



AWACS: NATO's eyes in the sky

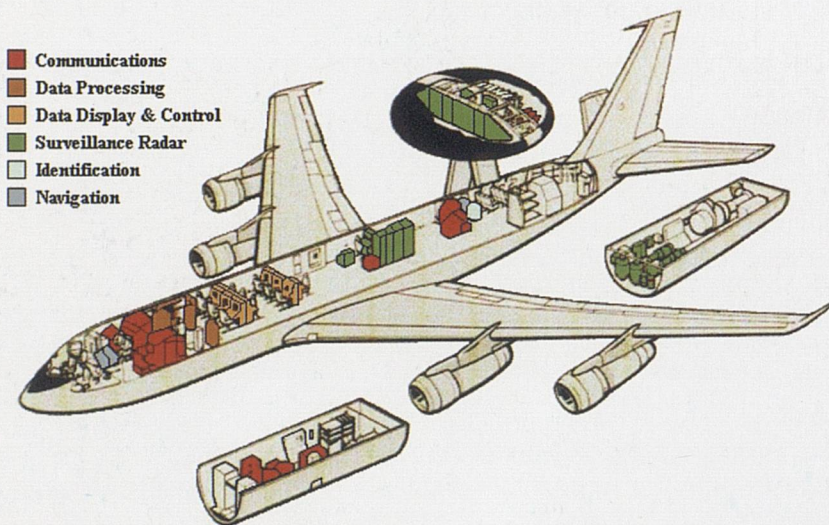


Effective air defence is an Alliance priority. The NATO Airborne Warning and Control System (AWACS) constitutes a highly mobile surveillance system designed to provide a solid air defence system over the entire Euro-Atlantic region.

The primary mission of the NATO AWACS fleet is to offer a multinational and immediately available airborne surveillance, warning and control capability in support of Alliance objectives. The fleet enables data to be transmitted directly from the aircraft to command and control centres on the ground, sea or in the air. The system also provides an all-altitude warning and detection capability which improves the Alliance's maritime surface picture, essential for surveillance operations.

In practice, the fleet plays a unique and valuable role for the Alliance by conducting a broad range of missions, ranging from air surveillance to air operations, such as close air support, reconnaissance and airlift. The changing nature of the international security environment in recent years has also led to the deployment of the force on more complex and tactical missions, including air-to-air and air-to-ground control, airspace management, air policing, combat search and rescue, force marshalling and threat warning.

### NATO Standard Configuration



### E-3A FAST FACTS

Length: 46.68m (152ft 11in)

Height: 12.7m (41ft 9in)

Wingspan: 44.45m (145ft 9in)

Operational Speed: 800 km/h (500mph)

Endurance: 10+ hours

Armament: None

Since 1982, when it began flying operations, the AWACS fleet has proven to be a critical asset for crisis management and peace support operations. The fleet has also played an important role in supporting NATO's strategic objectives, the command and control structures and the various missions and operations. With its flexibility, quick reaction and long-range capability, it has demonstrated its ability to respond effectively to emerging political and military crises.

The adaptability of AWACS aircraft served NATO well during the Cold War and has made the force an essential component of Alliance transformation today.



## >> The problem defined

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To acquire this capability, it was necessary to install a radar into a flying platform. The solution came in the form of AWACS, a militarised Boeing 707 with a rotating disk-like radar dome (rotodome) attached to its aft fuselage. This aircraft can fly over 10 hours (and longer with air-to-air refuelling) at 9,150 metres (30,000 feet) and can detect low-flying aircraft within 400 kilometres and aircraft flying at a medium altitude within 520 kilometres.

This emblem, representing NATO's AWACS fleet, exemplifies the Alliance's resolve to cooperate and maintain its military strength. Specifically, the NATO star symbolises the component's multinational members who operate and support the Alliance's first and only multinational flying unit. The aircraft silhouette depicts an operational flying unit performing critical surveillance and early warning duty. The silver lightening bolts portray the rapid dissemination of early warning information to the Alliance's major commands. The blue sky illustrates the operational element where NATO air force members serve and fly the E-3A. The fortress curving across the horizon represents NATO's defensive forces, constantly on alert to maintain peace and security.



## → Did you know?

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## >> Programme overview

In December 1978, NATO's Defence Planning Committee approved the joint acquisition of 18 E-3A AWACS aircraft to be operated as an Alliance-owned airborne early warning system.

The NATO Airborne Early Warning and Control (NAEW&C) programme is the largest commonly funded project ever undertaken by the Alliance. It involves 13 countries: Belgium, Canada, Denmark, Germany, Greece, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Turkey, and the United States. The United Kingdom also contributed to the programme but decided to create its own unit of E-3D AWACS aircraft. All these countries, together with the United Kingdom, participate in the multinational NATO Airborne Early Warning and Control Force (NAEW&CF).

Both the United States and France have their own national AWACS fleets. France is not part of the NAEW&C programme or NAEW&CF but its E-3F AWACS aircraft participate in joint operations with their NATO counterparts on a case-by-case basis.

In addition to the delivery of 18 E-3A aircraft to the NAEW&CF, between February 1982 and May 1985, the NAEW&C programme included the AEGIS project to upgrade 40 NATO Air Defence Ground Environment (NADGE) sites, stretching from northern Norway to eastern Turkey, to make them interoperable with AWACS. A main operating base was established in Geilenkirchen, Germany, to which Konya, Turkey, Aktion, Greece, Trapani, Italy and Oerland, Norway are attached.

One of the reasons for the success of the programme is that the North Atlantic Council granted organisational, administrative and financial autonomy to the NAEW&CF Programme Management Organization (NAPMO) established as a production and logistics organisation to implement the programme. The 18 E-3As were delivered on schedule and under cost estimate, with some \$100 million in savings. Part of these savings were used to buy three used 707s and convert them into trainer/cargo aircraft.



### Did you know?

The NATO AWACS programme is run by the NAEW&C Programme Management Agency (NAPMA) in Brunssum, the Netherlands. The agency is staffed by seconded military officers and civilian officials from the countries participating in the programme. Its general manager is responsible to the NATO Secretary General for administrative and personnel matters.

The NAEW&CF Command is co-located with Supreme Headquarters Allied Powers Europe (SHAPE) in Mons, Belgium, which exercises administrative control over the force. The NAEW&CF consists of two operational elements:

- The NATO E-3A Component at Geilenkirchen, which operates the NATO E-3A aircraft. NATO E-3A squadrons are manned by integrated international crews from 12 countries: Belgium, Canada, Denmark, Germany, Greece, Italy, the Netherlands, Norway, Portugal, Spain, Turkey and the United States.
- British Royal Air Force (RAF) Airborne Early Warning Squadron Number 8 at RAF Waddington, Lincolnshire, United Kingdom, with seven Boeing E-3D aircraft. The E-3D Component is manned only by RAF personnel and its main operating base is RAF Waddington.

In addition to the operational fleet of AWACS aircraft, there are also three trainer/cargo aircraft used for pilot instruction and cargo and passenger transport. Part of the operational fleet, these aircraft can be quickly converted from an all passenger configuration into an all cargo configuration or a combination of the two.



# AWACS: NATO's

The programme and the force are examples of what the Alliance can achieve by pooling resources. For over two decades, the E-3A AWACS fleet has been NATO's eyes in the sky and a vivid symbol of Alliance unity.

Despite an ever-changing security environment, the AWACS fleet remains a powerful tool for air defence. For instance, the NAEW&CF has been part of the NATO Response Force, a vehicle of Alliance transformation, since its prototype stood up in October 2003. The force oversees NATO airspace, helping protect Alliance members from the threat of terrorism, and supports NATO crisis management operations.

## Reinforcing NATO: Operation *Anchor Guard*

Following the Iraqi invasion of Kuwait in 1990, aircraft from NATO's E-3A component deployed to eastern Turkey in order to help reinforce NATO's southern flank during the war. Their specific mission included monitoring air and sea traffic in the eastern Mediterranean and providing airborne surveillance along the Iraqi-Turkish border. This deployment lasted from August 1990 to March 1991.

## Guarding America: Operation *Eagle Assist*

Seven NATO AWACS aircraft were deployed to the United States following the 11 September 2001 terrorist attacks to help defend North America against further attacks. Operation *Eagle Assist*, which was launched on 9 October 2001 and concluded on 16 May 2002, represented the first time in Alliance history that NATO assets were deployed in support of the defence of one of its member countries. The speed and success with which this mission was carried out demonstrate that NATO remains an effective military organisation and the transatlantic link remains strong and solid.



## Defending Turkey: Operation *Display Deterrence*

NATO's defensive deployment to Southeast Turkey – Operation *Display Deterrence* – was launched in response to the threat posed by the conflict in Iraq. It consisted of theatre missile defences, chemical and biological defence equipment and AWACS surveillance aircraft. Between February and May 2003, AWACS crews flew over 100 missions and more than 950 flying hours to protect Turkish forces and citizens.

## Did you Know

Since July 1992, aircraft from both the NATO E-3A fleet and the UK E-3D fleet have operated extensively in the Balkans, supporting United Nations resolutions in the former Yugoslavia and Alliance missions in Bosnia and Herzegovina and Kosovo. Aircraft from the French E-3F force and the U.S. Air Force have also helped achieve the objectives of these missions.

## Did you know?

An E-3A can detect low flying targets within 400 kilometres or 215 nautical miles. At medium altitude, it can detect targets within 520 kilometres or 280 nautical miles.



## >> Inside an AWACS aircraft

The AWACS fleet is composed of special aircraft (modified Boeing 707s), owned and operated by NATO, and equipped with a radar capable of detecting air traffic over large distances and at low altitudes. The antennas for the radar systems are found in the rotodome that is carried atop the AWACS. This structure rotates every ten seconds, providing 360-degree surveillance coverage. Radar systems are able to detect not only airborne targets but also maritime vessels operating in areas such as the North Sea or the Mediterranean Sea. Operators are able to identify and track enemy aircraft operating at low altitudes over all different types of terrain and give directions to friendly aircraft operating in the same area. Because the onboard radars are able to look down at the ground below, targets which would normally be obscured by stationary ground clutter can be picked up and tracked.

In addition to the surveillance systems, the AWACS fleet also carries extensive avionics equipment for navigation, communications and data processing. One such system is the Joint Tactical Information Distribution System (JTIDS), which instantly transmits a large amount of valuable and strategically important information to Allies.

### *What is a radar?*

***The term “radar” is an acronym for Radio Detection And Ranging. Radars use radio waves to detect the presence of an object and to determine its position relative to a known point, such as a radar installation. Radars can pick up objects, including aircraft, ships or land, and determine their course, speed, closest point of contact and other data, depending on the radar type. There are many different types of radars, including those for weather, air traffic control and navigation.***



There are two pilots aboard each flight: the aircraft commander and the first pilot, or co-pilot. Flying time is normally divided equally between the two pilots who are both qualified to operate the aircraft. The aircraft commander is the pilot in command and has overall responsibility for the safety of the aircraft and its crew. When not at the flight controls, the co-pilot is in charge of radio communications and monitoring radio navigation aids. Also on the flight deck are a navigator and an engineer. The navigator ensures that the aircraft reaches and maintains its orbit position while the flight engineer monitors engine power and the performance of the aircraft during flight.



The mission crew sits in the main body of the aircraft and is responsible for carrying out the specific tasks assigned to them for a given flight. The tactical director is the senior member of the mission crew and is responsible for the overall conduct of the mission, ensuring that it is carried out safely and effectively. The mission crew consists of a surveillance team, a weapons team, a communications operator and a number of technicians that monitor and perform basic maintenance on the equipment.

The surveillance controller commands the surveillance team, which consists of three surveillance operators and a passive controller. The team makes sure that it has an accurate picture of what is going on in the operations area. This picture is then passed on to force commanders on the ground, as well as airborne Allies operating with the E-3A. The weapons team is responsible for both defensive and offensive counter air operations, close air support, battlefield air interdiction, and other similar combat roles. The communications operator is in charge of all the on-board communications that allow crew members to interact and work as a team.



## Working together for results

Multinationality is a key characteristic of NATO's air defence system. AWACS crews are multinational, the greatest level of integration achieved by the Alliance, with 12 of the 13 NATO member countries currently participating in the programme contributing crew members. In order to operate the E-3A and all of its on-board systems, there is a crew of 17 highly trained men and women from all areas of expertise. The multinational crews work together in support of NATO's goals, objectives and strategic concept and help the Alliance's command and control structures carry out their missions.

## Did you know?

Since NATO, as an inter-governmental organisation, cannot certify the AWACS fleet, the aircraft are registered in Luxembourg and each plane carries the royal Luxembourg lion emblem on its vertical tail.



## Modernisation programme

At the end of the Cold War, the political, military and security situations in the Euro-Atlantic region changed fundamentally. NATO has since undertaken a series of reforms affecting its strategic direction, defence capabilities and partnerships with other countries. Part of this process has involved modernising the E-3A fleet to meet evolving mission requirements and exploring options for enhancing the Alliance's air defence systems to effectively combat emerging threats. For example, the fleet is currently being improved through a modernisation programme involving state-of-the-art engineering and manufacturing developments.

The mid-term modernisation programme includes integration of enhancements to the E-3A component's computers, displays, communications, navigation and target identification systems. The programme, which began in 1998 and is scheduled for completion in 2007-2008, consists of nine major projects: improved human-machine interface, multi-sensor integration, automated digital communication switching, navigation system improvement, wide-spectrum very high frequency radios, ultra high frequency satellite communications, additional display consoles, and new identification friend or foe transponders and interrogators.

Additionally, studies are underway looking at the next phase of AWACS enhancements, to follow the current round, which will allow the force to meet operational requirements in the future.



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