

# ARCHIVED REPORT

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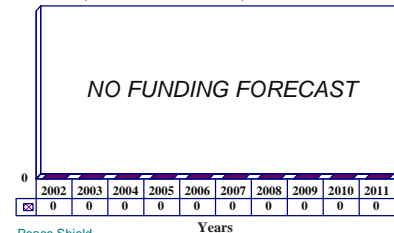
## Peace Shield - Archived 03/2003

### Outlook

- Forecast International expects current Peace Shield modernization efforts to continue at least through 2002
- Look for installation of new mission computers on the Royal Saudi Air Force's fleet of AWACS aircraft to be completed by the end of 2002
- Anticipate the Royal Saudi Air Force to eventually upgrade its fleet of Tornado ground-attack and air-defense aircraft

### Forecast Funding Levels 2002 - 2011

Values (In millions of FY02 dollars)



### Orientation

**Description.** Peace Shield is a Saudi Arabian air-defense system. Peace Shield links ground-based radars, Airborne Warning and Control System (AWACS) aircraft, and fighter aircraft to defend Saudi airspace. Initially, Peace Shield was sponsored by the United States Air Force as a US foreign military sales program.

#### Sponsor (Initial)

Electronic Systems Center, US Air Force  
Saudi Ground Systems Office  
Hanscom AFB, Massachusetts (MA)  
USA

#### Contractors

Raytheon Company  
(Formerly Hughes Aircraft Co)  
141 Spring Street  
Lexington, MA 02421  
Tel: +1 781 862 6600  
Fax: +1 781 860 2172  
Web: +1 <http://www.raytheon.com>  
(Primary Contractor)

The Boeing Company  
100 N. Riverside  
Chicago, IL 60606  
Tel: +1 312 544 2000  
Web: <http://www.boeing.com>

**Status.** Currently, the Peace Shield air-defense system is being upgraded.

**Total Produced.** Not applicable.

**Application.** To provide air defense to Saudi Arabia.

**Price Range.** Indeterminate

### Technical Data

**Design Features.** Peace Shield is an air-defense system that coordinates the activities of ground-based radars,

E-3A early-warning aircraft, F-15 and Tornado interceptors, and surface-to-air missiles. Peace Shield

replaces the obsolete network of US and British radars supplied to Saudi Arabia in the early 1960s.

Centralized command and control of Peace Shield is executed from the Command Operations Center at Riyadh. Sector stations located at Dhahran, Raif, Tebuk, Khamis Mushayt and Al Kharj exercise direct operational authority over six TPS-43G radars. The sector stations also control five of the 10 AWACS ground entry stations.

HAWK and Shahine surface-to-air missiles are linked to Peace Shield. A telecommunications network, two base-operations centers, and air/ground radio communications sites (remotely controlled) are also provided.

Long-range air coverage is furnished by 17 FPS-117(V)3 radar sites. These are integrated with five E-3A AWACS aircraft and eight KE-3A tankers operating out of the Al Kharj airbase. Communications facilities are based on both land lines and troposcatter systems, and include both internal Saudi Arabian links and interfaces with the air-defense systems of Kuwait, the UAE, Bahrain, Qatar, and Oman. To improve coverage of growing Iranian threats, Kuwait procured a Low Altitude Surveillance System (LASS), equipped with a TPS-63 radar.

## Variants/Upgrades

The decision to incorporate British components into a fundamentally US system has resulted in major upgrades to Peace Shield. Dissimilarities between Tornado and F-15 aircraft necessitated widespread software changes in Peace Shield's command, control, communications, and intelligence (C<sup>3</sup>I) systems.

An additional series of changes in Peace Shield resulted from the Saudi purchase of Chinese CSS-2 intermediate-range ballistic missiles. Further modification to Peace Shield was required to accommodate the Patriot air-defense missile systems procured by the Saudis.

## Program Review

**Background.** The original Peace Shield plan envisioned the installation of 17 FPS-117(V)3 long-range 3-D search radars, six TPS-43G mobile search radars, five E-3 AWACS early-warning aircraft, and roughly 100 F-15A Eagle interceptors. The complete system is linked by five sector command centers, two base operations centers, and a command operations center.

The original Saudi air-defense system was based on British and US radars delivered in the early 1960s. A succession of piecemeal improvements were added to this system over the years, either to plug perceived holes in the network or to accommodate new items of equipment acquired by the Saudi Arabian defense forces. Examples of the latter include the radars associated with the US Improved HAWK and the French Shahine surface-to-air missile systems. These forces totaled 16 batteries of Improved HAWK and 17 batteries of Shahine missiles operated by the Royal Saudi Army. An additional 10 Shahine and 14 Improved HAWK batteries were operated by the Air Defense Forces.

In 1980, the US supplied a TPS-43 3-D radar to strengthen the region's defenses, and, at the same time, deployed four E-3 AWACS aircraft to serve as airborne command posts. Three additional TPS-43 radars were subsequently procured. In 1981, a contract for US\$75 million was signed for the delivery of two more TPS-43

radars, bringing the grand total of the TPS-43G standard to six.

The increasing dangers from the Iran-Iraq war led the six defense ministers from Saudi Arabia, Kuwait, the UAE, Bahrain, Qatar, and Oman to agree to establish a joint air-defense system. The system was based upon Saudi Arabian early-warning radars and airborne command posts. This agreement was the foundation of the Peace Shield project, and was finalized at a force level of five E-3 AWACS aircraft, eight KE-3A tankers, and 17 FPS-117(V)3 radars.

Work on the project was begun in 1981, and the Centralized Command Operations Center was completed in 1987. Work on the five Sector Command Operations Centers was also well under way by that time. The first E-3 was delivered in June 1986, and all 13 aircraft arrived in Saudi Arabia by December 1987.

The planning required to connect the six members of Peace Shield by datalink evolved during 1984-85. In 1984, France and Saudi Arabia signed a maintenance agreement for the Shahine missile, and contracts were awarded for further improvements to the TPS-43 radars, communications equipment, and troposcatter links. Another arms package from the US was agreed upon in November 1987, and included 12 additional

F-15 aircraft to be delivered individually as replacements for attrition losses in the original order of 60.

The F-15 export issue caused a major change in the composition of the Peace Shield project. In 1985, the Saudi government attempted to order an additional batch of 40 F-15A interceptors to complete the fighter component of the Air Defense Force. The deal was blocked by intense political pressure from the Israeli lobby in the US. The Saudi government turned to the UK as an alternative supplier and awarded a contract for 72 Tornado aircraft, including 24 Tornado ADV interceptors and 48 Tornado IDS strike aircraft. A subsequent order was placed for an additional 48 Tornado IDS aircraft. The Tornado ADV has totally different electronics, avionics, and mission parameters than the F-15, and the integration of this aircraft into the Peace Shield system came at considerable expense.

Boeing Experiences Snags. The C<sup>3</sup>I component of the Peace Shield system was scheduled for completion in 1992. The entire network was to be fully functional by 1994, but Boeing experienced some snags during software integration, and the ensuing delays prompted the US Air Force to drop Boeing as prime contractor. Boeing was so far behind schedule that the original 39-month delivery time frame had lagged to 92 months.

The Air Force notified Boeing in November 1989 that it would terminate the contract if Boeing did not devise a satisfactory “get well” plan by the end of December. Surprisingly, Boeing was able to come up with solutions to satisfy the service – temporarily. The Air Force terminated Boeing’s contract shortly after the builder announced that it could not finish the contract work until August 1994. The agreement had called for a completion date of April 1991.

Hughes Awarded Re-bid. In July 1991, Hughes (now Raytheon) was awarded a contract involving the technical analysis of the major ground-based portions of the Peace Shield contract that was terminated from Boeing. Under the US\$837 million contract, Raytheon would integrate command- and control-system data processing, displays, and communications equipment throughout Saudi Arabia, and provide a variety of equipment and software, including Hughes AMD-44 workstations and HDP-6200 displays. The Raytheon contract was completed in January of 1996.

Hughes Uses Off-the-Shelf Technology. In January 1992, Hughes Aircraft announced its intent to use existing off-the-shelf technology to meet program requirements – it was planning to use air-traffic control technology from the civil sector.

Hughes decided to employ its AMD-44 workstation as part of the Peace Shield ground-station network in

Riyadh, Saudi Arabia. The workstation, located at Karlsruhe Upper Airspace Control Center in Germany, was reconfigured to military specifications.

Hughes Delivers Peace Shield. Hughes Aircraft delivered its Peace Shield air-defense system in mid-1995, six months ahead of schedule. The early delivery qualified the company for a US\$50 million incentive bonus from the US Air Force. The Assistant Secretary of the Air Force (Acquisition) attributed Hughes’ success to its streamlining initiatives.

In early 1996, Hughes received a 15-month, US\$262 million contract to provide operations, maintenance, and training for the Peace Shield program. The company was to supply equipment, facilities, and software support, in addition to training. A seven-month contract extension followed in August 1997 to provide for further maintenance of the Peace Shield system. The contract was for US\$120 million.

In 1998, Raytheon received a US\$5.9 million contract to provide follow-on software and hardware maintenance for Peace Shield. The contract extended through December 1998 and has been completed.

Latest Information. The Saudi Arabian government was pleased with Raytheon’s work. So much so that in May 2000, Saudi Arabia awarded Raytheon a US\$300 million follow-on contract for support services on the country’s Patriot and Hawk air-defense missile systems. Since January 2000, Raytheon has been providing technical services at Patriot and Hawk missile sites in Saudi Arabia without an official contract. Raytheon’s services include manufacturing spare parts, installing new parts, training, modifications, and logistical support. Contract work will be completed in December 2002.

In August 2001, the Boeing Company received a US\$60 million contract to install new mission computers on the Royal Saudi Air Force’s fleet of five AWACS aircraft. Under the agreement, Boeing will upgrade the aircraft’s mission computer and software to the level currently in use by United States Air Force AWACS aircraft fleet. In addition, Boeing will provide operator training to the Royal Saudi Air Force. This enhancement will provide improved operator capabilities and equipment reliability. Forecast International expects work on all five Royal Saudi Air Force AWACS aircraft to be completed by the end of 2002.

In the future, additional measures to modernize the Royal Saudi Air Force’s inventory of aircraft could take place. Look for the Royal Saudi Air Force to eventually upgrade its fleet of more than 100 Tornado ground-attack and air-defense aircraft. Over the long haul, look for Saudi Arabia to procure a new front-line

strike aircraft to augment its current F-15 and Tornado fleets.

## Funding

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Peace Shield funding information is unavailable.

## Recent Contracts

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<u>Contractor</u>	<u>Award (\$ millions)</u>	<u>Date/Description</u>
Raytheon	300.0	May 2000 – Follow-on contract for support services on the Saudi Arabian Patriot and Hawk air defense missile systems. Work is expected to be completed in December 2002.
Boeing	60.0	August 2001 – The Boeing Company receives a US\$60 million contract to install new mission computers on the Royal Saudi Air Force's fleet of five AWACS aircraft.

## Timetable

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<u>Year</u>	<u>Major Development</u>
FY 1980	Royal Saudi Air Force starts project
FY 1981	General Electric receives orders for TPS-43G radars, first TPS-43 radar delivered
FY 1983	US signs Letter of Offer; Saudi AF accepts first Letter of Agreement from USAF
FY 1984	Franco/Saudi agree to integrate Shahine with Peace Shield; two KE-3As ordered; RFPs sent to Boeing, Hughes, Litton; technical proposals and bids submitted
FY 1985	Boeing awarded C <sup>3</sup> I contract; sale of F-15A second batch blocked; Royal Saudi Air Force places order for 24 Tornado ADVs
FY 1986	Boeing awarded aircraft overhaul plant contract; Hazeltine awarded IFF contract; GE awarded supplementary FPS-117 contract; first E-3 aircraft arrives
FY 1987	Centralized Command & Operations Center completed; E-3 and KE-3A aircraft delivered; attrition batch of 12 F-15A ordered; aircraft overhaul plant completed
FY 1988	Royal Saudi Air Force orders second batch of Tornados
FY 1989	Tornado ADVs scheduled to complete delivery
FY 1991	Peace Shield recompeted; Hughes wins contract; first FPS-117 delivered
FY 1992	FPS-117 installations completed
FY 1994	Kuwait Early Warning System (built by Hughes, using FPS-117 radar) operational
FY 1995	Full installation of Peace Shield
FY 1997	Two maintenance contracts awarded; work by Hughes
FY 1998	Two maintenance contracts awarded; work by Raytheon and AT&T Communications
FY 1999	Software/hardware sustainment contract awarded to, and carried out by, Raytheon
	Saudi Arabia awards Raytheon a US\$300 million follow-on contract in May for support services on the Saudi Arabia Patriot and Hawk air defense missile systems. Contract work is to be completed in December 2002
	Boeing receives a US\$60 million contract to install new mission computers on the Royal Saudi Air Force's fleet of five AWACS aircraft
	Expect installation of new mission computers on the Royal Saudi Air Force's fleet of AWACS aircraft to be complete

## Worldwide Distribution

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Peace Shield provides air defense to **Saudi Arabia**. That said, Peace Shield has the capability to furnish limited air protection for other members of the Gulf Cooperation Council states.

## Forecast Rationale

Peace Shield is a Saudi Arabian air-defense system. Peace Shield links ground-based radars, AWACS aircraft, and fighter aircraft to defend Saudi airspace. Initially, Peace Shield was sponsored by the United States Air Force as a US foreign military sales program.

Forecast International projects Peace Shield modernization efforts to continue *at least* through 2002. In August 2001, the Boeing Company received a contract to install new mission computers on the Royal Saudi Air Force's fleet of AWACS aircraft. Under the

agreement, Boeing will upgrade the aircraft's mission computer and software, as well as provide operator training to the Royal Saudi Air Force. Work on all five Royal Saudi Air Force AWACS aircraft is forecast to be completed by the end of 2002. Given the ongoing US war on terrorism, expect additional efforts to upgrade Saudi Arabian aircraft critical to the Peace Shield air-defense system to take place. Forecast International will continue to analyze and report Peace Shield developments as they arise.

## Ten-Year Outlook

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Production of the products that make up the Peace Shield air-defense system (command, control, and communication systems; control centers; radars; aircraft; missiles; etc.) is complete. Peace Shield funding information is not available. As a result, the **Ten-Year Outlook Chart** is omitted.

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