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SHORTSTOP/WARLOCK VLQ-11(V), PLQ-7(V), GLQ-16(V) - Archived 7/2009

Outlook

- Insurgents have continually added power to Radio-Controlled Improvised Explosive Device (RCIED) transmitters and utilized varying signals to overcome U.S. countermeasures and set off the deadly roadside bombs
- The Warlock was an earlier attempt to counter the RCIEDs, but it has since been replaced by more capable systems
- The latest jammer to be produced is known as the Joint Counter RCIED Electronic Warfare (JCREW) Spiral 2 jammer
- Production of the Warlock has ended, and therefore this report will be archived in 2009

Orientation

Description. Originally a mobile electronic countermeasures system to protect ground forces from indirect fire and fuzed artillery, modified and rushed into service to protect convoys and combat vehicles from IEDs in Iraq and Afghanistan.

Sponsor

U.S. Army
Army Communications-Electronics Command
(CECOM)
C⁴IEW Acquisition Center
Night Vision & Electronic Sensors Directorate
Ft. Monmouth, NJ 07703-5000
USA
Tel: + 1 (201) 532-2534
Web site: <http://www.monmouth.army.mil>

Status. In production.

Application. Detonation of artillery and mortar shells high enough above the ground to protect battlefield assets.

Price Range. Unit price ranges between \$300,000 and \$380,000.

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Contractors

Prime

EDO Communications and Countermeasures Systems	http://www.edocorp.com/EDOCCS.htm , 3500 Willow Ln, Thousand Oaks, CA 91361 United States, Tel: + 1 (805) 373-3200, Prime
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Contractors are invited to submit updated information to Editor, International Contractors, Forecast International, 22 Commerce Road, Newtown, CT 06470, USA; rich.pettibone@forecast1.com

Technical Data

	<u>Metric</u>	<u>U.S.</u>
Dimensions		
Weight		
PLQ-7(V) Manpack version	11.35 kg 17.3 x 30 x 45.5 cm	25 lb 6.8 x 11.4 x 17.9 in
VLQ-11(V) Vehicle-mount version	22.7 kg 26.7 x 40.1 x 40.3 cm	50 lb 10.5 x 15.8 x 15.9 in
GLQ-16(V) Stand-alone version	21.79 kg 24.1 x 40.1 x 40.3 cm	48 lb 9.5 x 15.8 x 15.9 in
Characteristics		
Detonate round	7 to 11 km above the ground One-switch automatic operation Minimal training needed to operate	
Power source	Self-contained battery (8 hr on 3 BA 5590/U) Vehicle battery AC to DC power source	
Warlock		
Warlock Red	24V DC power from any military vehicle	
Warlock Green	12V DC jack or cigarette lighter	

Design Features. The SHORTSTOP Electronic Protection System (SEPS) is an autonomous, lightweight, fully integrated radio frequency countermeasure system designed to provide protection for personnel and high-value assets against proximity-fuzed indirect munitions – specifically, artillery, mortar, and rocket-type munitions. Once activated, SEPS detects the weak RF signal generated by proximity fuzes, without operator intervention. This reflected signal tells the round when it is about 10 meters above the ground, causing detonation at a height that maximizes shrapnel effect.

The system uses an RF Digital Memory system to manipulate this signal and transmit a false return that causes the round to explode 7 to 11 kilometers above the ground, before it gets within lethal range. Control algorithms differentiate a threat signal from a non-threat

signal, and a confirmed threat signal is then subjected to further algorithms and countermeasure techniques that cause the fuze to activate.

SEPS can be deployed in three configurations: manpack, vehicle mount, and stand-alone. All three configurations utilize a core receiver/transmitter (R/T) supplemented with electronic and power modules appropriate for the intended application. SEPS also utilizes a single omni-directional antenna for both receive and transmit functions. It has a dual redundant 1533 interface allowing for integration into a multi-system electronic warfare suite. Additionally, the system has a robust programming capability for customized uses.

The VLQ-9(V) was developed and built in response to a Quick Reaction Capability (QRC) requirement of Operation Desert Storm. The systems went from

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concept to production (36 units) in 90 days. Following the 1991 Gulf War, the units were placed in contingency storage. The success of the original development resulted in (then) Whittaker Corp receiving a contract from the Army's Program Executive Office, Intelligence and Electronic Warfare (PEO IEW) in July 1994 to develop advanced versions of the system. These systems would be designed to be smaller and lighter.

The system is being produced for the Army in three configurations: a lightweight manpack (PLQ-7(V)), a vehicle-mounted version (VLQ-11(V)), and a stand-alone unit fitted on a tripod (GLQ-16(V)). All three configurations feature a common core receiver/transmitter. A flash memory card functions as a user data module and makes it easy to upgrade the system's threat countermeasures or reprogram them remotely.

Based on U.S. requirements, SHORTSTOP was militarized and made lighter, more portable, and more capable. Digital RF memories make very fast switching times possible, enhancing the protection provided. Special features of the militarized, lightweight version include autonomous operation, contiguous coverage, BIT/BITE, and an omni-directional capability. These units have an omni-directional antenna and feature wider bandwidth than the first units, making them able to protect forces from most known proximity fuzes. Nine VLQ-9(V) prototype units were placed in contingency storage in FY95. Fourteen were modified into the VLQ-10(V) multiband version and put into storage.

Warlock Anti-IED. In an emergency response to deadly attacks in Iraq, officials developed the Warlock modification to SEPS. The frequency range and transmitter waveforms were changed and mounting designed to provide protection from the roadside bombs being used by insurgents in both Iraq and Afghanistan.

Versions could be used in military convoys, fixed sites, or checkpoints to protect forces from improvised explosive devices (IEDs) detonated by simple pager or cell phone signals.

Operational Characteristics. The vehicular and manpack versions are operationally similar. Packaged in a suitcase-sized enclosure and fitted with a small multidirectional antenna, SHORTSTOP systems can be activated and operational within seconds. They have been designed for turn-on/turn-off operation and feature an easy-to-learn operator interface. A single SHORTSTOP system can protect against single-shot or barrage attacks, although plans are to deploy systems in groups when mutual coverage is desirable. A SHORTSTOP deployment reportedly can protect an oval big enough to contain 12 football fields.

The system's passive electronics and operational features make it impervious to detection by enemy signal intelligence sensors. SHORTSTOP is used by infantry, engineering, armored, field artillery, and intelligence units.

Systems have been deployed to Kuwait, Kosovo, Bosnia, Saudi Arabia, Afghanistan, and Iraq.

An Expanded Approach. Insurgents are now able to detonate IEDs from up to three miles away, compared to 100 to 300 yards just a short time ago. They have moved from using items such as wireless doorbells, car alarms, and garage door opener remotes to triggering the devices with cell phones and two-way radios. According to Marine explosive ordnance disposal expert Staff Sergeant Jason Taylor, "They've learned to adapt any power source that is a communications device to relay [information] to the explosive devices."

The current goal is to jam, not pre-detonate, IEDs, according to Lt. Gen. John F. Sattler, Commander of the 1st Marine Expeditionary Force which returned from Iraq in early 2006. Jamming the circuitry prevents the IED from going off, but it is still there. One suggestion was to use a big spike of energy from a truck- or aircraft-borne system to overpower the detonator and "fuse the circuitry of a blasting cap or pre-detonate it before a convoy gets to where it is implanted."



SEPS

Source: DoD

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Variants/Upgrades

VLQ-9(V). The original single-band system.

VLQ-10(V). The original multiband system.

VLQ-11(V). The current vehicle-mounted version.

PLQ-7(V). The manpack variant.

GLQ-16(V). A stand-alone version.

Warlock. This is a version of SEPS modified to operate in a classified frequency band and developed to counter the IEDs that have become the bane of U.S. forces in Iraq. Terrorist-planted explosives are being detonated by cell phones, pagers, garage door openers, and similar electronic devices.

Warlock Red operates off a 12-volt vehicle power system, and can hook up to a cigarette lighter plug.

Warlock Green operates off the 24-volt power of military vehicles.

Combat in Iraq proved the deadliness of the IED threat. Defense officials and Congress rushed funding and contracts to field systems to the war zone as fast as possible. Both Warlock Red and Warlock Green can operate in military convoy, fixed-site, or check point configuration to protect convoys and positions.

Program Review

Testing Proves System

Tests against more than 6,000 live artillery and mortar rounds conducted by the U.S. Army showed the system to be essentially foolproof and 100 percent effective and reliable against selected weapons.

In response to the 1991 Persian Gulf War, the U.S. Army decided to develop a proximity fuze that could counter the massive artillery strikes expected from the Iraqis. The Army and Whittaker Corp designed the SHORTSTOP system under a QRC requirement. The system was dubbed SHORTSTOP, "a life-saving system" that proved 100 percent effective against artillery and mortar shells fitted with proximity fuzes. The 1991 Gulf War ended before SHORTSTOP could be deployed.

All sides used artillery and mortar weapons extensively during the Balkans war. The Army took systems from storage and deployed 16 VLQ-9(V)s and 10 VLQ-10(V)s with the U.S. soldiers deployed to Bosnia in support of Operation Joint Endeavor. This was the first time in the history of warfare that systems of this type had been used. They were used to protect U.S. forces as well as to shield airfields, command posts, barracks, and other facilities against enemy artillery and mortar attacks. This was also an opportunity for the Army to train with SHORTSTOP.

Upgrades Continue

Development continued on the upgraded, downsized units. In FY96, the Army completed the new software design and began integration with the hardware.

In FY97, the Army completed fabrication and contractor qualification testing of nine prototypes. An installation kit was developed for a vehicle-mounted version, and a technical and operational test was conducted.

The resized vehicle-mounted version of SHORTSTOP was tested at the Yuma Proving Grounds in Arizona in 1997. It proved successful against both single-shot and barrage firings of live artillery rounds. The system also proved that it could prematurely activate the proximity fuzes of multiple high-speed rockets. Reports indicate that the rockets were detonated at ranges and heights that exceeded those of the tested artillery rounds.

In October 1998, reports indicated that the Army had decided to field 62 systems to South Korea. The Program Manager had funds for 44 of those, and fielding was scheduled for summer 1999. Plans were to field the rest when funds became available.

SHORTSTOP has had strong congressional support, with \$20 million added to the FY00 Defense Authorization allocation for Army procurement, and \$3 million added to the Navy request for a Marine Corps buy. The Army put \$10 million in its FY01 unfunded priorities list submitted to Congress. Congress authorized \$13 million and appropriated \$10 million, which Army officials said would complete fielding in South Korea and allow fielding in Kuwait to begin. The Army nevertheless said that it had no plans to purchase systems other than those to be fielded in South Korea and Kuwait. Although the Army considers SHORTSTOP to be a high-priority system, it is just one of many such priorities.

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System Officially Deployed

In mid-2003 officials deployed the Warlock system, a modified version of SEPS developed to counter IEDs. Warlock is designed to detect the signals that are used as triggers so convoys may avoid the danger. They may pre-detonate or prevent triggering of these threats, which have proven deadly to U.S. forces in Iraq.

Initially, 92 systems were deployed to Iraq and Afghanistan, with an additional 166 SEPS being converted into Warlock configuration. One weakness is the reduced performance of these systems in a signal-rich urban environment.

DARPA (Defense Advanced Research Projects Agency) initiated an effort in mid-2003 to develop a system to counter the IEDs. The schedule called for technical demonstrations and limited integrated demonstrations from FY03 to FY05. A Full Integrated Demo/Military Utility Assessment was conducted in FY06.

As an interim measure, the Army rushed through contracts for systems to be deployed to Operation Enduring Freedom. By early 2004, just under 1,300 units had been contracted for delivery ASAP, but no later than 2005.

HASC FY07 Authorization Addresses IED Threat

The FY07 Defense Authorization bill approved by the House Armed Services Committee on May 5, 2006, contained hundreds of different policy and budget

initiatives. The committee-approved bill provided for improved capabilities to counter IEDs.

A new initiative included \$109.7 million for radio signal jamming devices that would prevent the radio-initiation of roadside bombs. The second part of the initiative was \$100 million for at least 10 manned persistent surveillance aircraft to patrol roads and other areas where IED activity is greatest. These surveillance platforms would be tactical assets controlled by ground commanders in combination with quick reaction forces to prevent IED emplacement and secure the roadways.

An additional \$50 billion in supplemental funding was allocated to support the Global War on Terror – specifically, operational costs, personnel expenses and the procurement of new equipment including up-armored HMMWVs, HMMWV IED protection kits and gunner protection kits, IED jammers, and state-of-the-art body armor.

Warlock jammers in use in Iraq are interfering with U.S. Army radio communications and block controls needed to operate unmanned air vehicles (UAVs), according to a study of the service's initial effort to transform divisions into "modular" brigades. The report found that soldiers had to turn off the jammers when they wanted to use their SINCGARS radios. Raven UAVs that were operating in the same vicinity lost the signal of their control units and automatically returned to their launch points. The report recommended that the U.S. Army change the jammers so as not to interfere with other equipment. It also recommended that the Army change its tactics with the jammer to create less interference.

Contracts/Orders & Options

(Contracts over \$5 million)

<u>Contractor</u>	<u>Award (\$ millions)</u>	<u>Date/Description</u>
EDO	6.8	Mar 2004 – Increment of \$45,287,633 FFP contract for 132 Warlock Green devices. Completed Jan 2006. (W15P7T-04-C-L001)
EDO	7.9	Nov 2004 – Mod to an FFP contract for 100 Warlock Green and 500 Warlock Red electronic countermeasure devices. Completed May 2005. (W15P7T-04-C-L001)
EDO	56.1	Jan 2005 – Mod to an FFP contract for 720 Warlock Green and 720 Warlock Red electronic countermeasure devices in a combined, single-system configuration with associated dual-band antennas. Completed May 2005. (W15P7T-04-C-L001)
EDO	34.0	Jun 2005 – Mod to an FFP contract for Warlock Green and Red electronic countermeasure devices. Completed Dec 2005. (W15P7T-04-C-L001)

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Timetable

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
Nov	1990	CINC CENTCOM QRC Statement of Need
Feb	1991	Limited procurement contract for VLQ-9(V)
Aug	1991	Limited live-fire testing
Aug	1992	Full live-fire testing
Apr	1994	Operational Requirements Document approved
Jul	1994	Competitive development contract
3Q	FY94	SEPS Milestone II
4Q	FY94	Production of nine prototypes begins
3Q	FY97	Fabrication of nine prototypes completed, contractor qualification testing conducted, support contract awarded
4Q	FY97	Technical & Operational test conducted
1Q	FY98	Milestone III, order for 48 systems
	2000	SEPS added to Army unfunded priorities list
Sep	2001	Contract for 44 systems
Dec	2001	Delivery of first 40 units completed
Apr	2002	Delivery of 90-unit procurement completed
Oct	2003	Delivery of 44-unit procurement completed

Worldwide Distribution/Inventories

This is a **U.S.**-only program at this time. Foreign Military Sales (FMS) procurement is possible in the future. In this respect, discussions are under way with **Australia, Canada, Italy, the Republic of Korea, and the United Kingdom.**

Forecast Rationale

The battlefields in Iraq and Afghanistan are rapidly changing. Insurgents will continue to improve their weapons so long as the insurgency continues. Radio-Controlled Improvised Explosive Devices (RCIEDs) are one example of this type of evolution in weaponry. Insurgents have continually added power to transmitters and utilized varying signals to overcome U.S. countermeasures and set off the deadly roadside bombs. In order to counter these weapons, the U.S. continually upgrades its jammers, known as Counter-RCIED Electronic Warfare (CREW) systems.

The Warlock was one of the earlier jammers rushed into service to protect U.S. soldiers. Being based on the older SHORTSTOP system, the jammer was not ideally suited to the mission. One shortfall of the system was that it jammed U.S. radio signals as well as those of the

insurgents. The Warlock has since been replaced by newer systems that have been designed for the mission at hand.

JCREW Spiral 2 Replaces Warlock

The latest system to be produced is known as the Joint CREW (JCREW) Spiral 2 jammer. Spiral 2 consists of two types of jammers: 2.1 is a vehicle-mounted jammer and 2.2 is a dismounted jammer carried by soldiers on foot. Even though JCREW Spiral 2 jammers are still being produced, the U.S. has begun development of a new jammer, known as the JCREW Spiral 3. Because of these developments, no new production of the Warlock is expected at this time. For this reason, Forecast International will archive this report in 2009.

Ten-Year Outlook

Barring further developments, this report will be archived in 2009.

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