Tamaya Echo-Sounder

# TDM-9000A

## Thermal Recording Method

Most of the echo-sounders have a rotary recording mechanism which needs an electrosensitive pen driving motor. It has various shortcomings, including the scattering of recording performances and the large dimensions. Many characteristics which overcome the previous shortcomings could be attained by adopting thermal recording for TDM-9000A.

### *Compact (363 x 256 x 120 mm) and Light Weight (7.5 kgs. with battery)*

The size is less than about 1/8 compared with the previous echo-sounders.

### *No pen driving motor, No Synchronization Error*

Stationary mechanism has no synchronization error caused by voltage fluctuations and inertia oscillations.

### *Small Power Consumption(10W)*

Only the oscillation line and the recording part are heated.
It has a built-in NiCd battery and can operate for about 6 hours.

### *Simple Maintenance*

Needless to replace a pen.

### *Rest Analog Recording*

The data can be output by RS-232C Interface.
Only digital display can be selected when analog recording is unnecessary.


### *NEW FEATURES OF TDM-9000A*

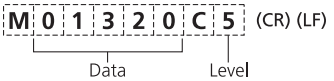
- Works with all GPS systems including Leica, Sokkia, Topcon, and Trimble, and their softwares.
- Automatic adjustment of sensitivity.
- Depth, sound velocity correction, time, scale, and other values will now appear on recording paper.

### Specifications Thermal Recording Method

Measurement range : 0.7m~100m(1/100), 0.7m~120m(1/200)
Accuracy : ±3cm ±water depth x 1/1000
Recording method : Linear recording memory storage
Recording scale : 1/100, 1/200 ; options : 1/50, 1/500
Recording form : Heat sensitive sheet (thermal type)
Size of recording form : Length 25m Width 112mm
Form feeding speed : 15mm/min., 30mm/min., 45mm/min., 60mm/min., 90mm/min., 120mm/min., 240mm/min., 360mm/min.
Transducer frequency : 200KHZ±3KHz
Direction angle of transducer : Half value half angle, about 3°
Output : 20W
Oscillation method : Transistor method
Depth output : RS-232C
Power supply : DC12V
Power consumption : 10W
Operating time : 6 hours continuously
Dimensions : 363W x 256H x 120D mm
Weight : 7.0 kgs.(Built-in battery)
Accessories : Transducer, boardside fixture, charger, marker, 5 rolls of recording paper

### RS-232C OUTPUT

Baud Rate : 4800 (Fixed)
Data : 8 bits
Parity : None
Stop bits : 2
Output data format is as follows ;
Example : 13.20 meters




"C" appears when fix event switch is activated.
When the switch is not pressed, it disappears and stays blank space.

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# Built-in Computer

Reflected waves usually contain unnecessary reflected acoustic signals attributable to transmission reverberation, schools of fish and turbidity. In order to take out only the echo from sea bottom, unnecessary signals must be removed on the basis of the time-sequential continuity of the echo and the difference of waveform intensity etc. Since the built-in computer executes depth data processing, high accuracy processing are implemented.

## High Accuracy

1. Noise is erased from received waveforms by removing high frequency components by the use of a low pass filter.
2. Receive waveforms are stored into the memory after A/d conversion and distributed to the thermal heads immediately.
3. After the above processings, the data are processed by the "peak value detection method" which judges the reflected wave of the highest level as the depth.
4. The "shallow water limited" function can be specified for removing the influences of floating substances near the sea surface.

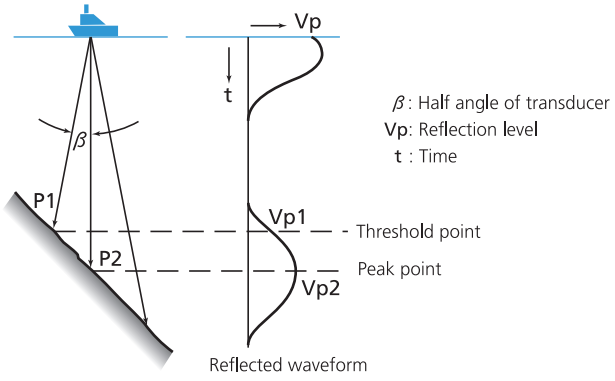
## A sound velosity correction

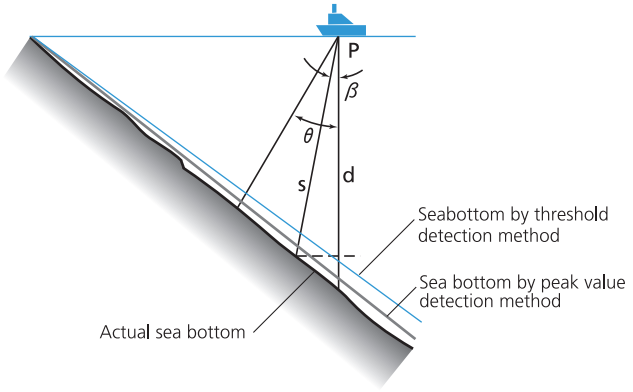
The sound velosity is influenced by the season, location, water temperature, salt concentration and water depth. TDM-9000A will correct it automatically when the sound velosity correction value is input.

## Adopted the peak value detection method

***The sharpness of the direction angle was increased.**

Under the generally employed threshold detection method, the shallowest point(P1) in the direction angle of the super-sonic waves is taken as the depth value(Vp1). Under the peak value detection method, the peak point (P2) is taken as the depth value(Vp2). Since nearly the center point of the direction angle is measured by this method, the error can be decreased. Therefore, it may be said that the sharpness of the direction angle was increased.
It has been confirmed that the peak value detection method raises the direction angle characteristic by 4~5 times in comparison with the previous method.




Angle of inclination $\theta$=30° Direction angle of transducer $\beta$=3°

| Actual Depth(d) | The difference (d-s) | |
|---|---|---|
| | By threshold detection method | By peak value detection method |
| 10m | 0.2m | 0.05m |
| 20m | 0.4m | 0.1m |
| 30m | 0.6m | 0.15m |
| 40m | 0.8m | 0.2m |
| 50m | 1.0m | 0.25m |

**Standard Configuration**

| ITEM | DESCRIPTION | QUANTITY |
|---|---|---|
| 1 | Recorder TDM-9000A | 1 |
| 2 | Transducer | 1 |
| 3 | Outboard pipe | 1 |
| 4 | Boardside fixture | 1 |
| 5 | Remote fixing marker | 1 |
| 6 | Power cable | 1 |
| 7 | Canvas cover | 1 |
| 8 | Charger | 1 |
| 9 | Recording paper | 5 rolls |

**Options**

| ITEM | DESCRIPTION |
|---|---|
| 1 | Check bar (reflection plate) |
| 2 | Data-collector TDC-9 |

***The size of the transducer was reduced ( $\phi$ 120×50mm, 4 kgs.)**

It may be thought that the dimensions and the weight of the transducer increase as the direction angle becomes sharp.
However, since the peak value detection method assumes that the sharpness increased, accurate depth information can be obtained with a more compact transducer.

*Transducer*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