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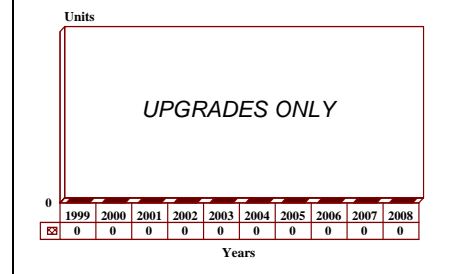
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ALQ-151(V) (Advanced QUICK FIX) - Archived 4/2000

Outlook

- QUICK FIX production complete; in service; ongoing logistics support
- Upgrades to Advanced QUICK FIX EMD
- Budget re-work will change program

10 Year Unit Production Forecast
 1999-2008



Orientation

Description. Airborne communications and signals intercept, precision direction-finding, and active countermeasures (jamming) system. Advanced QUICK FIX exploits COMINT and ELINT against Low Probability of Intercept and conventional signals.

Sponsor

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 (Advanced QUICK FIX)

Status. QUICK FIX is in service and out of production, with logistics support ongoing. Advanced QUICK FIX is in EMD, an LRIP contract for the upgrades has been awarded; but budget decisions re-vamping the program..

Total Produced. An estimated 14 QUICK FIX I and 66 QUICK FIX II systems have been produced.

Application. EH-1H (QUICK FIX I), EH-60A (QUICK FIX II), and EH-60U (Advanced QUICK FIX) helicopters.

Price Range. Unit cost is an estimated US\$190,000.

Technical Data

	<u>Metric</u>	<u>US</u>
Dimensions		
Weight:	7,491 kg	16,500 lb
Altitude limit:	3,300 m	10,000 ft
Characteristics		
Frequency range:	HF/VHF (2 to 76 MHz)	
Coverage:	Line-of-sight	
Signal types:	AM, FM, CW, SSB	
Bandwidth:	8 kHz, 30 kHz, 50 kHz	
Input sensitivity:	-110 dB nominal	
Power output:	40 to 150 W	
Time on Station:	4.8 hours	

Design Features. The ALQ-151(V) is an HF/VHF command, control and communications ECM set carried by Army helicopters. Both the ALQ-151(V) and the carrier aircraft are referred to by the code name QUICK FIX. The QUICK FIX program converts the UH-1 into the EH-1H and the UH-60 Black Hawk into the EH-60A.

The system is distinguished by four dipole antennas mounted on either side of the rear fuselage and a deployable whip antenna beneath the helicopter. It consists of six major subsystems:

- DF unit
- Power system
- ECM suite
- Intercept receiver
- Communication system
- Computer/Navigation components

The jammer was designed to be compatible with Airborne Survivability Equipment (ASE), allowing the use of both systems on the same platform.

Advanced QUICK FIX (AQF) will be an integral part of the Army's Intelligence and Electronic Warfare Common Sensor (IEWCS) under development, requiring interface and data link upgrades. The upgrades are a materiel change to the existing heliborne QUICK FIX communications intercept, collection, processing, direction finding, and jamming system and will be deployed to Army Divisions and Armored Cavalry Regiments. It is considered an evolutionary, open-architecture design.

Configured in a Black Hawk Helicopter (EH-60L), QUICK FIX provides the moving platform necessary to use Differential Doppler technology to achieve location accuracies sufficient for "steel on target" requirements, as well as for the extension of the Line of Sight (LOS)

for greater range and coverage of signals intercept and C2 jamming targets. The incorporation of an advanced suite of self-protection equipment enables Advanced QUICK FIX to overfly enemy territory and thus provide an electronic overwatch of the commander's entire area of interest.

Operational Characteristics. QUICK FIX is capable of direction-finding as well as intercept and jamming command and control communications. The ALQ-151(V)2 can also perform communications surveillance, providing real-time intelligence and combat information to the field commander. The system is used to search for, intercept, record, locate, report on and jam radio signals. It is interoperable with the TRAILBLAZER in a netted configuration for direction-finding purposes.

The EH-1 can intercept and jam radio communications, and the EH-60A with the ALQ-151(V)2 can also locate communication transmitters. QUICK FIX helicopters are organic to division, separate brigade, and armored cavalry regiments. Three helicopters are deployed with each division support company and two with each brigade support company.

The ALQ-151(V) can interface with other Army helicopters and fixed-wing aircraft via a secure air-to-air data link. The system also interfaces with a division's support company through an ARC-164 UHF radio.

The operational concept for the Advanced QUICK FIX is to have from two to 16 platforms linked as an integrated set. Each division would have about four EH-60s. The helicopter will extend the line-of-sight for the system. Advanced QUICK FIX and the Ground Based Common Sensor will replace the current suite of divisional equipment. The technology used for AQF will make it possible to operate against Low Probability

of Intercept signals. It will interoperate with the Ground Based Common Sensor-Light and -Heavy.

Variants/Upgrades

ALQ-151(V)1. This is the QUICK FIX I version of the system.

ALQ-151(V)2. This is the QUICK FIX II variant, with an electronic intelligence gathering capability. It is installed on the EH-60A helicopter which also incorporates portions of the TLQ-17A(V)2 jammer and other

ESM equipment, along with secure voice and data link communications systems.

Advanced QUICK FIX. Block improvements to the ALQ-151(V)2 QUICK FIX II evolving into the Advanced QUICK FIX COMINT/ELINT SYSTEM. It is the airborne component of the Intelligence and Electronic Warfare Common Sensor (IEWCS).

Program Review

Background. The QUICK FIX I system was developed in the mid-seventies by ESL Inc for the US Army. The ALQ-151 was designed to detect, intercept and jam enemy communications. In 1984, a production contract for 56 systems was awarded to Tracor Aerospace. The basis for the ALQ-151 QUICK FIX II was the TLQ-17A TRAFFIC JAM system, a medium-powered, ground-based communications countermeasures system. The last EH-60A was delivered in 1989.

In FY91, the Army awarded the IEWCS (GBCS-L, GBCS-H and Advanced QUICK FIX) EMD contract. This continued through FY92.

FY93 accomplishments included continuation of the GBCS/AQF Integration effort at a cost of US\$36.819 million. The program office delivered the final two EH-60A platforms for integration.

In January 1993, the Army released its *Modernization Plan*, a 17-volume document that laid out the Army's plan for reshaping and re-equipping its forces for the future battlefield. Annex I highlighted the Army's plan for Intelligence and Electronic Warfare (IEW) and how it will support the Army's five modernization objectives and the Vision of LAND FORCE DOMINANCE. The IEW Annex outlined the details and rationale for the major programs that would be key to achieving the Modernization Vision. These efforts will support:

- Winning the Information War
- Protecting the Force
- Conducting Precision Strikes
- Dominating the Maneuver Battle

Based on lessons learned in Operation Desert Shield/Desert Storm, the Army found that the IEW force lacked versatility and balance. Processing and communications capabilities were inadequate, and deployability was limited. The sensor technology in use

is 15 to 25 years old and does not have the needed frequency range and precise targeting capability, and cannot exploit modern modulation techniques. The platforms are also very support/maintenance intensive.

The Army Intelligence and Electronic Warfare Modernization Plan provided a coherent force modernization strategy for developing, acquiring and fielding IEW forces and material. It is a major foundation of planning for Force XXI and the Army After Next, the "digitized" Army of the future.

The plan is evolutionary and incremental, cost effectively transitioning from single-mission systems on multiple carriers to multi-mission systems that are as survivable and mobile as the forces they will support. An open architecture will allow incorporating new technology for growth. The plan and requirements have built on the lessons learned in combat during Operation Just Cause, Operation Desert Shield/Storm, and Operation Urgent Fury.

Military forces in many regions are increasing their combat capability by acquiring increasingly sophisticated weapons and communications equipment. US Forces must be prepared to face this broad array of systems and capabilities by upgrading older systems or adding new, leading edge equipment to their inventory.

Future threat forces will be able to move more rapidly and target friendly forces more accurately, and will possess better C³I equipment. To counter this, the US and allied forces must increase the technical capability of their intelligence collectors. This will make it possible for commanders to see the battlefield more deeply, completely and accurately, fusing and disseminating this information quickly.

The Modernization Strategy is focusing on long-term, "leap ahead" capabilities that will overmatch any projected threat. The goal is a smaller but technologically

superior force that is versatile, deployable and lethal. A "first to fight" capability is crucial to the plan, as is the ability to avoid protracted combat.

A "System of Systems" approach is planned with a fully integrated mix of air and ground assets. It will support heavy, light and SOF forces at all echelons. The Army will be prepared for a broad spectrum of conflict and face a wide range of perspective threats. Forces must also be prepared to participate in operations short of war, such as counterdrug, peacekeeping and humanitarian aid operations. Besides flexibility and deployability, the new systems must be interoperable with systems fielded by other agencies and services.

The open architecture will allow rapid integration of emerging technology for upgrading equipment in the future. Common, interchangeable components will improve supportability and operability.

Major improvements in EW/SIGINT capability are envisioned in the FY96 through FY99 time frame. Systems will have an open architecture and modular design. Precision and capability will be significantly improved, as will mobility, deployability, balance and supportability. The keys are the Guardrail Common Sensor, Advanced QUICK FIX, and Ground Based Common Sensors.

In the long term, FY00 and beyond, the Army plans to have design advances that outpace threat development. Technology and processing will be state-of-the-art, and mobility/deployability will have been further improved. The airborne collection fleet will have been replaced and common ground systems will anchor the battlefield capability.

In addition to the development and fielding of new systems, the Army will establish a parallel track for improvements in IEW training, to include new training and simulation hardware. An effort will also be ongoing to investigate R&D possibilities for technology advances.

Electrospace Systems was contracted to integrate the Ground Based Common Sensor-Heavy (GBCS-H), Ground Based Common Sensor-Light (GBCS-L), and Advanced QUICK FIX (AQF) systems into the Intelligence and Electronic Warfare Common Sensor (IEWCS) by late 1996. In late 1995 Loral Federal Systems was awarded the build-to-model US\$276,500,000 production contract for the IEWCS program.

In FY94, the Army spent US\$15.440 million on the continuing GBCS/AQF integration effort, including the conduct of a Special In-Process Review and Contractor Test.

The FY95 plan allocated US\$20.9 million for engineers to continue the GBCS/AQF integration effort. Plans included improving GBCS/AQF by adding the capability to intercept, process and locate pre-formatted communication signals and additional special modulations.

FY96 accomplishments included completing TACJAM-A ESM development (US\$241,000) and investing US\$7.401 million to continue GBCS/AQF integration, fielding EMD Models of GBCS and AQF systems to Task Force XXI, and improving GBCS/AQF by including other advanced communication modifications and techniques as well as advanced signal analysis and improved signal sorting parameters. Planners began integration of TACJAM-A ECM into AQF.

Also in FY96, US\$1.749 million was budgeted for an Operation Demonstration Customer Test/Development Test (OCDT) on GBCS, and US\$3.044 for high-level software design and initial hardware development. Contractor maintenance support for Task Force XXI cost US\$925,000.

The FY97 plan included US\$87,000 to conduct a special in-process review (SIPR) on AQF ECM, and US\$4.622 million to continue GBCS/AQF improvements to allow advanced digital modulations and techniques and remote collection techniques and to finish ECM subsystem integration into AQF and begin integration into GBCS-L and GBCS-H of product improvements resulting from Task Force XXI. US\$6.9 million would be used for GBCS-L/AQF software fixes. US\$1.106 million was budgeted for conducting training and providing contractor depot repair in support of Initial Operational Test and Evaluation (IOT&E) for GBCS-L. US\$1.702 million was allocated for contractor maintenance support for Task Force XXI and US\$1.9 million went to ADEXJAM incremental efforts. US\$378,000 was set aside for Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR).

FY98 plans budgeted US\$2.996 million to begin integration of ECM subsystem into GBCS-L and GBCS-H, and US\$1.367 million to complete the signal analyzer upgrade and provide for production line cutover. US\$4.289 million was budgeted to start GBCS/AQF pre-planned product improvement (P³I), to continue

work on advanced digital modulations, the reconfigurable tuner, co-channel analysis, the analog-to-digital converter, improved signal analysis, and enhanced sorting parameters capability, and to improve HF tuners. US\$2.945 million was planned for GBCS-H and AQF OCDT.

US\$1.629 million was budgeted for training and providing contractor depot repair in support of IOT&E for GBCS-H and AQF. Conducting Milestone III for GBCS-H and AQF would cost US\$318,000, and US\$186,000 has been set aside to complete IOT&E on GBCS-L. GBCS-L Milestone III was budgeted at US\$144,000.

Program Budget Decision No. 290 on Army C4 Program

Army — IEW Ground Based Common Sensor/Electronic Warfare Development (PE#0604270A, BA 5)

(TOA, Dollars in Millions)	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>
Service Estimate			
IEW Ground Based Sensor (OPA)	US\$12.1	–	–
RDT&E, A (PE 0604270A, BA 5)	US\$16.4	US\$38.6	US\$55.5
Alternative Estimate	–	US\$27.5	–

The Army's Intelligence Electronic Warfare Common Sensor (IEWCS) system is intended to modernize the Army's signals intelligence equipment at the division level. Due to problems with development and achieving a level of maturity and reliability necessary to enter operational testing, the IEWCS program managers deferred five Initial Operational Test and Evaluation (IOT&E) planned for 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 1st quarter FY 2003.

As now envisioned, PROPHET is to be a division-level Signals Intelligence (SIGINT) system. Its primary mission is to electronically map radio frequency emitters on the battlefield. The Army budget includes US\$38.6 million in FY00 and US\$55.5 million in FY01 in RDT&E, A funds for PROPHET. In addition, US\$28.5 million is available in FY99 for IEWCS/PROPHET. To date, the Army has identified US\$5.5 million of the US\$16.4 million in FY99 RDT&E, A funds to initiate PROPHET in FY99. The Army has no current plan for the remaining FY99 resources.

The details of the PROPHET Program were not articulated with any degree of specificity in the Army's FY00 Budget Estimate Submission (BES) or in subsequent information the Army provided. In fact, "PROPHET" is not referenced in the FY00 BES. The draft Operational Requirement Document (ORD) for PROPHET was coordinated within the Army and completed in January 1999. As a SIGINT program,

PROPHET must be in compliance with the Joint Airborne SIGINT Architecture (JASA). The JASA determines the system architecture (i. e., designates the protocol, hardware, software, system interfaces, etc.). The Army has earmarked US\$1.7 million in the FY99 RDT&E, A budget for the JASA compliance. Eleven months are estimated for this effort (two months formulating the statement of work and revising the contract with Lockheed Martin, six months to develop the JASA itself, and three months for National Security Agency coordination). Since the Army planned to initiate the JASA effort in January 1999, the JASA for PROPHET will not be in place until 2QFY00.

The FY99/00 PROPHET requirements presented by the Army include:

FY99 Requirements (Total US\$5.460 million)

US\$300,000 to conduct Milestone II for PROPHET.

US\$2.3 million to develop communications intelligence (COMINT) subsystem.

US\$800,000 to investigate and demonstrate existing technology and COTS hardware as an alternative COMINT capability for Tactical Communications Jammer (TACJAM-A).

US\$400,000 to conduct initial technical survey of available manpack COMINT receivers in preparation of Milestone II for PROPHET.

US\$1.660 million for preliminary design of Common Remote/Reporting Architecture.

FY00 Requirements (Total US\$38.550 million).

US\$4.0 million to procure long-lead items (Advanced QUICKFIX [AQF] aircraft displays).

US\$500,000 to procure COTS manpack radios.

US\$2.5 million to procure modified CDL datalink.

US\$2.0 million to start integration of manpack radios into HWMMV.

US\$1.0 million to start antenna design for PROPHET - Ground.

US\$2.0 million to start antenna design for PROPHET - Air.

US\$6.0 million to upgrade AQF helicopters to current Black Hawk configuration.

US\$5.5 million to start TACJAM-A sub-system development (modified COTS).

US\$2.0 million to start development of a precision location capability.

US\$5.9 million to start integration of PROPHET subsystems.

US\$600,000 to procure non-developmental PROPHET Ground Control Stations.

US\$50,000 to procure SICP shelters and incorporate them on HWMMVs.

US\$3.5 million for salaries and operating expenses.

US\$3.0 million to fix legacy systems based on DT/OT results.

The alternative estimate does not recommend funding the following FY99/00 amounts for PROPHET given a realistic program start date of January 2000:

- US\$3.8 million for FY99 PROPHET (FY 1999 RDT&E, A) – Undertaking initiatives in FY99 to conduct a Milestone II, to develop COMINT sub-systems, and to investigate/demonstrate hardware as alternatives for PROPHET are premature when the Joint Airborne SIGINT Architecture (JASA) which will designate the protocol, hardware, software and interfaces will not be completed until 2nd quarter FY00.
- US\$6.0 million to upgrade AQF helicopters to current Black Hawk configuration (FY00 RDT&E, A) – Upgrading two Black Hawk helicopters to fleet standards is not a functional part of the PROPHET system itself and the Army has the option to provide a “conditional release” to fly these helicopters as needed for PROPHET. Therefore, this effort may be delayed.
- US\$5.9 million to start integration of PROPHET subsystems (FY00 RDT&E, A) – Integration of PROPHET subsystems in FY00 is premature and should be delayed to FY01 and FY02. This will

allow for a complete maturing of the various PROPHET software subsystems/data links being procured in FY00 as COTS, new development or upgrades.

In addition, the Army plans to utilize the US\$3.0 million of FY00 RDT&E, A funds for follow-on efforts related to the IEWCS legacy system. This item must be funded with the available FY99 Other Procurement, Army (OPA) funds since it is for repairs of OPA-procured items.

The net impact is a reduction of US\$27.5 million in FY00 RDT&E, A funds to the Electronic Warfare Development program. The alternative estimate offsets the recommended FY00 PROPHET program of US\$23.7 million with the FY99 RDT&E, A carryover of US\$12.6 million since the Army has not provided any rationale on the use of FY99 funds. In addition, the alternative identifies a FY99 OPA asset of US\$9.1 million available for Army reprogramming to other priorities.

(Outyear adjustments: None).

Electronic Attack Study. In December 1998, the U.S. Army CECOM, CECOM Acquisition Center, Fort Monmouth, New Jersey, announced in the *Commerce Business Daily* that it is seeking industry information on commercial off-the-shelf or non-developmental items (NDI) electronic attack systems that can support TACTICAL operations. This was the result of Program Decision No. 209 and the creation of the Prophet effort. As such, it will impact the TACJAM-A, Ground Based Common Sensor and Advanced QUICK FIX programs.

The new systems may be considered for integration into heliborne and/or ground vehicle platforms. The U.S. Army, Product Manager Signal Warfare is requesting inputs which will address specific capabilities along with detailed descriptions of any additional capabilities and features of available systems. Plans are to identify potential sources of available systems or systems that can be modified in a quick and economical fashion to meet program requirements. PM GBCS/AQF will evaluate the inputs and ability of the proposed system to jam fixed frequency, burst, and low probability of intercept signals within the VHF band (frequency extension will be a future desire) with a minimum effective radiated power of 550W out of a directional antenna, jam signals having voice and data content with various modulation, jam signals while on the move, and operate independently of any other systems.

Proposed systems would have to comply with Joint Technical Architecture-Army, Version 5.0 and be capable of operation in a tactical environment; including heat, cold, rain, fog, dust, sand, wind, shock and

vibration, explosive atmosphere, and other conditions found on the battlefield.

Funding

Funding for the system has been from EH-1 and EH-60A procurement lines with RDT&E money provided by PE#0604270A. Ongoing logistics support is from Operations and Maintenance budget lines.

Recent Contracts

No recent DoD contracts over US\$5 million have been recorded.

Timetable

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
	1974	Development begins
Late	1970s	Integration to develop the EH-1 begins
	1978	Integration with UH-60 begins
Sep	1979	First contract for EH-60 awarded
Apr	1983	YEH-60A prototype delivered
	1984	EH-1X QUICK FIX production completed
Sep	1984	QUICK FIX II production contract awarded
Jul	1987	First ALQ-151-equipped EH-60A delivered
Feb	1988	First Unit equipped
Oct	1989	Final EH-60A delivery to US Army
Mar	1990	Production completed
Jun	1990	Fielding completed
Oct	1991	Product Improvement Program initiated
Jul	1994	Development & test of Advanced QUICK FIX/GBCS completed
Mar	1995	GBCS/AQF production initiated
4Q	FY95	Integrated Customer Test
	FY95	Planned upgrades to GBCS/AQF begin
1Q	FY96	LRIP awarded
2Q	FY96	Field to Task Force XXI
3Q	FY96	GBCS-L User testing
Sep	1996	Integration completed
4Q	FY97	IOT&E start, participate in GBCS-L IOT&E
	FY98	Program Budget Decision No. 209
1Q	FY99	Originally planned Full Scale Production Awards (1Q FY00, 1Q FY01, 1Q FY02)
	FY08	Planned upgrades to GBCS/AQF to be completed

Worldwide Distribution

This is a **United States** only program.

Forecast Rationale

The Persian Gulf War let the Army evaluate most of its electronic warfare equipment in actual combat and Coalition forces were successful in exploiting and disabling the Iraqi command and control network. US Intelligence gathering relied heavily on airborne assets, but the complexity and sophistication of the available distribution networks proved that front-line assets cannot be eliminated. Electronics is the key to success on the battlefield, and the foundation of the Army's Force XXI and "The Army After Next." Electronic combat is a priority in the development of both equipment and tactics.

The high-speed ground war in the Persian Gulf showed that many older systems could not keep up with the rapid advance of the Coalition forces. Tracked vehicles suffered breakdowns and did not have the mobility or speed to keep up with the fast-moving combat forces. The planned platforms, including Advanced QUICK FIX, are being designed to be as mobile as the forces they will support.

When the Army released its Modernization Plan in early 1993, it noted that over the next decade military forces worldwide would be improving their combat capabilities. Acquisition of advanced weapons and communications equipment is increasing, and the emphasis would be on quality, not just quantity. The increased interconnectivity of available assets, and the ability to interface with other developing information systems coming to the battlefield, are important to ensuring that the Army has an electronic warfare capability suitable to future combat. Standardization

will reduce the cost and complexity of logistics support. The strategy emphasizes smaller but technologically superior forces that are versatile, deployable and lethal. The planned systems are to meet these goals by developing an advanced capability with less equipment. A series of Advanced Warfighting Experiments is validating the digitization goal. The new systems are to increase the potency of combat forces and make it possible to accomplish missions with smaller forces.

Remotely piloted vehicles are receiving significant interest as future EW assets. They will not replace the EH-60A fleet, but rather supplement its tactical capabilities. Television-equipped RPVs were valuable in the Persian Gulf; this includes the now-famous incident in which a group of Iraqi soldiers surrendered to one. By the end of the reporting period, RPVs (even with their limitations) are going to be routinely teaming up with battlefield sensors, such as QUICK FIX, in combat operations.

Production of the original hardware is complete and there is little likelihood that the original system will see significant procurement in the future. Advanced QUICK FIX upgrades will dominate the developmental efforts for this system. The major changes will be programmatic as a result of the re-vamped Prophet program. The Army is not abandoning the effort, just taking a step back and allowing planners to sort through growing problems and come up with appropriate fixes before things get totally out of hand. A key is the attempt to capitalize on COTS hardware and software.

Ten-Year Outlook

No further production is anticipated. Upgrades/enhancements planned.

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