2009 Technical Presentation

• NMEA 2000 Product Line
• New products for 2009
• Installation & Troubleshooting of all transducer styles
Your #1 NMEA Accessories Source

• Smart Sensor Transducers
• PB200 Ultrasonic WeatherStation Instrument
• H2183 Heading Sensor
• GH2183 GPS & Heading Sensor
• Cables & Connectors at a fraction of the price.
• All can be purchased through Gemeco 843 210 7000
NMEA 2000® Products

NMEA 2000® Cables & Connectors
- Micro Ties
- Power-Tie—8 meters
- Termination Resistors—Male and female
- Field Attachable Connectors—Male and female
- Single-Ended Cordsets—2, 6, 10, and 30 meters
- Double-Ended Cordsets—1, 3, and 6 meters

PB2000 Ultrasonic Weather-Station® Instrument
- True and apparent wind speed and direction
- Biometric pressure
- Air and water temp temperatures
- Better than 1° statute compass accuracy
- Recommended for large powerboats and commercial vessels

GH2183 Heading Sensor With GPS
- GPS and heading combined into one housing
- Saves installation time and money
- Better than 1° statute heading accuracy
- Best-in-class 2° dynamic heading accuracy
- Only recreational heading sensor that uses a three-axis rate gyro
- Optionally available as GPS only

DT800 Tilted Element™ Thru-Hull
- Depth and temperature
- 235 kHz
- 110 Watts Power
- Maximum Depth Range: 0.5 m (1.6)
- Plastic, bronze, or stainless steel housings

DST800 Thru-Hull
- Depth, speed, and temperature in one housing
- 235 kHz
- 100 Watts Power
- Maximum Depth Range: 0.5 m (1.6)
- Plastic, bronze, or stainless steel housings

P79 Adjustable In-Hull
- Depth only
- 235 kHz
- 100 Watts Power
- Maximum Depth Range: 0.5 m (1.6)
- Plastic, bronze, or stainless steel housings

H2183 Heading Sensor
- Better than 1° static heading accuracy
- Best-in-class 2° dynamic heading accuracy
- Three-axis solid-state compass provides heading data
- Three-axis accelerometer provides pitch and roll data
- Three-axis rate gyro provides rate-of-turn data
NMEA 0183 & 2000® Smart Sensors

• All signal processing is done inside the transducer
• Operates at 235kHz
• No interference with on-board 50/200 kHz sounder
• Provides digital depth, speed, and temperature
• Separate models for 0183 and 2000

NMEA 0183 Smart Sensors are compatible with all NMEA 0183 displays that can read the following sentences:

$SDDBT, DDPT....Depth
$VWVHW.......... Speed
$VWVLW.......... Distance
$YXMTW.......... Water Temperature

NMEA 2000 Smart Sensors are compatible with all NMEA 2000 displays that can read the following PGN’s:

128259......... Speed Water Reference
128267.......... Water Depth and Transducer
128275......... Distance Log
130310......... Water Temperature
Smart™ Sensor Transducers

P39
- Transom-Mount
- Depth/Speed/Temp
- 235kHz
- 100W Power
- 500’ Max depth

P79
- In-Hull
- Depth Only
- 235kHz
- 100W Power
- 500’ Max depth

D800, DT800
- Thru-Hull
- Depth/Temp
- Tilted Element™
- 235kHz
- 100W Power
- 590’ Max depth

DST800
- Thru-Hull
- Depth/Speed/Temp
- Wide fan beam
- 235kHz
- 100W Power
- 330’ Max depth
DT800 Tilted Element™ Smart Sensors
New design incorporates:
• Tilted Element feature
• Broadband 235kHz Ceramic
  • Higher power rating (100W)
  • Increased depth capability down to 600ft
  • Better shallow water performance(<1.6 ft)
• All signal processing is done inside the transducers
• No interference with on-board sounders
• NMEA 0183 and NMEA 2000 versions available
Benefits of a Tilted Element™

**With Tilt**

Transducer beam profile of a Tilted Element™, low-profile housing installed on a vessel with more than 8° of hull deadrise angle. The tilted ceramic aims the beam straight down resulting in strong bottom echo returns and accurate depth readings at any speed.

**Without Tilt**

Transducer beam profile of a Non-Tilted Element™, low-profile housing installed on a vessel with more than 8° of hull deadrise angle. The angled beam out to the side of the vessel will return a weak bottom echo resulting in poor depth readings.
DT800 vs. DST800

• Broadband, round ceramic
• Better sensitivity vs. DST800
• 12° beam, 590’ max depth
• Fixed 0°, 12°, or 20° tilt

• Rectangular bar ceramic
• Three sensors in one housing
• 10° x 44° beam, 330’ max depth
• Works with all deadrise angles
PB150 WeatherStation® Instrument

- Recreational weather sensing
- NMEA 0183 Output Only

Features:
- True and Apparent Wind Speed and Direction
- 2 axis compass
- Three axis accelerometer for Pitch & Roll
- WAAS Enabled GPS
- Barometric pressure
- Air Temperature
- Wind Chill Temperature
PB200 WeatherStation® Instrument

- **Professional-grade weather sensing**
- Both NMEA 0183 & NMEA 2000® Outputs

Features:
- 3 axis compass with yaw rate gyro
  - +/- 1° for pitch and roll angles ≤ 5°
  - +/- 2° for pitch and roll angles ≤ 30°
  - +/- 3° for pitch and roll angles ≥ 30°-45°
- True and Apparent Wind Speed and Direction
- Three axis accelerometer for Pitch & Roll
- WAAS Enabled GPS
- Barometric pressure
- Air Temperature
- Wind Chill Temperature
H2183 Heading Sensor

- Better than 1° heading accuracy in static conditions
- Best-in-class 2° heading accuracy in dynamic conditions
- Three-axis solid-state compass provides heading data
- Three-axis accelerometer provides pitch and roll data
- Only recreational heading sensor that uses a three-axis rate gyro which provides the most precise rate-of-turn data
- Easily mounts on any angled bulkhead
- IPX6 waterproof enclosure
- Auto calibration feature
- Default 10 Hz update rate for heading
- Outputs NMEA 0183 and NMEA 2000 data simultaneously
GH2183 Heading Sensor with GPS

- GPS and heading combined into one housing
- Saves installation time and money
- Better than 1° heading accuracy in static conditions
- Best-in-class 2° heading accuracy in dynamic conditions
- Three-axis solid-state compass provides heading data
- Three-axis accelerometer provides pitch and roll data
- Three-axis rate gyro provides rate-of-turn data
- Only recreational heading sensor that uses a three-axis rate gyro
- Perfect product for metal hulled boats because the heading sensor is mounted above the deck
- WAAS GPS provides latitude, longitude, COG, SOG, time and date, and magnetic variation
- Optionally available as GPS only (G2183)
- IPX6 waterproof enclosure
- Outputs NMEA 0183 and NMEA 2000® data
H2183 & GH2183 Heading Accuracy

See videos section of CD to view
# NMEA Compatibility Chart

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<thead>
<tr>
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NMEA 2000 Cables & Connectors

- Priced significantly lower than the competition
- Meets NMEA 2000® specifications
- IP67 waterproof rating
- Keyed, Gold connection contacts for easy installation
- Various cable length options
CA500 Underwater Camera

- Low lux (0.01) for all lighting conditions
- Wide viewing angle (90°)
- Sapphire viewing window is scratch and crack resistant
- Retractable insert with self-closing valve
- NTSC or PAL input versions available
- P617V Plastic housing. (Bronze and Stainless also available)
- Uses standard 2” housings which are also used for the ST650, ST850, DT800, and DST800.
- MSRP $495.00 - Lowest on the market
CA500 Underwater Camera

See videos section of CD to view
SS270W Wide Beam

- Only 1kW transducer on the market that provides a 25° at 200 kHz
- Provides four times the beam width at 200kHz compared to other models
- 25° degree beam at both frequencies
- Split screen 50/200kHz fish finder display is more intuitive for novice users because the same targets appear in both beams.

- Can retrofit existing B260 installations
- Stainless Steel Housing
- Includes High Performance Fairing
- Built-in Temp sensor
- MSRP: $1495
SS270W Wide Beam

Twin 25° beams @ 50 and 200kHz
Important Notes: SS270W

- Wide beam covers four times more area and still delivers the target detection and sensitivity of a 200kHz transducer.

- Since the beam is wider, the sound energy is dispersed over the wide beam, thus energy on individual targets will be less than the B260.

- Therefore, the SS270W requires more manual gain than the B260 does for optimum performance.
SS264W Wide Beam Tilted Pair

- SS270W elements split apart into two tilted element™ transducers
- Same ceramics and performance as the SS270W
- Separate transducers for 50 kHz and 200 kHz
- Engineered for Center console and trailered boats up to 40ft
- Transducers sold separately
- No High Performance Fairing needed
- Fast Response temperature sensor
SS264N Narrow Beam Tilted Pair

- B260 elements split apart into two tilted element™ transducers
- Same ceramics & performance as the B260 at 200 kHz
- Separate transducers for 50 kHz and 200 kHz
- Top of the line 1kW tilted element™
- Engineered for Center console and trailered boats up to 40 feet
- Transducers sold separately
- No High Performance Fairing needed
- Fast Response temperature sensor
SS264W & SS264N Tilted Element™ Pair
Installation: Single transmission line

- FOR: Garmin, Navico, Raymarine DSM300 Furuno FCV585, BBFF1, DFF1
- Once the transducers are connected, a single cable is routed to the display.
- Each transducer has an internal diplexer with XID feature, and comes with OEM connectors
SB264 200kHz Wide/Narrow-Beam Switch box

- Allows SS270W or SS264W 200 kHz to work with existing B260, M260, & B258 installations.
- User now has a switchable 200 kHz wide or narrow beam for the specific type of fishing.
- For single transmission line transducers only
SB260 1kW Switch box

- Switches 2 fish finders with one transducer
- Switches 2 transducers with one fish finder
- For single transmission line transducers only
- Not for use with transducers of different power ratings
High Performance 1kW Transom Bracket

- Heavy Gauge plastic bracket with 316 Stainless mounting plate (0.90” thick)
- Kicks up and locks in place without damaging the transom
- Easy to install
- Retrofits to TM258 and TM260’s in the field
- High speed performance over 30 Knots
3 New Transom Models:

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Same Ceramics as:</th>
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</thead>
<tbody>
<tr>
<td>TM258</td>
<td>NEW Entry-Level, 1 kW</td>
<td>B258</td>
</tr>
<tr>
<td>TM270W</td>
<td>NEW 1 kW, Twin Wide-Beam</td>
<td>SS270W</td>
</tr>
<tr>
<td>TM260</td>
<td>NEW Broadband, 1 kW</td>
<td>B260</td>
</tr>
</tbody>
</table>
P48W Adjustable-Beam Transom Mount

- The widest transom-mount transducer on the market
- True 38° x 12° beam that is measured at -3 dB
- Depth and temperature, 200 kHz Only
- 100 Watts RMS power (800 Watts Peak-to-Peak)
- Maximum Depth: 122 m (400’)
- Transom or trolling-motor mounting options
- For 18’ to 25’ Inshore saltwater & freshwater boats
  - Compatible with **200kHz ONLY** fishfinders from Raymarine, Garmin, Lowrance, & Humminbird
P48W Adjustable Beam

- User can manually change the beam direction
  - Pressing and twisting the knob on top changes beam
  - Port-Starboard beam is 38° wide x 12° bow-stern
    - Marks more fish side to side
  - Bow-Stern beam is 12° wide x 38° bow-stern
    - Looks forward and aft to help detect bottom changes
## Four Transducer Categories

<table>
<thead>
<tr>
<th></th>
<th>Thru-Hull</th>
<th>Tilted Element™</th>
<th>In-Hull</th>
<th>Transom</th>
</tr>
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<tbody>
<tr>
<td><img src="image1.png" alt="Thru-Hull" /></td>
<td><img src="image2.png" alt="Tilted Element" /></td>
<td><img src="image3.png" alt="In-Hull" /></td>
<td><img src="image4.png" alt="Transom" /></td>
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</tr>
</tbody>
</table>
| **Pros**       | + Best overall performance  
- Fairing needs to be cut & installed | + No fairing, low profile  
- Requires larger hole | + No Hull protrusions  
- No integrated temperature | + Low Cost  
- Moderate performance at speed |
| **Cons**       |           |                 |         |         |
AIRMAR® Technology Corporation

Bottom Coverage at Depth

B45, B744V, B60, P66
B164 SS164
SS270W, TM270W
B258, TM258
B260, TM260
R99, R209, R309

Yellow cone and numbers = 50 kHz bottom coverage area at given depth
Red cone and numbers = 200 kHz bottom coverage area at given depth

Transducer maximum depth will vary with sounder, settings, and conditions

Top View

Beam Widths
- 50 kHz: 45°, 22°, 25°, 21°, 19°, 17°
- 200 kHz: 12°, 8°, 8°, 8°, 8°, 8°
Thru-Hull models

- Delivers the best performance because the transducer face is in contact with the water.
- For stepped, planing or displacement hulls.
- Models available for wood, fiberglass, aluminum or steel hulls.
- Can be used with inboard, I/O, OB and jet drive propulsion systems.
- Excellent high speed results with use of high-performance fairings.
- For hull dead rise angles up to 25°
Tilted Element™ models

- For large, trailered center console and walk-arounds that can not accommodate a thru-hull with fairing
- Virtually flush installation to the hull
- Models available for wood, fiberglass, aluminum or steel hulls
- Can be used with inboard, I/O, OB and jet drive systems
- Gives excellent high speed results over 30 knots
- For hull dead rise angles up to 25 degrees.
Importance of a vertical beam

Regardless of mounting style, a properly installed transducer delivers a vertical beam that aims straight down toward the bottom, resulting in strong echo returns and accurate depth readings.
High Performance Fairings

The face of the transducer extends off of the hull surface, placing the active surface outside of the boundary layer.

The transducer delivers a vertical beam that aims straight down toward the bottom.
High Performance Fairings

Maintain smooth flow, significantly reducing drag on the hull and lessening the chance of intake and prop cavitation. This installation works great over 30 kts.
Without a High-Performance Fairing

The transducer face is exposed to aeration and turbulence as the flow makes an abrupt change in direction. This installation will work poorly above 10 kts.
Great Fishfinder Performance starts with *optimum* transducer placement.

Regardless of which mounting style is selected, clean water flow over the face of the transducer is critical to the proper operation of the system and is the single most important parameter in selecting a mounting location.
Installation Guidelines

• Bow thrusters, live well or cooling intakes as well as chines, steps and strakes can all introduce aerated water into the path of the transducer.

• Remember to always look forward all the way to the bow of the vessel to see if there will be any interference in front of the transducer’s mounting location.

• If there is an intake 50 feet ahead, in line with the transducer, it will effect performance at high speeds.
Bad Installation

This installation of a B164 looks good, however notice the strake 10 feet directly in front of the transducer. This causes turbulence and air bubbles making the transducer stop reading bottom at 12 knots.
This intake shown in the photos above will cause turbulence and send air bubbles over the transducer face as vessel speed increases. The transducer will work great when the vessel is drifting, but will not work well at speed.
Bad Installation

This transducer is mounted too far aft and will be affected by the turbulent water that the starboard propeller will create at ANY speed.
Good Mounting Location vs. Bad @ 30 kts

See videos section of CD to view
Good Installation

This is an excellent installation of a B744V. There are no hull protrusions in front or alongside the transducer. The transducer is also installed away from the keel so that the beam is not shaded. An installation like this will give clear bottom readings up and above 30 knots.

See the video on the next slide.
Good Installations = This performance @ 30 knots

See videos section of CD to view
Thru-hull location selection

Transducer placement should be aft and close to the centerline. It needs to be located low enough that the transducer is in the water at all times.
Consider items such as the lifting strap placement into the location as well as trailer bunks and rollers if it is a trailered vessel.
Thru-hull location selection

Select a location that is not directly behind any water intakes, through hull fittings, strake terminations, or any source of turbulent water flow.
Thru-hull location selection

Be sure that the transducer signal will not intersect the prop shaft(s), keel or any other hull projections, and that it is not directly in-line with the prop(s)
Thru-hull location selection

Thru hulls can be used on stepped hull vessels, but they must be located in front of the first step and low to the keel to operate effectively.
Thru-hull Installation

3M 4200 or 5200 is the common sealant used. Be sure to apply enough to allow it to fully seal the stem hole.
1kW High Speed Performance

See videos section of CD to view
R99, R209, & R309 Installations

• It is **Critical** that the fairing be bolted and secured to the hull before the transducer is installed.

• Be sure the fairing is **100% flush to the hull and does not rock front to back or side to side**. This rocking could cause the final installation to crack the transducer.

Figure 2. Bedding and installing the fairing and backing block (non-metal hull shown)
R99, R209, & R309 Installations

- After the fairing is bolted to the hull, slide the transducer onto the threaded rods being sure the rounded bottom is facing forward toward the bow and the temperature sensor is aft.
- Be sure the rods extend a minimum of 3 threads beyond the nut after being tightened to 20ft.-lb of torque.
In-hull models

• For solid fiberglass stepped, planing or displacement type hulls
  • No hull penetration. Entire installation is done from inside the hull
  • Can be installed while boat is in the water.
  • Can be used with single or twin inboard, I/O, OB and jet drive propulsion
  • For deadrise angles up to 30 degrees
  • Can now be mounted port/starboard or bow/stern
In-hull location selection

In-Hull transducers are desirable for trailered, stepped hull, and high performance hull designs as there is no drag, hull penetration or fouling.
In-hull location selection

As with thru-hulls, the selected location should be aft and close to the centerline so that the transducer is in the water at all times.
In-hull location selection

The hull below and in front of the transducer must be free from any sources of turbulence, just as with a thru hull installation.
In-hull location selection

It is important to be sure that it is not mounted too close to the keel or above the prop shaft(s) which could cause the signal to be blinded.
Testing an In-Hull Mounting Location

Before installing the transducer tank, perform one of the 3 methods below in as deep of water as possible. Connect the transducer cable to the fishfinder to verify strong bottom readings.

A. Flood the area with bilge water.
B. Place the transducer in a garbage bag and fill with water
C. Apply a water based lubricant to the transducer face and press against the hull

Figure 4. Testing the transducer at the selected location
In-hull location selection

Be sure that the location has sufficient deck access and space to install or service the transducer as well as enough head-room for assembly.
M260 & R199, 299,399 Tanks

- Now shipped with flat 90° tank bottom which can be easily cut for bow-stern or port-starboard mounting.

- To fill the new tank, we recommend using non-toxic propylene glycol (RV / Marine anti-freeze).

- To mount the tank to the hull, we recommend using fiberglass resin, 3M 5200, Marine Tex® or Fusor® 100EZ / T10.
Transom Mount Models

For displacement or planing hulls only

Can be used on wood, fiberglass, aluminum or steel hulls

Can be used with single or twin I/O, OB and jet drive propulsion systems

Good high speed performance can be achieved with careful installation

Easy maintenance designs
Transom location selection

Transom models are best suited for small and trailered vessels where a thru-hull is not practical. They are not for use on stepped hull boats or with inboard power.
Transom location selection

Transom models can be used on **stepped transom** boats that have sufficient headroom for release. They should be mounted on the lower surface.
Transom location selection

Select a mounting location that is not directly behind any strakes, hull fittings or sources of turbulence.

The water flowing over the face of the transducer must be turbulent free.
Transom location selection

Before installation, run the boat at speed and watch the water flow over the back of the transom. Locate the transducer in an area which you observed clean flow.
Transom location selection

Best results are achieved when the flow from the prop comes over the top of the transducer. Typically this is on the starboard side of the transom.
Transom location selection

For twin OB or I/O applications best results are achieved by mounting the transducer between the two drives, either on or just off of the centerline.
Transom Mount Guidelines

Mount so that the bow of the sensor is slightly higher than the stern of the sensor and the sensor projects below the hull, otherwise aeration will occur.

Sea trial the vessel and adjust the transducer mounting height to achieve clear screen images at speed.
If experiencing interference with a transom mounted transducer you must test drive the vessel to determine what speed the image is lost at.

Move the transducer to it’s lowest position and retest.

If screen image is improved repeat until you are satisfied with results.

If screen image gets worse, move transducer up and re-test until improvement is seen.
Transom Mount Flow Noise

- Perform a slow but constant turn to the side of the hull that the transom transducer is mounted. Gradually increase rate of turn. If screen image improves the transducer needs to be mounted lower in the water.

- If screen image is worse when turning to the same side as the transducer try turning the opposite direction. This would indicate the transducer needs to be mounted higher in the water.
Avoiding Interference

- Always choose a location away from interference caused by sources such as propeller shafts, satellite or radar equipment, other machinery and cable runs.

- The lower the overall noise level around the transducer and cable, the higher the gain setting that can be used, resulting in more screen detail.
Avoiding Interference

• If screen interference appears at a specific rpm or when the boat is put in and out of gear, this could be a sign of electrical interference on the sounder’s power line. Try powering the sounder directly from a stand-alone battery.

• If the screen interference increases proportional to vessel speed this usually indicates that the transducer face is exposed to aerated water.
Using an EDI transducer test box you can determine the resonant frequency of a transducer and confirm that all of its functions are operating properly.
T3D digital test set

Tests depth, speed and temp functions of most transducers. Bright led bar readout clearly displays each function. Designed for non-diplexed transducers.
Tests depth function of all transducers including commercial models. Precise digital readout shows exact frequency and impedance at resonance.
Transducer test cables

Available through Gemeco for most manufacturers connectors. This eliminates having to probe cable or pin-out connector to test the transducer functions.
Using the T3D tester

Attach the transducer and press the power button. After the self test completes, the transducer’s resonant point(s) are displayed via the led bar graph display.
Using the T3D tester

Press and hold the **function** button until the segment next to **leak** illuminates. This test allows you to check the transducer for open or shorted depth wiring.
Using the T3D tester

Press and hold the function button until the temp segment illuminates. Temp is displayed in centigrade and pressing the sensitivity + button displays farrenheight.
Using the T3D tester

Press and hold the function button again until the segment next to speed illuminates. Rotate the paddlewheel and the bar graph segments light progressively.
Using the TT2D tester

Attach the transducer and rotate the **fine frequency** knob to turn the tester on. Rotate the coarse and fine knobs until the **res** led light becomes the brightest.
Using an EDI transducer test box you can determine the resonant frequency of a transducer and confirm that all of its functions are operating properly.
Using the TT2D tester

Each frequency will typically have multiple resonant points, but the true resonant frequency of the transducer will show the lowest impedance and brightest led.
Testing for *temp* function

With meter set to OHMS the reading should be in the 10,000 ohm range at 77 degrees F.

The resistance increases as the temp decreases.

The sensor will read correctly in or out of water.
Testing for speed function

Use a 9 volt or 12 volt cordless drill battery to apply battery voltage to red and bare wires. Attach meter test leads between the green and bare wires.
Testing for \textit{speed} function

Turn the paddlewheel slowly by hand. The volt meter should toggle between zero volts and the input voltage with each 90 degrees of rotation.