

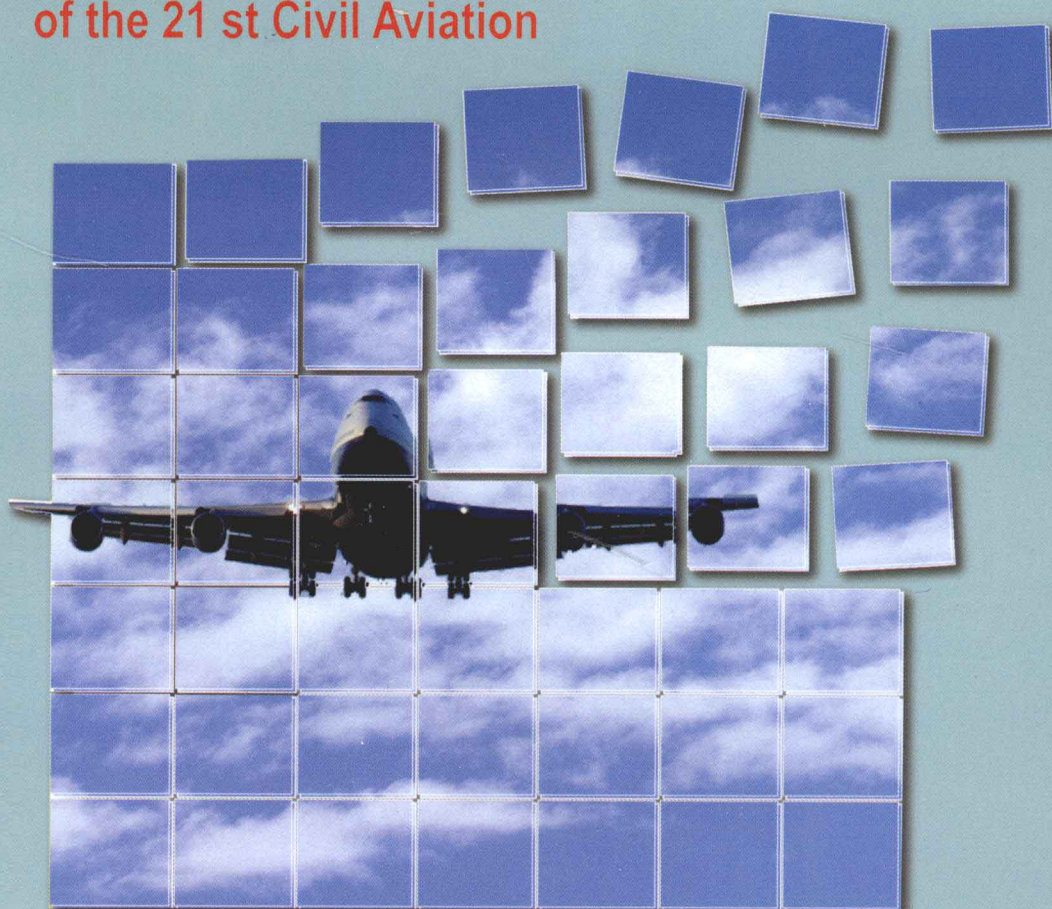
21 世纪民航高等教育系列教材

RADAR SERVICES

雷 达 服 务

任成锁 编

Textbook Series of the Higher Education
of the 21 st Civil Aviation



兵器工业出版社

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内 容 简 介

本书主要是为培养和复训空中交通管制员编写的。读者可以通过此书了解和掌握雷达管制的理论和技巧。主要内容包括：雷达服务有关术语、“武汉机场”的机场细则、雷达服务的程序和规则、雷达管制模拟练习的技巧、国际民航组织标准通话用语和相关技术。

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前 言

本书主要以国际民航组织 2001 年出版的 4444 文件《空中交通管理》第八章的内容进行编写的。读者可以通过此书了解和掌握雷达管制的理论和技巧。它可用于本科生的教学,也可用于成人培训。本书由 6 章组成:第 1 章 术语:解释书中出现的有关概念。第 2 章 机场细则:以“武汉机场”为例介绍机场的管制程序和规则。第 3 章 雷达服务:阐述雷达服务的程序和规则。第 4 章 练习:说明练习的要求和注意事项。第 5 章 通话用语:列举雷达服务方面的用语。第 6 章 相关技术。

书中内容以英文为主。鉴于本书的读者范围,第 1 章和第 3 章采用了英汉对照的形式。

本书在编写过程中得到了空管学院领导的大力支持和各位专家的帮助,在此编者深表感谢。由于本人水平有限,加之编写时间极为仓促,疏漏之处在所难免,恳求广大读者批评指正。

编 者
2003 年 5 月

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CHAPTER 1 DEFINITION

When the following terms are used in the book they have the following meanings:
下列术语在本书中的含义如下:

Accepting unit/controller 接收单位/管制员

Air traffic control unit / air traffic controller next to take control of an aircraft.
下一个行将担任管制某架航空器的空中交通管制单位/空中交通管制员。

Aeronautical Information Publication (AIP) 航行资料汇编

A publication issued by or with the authority of a State and containing aeronautical information of a lasting character essential to air navigation.

由国家发行的或由国家授权发行的、含有对空中航行起重要作用的持久性的航行资料出版物。

Aircraft identification 航空器识别标志

A group of letters, figures or a combination thereof which is either identical to, or the coded equivalent of, the aircraft call sign to be used in air-ground communications, and which is used to identify the aircraft in ground-ground air traffic services communications.

一组字母、数字或两者的组合，它与用于陆空通信中的航空器呼号一致或是此呼号对应的代码，用在地面与地面之间的空中交通服务通信中以识别航空器。

Air-report 空中报告

A report from an aircraft in flight prepared in conformity with requirements for position, and operational and/or meteorological reporting.

根据对位置、运行和/或气象方面作报告的规定，航空器在飞行中所准备的报告。

Air traffic advisory service 空中交通咨询服务

A service provided within advisory airspace to ensure separation, in so far as practical, between aircraft which are operating on IFR flight plans.

在咨询空域内, 对按 IFR 飞行计划飞行的航空器, 尽可能地保证相互之间的间隔而提供的服务。

Air traffic control service 空中交通管制服务

A service provided for the purpose of:

为下列目的而提供的服务:

a) preventing collisions:

防止相撞:

i) between aircraft, and

航空器之间, 和

ii) on the manoeuvring area between aircraft and obstructions; and

在机动区内航空器与障碍物之间; 和

b) expediting and maintaining an orderly flow of air traffic.

加速和保持有秩序的空中交通流动。

Air traffic service (ATS) 空中交通服务

A generic term meaning variously, flight information service, alerting service, air traffic advisory service, air traffic control service (area control service, approach control service or aerodrome control service).

飞行情报服务、告警服务、空中交通咨询服务和空中交通管制服务(区域管制服务、进近管制服务或机场管制服务)等术语的统称。

Alerting service 告警服务

A service provided to notify appropriate organizations regarding aircraft in need of search and rescue aid, and assist such organizations as required.

把关于需要搜寻和援救的航空器通知有关组织以及必要时协助该组织而提供的一种服务。

Alphanumeric characters (alphanumerics) 字符

A collective term for letters and figures (digits).

包括字母和数字的集合术语。

Altitude 海拔高度

The vertical distance of a level, a point or an object considered as a point, measured from mean sea level.

自平均海平面量至一个面、一个点或作为一个点的物体的垂直距离。

Approach sequence 进近顺序

The order in which two or more aircraft are cleared to approach to land at the aerodrome.

准许两架或多架航空器在机场上进近着陆的次序。

Appropriate ATS authority 有关空中交通服务当局

The relevant authority designated by the State responsible for providing air traffic services in the airspace concerned.

由国家指定的负责在相应空域内提供空中交通服务的有关当局。

Code (SSR) 编码

The number assigned to a particular multiple pulse reply signal transmitted by a transponder in Mode A or Mode C.

指定给某一特定的多脉冲回答信号的数字，由应答机在模式 A 或 C 下发出。

Control area 管制区

A controlled airspace extending upwards from a specified limit above the earth.

从地球表面上空某一指定高度向上延伸的管制空域。

Controlled airspace 管制空域

An airspace of defined dimensions within which air traffic control service is provided in accordance with the airspace classification.

一个规定范围的空域，在此空域内根据空域的分类等级（对有关航空器）提供空中交通管制服务。

Controlled flight 管制飞行

Any flight which is subject to an air traffic control clearance.

受空中交通管制许可约束的任何飞行。

Control zone 管制地带

A controlled airspace extending upwards from the surface of the earth to a specified upper limit.
从地球表面向上延伸至指定上限的管制空域。

Discrete code 离散编码

A four-digit SSR Code with the last two digits not being “00”.
四位数的 SSR 编码，其最后两位不是“00”。

Final approach 最后进近

That part of an instrument approach procedure which commences at the specified final approach fix or point, or where such a fix or point is not specified,
仪表进近程序的一部分，从指定的最后进近定位点或点开始，或没有指定这样的定位点或点时，

a) at the end of the last procedure turn, base turn or inbound turn of a racetrack procedure, if specified; or

从完成最后程序转弯、基线转弯或直角程序的向台转弯后（当规定有这类转弯时）开始；或

b) at the point of interception of the last track specified in the approach procedure; and

从该进近程序所规定的最后航迹的切入点开始；并且

ends at a point in the vicinity of an aerodrome from which:

到机场附近的某一点结束，从这一点起：

a) a landing can be made; or

可以进行着陆；或

b) a missed approach procedure is initiated.

开始作复飞程序。

Flight information service 飞行情报服务

A service provided for the purpose of giving advice and information useful for the safe and efficient conduct of flights.

提供有助于安全和有效地实施飞行的建议和情报的服务。

Flight level 飞行高度层

A surface of constant atmospheric pressure which is related to a specific pressure datum, 1 013.2 hectopascals (hPa), and is separated from other such surfaces by specific pressure

intervals.

以特定气压 1013.2 百帕为基准的等压面，各等压面之间具有规定的气压差。

Note 1 — A pressure type altimeter calibrated in accordance with the Standard Atmosphere;

- a) when set to a QNH altimeter setting, will indicate altitude;*
- b) when set to a QFE altimeter setting, will indicate height above the QFE reference datum;*
- c) when set to a pressure of 1 013.2 hPa, may be used to indicate flight levels.*

Note 2 — The terms “height” and “altitude” used in Note 1 above, indicate altimetric rather than geometric heights and altitudes.

Glide path 下滑道

A descent profile determined for vertical guidance during a final approach.

供最后进近时作垂直方向引导的一个下降剖面。

Heading 航向

The direction in which the longitudinal axis of an aircraft is pointed, usually expressed in degrees from North (true, magnetic, compass or grid).

航空器纵轴所指的方向，通常以北（真北、磁北、罗北或网格北）为基准的度数表示。

Height 高

The vertical distance of a level, a point or an object considered as a point, measured from a specified datum.

自某一特定基准量至一个平面、一个点或作为一个点的物体的垂直距离。

IFR flight IFR 飞行

A flight conducted in accordance with the instrument flight rules.

按照仪表飞行规则实施的飞行。

Initial approach segment 起始进近航段

That segment of an instrument approach procedure between the initial approach fix and intermediate approach fix or, where applicable, the final approach fix or point.

仪表进近程序的一部分，从起始进近定位点到中间进近定位点，或如适用，可到最后进

近定位点或点。

Level 高度

A generic term relating to the vertical position of an aircraft in flight and meaning variously, height, altitude, or flight level.

航空器在飞行中的垂直位置，是高、海拔高度和飞行高度层的统称。

Missed approach procedure 复飞程序

The procedure to be followed if the approach cannot be continued.

航空器在不能继续进近时应遵循的程序。

Mode (SSR) 模式

The conventional identifier related to specific functions of the interrogation signals transmitted by an SSR interrogator. There are four modes specified in Annex 10: A, C, S and intermode.

表示 SSR 询问机发出的询问信号有特定功能的规定标识符。附件 10 规定了 4 种模式：A、C、S 和交互模式。

Non-radar separation 非雷达间隔

The separation used when aircraft position information is derived from sources other than radar.

航空器的位置情报来自雷达以外时所采用的间隔。

No transgression zone (NTZ) 不准逾越地带

In the context of independent parallel approaches, a corridor of airspace of defined dimensions located centrally between the two extended runway centre lines, where a penetration by an aircraft requires a controller intervention to manoeuvre any threatened aircraft on the adjacent approach.

在独立平行进近中，一条限定了范围的空域走廊，它位于两条跑道中心延长线的正中，当一架航空器穿越该地带时，需要管制员的干预，设法使在相邻跑道进近的受到威胁的航空器避让。

Obstacle clearance altitude (OCA) or obstacle clearance height (OCH) 超障高度或超障高

The lowest altitude or the lowest height above the elevation of the relevant runway threshold or the aerodrome elevation as applicable, used in establishing compliance with appropriate

obstacle clearance criteria.

在相关的跑道入口标高或机场标高（适用时）之上、根据有关超障标准确定的可使用的最低海拔高度或最低高。

Note 1 — Obstacle clearance altitude is referenced to mean sea level and obstacle clearance height is referenced to the threshold elevation or in the case of non-precision approaches to the aerodrome elevation or the threshold elevation if that is more than 2 m (7 ft) below the aerodrome elevation. An obstacle clearance height for a circling approach is referenced to the aerodrome elevation.

Note 2 — For convenience when both expressions are used they may be written in the form “obstacle clearance altitude/height” and abbreviated “OCA/H”.

Precision approach radar (PAR) 精密进近雷达

Primary radar equipment used to determine the position of an aircraft during final approach, in terms of lateral and vertical deviations relative to a nominal approach path, and in range relative to touchdown.

用以确定航空器在最后进近时的位置的一次雷达设备，该位置以相对于标称进近航道的左右和垂直偏差以及距接地点的距离表示。

Note — Precision approach radars are designated to enable pilots of aircraft to be given guidance by radiocommunication during the final stages of the approach to land.

Primary radar 一次雷达

A radar system which uses reflected radio signals.

利用无线电反射信号的雷达系统。

Primary surveillance radar (PSR) 一次监视雷达

A surveillance radar system which uses reflected radio signals.

利用无线电反射信号工作的监视雷达系统。

PSR blip PSR 回波

The visual indication, in non-symbolic form, on a radar display of the position of an aircraft obtained by primary radar.

由一次雷达所获得的、在雷达显示器上以非符号形式表示航空器位置的目视指示。

Radar 雷达

A radio detection device which provides information on range, azimuth and/or elevation of objects.

一种可提供目标的距离、方位和/或高度情报的无线电探测设备。

Radar approach 雷达进近

An approach in which the final approach phase is executed under the direction of a radar controller.

在最后进近阶段由雷达管制员引导下所做的进近。

Radar clutter 雷达杂波

The visual indication on a radar display of unwanted signals.

雷达显示器上干扰信号的目视指示。

Radar contact 雷达看到

The situation which exists when the radar position of a particular aircraft is seen and identified on a radar display.

当在雷达显示器上看到某一特定航空器的雷达位置并识别出其身份的情况。

Radar control 雷达管制

Term used to indicate that radar-derived information is employed directly in the provision of air traffic control service.

用来表示雷达获取的情报被直接用于提供空中交通管制服务的术语。

Radar controller 雷达管制员

A qualified air traffic controller holding a radar rating appropriate to the functions to which he is assigned.

持有与指定职责相应的雷达等级证书的合格的空中交通管制员。

Radar display 雷达显示器

An electronic display of radar-derived information depicting the position and movement of aircraft.

可显示由雷达获取的能表明航空器位置和移动情况的电子显示设备。

Radar identification 雷达识别

The situation which exists when the radar position of a particular aircraft is seen on a radar display and positively identified by the air traffic controller.

当空中交通管制员在雷达显示器上看到某一特定航空器的雷达位置并明确地识别出其身份的情况。

Radar map 雷达视频图

Information superimposed on a radar display to provide ready indication of selected features.

在雷达显示器上把经过选择的地形进行显示以提供现成指示的情报。

Radar monitoring 雷达监视

The use of radar for the purpose of providing aircraft with information and advice relative to significant deviations from nominal flight path, including deviations from the terms of their air traffic control clearances.

使用雷达向航空器提供有关重大偏离标称飞行路线的情报和建议, 包括不符合空中交通管制许可的情况。

Radar position indication (RPI) 雷达位置指示

The visual indication, in non-symbolic and/or symbolic form, on a radar display of the position of an aircraft obtained by primary and/or secondary surveillance radar.

雷达显示器上以符号和/或非符号形式表示由一次和/或二次监视雷达获得的航空器位置的目视指示。

Radar position symbol (RPS) 雷达位置标识符

The visual indication, in symbolic form, on a radar display, of the position of an aircraft obtained after automatic processing of positional data derived from primary and/or secondary surveillance radar.

雷达显示器上以符号形式表示航空器位置的目视指示, 该位置是由一次和/或二次监视雷达提供的位置数据并经自动处理后得到的。

Radar separation 雷达间隔

The separation used when aircraft position information is derived from radar sources.
航空器的位置情报来源于雷达时所采用的间隔。

Radar service 雷达服务

Term used to indicate a service provided directly by means of radar.
用于表示使用雷达直接提供服务的术语。

Radar track position 雷达航迹位置

An extrapolation of aircraft position by the computer based upon radar information and used by the computer for tracking purposes.
由计算机根据雷达情报用外推法求得的航空器位置，并用于计算机对航空器进行跟踪。

Note — In some cases, information other than radar-derived information is used to assist the tracking processes.

Radar unit 雷达单位

That element of an air traffic services unit which uses radar equipment to provide one or more services.
空中交通服务单位中利用雷达设备提供一种或多种服务的部门。

Radar vectoring 雷达引导

Provision of navigational guidance to aircraft in the form of specific headings, based on the use of radar.
利用雷达，以具体航向的形式向航空器提供的领航引导。

Secondary radar 二次雷达

A radar system wherein a radio signal transmitted from the radar station initiates the transmission of a radio signal from another station.
一个雷达站发出的无线电信号可引起另一雷达站发射无线电信号的雷达系统。

Secondary surveillance radar (SSR) 二次监视雷达

A surveillance radar system which uses transmitters/receivers (interrogators) and transponders.
使用发射机/接收机组（询问机）和应答机工作的监视雷达系统。

SSR response SSR 应答信号

The visual indication, in non-symbolic form, on a radar display, of a response from an SSR transponder in reply to an interrogation.

雷达显示器上以非符号形式表示二次监视雷达应答机回答询问所做的应答的目视指示。

Surveillance radar 监视雷达

Radar equipment used to determine the position of an aircraft in range and azimuth.
用于以距离和方位的方式确定航空器位置的雷达设备。

Track 航迹

The projection on the earth's surface of the path of an aircraft, the direction of which path at any point is usually expressed in degrees from North (true, magnetic or grid).

航空器飞行的路径在地面上的投影，其任何一点的方向通常以北（真北、磁北、罗北或网格北）为基准的度数表示。

Traffic avoidance advice 冲突避让建议

Advice provided by an air traffic services unit specifying manoeuvres to assist a pilot to avoid a collision.

空中交通服务单位提供的如何进行机动飞行的建议，以帮助飞行员避免碰撞。

Traffic information 冲突情报

Information issued by an air traffic services unit to alert a pilot to other known or observed air traffic which may be in proximity to the position or intended route of flight and to help the pilot avoid a collision.

空中交通服务单位发布的关于其他已知的或观察到的空中交通情报，以警告飞行员在其附近或预定航线上另有活动，帮助飞行员避免碰撞。