# SENSORS FOR MONITORING GROUND COMBAT VEHICLE PERFORMANCE

PCB PIEZOTRONICS
AN AMPHENOL COMPANY

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## REASONS TO CHOOSE

# PCB PIEZOTRONICS

### CUSTOMIZATION

In addition to offering a wide variety of commercial off-the-shelf products, PCB designs custom sensors for every stage of product development, with features tailored to your specific application.

Our cutting-edge design capabilities provide your team with a competitive advantage, allowing for future upgrades and scalability to meet evolving operational needs.

### QUALITY AND RELIABILITY

Precision is everything. PCB sensors are designed and manufactured to meet high quality standards for greater reliability, accuracy, and consistency in performance. The successful field operations of our customers serve as testaments to the quality, reliability, and effectiveness of our sensors.

### 24/7 TECHNICAL SUPPORT

PCB's Total Customer Satisfaction (TCS) approach and superior technical capabilities are unmatched in the industry. Our customers have access to 24/7 technical support for troubleshooting issues, fine-tuning product integration, and optimizing sensor performance.

### PERFORMANCE AND DURABILITY

PCB sensors have been successfully deployed and tested in real-world scenarios, securing their reputation for excellence and consistent performance in the most challenging application environments.

# INTRODUCTION

PCB has long served the defense industry's requirements for sensor technologies to support superior warfare capability and readiness.

Ground Combat Vehicles rely heavily on sensors to provide situational awareness and enhance their operational capabilities. Sensors to quantify and monitor vibration, shock, force, pressure, torque, strain, acoustics, load and blast are designed by PCB advanced technology professionals to support new and innovative applications.

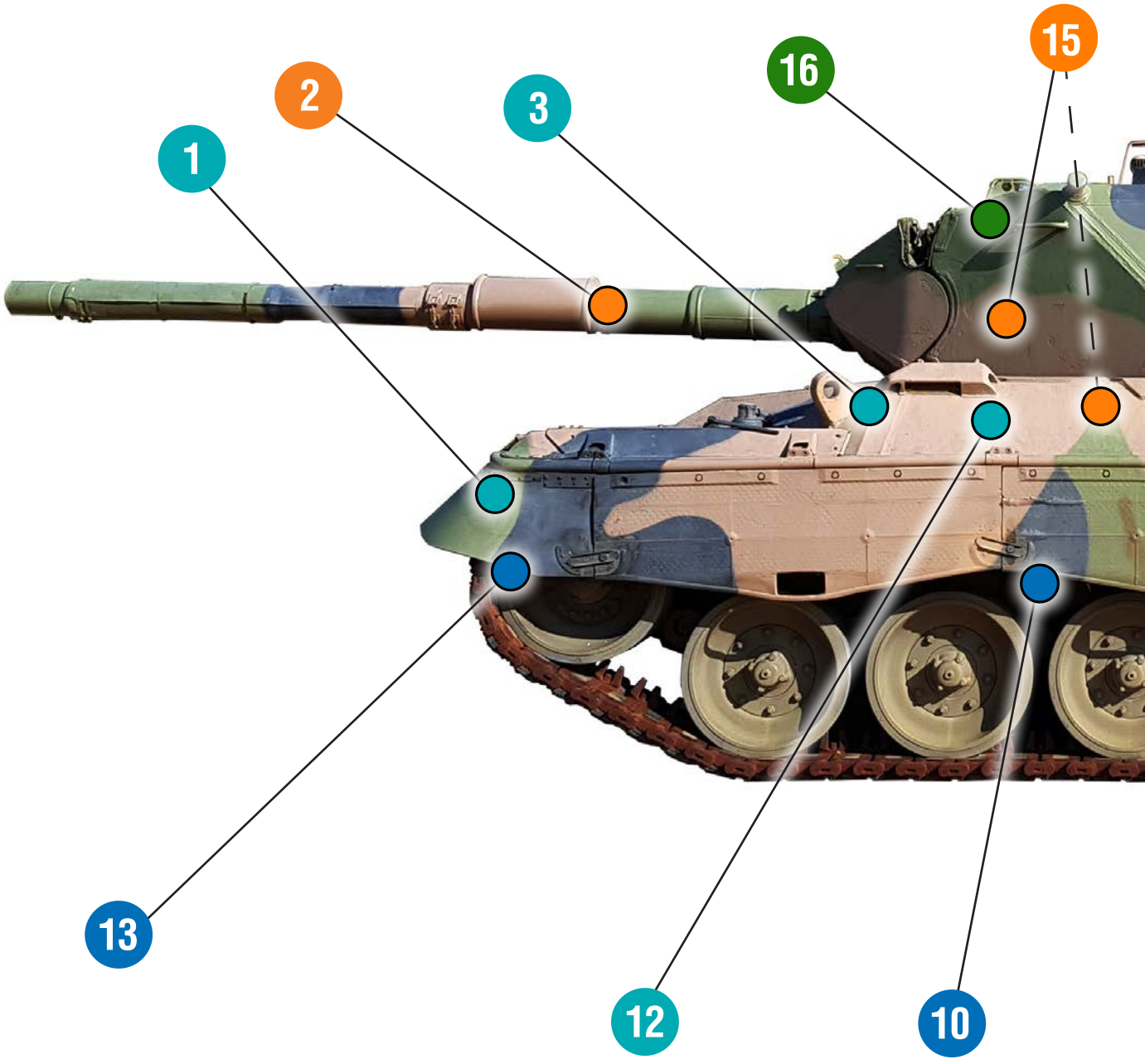
Our commercial off-the-shelf sensors are often customized to meet specific requirements, such as footprint, form factor, performance characteristics, and digital communication protocols.

Condition-based maintenance (CBM) sensors are rapidly replacing time-based and run-to-failure practices in order to provide combat vehicle personnel the ability to monitor and maintain optimal performance of critical components in harsh battlefield environments. Sensors reduce the risk of catastrophic equipment failure by monitoring assets in real time from various sources, including pumps, motors, gearboxes and vehicle suspension system components.

Notable additions to the list of combat vehicle sensing applications include: ultrasonic pressure sensors for sniper detection and superior weapon stabilization for fire control systems. These solutions allow for personnel safety, operational precision and overall effectiveness of the weapon system, to better ensure mission success.

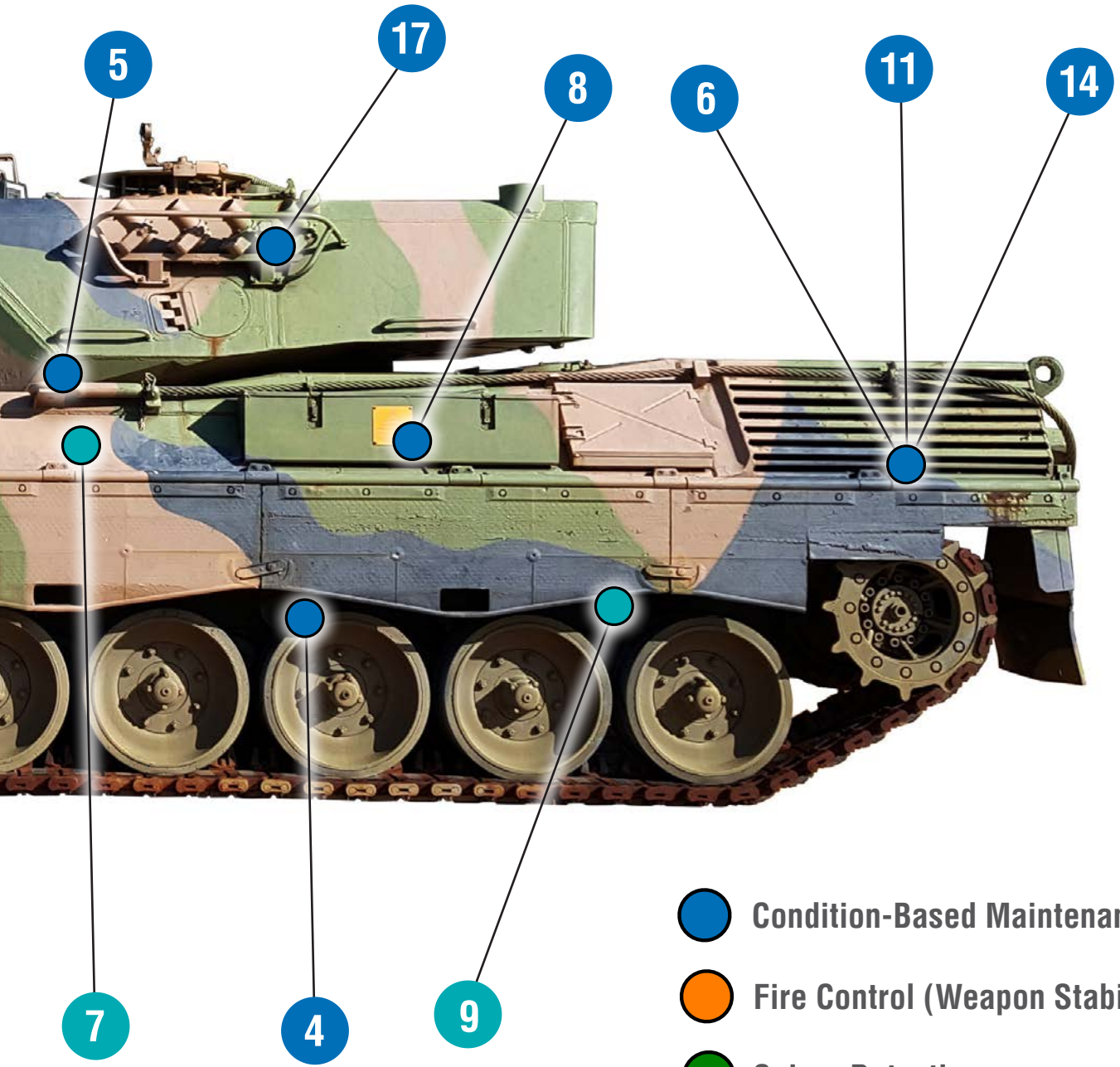
# GROUND COMBAT VEHICLE SENSORS

## Critical Monitoring, Detection and Control Applications



**Fire Control (Weapons Stabilization)**
**Sniper Detection**
**Personnel Safety**

**Condition-Based Maintenance (CBM)**
Vehicle Monitoring
Bearing Fault Detector




- Condition-Based Maintenance
- Fire Control (Weapon Stabilization)
- Sniper Detection
- Personnel Safety

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|---|---|
| **1 Blast Sensors** | Quantify surrounding air blast levels<br>Monitor peak pressure and total impulse |
| **2 Ballistic Sensors** | Ballistic sensors<br>Acceleration compensated pressure sensors for high frequency ballistics applications<br>Monitor weapon chamber pressure for crew safety and combat effectiveness |
| **3 Dynamic Force Sensors** | Gun recoil<br>Impact |
| **4 Bearing Fault Detector** | Monitor and detect bearing and gear faults to avert catastrophic failure<br>Detects impacting associated with spalling, cracking, and lubrication problems |
| **5 Vibration Sensors** | Structural analysis and environmental stress screening<br>Multi-axis operational vibration monitoring |
| **6 Vehicle Monitoring** | Suspension, shock absorption and damping studies<br>Engine monitoring<br>Drivetrain monitoring |
| **7 Human Vibration Sensors** | Monitor potentially dangerous vibration levels transferred from the vehicle to personnel<br>Whole body vibration risks include back, neck, shoulder, digestive, circulatory, cranial nerve, and reproductive disorders |
| **8 Dynamic Strain Sensors** | Detect early signs of compromise to vehicle structural integrity<br>A critical component in systems for determining strain-displacement relationships, load predictions, and providing active vibration control |
| **9 Shock Sensors** | Metal-to-metal impact and pyroshock on hull<br>Blast loading and mitigation to improve survivability<br>Seat and occupant measurements |
| **10 Water Resistant Microphone** | Rugged acoustics sensors for harsh combat environments<br>Identify noise sources and detect structural defects via non-contact means |
| **11 Ultra-High Temperature Sensors** | Capable of monitoring critical engine components with surface temperatures up to 1200°F (649°C)<br>Ultra-High temperature accelerometers and pressure sensors are key components in vehicular condition-based maintenance (CBM) systems |

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|---|---|
| **12 Sound Level Meter** | Environmental noise assessment and monitoring<br>Occupational noise evaluation<br>NVH correlation |
| **13 MEMS DC Response Accelerometers** | Monitor critical vehicle dynamics parameters<br>Detect road load impacts on powertrain, chassis and overall structural durability |
| **14 High Temperature Microphone** | Acoustic sensors for use in operating temperatures up to 257°F (125°C)<br>Critical component for noise monitoring of engine and exhaust systems |
| **15 Triaxial DC Response Accelerometer** | Critical fire control system component<br>Ensures high accuracy of weapon system through vibration stabilization over rough terrain |
| **16 Ultrasonic Pressure Sensors** | Shock wave velocity and/or time of arrival determinations<br>Critical component in sniper detection systems |
| **17 Accessories** | Portable Vibration<br>Patch-Panels<br>Multi-Conductor Cables |

# EXPERIENCE THE PCB PIEZOTRONICS DIFFERENCE

## Our top-quality sensors undergo rigorous testing and meet stringent quality standards, ensuring reliability and durability even in demanding and harsh environments.

PCB Piezotronics has a proven track record in supporting mission-critical applications. Our investment in vertical integration to support every aspect of engineering, design assurance testing, and manufacturing affords us complete control over product quality.

PCB Piezotronics's quality management system is certified to AS9100:2016 and ISO 9001:2015, with calibration procedures accredited by A2LA to ISO 17025.

Products can be manufactured to meet specific aerospace environmental standards, with program design requirements to meet RTCA-DO-160 and MIL-STD-810.

When you partner with us, our expert Program Management team connects our engineers to yours to meet your project demands from concept to full-scale production, with a Total Customer Satisfaction (TCS) approach to business that is unmatched in the industry.

Trust PCB as your premier source for ground combat vehicle sensing components. For more information, visit pcb.com.

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