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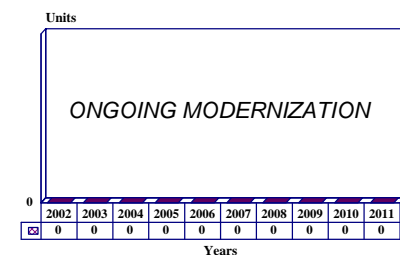
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GUARDRAIL/Common Sensor (USG-9(V)/TSQ-176A) - Archived 03/2003

Outlook

- Battlefield SIGINT support for Corps and joint operations
- GRIFN ground station development contract awarded
- Future plans call for increased use of UAVs for battlefield SIGINT
- Counter-terrorism upgrades planned

10 Year Unit Production Forecast
2002 - 2011



Orientation

Description. Direction-finding, signals and communications intercept, Signals Intelligence (SIGINT) aircraft. The USQ-9(V) is the airborne system and TSQ-176A the ground portion. GUARDRAIL is considered the “eyes of the Deep Battle” in US joint and coalition operations. System 2 is called GUARDRAIL 2000.

Sponsor

US Army
Army Communications-Electronics Command
(CECOM)
AMSEL-IO
Ft. Monmouth, New Jersey (NJ) 07703-5000
USA
Tel: +1 201 532 2534
Web site: <http://www.monmouth.army.mil>

Contractors

TRW
Systems & Information Technology Gp
1330 Geneva Drive
PO Box 3510

Sunnyvale, California (CA) 94088-6510
USA
Tel: +1 408 752 2376
Fax: +1 408 752 2300
Web site: <http://www.trw.com>

Status. In service, ongoing logistics support.

Total Produced. An estimated 55 GUARDRAIL systems of different types have been produced. The last of the upgraded systems just rolled out.

Application. RC-12K/N/P/Q

Price Range. Estimated unit cost for a complete GUARDRAIL/Common Sensor platform is US\$26.5 million.

Price is estimated based on an analysis of contracting data and other available cost information, and a comparison with equivalent items. It represents the best-guess price of a typical system. Individual acquisitions may vary, depending on program factors.

Technical Data

	<u>Metric</u>	<u>US</u>
Dimensions		
Payload weight	908 kg	2,000 lb
Characteristics		
Frequency bands	20 to 75 MHz 100 to 150 MHz 350 to 450 MHz	
LOS coverage from aircraft	450 km	243 nm
Endurance	5+ hr	
Maximum flight range		1,200 nm
Cruising speed	250 kt	
Features	Open distributed architecture Universal compatibility – seamless joint interoperability Modular design Direct support to warfighter Reconfigurable architecture Split-base operation Only DoD SIGINT targeting system 99% COTS/GOTS hardware Flexible deployment configurations Responsive to battlefield dynamics	
Technical capabilities	COMINT (intercept & DF) ELINT (intercept & DF) LPI intercept, copy, DF COMINT targeting (TDOA) ELINT targeting (TDOA) Direct air-to-satellite relay Product broadcast dissemination Pooled receivers General/directed search Product correlation Onboard processing Sensor-to-shooter transmission Multi-INT correlation	

Design Features. The GUARDRAIL/Common Sensor is a corps-level airborne signals intelligence (SIGINT) collection/location system that integrated the Improved GUARDRAIL V (IGRV), the Communication High Accuracy Airborne Location System (CHAALS), and the Advanced Quicklook (AQL) into a single SIGINT platform. The airborne elements are integrated into the RC-12K/N/P/Q aircraft, while ground processing takes place in the TSQ-176A Integrated Processing Facility (IPF). Interoperable Data Links (IDL) provide microwave connectivity between the airborne elements and the IPF. Reporting is accomplished via Commander's Tactical Terminals (CTT).

Key features include integrated COMINT and ELINT reporting, enhanced signal classification and recognition, fast direction finding (DF), a precision emitter

locator, and an advanced integrated aircraft cockpit. Preplanned product improvements include frequency extension, computer assisted on-line sensor management, upgraded datalinks, and the capability to exploit a wide range of signals.

The latest hardware is the USD-9(V)2, an improved version that combines communications and electronic intelligence sensors. Ground processing is accomplished in the IPF. Data are reported via IDLs using microwave connectivity. Aircraft are interlinked. The seventh generation GUARDRAIL 2000 is compliant with Joint Airborne SIGINT Architecture (JASA). System 2 was the first operational implementation of this architecture. It will be the key component of the Army's next-generation Aerial Common Sensor system future battlefield surveillance platform.

With universal workstations, operators can shift between collection, processing, and reporting functions at the same workstation. Operators remotely control airborne collection and perform data analysis and report from a sheltered ground station away from direct combat. GUARDRAIL 2000 is the only real-time SIGINT targeting system with direct airborne satellite relay.

The GUARDRAIL Information Node (GRIFN) will replace the GUARDRAIL System 1 Integrated Processing Facility. GRIFN will be a highly mobile truck-mounted ground station that provides direct distribution of GUARDRAIL intelligence products to the warfighter. It is considered the first step in satisfying the Army's Distributed Common Ground Station (DCGS) architecture.

Operational Characteristics. GR/CS provides near real-time SIGINT and targeting information to Tactical Commanders throughout the Corps area with emphasis on Deep Battle and Follow-on Forces Attack support. It is a stand-off, airborne SIGINT system composed of a transportable, ground-based facility and airborne platforms carrying remotely controlled mission equipment. The system was designed to intercept, locate and classify emitters to provide ground commanders with real-time signals intelligence information.

Two aircraft are launched together to provide an optimum base for direction-finding. It was designed to

orbit just behind the forward edge of battle area (FEBA) to intercept enemy communications emissions. The system is capable of direction-finding operations in the two lower frequency bands. One GR/CS is authorized per Aerial Exploitation Battalion in the MI Brigade at Corps. Each system is made up of 12 aircraft (nominal) which normally fly operational missions in sets of three.

At the beginning of hostilities, GUARDRAIL provides wide area coverage, giving the warfighter a clear knowledge of the battlefield, and collecting intelligence that aids in troop deployment decisions. In offensive operations, GUARDRAIL detects and locates communications and radar emitters on the battlefield, helping the commander understand enemy intentions and plans. GUARDRAIL also provides early warning of enemy approach by determining activity level and the location of communications and electronic emissions. GUARDRAIL has proven itself as both a tactical and national asset. It can provide critical intelligence information from around the world to a host of government decision-makers.

GR/CS System 3 was fielded to Korea in 1988. GR/CS System 4 went to Europe in 1991 and saw action over Iraq. System 1 was fielded with XVII Corps and III Corps in FY98. GUARDRAIL 2000 is being fielded with XVII Corps.

Variants/Upgrades

Older GUARDRAIL IIA systems had 14 intercept/DF positions and truck-mounted mobile relay stations.

GUARDRAIL IV had eight intercept/DF positions and was operational in Korea.

GUARDRAIL V (IGRV) underwent a Product Improvement Program (PIP) to compensate for various RU-21H shortcomings. The Improved GUARDRAIL and the RC-12K aircraft installation correct these limitations.

GUARDRAIL/COMMON SENSOR (GR/CS) is the follow-on platform. It combines into one platform the Improved GUARDRAIL V (IGRV) communications intelligence (COMINT) collection system, the Advanced QUICK LOOK (AQL) ELINT system, and the Communications High Accuracy Airborne Location System (CHAALS). The GR/CS provides direct, near-real-time ELINT/SIGINT reporting to tactical commanders. One GR/CS system (12 aircraft) is authorized per Aerial Exploitation Battalion.

Preplanned product improvements include frequency extension, computer-assisted on-line sensor management, upgraded datalinks, and the capability to exploit a wide range of signals. A series of joint interoperability upgrades were planned for the FY97 to FY99 time frame. GUARDRAIL Common Sensor Systems 1, 3, and 4 are to be upgraded to GUARDRAIL 2000 configuration.

GUARDRAIL 2000 is the latest (seventh-generation) system fielded. It features a direct satellite relay and will be the baseline for the Aerial Common Sensor.

Aerial Common Sensor. The design plan is to combine GUARDRAIL's COMINT/SIGINT and targeting qualities with the imagery intelligence (IMINT) capabilities provided by RC-7B Airborne Reconnaissance Low (ARL) aircraft into a single platform called Aerial Common Sensor (ACS). GR/CS and ARL have demonstrated their compatibility while simultaneously operating over a simulated target area. The two reconnaissance systems proved the ACS concept by cross-cueing each other and confirming target intelligence.

ACS will combine the features on a single airframe and provide multiple-intelligence subsystems in a modular, reconfigurable and rapidly deployable platform. It will be capable of supporting a variety of operations. A Milestone I decision was planned for summer 1999 (US\$3 million in support funds approved), with an Initial Operational Capability (IOC) planned for 2005,

followed by Full Operational Capability by 2007 and fielding with the Army's planned Objective Force.

Ongoing development of unmanned aerial vehicles (UAVs) could result in some changes to these plans as the Army moves closer to the 21st Century Digital Battlefield.

Program Review

Background. The GUARDRAIL program dates back to a National Security Agency (NSA) experiment in 1970 which proved the possibility of airborne SIGINT. In 1971, the NSA contracted for the development of a remotely operated airborne communications intelligence (COMINT) system. Unlike Vietnam-era systems, the equipment carried by GUARDRAIL aircraft would not require onboard operators.

Later that same year, GUARDRAIL I was deployed to Germany for the annual Reforger exercise, with airborne sensors installed in three modified US Army U-21Gs, redesignated RU-21Gs. GUARDRAIL II/IA was deployed to Germany in 1972 and airborne equipment that included a direction-finding capability was installed in six modified RU-218s. These aircraft previously had been modified for an earlier COMINT program called "Left Foot" and were equipped with an Inertial Navigation System (INS). In 1973, officials awarded a contract to develop GUARDRAIL IV, with datalinks added for air-to-ground control and data communications. It was also installed in six modified RU-21Es and the system was fielded in Korea in 1974.

In 1976, a US\$11.8 million contract was awarded for the development of GUARDRAIL V. The US Army assumed responsibility for the program from the NSA. The production of GUARDRAIL V required the conversion of 25 IIA and IV units, and the construction of two new systems. The contract included modifications to the RU-21H airframe and mission electronics, and to ground-based data- processing equipment.

Three GUARDRAIL V systems were delivered between 1978 and 1980, and the airborne equipment installed in modified RU-21D/Es and U-21Gs, including the earlier GUARDRAIL I, IA and IV airframes (the GUARDRAIL III designation was never used). The 21 GUARDRAIL V aircraft, which featured more capable DF equipment, were designated RU-21Hs.

Development of Improved GUARDRAIL V (IGRV) began in 1981 and a contract was awarded for the first two of four planned systems. On September 30, 1982, the Army awarded a US\$49.7 million contract for Improved GUARDRAIL V systems. According to this contract, GUARDRAIL V was named the USD-9(V)2.

With IGRV, the larger C-12D replaced the RU-21H as the airborne platform, and 13 RC-12Ds were sent to Germany in 1984 and 1985. The pressurized RC-12D made it possible to operate at higher altitudes than the RU-21H, and the improved aircraft featured a Differential Global Positioning System (DGPS) and a more reliable INS that made accurate target location possible. An advanced direction-finding system and a new Interoperable Data Link (IDL) allowed more effective multiservice communications. By late 1998, a single IGRV system remained operational with the 15th Military Intelligence Battalion at Robert Gray Army Airfield, Fort Hood, Texas.

The Army planned two additional IGRV systems, but in July 1984 awarded a contract to upgrade the aircraft to GUARDRAIL/Common Sensor (GR/CS) Systems 3 and 4 instead, adding the ability to intercept electronic intelligence (ELINT), including radar and non-communications signals. The Advanced Quicklook (AQL) electronic intelligence intercept classification and direction finder and the Communications High Accuracy Airborne Location System (CHAALS) were added to GR/CS System 4. The effort included production contracts for Integrated Processing Facilities (IPFs).

When GR/CS System 3 (Minus) was deployed in Korea by the 3rd Military Intelligence Brigade (Aerial Exploitation) in December 1988, it lacked the AQL and CHAALS systems which were retrofitted in 1996. GR/CS System 4 was deployed to Germany with the 1st Military Intelligence Battalion (AE) in August 1991; the two systems include six RC-12Hs and nine RC-12Ks. Data transmission for both, like the Improved GUARDRAIL V (IGRV), was line-of-sight between the Airborne Relay Facility (ARF) and IPF (via the interoperable datalink) at a range of up to 250 miles.

A contract for GR/CS Systems 1 and 2 was awarded in August 1990. System 1 included 12 RC-12Ns and was assigned to the 224th Military Intelligence Battalion (AE) at Hunter Army Airfield in Savannah, Georgia, in August 1994. With the exception of updated ELINT software, System 1 contained equipment similar to that in System 4. The RC-12N was the first GUARDRAIL

aircraft to incorporate a remote relay capability, enabling transmission of data from the RC-12N to the IPL via a Ground-Tethered Satellite Relay (GTSR). The GTSR allowed the aircraft to be forward-deployed while leaving the IPL at a location in the rear, or even at home in the US. Earlier systems required the IPL to be forward-deployed near the aircraft in order for data to be received.

System 2 included nine RC-12Ps and three RC-120s, and was fielded with the 15th Military Intelligence Battalion during FY99, making it possible to retire the last IGRV. The RC-12Q can operate as a “mother ship” and is equipped with a data correlator plus a Direct Air-to-Satellite Relay (DASR) system. Instead of transmitting data to the IPL via line-of-sight (LOS) or DASR, an RC-12P sends it via datalink to the RC-12Q, which then forwards the information to the IPL via LOS or DASR. The RC-12P retained the capability to transmit via datalink, however, and the RC-12Q is also equipped to perform the intelligence-gathering mission.

Another upgrade to System 2 included replacement of the COMINT and DF components with digital equipment developed for the USAF U-2 Senior Smart program. In addition, CHAALS was replaced by the Communications High Accuracy Location Subsystem – Exploitable (CHALS-X). The platform aircraft have greater onboard processing capabilities. CHALS-X provides precise locations for high-value targets (HVTs) using Time Difference of Arrival/Differential Doppler (TDOA/DD) techniques to compute the locations of hostile emitters. CHALS-X offers a targeting capability to identify the location of HVTs accurately enough for ground-based artillery to attack specific coordinates with first-round fire. The system has increased frequency range and frequency hopping, and reduced size and weight. System 1 aircraft also have a common datalink, which allows transmission of data from aircraft to aircraft.

In August 1991, System 4 was fielded to USAREUR. The FY94 to FY99 Program and Acquisition Plan was approved by the Army. System 1 was fielded to Forces Command (FORSCOM).

In 1996, the Army announced that acquisition streamlining and using an open system architecture for GUARDRAIL/Common Sensor upgrades resulted in a savings of US\$19 million. Commercial specifications

and tailored testing also helped save money. Depot support was being re-engineered to produce further savings.

A February 1999 *Commerce Business Daily* announced a pending solicitation for the addition of a remote relay/direct air-to-satellite capability to the Joint Tactical Terminal/Common Integrated Broadcast Service Module in support of the Tactical Reconnaissance Intelligence Exchange System (TRIXIS) network. This would be required to support the GR/CS program.

A March 1999 *Commerce Business Daily* featured an announcement of pending contractor production, engineering and repair support for the AQL APD-13(V), the ELINT subsystem of the GUARDRAIL weapon system family of equipment. This would apply to the GUARDRAIL/Common Sensor Systems 1, 2, 3 and 4. Plans were for the contract to be on a firm fixed-price basis for production and a Time & Material basis for repair and engineering support. The period of performance would be 10 years: one base year and nine option years.

In February 2000, GUARDRAIL Common Sensor System 2 (GUARDRAIL 2000) was rolled out in ceremonies at Moffett Field, California.

A Guardrail aircraft crashed in Germany in March 2001.

Market Survey for GUARDRAIL Common Sensor (GR/CS) Systems. In a January 28, 2000, issue of *Commerce Business Daily*, US Army CECOM published a market survey to identify companies with the capability of modifying GUARDRAIL Common Sensor (GR/CS) Aircraft Systems 1, 3, and 4 to the GR/CS System 2 airborne configuration. The following are the detailed tasks listed:

1. Implement modifications to Guardrail Common Sensor (GR/CS) Systems 1, 3, and 4 and aircraft system configurations to upgrade them to the GR/CS System 2 airborne configuration. Modifications may include replacing the current Advanced Quick Look (AQL) airborne processor hardware and software. These modifications will also include the integration of SIGINT Interface Processor (SIP) SIGINT Performance Subsystem (SPS) software from GR/CS System 2 to perform AQL ELINT functions. In replacing hardware and software, commercial products must be used which meet the Department of Defense (DoD) Joint Technical Architecture (JTA) and Defense Information Infrastructure Common Operating Environment (DII COE) requirements.
2. Upgrade GR/CS Systems 1, 3, and 4 ELINT antenna pods to GR/CS System 2 configuration.

Make necessary modifications to the legacy physical antenna pod configurations. Upgrade the ground-processing software and hardware of legacy GR/CS systems to meet GR/CS System 2 XQUEST standards. In replacing hardware and software, commercial products must be used which meet the DoD JTA and DII COE requirements.

3. Redesign and replace the existing legacy GR/CS ground processing audio subsystem. The redesigned audio subsystem must meet the current GR/CS requirements as well as incorporate new commercial audio, recording and storage technologies. The redesigned software and hardware would be installed in the existing ground-processing hardware. In replacing the hardware and software, commercial products must be used which meet the DoD JTA and DII COE requirements.
4. Redesign and code existing legacy ground processing Main System Computer (MSC) and ELINT System Computer (ESC) software. The redesigned MSC and ESC subsystems must transfer all of the functionality of the existing GR/CS Systems 1, 2, 3, and 4 into upgraded software subsystems. The redesigned software must be installed in the existing ground-processing hardware. In replacing hardware and software, commercial products must be used which meet the DoD JTA and DII COE requirements.
5. Conduct Systems Engineering, detailed design, and design integration for modifications and upgrades to existing GR/CS ground and airborne systems. Utilize core knowledge of legacy GR/CS systems to redesign for optimal implementation of improvements to the GR/CS fleet. Follow DoD JTA and DII COE requirements.

Potential offerors were to provide responses no later than February 25, 2000.

In a July 2000 *Commerce Business Daily*, US Army CECOM, Logistics and Readiness Center, Fort Monmouth, New Jersey, published a Market Survey to locate sources for Forward Field Service Representative (FSR) support for the AQL ELINT portion of the GUARDRAIL/Common Sensors fielded in Korea and in Europe, and in Georgia and Texas.

The main duty of the FSR will be to provide on-site repair, maintenance and training for AQL. Military personnel and Tobyhanna Army Depot FSRs will be trained on the maintenance of the AQL system. This support will be provided at any deployed site in both peacetime and wartime. Respondents would have to be able to provide personnel with at least five years

experience in repair of AQL. The personnel provided for this effort will be under the direction of the on-site Tobyhanna Army Depot FSR.

A US\$13 million two-year cost-plus-incentive contract was awarded July 24, 2001, to develop and field the manned, mobile, ground-based GRIFN (GUARDRAIL Information Node). The system will provide control and data processing for the GUARDRAIL Common Sensor.

GR/CS to Host ACN. The DARPA Airborne Communications Node (Adaptive C4ISR Node – ACN) is becoming more than just a communications relay. It is being adapted to be able to perform SIGINT and Information Operations as well. The current DARPA ACTD (Advanced Concept Technology Demonstration) effort will end with a Concept Lab System demonstration by the end of FY02, moving into a System Integration effort which will build and integrate a payload for a flight demonstration in late 2004. A downselect from the two competing Phase II teams, one led by Raytheon and the other by BAE, would take place before Phase III begins in FY03.

The ACN system has developed from a simple airborne communications relay into an ad hoc networking capability scalable to fit just about any platform and function as a communications node, communications relay, cellular system, surrogate satellite, or hub which makes dissimilar radio interoperability possible. Signals Intelligence has become an add-on mission, and designers are working to make it possible for both the SIGINT and communications capabilities to operate simultaneously.

The Program Manager noted that the SIGINT capability was added with no compromise in other missions because the same receiver can accomplish both missions. Common programmable hardware was adapted for signals intelligence, electronic warfare, and information warfare, with functionality based on software.

ACN will be reconfigurable in real time through any communications link so it can be readily adapted to meet changing mission needs. The software re-programmable system will be interoperable with legacy communications systems (SINCGARS, Have Quick, EPLRS, Link 16, and MSE) as well as emerging military and civilian waveforms. It will include both wideband and narrowband waveforms across the 30 MHz to 2 GHz spectrum, and have low-probability-of-detection and anti-jam capabilities. Raytheon designers are leveraging some technology from their Joint Tactical Radio System (JTRS).

The Army considers the relay capability to be important. The Future Combat System will have an ACN requirement. Because the system is scalable and adaptable, it has been mentioned as the communications relay system for the "Smart Tanker" program being considered by General John P. Jumper, AF Chief of Staff. FEMA and Homeland Defense officials are interested because of ACN's potential for providing a communications infrastructure in case of a catastrophic event. It could also be used in Third World theaters to support humanitarian and peacekeeping operations.

The effort began in 1998, with TRW, (then) Sanders, and Raytheon being selected for the Phase I concept development effort. A May 2000 downselect to Raytheon and BAE began Phase II. To date, DARPA has spent roughly \$100 million since the start of the program. The lab demonstration, downselect, and move into the flight phase are expected to cost between \$35 and \$70 million.

The initial platform may be the RC-12 (Interim ACS), followed by Global Hawk and "Smart Tanker."

Counter-terrorism Upgrades Contracted. A contract was awarded in March 2002 for the development of upgrades which would make the GUARDRAIL system better able to handle commercial hand-held transmitters and low-probability-of-intercept military communications. Budget documents explain that US\$5 million from the Defense Emergency Response Fund (DERF) would be used for improving hardware and software to process non-traditional signals. DERF was set up to fund war-related expenses.

Outyear requirements were initially put at more than US\$170 million: US\$28.4 million in FY04, US\$32.5 million in FY05, US\$29.4 million in FY06, and US\$82 million in FY07. These changes are intended to improve the ability of the US to contend with the radio and commercial communications techniques used by terrorists in Afghanistan and elsewhere.

A March 2002 *Commerce Business Daily* announced a market survey to identify sources with the capabilities to upgrade all four GR/CS systems.

Funding

	<u>US FUNDING</u>							
	<u>FY00</u>		<u>FY01</u>		<u>FY02</u>		<u>FY03 (Req)</u>	
	<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>
Production (US Army)								
GUARDRAIL/CS	-	-	-	-	-	14.5	-	49.8
Mods	-	18.7	-	6.5	-	12.2	-	20.9

Note: Budget background documents said that Army plans include US\$79.3 million for GR/CS and ACS RDT&E in FY04, US\$87.8 million in FY05, US\$74.5 million in FY06, and US\$9.2 million in FY07. Most funding will become focused on Aerial Common Sensor development.

All US\$ are in millions.

Recent Contracts

<u>Contractor</u>	Award (\$ millions)	<u>Date/Description</u>
TRW	4.5	Mar 2002 – Increment of a US\$8.9 million CPFF contract for GR/CS counter-terrorism upgrades to Systems 1, 2, 3, and 4 in support of Operation Enduring Freedom. To be completed Aug 2002. (DAAB07-D-L860)

Timetable

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
	1971	NSA contract to develop airborne COMINT system
	1972	Guardrail II/IIA deployed to Germany

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
	FY76	GUARDRAIL V contract awarded
	1984	GUARDRAIL/Common Sensor contract awarded
	1985	Two Improved GUARDRAIL V units deployed
Dec	1988	GR/CS (Minus) System 3 deployed to Korea
Jun	1989	AC-12K Production system (System 1)
Aug-Sep	1990	GR/CS Systems 1 and 2 IPF and ARF production contracts awarded
Aug	1991	GR/CS System 4 fielded to USAREUR
Apr	1994	GR/CS FY94-99 Program and Acquisition Plan approved, System 1 fielded for FORSCOM, GRE contract awarded
	1996	Last GUARDRAIL V deliveries
	1997	GUARDRAIL/ARL interoperability demonstration, Mini-IPF prototype
4Q	FY99	System 2 fielding (with JASA)
	1999	Mini-IPF production, interface with Appliqué
	2000	Full interoperability of Guardrail and ARL
Feb	2000	System 2 GUARDRAIL 2000 rolled out, Systems 1, 3, and 4 upgrade market survey
Jul	2001	GRIFN development contract awarded
	2002	JSAF HBP payload installed
	2005	Aerial Common Sensor Initial Operational Capability
	2007	Aerial Common Sensor Full Operational Capability
	2010	Life of GR/CS

Worldwide Distribution

This program is for the US only.

Forecast Rationale

GUARDRAIL was originally designed for the European scenario, but because of ongoing battlefield ELINT mission commitments around the world, the Army needs an active battlefield ELINT/SIGINT capability. GUARDRAIL aircraft have performed ELINT/ COMINT collection throughout Europe since 1972, and in Korea since 1974. They saw service between 1983 and 1994 in Central America, and two six-aircraft systems were deployed to Saudi Arabia in 1991 to support the Persian Gulf War. Moreover, an Integrated Processing Facility and nine RC-12 aircraft of GR/CS System 4 provided precision location and targeting data during UN operations in Bosnia. During the first 60 days of that deployment, the 1st Military Intelligence Battalion (AE) flew 111 sorties and amassed 1,200 hours. By July 1997, the unit had logged more than 1,500 sorties.

GUARDRAIL supported Operation Allied Force in the Balkans, locating and identifying Yugoslav air defenses, especially SA-14s, for targeting by the AH-64A Apache helicopters. GUARDRAIL data were overlaid with Moving Target Information from JSTARS, and communications intercepts proved particularly valuable.

One problem involved all of the passive intercept systems operating in the region, including Rivet Joint and EP-3s. While these systems were eavesdropping on Yugoslav forces, EA-6Bs and Compass Call aircraft were jamming the same systems. It was difficult to effectively monitor communications while they were being jammed – a consideration for future operational planning.

GUARDRAIL is one of many assets making up the reconnaissance and surveillance “system of systems” planned for the battlefield. Information obtained through GUARDRAIL will be combined at all levels to quickly answer critical questions.

Since 1997, multi-environment, multi-dimensional global force projection has driven GR/CS development. The Army has laid the groundwork for a follow-on, fixed-wing tactical reconnaissance system to replace both the GUARDRAIL/Common Sensor and the Airborne Reconnaissance Low. It is called the Aerial Common Sensor (ACS). The Army first conducted an Analysis of Alternatives and Threat Study. Initial contract activity began with technical studies in FY00, followed by a downselect to an integration contractor. A Milestone I decision was funded in 1998 at US\$3

million. The new aircraft will combine the signals/electronic intelligence capability of GUARDRAIL with the imagery capabilities of the ARL aircraft. Hopes are for the new aircraft to achieve IOC by 2005 and be fully operational by 2007. Battlefield SIGINT and other electronic combat improvements are needed to match the plans for the future Objective Force.

The new platform will fully comply with Joint Airborne SIGINT Architecture standards, instead of having to be backfitted with new hardware and software. A Mini-IPF and full interconnectivity of intelligence and command assets are part of the plan, so that the entire battlefield intelligence supersystem will share data across the board. A Direct Air-to-Satellite Relay (DASR) will give the system unlimited global range in providing time-sensitive targeting and situational awareness intelligence. Global Hawk UAVs are being

considered for future battlefield SIGINT collection. The Air Force is trying to find ways to accelerate the fielding of current and new versions of the UAV.

The contract for anti-terrorism upgrades has accelerated interest in the GR/CS system. Because of interest in homeland defense and fighting terrorism, a good funding flow through the near term can be ensured. Some of the enhancements will become part of the ACS system.

An active spare and repair parts market to support fielded systems will continue, and upgrades to the GUARDRAIL/Common Sensor, and especially to GUARDRAIL 2000, are ongoing. In Europe, locally produced equipment competes with any potential FMS procurement. Licensing of the advanced GUARDRAIL technology through FMS is doubtful.

Ten-Year Outlook

No further production. Upgrades planned.

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