

innovative Technology Projects Acoustic Systems Trainer for SONAR



KEY FEATURES

The Acoustic Systems Trainer (AST) is the sole commercially accessible system designed for learning real-time SONAR acoustic principles. The benchtop configuration facilitates the exploration and demonstration of SONAR technology principles and techniques in an educational laboratory.

Worldwide Military Training Facilities, Technical Colleges, and Universities are using the system as an educational platform, development tool and for shallow water studies.

The system comprises of the AST Console, an Acoustic Tank, a variable-speed Target Transport System, a range of Active and Passive Targets, Transducers, and Hydrophones. The system is able to operate in both a passive and active SONAR configuration.

All of the specialised accessories are designed to work in educational and training environments.

AST COMPONENTS

AST CONSOLE

The AST Console is designed to be operated by one of a two student pair. The student makes and adjusts the configuration of the SONAR following the Student Manual and using the supplied cables. The AST Console provides pulse generation, pulse modification, transmitter, receiver and power control functions to the provided accessories.

The AST Console is equipped with an integrated PC and a precision measuring instrument. Students interact with the provided software package to conduct real-time measurements of the experiments, allowing them to observe the live effects of changes.

ACOUSTIC TANK

The Acoustic Tank holds approximately 400 litres of water and is fitted with a 3kW heater which is powered by a mains connection. Using the Target Transport System allows the student to observe the effects of SONAR against a range of moving and static targets.

The Acoustic Tank provides a realistic transmission medium for acoustic signals generated by the AST Console.

SONAR SIGNAL ANALYZER

The integrated precision measuring instrument provides a data acquisition interface. In combination with the supplied software package the system can provide the following functions:

- Dual Channel Oscilloscope.
- Dual Channel Spectrum Analyzer.
- Dual Channel Multimeter.
- Dual Channel Transient Recorder.
- Arbitrary Waveform Generator with Sweep.

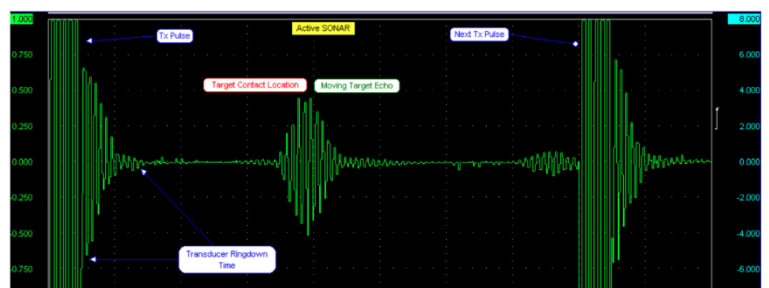


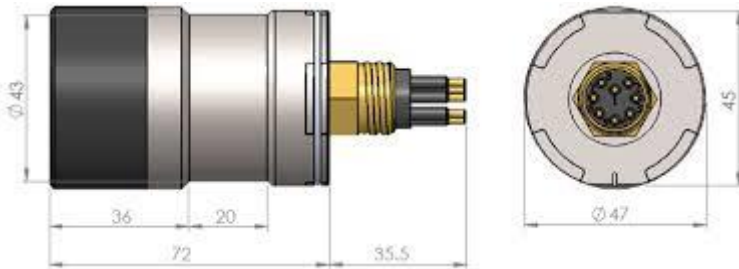
Figure 1 - Sonar Signal Analyzer Software



360° IMAGING SONAR

The 360° SONAR is a compact imaging sensor widely used on underwater Remotely Operated and Autonomous Vehicles.

The equipment provides a 2.2° angular resolution (at 700kHz) coupled with a 2.5mm range resolution and a distance measurement range of up to 90 meters/295 feet. It utilises a CHIRP (Compressed High Intensity Radar Pulse) from 600 to 900kHz.



System Features

- Real-time operation
- Integrated Sonar Signal Analyzer
- 360° imaging SONAR
- Windows-based menu driven software
- Integrated control PC
- A wide variety of lessons are included within the LMS
- Variable environmental conditions
- Variable frequency transducers
- Active and passive targets
- Acoustic Tank
- Variable speed Target Transport System
- Low power, low voltage operation
- Signal recording and playback

Topic Coverage

- Effect of temperature on speed of sound
- Active SONAR
- Passive SONAR
- CTFM SONAR
- Transducer frequency response
- Sub-bottom profiling
- Beam width measurement
- Beam formation / beam steering
- The Doppler Effect
- Target range resolution
- Volume scattering
- Acoustic signal jamming
- Underwater sound analysis

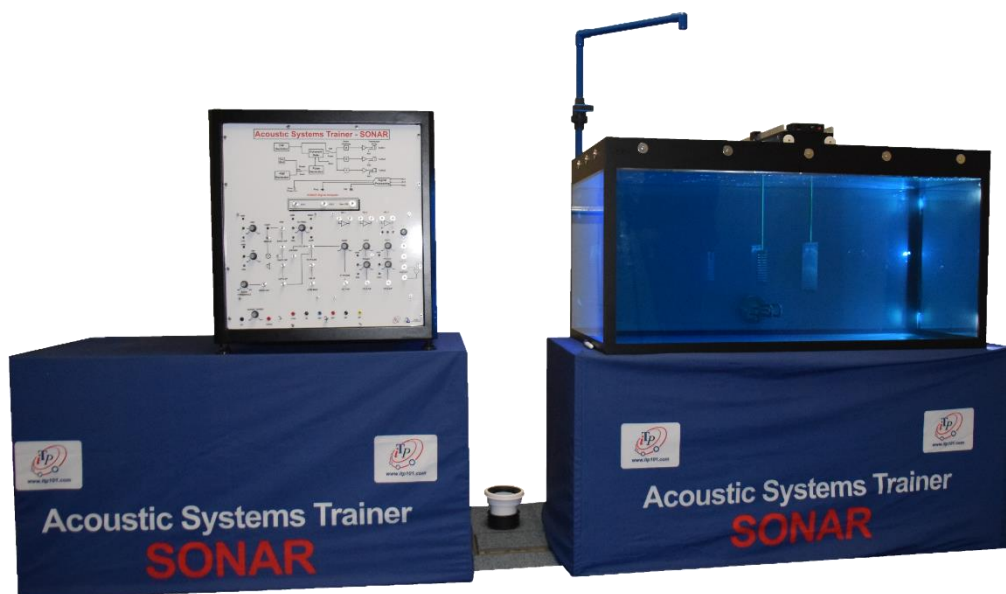


Figure 2 - A typical AST classroom set-up

SYSTEM DESCRIPTION

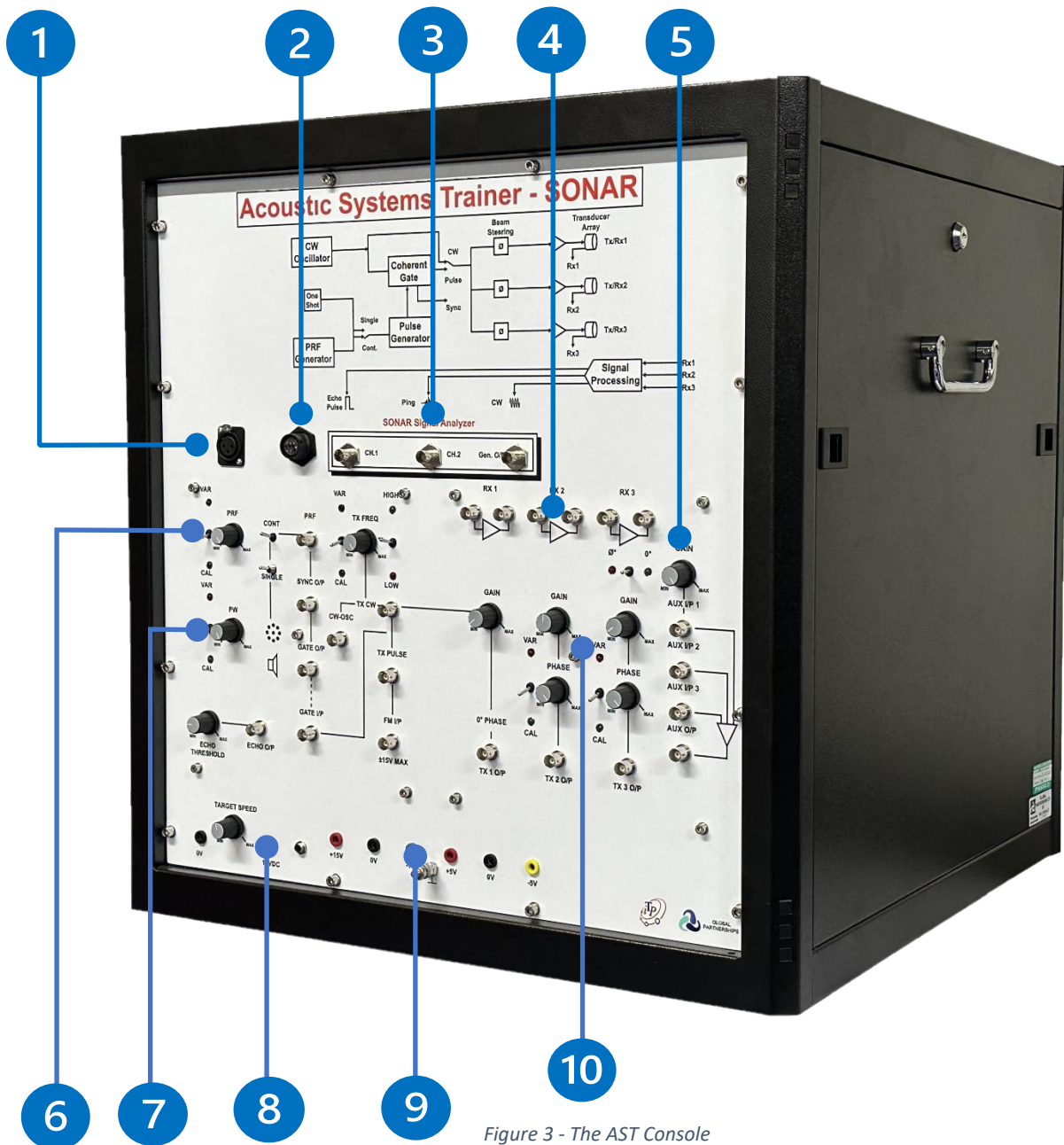


Figure 3 - The AST Console

Image Reference	Component Description
1	360° imaging SONAR
2	Wideband Hydrophone
3	Sonar Signal Analyzer – 2 Channel Input and AWG Output
4	3 Fixed Gain Receiver Amplifiers
5	3 Aux Input – 1 Aux Output Variable Gain Amplifier
6	Fixed or Variable PRF
7	Fixed or Variable Pulse Width
8	Variable Target Speed / 12v DC Output
9	Fixed $\pm 5v$ & $\pm 15v$ DC Outputs
10	3 Fixed or variable Gain and Phase Transmit Outputs

SYSTEM DESCRIPTION

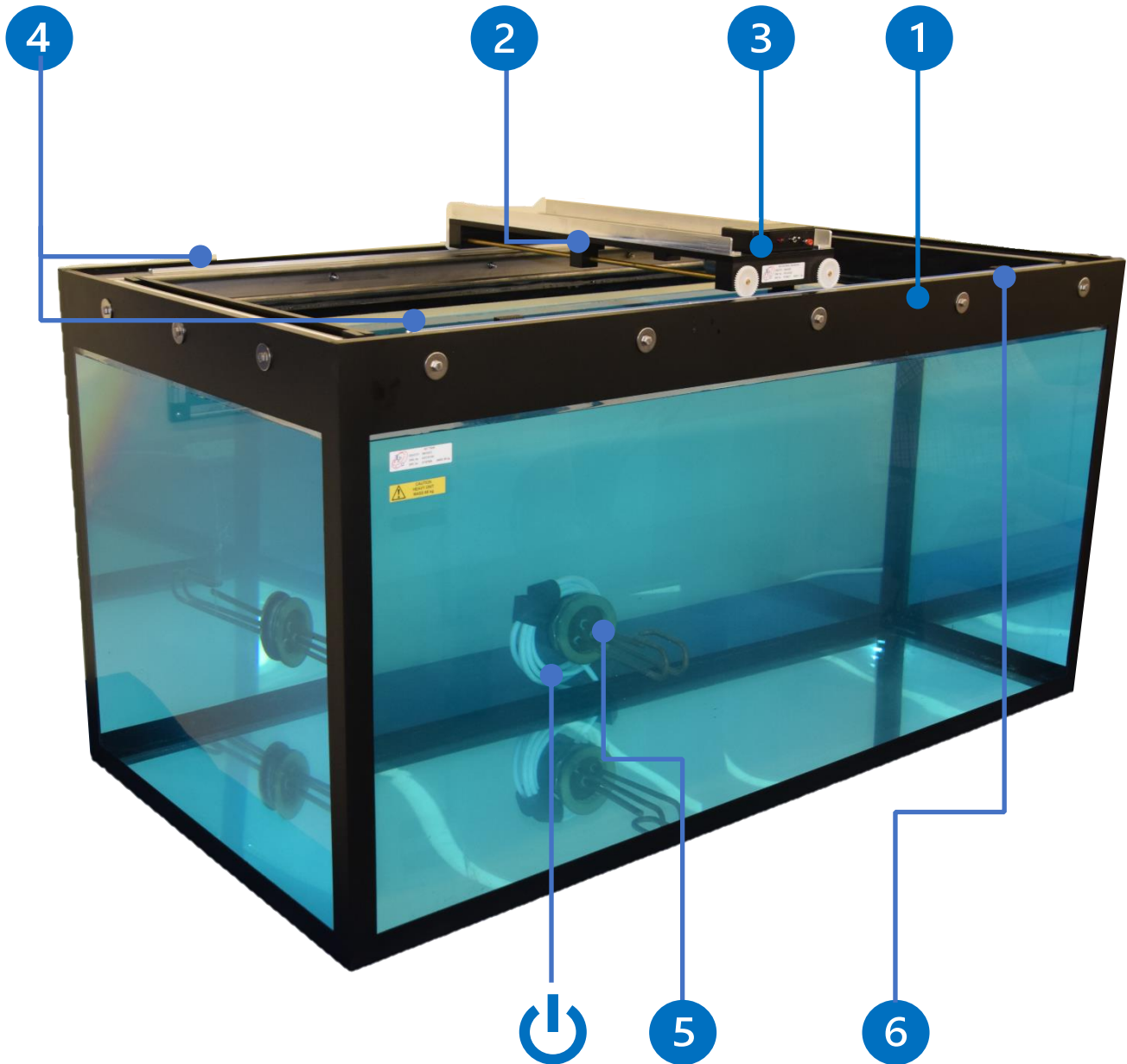



Figure 4 - The Acrylic Acoustic Tank & Target Transport System

Image Reference	Component Description
1	15mm Acrylic Acoustic Tank
2	Variable speed Target Transport System
3	Target Transport System control box
4	Target Transport System guide rails
5	3kW heater
6	Target Transport System magnetic reversing sensor
	UK Type G plug power supply to 3 kW heater

PRODUCT SPECIFICATIONS

AST Console	Lockable rack enclosure with carry handles
	Supply: 110 / 220 / 240 Volts, 50/60 Hz ~ @ 2 amps
	Outputs: 0-12 Volts D.C. variable / ± 5 Volts D.C. fixed / ± 15 Volts D.C. fixed
	Connections: 2x HDMI, 2x USB 2.0, 1x USB 3.0, 1x Ethernet, 1x 3.5mm Aux
	TX CW: 200 kHz – CAL / VAR
	PRF: 714 Hz – CAL / VAR
	PW: 100 μ secs – CAL / VAR
	TX PULSE gated: 100 μ secs ~ 20 CW cycles
	TX2, TX3 fixed and variable phase O/Ps
	SYNC pulse: +5 Volts D.C. Echo threshold control
Acoustic Tank	15mm reinforced acrylic construction
	Tank capacity: ~ 400 Litres (106 gal)
	Supply: 220/240 Volts, 50/60 Hz (Live, Neutral and Ground)
	Internal fitted 3kW heater with 50°C max limit thermostat
	Internal/External digital thermometer
	Stainless steel frame Target Transport System guide rails with magnetic reversing sensors
Sonar Signal Analyzer	Sample Rate: 8, 12, 14, 16 bits Resolution ~ 500 Ms/sec
	2 Channel operation & math functions
	Storage Oscilloscope: 100 nsec – 600 sec/div
	Averaging: 1 - 256
	Phase measurement
	Spectrum Analyzer: .001Hz – 50MHz
	AM/FM/FSK modulation ~ Sweep & Burst
	Transient Recorder: > 30,000 points ~ 750 days
Voltmeters: 6 programmable Arbitrary Waveform Generator: 1 μ Hz – 30MHz	
Transducer	Resonant Frequency: 200 kHz
	Beam Width: ~ 10° to 20° @ -3 dBs
	Conical beam shape
	Epoxy resin encapsulation
	Variable depth
	Connector Type: BNC Connector
	Orientation: vertical or horizontal Mounting: Delrin tank mount
Target Transport System	Speed Control Voltage: 0-12 Volts (Using AST Console)
	Auto reversing with manual override
	Magnetic reversing sensors
	Direct traction drive Sliding target rails
Targets – Active	Stainless steel flat plate 20cm Sq.
	Stainless steel flat plate 10cm Sq.
	Stainless steel grill plate 10cm Sq.
	Acrylic flat plate 20cm Sq.
	Plastic Sphere
Targets – Passive	Three bladed propellor 45mm M4 RH
	Four bladed propellor 45mm M4 RH
	Five bladed propellor 45mm M4 RH
	Variable speed motor & gearbox



PHYSICAL CHARACTERISTICS

AST Console		
	Console Dimensions	Shipping Dimensions
AST Console	LxWxH: 600x600x650mm (24x24x26in)	LxWxH: 760x760x960mm (30x30x38in)
	Weight: 40Kg (88lb)	Weight: 74Kg (163lb)
Acrylic Acoustic Tank (Empty)		
	Tank Dimensions	Shipping Dimensions
Acrylic Acoustic Tank (Empty)	LxWxH: 1200x600x600mm (47x24x24in)	LxWxH: 1360x760x960mm (54x30x38in)
	Weight: 68Kg (150lb)	Weight: 123Kg (271lb)
Acrylic Acoustic Tank (Water filled)		
	Tank Dimensions	
Acrylic Acoustic Tank (Water filled)	LxWxH: 1200x600x600mm (47x24x24in)	
	Weight: ~500Kg (~1102lb)	

ENVIRONMENTAL & SAFETY

Temperature	Operating: +5°C to +45°C (41°F to 113°F)
	Non-operating (empty tank): -5°C to 55°C (23°F to 131°F)
Relative Humidity	Operating: 5% to 90%, non-condensing
	Non-operating: 5% to 90%, non-condensing
Regulatory	Built to ISO 9001:2015 standard
Console Cooling Clearance	50mm (2in) from any console surface

BUILT-IN PC

An integrated Windows-based PC is supplied to operate the AST and software functions.



ABOUT US

innovative Technology Projects have been around since December 2000, and we primarily specialise in Technical Training Systems for Engineering & Technology serving our College, University, and Military customers.

We provide Installation and Commissioning of all new systems, which can be quoted upon request.

We also offer annual Service Contracts with every installation which include:

- System Calibration
- First-Line Support
- Troubleshooting & Repairs

If you would like a quotation for the Acoustic Systems Trainer for SONAR or any of our services, please contact info@itp101.com

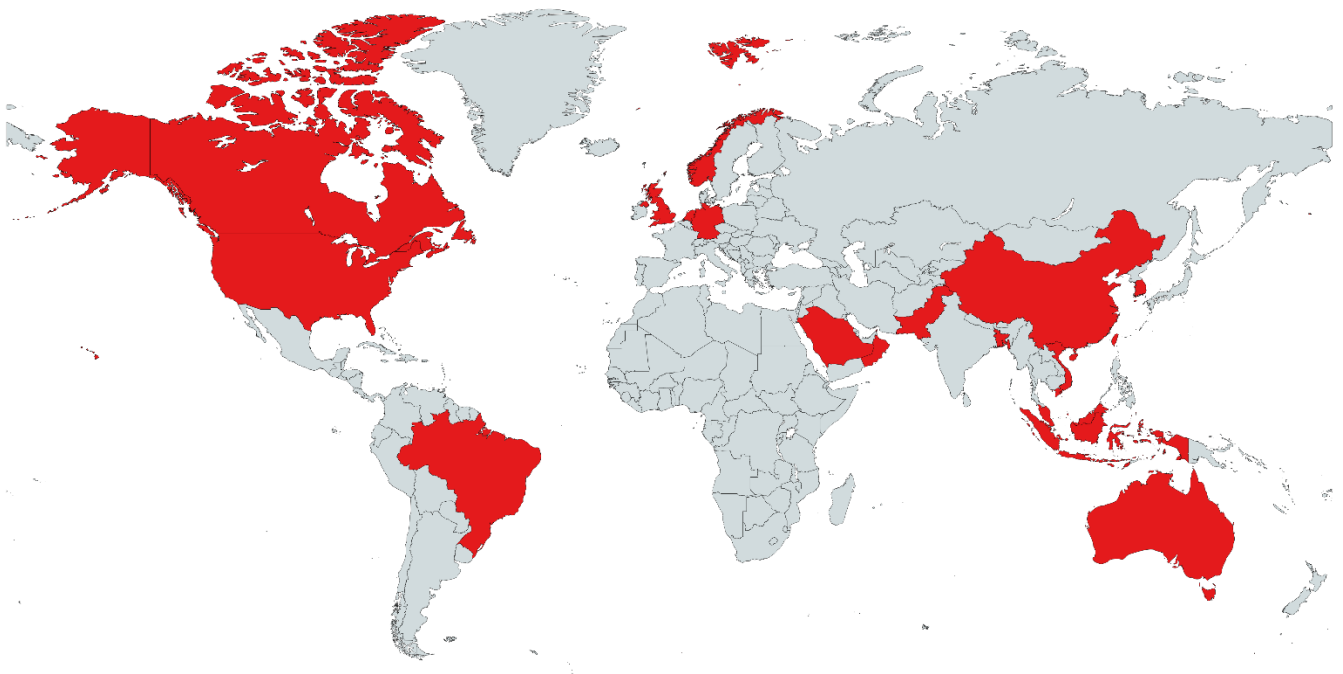


Figure 5 – Our international AST Installations

