed as far as 700m laterally. Since kimberlites can be as small as 100m across in plan view, the IV's off-line sensitivity provides some important advantages in exploration. It reduces cost by permitting wider line spacing while simultaneously ensuring that nothing significant is missed.

The IV is derived from the magnetic field alone, so does not require measurement of the electric field. Thus, it is not affected by MT static shift – a phenomenon that can shift the measured resistivity upwards or downwards over the entire measurement spectrum, resulting in erroneous inversions unless compensated.

Where the surface is highly resistive (such as dry sand, dry snow, frozen ground, bare rock or caliche), it is difficult to obtain reliable electric field measurements. The IV measurement is therefore very useful in such survey conditions. The IV is a true 3-D parameter, and as such, rotationally invariant – independent of “mode effects” and target-sensor relative orientations.



Static shift is caused by near-surface resistivity inhomogeneities such as pockets of sand or clay, bedrock knolls in swampy terrain, damp zones in desert salt pans, etc. ■

Ref: *Correction for the static shift in magnetotellurics using transient electromagnetic soundings, Sternberg et al, GEOPHYSICS. Vol. 53, 1988, p1459-1468.*

NEWS FROM CHINA



James Kok and Wang Fei of Phoenix pose with members of The First Geophysical & Geochemical Prospecting Team, Bengbu (Anhui Province) during the acceptance of their V8 system. In 1983, the forerunner of the Bengbu group (then part of the Ministry of Geology) became Phoenix's first customer in China.

- The 5th Division of CNPC's Bureau of Geophysical Prospecting acquired an 86-channel MT system in April 2006. The 5th Division, the largest owner of Phoenix equipment, is a major player in CSEM/MT surveying in China and abroad.
- The First Survey and Design Institute of the Ministry of Railways, in Lanzhou, PRC, acquired a second V8 system this summer. First Railways has purchased several generations of Phoenix equipment since the late 1980s.
- The Geophysical and Geochemical Research Institute of the Ministry of Land and Resources, Langfang (Hebei Province) purchased a 15-channel MT system.

ON THE ROAD

El Vendrell, Spain: Olex & Tamara Ingerov attended the 18th EM Induction Meeting September 17-23. Olex presented a paper: *2D MT survey on the north shore of Lake Erie (Appalachian Basin)*.

Kazakhstan, Turkmenistan: The Turkmenistan International Oil & Gas Exhibition & Conference (TIOGE) was attended by Alexander Antonov and his staff in mid-September. Mr. Antonov recently opened the "Phoenix representative office in Central Asia" in Tashkent, the capital of Uzbekistan.

COMING UP

- Oct 3-6: Phoenix will be represented at the 14th Kazakhstan International Oil & Gas Exhibition (KIOGE) in Almaty, Kazakhstan by staff from our Tashkent representative office.
- Oct 16-18: Mits Yamashita and Leo Fox will attend the SEGJ in Fukuoka, Japan.
- Oct 16-19: Phoenix representatives will attend the SEG/EAGE joint international meeting in St. Petersburg, Russia.

PRESIDENT'S MESSAGE

IN MEMORIAM

I regret to report the passing on September 18 of Keith Levere, Vice-President (Finance) of Phoenix for many years until his retirement in 2005.

Keith was one of our longest-serving employees. He joined Phoenix shortly after the company was founded in 1975; before that he worked for several years at McPhar, Phoenix's predecessor.

Keith's integrity, strength of character and sense of humour were always important to me, but especially so during the "down times" after the oil price crash in 1985.

Keith always reminded me of the anecdote about there being only two kinds of people: in a serious crisis, there are those who you would want to have with you, and those you wouldn't want to have with you at any price. Keith certainly was in the first category.

Keith will be missed not only by his family but by his many friends and colleagues.

~ Leo Fox



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