

# RC-12 GUARDRAIL

## Roles and Missions

**Mission Overview.** The IMPROVED GUARDRAIL V (IGRV) and the GUARDRAIL/Common Sensor (GR/CS) systems are remotely controlled, airborne COMINT/SIGINT collection and location systems with ground based processing, analysis, and reporting capabilities.

GR/CS is a Corps level tactical Airborne Collection asset, which supports EAC, Corps, Division, Joint Land Force Component Commanders and Peacetime Aerial Reconnaissance Programs. GR/CS is found in the MI Bn (Aerial Exploitation) of the Corps MI Bde. Concept of operations is to fly two (2) or three (3) aircraft, (three is desirable for the best coverage and technical performance), in a coordinated fashion over a corps front. Each aircraft is remotely linked to an Integrated Processing Facility (IPF) on the ground. All operators are located in the IPF. Ground personnel remotely task, tune, and direct the airborne sensor suite. Near real time reaction and re-tasking based on current intelligence information is routine.

Corps tasking is generated by the Technical Control and Analysis Element (TCAE) following an analysis of all corps related intelligence and mission directives. Corps tasking is passed to the unit by one of the Ground Processing communications interfaces and will normally include general taskings such as "look for any type of tactical units," and some specific taskings which include "tips" on specific requirements. The MI Bn (AEB) S2 receives the TCAE tasking which is implemented by the GR/CS mission manager into a System Mission Plan. This plan puts the Tasking Directive into technical and system related activities such as; frequency coverage, scan plans, receiver assignments, signal recognition tips, high priority emitter lists, and flight profile and tracks. Mission analysts and the System TCO react during a mission to high priority locations, emitters and unit designation by generating and transmitting TACELINT and TACREP reports to the users.

**System Configuration.** There are five generations of the IGRV/GRCS systems and four versions of GR/CS aircraft currently in service. They are distributed as follows, including GR/CS System 2 currently scheduled for fielding 2QTR FY99:

<b>SYSTEM</b>	<b>AIRCRAFT</b>	<b>QUANTITY</b>	<b>NOTES</b>
Improved GUARDRAIL V (IGRV) (III Corps)	RC-12D	6	
GUARDRAIL Common Sensor (GRCS) System #3 (ROK)	RC-12H	6	
GUARDRAIL Common Sensor (GRCS) System #4 (V Corps)	RC-12K	8	
GUARDRAIL Common Sensor (GRCS) System #1 (XVIII Abn Corps)	RC-12N	9	
GUARDRAIL Common Sensor (GRCS) System #2 (Fielding 2 QTR F99 to III Corps)	RC-12P RC-12Q	9 3	To Be fielded with System #2

The IGRV and GRCS aircraft provide various levels of capability. Capabilities have increased with each subsequent fielding of a new generation of aircraft and related ground equipment:

<b>AIRCRAFT</b>	<b>COMINT</b>	<b>ELINT</b>	<b>Intercept</b>	<b>DF</b>	<b>Precision Targeting</b>	<b>Multi-Ship Geo-location</b>
RC-12D	Y	N	COMINT ONLY	COMINT ONLY	N	Y
RC-12H	Y	Y*	Y	Y	Y**	Y
RC-12K	Y	Y	Y	Y	Y	Y
RC-12N	Y	Y	Y	Y	Y	Y
RC-12P	Y	Y	Y	Y	Y	Y
RC-12Q	Y	Y	Y	Y	Y	Y

\* Limited - Only 2 Aircraft sets of equipment

\*\* Limited - 4 Aircraft sets of Engineering Development Model Hardware

The RC-12D/H aircraft in the IGRV and GR/CS (-) provide organic COMINT, ELINT (2 aircraft), precision targeting (4 aircraft) collection for Army Corps. The RC-12D/H is a standoff platform with a five hour mission duration. Missions include COMINT intercept and DF of tactical radios for intelligence and targeting. Missions normally fly 2 aircraft to rapidly provide targetable geo-locations of communications emitters.

Operating Altitude: 28,000 (RC-12H) ft ceiling, 31,000 (RC-12D)  
Speed: operates at 200kts true airspeed, cruises at 260kts  
Endurance: 5 Hours  
Range: max range 1200 nautical miles  
Operating radius: approximately 180 miles between tethered aircraft and IPF  
Gross Weight: (RC-12D) 14,200 lbs  
(RC-12H) 15,000 lbs

The RC-12K/N/P/Q aircraft of Guardrail/Common Sensor provides organic SIGINT and precision targeting for an Army Corps. It also has COMINT and ELINT intercept/DF of tactical radios for intelligence and targeting for Army Corps and echelons above corps.

Operating Altitude:	35,000 feet max
Speed:	operates at 200kts true airspeed, cruises at 260kts
Endurance:	4.5 – 5.5 hours
Range	max range 1400 nautical miles
Operating radius	approximately 180 miles between tethered aircraft and IPF
Gross Weight:	(RC-12K) 16,000 lbs (RC-12N) 16,200 lbs (RC-12P,Q) 16,500 lbs

**Description of Operations.** In its various configurations, the RC-12 accommodates a crew of two and has an operational endurance of approximately 5.5 hours. Missions are normally conducted with up to 3 aircraft flying in orchestrated patterns to achieve precision geo-location results. The maximum cruising speed of the aircraft is 265 knots (305 mph) at 14,000 feet and maximum takeoff weight.

A system consists of an Integrated Processing Facility (IPF) consisting of 4 each 40 ft vans, 6 to 12 Airborne Relay Facilities (ARFs), an Auxiliary Ground Equipment (AGE) test van, 3 Interoperable Data Links (IDLs), a power distribution system, and associated ground support equipment.

GR/CS System #1 can operate in either direct tethered mode or ground tethered satellite remote mode (COMINT and ELINT). GR/CS system #2, which is currently in production, will add the extended direct tethered and direct aircraft-to-satellite remote modes of operation (COMINT, ELINT and CHALS-X) as well as single aircraft untethered mode. Both System 1 and System 2 can be deployed in a two van configuration by C-130 aircraft.

The GR/CS Systems are under the administrative authority of the MI Aerial Exploitation Battalions (AEBs). The four GUARDRAIL Integrated Processing Facilities (IPFs) are located at:

III Corps, Fort Hood, Texas (IGRV)

V Corps, Split based Taszar, Hungary/Wiesbaden, Germany

INSCOM, Camp Humphrey's, Korea (GRCS(-))

XVIII ABN Corps, Savannah, GA

### **System Characteristics**

**Platform.** The RC-12 fleet of aircraft enabled the Army to phase out the old RU-21 model aircraft used with previous generations of GUARDRAIL systems. Initial deliveries of RC-12 aircraft currently in use by the GR/CS systems began with the conversion of 13 RC-12D aircraft in 1983. In 1988, the RC-12H with an increased maximum takeoff weight of 15,000 lbs entered the fleet. In 1990, nine RC-12K aircraft were delivered with improvements including a large cargo door, PT6A-67 turboprops, oversized landing gear, and takeoff weight of 16,000 lbs. Fifteen RC-12N aircraft were delivered in 1994. Nine RC-12P and three RC-12Q aircraft are scheduled for delivery 2QTR FY99.

The IGRV saw the transition to a pressurized aircraft for higher altitude/longer duration missions, improvements in the INS capability, and the adoption of the Interoperable Data Link (IDL) in support of interoperability. The interoperable link originated as a wide band microwave link designed for the Air Force.

**Sensors.** The Guardrail family of systems dates back to 1971 with QRC procurement of the first Guardrail system. Subsequent systems deployments each provided increased capability and ease of use through enhanced automation and computing power.

GR/CS integrates the basic IGR V system with the Advanced Quick Look (AQL) ELINT intercept/precision location subsystem and the Communications High Accuracy Airborne Locations System (CHAALS), as part of a planned evolution to the Army's Aerial Common Sensor (ACS) aircraft and the JASS hi-band and low-band system.

GR/CS has a full compliment of Signal Intelligence (SIGINT) collection subsystems, for the passive intercept, copy and location of both Communication (COMINT) emitters and non-communication, (ELINT) emitters. It has the capability, through the use of Differential Doppler and Time of Arrival techniques, to provide precision geo-location of both COMINT and ELINT signals. GR/CS has a GPS interface for accurate aircraft location and precise system timing. Operation is normally with multiple aircraft linked via either microwave line of site data link or through satellite relay to a mobile operator processing facility.

**Ground/Surface Systems.** The GR/CS Integrated Processing Facility (IPF) provides the control, data processing for COMINT, CHAALS and AQL capabilities and message preparation for distribution in support of U.S. Army Corps commanders.

IGRV improvements included operator stations equipped with color graphics terminals, expanded frequency coverage of intercept and DF, and a significant upgrade in software was provided to make all the positions capable of doing any authorized computer related responsibility. A greater degree of signal collection automation was made possible by the integration of Fast DF and SCARS subsystems. A more sophisticated message file was added for interactive report generation.

Ground equipment includes (4) operator vans, maintenance facilities, equipment and parts vans, airfield preflight facility, and satellite relay facility are transported via road, sea or air transport. Air transport requires C-5, C-141 and C-130 aircraft. The new versions of the GR/CS (System 1 and System 2) can be totally transported using C-130 type aircraft.

**Data Links/Communications.** GR/CS uses the Interoperable Data Link (IDL) which is common and interoperable with other services collection platforms. Link capacity is 10.7 MB on the down link and 200 KB, command or up link. The link can operate in either channelized or demand driven mode while in the Ku band. There also exists an X band capability to communicate with other services. Variants of the common data link also provide remote satellite capability, either through ground to satellite or direct air to satellite.

Multi-role data link (MRDL) equipment includes the Modular Interoperable Surface Terminal (MIST), the GUARDRAIL Dual Data Link (GDDL), and Portable Ground Support Equipment (PGSE). Operating in the Ku band, the GDDL provides an air-to-air and air-to-ground mode. The MRDL is backwards compatible with previous versions of deployed GR/CS and other service X band datalink systems. MRDL can transmit data to the ground station at 10.71, 137, or 274 Mbps or air-to-air at 10.71 Mbps.

GR/CS System #2 is being developed within the Common Data Link (CDL) program. It will be both a Class I, tethered and a Class V, regional Extended Tether link and will be interoperable with other CDL program links.

The MRDL link is a CDL link and represents an Army development to increase the common usage and interoperability aspects of GR/CS systems. The MRDL is a combination of existing CDL common modules and new modules developed specifically for the Army. The surface terminal is a CDL configuration, however, the software has been modified to permit the operation of three simultaneous links. Also of note is the repackaging and productization of the CDL surface communication element equipment to be placed onboard the master relay aircraft and in a HMMWV Repeater System. The GR/CS system #2 is an example of programs tailoring CDL equipment to meet specific operational needs.

The Direct Air-To-Satellite Relay (DASR) will provide an Extended Tether operation capability, remoted directly from an airborne satellite terminal in one of the GR/CS system #2 mission aircraft. This aircraft is referred to as the DASR aircraft and will be the Master of the air-to-air operation (Extended Tether). The use of the DASR capability will drastically reduce the fielding costs as well as decrease deployment reaction time of the GR/CS system.

GR/CS has an integrated communications suite that facilitates both collateral and SCI dissemination of collection results. Communication capabilities include AUTODIN, MSE, CTT/JTT, and secure fax. TRIXS, provides near real time reporting to tactical

field terminals. GR/CS has reporting interface with the Tactical Information Broadcast Service, TIBS, TADIXS-B, and the TRAP network.

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