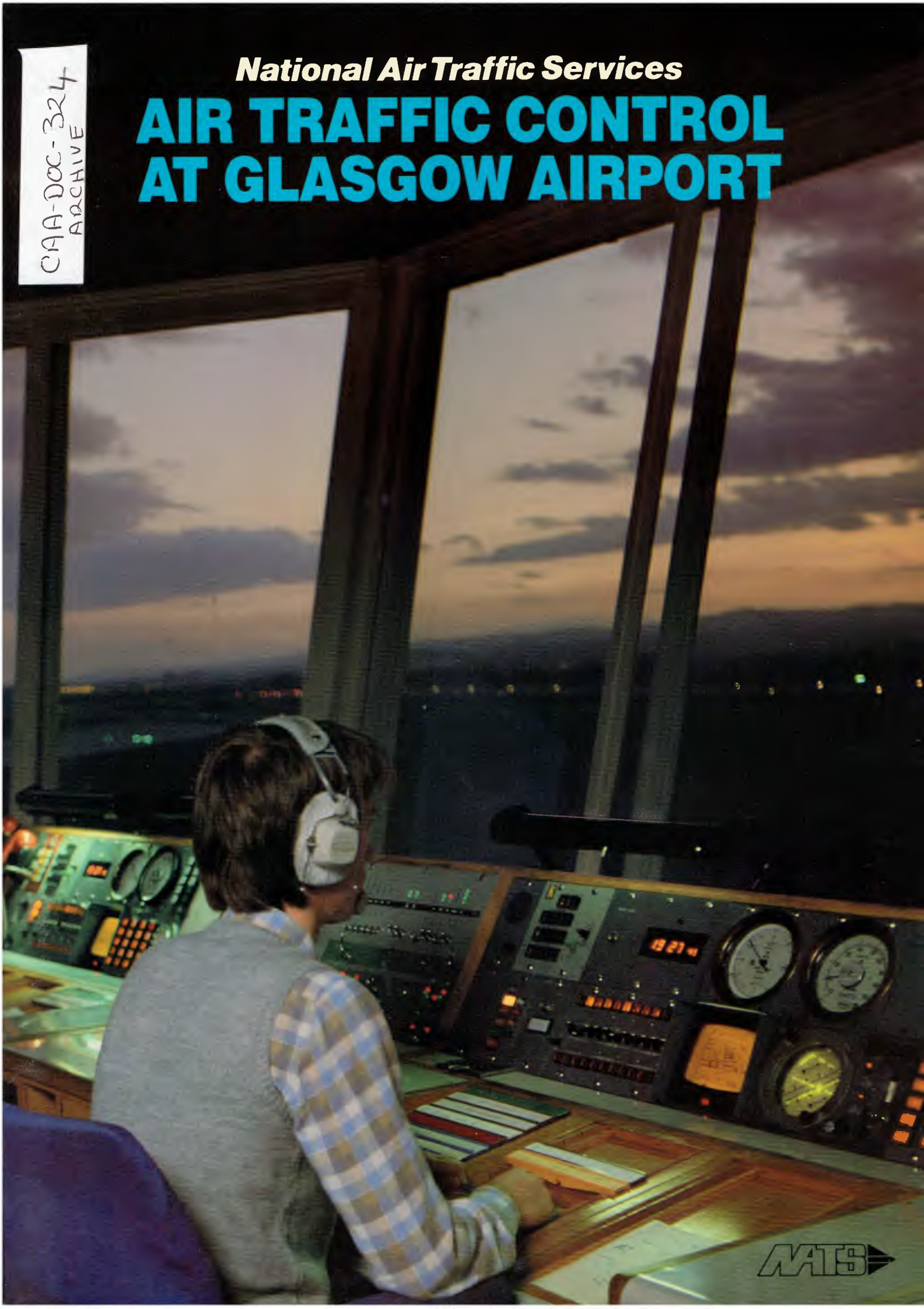
National Air Traffic Services

# AIR TRAFFIC CONTROL AT GLASGOW AIRPORT



# AIR TRAFFIC CONTROL AT GLASGOW AIRPORT

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

◀ *An aerial view of Glasgow Airport from the south*



*The pilot of every public transport aircraft (that is, one that carries paying passengers or freight or both) must file a flight plan. The pilot plans his route, decides his economical height and speed, and calculates his fuel requirements. His flight plan also gives the time he expects to arrive at various points, and his ETA (estimated time of arrival). Before completing the flight plan the pilot consults the meteorological department because wind strengths affect his speed, and he may need to alter height or course to avoid bad weather or to take advantage of a following wind. Finally, he submits his plan to Air Traffic Control.*

*The relevant flight plan data is computer-processed and presented to the controller as a flight progress strip.*

**The origin of Abbot's Inch lying between the White and Black Cart rivers is lost in time, but the history of the airfield there is better recorded. In 1932 the site became an airfield known by the contemporary spelling of 'Abbotsinch'.**

**Originally the headquarters of 602 (City of Glasgow) Squadron, Royal Auxilliary Air Force, the name became synonymous with this famous squadron. In 1943 Abbotsinch was transferred to the Fleet Air Arm and became HMS Sanderling. It remained a naval station until 1963, when the white ensign was hauled down from the mainmast.**

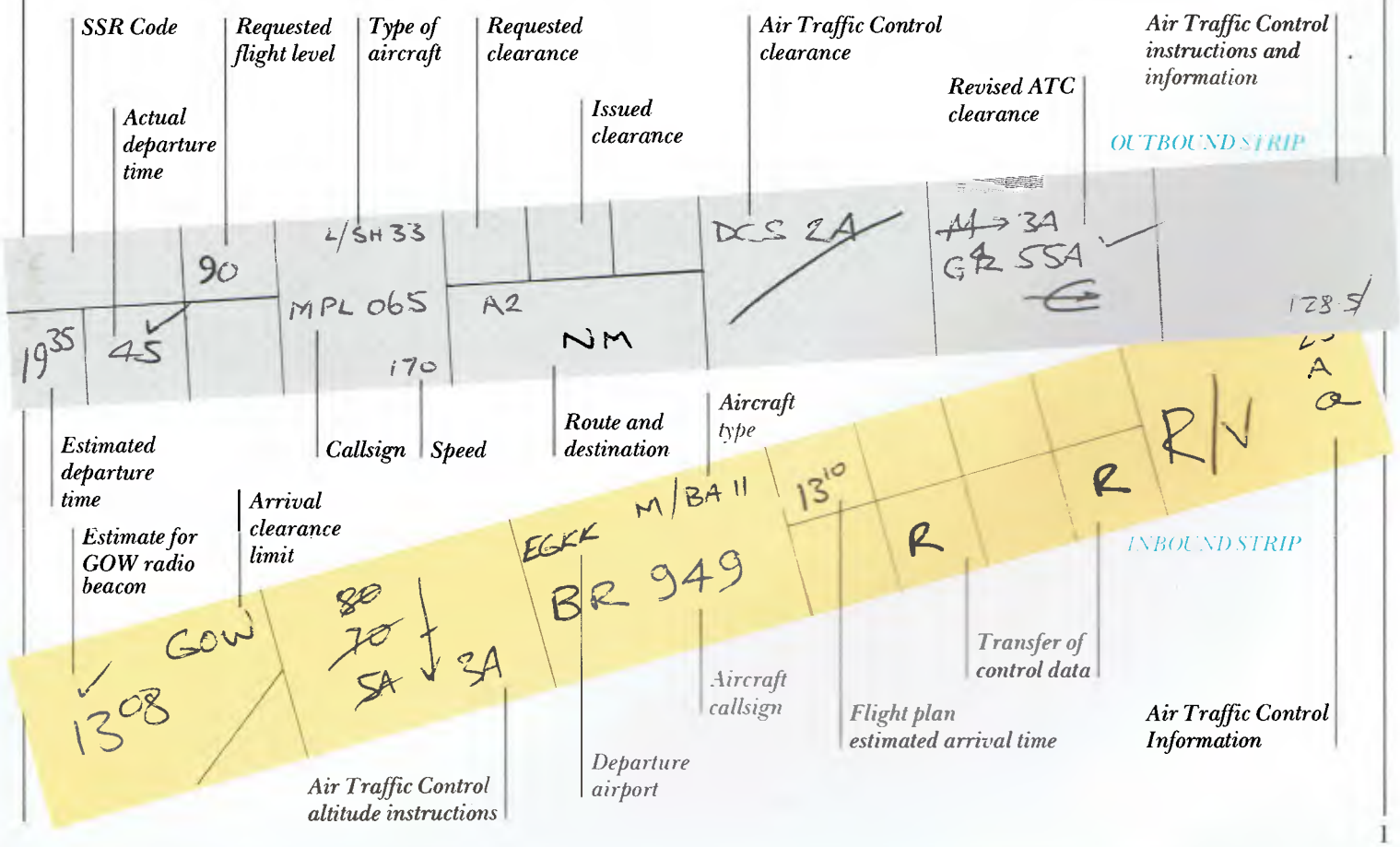
The need to develop Abbotsinch as a civil airport became apparent when the original airport at Renfrew which served Glasgow could expand no further. The airfield was officially opened as Glasgow Airport on 27 June 1966.

The airport is now the fourth busiest in the United Kingdom, handling nearly 2½ million passengers and 95,000 aircraft movements annually. To meet this demand, it is equipped with two independent radars and blind landing systems on the main runways. Air traffic control is provided by the National Air Traffic Services, who have refurbished the control tower and opened a new Approach Radar Control Room, which has been planned to accommodate any expansion that may be needed up to the 21st century.

To many air travellers the control tower and radar aerials are visible reminders of the air traffic services. In reality, they are only a small part of the facilities, organisation and planning necessary to ensure that each aircraft can operate safely and expeditiously and at the same time be integrated with all other civil and military aircraft operating in United Kingdom airspace.

To achieve this high level of safety and efficiency, the National Air Traffic Services use modern and sophisticated equipment, maintained by its own staff.

This booklet endeavours to give the reader a broad insight into the main responsibilities of NATS and a more detailed, behind-the-scenes, look at the facilities at Glasgow. It is hoped that it will also show the nationwide nature of the task and the intricate part in it that each airport plays.



# SERVICES PROVIDED BY NATS

Within controlled airspace, the main function of air traffic control is to keep each aircraft safely separated from all others in accordance with internationally-agreed standards. This is achieved by allocating different heights or by arranging certain minimum horizontal distances between aircraft. The separation distances vary according to the appropriate rules. For example, an aircraft flying in the Glasgow Control Zone under radar surveillance will be separated from other aircraft at the same height by at least three nautical miles. If two aircraft are less than three nautical miles apart horizontally, they are separated vertically by at least 1000ft.

As well as ensuring that aircraft are adequately separated, ATC provides flight information and alerting services to aircraft flying under their control.

Flight information consists of all the data required for safe navigation of aircraft, such as radio frequencies for air/ground communications, the serviceability of navigation aids, the height, speed and direction of flight of other aircraft in the vicinity and 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 provide assistance – airfield and local fire services, the police, the Rescue Co-ordination Centre, HM Coastguard and the RNLI. Over the seas surrounding the UK the rescue services are supported by maritime reconnaissance aircraft and winch-equipped civil and military helicopters.

# IN THE CONTROL TOWER AT GLASGOW

In 1984, Glasgow Airport was the fourth busiest airport in the UK, handling 94,848 aircraft movements and 2,476,900 passengers.

A wide variety of aircraft types use the airport, ranging from the jets of the big airlines to the smaller airliners of regional airlines; from executive jets to light aircraft operated by flying clubs.

To provide air traffic control services to this wide selection of aircraft, ATC at Glasgow Airport is divided into two distinct functions – Approach Control and Aerodrome Control. Although these functions are located on different floors in the Control Tower, the procedures which are used give a fully integrated service – not only within Glasgow ATC but also with the Scottish Air Traffic Control Centre (ScATCC) and the air traffic control units at Edinburgh and Prestwick Airports.

*A pilot collecting pre-flight briefing information from the Aeronautical Information Service*

# APPROACH CONTROL

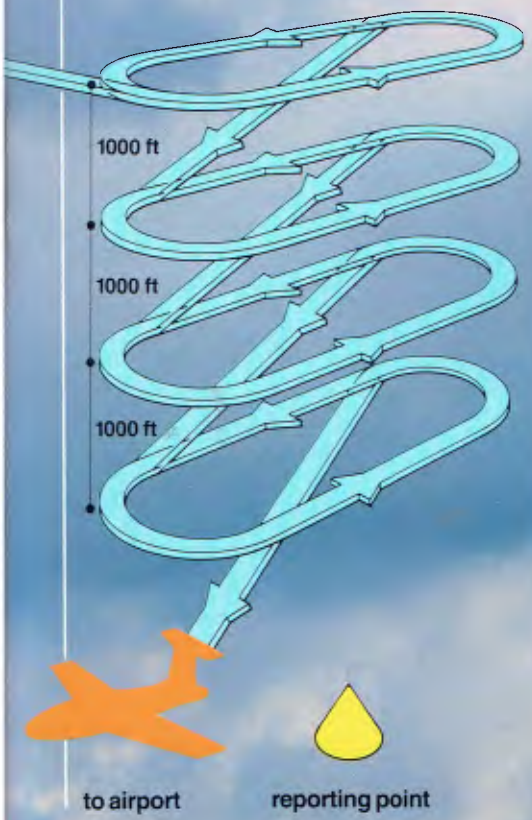
In a new Approach Control room on the ground floor of the control tower, three Approach Radar Controllers work as a team, using primary radar equipment to guide aircraft in and out of the airport.


When an inbound aircraft is about 40 miles from Glasgow Airport a controller at the Scottish Air Traffic Control Centre hands over control to one of the Approach Radar Controllers at Glasgow who has details of the aircraft's height and estimated time of arrival. When he receives the first call from the pilot, the Approach Controller gives the pilot an initial clearance. This may include instructions to enter a holding pattern, or 'stack', if an approach delay is expected. Aircraft in the holding pattern circle at different heights round a reporting point until the way is clear for them to be guided into the sequence for landing.

The Approach Radar Controllers work closely together to establish the correct landing intervals between aircraft on final approach by instructing the pilots to adjust their height, speed and route so that they are correctly separated.

The spacing required between arriving aircraft depends on a number of factors, such as the prevailing weather conditions, the size of aircraft involved and the number of aircraft waiting to depart. Because of their great size and weight, wide-bodied aircraft such as the Boeing 747 create more turbulence to the air they pass through than smaller or slower aircraft. As this turbulence can upset the flying characteristics of lighter aircraft following behind, greater separation distances have to be applied.

## HOLDING PATTERN




*A Doppler VHF Omni-Directional radio beacon which transmits navigational information to pilots*

# 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 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 that are being towed and the airport maintenance 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.

At night and during low visibility in 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 by either the Ground Movement Controller or the Air Controller.

*The airfield lighting control panel*

# CONTROLLING DEPARTING AIRCRAFT

When an aircraft has loaded its fuel, catering supplies, baggage and passengers, and the doors are locked, the captain makes a radio call to the Ground Movement Controller for permission to start engines. The controller has to consider, among other things, how many aircraft have started up and whether there is any congestion along the outbound air routes – both in the UK and abroad. When he sees that the aircraft will not be unduly delayed either on the ground or in the air, the Ground Movement Controller gives the aircraft 'start-up' clearance.

The pilot then requests 'push-back' from his parking stand, followed by permission to taxi to the departure runway. The Ground Movement Controller confirms the runway in use and guides the aircraft to the holding point.

The Ground Movement Controller also ensures that the pending departure is co-ordinated with the Approach Radar Controllers and the Scottish Air Traffic Control Centre, so that it can be integrated into the traffic flow around the airport.

As the aircraft approaches the holding point, the Air Controller takes over control and lines up the aircraft in a departure sequence that will make maximum use of the runway. For example, when two aircraft of a similar type are departing in rapid succession, one on a northbound route and one southbound, they may be allowed to take off one minute apart. Minimum departure separations are decided according to the combination of aircraft types involved. If two aircraft are following the same route, or if a faster aircraft is following a slower one, the time interval between the departures has to be increased. As with arriving aircraft, it is also necessary to take into account the turbulence caused by large aircraft on departure.


After becoming airborne, departing aircraft are transferred to Glasgow Approach Control to be integrated with local traffic and then to the Scottish Air Traffic Control Centre for integration with traffic flying along the airways.

# TELECOMMUNICATIONS

Telecommunications are an essential feature in the safe and efficient operation of air traffic control. The equipment at Glasgow includes UHF ground communications, VHF and UHF air-to-ground communications, instrument landing system (ILS), primary surveillance radar, VHF direction finder, instrumented runway visual range (IRVR), and other back-up services to ATC and the airport authority.

*The Telecommunications equipment room*

# RADIO COMMUNICATIONS

To control aircraft, NATS at Glasgow Airport has five VHF and one UHF radio channels. There are also two UHF radio channels to control vehicles, fire service and engineering units. Some of the UHF and VHF channels are coupled to enable the controller to hear air and ground traffic at the same time.

The whole radio network is fed through a distribution and control system which enables the controller to select any radio channel or telephone line he needs. He can use the telephone system without removing his headset because the left earpiece and the microphone are connected to the telephone, while the right earpiece remains connected to the radio network so that incoming radio calls can always be heard. Full standby and emergency facilities are provided, independent of the main distribution system, to maintain communications under all conditions.

To avoid interference, the VHF transmitter and receiver sites are situated some way from the control tower and are connected to it by landlines. Up to four transmitters or four receivers can share one aerial by using suitable isolators.

VHF ground-to-air communications are also provided by the Arrival Terminal Information Service. This is a pre-recorded, frequently-updated, continuous broadcast of local meteorological conditions and other essential information for arriving aircraft. All speech on the air-to-ground radio channels, as well as operational telephone conversations, are recorded in accordance with International Civil Aviation Organisation (ICAO) standards. The recordings are made on multi-channel recording equipment, and time-coded signals are superimposed on the tape every ten seconds. The recorded tapes are retained for at least thirty days so that they are available should there be any incident which needs an enquiry.

# RADAR

Glasgow Airport has two 50cm primary surveillance radars on the airfield. Primary radar operates on the principle that part of the energy transmitted through a radar aerial is reflected back from objects such as aircraft, hills, buildings, and even rain clouds. These echoes are received on the same radar aerial and can be amplified and displayed as blips on a radar screen. As only reflections from aircraft are required, unwanted fixed echoes are eliminated by electronic means so as to present air traffic controllers with as clear and uncluttered a picture as possible.

*The controller's radar display* ▶

*The two 50cm primary surveillance radars* ▼

# RADAR DISPLAYS

Input from the primary radar is displayed on radar display system enhanced by video maps which provide an accurate indication of the extended centre line of runways, airways, control zone, navigational beacons, airfields, reporting points and other data. The primary radar also gives information to the Distance From Touchdown Indicator in the Visual Control Room.

# RUNWAY VISUAL RANGE

Pilots landing or taking off in low visibility need accurate measurements of the visibility along the runway they intend to use. A system called the Instrumented Runway Visual Range (IRVR) automatically measures and provides this information.

Three measurements are taken from the side of the main runway – at both ends and in the middle. IRVR equipment uses an instrument called a transmissometer which measures the loss of light from a source projected over a standard distance. The measurement is fed into a computer, together with other data such as runway lighting intensities, to give a computed runway visual range of each area of the runway. This information is then displayed in all the operational control rooms of the control tower and is transmitted to pilots by air traffic control when the visibility falls below 1500 metres.

*The Instrumented Visual Range equipment at the side of the runway*

## DRDF

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

*The Digital Resolution Direction Finding aerial*

## AFTN

International airline operations are supported by a worldwide teleprint system called the Aeronautical Fixed Telecommunications Network (AFTN), which is specifically planned for air traffic purposes. Flight plans, meteorological information and other operational messages may be passed between AFTN terminals throughout the world. Glasgow Airport is connected into the AFTN through the Heathrow Communications Centre, where a computer-controlled, fully automatic routeing system can handle up to ¼ million messages a day. Glasgow Airport has its own internal message system so that messages can be routed directly to airline operators.

*A close-up of part of the IRVR*

## CCTV

A closed circuit television system is provided to give information from the Meteorological Observing Office in the control tower to the air traffic controllers in the Approach and Visual Control Rooms, and to the flight clearance/briefing room in the Terminal Building.

*NATS also supply services at:*

*Aberdeen*
*Aberporth*
*Bedford*
*Belfast*
*Benbecula*
*Birmingham*
*Boscombe Down*
*Cardiff-Wales*
*Edinburgh*
*Farnborough*
*Gatwick*
*Heathrow*
*Inverness*
*Islay*
*Kirkwall*
*Manchester*
*Prestwick*
*Stansted*
*Stornoway*
*Sumburgh*
*Tiree*
*Wick*



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