



: Technical Specification

Easytrak

Easytrak is an Ultra Short Baseline (USBL) underwater positioning and tracking system centred on a multi-element, single transducer that transmits and receives acoustic signals to dynamic subsea targets, from which range, bearing and depth information can be determined.

Developed to meet the ever increasing demands for a highly efficient location device which is truly portable, straightforward to use and extremely stable, Easytrak offers a multitude of benefits for a wide range of marine positioning applications which include diver, ROV, AUV and towfish tracking, instrumentation positioning and release.

Easytrak has rapidly developed a sound reputation for use in commercial, military and environmental research situations where both accuracy and versatility are stipulated.

Key Features

- : Accurate and stable
- : Lightweight and truly portable
- : Easy to operate
- : Tracks on the horizontal
- : Approved for military use



Applied Acoustic Engineering Ltd

Marine House, Marine Park
Gapton Hall Road
Great Yarmouth NR31 0NB
United Kingdom

- T** +44(0)1493 440355
- F** +44(0)1493 440720
- E** general@appliedacoustics.com
- W** www.appliedacoustics.com

Operation straight out of the box

Easytrak is a complete system which consists of a transducer deployed in the water over the side of the vessel or quayside; a cable, available in a choice of standard lengths and able to support the weight of the transducer on its own, and either the Easytrak Portable console complete with display screen and keyboard, or an Easytrak Lite box, which connects to a PC via a USB cable. The system is completed by one of Applied Acoustics' beacons attached to the target object, though up to 4 individually identified subsea targets can be displayed simultaneously. At every stage both the equipment itself and the accompanying software interface has been designed to be user-friendly and uncomplicated, even for a relatively inexperienced user, so that operation can proceed very efficiently and with confidence.

With calibration being carried out at the factory before despatch, operations can begin as soon as the beacon is in the water when Easytrak's colour TFT display will instantly show range and bearing. Easytrak can also calculate the beacon's position when on the water surface, which is ideal for floating targets.

Single Transducer Assembly

Easytrak's speed of use is possible because it is an Ultra Short BaseLine (USBL) system, which features an array of receiving transducers, mounted in the single 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, the angle down from the horizontal, is also measured when the beacon is below the surface.

The transmit and receive elements within the transducer are positioned in such a way as to allow tracking at very shallow depression angles as well as along a horizontal path. Other systems such as Short BaseLine (SBL) and Long BaseLine (LBL) require a number of transducers or transponders to be deployed and their relative positions calibrated before work starts, which can delay operations and add to mobilisation time and system complexity.

Flexibility

The flexibility of the Easytrak design allows it to detect a variety of underwater targets and beacon types. These include Pingers, which transmit a single pulse and are often used as emergency markers, Responders linked by cable to the tracking system and triggered by an electric pulse, and Transponders which are the most commonly used target devices. Once in the water, a transponder will 'listen' until interrogated by a specific acoustic signal from the transducer. It then replies with a different one, allowing its location and position to be determined. In addition, Instrumentation Transponders can transmit back information such as depth, height above seabed, temperature or tilt.

The range obtained with any underwater acoustic system will depend on the background noise and other conditions such as water aeration, which can attenuate the signals severely, and possible ray bending where the sound pulse bends due to refraction caused by different temperature layers in the water. For example, one of Applied Acoustics' 219 Micro beacons will operate to around 500 metres in reasonable conditions and a 919 Mini beacon will operate to around 1000 metres. Higher source levels (signal levels) will result in longer ranges. Accuracy will depend on the quality of the installation, signal reception and noise levels. Integral pitch, roll and heading sensors compensate for vessel movement and serial ports on the Easytrak console allow it to interface with gyros and accurate vertical reference units (VRU's) for higher positional accuracy. A further GPS input allows for latitude and longitude corrected co-ordinates of the target beacon or beacons.

Applied Acoustics' choice of positioning and release beacons for use with Easytrak is one of the most extensive available from any manufacturer. Designed for the variety of challenging tasks during subsea operations, each beacon combines durability with ease of use. For added versatility, Easytrak can also track

beacons in the same frequency range from other manufacturers.

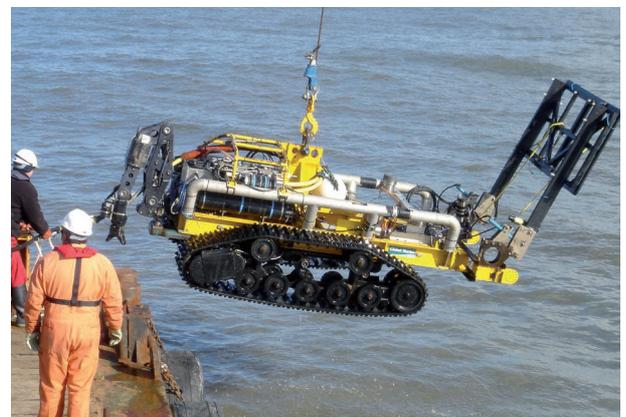
Two commercial versions of the Easytrak system are available; the Portable which includes a display screen and keyboard housed in a splash proof enclosure - and the Lite, which carries out the same functions while utilising the operator's own laptop or vessel based PC.

In addition, a military version of the Easytrak Lite has been developed to operate inside the Operations Room of a Naval vessel.

Options and upgrades allow operators to mix and match component parts to create a suitable system for specific applications.



DIVER WITH 219 MICRO BEACON



ROV WITH 919 MINI BEACON

2650 Easytrak Portable

Easytrak Portable consists of a yellow marine-grade splash proof console containing all the electronics for the USBL system including receive amplifiers, transmitter, digital signal processing and navigation computer and display. A built in power supply allows operation away from an AC power supply for 3 to 4 hours.

The user interface consists of a number of illuminated keys on the panel, plus on-screen information from the bright TFT display. Transmit and receive LED's are further visual confirmation. Audio monitoring of signals is also available via an integral loudspeaker or headphone jack.

Serial connectors allow the integration of a GPS receiver, external motion sensors, gyrocompass and a data-out port for use with navigation packages. Also included are an Ethernet port, allowing a remote user PC to display the tracking data, plus a USB mouse port.

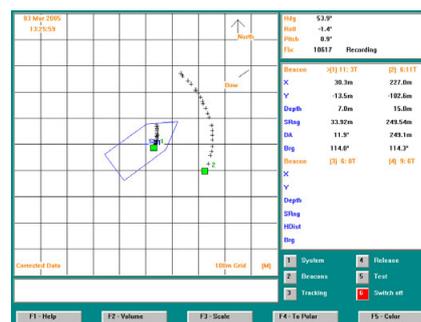
The TFT display consists of two parts; an auto-scaling Position Display and an area for data to be read and entered, the Text Panel.

The Position Display can be shown with polar or rectangular scaling with colour coded targets to indicate signal strength.

Operation is menu-driven and operates on a Windows CE platform with default settings pre-programmed.



EASYTRAK



EASYTRAK SCREEN

2660 Easytrak Lite

Easytrak Lite incorporates all of the features of the Easytrak Portable system, but has been designed for a more permanent installation in a vessel's Operations Room or dry laboratory. The main transmit and receive electronics power supply and digital signal processing (DSP) hardware have all been mounted within a rugged enclosure for connection to a laptop or desktop PC. Connection is by serial cable (via supplied usb adapter), with the system software provided on CD.

The operational performance is identical to the Portable unit, the only additional requirement being a suitable PC with a 1.2 GHz processor running Windows XP. This configuration eliminates the need for the integral keyboard and display screen, thereby reducing the system cost to the end user.

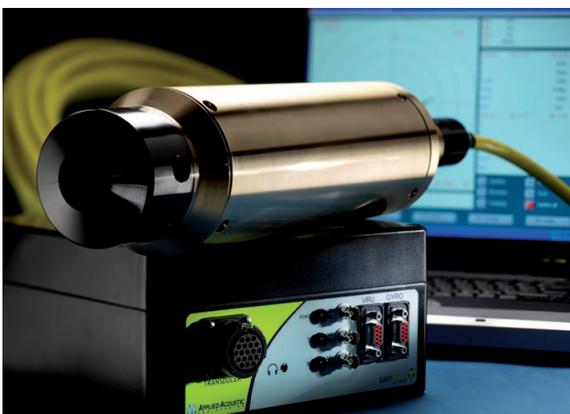
Easytrak Transducers

The ETM902C is a rugged transducer designed for deployment from moon-pool, gate valve or over the side of a vessel. Designed to be specifically small and relatively heavy, the transducer is ideal when deployed on a cable. At just 100mm in diameter, each unit uses multiple receive transducer elements and one transmit element along with receive amplifiers. This innovative design configuration allows accurate range and bearing calculations, both at depth and along a horizontal path.

The ETM902C transducer has a built-in pitch and roll sensor to compensate for vessel movement as well as a magnetic compass for heading calculations. It also has transducer calibration information stored inside, so that on connection Easytrak, either the Portable or the Lite, can upload the calibration parameters of the transducer to ensure optimal accuracy in minimum time.

For static applications, the transducer can be supplied without the compass and pitch + roll sensor installed.

The compact yet relatively heavy design of the transducers follows R&D trials to determine the best solution for portability, ease of deployment, stability in use and general robustness. It is these features, combined with its operational characteristics that give the Applied Acoustics' transducer a valuable advantage.



2660 EASYTRAK LITE



EASYTRAK TRANSDUCER

MODEL 2650 PORTABLE

Dimensions	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	3 - 4 hours from built-in battery pack
Display	Colour TFT VGA display
Keypad	21 key membrane keypad with backlight
Ethernet	Allows optional remote monitoring software to be run on separate PC
USB	Connects to a USB mouse

MODEL 2660 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 up to 3 x RS-232 port. Colour display, 1024 x 768. CD Rom drive.

DATA FORMATS

Data Output	AAE format, TP-2EC TP-EC W/PR, Simrad 300P, Simrad 309 (binary) \$PSIMSSB, \$PSIMSNS (One string after the other for each fix) \$GPRMC (Suitable for Coda Octopus 460P and others) KLEIN 3000, \$GPGGA and \$GPVTG (Lite only)
Compass Input	TCM-2.X, \$SGB-HTDS, \$SGB-HTDt, \$SHEHDT, \$HDHDM, \$HDHDT, \$HDHDG
VRU Input	TCM-2.X, \$HCXDR, TSS1
GPS / DGPS 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

(Aluminium-Bronze transducer. May be tilted by 20 degrees for towfish tracking)

Transducer; ETM902 & ETM902C	375 mm long x 100 mm diameter
Weight in air/water	9.5kg / 7 kg
Depth Rating	50 metres

(Note: ETM902C has compass fitted)

TRANSDUCER CABLE EZT-DC xx

Diameter	12.8 mm nominal
Colour	Yellow
Length (xx)	20 – 60 metres standard lengths available
Connectors	Supplied. Connects ETM transducers to 2650/2660 Easytrak systems
SWL	20 kg (Allows transducer to be deployed from cable)



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 dependent on correct speed of sound)
Position accuracy standard	1.40° drms. 2.5% of slant range
Position accuracy (high accuracy system)	0.60° drms. 1.0% of slant range
(Acoustic accuracy excluding heading errors)	
Bearing Resolution	0.1° displayed. Internally calculated to 0.01°
Heading sensor accuracy	0.8° rms standard; +/- 0.1 degree resolution/repeatability
Pitch/Roll sensor accuracy	+/- 0.20° rms +/- 0.1° resolution/repeatability
Channels	4 channels displayed from 134 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	178/185/190 dB software controlled.
CE Marking	Externally assessed for immunity and emissions; conforms to 89/336/EEC



Certificate No. 6447
BS: EN: ISO9001 : 2000