



EASYTRAK ACOUSTIC POSITIONING SYSTEMS



Easy to use
Easy to deploy
Highly portable
Low Cost or Full Featured
Accurate

www.easy-trak.com
www.appliedacoustics.com

EASYTRAK Acoustic Positioning Systems

EASYTRAK acoustic positioning systems are cutting edge tracking systems using the latest technology and techniques to offer a host of benefits for a wide range of marine positioning applications. Using a single transducer assembly, range and bearing can be obtained from a variety of underwater positioning beacons. With two basic systems and a number of upgrade options, EASYTRAK can be configured to suit a variety of tasks including:-

- Diver tracking
- Salvage tasks
- Archaeology
- Data retrieval
- Towfish tracking
- Relocation
- Acoustic release location and recovery
- AUV / ROV tracking
- Dam inspection



EASYTRAK: Portability with ease of use.

Compatibility

In order to make the system as versatile as possible, there are a large range of beacons available. In addition, EASYTRAK can be used with beacons made by other manufacturers. Please consult the factory to check for suitability.

Installation

System set-up and installation is easy. A transducer is deployed in the water, either over the side of a vessel (fixed or hanging), through a gate-valve or over the quayside for port and harbour marine positioning work. The transducer is connected to the surface electronics by a heavy duty cable which has been designed to carry the weight of the transducer. The surface electronics will either be the all-in-one EASYTRAK *Portable* console or EASYTRAK *Lite* box which is connected in turn to a customer supplied PC with a USB cable.

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Operation straight out of the box.

Software for either system is simple and intuitive so that minimum training is required before operations can begin. The more comprehensive software supplied with EASYTRAK *Portable* has a “set-up wizard” which allows operator ‘hand-holding’ during the initial start of a project, and online help is also provided.

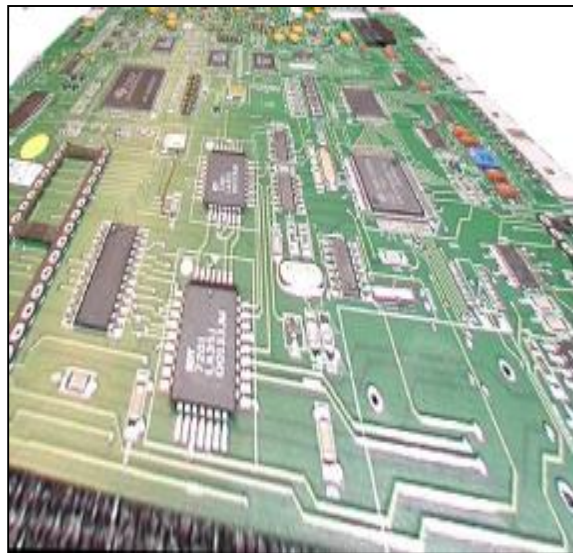
As mentioned earlier, EASYTRAK can be used with a variety of beacons – these are the targets which EASYTRAK will locate.

For many applications, our 219 Transponder will be the ideal choice, with its small size, easy battery replacement and low cost. The transponder is fitted to the object to be tracked so that a clear ‘line of site’ can be established between the transponder and the EASYTRAK transducer. Operations can begin immediately the transponder is in the water, and EASYTRAK will display range and bearing to the transponder. Up to 4 targets can be displayed at any one time. This may be 4 moving objects or alternatively, one or more may be fixed reference markers. One of these can be set as ‘Target Centred’ so that the on-screen display shows this as the centre of the screen with the ship position and any other beacons moving relative to this reference. Additional software allows GPS data to be input and on-screen UTM co-ordinates displayed. The Surveyor has the option of entering waypoints and calculating relative distances between one target and another. Operator courses can be arranged. Please consult the factory for further information.

New Technology

EASYTRAK incorporates the latest digital signal processing (DSP) technology both in hardware implementation and in advanced ‘software’ algorithms. The flexibility of the design allows customisation and the addition of new features. One new feature is the ability to output system set-up information from the serial port. This allows a small file to be emailed to our technical support specialists to help diagnose problems.

Several additional features are currently ‘under wraps!’ Product enhancements and added features will be announced when available.



EASYTRAK Acoustic Positioning Systems

Ultra Short BaseLine

EASYTRAK is referred to as a USBL system which is short for **Ultra Short BaseLine**, and means that an array of receiving transducers are mounted in one easy to install transducer assembly. Measurements are related to this one assembly. Phase measurements between elements within the assembly are converted to bearing measurements and range is calculated from the time taken for the acoustic signals to travel through the water. The depression angle is also measured; this is the angle down from the horizontal. Other systems such as Short BaseLine (SBL) and Long BaseLine (LBL) require a number of transducers or transponders respectively to be deployed and their relative positions calibrated before work starts, which can delay operations and adds to mobilisation time and system complexity.



Calibration facilities at the factory allow for high system accuracies to be achieved with the option of 'standard' and 'high accuracy' transducer arrays available for EASYTRAK systems.

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Targets

The flexibility of the design allows EASYTRAK to detect a number of underwater beacon types as below:-

[Please note that we refer to a beacon as any type of underwater positioning device as described below. Some manufacturers define a beacon as a free running pinger which can be confusing!]

Pingers

A free running pinger transmits a single pulse at a set interval, usually until the battery is exhausted. Range cannot be calculated. Primarily used as emergency markers.

Responders

A responder is an electrically triggered device, and requires a trigger pulse and hence a cable from the tracking system in order to work. The tracking system uses the time delay between the trigger pulse and signal reception to determine range. Good for use on noisy targets as signal reception at the target is not required. Also good for faster updates at long ranges as only one (slow) acoustic transmission path is required.



219 Micro-Transponder. Just 220 g in water.

several years if required on built-in batteries. Versions can be supplied with various battery options and with remote transducers so, for example, the electronics assembly can be hidden away with just the transducer mounted on the top of a small ROV for an unobstructed sound path and effective balancing of the vehicle.

Transponders

The most commonly used 'target', a transponder receives a specific acoustic signal and replies with a different one. There is no need for an electrical connection between it and any other object. Transponders can remain 'listening' for

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Release Transponders

Release transponders have a mechanical hook or release mechanism and will release upon command from the surface. This allows instrumentation to be retrieved by the use of external floatation. EASYTRAK is fully conversant with the AAE release protocol.

Instrumentation Transponders

We can also supply transponders which transmit back information such as depth, height above seabed, temperature, tilt or any other parameter....



Release Transponder and PAM command Unit

The accompanying picture shows a large release transponder with floatation collar and our PAM 2 Command Unit with 'Dunking Transducer'. PAM has the ability to range, test, release, gather data messages, charge beacons, operate with an array of depth transponders and a host of other features.

Ranges and accuracy

The range obtained with any underwater acoustic system will depend on the background noise and other conditions such as water aeration which attenuates the signals very severely and possible ray bending where the sound pulse bends due to refraction caused by different temperature layers in the water. A 219 micro transponder will operate to around 500 metres in reasonable conditions (it has been proven to operate further) and a 919 model will operate to around 1000 metres (again it has been proven to operate further). Higher source levels (signal levels) will result in longer ranges. Accuracy will depend on the quality of the installation and signal reception and noise levels. For higher dynamic accuracies, external pitch roll and heading sensors are recommended.

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System Beacons.

A wide range of models are available, these are just a small selection of those available:-

Model 219 Transponder

Size 50 mm diameter x 230 mm long

Weight in air/water: 660g/260g

Battery: 2 x 9v Alkaline

Battery Life: 30 hours at 1 pps / 30 days listening

Transducer: Hemispherical 180 dB

Typical applications: Small ROV's and divers.

Model 935 Beacon

Size 95 mm diameter x 480 mm long

Weight in air/water: 5kg/2.5kg

Battery: NiMH Pack. 10 hr charge time

Battery Life: 28 hours at 0.5 pps / 45 days listening

Transducer: Directional +/- 45 degrees 200 dB

Charger : Model 982

Typical application: Deepwater ROV / Towfish tracking.

Model 919 Beacon

Size 70 mm diameter x 355 mm long

Weight in air/water: 2500g/1500g

Battery: NiMH Pack. 5 hr charge time

Battery Life: 28 hours at 1 pps / 40 days listening

Transducer: Hemispherical 188 dB

Charger : Model 982

Typical application: General purpose.

Model 959 Beacon

Size 125 mm diameter x 1000 mm long

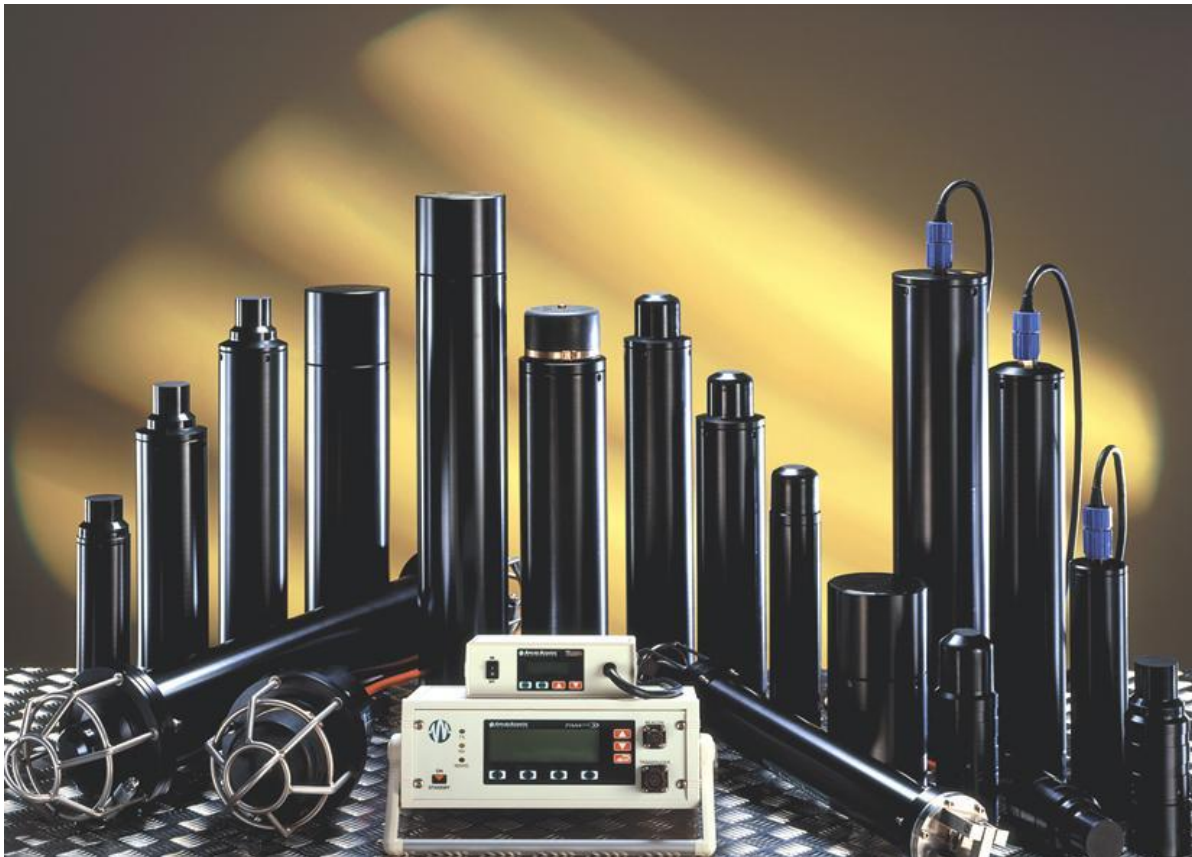
Weight in air/water: 20kg/10kg

Battery: Lithium

Battery Life: 2250 hours / 5 years listening

Transducer: Hemispherical 188 dB

Typical application: Seabed reference marker.

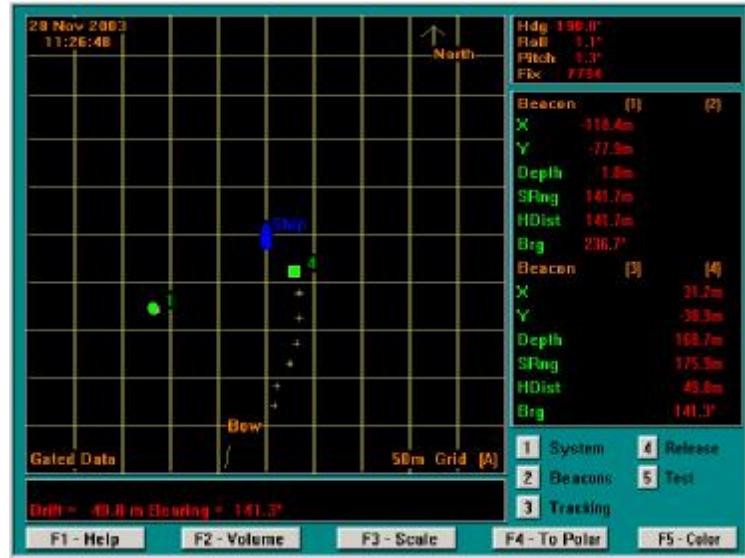


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SYSTEM Descriptions:-

EASYTRAK Portable

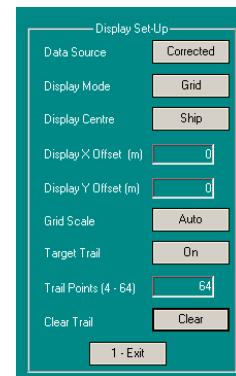
EASYTRAK Portable consists of a yellow marine-grade splash proof console which contains all the electronics for a complete USBL system including receive amplifiers, transmitter, digital signal processing and navigation computer and display. A built-in battery pack allows operation away from an AC supply for 4 to 6 hours. The user interface consists of a number of EL illuminated keys on the panel, plus on-screen information from the bright TFT display. The key illumination allows for use at night or in dark conditions. Built-in audio is available so the user can monitor in-water



EASYTRAK Portable display screen

signals, these signals being mixed down to audio frequencies within the DSP and being sent to a loudspeaker or optional headphones. Experience has shown that audio monitoring is very useful, particularly during mobilisations and in difficult conditions. Transmit and receive LED's are also included as further visual information for the user. The TFT display consists of an auto-scaling position display, plus areas for data to be read and entered. The position display can be shown with polar or rectangular scaling and colour schemes for each target shows a good, acceptable or bad signal reception. Facility for connections to / from external sensors is catered for by several serial communications connectors, plus responder trigger output, external trigger input and audio monitor output. VGA and USB mouse ports are also available. The VGA port allows a separate colour monitor to be used in addition to the built-in display whilst the mouse port removes the need for scrolling through the menus.

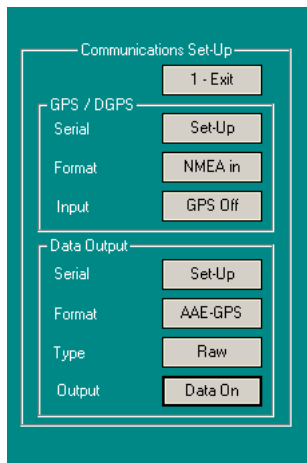
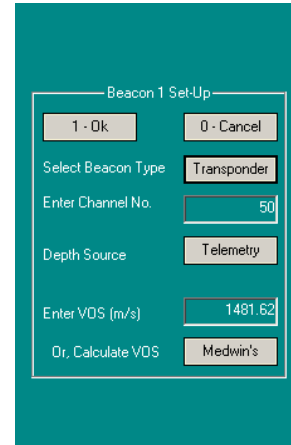
EASYTRAK Portable connects to the EZT901C transducer which has a built in pitch, roll and heading sensor for automatic position compensation as the transducer moves. Should a higher accuracy sensor be required – such as an external VRU and or Gyro - then these can be connected direct to the console via the serial ports. An additional serial port is available for reception of GPS data as described previously, for on-screen UTM co-ordinates. This results in an integrated system which can replace a tracking system and separate navigation computer for some applications so reducing complexity and space. As one might



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expect, Industry Standard serial strings can be accepted for the GPS data. The third serial port is designed for data output. Again, standard formats are available to ensure compatibility with existing navigation software.

For the experienced user, there are a number of additional features for adjusting the receive bandwidth, gating and filter settings and gain adjustments AGC / TVG rates / settings. However for most applications, the automatic settings work well. The internal heading sensor is used for target error correction, so for example, a fast turn will not result in a bearing error being displayed which would otherwise be the case without any heading information. The facility has been built in to allow for on-site compass calibration to remove the effects of local (hard iron) anomalies.



Positioning software can be updated from a separate PC using one of the serial ports. This may be required for interim software updates or after purchasing additional software modules. EASYTRAK *Portable* operates on the Windows CE platform, and considerable effort has been taken to ensure robust and crash-proof code. The fact that the system runs on it's own computer ensures that system contamination from other software, viruses or games is eliminated.

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EASYTRAK *Lite*

EASYTRAK *Lite* consists of the main transmit and receive electronics, power supply and DSP hardware mounted in a rugged box for connection to a separate laptop or desktop PC. Connection is by USB cable (supplied). A suitable PC running Windows XP is usually supplied with the system, which has been pre-



configured by our technicians; although customer supplied PC's are also supported. With the option of a low cost transducer and by using a separate PC, the cost of the keypad, computer board and display can be eliminated, thus reducing the system cost to the end-user. A few features may not be available within the *Lite* version.

System Transducers

The EZT901 and the EZT901C are rugged transducers designed for deployment from moon-pool, gate valve or over the side. Just 100 mm diameter each unit uses 4 receive transducer elements and a transmit transducer along with receive amplifiers. They also have transducer calibration information stored inside so that on connection, EASYTRAK Portable can upload the calibration parameters of the transducer to ensure optimal accuracy. The C version has a built-in pitch/roll/heading sensor (Compass option).

The EZT905 transducer is a small and lightweight transducer without the calibration information or the compass option installed. It uses the same cable as the EZT901 has been designed as a low cost alternative to the 901 models. It is ideal for harbour / dockside applications where no movement will be experienced. Typically this will be used with divers and small ROV's.

The 90x transducers are interchangeable between the '*Lite*' box and the '*Portable*' console offering the ultimate flexibility.

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Careful consideration was given during the design process to ensure that the operating costs of the system were kept as low as possible. To this end we decided to keep the 'expensive' signal processing electronics on the surface rather than having them in the water with the transducer. Should the transducer be damaged or written off completely, the repair / replacement cost is limited to the transducer and perhaps a cable, rather than the complete system which would be the case for an 'everything-in-the-water' system. The reduced complexity and size also reduces drag and allows deployment through a very small gate valve.

Compatibility

EASYTRAK is compatible with our own 200 series and 900 series positioning beacons, plus our 500 series release transponders and our new 1000 series beacons when they become available. It is also compatible with medium frequency positioning and release transponders from Sonardyne, Simrad and ORE. Standard frequencies (channels) are pre-programmed into EASYTRAK, and there is the facility to set up 4 user-defined channels which can be either transponder, responder, pinger or depth transponder. EASYTRAK is capable of operating with, for example, a HiPAP transponder, a Trackpoint transponder and a HPR transponder all at the same time.

Additional Features

With GPS or Differential GPS positioning connected to the appropriate serial port of EASYTRAK, and combining this 'world-referenced' position with the acoustic position obtained by Easytrak's range & bearing to target computations, allows for a data output of the target in Latitude and Longitude (in a GPRMC format – a pseudo GPS string) to a separate storage device such as the CodaOctopus 460 for sidescan sonar towfish positioning allowing the towfish position to be stored in synchronisation with the sonar data.

Mapping and Archaeology

For mapping applications – perhaps archaeology or wreckage location, there are 100 user 'Events' which can be saved/plotted by pressing the 'Events' function key as soon as an object of interest occurs. Each event includes Identification Number, Time, Date, Latitude, Longitude, UTM Eastings and Northings and depth. This information can be outputted through the serial port for later use. In addition, 10 Waypoints can be entered and plotted. Need to know more? Please contact us for further information.



EZT901C Transducer and cable

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EASYTRAK Products

- EASYTRAK Portable c/w ac power supply.
- EASYTRAK Lite, plus PC (Or user supplied pc).
- Various Software options available for EASYTRAK.
- Transducer Cable, 20 / 40 / 60 metres.
- EZT901 Transducer.
- EZT901C Transducer with Compass option.
- EZT905 Lite Transducer.
- Transponders.
- Responders.
- Pingers.
- Release transponders.
- Depth transponders.
- Special (custom built) transponders.
- Beacon Chargers.
- 12 volt converter for EASYTRAK.
- DGPS Equipment.

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Technical Specifications

EASYTRAK Portable

| | |
|-----------------------------|---|
| Size | : 400 x 330 x 190 mm. |
| Weight air/water | : 6 kg / floats on water. |
| IP Rating | : Sealed when closed - IP67. Splash proof - IP65 rated when open. |
| Serial Communications | : 3+ 1 RS-232. |
| Power requirements | : 90 – 250 VAC at 80 VA. DC options. |
| Audio Output | : 0.5 watt into internal loudspeaker or headphones. |
| Battery Life | : 4 - 6 hours from built-in battery pack. |
| Display (<i>Portable</i>) | : Colour TFT VGA display. |
| Keypad (<i>Portable</i>) | : 21 key membrane keypad with backlight. |
| VGA Output | : Connects to a standard VGA monitor. |
| USB | : Output connects to a USB mouse. |

EASYTRAK Lite

| | |
|---------------------------|---|
| Size | : 265 x 240 x 120 mm. |
| Serial communications | : RS-232. USB to RS-232 adaptors available. |
| Power requirements | : 90 – 250 VAC at 50 VA |
| PC requirements (minimum) | : 1.2 GHz running Windows XP. USB or RS-232 port. Colour display 1024 x 768. CD Rom drive. |

EASYTRAK Data formats

| | |
|------------------|---|
| Data Output | : AAE format, TP-2EC TP-EC W/PR, Simrad 300P, Simrad 309 \$PSIMSSB, \$PSIMSNS (One string after the other for each fix) \$GPRMC (Suitable for Coda Octopus 460P and others) |
| Compass Input | : TCM-2.X, SGB-HTDS, SGB-HTDt, \$HDHDM, \$HDHDT, \$HDHGD |
| VRU Input | : TCM-2.X, \$HCXDR, TSS1 |
| GPS Input | : NMEA; GLL, GGA, RMC |
| Sync. Input | : TTL type 5 volt pulse. Triggers on rising edge. |
| Responder Output | : Positive 12v pulse 5 mS long. |

TRANSDUCER OPTIONS

| | |
|------------------------------------|--|
| Transducer; ETM901 & 901C | : 330 mm long x 100 mm diameter. |
| Weight in air/water | : 9.5kg / 7 kg |
| Transducer; ETM905 | : 250 mm long x 100 mm diameter. |
| Weight in air/water | : TBA |
| Depth Rating | : 50 metres |
| Transducer Cable type | : 12.5ø, Pu sheathed, various lengths available. |
| (Note: ETM901C has compass fitted) | |

ACCURACY/PERFORMANCE

(Accuracy is based on the correct speed of sound being entered, no ray bending and an acceptable S/N ratio).

| | |
|--|--|
| Slant Range Accuracy | : 10 cm. (Accuracy dependant on correct speed of sound). |
| Position accuracy standard | : 1.4 ⁰ rms. 2.5% of slant range |
| Position accuracy (high accuracy system) | : 0.6 ⁰ rms. 1.0% of slant range |
| Bearing Resolution | : 0.1 degrees displayed. Internally calculated to 0.01 degree. |
| Heading Sensor Accuracy | : 0.8 degrees standard; +/- 0.1 degree resolution/repeatability. |
| Channels | : 4 channels displayed from 98 stored. |
| Frequency Band (MF) | : Reception 22 - 32 kHz. Transmission 17 – 26 kHz. |
| Tracking Beam Pattern | : Hemispherical. |
| Beacon Types | : Transponders, Responders and Pingers. |
| Interrogation Rate | : 0.5 – 30 seconds or external key. |
| Transmit Power | : 3 levels software controlled. |
| CE Marking | : Externally assessed for emissions to 89/336/EEC |

EASYTRAK Acoustic Positioning Systems

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