Analysis of the Challenge to Air Traffic Control Department of Civil Aviation Flight University of China Caused by the General Aviation Development

Le Zhang

Civil Aviation Flight University of China, Chian Sichuan 618307

Keywords: General Aviation; CAFUC; Control Department; Challenge Today

Abstract: With the continuous development of social economy, Chinese general aviation has also been greatly developed. At the same time, there will be some contradictions in the use of airspace. This paper mainly analyzes the adverse effects of the opening of low altitude area of general aviation on the flight training of Civil Aviation Flight University of China (CAFUC), and discusses the necessity of the control department of CAFUC in the development process of general aviation, and puts forward corresponding countermeasures.

Air travel has become one of the ways for many people to travel. General aviation is an important part of civil aviation, and the control department of CAFUC plays an important role in the development of general aviation, response to public emergencies, rescue and relief work. At present, the scale of Chinese general aviation is about 2000, which is still a big gap compared with developed countries, but because of the gap, it shows that Chinese general aviation still has a lot of room for development.

1. The Influence of the Development of General Aviation on the Flight Training of CAFUC

The so-called CAFUC refers to Civil Aviation Flight University of China, which has five training airports in total, four of which are located in the hinterland of Sichuan. The economy of this region is relatively developed, which can meet the needs of general aviation development to a large extent. According to the statistics of new relevant departments, the development of general aviation in Southwest China is faster than that in other regions, especially in Sichuan. After years of continuous efforts, CAFUC has made great progress and development. Now it has opened up many flight training routes and realized real-time networking, which can better monitor the flight status. The training of CAFUC has been authorized by the military and civil aviation control department. In the process of flight training, the utilization rate of space area is particularly high. Although the flow is large, it also meets the daily needs of flight training of CAFUC to a certain extent [1].

Since the development of general aviation, the difficulty of using low altitude airspace has always been a problem, which limits the flight of general aviation in the society to a large extent. At the same time, it also limits other flights to enter the training airspace of CAFUC and improves its training efficiency. CAFUC usually conducts flying training in low altitude airspace, but with the development of general aviation, it will be difficult for CAFUC to use low altitude airspace for flying training independently. For general aviation, the opening of low altitude airspace reduces certain constraints, and the air flow will increase significantly, which will obviously conflict with the flight training of CAFUC. Preventing air collision will be a huge challenge for the control department of CAFUC.

From the perspective of technological development, equipment installation, and flight capabilities, many general aviation companies do not have the ability to fly freely and autonomously in a short period of time. Especially for CAFUC, it has a high flight density. Avoiding aircraft collisions will be a major problem, which requires reasonable control by ground control authorities. In fact, the flight training is also a type of general aviation. In fact, CAFUC does not have the ability to use airspace independently. Only after obtaining authorization from the control department can flight training be conducted. If the flight training does not seek authorization, low-altitude airspace is generally laborious. After entering, the flight training of CAFUC will be affected, and even the flight training tasks are unable to be completed [2].

From the perspective of security, flight altitude of general aviation is not high, the speed is slow, the volume is small, and the flight is frequent, which brings certain difficulties to the detection, identification, and defense work. If the management measures of management department are not strict enough, there will be loopholes in the control of UFOs, and the risk of collision is prone to occur. The most important issue in the opening of low-altitude airspace is security. A safety barrier needs to be set up to ensure that flying aircraft can avoid the risk of collision. It requires starting from the flight time interval, and the control department must master the dynamics and flight intentions of all aircraft and aircraft to reasonably arrange the flight.

2. The Implementation of Unified Flight Command by Control Department of CAFUC

2.1 Conditions for Flight Monitoring

The opening of low-altitude airspace is to enable general aviation to use free, unrestricted and reasonable use of low-altitude airspace for flight and training, and to reduce the approval process and improve airspace efficiency. However, the primary problem in the flight process is safety. For the smooth implementation of low-altitude airspace, safety must be solved, that is, effective monitoring of aircraft flight, understanding of the flight status and flight targets, and effective prevention of aircraft to effectively prevent the problem of aircraft collision. General aviation usually uses small aircraft, which usually fly in low-altitude areas. Small aircraft have the disadvantage of a small radar reflection surface. In addition, there are many blind areas in low-altitude areas, and it is difficult to realize the radar continuous monitoring. CAFUC is the first range in China to use the ADS-B system for real-time monitoring of aircraft. It is equipped with multiple base stations on the ground and implements real-time networking. At the same time, the UAT (Universal Access Transceiver) mode is opened which has a strong monitoring function for monitoring small general-purpose aircraft. After practical tests, it is found that this system is satisfactory in monitoring and controlling small aircraft in general aviation, and basically achieves comprehensive coverage of low-altitude flight areas, which is beneficial to the aerodrome control department for all aircraft in low-altitude areas. Effective monitoring provides effective technical support for the implementation of unified flight command, which can effectively reduce the occurrence of aircraft security risks [3].

2.2 Command Advantages of the Control Department of CAFUC

As the name suggests, the control department is to supervise and control the flight, which has strong command advantages, and it is mainly manifested in the following aspects: (1) The control department has a detailed understanding of the functions and performance of small aircraft, has a keen judgment ability for low-speed and light aircraft, and can take corresponding measures to help solve the problems in the flight in time. (2) The flight training of disadvantage of a small radar reflection surface. In addition, there are many blind areas in low-altitude areas, and it is difficult to realize the radar continuous monitoring. CAFUC has the characteristics of large flow, high density and frequent flight mission changes, it requires the relevant personnel of the control department to have strong command awareness and command skills. In addition, the relevant personnel of the control department often participate in the flight training to better control the flight; (3) The control department monitors the weather in the relevant flight area in real time and conducts a detailed investigation of the terrain and topography of the flight area, which reduces certain risks for flight and ensures the safe flight of the aircraft [4].

2.3 Strong Guarantee Conditions

The flight training of CAFUC is limited in a certain range. In this range, it has been able to realize the comprehensive coverage of wireless communication equipment, to monitor the flight path of the aircraft in real time, and to detect the situation of the flight path in front, to ensure the safety of the flight path of the aircraft. In addition, the flight control department also provides intelligence services, alarm services, search and rescue services and other functions.

3. Challenges Faced By the Control Department of CAFUC under the Background of General Aviation

The great development of general aviation is the general trend of social development and national development, and it is also an important embodiment of national scientific and technological progress. The control department of CAFUC should not only guarantee the safety of CAFUC in flight training, but also ensure the smooth flight of other general aviation tasks, which is the responsibility of the control department of CAFUC. Because all kinds of general aviation flight activities are carried out at the same time, the complexity of them is self-evident, which brings huge challenges to the control department.

3.1 The Greatly Increasing of the Difficulty of Regulatory Coordination

Because general aviation will involve many types of aircraft, and each aircraft has a different mission, and the flight route may change at any time in the flight process, with a lot of uncertainty. The control department should timely report the dynamic information, analyze the risk and put forward countermeasures, reasonably divide the flight area, and carry out the control transfer efficiently. General aviation needs a lot of information in the flight mission, but the level of information automation and processing on the aircraft is low, which cannot meet the needs of the flight and increases the workload of the control part. The flight of general aviation is quite different from the flight training of the flight academy. The flight of general aviation has more uncertainties. The control and coordination work needs to be adjusted according to the actual situation. This work is basically irregular, which greatly increases the difficulty of control and coordination [5].

3.2 Large Demand for Differentiated Regulatory Services

Different general aviation missions, flight routes, crew levels, and aircraft equipment will bring difficulties to the control work. Because of the differences of aircraft, the control services will also have differences, such as the form of monitoring and flight safety interval. It requires the flight control department to have a strong ability to respond, and be able to reasonably regulate and reduce risks according to different situations [6].

3.3 The Dynamic Change of Use and Division of Airspace

From the perspective of aircraft safety flight, it is safer to fly on a fixed route and airspace, and it is also conducive for the control department to grasp the pilot's flight dynamics in time. In the course of flight training, CAFUC also conducts flight training within a specified range according to a fixed route, but with the opening of the low-altitude area, the flight flow in the area greatly increases, and there will be multiple flight flights on the same route or in the same area. In order to effectively avoid the risk of aircraft collision and other risks, the control department of CAFUC needs to re-divide the airspace. It is a dynamic control mode and requires the control personnel to have good resilience [7].

Conclusion

The general development of general aviation is the general trend of the development of aviation industry now. The control department of CAFUC must clarify and adapt to the development and take effective measures to actively respond to it to ensure that the flight training in the field is conducted in an orderly manner. The development of general aviation has brought huge challenges to the flight control department. The control department must take measures to improve the efficiency of airspace use. The control personnel must have dynamic management capabilities and resilience. At the same time, the flight control unit should also cooperate with other flights. The unit has established a good communication platform and conducted flight training in a planned way to meet various flight requirements, instead of placing itself in a passive position

References

[1] Lin Ruipeng. Discussion on Air Traffic Control Pressure and Risk Assessment Method Based on General Aviation [J]. Heilongjiang Science and Technology Information, 2014 (32): 177.

[2] Zhang Huating. Study on the Workload of Controllers in the Same Field with General Aviation and Transportation Aviation [D].

[3] Hao Liangyi. Low Altitude Airspace Capacity Assessment of General Aviation Based on Controller Load Study [D]. 2017.

[4] Li Ye, Sun Songbo. Preliminary Study on Flight Control Work of General Aviation of China [J]. Business Information (28): 35.

[5] Jing Hao. Status and Trend of General Aviation Development in China [J]. Divine China, 2018 (20): 272-272.

[6] Kuang Jing. Strategies for Establishing Management System of General Aviation Enterprises [J]. China Business Review, 2017 (28): 72-73.

[7] Qu Di. Research on the Construction Strategy of Management System of General Aviation Enterprise [J]. Modern Business, 2019 (9).