

RUGGED OXYGEN GENERATOR (ROG)

A PORTABLE, POWER-FREE REPLACEMENT FOR COMPRESSED MILITARY OXYGEN TANKS AND GREEN O2 BOTTLES

By Andrew Maier



1. EXECUTIVE SUMMARY

Future large-scale combat operations (LSCO) will impose extended evacuation timelines, contested air corridors, and prolonged periods of Role 1 care. Army Futures Command and the Medical Capability Development Integration Directorate (CDID) have identified [far-forward oxygen delivery](#) as a critical capability gap for 2028 and beyond. Current oxygen systems such as pressurized cylinders, PTLOX units, and portable concentrators cannot be reliably pushed to the point of injury because of hazard risk, power dependence, weight, and environmental sensitivity.

The [Rugged Oxygen Generator \(ROG\)](#) provides a safe, power-independent oxygen solution capable of delivering $\geq 96\%$ oxygen at ≥ 6 L/min for ≥ 15 minutes without external power, pressure, or maintenance. This enables medics to perform early oxygenation during the most decisive phase of trauma care, directly supporting TCCC, DCR principles, and U.S. Army medical modernization requirements.

2. THE OPERATIONAL PROBLEM

Early oxygen delivery is foundational to prevent secondary brain injury, respiratory collapse, and physiological deterioration in combat trauma. Yet the U.S. military lacks a system that can safely and reliably provide oxygen: at the point of injury, during prolonged prehospital care, under power-denied, distributed or contested conditions, or without adding explosive or fragmentation hazard.

Current systems are inadequate. [Pressurized Oxygen Cylinders](#) present fragmentation and explosion hazard under fire, are often restricted from dismounted operations, add significant weight/volume to CASEVAC platforms, and require supply chain access that is unrealistic in LSCO environments. [Portable Oxygen Concentrators \(POCs\)](#) require continuous, clean electrical power. Their performance degrades in heat, altitude, dust, or high respiratory demand, and are not viable in electromagnetic-contested or power-denied operations. [PTLOX Systems](#) are highly effective but heavy, vehicle-borne, and reliant on replenishment. They are also not feasible for dismounted or squad-level care. The result being that medics routinely lack oxygen during the period when intervention has the greatest impact on survival and neurological outcome

3. WHY THIS MATTERS

Far-forward oxygen delivery is an explicitly documented requirement in the Army's 2028 medical modernization priorities. Army Futures Command and Medical CDID have identified oxygen therapy as a decisive shortfall for Role 1 and en-route care, particularly as LSCO increases dispersion and degrades evacuation timelines.

Current oxygen systems cannot be pushed to the point of injury because they are hazardous, heavy, and power-dependent. This leaves medics without the ability to administer early oxygen, the intervention that most directly influences survivability in airway compromise, traumatic brain injury, and respiratory failure.

A rugged, power-free capability delivering $\geq 96\%$ oxygen at ≥ 6 L/min for ≥ 15 minutes aligns directly with these published requirements and provides commanders with a safe, scalable oxygen solution during the phase of care where preventable deaths overwhelmingly occur.

4. THE ROG SOLUTION

The [Rugged Oxygen Generator \(ROG\)](#) is a solid-state oxygen generator engineered for austere, high-risk, and power-denied environments.

Key capabilities

- $\geq 96\%$ medical-grade oxygen
- ≥ 6 L/min flow rate
- ≥ 15 minutes duration (90 L delivered)
- No external power, batteries, or compressors
- Non-pressurized and safe under small-arms and fragmentation exposure
- 360° deployment orientation
- Shelf-stable, ruggedized, and maintenance-free
- Compatible with masks, cannula, and ventilators (low-flow bypass)



Operational advantages

- Enables POI oxygenation during TCCC MARCH sequence
- Provides immediate oxygen in blackout, EMCON, or denied-power conditions
- Safe in vehicles, aircraft, shelters, and dismantled operations
- Functions in extreme heat, cold, humidity, and altitude
- Zero sound/light signature which is suitable for concealed care



5. SAFETY & CERTIFICATION

The ROG complies with key safety and certification requirements:

- FDA 510(k) Cleared Medical Device
- UN3356 Certified - safe for global transport via air, land, and sea
- MIL-STD-810G Environmental Durability
- Validated with ventilators used in U.S. military en-route care

These certifications ensure the device can be stocked, stored, transported, and deployed across DoD medical logistics and operational environments.

6. USE CASES IN LSCO & MULTI-DOMAIN OPERATIONS

- Role 1 Aid Stations - immediate oxygen without power dependency
- Dismounted Medics - lightweight, safe, immediate activation
- En-Route Care (CASEVAC/MEDEVAC) - backup or supplemental oxygen
- Prolonged Care Settings - bridging oxygen until higher-level assets available
- CBRN or denied environments - functions without clean intake air
- Coalition, humanitarian, and disaster response - portable, safe, rapid-use oxygen

7. SUMMARY

Combat medics and forward surgical teams require a safe, portable, power-free oxygen capability that can be deployed at or near the point of injury. The ROG directly fills this documented capability gap, aligning with Army 2028 modernization priorities and supporting DCR and TCCC principles in LSCO.

By providing high-purity, high-flow oxygen without power, pressure, or logistical burden, the ROG enhances survivability during the most critical minutes of care where preventable deaths overwhelmingly occur.