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Lodestar: a combined heading, attitude and inertial reference that utilises accelerometers and gyroscope components that are the perfect specification for motion compensation. Ranger: an easy to use USBL acoustic tracking system with an operating range proven to beyond 6,000 metres. When used together, the combination of high accuracy motion data from Lodestar tightly integrated with Sonardyne’s Wideband® acoustic technology and its advantages, unlocks the true potential of Ranger USBL to deliver the ultimate survey grade positioning performance, reducing operational costs and enhancing DP and survey operations. Put yourself in the best position.

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**Baseline**

**Issue 5**

**Front Cover**
The crew of Saipem’s giant heavy lift crane vessel, the S7000, prepare their new Sonardyne wide aperture USBL transceiver for deployment over the side of the vessel. The system was used to assist with precise positioning for the installation of Template D in the Ormen Lange field.

**Editorial Team**
David Brown, Marketing Manager
Paul Eastaugh at PEMI
paul.eastaugh@btinternet.com
Rob Balloch, Strategic Development and Marketing Director

**Design and Art Direction**
Michael Landley at Truth Studio
www.truthstudio.co.uk

**Photography**
Astonleigh Studios
www.astonleighstudio.co.uk
(Inside cover, pages 03, 04, 12, 25, 28, 29)
Rod Catanach/WHOI
(Contents page image 08)


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**THIS FIFTH EDITION** of Baseline is our most exciting yet with articles from across the globe exploring the wide range of applications that demonstrate the performance and capabilities of our technology.

One of the keys to our success this year is the increasing influence of our Survey Support Group. The work they undertook on the Perdido and Pluto field developments (pages 06 and 16) illustrate how you can tap into the group’s knowledge to get the best performance out of your Sonardyne equipment and improve the efficiency of your subsea operations. In recent months, they’ve taken this message on the road with worldwide customer workshops.

Strengthening the team has been a priority for us and we are pleased to announce that Barry Clutton is taking over as Chairman from our founder John Partridge with John Ramsden returning from Singapore to assume Barry’s previous role as Managing Director. In the US, Simon Reeves joined as VP Americas and several well known industry names have joined us in sales and support roles.

Over the last six months, more than 20 Sentinel intruder detection systems have been sold for applications ranging from port protection to deployment on commercial shipping. Page 26 provides an overview of the latest features now available for the system such as the world’s first integrated acoustic countermeasure.

Since 2007, Sonardyne has grown substantially thanks in part to the significant investments we have made in new innovative technology. The Acoustic Monitoring Transponder is a perfect example and on page 12, Simon Partridge explains all.

Our next issue is due out in March 2010, coinciding with our industry’s premiere exhibition, Oceanology International in London. So until then, all the best,

Rob Balloch, Marketing Director
**NEWS**

**OUR PEOPLE**

**New Managing Director and Chairman**

John Ramsden has taken over from Barry Clutton (seated) as MD who now becomes Chairman.

Baseline is pleased to report the appointment of John Ramsden as Sonardyne’s new Managing Director. John takes over from Barry Clutton who in turn takes up the role of Chairman from Sonardyne’s founder, John Partridge.

"All of this experience makes John the best possible choice to lead the company forward through its next stage of growth," explained John Partridge. He added, "Whilst stepping down as Chairman, my day-to-day involvement with the business will continue and I will remain on the Board."

"John Ramsden will relocate back to the UK over the next few months ready to take up his new position in November. Speaking up his new position in November. Speaking of his appointment he said, "I am proud to be taking the helm of the business. We have a great team ethos at Sonardyne and have been a very successful period for the company."

John Ramsden joined Sonardyne in 1998 during the early years of Sonardyne’s expansion in the Asia Pacific region. Since then he has lead the Singapore office through significant sales growth and has a thorough knowledge and understanding of Sonardyne’s products, customers and markets. In particular, John has played the key role in developing China as a new emerging market. "All of this experience makes John the best possible choice to lead the company forward through its next stage of growth," he said."

**ORDERS AND CONTRACTS**

**Unique add Compatt 5s to rental pool**

Survey and diving equipment specialists Unique System LLC (USA) has taken delivery of a major consignment of Compatt 5 positioning transponders.

The equipment will be made available to rent from their US office in Houston which opened in 2008 to support clients and offshore projects throughout the Gulf of Mexico.

Unique System Sales Director, Vaughan Reddick, was clear about the benefits of establishing a major rental stock in Houston. "Compatt 5 is the trusted workhorse of the survey industry and is in high demand here in the Gulf. It is configurable to meet any subsea positioning requirement our customers’ may have from template installation and pipeline survey through to DP reference and high accuracy metrology. This latest investment in Sonardyne Wideband technology means that we will now be able to meet this demand with equipment that is available to rent off-the-shelf."

Unique add Compatt 5s to rental pool
Scout-Pro USBL improves efficiency of Caspian Sea survey

A multi-year geophysical survey in the Caspian Sea is benefiting from faster, more efficient subsea positioning operations thanks to the performance offered by Sonardyne’s Scout-Pro tracking system.

The Scout equipment is owned and operated by marine navigation services company NCS SubSea Inc. who purchased the technology specifically to reduce the vessel time needed to position transition zone (TZ) seismic cables and ground stations once deployed on the seabed.

Conventional techniques require a recording vessel to pass down both sides of the cable, collecting multiple acoustic ranges from transponders attached to the cable at regular intervals. Whilst this method is very accurate, the process takes time and also relies upon good geometry from the vessel to each transponder. Now in their second season with the Sonardyne equipment, the NCS team’s approach has been to use Scout-Pro USBL interfaced to their own survey instruments to create a fully integrated navigation solution. With Scout, a vessel-mounted transceiver measures both the range and bearing to each transponder. The recording vessel is therefore able to position the cable in one overhead pass, saving vessel time and making for very efficient surveys.

Sonardyne’s HydroPos navigation software manages the large number of acoustic transponders deployed and creates pre-plot data for the system to follow and automatically search for the correct transponders along the cable. Position solutions are calculated and can be outputted in various file formats.

Commenting on the benefits gained from using Scout-Pro, Curtis Sims Jr, General Manager of NCS SubSea said, “Scout is now an integral component of our Distributed Navigation System which we have developed for seismic acquisition. It can be rapidly deployed on vessels from the smallest skiff to the largest gun boat.” He added, “Our crews have reported that Scout has been a real aid to productivity at times they have had the system operating in less than three metres of water with the recording boat right over the top of the cable without any loss of positioning data.”

ORDERS AND CONTRACTS

Scout-Pro USBL improves efficiency of Caspian Sea survey

It’s been a busy summer for the Survey Support Group who have been touring Sonardyne’s business regions conducting technology workshops. On the agenda has been how the company’s positioning systems can be optimally applied to the various activities associated with the main phases of Field Development.

Attendees have included oil company representatives, project personnel from contracting companies, senior surveyors and vessel owners and operators. “The workshops provide a complete overview of subsea positioning for life of field development” explained survey group head, David Riches. “Applications are brought to life through simple graphics, case studies and interactive exercises. This process highlights the performance and commercial gains that can be realised from using our latest technology.”

Email: survey.support@sonardyne.com to find out the group’s next tour dates.
Sonardyne’s Survey Support Group (SSG) has recently provided planning support for a new, record breaking deep water field development in the Gulf of Mexico.

The Perdido Regional Host development lies 200 miles south of Freeport, Texas and is operated by Shell on behalf of partners BP and Chevron. Once complete, Perdido will be the deepest drilling and production platform in the world and have the deepest subsea well in the world.

Acery won the installation contract for approximately 60 kilometres of subsea production umbilicals and subsea hardware that link three satellite fields to a central processing spar. This scope of work was tendered and successfully executed from Acery’s North America and Mexico office.

Positioning for the umbilical lay was undertaken using a Sonardyne Wideband Long BaseLine (LBL) system, the only positioning technique available that would be able to provide the necessary accuracy.

During the array planning stage, Acery approached Sonardyne’s survey group to verify that the initial locations chosen for the Compatt 5 transponders would make the most efficient use of the available hardware.

“This is exactly the type of service that our group was set up to do,” said SSG Project Surveyor, James Hope. “We’re here to make sure that when customers head offshore, they’ve had the ‘tick in the box from us’ that the Sonardyne hardware will do exactly what they want it to do.”

The work James’s group undertook on Perdido was to look at Acery’s array plan and, using specialist software (see page 16), verify that there was clear line of sight between each of the Compatt 5 transponders. John Brader, Project Surveyor, and Gerry Quinn, Survey Operations Manager, at Acery, were pleased with the acoustic success of the project in particular regarding areas with difficult terrain. “Based on Sonardyne’s analysis and recommendations, we were able to hire in exactly the right quantity of equipment for the job. The viewed data proved extremely accurate with each transponder positioned for maximum potential and ultimately providing the coverage the analysis said it would. The support we were given by Sonardyne’s support group gave the guys offshore doing the job a real confidence boost. We would have no hesitation in calling upon those support services again.”

The Perdido host spar is tall as the Eiffel Tower and will be the central processing centre for three main development fields; Great White, Silvertip, and Tobago. Shell has already set a new water depth world record in drilling and completing a subsea well 9,356 feet (1.77 miles) below the water’s surface. The project intends to drill an even deeper well at 9,627 feet. Photos: Shell

**Fugro Chance complete Perdido metrology**

In a separate operation at Perdido, Fugro Chance Inc. recently completed an acoustic jumper metrology survey on behalf of Oceaneering International Inc., Shell’s jumper installation contractor.

The Marine Construction Survey Division of Fugro Chance performed the acoustic jumper metrology using a Medium Frequency Sonardyne Wideband LBL acoustic positioning system that provided a highly accurate and highly repeatable solution. The jumper spanned two pipeline sleds in a water depth of 9,625 feet. The Sonardyne system was chosen for a number of reasons; reliability at water depth, ease of use, accuracy and noise immunity of the system, and efficient and cost effective use of hardware with just two Compatt 5 Wideband transponders being required to perform the acoustic jumper metrology. (Source: Fugro Chance Inc.)
Sonardyne has announced to users of its Type 8070 Wideband Sub-Mini transponders (WSMs), that the depth rating of their equipment has now been upgraded from 3,000 to 4,000 metres. This follows an engineering design review prompted by customers’ desire to operate at greater depths. The change not only applies to newly manufactured WSMs but all Type 8070 units currently in the field. No mechanical modifications or new parts are required to benefit from the extended depth capability.

Users wishing to re-label their WSM end-caps, which currently indicate the 3,000 metre rating, can obtain a replacement label free of charge by contacting Sonardyne’s customer support team at: support@sonardyne.com

Sonardyne’s Ranger USBL positioning system has also been upgraded, taking the operating range limit from 2,000 metres to over 6,000 metres. This means that the system now provides users with the same range capabilities as the more advanced Ranger-Pro system.

All standard Ranger USBL systems scheduled for delivery from October 2009 onwards will be delivered with the extended range capability. There is no change to the specification of Ranger-Pro USBL which will continue to provide more advanced features such as additional target tracking, ping stacking for fast position updates and support for legacy transponders.

Existing Ranger USBL users and customers who have recently taken delivery of a Ranger USBL are being invited to contact Sonardyne to arrange their free of charge software update.

Subsea 7 has become the first major customer for Sonardyne’s new long life positioning transponder, Compatt 5 Max. Officially launched at the Ocean Business exhibition in Southampton earlier in 2009, Compatt 5 Max has been developed to meet operators’ needs for a semi-permanent seabed transponder that can be utilised for life-of-field positioning tasks. Almost immediately an order was placed by Subsea 7 for 21 units to be deployed in BP’s Skarv field offshore Norway, currently the largest field development project underway in that region.

The Max’s ultra long life lithium battery pack is the key feature that sets it apart from standard Compatt 5 transponders. It offers a working life of two years of continuous operation for subsea navigation and data telemetry functions which is substantially longer than conventional seabed transponders.

However, real-life predictions, taking account of periods of inactivity, suggest that the Max’s battery life could be closer to three years.

For field operators and contractors like Subsea 7, the Max’s long life enables the transponders to be left in-situ throughout all drilling, production and construction activities. It is expected that this will produce significant cost savings by minimising the vessel deployment costs typically associated with installing, recovering and then reinstalling seabed transponders for each positioning task.

In addition to a long operating life, the Compatt 5 Max transponder provides all the tried and tested benefits of Sonardyne’s Wideband signal technology for multi-vessel and subsea vehicle positioning. A network of Compatt 5 Max transponders can therefore be used to provide DP and survey references for different vessels equipped with both Sonardyne and non-Sonardyne systems undertaking simultaneous subsea tasks.

The Compatt 5 Max transponders for Skarv were delivered in readiness for a busy summer campaign of work that began with providing Long Baseline (LBL) positioning for the installation of various subsea templates in water depths ranging from 350 to 450 metres. With the transponders left deployed, the Sonardyne Max units will now be available at any time in the future for other field development tasks including metrology, cut-to-length and umbilical lay.

The Skarv FPSO currently under construction. © BP plc
Deep water tracking

Ranger follows a star

The world’s best known research submarine has a new link with the world following the purchase of Sonardyne Ranger acoustic tracking systems by the US National Deep Submergence Facility (NDSF). The three-man submersible Alvin is operated and maintained by the Woods Hole Oceanographic Institution (WHOI) and achieved global stardom when it performed the first exploration of the Titanic in 1986. Kim Swords, a senior applications engineer for Sonardyne in Houston reports for Baseline.

Alvin was built in 1964, a continuous programme of upgrading and renewal means that all the present vehicle shares with the original submersible is its name. The sub is completely disassembled every three to five years so engineers can inspect every last component – all of which have been replaced at least once in the sub’s lifetime.

Part of that upgrading process now includes the installation of a Sonardyne Ranger-Pro USBL (Ultra-Short Baseline) to enable the precise deep water tracking of Alvin, together with Woods Hole’s equally famous remotely operated vehicle, Jason, and other vehicles. Ranger’s ability to transmit and receive text data messages is an additional feature of the technology that should make a significant contribution to the operation and safety of WHOI’s work.

Lane Abrams, a member of the Woods Hole Alvin team, explained the thinking behind their choice of equipment.

“We purchased a pair of Ranger systems to be used as tracking equipment for the vehicles we operate,” he said. “In general,
one of the systems will be mounted onboard Alvin’s mothership, the R/V Atlantis, and used principally to track the Alvin. The other system will be configured for flyaway use on vessels of opportunity when operating with Jason, an ALV called Sentry, or other vehicles.” He added that prior to purchase, they also looked at USBL systems from other manufacturers but did not feel that their performance matched that of Ranger’s.

Until now, the NDSF vehicles have been tracked using a combination of navigation tools. “Our basic navigation tool is Long Baseline (LBL),” explained Lane. “With this, both the vehicle and the surface ship can determine their location relative to transponders placed on the seabed. When we are close to the seabed, we also use acoustic doppler positioning to determine the vehicle’s motion.

“One incentive to use the Ranger is to save operational time and effort by not having to deploy and set up an LBL transponder network before we can get to work. With USBL, we can arrive on location and begin tracking soon as the vehicle is in water. We expect to obtain increased capability over the previous systems we have used,” said Lane.

Ranger had been earlier put to the test by Jonathan Howland of Woods Hole who undertook a detailed study of the equipment options available. He had been encouraged by the performance of a trial system loaned to WHOI for use on Jason last year (Baseline Issue 4) where the vehicle was tracked to near 5,000 metres off Hawaii.

The WHOI team had also been reassured by favourable reports received from their counterparts in the UK at the National Oceanographic Centre in Southampton. Their ROV Isis was built by Woods Hole engineers as a sister to Jason and they have been successfully using it with Ranger at similar depths to those at which Jason operates. Because of this the team had every reason to be confident that the Sonardyne equipment would perform well.

Following delivery of the two Ranger systems, the Woods Hole team immediately put one to work aboard the R/V Atlantis on a science cruise. This set out from Astoria, Oregon on June 8th so the team used the transit up from San Diego to complete the commissioning of the system. The work included mounting the transceiver on a through-hull pole, installing the AvTrak transponder on the vehicle and calibrating the whole system to remove any systematic biases.

Under the direction of chief scientist Jim Holden, the ship left Astoria with a science party of 22, a ship’s crew of 24 and an Alvin operations crew of 10. Their objective was to study the biogeochemistry and microbiology of the Axial Volcano on the Juan de Fuca Ridge. During the 20 day cruise, Alvin completed 13 dives in two areas to depths of 1,500 and 2,200 metres where it was used to deploy instrumentation and collect fluid and sulfide samples.

The Ranger’s performance was subjected to close scrutiny throughout the cruise as the Alvin crew familiarised itself with its operation. The user-friendly software interface has been specifically developed so that it is easy to learn, set up and operate. This ensures novice users quickly gain confidence and use it successfully regardless of their previous experience of USBL technology.
Ranger’s performance is further enhanced with Wideband “ping stacking” technology that enables acoustic interrogations to a transponder in the water to be transmitted before the last reply was received. In this way, the position of a target being tracked can be updated by more than once a second regardless of the water depth.

“Although this was a scientific cruise, our goals for the Ranger were not particularly scientific,” said Lane. “Rather, it was to continuously track the sub while it was performing the required science tasks. We were monitoring the performance of the Ranger and comparing it to other readings.”

“We were able to reliably track the vehicle all the way to the bottom and out to the side as it returned to the surface. We were also able to get SMS (Sonardyne Message Service) data from the submarine to the surface, though not on this particular occasion from the surface to the submarine.” Although this technical issue was not seen as a major obstacle, the potential value of the SMS facility for passing operational messages between the ship and the submersible makes its complete functionality a high priority.

“There is still more work for us to do,” said Lane. “We have other navigation systems which must be modified to accept the Ranger data format. We must also iron out the two way messaging and get it integrated into our logging systems. Lastly, we need to fit the vehicle hardware into its final configuration.”

Despite the work ahead, the Woods Hole team have welcomed the Sonardyne technology aboard the Alvin. “Our initial cruise with Ranger has now been completed,” concluded Lane. “The system operated well; it tracked Alvin consistently and the feedback from the operators has been positive. We consider the installation and commissioning of Ranger to be a success.” BL
Simon Partridge, Engineering Director at Sonarype, has been at the forefront of the development of a new breed of autonomous Wideband transponders for specialist monitoring applications.
Left to their own devices: Transponder technology moves toward autonomy

For the past two years Sonardyne has been working on the development of a specialist acoustic monitoring system that uses a network of autonomous seabed transponders. The success of the first operational deployment offshore Norway and in South East Asia, suggests that the new technology can deliver valuable survey data and significant cost savings. Baseline speaks to Engineering Director, Simon Partridge, to find out more.

Development of the new system began in 2007 when Shell Exploration and Production approached Sonardyne with a challenge. “They were looking for a method of precisely measuring movement of the seabed caused by reservoir depletion,” recalled Simon. “Existing ‘4D time lapse seismic’ images the reservoir below but it is very expensive and therefore infrequently acquired. The hope was to find a cost effective technology that could detect changes in the seabed much earlier and therefore help determine when to acquire 4D seismic and provide data useful for understanding the effects of subsidence on seabed infrastructure.”

It was a demanding brief. The system would need to be deployed for many years without intervention, make hundreds of thousands of stable highly precise measurements from a number of sensors, safely log the data and on command, efficiently transmit the data to the surface.

“Precise ranging, acquisition of sensor data and telemetry is a common element of many subsea applications and one to which our Wideband acoustic signal technology is particularly suited,” continued Simon. “When we sat down and looked in detail at the requirement, it was immediately recognised that we had the technology to provide a unique monitoring network that could not only be used for seabed studies, but a whole host of other long term monitoring applications.”

What is the System?
From the engineering development programme has emerged the Acoustic Monitoring Transponder (AMT), the main component of the new system.

“The AMT has all the traditional positioning functionality of our most advanced Wideband transponder platform, Compatt 5,” explained Simon. “We’ve re-packaged it in a 3,000 metre depth rated, aluminium-bronze housing suitable for long term deployment over several years. We’ve also added a full suite of precision sensors to measure sound velocity, temperature, pressure and inclination across two axes.”

However, it is the AMT’s unique autonomous operating mode that really sets the instrument apart from a conventional transponder. At the requested time and sampling period, each AMT wakes up and acoustically interrogates neighbouring AMTs in order to precisely measure the distance (range) between each unit. These ranges, along with the environmental readings from the onboard sensors, are then stored to the AMT’s memory.

“This process is repeated for each AMT in the network and as often as required,” explained Simon. “The sub-centimetre ranging precision offered by our Wideband acoustic signal means that the slightest shift in position of an AMT can be detected. Simply put, this means that a network of AMTs can be deployed on the seabed over a large area and left for several years to monitor structure, seafloor or pipeline movement without a surface vessel or ROV being required to oversee the process.”

Three main parameters can be measured using the new AMTs:

- Horizontal distance / displacement
- Highly precise acoustic ranges measured
- Temperature
Technology

Autonomous data acquisition and monitoring

autonomously, repeatedly and simultaneously between multiple AMT instruments to monitor lateral displacements. Temperature and sound velocity recorded simultaneously to compensate the time of flight range measurements.

Vertical displacement
• Highly precise and stable pressure measurements recorded to enable long term monitoring of vertical displacements by analysis of differences in average water column height between different AMTs. Precise tidal amplitude and period within the field area can also be calculated.

Inclination
• Changes in pitch and roll of a structure or surface on which the transponder is placed recorded using highly precise inclinometers.

AMTs are deployed in special seabed frames or clamps attached to the structure being monitored. “Deployment arrangements can be custom designed depending on the application,” said Simon. “For Shell, we deployed the system in two different environments; warm shallow water and deep cold water so we designed and manufactured two types of frame.” He added, “Because AMTs are a positioning transponder as well, a USBL system can be used to aid deployment and then if necessary, ‘boxed-in’ to enable absolute positions for each unit to be calculated.”

With the system operational, a user can at any point, change logging parameters or collect acquired data using a PC interface unit and over-the-side ‘dunker’ deployed from a vessel-of-opportunity. A high speed data link ensures that the vessel need only be on-location for a short amount of time to complete the operation. This is expected to generate valuable operational cost savings.

Potential Applications
With a track record now established, Simon and his team are confident about the wider applications for the new system, highlighting two main categories:

Construction Survey
• Autonomous structural monitoring: Short to long-term settlement into the seabed of templates and PLEMs
• Autonomous seabed monitoring: Long term subsidence and stability of the seabed
• Autonomous MetOcean monitoring: Wireless telemetry of seabed environmental data (sound velocity, tidal heights, currents etc.)
• General survey work: LBL and USBL navigation, ROV and AUV multi-beam surveys and DP reference

Oil Field Production
• Long term structural monitoring of pipelines: Movement due to slugging, thermal expansion, anchor line drag, hurricane/cyclone damage and VIV monitoring at spans with optional interface to accelerometers and strain sensors
• Seabed settlement: Structure, pipeline and well casing integrity due to seabed subsidence
• Seismic: Seabed deployed tidal height reference for 4D seismic surveys. BL
With the summer weather window for deployment in Norwegian waters fast approaching, Sonardyne had only seven months to design, develop, prototype, exhaustively test and then manufacture the final production volume of AMT equipment.

The system had to be right first time with no room for error. Having been deployed at depth there was no going back to change firmware. The data had to be perfect too, the best possible ranging and sensor precision and importantly, stability over the years of deployment. This required exhaustive fine tuning and development of improved signal processing hardware and algorithms.

Sonardyne provided support to plan the surveys and experienced personnel to help deploy the equipment in the field, which was completed in just one day of vessel time.

The AMT network has now been deployed for two years and has been highly successful. All instruments have continued to operate and collect extremely high quality data. From time to time, it is cost effectively uploaded via the integrated high speed telemetry to a vessel of opportunity in order to be analysed. Sub-centimetre lateral displacement measurement has been proven.

The results are proving intriguing and providing value to the customer who is planning deployments in other oil and gas fields.

“The AMT project is excellent example of close working between an oil company and technology provider such as Sonardyne,” said Simon. “Shell was actively involved and an excellent partner to work with.”
Planning makes perfect for Pluto

Rain and Rehearsal have proved to be a winning formula with the installation of an integrated acoustic positioning network for the Pluto gas field off Western Australia.

Offshore pipeline installation contractor Allseas had been faced with a challenge that required precision pipe-laying to create a network of flowlines and a trunk line in some difficult conditions.

The project, which is still underway, requires two subsea wells to be tied-in to a subsea manifold from which two 20-inch production flowlines will transport the gas 27km to an unmanned riser platform standing on the edge of the continental shelf. Starting at a depth of some 830 metres, the flowlines rise until they arrive at the platform located in 85 metres of water. From there, a 36-inch export trunk line, piggy-backed by a 6-inch MEG line, will carry the liquid gas and condensate from the platform to a LNG processing plant onshore at Dampier.

The most critical stage of the route occurs in a narrow gully that bites into the edge of the continental shelf where it creates the most practical route for the umbilicals as they quickly descend from the platform.

To provide the one metre positioning accuracy required, the viewshed analysis had to take account of the deflection of the Compatt transponders when they were fitted with flotation collars and tethered on five metre strops in currents running at 0.4 metres per second.

The use of the planning software combined with dedicated training provided significant time and cost savings that resulted in a low-risk operation.
transponder positions can be overlaid and 'viewsheds' generated. "Viewshed is a digital imaging term used to define visibility to or from a particular point," explained Project Surveyor, Edd Moller. "We can use the process to calculate whether transponders deployed on the seabed will be able to 'see' each other and acoustically communicate. This is particularly important when operating in complex environments such as the Pluto chute where there are many subsea peaks and troughs to negotiate. Using the software we were able to produce different array plans until we arrived at a design that provided the optimum solution," he said.

The software revealed the exact number of Compatt 5 transponders that would be needed to achieve the required positioning accuracy in the most efficient way possible. "We were able to plan everything based on equipment that Allseas had available for the project," said Edd.

A training programme that included a complete simulation package and some of the hardware that would actually be used offshore was prepared and delivered at Allseas' subsidiary in Delft, The Netherlands. "The training was specific to Pluto and used the same coordinates and locations in the classroom that the crew would be using when they got to Australia," recalled Edd.

Summarising the success of the project Edd said, "Our first contact with Allseas was in October 2008 so within three months we had produced several array plans and conducted onsite customer training. The array was installed in January without any further support from us with pipelaying starting later in the month. The array has been designed to remain installed throughout the pipeline construction. This means that all lines can be laid without the need to recover or change-out any part of the array."

When Michiel van de Munt, head of Allseas' Survey Unit, was asked to comment on the project later he was happy to confirm that the Sonardyne system was meeting the high standards demanded by his company. "Pluto presented a challenging offshore development in which we needed to provide very high accuracy seabed positioning in deep water," he said.

"By working closely with the Sonardyne Survey Group, the array planning and the project-specific training enabled the successful installation, calibration and tracking to be conducted on time and without any problems."
Saipem Sonsub extend the role for USBL

High precision, deep w
In March, offshore construction services provider Saipem UK – Sonsub Division contacted Sonardyne with an interesting proposal. The aim was to push the boundaries of USBL positioning performance during the installation of Template D in the Ormen Lange field offshore Norway. The work was undertaken using the Saipem 7000, one of the world’s largest heavy lift crane vessels which in itself would create challenges from a system installation point of view, and also acoustically from the noise generated by its 12 azimuth thrusters. Project Surveyors Edd Moller and Darioosh Naderi were onboard.
Saipem Sonsub extend the role for USBL

**Feature**

Ormen Lange is well documented for being one of the harshest subsea environments in the world and a true test for even the most robust acoustic positioning systems. With a mobilisation date set for May 2009, planning began straightaway with discussions initially focussing on the accuracy and precision benefits offered by Sonardyne’s optimised Ultra-Short Baseline positioning technology.

**Optimised USBL**

For the last two years, Sonardyne has taken an integrated approach to optimising the performance of its USBL systems by addressing the factors that affect all such systems.

Ranging precision and signal to noise have both been improved with the introduction of Wideband signal processing; position update rates, crucial when lowering structures to the seabed, are now as high as once a second, independent of water depth; Lodestar, Sonardyne’s combined attitude, heading and inertial sensor, provides vessel motion compensation and can be mechanically integrated with an acoustic transceiver to allow for movement in the deployment pole.

These and other measures have significantly improved USBL performance whilst still maintaining compatibility with Long Baseline (LBL) systems for deeper water deployment or where deployment tolerances are tighter.

**Wide Aperture Transceiver**

Given the sheer size and potential for high acoustic noise generated by the S7000, choosing the right USBL transceiver for the job would be crucial.

Selection of a USBL transceiver should always be done on a case by case basis by modelling the operational scenario, the size and type of vessel, and the deployment method. In this case, the modelling process concluded that Sonardyne’s newly developed wide aperture transceiver would be most suitable.

Sonardyne’s family of USBL transceivers are designed with specific scenarios and vessel types in mind, rejecting enough of a vessel’s thruster noise for optimal signal reception and performance in deep water.

“Using Ormen Lange’s existing LBL array as a reference, and a pole GPS position supplied by the Fugro survey team, it was immediately determined that the optimised USBL had an accuracy of better than one metre in 848 metres of water depth”

The next stage was to arrange a method for fitting the transceiver to the vessel. Not an easy task given the immense scale of the vessel: 198 metres in length, 87 metres breadth and a draft of nearly 30 metres. Over 600 metres of cable connecting the transceiver to the bridge control equipment would have to be run.

With just two months until the operation, installing a through-hull deployment machine was ruled out. However, it emerged that a temporary over-the-side pole had been previously fabricated for the S7000.

Any concerns about its flexibility (see opening photo) were quickly laid to rest as the Lodestar inertial sensor co-located with the transceiver on the end of the pole, would take account of any movement and remove the bias caused.

Using Ormen Lange’s existing LBL array as a reference, and a pole GPS position supplied by the onboard Fugro survey team, it was immediately determined that the optimised USBL had an accuracy of better than one metre in 848 metres water depth. A USBL system alignment correction was then determined negating the requirement for a lengthy USBL calibration.

**Simultaneous Tracking**

On Tuesday 2nd June, Template D was over-boarded and the optimised USBL system evaluation commenced.

Due to the unique interrogation techniques employed by Sonardyne USBL systems, all four of the transponders installed on the template, and the majority of the pre-installed LBL array, were tracked simultaneously with a three second update rate for all transponders. Tracking the LBL array transponders enabled ‘on the fly’ comparison of the as-installed LBL transponder position to gauge the performance of the optimised USBL system.

**The Results**

The final fixes obtained once the template had landed showed that the optimised USBL position of each of the four structure transponders when compared to the LBL position were within 20 centimetres of each other and a precision, on average, of 70 centimetres (to 1 standard deviation). Although this positional spread would not have been good enough for the Ormen Lange structure positional tolerances, it demonstrated extremely high accuracy and precision for a vessel-only deployed USBL system.

Reviewing these results, Saipem Sonsub were delighted with the success of the project. A spokesman said, “The optimised Sonardyne USBL system on the S7000 has proved to offer survey grade USBL performance capable of meeting many structure positioning requirements previously only achievable with the use of LBL.”

The company is now looking towards the next suitable campaign to deploy the system BL.
All Sonardyne USBL transceivers offer operational advantages in addition to increased positioning precision.

- **Improved update rate**
  Using a common interrogate signal, Sonardyne USBL can position an almost unlimited number of transponders (either fixed to the seabed for DP or mobile when attached to structures and ROVs) without any loss in update rate. During the S7000 trial, nine transponders were tracked simultaneously with an update for all nine of only three seconds.

- **Dual use for LBL operations**
  Sonardyne USBL transceivers can be used for command and control of remote transponders and arrays during LBL operations, including calibration. Due to the size of vessels such as the S7000, deploying an LBL dunking transducer over the side is not practical. The S7000 can therefore utilise its Sonardyne USBL transceiver as a LBL transceiver, removing the need to deploy an ROV, a big time and cost saver.

- **INS ready**
  Sonardyne USBL transceivers provide extremely robust, precise and if correctly calibrated, accurate positioning. Coupled with the fast update rate to multiple transponders, INS systems can use these positions as an absolute position aid to reduce drift. Fast position update rates result in a shorter settling period for the INS which speeds up operational readiness, saving cost through time saved.

- **Sensor data recovery**
  Fully optimised USBL transceivers can simultaneously collect sensor data such as structure heading, pitch and roll data, transmitted through the water, while maintaining the required positioning update rate.

- **‘Ping Stacking’**
  By stacking interrogation and reply signals in the water column, up to 1Hz update rate can be maintained in any water depth.

- **Improved noise rejection**
  The physical design of the large array USBL transceiver is optimised to reject noise from thrusters and other sources of vessel based noise. This not only helps to improve the signal to noise ratio and therefore positioning precision, but also opens up weather windows with tracking remaining stable even when thruster levels increase to counter sea and wind.

- **Firmware upgradability**
  By utilising downloadable firmware through the existing cable, Sonardyne USBL transceivers can be upgraded and maintained without removal from the pole.

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### Comparison of LBL and Optimised USBL Transponder Positions

<table>
<thead>
<tr>
<th>Template Transponder</th>
<th>LBL Position and Optimised USBL Position Difference</th>
<th>Nothing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transponder</td>
<td>Easting</td>
<td>Northing</td>
</tr>
<tr>
<td>0109</td>
<td>- 0.19</td>
<td>- 0.08</td>
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<td>0110</td>
<td>- 0.10</td>
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<tr>
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<td>0.05</td>
</tr>
<tr>
<td>0112</td>
<td>0.21</td>
<td>- 0.06</td>
</tr>
</tbody>
</table>

(Top) The Saipem 7000, one of the world’s largest heavy lift crane vessels
(Middle, left to right) The Lodestar and USBL transceiver co-locating bracket designed to fit on the end of the S7000’s over-the-side pole (below).
Technology

Marksman+DP INS
In the last issue of Baseline, we reported on Sonardyne’s development of Marksman; a new, more user-friendly Long and Ultra-Short Baseline acoustic reference system that provides precise positioning for dynamically positioned (DP) vessels. Jon Parker, James Allen and Mikael Larsen bring the story up to date with a report on the system’s first operational deployment onboard Transocean’s Discoverer Enterprise drillship and look ahead to the next chapter in the Marksman story, integration with inertial navigation.

The Marksman system, together with a Lodestar attitude and heading reference system (AHRS), were installed in June to demonstrate the capabilities of the new Sonardyne technology and to gather important feedback from Transocean’s crew.

Using the vessel’s existing through-hull transceivers and seabed Compatt 5 transponders, Marksman proved quick to install and was fully operational and interfaced to the Enterprise’s DP desk within a few hours of arrival onboard.

A top-down calibration of the vessel’s transponder array was conducted and soon after, Marksman began providing its first live LUSBL ship positions to the DP system. Various positioning tests were carried out including manoeuvring the vessel around a 10 metre square on acoustics alone whilst monitoring GPS for vessel position deviation.

Lodestar = Optimised USBL

The opportunity was then taken to demonstrate how using the high specification Lodestar AHRS can significantly improve acoustic positioning repeatability.

The vessel’s existing attitude sensors were logged against the Lodestar and the results charted. The Lodestar data was considerably more precise, but even so, the pitch data exhibited some significant digitisation so the decision was made to switch to Sonardyne’s proprietary ‘SON1’ telegram to improve precision.

The importance of using a high precision AHRS with USBL-based systems cannot be understated and in this scenario, could halve the standard deviation of the USBL position. Having carefully designed and tested Lodestar AHRS and Marksman integration, Sonardyne can now guarantee that timing issues and misalignments between heading and attitude sensors are a thing of the past. >>
Vessel Deployed Arrays

Transponder arrays are traditionally deployed at between 15 and 20 degrees off bore sight, which in 2,000 metres of water would require the array on a 700 metre radius from the well. With the introduction Wideband signalling technology and development of better calibration software, Marksman can operate with a transponder array radius of just 7 degrees or 245 metres in 2,000 metres. This significant reduction enables onboard ROVs to reach the transponder locations whilst the rig is setting up over the well, saving hours of vessel time compared with the previous method where the rig or dedicated ROV vessel would move over each transponder location in turn.

Easy to Use

From the outset, one of the key design principals for Marksman was to make the job of LUSBL positioning easier. With so many different systems on the bridge of a drilling vessel to monitor, operators simply do not want to spend hours learning a complex equipment interface.

After the Enterprise crew worked with Marksman for just a few hours, Sonardyne received the seal of approval for the new look interface, echoing the opinions expressed by other users during earlier trials of the system. The feedback indicated that Marksman immediately gave the end user more confidence in setting up new jobs. The same went for setting up new Compatt transponders and getting them calibrated into an array. The menus were said to be very user friendly and required less technical knowledge to reach a successful outcome. It made the whole system easier to understand and more logical, which in the end, would make it easier to troubleshoot any problems that a user may encounter. The result: Marksman is far superior to the current LUSBL system and is what operators have been expecting from Sonardyne.

Inertial Navigation for DP

Sonardyne is shortly to release another new product, its first Inertial Navigation System (INS) which uses an acoustically aided Lodestar and Marksman as the front end.

For many years, DP vessels operating in ultra deep water have relied on GPS and
LUSBL acoustics as their two primary types of position reference. There has always been a desire to have a third independent type of DP reference that would allow safe rejection of a positioning error in one of the other two reference types. An example of the need for a third reference exists in Brazil where scintillation can degrade USBL positions leaving the LUSBL system as the sole reference.

Sonardyne’s new DP INS system addresses this need by offering a combined acoustic and inertial solution, with behavioural characteristics that both differ from and complement LUSBL.

“From the outset, one of the key design principals for Marksman was to make the job of LUSBL positioning easier.”

An INS integrates measured acceleration into velocity and position while using gyro’s to maintain knowledge of orientation. Simply put, an inertial navigation system does for position, orientation and velocity what a clock does for time.

Through a process known as gyrocompassing, the INS uses gravity and the Earth’s angular rate to determine true vessel orientation to a few hundreds of a degree. INS is self contained, inherently robust and very accurate in the short term. The complementary characteristics of acoustic positioning and INS are optimally combined using an advanced Kalman filter design based on decades worth of acoustic and inertial experience.

INS brings many benefits to the acoustic positioning market such as the ability to ride through acoustic problems without disturbing DP operations. Acoustic signals can be interfered with by various environmental factors such as aeration clouds, momentary increases in the noise level or physical masking. These effects are typically short term problems and incorporation of an inertial solution means that the problem passes without incident.

INS aided DP also provides cost saving benefits such as being able to run at much slower acoustic update rates (thereby saving transponder battery life) and being able to operate using a single transponder instead of an array.

DP INS can provide an improved solution:

- Complements LUSBL for the most demanding DP applications.
- Improved accuracy, typically factor 2-3*.
- Dramatically improved robustness and performance in noisy conditions*.
- 1Hz+ update rate, independent of depth.
- Reduced ping rate – greater transponder life.

The core of the system is Lodestar, configured for Acoustically Aided INS (AAINS) operation. Lodestar AHRS and Lodestar AAINS share an identical hardware platform custom built for tightly integrated marine applications. The unit makes use of the highest performance inertial sensors available for practical commercial use. Highly stable error characteristics and immunity to vibration and temperature variation makes the Lodestar inertial sensor suite uniquely well suited for DP.

In case of unexpected problems related to the inertial solution, DP INS can gracefully degrade to a conventional Marksman LUSBL mode of operation.

On recent trials, the DP INS system was purposely pushed to the limit with massive amounts of noise and aeration (Figure 1). The Lodestar INS system showed that even when USBL position aiding was lost for 90 seconds, the INS position drifted no more than two metres. DP INS position error was on average one third of USBL error and more importantly, the DP INS managed very well during periods of noise and acoustic drop outs.

The combination of Marksman LUSBL and Lodestar DP INS mean that Sonardyne is ready to provide the very latest technology to the deep water DP market. BL

Lodestar AAINS for subsea vehicles

Following on from successful demonstrations earlier this year, Sonardyne’s subsea Lodestar AAINS has been undergoing further system proving in the field and the first INS ready subsea Lodestar for customer delivery is due shortly.

The system has been the subject of rigorous trials and is designed for seamless integration with existing Fusion LBL and Ranger USBL systems.

“In ROV trials with DVL, position drift was just one metre after one hour of dynamic manoeuvring.”

The acoustically derived vehicle position is used to aid the INS navigation solution. Vehicle sensors such as DVL, depth and sound speed sensors can also be utilised in the INS positioning solution. In ROV trials with DVL, position drift was just one metre after one hour of dynamic manoeuvring.

The first customer units will be used to improve the positioning performance of towed vehicles which are currently tracked solely with a USBL system in water depths up to several thousand metres. It is estimated that the addition of AAINS will improve positioning precision by a factor of up to five depending on the specific mission parameters.
The tracks of two divers approaching a harbour during recent trials to evaluate the new extended range capabilities of Sentinel. The diver with the orange trail began his run towards the target at 900 metres and was immediately detected.
Specification upgrades enhance capabilities of Sentinel sonar

OT CONTENT WITH becoming the market leading Intruder Detection Sonar (IDS) within two years of launch, Sonardyne’s Sentinel product development team have spent the last few months testing a host of valuable product enhancements that will set the system even further apart from its rivals.

Sentinel is a truly new generation of underwater threat detection, tracking and classification sonar. Utilising innovative composite arrays, electronic design and software algorithms, the sonar head consumes no more power than an average light bulb and operates at considerably lower source levels than more generic hybrid systems, thus minimising its impact upon marine life. First demonstrated in October 2007 and delivered to its first customer in May 2008, more than 20 systems have now been ordered for a diverse range of maritime security applications.

Longer Detection Range
Trials over the summer period proved Sentinel’s ability to detect, track and classify potential underwater threats at up to 900 metres range in both shallow water and complex environmental conditions. Achieving the balance between longer ranges and the risk of higher false alarms has been a key target for the algorithm development team at Sonardyne, and one which the trials verify has been conquered.

Acoustic Countermeasure
The optional “Scylla” underwater loudhailer, the first fully integrated acoustic countermeasure to be offered with an IDS and operated autonomously within the system, has completed final testing and will be delivered to its first customer, an undisclosed European navy, later in 2009.

In simple terms, Scylla is a small underwater speaker that will be normally deployed next to the sonar head. When a diver reaches a pre-set distance from the protected asset, for example a yacht or port entrance, a prerecorded audio message is automatically transmitted through the water to deter the would-be intruder. Should the warning be ignored, further staged messages can be played. Live messages can also be broadcast allowing security personnel to respond to any situation unfolding before them.

Permanent Deployment
Proven in service as a versatile portable and expeditionary system due to its small size, light weight and ease of set up, Sentinel has now completed long term immersion and operational tests with a sonar housing manufactured from aluminium-bronze.

“Sentinel has been described as the best expeditionary system on the market.”

The corrosion resistance properties of aluminium-bronze are well known to Sonardyne as the company’s range of vessel-based acoustic positioning transceivers are made of the same material to withstand years of permanent deployment in cold and warm water environments. Offered as a no-cost option to prospective customers, the first Sentinel sonar with the new housing was shipped to an end-user in September 2009.

Commenting on the programme of upgrades, Dr Graham Brown, Director of engineering for Sentinel said, “Sentinel had been described as the best expeditionary system on the market. With these upgrades, we have also made it the best IDS for permanent installation where critical infrastructure such as ports and harbours require maintenance-free protection 24 hours a day, 365 days a year.” Further enhancements are already underway that will add additional capability when combined with integrated command and control systems.
Systems and Products

Lodestar GyroCompatt 5

A new tool for high accuracy structure placement and metrology; a Wideband positioning transponder and subsea gyro in an integrated 3,000 metre package

The Lodestar GyroCompatt 5 integrates a Wideband Compatt 5 acoustic positioning transponder and Lodestar AHRS (Attitude and Heading Reference System) technology in one small, highly versatile and robust instrument depth rated to 3,000 metres. This provides high update rate wireless attitude, heading, heave, surge, sway, pressure, SV and precise acoustic positioning of any subsea object.

Compatible with USBL and LBL positioning systems, the Lodestar GyroCompatt 5 provides real time motion data for structure deployment via the integrated high speed acoustic modem. The internal high capacity rechargeable battery pack enables quick charge times and up to 20 hours of continuous operation with the ability to turn the gyro ‘On’ and ‘Off’ to save battery life giving over two months of transponder life.

Small and light enough to be installed by ROV, a mechanical stab plate enables users to precisely align the unit to structures such as templates and manifolds.

Applications
Structure position and orientation can be accurately determined during lowering, set-down and as-built survey. Using the Lodestar GyroCompatt 5 for metrology delivers the measurements required for pipe-end coupling.

As the stab, gyro and transducer are pre-aligned, this speeds up spot measurements as only single observations are required.

Autonomous data logging removes the need for a vessel and ROV to be on standby collecting measurements during long term settlement observations.

Lodestar GyroCompatt 5 Facts & Figures

- Wideband Compatt 5 transponder and Lodestar AHRS unit in a single subsea housing
- Acoustic and ROV operated On/Off switch
- Upgradable to LBL aided INS
- Autonomous data logging
- Simultaneous ranging and sensor data recovery
- Integrated sound speed and pressure sensor with an additional port for auxiliary sensors
- Data telegram output and 24V available for ROV displays
- Option for external power
AvTrak Navigator

AUV positioning, vehicle homing, data telemetry and emergency recovery assistance; just some of the features available the new AvTrak Navigator instrument.

AvTrak Navigator is a new Wideband acoustic positioning and communications instrument that combines the functions of an Ultra-Short Baseline (USBL) transponder, transceiver and robust acoustic telemetry link in one low power device that can be easily retrofitted to a wide variety of subsea vehicles.

A comprehensive yet easy to use command language enables a vehicle to undertake complex multi-stage missions with great flexibility. It facilitates ranging to seabed transponder arrays for position aiding, homing into targets of special interest and robust high speed acoustic telemetry of mission data and mission commands.

Compared with traditional USBL systems, AvTrak Navigator consumes far less power. This reduces the energy drain on the AUV’s battery and therefore improves operational endurance, a key priority for all users.

An internal battery and acoustically commanded digital I/O provides emergency back-up power and control to facilitate mission abort, jettison ballast and vehicle recover in the event of onboard failure.

AvTrak Navigator Facts & Figures

- Incorporates Sonardyne Wideband® signal technology
- Compatible with Sonardyne Ranger USBL for combined tracking, telemetry and positioning
- Robust and High Data Rate Link telemetry modes
- Emergency relocation mode
- Easy to operate using serial port command interface
- Extremely low power consumption
- MF operating frequency
- Supports USBL homing in to remote targets
- Internal back-up battery
News from around the World

SE Asia – Singapore
Bob Coutts
Vice President Sales

It is with great pleasure that I take over sales in Asia from John Ramaden who is relocating back to the UK to become our new MD. Under his leadership, the Singapore office has grown enormously in recent years; it is now my responsibility to ensure that this success continues.

Joining the sales team is Anthony Gleeson whose background in motion sensor technology will be a great asset in gaining market share for our products.

Nick Smedley has been promoted to VP Operations overseeing all offshore activities in the region. He is undoubtedly one of our most knowledgeable people with a unique combination of skills and experience. Nick’s role within the Survey Support Group remains unchanged.

Mary Wong’s role as Finance and Administration Director also remains unchanged. Mary will continue to keep the finances in order and the office running as smoothly and efficiently as ever.

Our recent sales highlight has been the US$1.5M order for a multi-head Sentinel sonar system to protect a major infrastructure project in SE Asia.

USA – Houston
Simon Reeves
Vice President

I joined Sonardyne in June and after a busy summer moving my family over from Massachusetts to Texas, we are finally settled and ready to build our new lives in Houston.

There’s no doubt that the last few months have also been challenging in our core oil and gas markets, but we all know that it is only a matter of time before the market will return and I would like to think that we may see this early in 2010.

I’m privileged to be surrounded by a team of colleagues who are very dedicated and have tremendous strength and knowledge about our customers and their applications for our products.

Together we anticipate a renewed drive for our products as the new GyroCompatt 5 and DP INS systems featured in Baseline are released into the market; the latter especially with the increase of scintillation around Brazil and West Africa.

On the government contract side, we are very happy with the market attention and sales Sentinel is attracting and continue to have very high hope for large future sales.

UK – Aberdeen
Barry Cairns
Regional Sales Manager

Sonardyne Aberdeen continues to grow its influence within the European sectors. Survey workshops have now taken to the road and we have successfully given our first seminar in France. Similar events are planned for the rest of Europe, Africa and former soviet countries.

West Africa is a hot topic at the moment so we have been working hard to prove Sonardyne is at the forefront of acoustic technology for all the varied challenges posed from this region. With the success of Lochestar and optimised USBL, we believe Sonardyne will be the positioning system of choice.

New Appointments
I am pleased to announce two new additions to the team. Katie Wade joins us as our new Receptionist and Administrator. Katie previously worked for the AECC in Aberdeen where she developed her excellent organisational skills. Joining the sales team, after a long period of searching in Alan MacDonald as Sales Manager Aberdeen.

Formally of TSS, Alan joins us with over 11 years industry knowledge and will be a great asset to our team.

Brazil – Macaé
Gavin Hunting
Regional Manager

Business in Brazil continues to be very busy with new rig installations and vessel upgrades to Wideband keeping our field engineers fully occupied. There are currently 66 rigs working in the region so business is expanding all the time. New government rules outlining the exploration of the pre-salt reserves are being studied with particular interest.

Training and Workshops
As part of an ongoing company-wide investment programme, we have increased the training facilities at our Macaé office. In September, Darioosh Naderi from Sonardyne’s Survey Support Group held a series of user workshops on a variety of topics. These events provided a great opportunity to get expert advice and understand the latest techniques. Darioosh also assisted our own Paul Smith with training clients on the survey aspect of LBL operations. More workshops are planned for 2010 so email us to register your interest in attending.

The next major infrastructure upgrade to the office is the creation of a transponder calibration room. We expect it to be running and open for business by October.
Ask Darren²

Darren Taylor and Darren Murphy are the front line of Sonardyne’s customer support team. If you have a question, they can get you the answer.

If there’s something you’ve always been meaning to ask Sonardyne, then we’re here to get you the answer. Contact support@sonardyne.com with all your technical questions for a fast response from the two Darrens.

**Q** Is there a way of calculating the remaining battery life in a Compatt 5? We have an array of them deployed fitted with alkaline packs; the highest battery count is 255. What’s the worst case scenario with the beacon set in high power and a five second update rate?

**A** (DT) We have this simple little application that runs in Excel – it has just become available. Open the.xls file in the normal way making sure that your PC security settings allow macros to run. Then simply input the details of the transponder and it will then tell you how many days you have left. It’s not on our website just yet so for now, email: support@sonardyne.com with your details and we will email you the file. The file size is only a few kb.

**Q** I have Scout Plus system set up with one Coastal Transponder and one WSM. I would like to add an LRT to the job but the pull down menu for adding transponders doesn’t list it. What am I doing wrong?

**A** (DM) Set the LRT up as a Coastal beacon – it’s basically the same but just with the added functionality of a release. When you want to recover the LRT, go to the ‘Advanced Commands’ tab. In there you will see the command button to activate the release. To avoid accidental release, it will prompt you a couple of times to confirm this that is what you want to do.

**Q** (DT) If you drop the transponders from a ship (rather than place them using the ROV), attach a strop of at least two metres in length between the weight and the transponder. This is to reduce the possibility of the transponder hitting the clump weight when it reaches the bottom.

**Q** Our company has just won a large job off Nigeria which will involve a lot of LBL work for our department over the next couple of years. We’re all pretty experienced operators of your kit so I was wondering about the advanced training courses you offer. I’m keen to make sure my guys are fully up to speed on Wideband.

**A** (DT) We run advanced courses for all our LBL, USBL and LUSBL platforms. Demand is always high so let us know as soon as possible about numbers and where you would like the course to be held. At the end of each course, students are graded based on an exam.

**A** (DM) It sounds like you might want to consider a bespoke course. If you can give us an idea of the work that you will be doing, our survey support team can tailor the syllabus to you. At our Plymouth trials centre, we can simulate real jobs, such as putting in a template. This would allow your guys to get some hands on time before they do it for real. In the past, operational procedures have been written and rehearsed at the same time.

**Q** Dear Darren², how much are the clump weights holding down Compatts supposed to weigh? The only answer I can find is four times the buoyancy of the floats. Since we left ours on the bottom when we finished our last job, we now have to make some new ones. Thanks for your assistance.

**A** (DM) The weights should be four times nett upthrust, not four times total buoyancy. To calculate the nett figure, you need to take away the weight in water of your transponder from the buoyancy provided by your floats. Look at the example below.

- Buoyancy of 1,000m float collar: 30kg
- Less Compalt 5 weight in water: (13.6kg)
- Nett upthrust: 16.4kg
- Clump weight (4x16.4kg): 65.6kg

So in this case, weights of approximately 70kgs will do the job. Try to use biodegradable materials in order to reduce environmental impact.

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Well known for providing pinpoint accuracy in positioning systems, Sonardyne’s Wideband® acoustic technology is now being used as the foundation for a high integrity, wireless emergency control and monitoring system for BOPs. In the event of loss of normal communications with a blow-out preventor, the system is used to execute emergency shutdown and riser disconnect procedures. The robustness of the Wideband signals achieves an acoustic link with reliability that is comparable to that of a cabled link and may be considered as a direct alternative to an umbilical cable. Are you ready for Sonardyne Wideband® acoustics to put you in control? www.sonardyne.com/products