National Air Traffic Services

AIR TRAFFIC CONTROL AT ABERDEEN

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Introduction by the Chief Officer, Civil Aviation Authority, Aberdeen Airport

Aberdeen (Dyce) Airport recorded its first civil aircraft movement over 50 years ago, in March 1931, when aviation pioneer Eric Gandar Dower landed a Blackburn Bluebird in a field at Dyce. In May 1934, on the newly constructed runway, Aberdeen Airways started a daily scheduled service to Orkney. In October 1935, Aberdeen Airways took delivery of a new eight-seater de Havilland Dragon and started a service to London. This service took 3½ hours and cost £10.

Today Aberdeen Airport and the air traffic services provided by the National Air Traffic Services have moved into the 80s providing a safe and effective air traffic control service to some 110,000 fixed wing and helicopter movements a year at the airport and over the North Sea. Aberdeen is currently the United Kingdom's third busiest airport and Europe's biggest heliport.

The size of the operation and the hostile working environment of the North Sea demand both a high level of technical equipment and professional expertise to ensure that helicopter and fixed wing operations are safely and efficiently integrated in all weather conditions.

The National Air Traffic Services will continue to meet the unique challenge presented by offshore operations into the 90s.

Aberdeen Control Tower

HOW AIRSPACE IS ORGANISED

United Kingdom airspace is divided into two **Flight Information Regions** – London and Scottish – with air traffic control centres at West Drayton, Middlesex, and Prestwick, Ayrshire. The Oceanic Area Control Centre, also at Prestwick, looks after air traffic in the eastern part of the North Atlantic.

Within the Flight Information Regions, some airspace is designated **Controlled Airspace** and some is designated **Special Rules Airspace.**

Controlled Airspace is sub-divided into Control Zones surrounding major airports.

Terminal Control Areas, usually at the confluence of airways near major aerodromes.

Airways which are corridors of airspace 10 miles wide, extending up to 24,500 feet from a base, usually of 5000 to 7000 feet. They connect the Terminal Control Areas and link with the airways of adjacent countries.

Special Rules Airspace comprises all the airspace between 24,500 and 66,000 feet. Civil traffic in it is subject to special rules ensuring a full and mandatory ATC service. Most of this airspace is also a military Mandatory Radar Service Area in which military aircraft must receive a radar control service. Special Rules Airspace also occurs below 24,500 feet near some aerodromes where there is special need to protect public transport flights without introducing all the requirements of controlled airspace. For example, at Aberdeen Special Rules Airspace extends from ground level up to 11,500 feet.

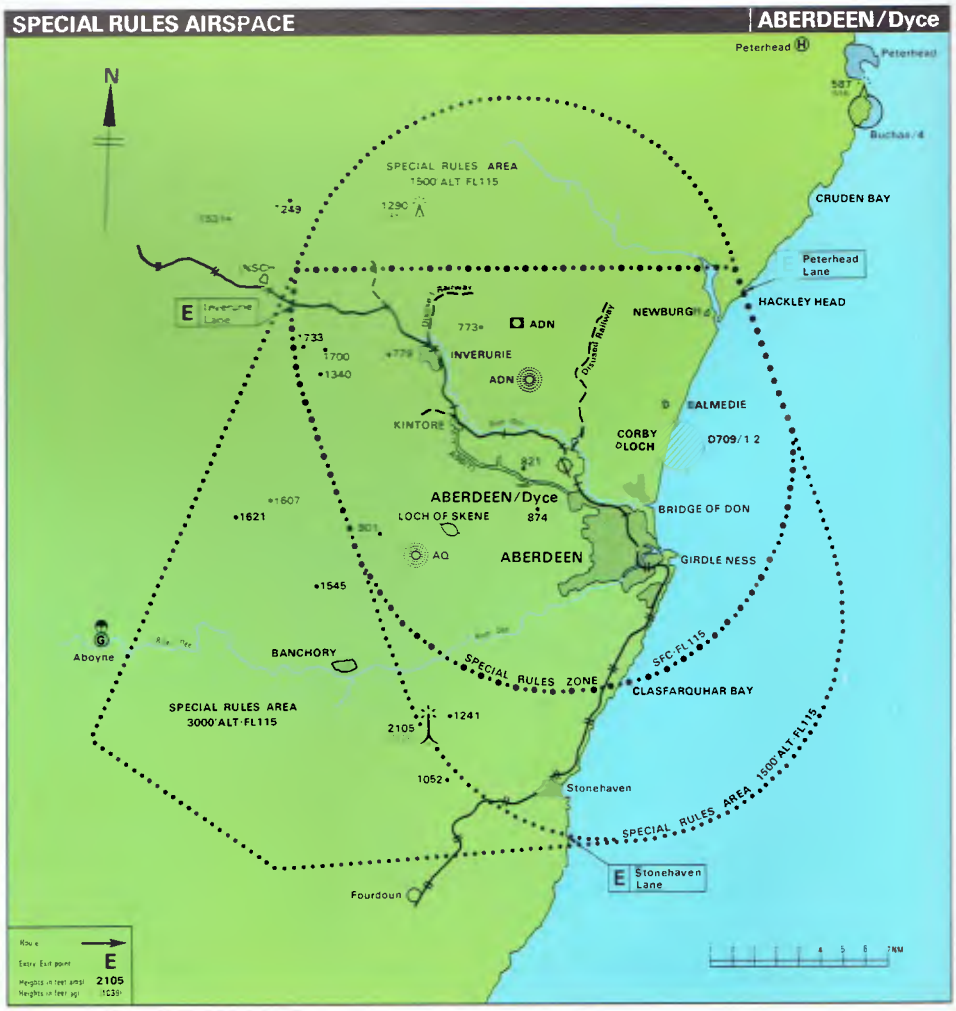
Outside these categories of airspace a variety of services is available on request from both civil and military air traffic control units, but it is not mandatory for pilots to use them.

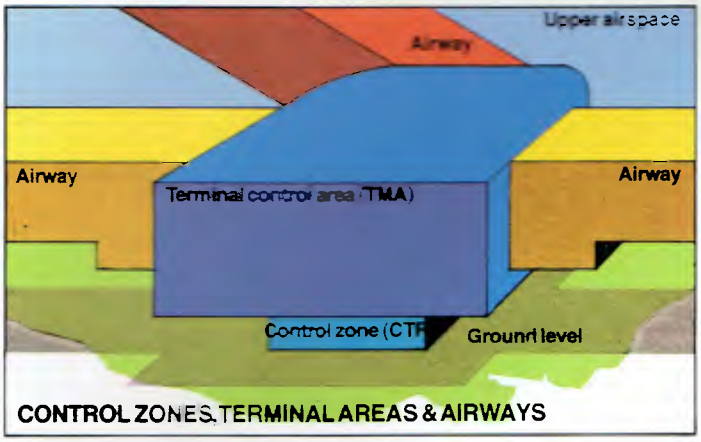
AIR TRAFFIC MANAGEMENT IN THE UNITED KINGDOM

Air traffic in United Kingdom airspace is managed by the National Air Traffic Services (NATS), an organisation jointly responsible to the Civil Aviation Authority and the Ministry of Defence. NATS is responsible for air traffic services to civil and military air traffic, and for the planning, provision and maintenance of radars, navigational aids, and communications.

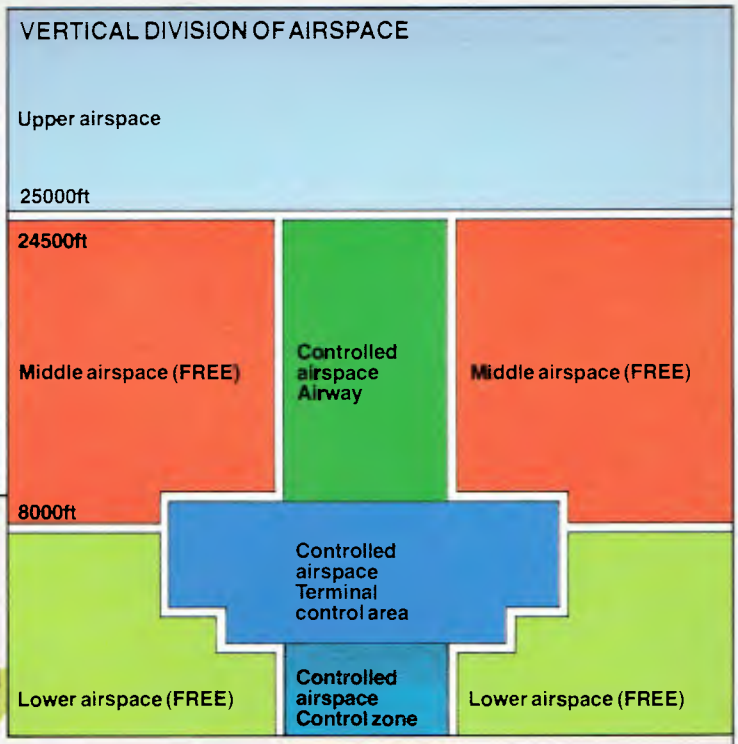
The aim of NATS is to ensure the safe, orderly and expeditious flow of air traffic within UK airspace, which extends over the land mass and the seas and oceans surrounding it. NATS also provide services over the eastern part of the North Atlantic – a responsibility assigned to the UK by the International Civil Aviation Organisation.

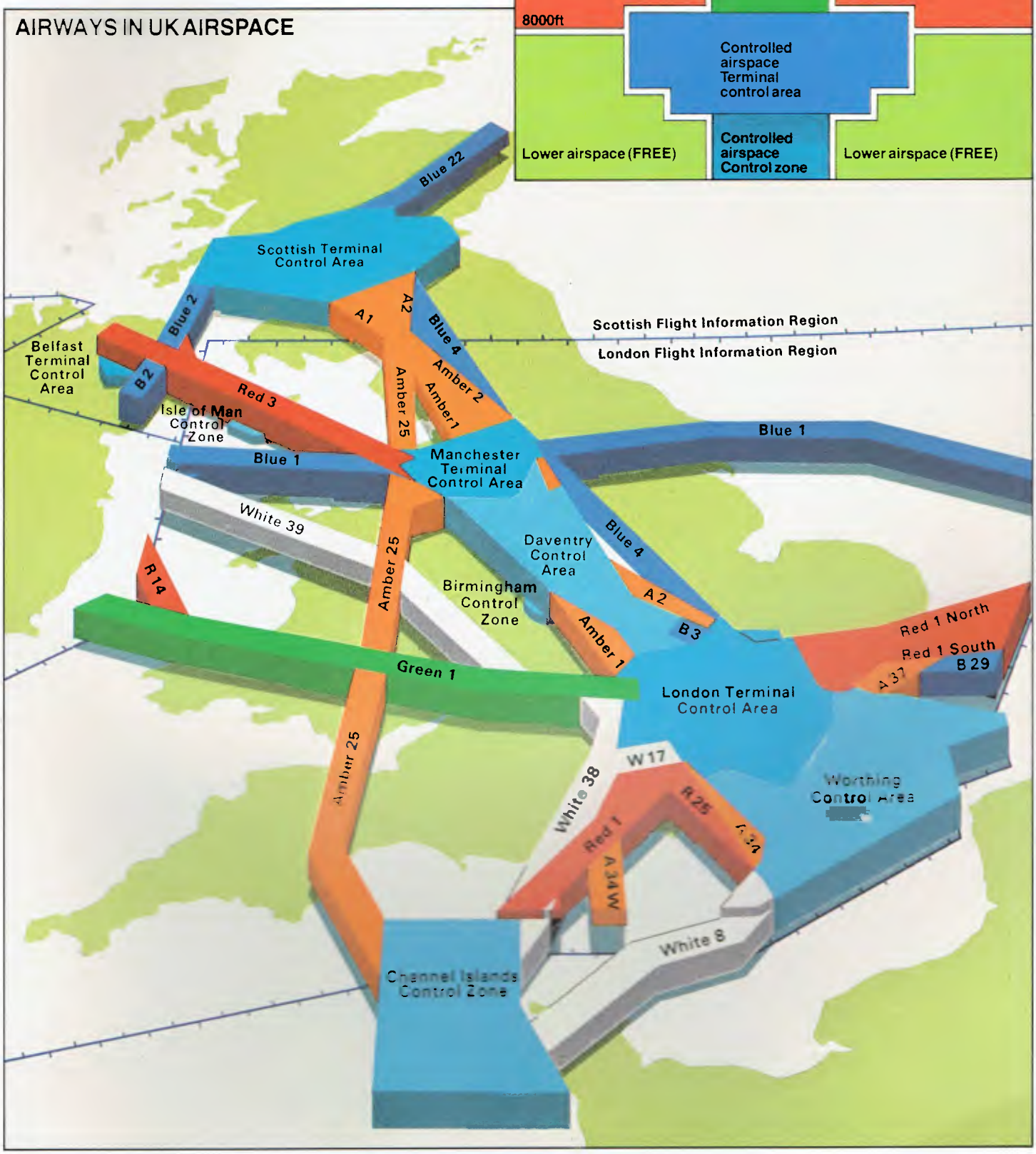
Air traffic in UK airspace is varied, ranging from public transport flights of the airlines to military aircraft on operational training; from the private pilot flying for pleasure to helicopters plying their way between oil rigs and the mainland; from island-hopping passenger services in the Scottish Highlands and Islands to agricultural crop-spraying aircraft; balloons and gliders.





CONTROL ZONES, TERMINAL AREAS & AIRWAYS





SERVICES PROVIDED BY NATS

A pilot using the Aeronautical Information Service at Aberdeen

As well as ensuring that the aircraft are adequately separated, the National Air Traffic Services provide flight information and alerting services to aircraft flying under their control. Flight information consists of all the data required for the safe navigation of aircraft, such as the radio frequencies for air/ground communications, the serviceability of navigation aids, the height, speed and direction of other aircraft in the vicinity when required, as well as the weather conditions prevailing en-route and at the destination airport. Should an emergency arise, the alerting service brings into action all organisations that can assist, such as the Rescue Co-ordination Centre, the police and other rescue services, including the fire brigade, HM Coastguard and the RNLI. Over the North Sea, rescue services are supported by maritime reconnaissance aircraft and winch-equipped civil and military helicopters.

The function of air traffic control is to keep each aircraft safely separated from all others to internationally agreed standards. This is achieved either by allocating different heights or by arranging certain minimum horizontal distances between aircraft. Information to provide this service is available to air traffic control by direct communication between the pilot and the air traffic controller, and by using information derived from ground-based radars.

CONTROLLING INCOMING AIRCRAFT

The Helicopter Offshore control suite

Fixed wing aircraft approaching Aberdeen are directed by the Scottish Air Traffic Control Centre at Prestwick to the reporting point located by a ground radio beacon 6 miles north of the airport to await their turn to land. Helicopters arriving from the North Sea are directed by Aberdeen Offshore Radar from 50-80 miles out in the North Sea towards the airport, where they are sequenced into the correct order for landing. Before they land at the airport, pilots need to know the prevailing weather conditions, the runway in use and the navigational approach aids available. This information is recorded and continuously transmitted on a discrete radio frequency. It is known as the Automatic Terminal Information Service, and its information is updated by an air traffic control assistant every half-hour or when significant changes in the weather occur.

HELICOPTER MAIN ROUTES–NORTHERN NORTH SEA

IN ABERDEEN AIRPORT CONTROL TOWER

In the control tower at Aberdeen there are four distinct air traffic control functions – Ground Movement Control, Aerodrome Control, Approach Control and Helicopter Offshore Control.

Ground Movement Control and Aerodrome Control operate from the Visual Control Room at the top of the tower, with a good all-round view of the airport and the approaches to the main and helicopter runways. From here, aircraft are controlled on their final approach to land, when they are preparing for departure, when taxying and during actual take-off. Aircraft and vehicles moving on the runways and taxiways are also controlled from the Visual Control Room.

Approach Control and Helicopter Offshore Control are situated on the first floor of the control tower and use primary and secondary radar equipment to guide fixed-wing aircraft and helicopters into and out of Aberdeen Airport and while they are flying over the North Sea.

APPROACH CONTROL

Approach Control at Aberdeen

The Approach Control radar suite is manned by two radar controllers and an Approach Procedural Controller.

The Approach Radar Controllers are designated No.1 and No.2. The No.1 Radar Controller works closely with the Approach Procedural Controller, taking the first radio call on aircraft approaching Aberdeen and directing the aircraft into the sequence of landing traffic. The No.1 controller continuously advises pilots to adjust their height, speed and route to ensure an orderly stream of traffic which is separated from departing aircraft. He then hands over to the No.2 Radar Controller who establishes the correct landing interval and ensures that all aircraft are correctly separated according to the prevailing weather conditions and types of aircraft involved. Because of their size and weight, larger aircraft, such as the Tristar and Boeing 757, create more turbulence to the air through which they pass than small or slower aircraft and helicopters. As this turbulence can upset the flying characteristics of lighter aircraft following behind, greater separation distances have to be provided.

◀ *The Visual Control Room*

The Aerodrome Controller on night duty

HELICOPTER CONTROL

Some of the helicopters that use Aberdeen for their North Sea operations

Adjacent to the Approach Control radar suite is the Helicopter Offshore suite, manned by a radar controller and an air traffic control assistant. This position provides air traffic services to helicopters over about 7000 square miles of the northern North Sea.

Up to ninety helicopters for North Sea operations are based at Aberdeen at any one time. Their daily operation takes in about 200 drilling rigs, oil production platforms, crane barges and the many oil support and diving vessels in the North Sea. The total offshore workforce can be as high as 20,000 people and the direct link with the mainland is by helicopter. These operations demand a high level of safety and regularity of service, even in hostile weather. The helicopter services are supported from Aberdeen by the resources of the National Air Traffic Services which provide air traffic control, alerting and navigational services. When departing from or arriving at Aberdeen Airport, helicopters conform to the same procedures as those used by fixed-wing aircraft. Over the North Sea, a radar and communication service between the helicopter pilot and Air Traffic Control is maintained by ATC at Aberdeen and other NATS units en-route. Such is the scale of the operation and the current capability of the helicopter that flights are regularly away from home base for up to six hours with only a brief stop on the helideck of their destination oil platform.

AERODROME CONTROL

Aerodrome Control at Aberdeen is complex, frequently with more than one stream of landing or departing aircraft using a multi-runway operation simultaneously. This operation entails the integration of fixed-wing aircraft with helicopters, using both instrument and visual approaches depending on the prevailing weather conditions.

Arriving aircraft and helicopters are merged into the landing stream and aligned with the runway about 6 to 8 miles from touchdown, when control is transferred to the Air Controller in the Visual Control Room. It is his responsibility to ensure that the runways are used to their optimum capacity.

When, from his commanding position overlooking the whole of the airfield, the Air Controller can see that the runway is clear, he issues the landing clearance to the first incoming pilot. He gives the current direction and strength of the surface wind, and the condition of the runway surface: if, for any reason, it is not safe to land, he will issue 'missed approach' instructions.

ABERDEEN – LOCATION OF TRAFFIC BLOCKS

To monitor the spacing between aircraft, the controller uses the Distance From Touchdown Indicator (DFTI), which shows part of the radar picture used in Approach Control and is displayed on a small daylight viewing tube. This enables the controller to determine the aircraft's distance from the touchdown point and its separation from the next aircraft.

Aircraft in the care of Ground Movement Control

Distance from Touchdown Indicator

Aberdeen-based helicopters have a special runway that they can use day and night, so that they avoid conflicting with the fixed-wing landing aircraft. Beside this runway is a visual landing aid (CHAPI – CRAMP Helicopter Approach Path Indicator) which consists of a lamp unit that gives helicopter pilots a visual glide path of 7° (compared to the fixed wing aircraft glide path of 3°).

GROUND MOVEMENT CONTROL

After the aircraft has landed, it is important that it should leave the runway as quickly as possible to unload its passengers or freight. When the aircraft is clear of the runway, the Air Controller instructs the pilot to contact the Ground Movement Controller who then directs the aircraft to its parking stand.

The Ground Movement Controller watches the inbound taxying aircraft's progress and integrates its movements with other aircraft and vehicles. He is responsible for taxying aircraft, both arriving and departing, as well as aircraft being towed and the airport service vehicles. All this traffic is in radio communication with the Ground Movement Controller.

In the daytime, when there is good visibility, he controls aircraft and vehicles by direct observation, which is why the Visual Control Room occupies such a commanding position in the airport complex.

Passengers disembarking from a Sikorsky S-61

At night, and during low visibility conditions during the daytime, aircraft are guided by green centreline and red stop bar lights embedded in the taxiways. The lighting is controlled from the Visual Control Room lighting panel by either the Ground Movement or the Air Controller.

DEPARTING AIRCRAFT

When an aircraft has loaded its fuel, catering supplies, baggage and passengers, the doors are closed and seat belts fastened, and the pilot makes a radio call to the Ground Movement Controller for permission to start engines. The Ground Movement Controller in the Visual Control Room advises the pilot when to start so that he will not be unduly delayed either in the air or on the ground, thus saving fuel. He has to consider how many other aircraft have started up, whether there is any congestion along the outbound air routes – both in the UK and abroad – and, if there is, the availability of time and height 'slots'. When the Ground Movement Controller has given the pilot 'start-up' clearance and received confirmation that he is ready to move, he allows the aircraft to be pushed back from its stand by a tug, advises the pilot of the runway in use and guides him to the runway holding point.

As the aircraft approaches the holding point on the taxiway, responsibility is transferred to the Air Controller, who lines up the aircraft in departure sequence to obtain maximum use of the runway concerned. For example, when two aircraft of a similar type are departing in rapid succession, one for a northbound destination followed by one for a southbound destination, they may be allowed to leave one minute apart but, because many different types of aircraft and helicopters use Aberdeen, the interval may be increased according to aircraft type and their specific departure route.

With the aircraft lined up in sequence ready to take off, the Air Controller issues individual take-off clearances. When each aircraft is safely airborne it is handed over to other air traffic control agencies, such as the Scottish Air Traffic Control Centre, to continue safely on its way.

Departing aircraft


British

TELECOMMUNICATIONS

Telecommunications are the essential link between aircraft and Air Traffic Control and, broadly speaking, can be divided into Communications, and Radar Navigational Aids.

At Aberdeen, five VHF radio telephone channels provide communications between ATC and aircraft, both on the ground and in the air, to the limits of Aberdeen's area. In addition, three UHF channels provide radio telephone cover to airport vehicles, including the airport fire service. A discrete channel is provided in conjunction with the main DVOR navigation beacon at Whiterashes, to transmit meteorological and other essential information to arriving and departing aircraft. A UHF air/ground channel is available to assist ATC in liaison with military aircraft operating over the congested North Sea.

The transmitters and receivers for these channels are housed at sites away from the airfield in order to give maximum cover. In communications, nothing can be left to chance, so each channel has main and standby equipment and the main air/ground channels also have a third, back-up set of equipment in the control tower in case of major line or electrical failures.

This network of channels is fed through the Radio Distribution and Control Equipment, known as RDCE. RDCE gives each controller access to his allocated channel. At the same time it allows him to monitor and use other channels as required, and to communicate with any other controller by intercom. Each controller has on his desk a battery-operated standby handset, which can bypass the RDCE and connect him to the standby equipment on his channel in case of electrical failure.

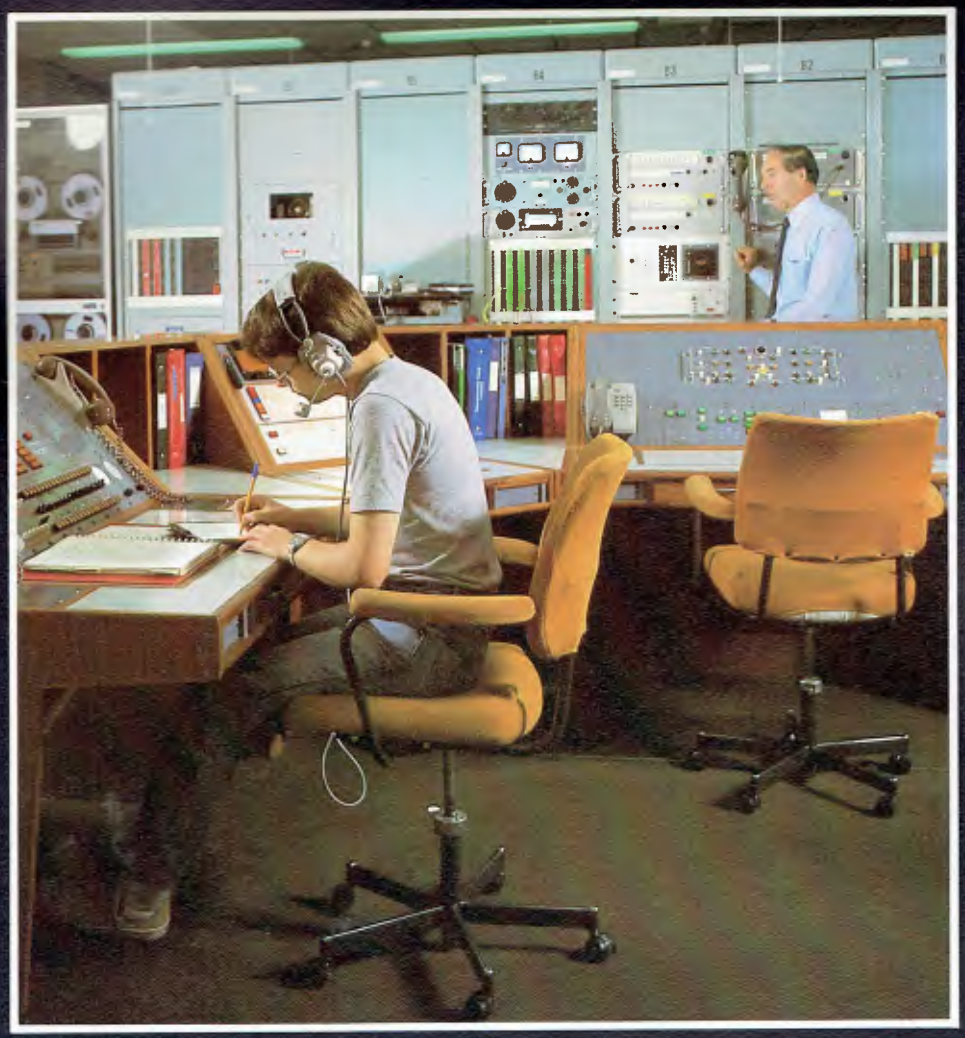
Closely associated with the RDCE is the Telephone Distribution and Control Equipment, which gives controllers immediate push-button connection to all other controllers in the control tower, to the Scottish and Oceanic Air Traffic Control Centres in Prestwick, to several other smaller units, to the equipment maintenance console in the telecommunications equipment room and to the public telephone system.

Transmitter aerial

Controllers can select any radio channel or telephone line they need. They can use the telephone system without removing their headsets because the left earpiece and the microphone of their headsets are connected to the telephone, while the right earpiece remains connected to the radio network so that incoming radio calls can always be heard.

Because spoken communication is such a vital tool in air traffic control, all speech to and from the control position, whether radio or telephone, is automatically recorded on a multi-channel tape recorder. The tapes are kept for a minimum of 30 days. This gives time for enquiries to start on any incident, when the tapes are impounded until investigations are complete. To assist such an investigation, a time signal is injected on to the tape every ten seconds.

DVOR beacon at Whiterashes



◀ *Telecommunications Systems Control and monitoring equipment*

Telecommunications equipment room ▼

NAVIGATIONAL AIDS

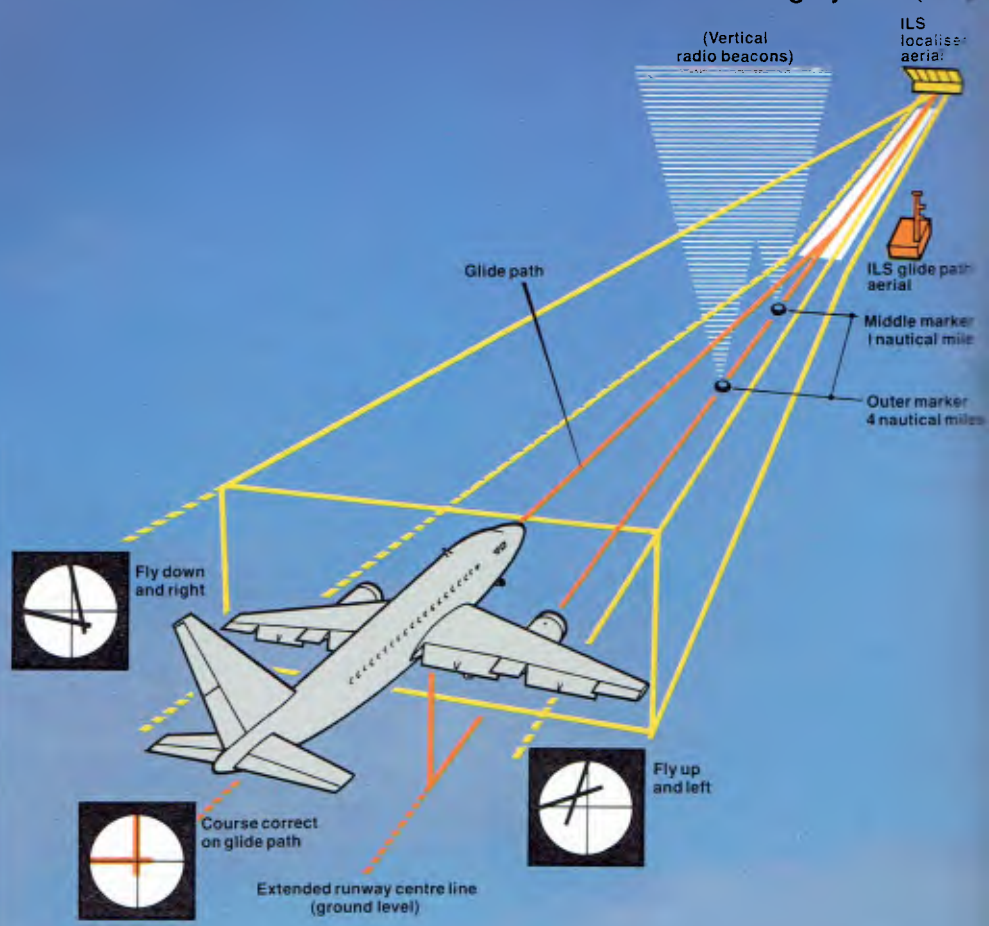
INSTRUMENT LANDING SYSTEM

When the Radar Director in Approach Control has positioned the aircraft on the extended centreline of the runway, the pilot completes the approach by using the Instrument Landing System (ILS).

The ILS is a radio system which transmits two beams, one – the localiser – operating on VHF, the other – the glide path – operating on UHF. The localiser beam defines the centreline of the runway and extends along the approach path for twenty miles. The glide path beam defines the angle or glide slope which the aircraft should fly while following the localiser course to approach the runway, safely clearing all obstacles. When this system is coupled to the aircraft's flight control system, certain aircraft can make automatic landings in very poor visibility. To ensure the utmost reliability in any conditions, the ILS equipment has to be tested to a 10-million-to-one failure factor. It employs duplicate electronic systems, no-break power supplies and continuous monitoring of signal accuracy and integrity.

Alternatively, a pilot may use the aircraft's ILS instruments to correct his position relative to the glide path and centreline while he controls the aircraft manually.

There are several internationally recognised categories of ILS performance. The Category I system at Aberdeen permits operations with a



A close-up of the DVOR

The glide path aerial

BEACONS

Doppler VHF Omni-Range beacon (DVOR) gives a continuous bearing to aircraft flying to or from the beacon, and the pilot can use it either to obtain a bearing or for a course to fly. The Aberdeen DVOR at Whiterashes is used partly as an airport aid, when aircraft use it to establish themselves before making a northerly ILS approach, and partly as an en-route aid, particularly for the North Sea helicopters, whose route structure is centred on the DVOR.

The localiser aerial

The non-directional beacon

Non-Directional Beacon (NDB) is a radio navigation beacon which helps the pilot to fly along a pre-set flight path to make a clear approach to the runway.

Digital Resolution Direction Finding (DRDF) assists Air Traffic Control to locate an aircraft. When an aircraft transmits a radio message on VHF, this signal is converted into a digital readout on a display which gives the controller the actual bearing of that aircraft from the airfield.

The Digital Resolution Direction Finding aerial

cloud base as low as 60 metres and a forward visibility down to 800 metres runway visual range.

The operational integrity of the ILS is checked every 90 days by the Civil Aviation Authority's Flying Unit which uses aircraft equipped as flying laboratories to measure and check the accuracy of the systems.

Distance Measuring Equipment (DME) is closely associated with the DVOR and is sited at the same location. It 'replies' to interrogations from the aircraft, which converts the time taken for reply into distance from the beacon.

AFTN

International and national airline operations are supported by a world-wide teleprinter system, called the Aeronautical Fixed Telecommunications Network (AFTN), specifically planned for air traffic purposes. Aberdeen is connected to the AFTN via Heathrow, so that flight plans, meteorologial information or any other operational or official message may be passed to any other AFTN terminal in the world. Many of these incoming messages are automatically routed to their address. At Aberdeen, an extension of this automatic 'Message Router' is used to pass meteorological information, navigational warnings and similar operational messages to various airline and helicopter operators, and to certain oil companies who operate oil rigs and platforms outside the ground-based range of airport equipment.

AFTN – a specialist teleprinter operator using Transtel equipment

CCTV

A closed circuit television system is provided to give information from the Meteorological Office in the control tower to the air traffic controllers, the flight clearance/briefing room and the AFTN.


British
airways
G-BFFK

NATS also supply air traffic services at:

Bedford
Belfast
Benbecula
Birmingham
Boscombe Down
Cardiff
Edinburgh
Farnborough
Gatwick
Glasgow
Heathrow
Inverness
Islay
Kirkwall
Manchester
Prestwick
Stansted
Stornoway
Sumburgh
Tiree
Wick

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