AIRSPACE CONTROL SYSTEM

Last Updated: 12 July 2019

The airspace control system (ACS) is "an arrangement of those organizations, personnel, policies, procedures, and facilities required to perform airspace control functions" (Joint Publication [JP] 3-52, *Joint Airspace Control*). A system of systems, the ACS enables multiple component air-ground systems to support the joint force commander's (JFC) planning and execution of air-ground operations.[1] The ACS combines each component's command and control (C2) and airspace control system supporting the JFC. Into this arrangement, the Air Force brings its theater air control system (TACS) with deployable air traffic control and landing system elements. The TACS, along with the Army, Navy, Marine, and Special Operations air ground systems combine to form the military's portion of the ACS. In many operations, wide-ranging interagency and nongovernmental organization (NGO) operations may be involved and challenge unity of command. A coordinated and integrated combat ACS is essential to the conduct of successful operations because any action taken by one airspace user may impact other users. An airspace control authority (ACA)-established ACS supports JFC objectives and facilitates unity of effort.

Airspace control should be executed through a responsive ACS capable of real time control that includes surface and airborne assets as necessary (e.g., control and reporting center [CRC] and airborne warning and control system). The ACS requires timely exchange of information through reliable, secure, and interoperable communications networks. Elements of the ACS may have dual roles as defensive counterair and airspace control assets. For example, a CRC can be a regional or sector air defense commander responsible for air and missile defense in addition to their airspace control duties.

The ACA normally delegates airspace control authority to elements of the ACS. Each component normally provides airspace control elements to an ACS. Their associated air traffic control (ATC) functions provide International Civil Aviation Organization-approved traffic and separation standards as required. All of these separate agencies are ultimately governed by the host nation's rules and regulations. However, as operations

[1] Air Force Tactics, Techniques, and Procedures (AFTTP) 3-2.17, *Multi-Service TTP for the Theater Air-Ground System* (restricted distribution).

transition between peace time and combat operations, peacetime airspace rules and organizations change. The nature of those changes will vary from theater to theater.

Airspace Control System Fundamentals

A common ACS facilitates accurate and timely coordination of airspace operations among friendly forces. Common equipment, a common understanding of Service and joint doctrine, and familiarity with procedures through joint exercises and training can enhance airspace control operations within the joint operations area (JOA).[2] Standardized airspace procedures rely upon an effective mix of identification and control measures. Identification requirements for airspace control should be integrated with those for air defense. Airspace control, air defense, ATC, and supporting command and control (C2) procedures, equipment, and terminology should be compatible, mutually supporting, and integrated to ensure commonality of procedures for airspace users and control agencies. Airspace control agencies should work out procedural agreements and establish required communication links to ensure effective interagency coordination.

Effective airspace control means securing the systems enabling that control. The systems comprising our ACS include, but are not limited to, sensors, communications, data processing, and common operating databases. Cybersecurity programs such as communications security, physical security, emissions security, along with defensive cyberspace operations are methods to protect airspace control systems and information. Due to the US military's dependence on, and the general vulnerability of, electronic information and its supporting systems, cybersecurity is essential to airspace control. Additionally, when developing communication policies and procedures, it is imperative operations security practices are applied.

Airspace Control Procedures

Airspace control is a mix of procedural and positive control. Airspace control procedures provide maximum flexibility through an effective mix of positive and procedural control measures. The capabilities of the organization executing control over a given section of airspace will normally drive the composition's mix. The control structure should encourage close coordination among joint force components allowing a rapid concentration of combat power. An ACS should be adaptable to changing requirements and priorities as operations progress through various operational phases.

Procedural control is a method of airspace control relying on a combination of previously agreed to and promulgated orders and procedures. It establishes the basic common criteria and concepts for airspace control. This form of control relies on common published procedures, designated airspace, and promulgated instructions by an authorized control agency to deconflict and activate airspace coordinating measures, fire support coordination measures, air traffic control measures, and air defense control

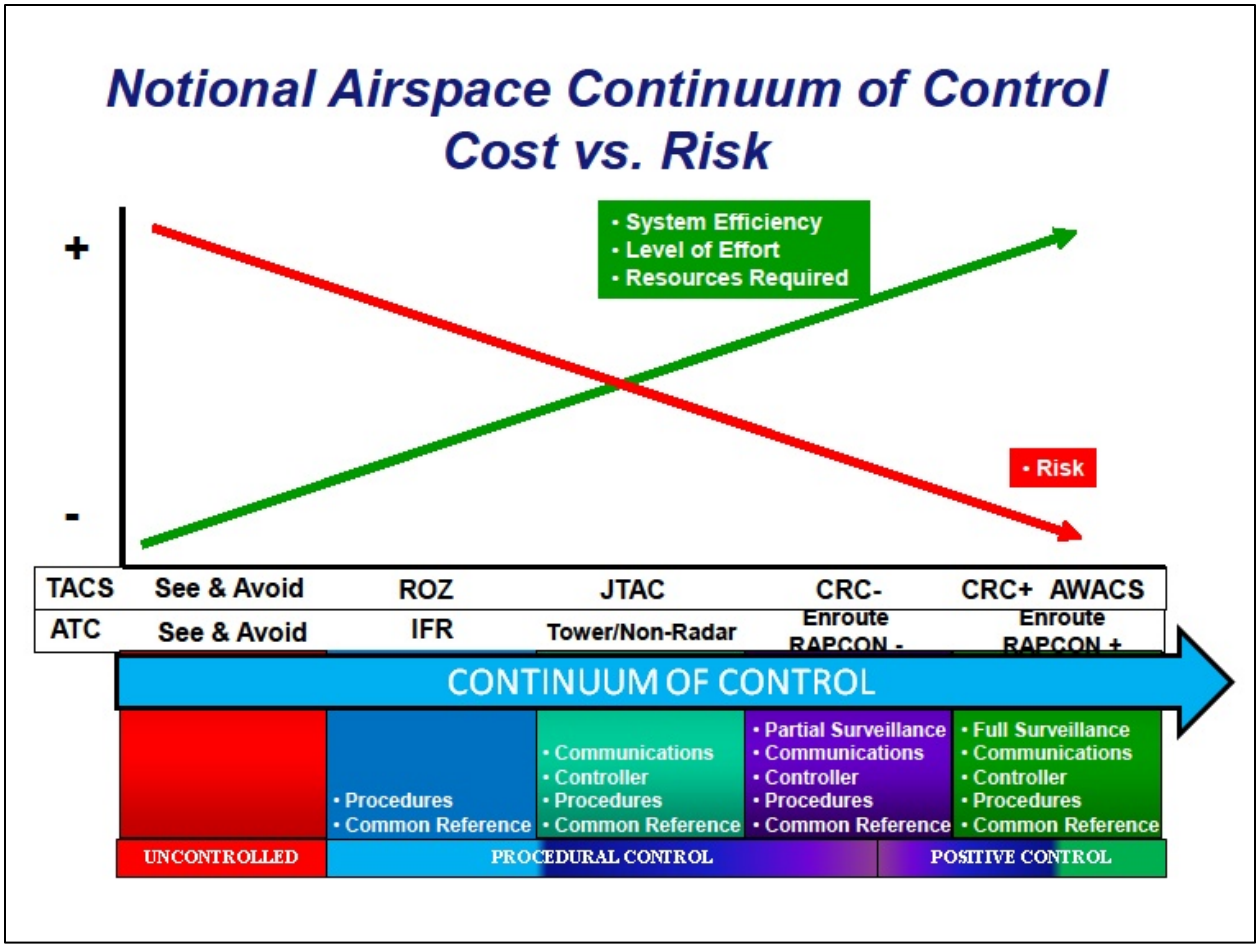
[2] Headquarters Air Force/A9 Lessons Learned Office, *Integration of Airpower in Operational Level Planning Report*.

measures. Controlling agencies activate airspace with a defined time and volume through standard coordination measures (CMs) or weapons control statuses. These procedures deconflict both aircraft and airspace use from other airspace users. When appropriate communications exist, an authorized airspace control agency can provide procedural control instructions in real time to increase operational flexibility for airspace users. This method is considered effective for low density airspace saturations and in areas lacking positive control coverage but is not normally as efficient as positive control. Procedural control measures should be uncomplicated, readily accessible to all forces, and disseminated through the airspace control order and special instructions of the air tasking order. Use of these single-source documents is essential for integrating rotary-wing, fixed wing, fires, and unmanned aircraft operations.

Positive control is a method of airspace control relying on the positive identification, tracking and direction of aircraft within a given airspace. It is normally conducted by electronic means by an agency having the authority and responsibility therein (JP 3-52). This form of control relies on surveillance, accurate identification, and effective communications between a designated airspace control agency and the airspace user. It is normally conducted by ATC agencies equipped with radar, identification friend or foe interrogators and receivers, beacons, track processing computers, digital data links, and communications equipment. Positive airspace control requires the means to locate and identify airspace users in real time, and the ability to maintain continuous communications with them to pass required control instructions. Positive control requires predetermined, standing transition procedures to procedural control should positive control systems become degraded or unavailable. Those procedures should also account for the differences between civil and military communications and surveillance systems.

Cost versus Risk

When discussing procedural and positive control, there is a continuum of efficiency, level of effort, resources required, and risk to be addressed (see figure titled **National Airspace Continuum of Control**). The minimum requirements for surveillance, identification, and communications equipment can vary by theater and operation, but are likely to be driven by a combination of military and civil aviation regulations and the level of risk the JFC is willing to accept. Assuming a constant air traffic volume, uncontrolled airspace exerts a small drain on resources, but carries increased risk. For that same airspace, standing airspace procedures, such as a restricted operations zone, not only incrementally increase control and resources required, but also reduce risk. Full military or civilian positive control provides the greatest risk mitigation, but exerts a significant drain on resources. Ideally, the entire airspace control area would be under positive control with radar and communication coverage. However, limited resources or other factors, such as terrain, may make this goal unrealistic. Airspace planners should determine where the JFC’s risk tolerance is lowest, or the needs for efficiency are highest, and establish positive control in those areas. In areas where positive control is not feasible, standing CMs should be the primary minimum standard for airspace control. These standing procedural control measures form a crucial backup in the event positive control capability is diminished.



Notional Airspace Continuum of Control

TACS – theater air control system
ROZ – restricted operations zone
JTAC – joint terminal attack controller
CRC – control and reporting center
AWACS – Airborne Warning and Control System

ATC – air traffic control
IFR – instrument flight rules
RAPCON – radar approach control