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# Design Analysis of the Desired Development System of the Air Force Campaign Process Deduction System

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***ABSTRACT.*** *Based on the actual needs of air force weapons and equipment, this paper proposes a development system for the deductive system used in the Air Force campaign. The proposed system covers the generation of battlefield environment, management of weaponry information and the development of the subsystem. The proposed system is based on the Sim2000 model class. It builds battlefield targets according to the relevant information of the model class, generates battlefield environment to support the combat mission planning of the air force weaponry, and points out how to implement the system to provide reference for similar research.*

***KEYWORDS****:Air Force campaign process; deduction system; think development system*

## 1. Overview of battlefield environment generation

### *1.1 Overview of the battlefield environment*

Simulation-based process deduction is inseparable from the battlefield environment and planning of combat missions. SNE (Battlefield Space) should use a geographic information system consistent with the real environment to reflect the true location of all entities in the battlefield space[1]. At the same time, it is also necessary to consider specific combat units and weapon performance, natural environment and other related data, which directly affect the operational effectiveness of the Air Force weapons and the results of the engagement calculation. The battlefield environment generation system is used to construct a digital battlefield environment that supports the desired editing and combat mission

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planning, determine the geographical environment related to the scenario[2], and configure the natural environment data consistent with the geographic environment. Then, in the Air Force Battle Process Deduction Simulation System, the operational plan and the intended generation should be assisted by a dedicated development system to assist the combatants to establish an action plan.

### *1.2 Battlefield environment generation*

In order to simplify the process of development, the battlefield environment generation and the establishment of the battlefield target are unified into a battlefield environment generation system. According to the geographical environment, the visibility, ocean state[3], and weather electromagnetic environment parameters are configured, and then the types and parameters of the battlefield space entities are read from the equipment database and deployed as battlefield targets to the battlefield environment. Finally, the edited battlefield environment data and battlefield target data are stored in the battlefield environment database, and the composition of the battlefield environment data finally formed in the battlefield environment (see Figure 1)

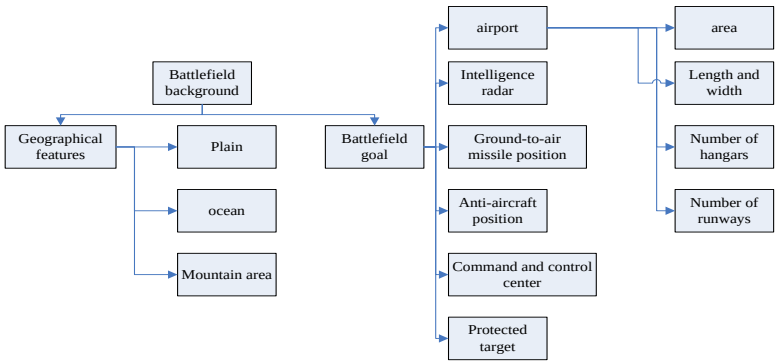


*Figure 1 Battlefield environment composition*

(1) Battlefield objectives

In order to establish combat plans, it is also necessary to identify different battlefield targets on the battlefield background, such as airport intelligence radars, ground-to-air missile positions, artillery positions, command and control centers,

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transportation hubs, ports, power plants, bridges, and tank armor targets. Each type of target can establish its own attributes, such as the airport, its area, the number of runways, the number of hangars, and the maximum capacity of the aircraft. The battlefield targets such as airports, intelligence radars[4], ground-to-air missile positions, artillery positions, and command and control centers are related to the corresponding weapon and equipment models. Therefore, when the battlefield generating subsystem establishes the battlefield target, it needs to allocate the corresponding weapon equipment quantity and configuration, such as the type and quantity information of the aircraft, to the battlefield target.

(2) Command and Control Center

Due to the command-and-control relationship between the command and control center, the airport, the ground-to-air missile position and the anti-aircraft position, the director must establish the battlefield target in accordance with the hierarchical command and control relationship of the battlefield target when establishing the battlefield target[5]. For example, first establish a command and control center in the battlefield environment, then establish a secondary command department belonging to the command and control center, or establish an early warning radar, an airport, a ground-to-air missile position, an anti-aircraft position, etc. Related weapon systems, and establish communication relationships between the command center and the weapons systems and weapons it directs, such as wireless communications, fiber-optic communications, etc., using a hierarchical approach to establish battlefield objectives on the one hand to determine the composition of the battlespace entities relationship. The process of establishing the battlefield target is consistent with the actual force structure. On the other hand, the command-and-control relationship between the battlefield targets can be described, and the command and control capabilities of both sides of the warfare can be easily analyzed.

(3) Weaponry equipment management system

In the weaponry management system, the director can build new weaponry based on the model information in the model database to create new types of equipment, such as new types of fighters and surface-to-air missiles. When building a new type of weaponry, you can specify the type of weaponry and equipment, and determine

the operational performance parameters, performance parameters, and manifestations of the weaponry in the battlefield environment through model parameters[6]. Save these settings to the equipment database for direct use in equipment deployment and battlefield objectives.

**2.want to edit**

It is determined that the editor is based on the battlefield environmental data, operational requirements and equipment instance templates to guide the user to establish combat missions, automatically establish the relationship between the mission and the weapon equipment model, generate a model system file that can be simulated, and read the model system by the Sim2000 simulation engine. The document is used to derive the operational process. In the battle-level operational simulation process, in order to achieve the operational objectives, when the operational plan is formulated, the operational tasks for accomplishing the mission and mission of the campaign are mainly established. A combat mission is an event or action taken by a weapon or unit to complete a mission. A combat mission is a series of operational missions to achieve a certain operational purpose. According to the modern air force campaign and tactical theory, and considering the ease of use of combat missions, it is possible to establish five types of 20 air force combat mission templates, such as ground (sea) attack missions, air defense missions, and security missions. Air interception task class and maneuver task class.

***2.1 combat mission***

Combat missions are generally composed of mountain time descriptions, spatial descriptions, and equipment descriptions. Due to the complexity of the air force's combat process, the combat missions are small. To accomplish a mission or campaign goal, there is a need for a coordinated operational relationship between combat missions. In order to perform a bombing mission, an escort mission and an accompanying ten-distance mission are required. In order to simplify the formulation of the mission of the battle, the task management can manage the mission of the mission in addition to the content of the mission. In the mission, the relationship between the mission and the mission and the time between the missions

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are established according to the tactical requirements. , information and spatial relationships. Enables the combatant to develop operational plans for the battle through operational missions and operational missions. When establishing an operational plan, users can choose to establish corresponding operational missions and operational tasks based on mission or mission type. After selecting the corresponding combat mission, based on the mission template included in the mission, establish specific combat missions based on the current content, and set the attributes of the mission. Establish a hierarchical relationship of combat missions (see Figure 2).

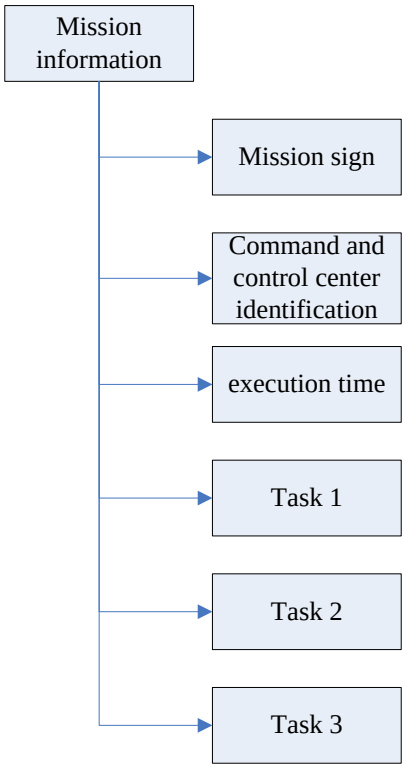


*Figure 2 Operational task hierarchy*

### *2.2 Route establishment*

The route establishment method should include the route calculation, the

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scheduled route selection and the route drawing. In the calculation of the route, according to different combat missions and types of combat aircraft, different route calculation methods are needed, such as the departure time of the early warning aircraft and the determination of the early warning patrol area, and the patrol route calculation: electronic ten-distance route calculation: tanker route Calculation: airspace cover takeoff time and airspace calculation: interception takeoff time and route calculation.

**3. system implementation**

This paper proposes the generated battlefield environment generation and scenario editor interface (see Figure 3). In the figure, the right side is the battlefield target that can be retrieved from the weapon equipment database and can be established in the geographical environment, such as the command post, airport, and missile. Position and radar. In the middle is the battlefield environment displayed according to MapInfo map data. Users can drag these battlefield targets into the appropriate locations in the battlefield environment for deployment. On the left is a list of battlefield targets that have been established in the plan, a list of combat missions, and the distribution of weapons on both sides. When the director establishes the battlefield environment, different personnel can deploy the assigned weapons and equipment, such as various types of aircraft and quantities, to different airports according to the established battlefield environment, and formulate combat missions according to the types of aircraft in the airport. The combat mission editor is divided into two steps. First, edit the basic information of the mission, such as the name of the mission, the type and number of aircraft performing the mission, and the ammunition carried by the aircraft. The user can then edit the route information based on the airport, target, etc. Determine the target of the attack, the execution time of the task, the time of arrival, and the different route points. Different combat missions contain slightly different information.The route editing supports the route planning in the environment thumbnail. The following figure shows the altitude map of the route, and determines the flight altitude and speed of the small route point. According to the coordinates, altitude and aircraft speed of the route point, the route editor can also automatically determine the task execution time according to the time of arrival and the speed of the aircraft, and reduce the difficulty of route planning.

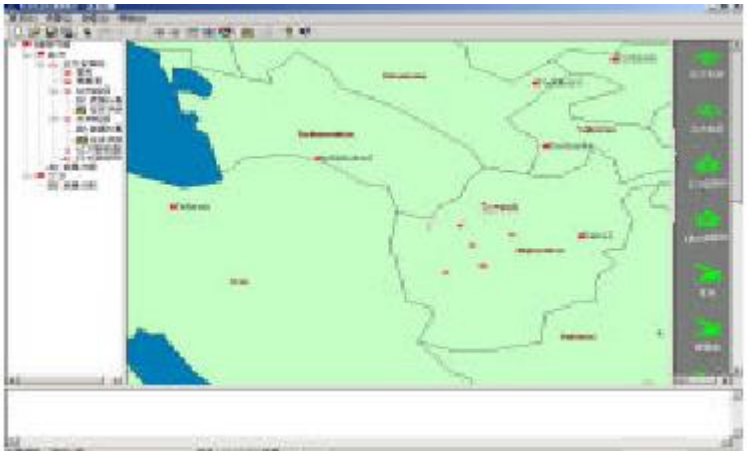

*Figure 3 generated battlefield environment generation and scenario editor interface*

## 4. Conclusion

By designing the development system of the Air Force campaign process deduction system, the battlefield environment, the management of weapon information and the editing subsystem are supported, and the combat mission planning of the Air Force weaponry is supported, and the system works well.

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