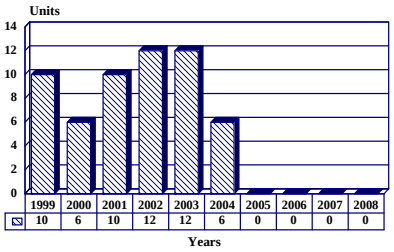
# CHALS-X -Archived 07/2000

## Outlook

- Precision direction-finding system for location of High Value Targets through triangulation
- In production for Advanced QUICK FIX and GBCS-L/H
- Rework of IEWCS effort may change some GBCS plans

10 Year Unit Production Forecast
1999 - 2008




## Orientation

Description. CHALS-X is the Communications High Accuracy Location Sub-System - Exploitable SIGINT DF and targeting system.

Sponsor

US Army
Army Communications-Electronics Command (CECOM)
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Status. In production, Block 1 upgrade in EMD.

Total Produced. Through 1998, an estimated 56 units had been produced.

Application. CHALS-X provides commanders with precise location information on High Value Targets. It will be carried by the EH-60A Advanced QUICK FIX and Guardrail Common Sensor (GR/CS) aircraft. It was also to be installed in the Ground Based Common Sensor-Light/Heavy (GBCS-L/H).

Price Range. Unit cost is estimated to be US$3.6 million, with some variance depending on installation and ancillary requirements.

## Technical Data

| | Metric | US |
|---|---|---|
| **Dimensions** | | |
| Width: | 48.2 cm | 19 in |
| Volume: | 0.28 m | 10 ft |

| | | |
|---|---|---|
| Weight | | |
| CHALS-X: | 68 kg | 150 lb |
| Block 1: | 23.6 kg | 52 lb |
| Units: | Receiver | |
| | Processor | |

Design Features. CHALS-X is a continuation of the CHALS precision location subsystem currently carried by the Guardrail Common Sensor (GR/CS) aircraft 4 and 1. The CHALS-X is design reduced the size and weight of the sensor package significantly, while increasing performance. It consists of two units, a receiver and processor, each designed for mounting in a standard 19 inch rack and weighing, approximately 75 pounds each.

It was designed for integration into numerous platforms and obtains precision locations using Time Difference of Arrival/Differential Doppler techniques. The system incorporates advanced electronics and a state-of-the-art, distributed processor for improved capabilities.

The CHALS-X system features increased frequency range, the ability to detect frequency-hopping radios, and a decreased size, weight, and power requirement. Three racks of computer equipment were reduced to two units which fit into a standard 19 inch mounting rack. It can be integrated with a GPS/Inertial Navigation system for increased accuracy.

An improved Block 1 CHALS-X will feature open system architecture with adaptable signal processing capacity, built in growth and flexibility, small size and low weight, low power, conventional and LPI signal capability, full frequency coverage of the existing system, and full compatibility with existing systems. The improved subsystem will be based on technological advances made during the development of CHALS-X and on the repackaging of the units currently in production.

Operational Characteristics. The CHALS-X system provides commanders with the targeting capability they need to locate and destroy the enemy by providing precise location information on High Value Targets (HVTs). CHALS-X will be deployed with both airborne and ground-based systems and capable of locating enemy weapon systems and units by detecting and locating their radio transmissions, regardless of whether or not they are using conventional or advanced radios.

The system provides target location information with sufficient accuracy for first-round fire-for-effect by organic artillery. By using the very accurate angle-of-arrival information combined with GPS location, a near-pinpoint target location can be derived through triangulation of multiple CHALS-X inputs. This gives the targeting accuracy needed for effective first-shot fires.

## Variants/Upgrades

There are no variants identified at this time. A program of upgrades is planned.

Block 1 Improvements. The improvements include expanded Low Probability of Intercept (LPI) performance, multiple dwell collection and processing capability and a tunable signal processing capability. The improved subsystem will feature substantial reduction in size, weight, and power requirement characteristics, while retaining the performance capabilities of the existing CHALS-X as well as compatibility and interoperability with the existing system.

The improved CHALS-X is planned to be deployable on ground-based, ocean-based, and airborne platforms, as well as in a manpack configuration.

CHALS-X(M). A miniaturized version.

Aerial Common Sensor. The Army plans 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 compatibilities 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 best features of GR/CS and ARL on a single airframe and provide multiple-intelligence su-systems 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.

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 CHALS-X requirement was included in the Guardrail Common Sensor (GR/CS) JSOR (Joint Statement of Requirement) in May 1984. The first contracting records available are for a US$2.9 million contract to (then) IBM System Integration Division in June 1990. There was a follow-up contract in July 1991 for US$6.5 million.

On November 5, 1991, the Army announced a basic sole source contract to IBM for 12 units, including contract options, to be procured for the Guardrail Common Sensor. On November 26, a contract modification for US$31.8 million was awarded. In February 1992, the contract was modified to include a basic quantity of 12, with an option for 12 units.

In February 1993, a contract was awarded to integrate CHALS-X into the Guardrail Common Sensor. The award was for US$5.3 million.

On January 18, 1994, the Army published a notice that it was seeking sources for Block I improvements to CHALS-X. The upgrades would include a variety of performance enhancements and result in a significantly smaller system. It would be deployable on airborne, ground and seaborne platforms and be interoperable with current CHALS-X systems. The government requirement would be for eight full EMD units plus spares, software and data to be delivered no later than 24 months after contract award. The government intended to issue this requirement on a sole-source basis to IBM, Owego, New York (now Lockheed Martin Tactical Systems) if no other capable and responsible sources were identified.

In a July 1994 release, the Army announced a requirement for up to 16 additional CHALS-X units. In August, the Army announced plans for a second production of approximately 55 CHALS-X subsystems. The release indicated there would be three additional options to cover production in 1997, 1998 and 1999.

In a DoD contract award on November 14, 1995, the Army awarded to Loral Federal Systems an increment (appropriate number and dollar value would be issued with each delivery order) as part of an estimated not-to-exceed US$276.5 million firm fixed price, build-to-model acquisition contract for the production and fielding of the Intelligence Electronic Warfare Common Sensor (IEWCS) systems. This includes the production and integration of IEWCS tactical platforms; the Ground Based Common Sensor - Light (GBCS-L) a lightweight ground-based system; and Advanced QUICK FIX (AQF), the heliborne version.

Production of sophisticated sensors for the platforms was included. One is the MSR-3 signal data acquisition system (TACJAM-A) and the other the production of the CHALS-X. The GBCS-L is mounted on the High Mobility Multi-Wheeled Vehicle (HMMWV) utilized by the Army's light divisions. The AQF is mounted in a modified EH-60 Black Hawk helicopter used by the Army's Air Cavalry and Air Assault Divisions.

These assets will provide tactical commanders the ability to identify, determine the intentions of and precisely locate enemy forces by utilizing state-of-the-art technology to electronically map the battlefield. When deployed, these systems will be able to meet the projected threat out to the year 2005.

PE#0604270A - Electronic Warfare Development, DL12: Signals Warfare Development. This project provides for development and test of the Intelligence and Electronic Warfare Common Sensor subsystems:

In FY94, the Army coded and tested the CHALS-X frequency-hopping software. This effort was funded at US$3.4 million.

FY95 plans were to complete, integrate and test the frequency hopping software, at a cost of US$3 million. This software would be integrated into the Guardrail Common Sensor Block I operational capabilities expansion.

Also included in the program element was the November 14, 1995, contract increment to Loral Federal Systems discussed above. Sensor (IEWCS) Systems.

GAO Report - Electronic Warfare: Test Results Do Not Support Buying More Common Sensor Systems (Letter Report, 03/24/98, GAO/NSIAD-98-3). The GAO conducted a follow-up review of the Intelligence and Electronic Warfare Common Sensor (IEWCS) program, focusing on whether results of testing conducted since its previous review supported continued IEWCS production.

GAO noted that the test results did not support continued IEWCS production. The report said that the Army had postponed operational testing scheduled for

FY97, a test that was to demonstrate IEWCS operational effectiveness and suitability in a realistic combat environment. The Army replaced operational testing with less rigorous developmental testing, which showed that the system had serious hardware and software problems. In addition, FY96 tests of IEWCS on a Marine Corps vehicle showed that the Marine Corps' IEWCS prototype also had serious problems, including inaccurately identifying the direction to hostile communication systems by as much as 100 degrees. Although the Army planned to conduct additional research and development work on IEWCS, in the interim, it still intends to contract for five more systems while trying to correct the problems. The GAO finally pointed out that despite the IEWCS system's many problems, the Marine Corps joined with the Army and is procuring two IEWCS systems.

Because of the Army's plan to contract for five more IEWCS systems without demonstrating that the known deficiencies have been corrected, the GAO recommended that the Secretary of Defense direct the Secretary of the Army to delay contracting for additional IEWCS systems until operational testing demonstrates that the system's problems are fixed.

The DoD concurred with the report. According to DoD, the Army has revised its plans and taken steps to reduce the technical problems cited. Furthermore, DoD stated that the Army has adjusted the program's schedule to ensure that no further procurement decisions will be made without supporting operational test results.

Prophet (Restructured IEWCS) May Impact CHALS-X. When the Army published Program Budget Decision No. 290 on Army C4 programs, the Ground Based Common Sensor was significantly impacted. Due to problems with achieving a level of maturity and reliability necessary to begin operational testing, IEWCS program managers deferred five Initial Operational Test and Evaluations (IOT&Es) planned between 1994 and 1998. The Army decided at the May 1998 operational test readiness review to downscope the 1998 IOT&E to a combined Development Test/ Operation Test (DT/OT) and restructure the IEWCS program. The Army renamed the restructured IEWCS program Prophet, with a Milestone III production decision moved to the first quarter FY03.

As now envisioned, Prophet is to be a division-level Signals Intelligence (SIGINT) system. Its primary mission will be to electronically map radio frequency emitters on the battlefield. The Army identified US$5.5 million of the US$16.4 million in FY99 RDT&E as funds to initiate Prophet in FY99. The Army announced no plans for the remaining FY99 resources.

These changes impacted the GBCS and AQF systems, although the exact impact these changes will have on CHALS-X efforts was not spelled out. In all likelihood, some of the installations planned will be delayed as the carrying platforms are pushed out in the restructured programs. A Milestone III decision on Prophet was planned for 1Q FY03. There have been no announcements about the impact this may have on GR/CS.

# Funding

**US FUNDING**

| | FY97 | | FY98 | | FY99 | | FY00(Req) | |
|---|---|---|---|---|---|---|---|---|
| | QTY | AMT | QTY | AMT | QTY | AMT | QTY | AMT |
| RDT&E (USA) | | | | | | | | |
| PE#0604270A EW Development | | | | | | | | |
| DL12 Signals Warfare | | | | | | | | |
| Develop. Total | - | 15.7 | - | 28.1 | - | 20.4 | - | 8.7 |

NOTE: National Security Agency Program Element 030885G, Tactical Cryptologic Activities, provides some funding for these efforts. Army Program Budget Decision No. 209 will probably have significant impact on this project when it is rewritten to include the Prophet program.

All US$ are in millions.

## Recent Contracts

(Contracts over $5 million)

| Contractor | Award ($ millions) | Date/Description |
|---|---|---|
| Loral (LMCo) | 29.5 | Dec 1995 – Production and integration of IEWCS platforms, production of TACJAM-A, production of CHALS-X, along with production and integration of the GBCS-L/H, and Advanced QUICK FIX. (DAAB10-96-D-Q002) |
| Lockheed Martin | 9.0 | Mar 1999 – CPFF and materials/FFP contract (appropriation number and dollar value issues with each delivery order) with not-to-exceed total of $29 million. Provide engineering and logistics support services for upgrades, improvements and repairs along with associated testing of the following CHALS products: CHALS-X, CHALS-X(M) [miniaturized], CHALS RDL [Remote Data Link], and future CHALS hardware versions. To be completed Mar 2004. (DAAB07-99-D-L353) |

## Timetable

| Month | Year | Major Development |
|---|---|---|
| May | 1984 | GR/CS JSOR requirements document |
| Dec | 1990 | CPFF for three prototype CHALS-X units |
| 1Q | FY95 | LPU start |
| 2Q | FY96 | GRCS EMD unit production end |
| 3Q | FY96 | LPU complete |
| 4Q | FY96 | End EMD |
| 1Q | FY97 | FSD start |
| 4Q | FY98 | IOT&E on GBCS-L |
| Nov | 1998 | PBD No. 209 released, changing Army $C^4$ programs |
| 1Q | FY03 | Prophet program (replaces IEWCS) Milestone III decision |

## Worldwide Distribution

This is currently a **US** only program.

## Forecast Rationale

Electronic combat and battlefield digitization has become the Army's top priority and a driving force in equipment and tactics development. Exercises and combat experience revealed the need for an aggressive approach to develop capabilities for operations on an increasingly sophisticated battlefield of the future. The Army's Force XXI as exercised in the Advanced Warfighting Experiment at the National Training Center in March 1997 is indicative of how the US will be fighting in the future, and how planners expect hostile forces to be fighting as well.

Developing the US electronic battlefield of the future has supported and encouraged the development of equipment and tactics to counter a foe's likely communications developments, so acquisition of advanced weapons and communications equipment is increasing, with an emphasis on quality, not just quantity. As forces become more dependent on sophisticated communications, a natural result is to develop a way to use this to a commander's tactical advantage. CHALS-X is one result of this planning. By using the sensor to accurately pinpoint forces, commanders will be able to

call down artillery and other fires quickly and accurately. Advances in technology and processing capability make this accuracy possible.

The interconnectivity of assets and the ability to interface with other developing information systems coming to the battlefield will be important in ensuring that the Army has an electronic warfare capability suitable to future combat. Standardization will reduce the cost and complexity of logistics support – an important consideration as defense budgets are reduced.

The Force XXI strategy emphasizes forces that are numerically smaller but technologically superior, versatile, deployable, and lethal. IEWCS (which is being replaced by the Prophet program), plans to combine several newly developed sensors and EC assets and help the Army meet its tactical needs with less equipment. The award of the IEWCS build-to-model acquisition contract was to move the entire effort, and therefore the individual projects, into final integration and production. Testing showed that IEWCS plans were overly optimistic and had not matured to the point necessary to meet the needs of the battlefield. The Army decided to call an all-halt

The forecast was adjusted to reflect likely delays in GBCS-H/L because of the testing problems identified by the GAO. Some further changes are possible, but their extent is not known at this time. A major change to CHALS-X is not expected as a result of the Army's new program plans.

# Ten-Year Outlook

**ESTIMATED CALENDAR YEAR PRODUCTION**

| | | | High Confidence Level | | | | Good Confidence Level | | | | Speculative | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Designation** | **Application** | **thru 98** | **99** | **00** | **01** | **02** | **03** | **04** | **05** | **06** | **07** | **08** | **Total 99-08** |
| CHALS-X | AQF, GBCS-L/H | 65 | 10 | 6 | 10 | 12 | 12 | 6 | 0 | 0 | 0 | 0 | 56 |

Note: Production includes prototypes.