# APPENDIX E
# NATIONAL AIR TRAFFIC CONTROL SYSTEM

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The national airspace system consists of a network of navigational aids and a number of air traffic control facilities. The specific purpose of the air traffic control service is twofold: to prevent collisions between aircraft and, in the maneuvering area, between aircraft and obstructions and to expedite and maintain an orderly flow of air traffic. To properly manage the traffic in the system, the jurisdiction of control is divided into three parts, en route, terminal, and oceanic. Terminal air traffic control may be further sub-divided into terminal radar approach control (TRACON), and air traffic control tower (ATCT) operations.

## E.1 AIR ROUTE TRAFFIC CONTROL CENTER

Air route traffic control centers (ARTCC) are established primarily to provide air traffic service to aircraft operating under instrument flight rules (IFR) on flight plans within controlled airspace, including airways and jet routes, and principally during the en route phase of flight. In addition, ARTCC can provide approach control services to non-towered airports and to non-terminal radar approach control airports.

There are 21 ARTCCs located throughout the United States. Each of these centers is responsible for controlling en route traffic over the United States and parts of the Atlantic and Pacific Oceans in a definitive amount of geographical area that can be in excess of 100,000 square miles. At the boundary point of their definitive area, ARTCC will provide the pilot in command of the aircraft with the option of terminating service or transferring to an adjacent ARTCC or approach control facility for continued service.

Each ARTCC geographic area is divided into sectors. The division into sectors is determined by an attempt to equalize the workload of the controllers. Control of aircraft is passed from sector to sector within the ARTCC area with each sector being staffed with one or more controllers. The average number of aircraft that each sector can handle depends largely on the number of individuals assigned to each sector, the complexity of the traffic, and the degree of automation provided.

Communications between the controllers and the aircraft is via voice transmittals. Therefore each ARTCC is assigned a number of very high and ultra high frequencies. The controller, in turn, assigns a frequency to each pilot.

## E.2 TERMINAL RADAR APPROACH CONTROL

Terminal radar approach control (TRACON) is responsible for monitoring the en route and terminal segment of air traffic in the airspace surrounding airports with moderate to high-density traffic. The

primary responsibilities of a TRACON include the control and separation of air traffic within a 50 nautical mile radius of their facility and up to an altitude of 17,000 feet, exclusive of the airspace controlled by air traffic control towers.

There are approximately 185 TRACON facilities located throughout the United States. Each of the stations has varying degrees of automation dependent upon the volume of traffic typically handled. Similar to ARTCC, the geographic area presided over by TRACON is divided into sectors to equalize the workload of the controllers.

TRACON facilities use radar and air-to-ground communications to ensure separation between aircraft arriving, departing, or transitioning through the airspace controlled by the facility. TRACON responsibilities will terminate once the aircraft in their control is aligned with the runway approximately five miles out from the airport. At this point continued service is provided by the airport air traffic control tower.

## E.3 AIR TRAFFIC CONTROL TOWER

Airport air traffic control towers (ATCT) are responsible for supervising, directing, and monitoring the arrival and departure of air traffic at the airport and in the immediate airspace within five nautical miles of the airfield. The tower is responsible for issuing clearances to all arriving and departing aircraft, providing pilots with meteorological information, and controlling all aircraft movement on the surface of the airport, with the exception of the ramp area.

There are currently over 648 air traffic control towers operating in the United States. There are 265 federally operated and staffed control towers employing approximately 8,230 individuals. Another 164 towers are operated and staffed by the United States military. The remaining towers are part of the Contract Tower Program began in 1982 as an effort to meet the demand for air traffic controllers. This program is regulated and staffed using the same standards and directives that govern the federally staffed towers. There are currently 219 contract towers in place that employ nearly 1,200 employees.

## E.4 FLIGHT SERVICE STATION

Flight service stations (FSS) are air traffic facilities responsible for providing a variety of services to pilots; including pilot weather briefings, en route communication, and VFR search and rescue services. Weather data disseminated by flight service is obtained from the National Weather Service and Weather Service International. In addition to pilot weather briefings, flight service stations maintain other responsibilities, which are related to the different components of flight operations. The following is a list of these additional responsibilities.

- VFR search and rescue services
- En route communications

- Originate Notices to Airmen (NOTAM)
- Receive and process VFR and IFR flight plans
- Take weather observations
- Issue airport advisories
- Provide assistance to lost aircraft
- Relay ATC clearances
- Broadcast aviation weather and national airspace system information
- Monitor NAVAIDs
- Provide en route flight advisory service
- Advise U.S. Customs of transborder

Lockheed Martin on behalf of the FAA currently maintains 20 automated flight service stations and six-flight service stations nationwide (excluding Alaska).