Airline Pilot Handbook of Aeronautical Knowledge

Air Traffic Management

Updated: 10-08-2021 | 12:30 UTC

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Updates


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of Aeronautical Knowledge
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Automatic Dependent Surveillance - Broadcast (ADS-B)

Introduction - Automatic Dependent Surveillance - Broadcast (ADS-B) is a cooperative surveillance technology in which an aircraft determines its position via satellite navigation and periodically broadcasts it, enabling it to be tracked. The information can be received by air traffic control ground stations as a replacement of secondary radar. It can also be received by other aircraft to provide situational awareness and allow self separation.

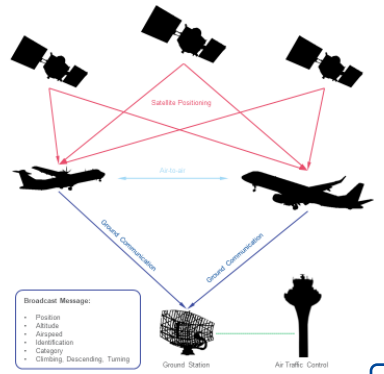
ADS-B is *automatic* in that it requires no pilot or external input. It is *dependent* considering it depends on data from the aircrafts navigation system. The system relies on two avionic components: a GPS navigation source and a ADS-B data link which essentially is a modified Mode S transponder.

ADS-B is an element of the US Next Generation air transportation system (NextGen) and the Single European Sky ATM Research (SESAR). From the 7 June 2020, all aircraft that weigh more than 5700 kg, or have a max cruise speed greater than 250 kts needs to be equipped with ADS-B capabilities to be operated in European airspace.

Operation - ADS-B consists of two different services, ADS-B OUT and ADS-B IN. It could potentially replace radar as the primary surveillance method for controlling aircraft worldwide. ADS-B enhances safety by making an aircraft visible in realtime to air traffic control and to other appropriately equipped ADS-B aircraft with position and velocity data transmitted every second.

ADS-B OUT periodically broadcasts information about each aircraft, such as identification, current position, altitude and velocity through an onboard transmitter, in most cases more accurate than the information from radar-based systems. With more accurate information, ATC will be able to position and separate aircraft with improved precision and timing.

ADS-B IN is the reception by aircraft of weather data and other ADS-B data such as nearby aircraft.



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Disclaimer

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❶ ATC Equipment

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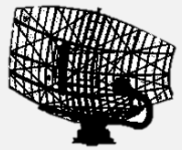
Format & Symbology

- Transmissions made by Air Traffic Service Units (ATSUs) are shown on the left side of the page in *"Gray Italic Text"*
- Transmissions made by aircraft are shown on the right side of the page and denoted by *"Blue Italic Text"*

Tower

- Delivery
- Start-up
- Ground
- Tower

Radar



- Approach
- Departure / Arrival
- Area Control Center
- Flight Information Service

Socata TB-9
"PH-ABC"

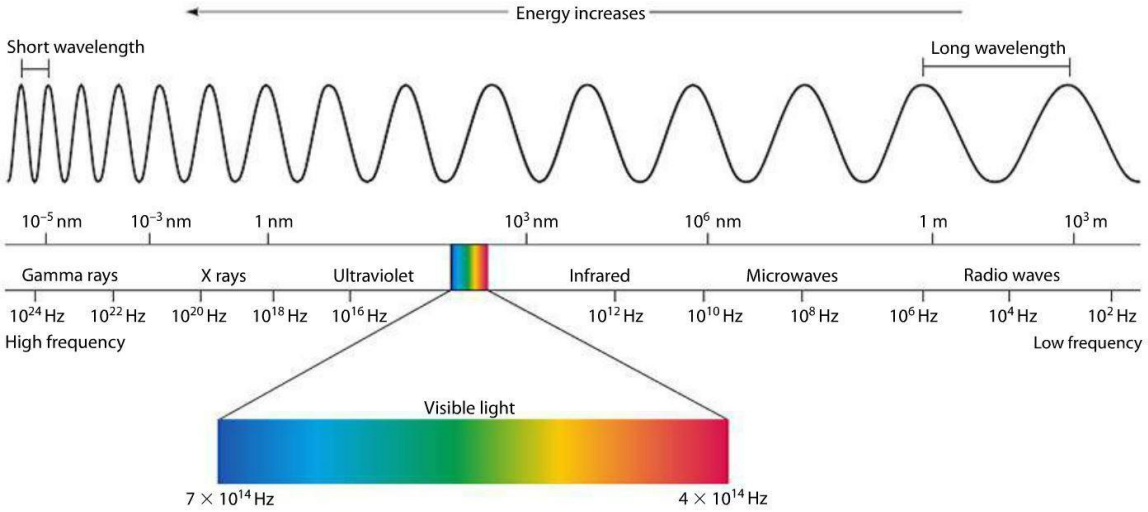
Jetstream 32
"Small-prop 505"

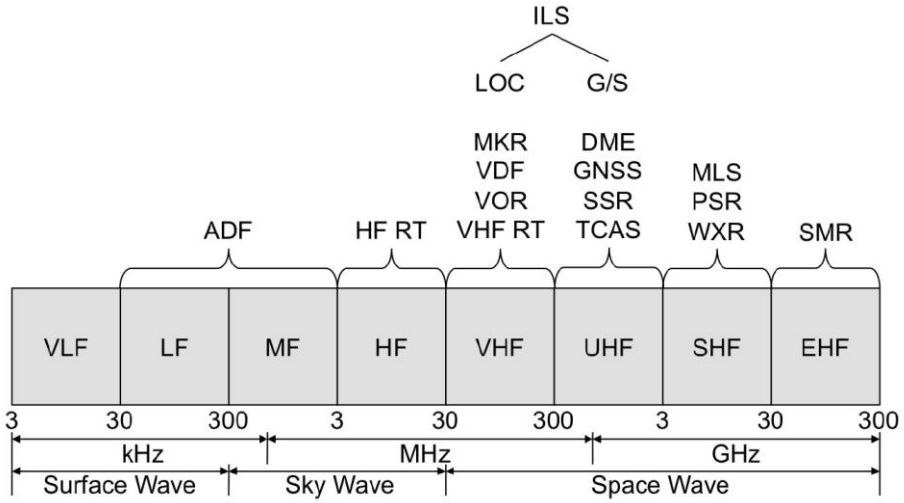
ATR 72-600
"Big-prop 1233"

Embraer 195
"Regional-jet 347"

Electromagnetic Spectrum

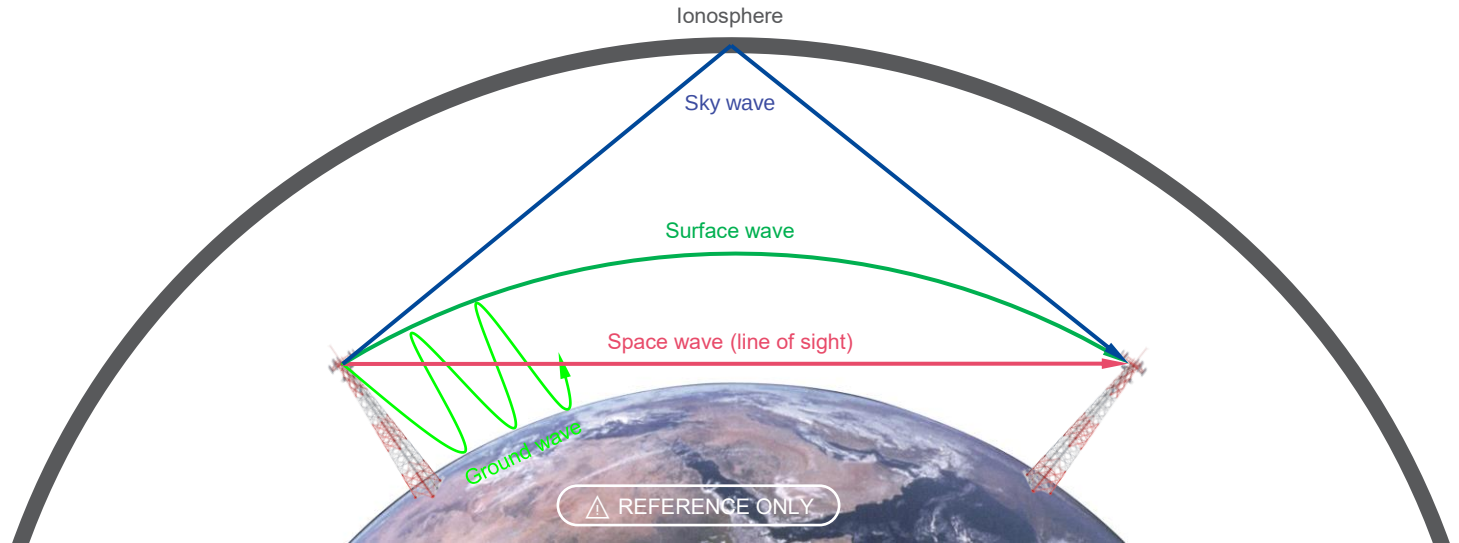
- The diagram below shows the electromagnetic spectrum.
- Frequency determines the different effects brought about by electromagnetic waves. The lower limit is determined by the size and efficiency of the arials, low frequency means long wavelength which in turn means a long antenna is required, while the upper limit is determined by the attenuation and absorption of the radio waves by the atmosphere.
- The part of the electromagnetic spectrum of interest to the pilot (radio waves) is subdivided below.





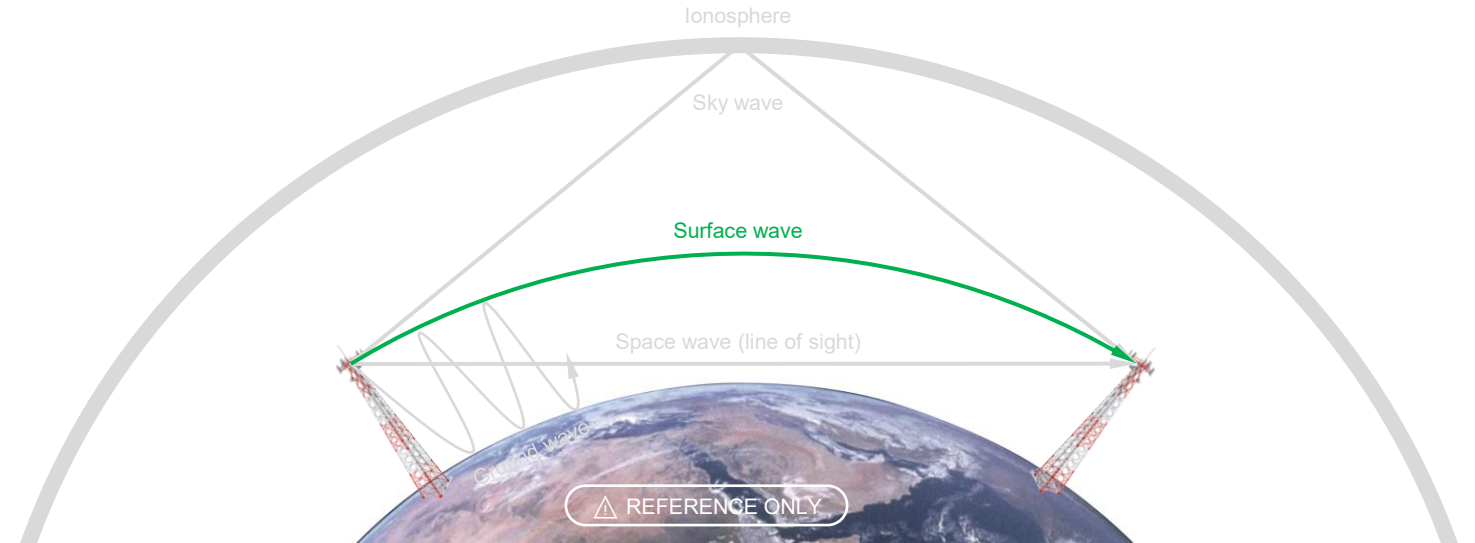
Radio Waves

- There are three principle paths that radio waves follow between the transmitter and receiver:
  a) Surface waves - low frequencies
  b) Sky waves - middle range frequencies
  c) Space waves - upper range frequecies
  d) (Ground wave - a combination of a surface wave and a space wave)



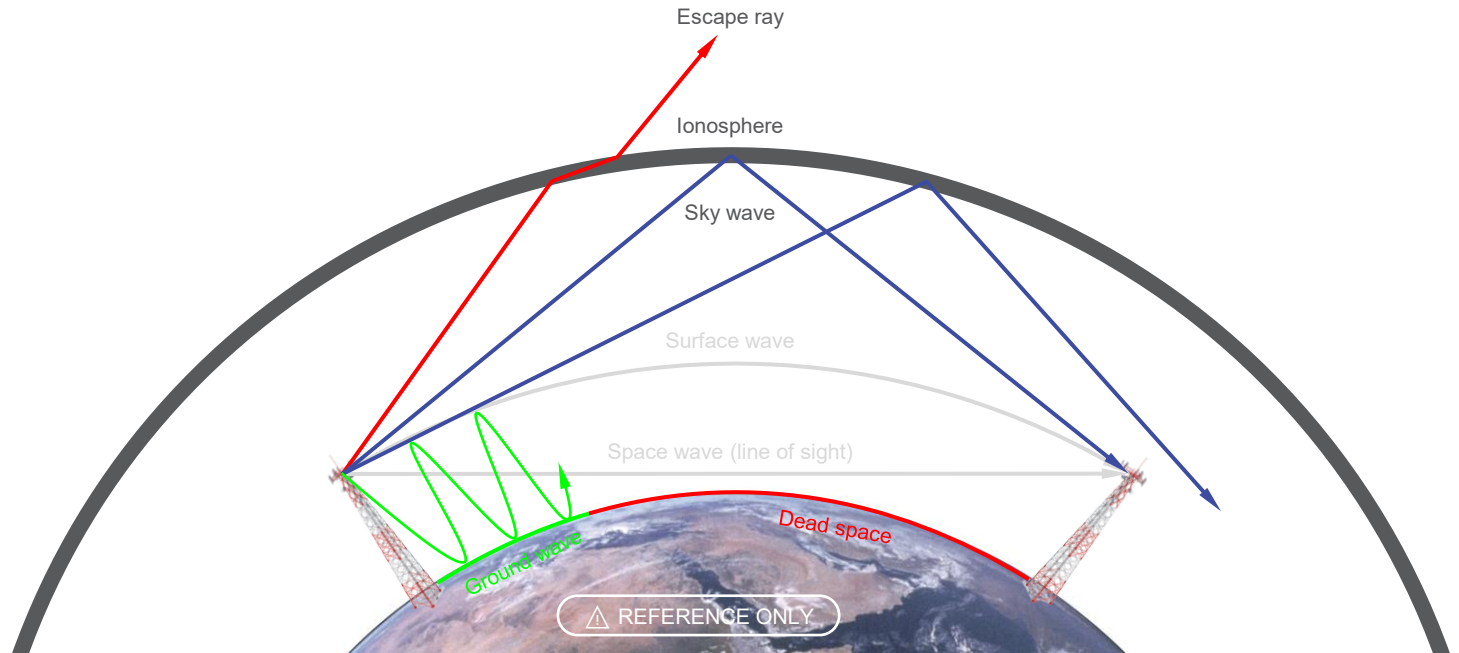
Surface Wave

The surface wave follows the curvature of the Earth, a process known as diffraction. The propagation does require large arials. High conductivity favours the passage of a radio signal. Therefore, passage over sea is better than over rock or desert. Surface absorption reduces the signal strenghth of a radio wave. If there is no restriction in the available transmitter power, then global ranges can be achieved by VLF radio waves.



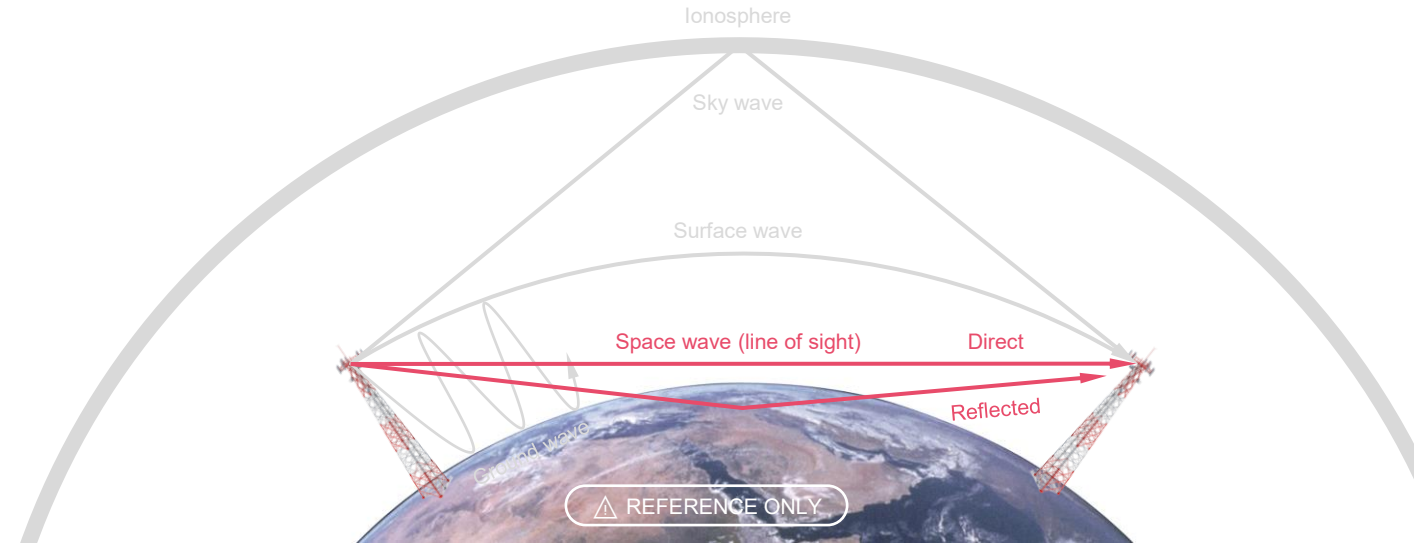
Sky Wave

- The sky wave ascends into the upper atmosphere and encounter a region containing electrically charged particles (the ionosphere) where it is refracted sufficiently to return to earth. Above a certain angle the radiowave is not refracted and continues into space (escape ray).
- Due to the high frequencies used in sky wave transmision, the ground wave travel is not as far as the first returning sky wave. The distance between the limit of the ground wave and the first returning sky wave is the so called “dead space”.
- HF radio installed onboard of aircraft works under this principle.



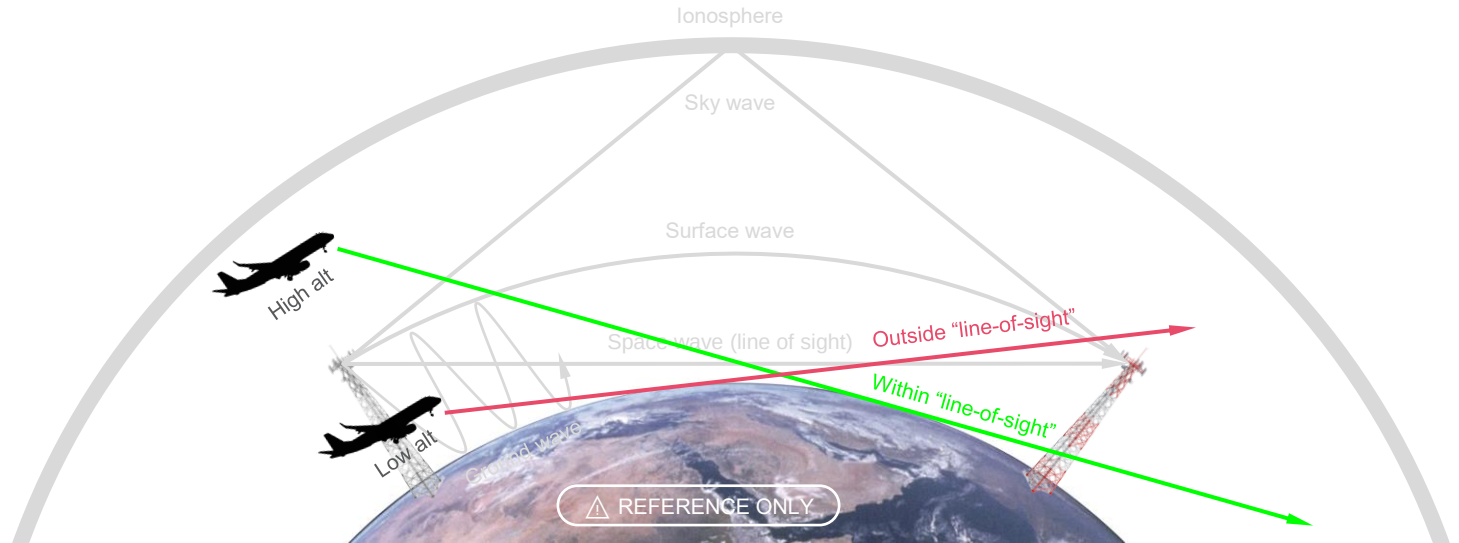
Space Wave

Transmissions at Very High Frequency (VHF) and above cannot propagate by either surface or sky wave. Attenuation is so severe that the surface wave is virtually non-existant. These frequencies are too high to be reftracted by the ionized layers aloft. As a result, transmission is in a straight line, or the direct wave. In addition to the direct wave, a reflected wave can also exist. The two components make up the space wave.



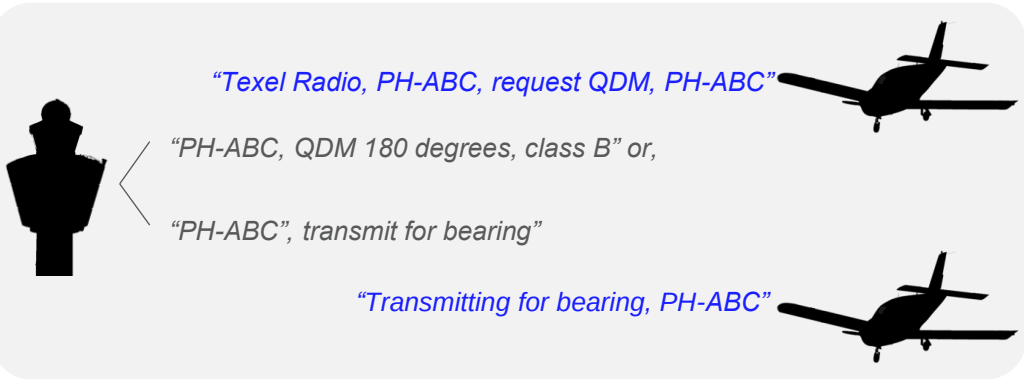
“Line of Sight”

- The ranges of a space wave are line of sight. This range can be approximated by the following formula:
- $VHF\ range = 1.25\ x\ (\sqrt{height\ transmitter\ ft} + \sqrt{height\ receiver\ ft})$
- VHF radio onboard of aircraft work under this principle.



VHF Direction Finding (VDF)

- Certain stations are equipped with VHF Direction Finding (VDF). VDF provides an ATC officer with the means of determining the direction of the VHF signal from an aircraft and, thereby, the possibility of guiding the aircraft overhead the station. The only equipment required onboard the aeroplane to obtain this service is a standard aircraft VHF radio. This is one of the main advantages of the VDF service.
- A VDF station can give steering instructions (QDL) and even a VDF controlled approach (QGH) using the following bearings:
  a) QDM - magnetic track to the station
  b) QDR - magnetic track from the station
  c) QUJ - true track to the station
  d) QTE - true track from the station
- When the pilot of an aircraft uses the Push-To-Talk (PTT) button, the radio waves will be transmitted in all directions from the VHF antenna on the aircraft. As the transmissions will be in the VHF band the signal will propagate in a straight line and any receiver set to the same frequency and within line of sight will be able to receive it. If the transmitter on an aircraft is tuned to the VDF frequency and the transmitter is activated, the arials of the VDF unit detect the incoming transmission and each aerial element feeds a signal to the VDF received, from this signals a bearing is calculated.
- The accuracy of the bearing given is measured in degrees and classified in accordance with the ICAO defined classifications:
  A. Class A - accurate within 2º
  B. Class B - accurate within 5º
  C. Class C - accurate within 10º
  D. Class D - accuracy less than class C
- Any terrain or buildings in the vicinity of the antenna on the ground may cause reflections of the incoming signal which will therefore approach the antenna from a different direction. This will lead to an erroneous reading of the bearing of the aircraft. Also, terrain or buildings may block the signals completely if sent from a particular direction.
- If two or more stations transmit at the same time the bearing indication will be erratic and tend to indicate the bearing of the stronger signal.
- To request a heading or bearing to steer, the pilot should cal the aeronautical station on the listed frequency. The pilot should then specify the type of service by using the appropriate Q-code.
- Normally the request made by the pilot is long enough for the VDF equipment to determine the bearing number and class of accuracy. The bearing or heading to steer shall be readback by the pilot.



- Some countries have the facility to provide a position fix based on VDF if necessary. The request must be made to a station with the capability for triangulation. By use of triangulation the position lines from three VDF receivers can be used to plot a reasonably accurate position of the transmitter (aeroplane).

Primary Surveillance Radar (PSR)

- **Introduction** - Radar (short for Radio Detection & Ranging) is a system that is developed to enable detection of objects, their position and movement. Although starting as a military system, it is also of great use in civil aviation for ATC purposes and weather detection.

- Radars work on the principle that pulses which are sent out in a particular direction reflect back towards the antenna by an object (like an aircraft). As only a fraction of the signal will be reflected the receiver will have to be very sensitive and therefore, frequency bands with as little noise as possible are chosen (1 - 10 GHz is most common).

- In todays Air Traffic Control (ATC) system, the role of radar is crucial for the safe and efficient controlling of ever-increasing air density. To provide for the needs of this task, the differing air traffic control environments demand different performance parameters from the radar. The main types of radar in use for civil aviation:

  - Primary Surveillance Radar (PSR):

    a) Long range surveillance radar

    b) Terminal surveillance radar

    c) Precision Approach Radar (PAR)

    d) Surface Movement Radar (SMR)

  - Secondary Surveillance Radar (SSR)

  - Weather Radar (WXR) (both airborne and ground based)

- **Radar Performance** - The strength of the returning pulse depends on obstructions between the antenna and the aircraft (e.g. clouds) and the cross section of the aircraft itself. The direction the antenna is pointing will give the bearing to the aircraft and pulse round trip time determines the distance to the aircraft, thus a fix can be plotted.

- Radar uses frequencies that are normally in the high bands of the electromagnetic spectrum. Propagation typically follows a direct wave path, so the range of the radar is generally line of sight. Certain factors, other than those of design affect performance includes atmospheric conditions and weather (e.g. rain & snow attenuates the radar signal).

- Surveillance radar is capable of providing coverage to ranges greater than 200 nm. However, both primary and secondary radar are strictly line of sight. So if an aircraft is below the radar horizon it will not be detected. When the aircraft is above the radar horizon, there are still other considerations which could make the aircraft a poor radar target:

  - Size of the aircraft

  - The orientation of the aircraft relative to the radar station

  - Material the aircraft is made of (e.g. glass reinforced plastic)

- Secondary Surveillance Radar (SSR) provides information that is not affected by the above, but relies on:

  - Ground unit being equipped with an interrogator

  - Aircraft having a transponder & pilot correctly operating it

Long Range Surveillance Radar

- The long term surveillance radar has the following properties:
  - A range of 200 to 300 nm
  - The ability to penetrate intervening weather
  - The ability to detect small targets out to max. range
  - Moderate target discrimination capability in range and bearing
- Using two radar systems generally fulfill those needs, Primary Surveillance Radar (PSR) and Secondary Surveillance Radar (SSR). SSR serves as a complement to the primary radar, improving the possibility of detecting targets at long ranges and allowing identification of cooperating targets.

Terminal Surveillance Radar

› This radar provides separation between aircraft within the terminal area during transit, approach and departure. It may be used to provide a radar approach. The service is provided by primary radar with the following characteristics:

- Range around 60 to 80 nm
- Ability to refresh the target information at short intervals
- Ability to penetrate intervening weather
- Good target discrimination & accuracy

› An SSR element is normally used in the terminal surveillance radar environment. Surveillance radar displays for long range and terminal radars are normally processed and combined with the information from primary radar. The implementation of SSR information on the primary display shows the controller a complete situational picture of the relevant airspace on an easily viewed screen.

Aerodrome Surveillance (Approach) Radar

› Where provided, the aerodrome surveillance radar is normally a short-range (25 nm) primary radar that is capable of providing guidance during initial, intermediate and final approach phases of flight. As such it requires the following capabilities:

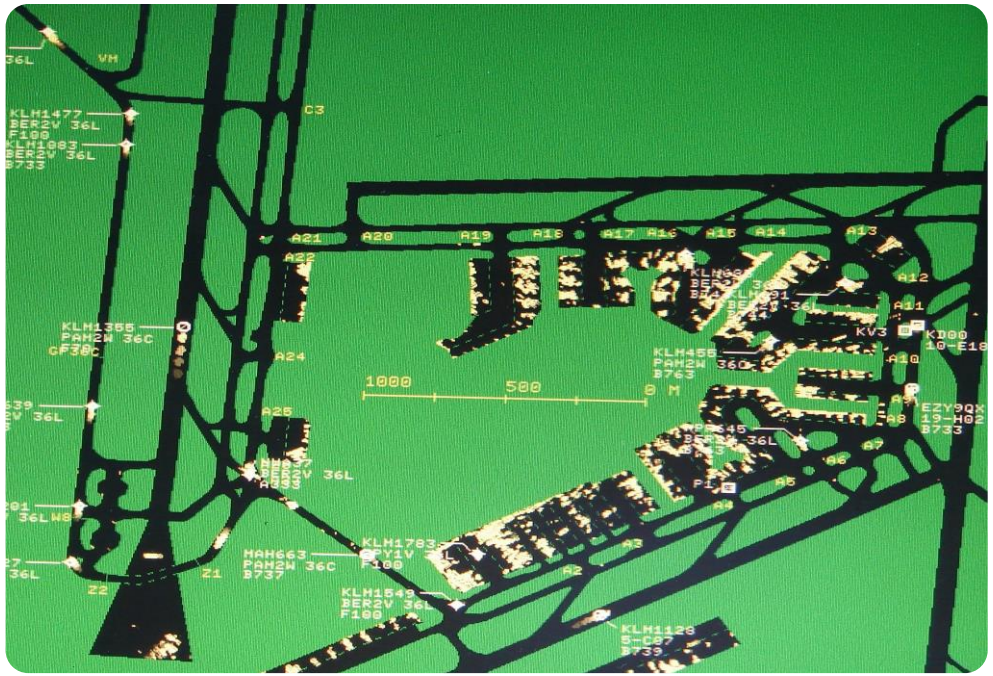
  - Very accurate range and bearing
  - Excellent target discrimination
  - Rapid refreshing of the information

› This type of radar can provide a Surveillance Radar Approach (SRA).

Surface Movement Radar

The SMR is a highly specialized primary radar unit designed to assist controllers in maintaining safe separation between aircraft and vehicles on the ground and to monitor all ground movement. The maximum range is approximately 2.5 nm. The SMR requires:

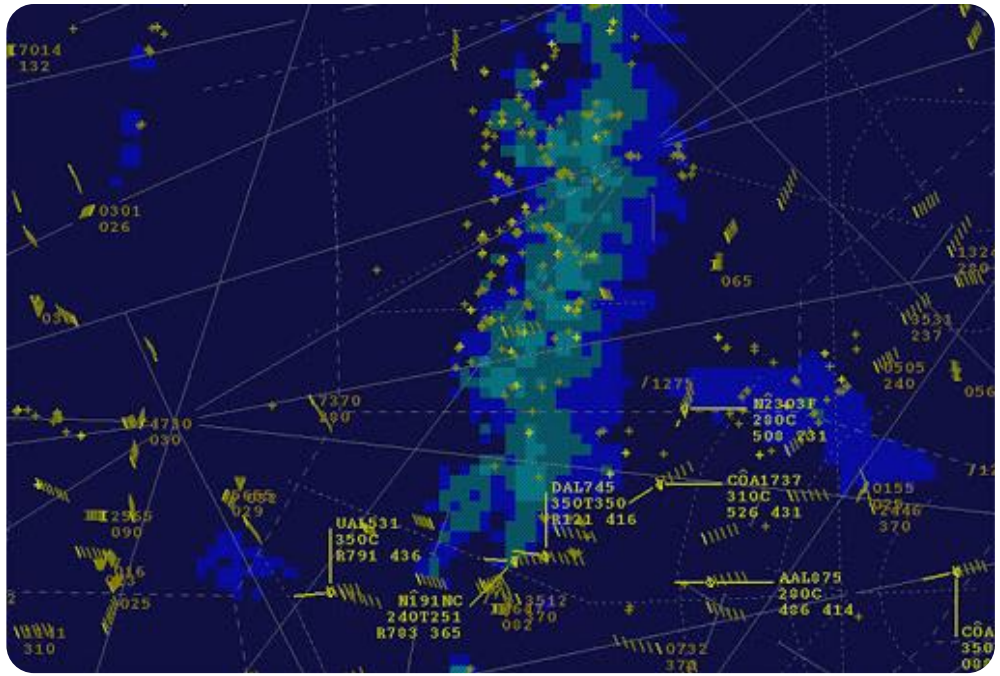
- Very low minimum range
- 360º coverage
- Very high level of accuracy
- Excellent target discrimination



Weather Radar

The weather radar found at an aerodrome is not an ATC radar but is used by the meteorological services to supplement their forecast information.

On some systems, weather can be displayed on the ATC officers radar display, this system is called Weather and Radar Processor (WARP).



Secondary Surveillance Radar (SSR)

- **Introduction** - The primary element of the ATC surveillance radar system provides detection of suitable targets with good accuracy in bearing and range measurement. However, targets that are too small, built of materials that reflect radar energy poorly, or have poor aspect may not be detected.
- To overcome these problems a Secondary Surveillance Radar (SSR) is often colocated with the primary radar and has its antenna mounted on top of the primary radar dish.
- The SSR system uses one ground based transmitter and receiver, called the interrogator, and one airborne transmitter / receiver. The airborne part is referred to as the ATC / SSR transponder or simply, transponder. The interrogator transmits pulses, a receiver within the interrogators area, receives these pulses and decodes them. The transponder then responds by transmitting a pulse train back to the interrogator. The pulse train contains information according to what the interrogator requested.
- SSR information is presented together with primary radar information. The primary radar is very accurate in bearing and range, but does not contain any additional information. The secondary radar information is not very accurate in bearing and range, although it can serve as a backup. The SSR does provide reliable information that can identify every aircraft and provide altitude information.
- The primary radar element provides the necessary bearing and range. The use of computer generated displays allow calculated information, such as course and groundspeed to be shown.
- **Limitations** - SSR complements the primary radar and, although effective, is gonna be replaced by ADS-B in the near future. In addition to inaccurate range and bearing information there are two other problems: “fruiting” and “garbling”.
- **Fruiting** - Although ground-based interrogators have a nominal range of approximately 200 nm, the propagation is line of sight and it is not unusual for aircrafts, especially at cruising altitude over well-developed ATC regions to be within range of two or even more ATC interrogators. Since SSR units operate at the same frequency, this can result in detection of an aircrafts response to one interrogator by other ground units. Such responses occur out of synchronization causing random responses to appear. This is called fruiting. Electronic circuits are employed (de-fruiters) to remove this effect but they do not remove all random responses and the situation becomes worse as traffic density increases.
- **Garbling** - Occurs when targets are close to one another (e.g. in a holding pattern or progressing along an airway one above the other). If both aircraft are in the interrogation beam at the same time, and are close enough to each other, the ground interrogator cannot differentiate between them and records only one confused return.
- Both fruiting and garbling problems have been partly resolved with the implementation of the Mode S transponder since the SSR system can interrogate aircraft by their unique 24-bit code. In this case, only that aircraft will respond to the interrogation.

Transponder Modes & Codes

Mode A - The pilot sets the transponder to the mode and code instructed by ATC. If the transponder is set to ON, the unit responds with the set code only. Any squawk code issued by ATC will be a unique code, the squawk code is then used to couple a flightplan to a specific aircraft. The radar display will now show the aircraft identification instead of the Mode A code including specific flightplan information.

For aircraft squawking a generic code (e.g. 2000 or 7000) no information label can be displayed since this is not an unique code and therefore not associated with any specific flight. ATC will be unable to identify the aircraft using the SSR.

Aircraft that are not squawking are only displayed as a conventional radar track.

Mode C - If the transponder is set to ALT or similar, the transponder responds to Mode A and C (and Mode S if applicable) interrogations, replying with both the identification and pressure altitude information.

Special use Codes - There are four codes which have been assigned a predefined condition, these are:

- Code 7500 - Unlawfull interference
- Code 7600 - Communication failure
- Code 7700 - Emergency
- Code 0000 - Transponder unserviceable

IDENT feature is used to enhance the echo as seen by the ATC controller on the radar display. Once activated, it will give the enhanced echo for 15 to 30 seconds. It will simplify identification of an aircraft if there are several returns in the same area. IDENT is only supposed to be used when requested by ATC **(“SQUAWK IDENT”)**.

Mode S is a development of the basic SSR and facilitates additional data to Mode A and C to be exchanged. The Mode S ground interrogator and airborne equipment are fully compatible with the conventional Mode A and C units and use the same basic frequencies.

The Mode S interrogator and receiver operate on the same frequency as standard SSR. The initial part of the interrogation signal is such that a normal airborne transponder unit recognizes the standard SSR modes. The second part of the Mode S interrogation contains the aircraft allocated 24-bit aircraft address (every aircraft equipped with a mode S transponder has a unique 24-bit address). This permits the controller to interrogate a specific aircraft.

In order to detect further Mode S transponders, a special feature known as SSR / Mode S ALL CALL is broadcasted at intervals. Normal SSR transponders respond to this in Mode A or C. Mode S transponders recognize the special character of the ALL CALL interrogation and transmit a response that includes the aircrafts identity / address.

The use of Mode S has the following benefits over standard SSR:

- Elimination of synchronous garbling
- Elimination of fruiting
- Increased traffic capacity
- Improved accuracy

Mode S information, transponder to transponder, can also be integrated by the Traffic Alert and Collision Avoidance System (TCAS) allowing the systems of conflicting aircraft to communicate and resolve conflicts.

Radar Operation

- **Radar operation procedures** are limited to those for identification. This may involve:
  - Carrying out turns as directed by the controller
  - Identifying the position of the aircraft as a radial & range from a VOR/DME beacon at the request of the controller
  - Identifying the position of the aircraft as a geographical point at the request of the controller
- In European regions, identification occurs more frequently using the SSR element. In the event of a primary radar failure, the controller introduces non-radar standards using SSR to assist.
- **Presentation of Information** - SSR information is presented together with primary radar information. The difference between the two is that the primary information is very accurate in bearing and range but does not consist any extra information. The secondary radar information is inaccurate in bearing and range, although is can serve as a backup, but provides reliable information that can identify every aircraft and provide altitude information.
- The primary radar element provides the necessary bearing and range. The use of computer-generated displays allows calculated information, such as course and groundspeed to be shown. Here is a common style of displaying of combined (primary and secondary surveillance radar) information on the air traffic controllers radar screen.

Use of Transponder

- **On Ground** - Most airports are equipped with a Mode S Surface Movement Radar (SMR). Pilots shall select the assigned Mode A code and activate the Mode S transponder:
  - Before aircraft movement for pushback (if applicable) or taxi until,
  - After landing, continuously until the aircraft is fully parked, the transponder shall be deactived immediately after parking.
- If no Mode A code is received or required the aircraft should use standard squawk codes: 2000 (IFR) or 7000 (VFR). Aircraft are required to squawk the assigned code in order to enable the display of information labels on the ground radar.
- The information on the labels as presented by air traffic controllers varies depending on category of flight (inbound or outbound). For aircraft squawking a generic code (e.g. 2000 or 7000) no information label can be displayed since this code is not unique and therefore not connected to any specific flight plan.
- Aircraft that are not squawking are only displayed as a conventional radar track and are less conspicuous on the display compared to other traffic. Vehicles operating on the manoeuvering area must also have a servicable transponder. Vehicles like bird controllers, crashtenders and tow trucks are therefore shown on ground movement radar.
- **During Flight** - From line-up for take-off until vacating the runway after landing, the transponder must be selected in such a way as to transmit altitude information (Mode C) in addition to Mode A and S. Mode C is essential for the effectiveness of air traffic control safety nets such as Short Term Conflict Alert (STCA) and TCAS systems onboard of aircraft.
- ATC safety nets rely heavily on Mode S and Mode C information, it is therefore important that pilots operating in all airspace classes are aware of the significant impact incorrect setting of Mode S transmponders can have on the effectiveness of ATC safety nets.

Inbound Traffic

KLM 682
Via taxiway A10 to gate E8
Airbus A330-200

Outbound Traffic

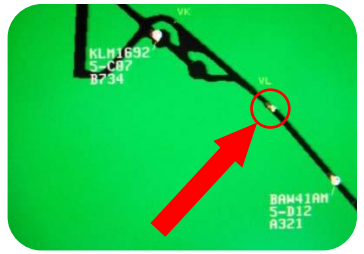
KLM 1693
LEKKO 2E departure, runway 18L
Boeing 737-900

Generic Code

Aircraft or vehicle using an incorrect squawk code or squawking a generic code (e.g. 2000, 7000)

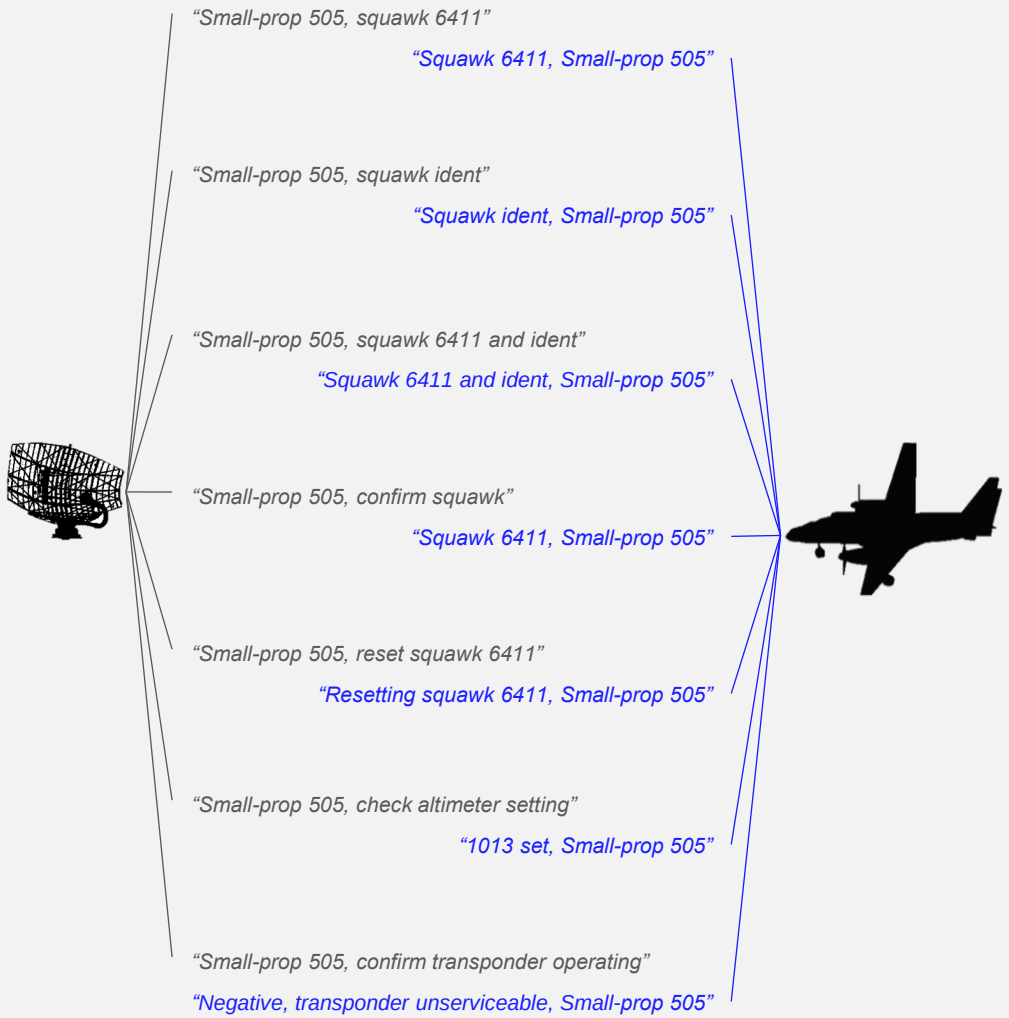
No Transponder

Aircraft or vehicle not equipped with a serviceable transponder, or transponder set to standby / off (primary radar return only).



SSR Phraseology

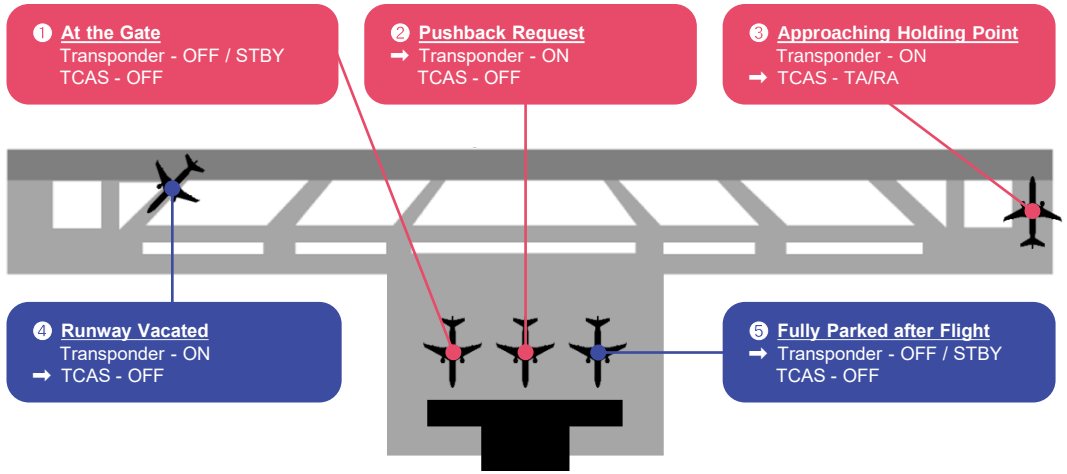
Phrase	Meaning
“SQUAWK ... (code)”	Set the code as instructed. Unless instructed otherwise, pilots should also select “altitude” on, even if only provided with a code instruction from ATC.
“SQUAWK ... (code) WITH ALTITUDE”	Set the code as instructed and select “altitude” on.
“CONFIRM SQUAWK”	Confirm the code set on the transponder.
“RESET SQUAWK ... (code)”	Reselect assigned code.
“SQUAWK IDENT”	Operate the special position identification feature.
“SQUAWK MAYDAY”	Select Emergency (7700).
“SQUAWK STANDBY”	Select the standby feature.
“SQUAWK ALTITUDE”	Select altitude reporting feature.
“CHECK ALTIMETER SETTING AND CONFIRM ... (level)”	Check pressure setting and confirm your level.
“STOP SQUAWK ALTITUDE”	Deselect altitude reporting.
“STOP SQUAWK ALTITUDE, WRONG INDICATION”	Stop altitude report, incorrect level readout.
“CONFIRM ... (level)”	Check and confirm your level.
“CHECK SELECTED ALTITUDE, CLEARED LEVEL IS ... (cleared level)”	Check and confirm your cleared level.
“CONFIRM YOU ARE SQUAWKING ASSIGNED CODE ... (assigned code)”	To verify that 7500 has been set intentionally.
“CHECK ALTIMETER SETTING ... (correct altimeter setting)”	Check and confirm your altimeter setting.
“RE-ENTER MODE S AIRCRAFT IDENTIFICATION”	Check and re-enter the aircraft identification feature.



Use of TCAS

- **On Ground** - To preclude unnecessary transponder interrogations and possible interference with ground radar surveillance systems, TCAS should not be activated (TA-only or TA/RA mode) until taking the active runway for departure.

- For arriving aircraft, TCAS should be deactivated as soon as possible after vacating the runway. To facilitate surveillance of surface movements, it is necessary to select a mode in which the Mode S transponder can nevertheless squitter and respond to discrete interrogations while taxiing to and from the gate.

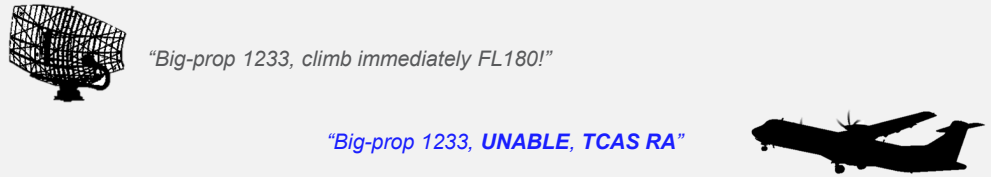


- **During Flight** - In the air TCAS should normally be in the TA/RA mode using the proper range setting. TA-only mode should be selected when TCAS RAs cannot be followed (e.g. engine failure).

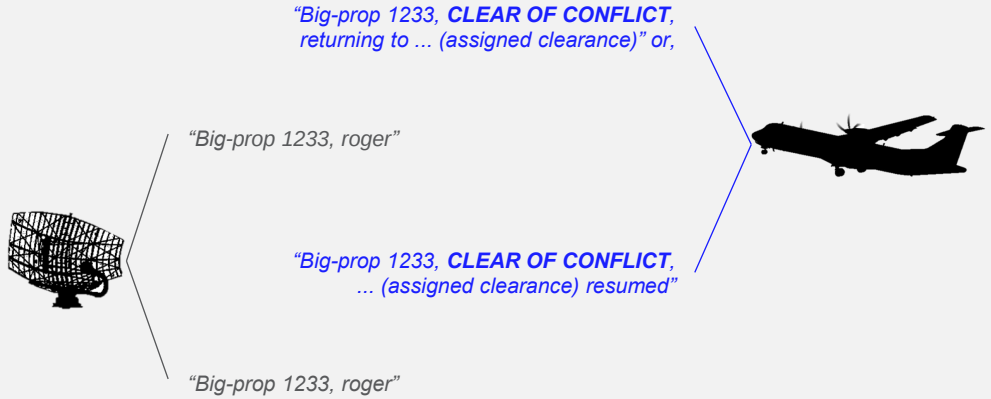
- To minimize the generation of TAs and RAs, vertical speeds of no more than **2000 ft/min** should be used within 2000 ft to level off and **1000 ft/min** within 1000 ft to level off at the required altitude.

TCAS Resoltion Advisory (RA) - Pilots should report TCAS manoeuvers to ATC, the report should simply include aircraft callsign + **"TCAS RA"**, and NOT such phrases as **"TCAS CLIMB"** or **"TCAS DESCENT"**. Traffic Advisories (TAs) shall NOT be reported to air traffic control.

Unable to Comply - If at any time a pilot receives a clearance or instruction with which he / she cannot comply, he / she should advise the controller using the phrase **"UNABLE"** and state the reason(s).

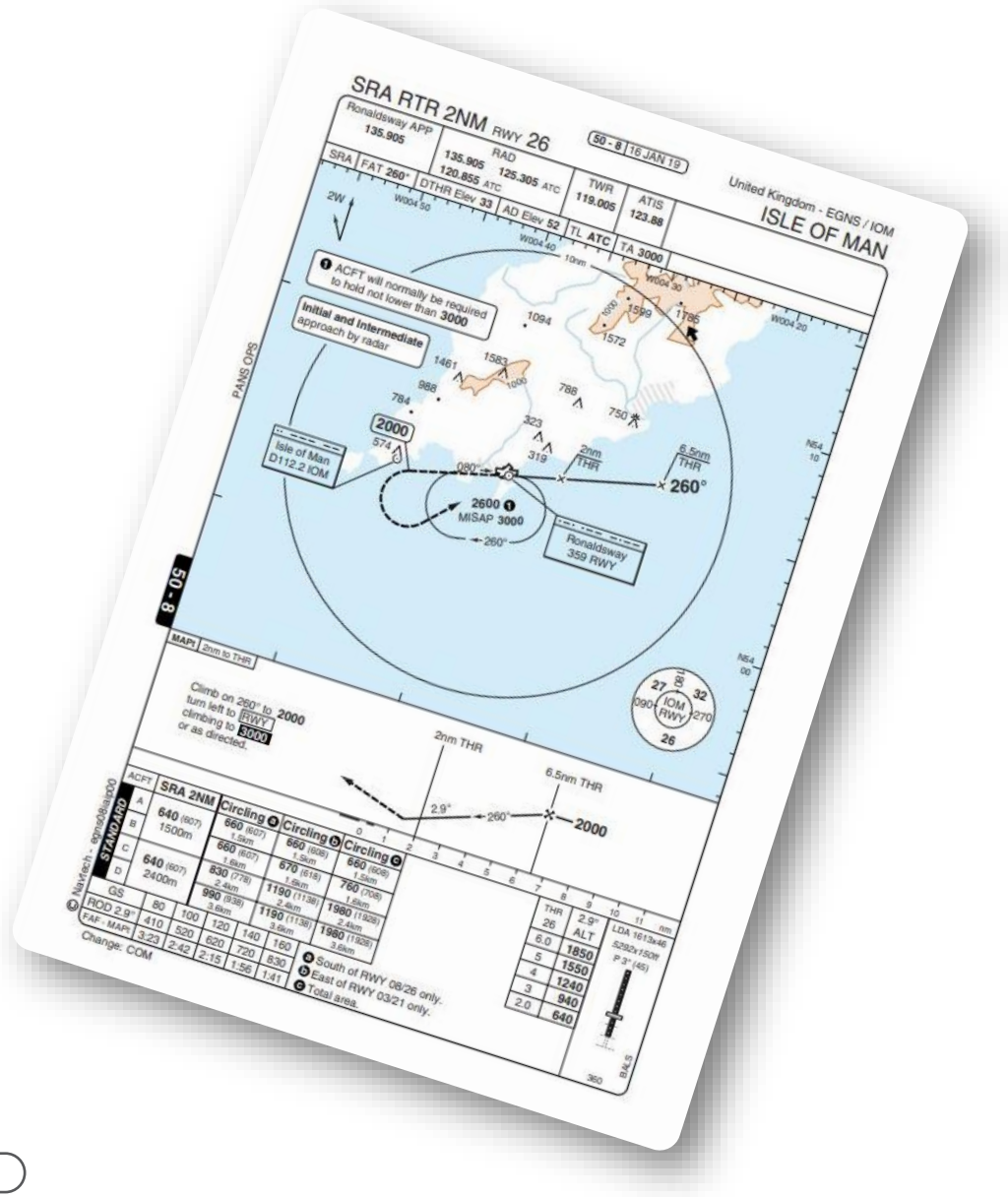


"Clear of Conflict" - The pilot should report returning to the assigned level or when the cleared level has been resumed:



Surveillance Radar Approach | Precision Approach Radar

- **Surveillance Radar Approach (SRA)** - Aerodrome surveillance radar may be used to provide the pilot with approach guidance including azimuth information and altitude advisories. The skill of such approach depends on:
  - The skill of the controller
  - The ability of the pilot to carry out the controller's instructions
- This type of radar has no height-finding capability, so all height information is advisory. This is the height the aircraft should be flying at the range and bearing observed by the controller. If the pilot cannot see the runway upon reaching Decision Altitude / Height (DA/H), the pilot must not descend below this altitude / height and a go-around shall be performed.
- **Precision Approach Radar (PAR)** - Many military airfields have Precision Approach Radar (PAR) installations. These are primary radar units designed to provide guidance during final approach and landing. The PAR consists of two elements:
  - One providing azimuth and range information
  - The other providing elevation and range information
- Instructions are designed to help pilots on the the glidepath and centerline by providing regular azimuth and glidepath correction information to the pilot. It is the pilot's responsibility to ensure the runway is in sight before Decision Altitude/Height (DA/H). Initiate a missed approach procedure if the runway is not in sight at DA/H.



Surveillance Radar Approach Phraseology

General - During a Surveillance Radar Approach (SRA) the pilot is given distances from touchdown, advisory altitude information and azimuth instructions to enable him to make an approach to a particular runway. A pilot wishing to conduct his approach by reference to height must inform the controller and request the QFE. All references to the level of the aircraft will then be to height. Pilots conducting an approach based on QNH shall be passed the aerodrome / threshold elevation before commencing the final descend.

If the pilot reports visual in the early stages of the approach he will be asked whether he wishes to continue the SRA. Normally aircraft will not be transferred to aerodrome control (tower) until after they have completed the SRA approach and have landed. The range at which the descent begins depends on the altitude or height during the intermediate phase and the angle of the glide path.

"Small-prop 505, Ronaldsway Approach, this will be a surveillance radar approach runway 26 terminating at 2 miles from touchdown, check your minima (step down fixes and missed approach point)"

"Roger, Small-prop 505"

"Small-prop 505, QNH 1003, threshold elevation 33 ft"

"QNH 1003, threshold elevation 33 ft, Small-prop 505"

"Small-prop 505, turn right heading 235 closing final approach"

"Right heading 235, Small-prop 505"

"Small-prop 505, ... miles from touchdown, your descent will begin at 6.5 miles, check gear"

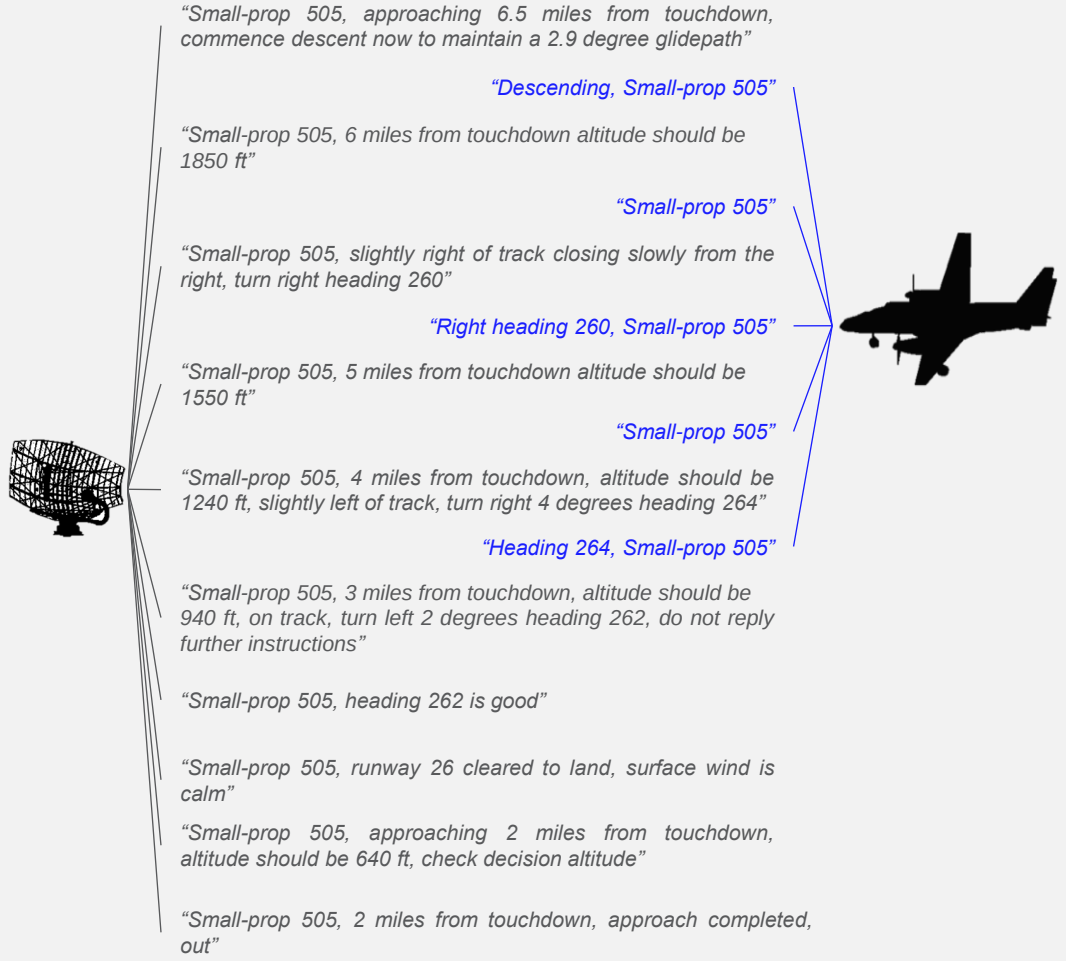
"Small-prop 505"

"Small-prop 505, ... miles from touchdown, report runway lights in sight "

"Small-prop 505"

"Small-prop 505, after landing contact Isle of Man Tower 119.005"

"After landing, Isle of Man Tower 119.005, Small-prop 505"



"Small-prop 505, approaching 6.5 miles from touchdown, commence descent now to maintain a 2.9 degree glidepath"

"Descending, Small-prop 505"

"Small-prop 505, 6 miles from touchdown altitude should be 1850 ft"

"Small-prop 505"

"Small-prop 505, slightly right of track closing slowly from the right, turn right heading 260"

"Right heading 260, Small-prop 505"

"Small-prop 505, 5 miles from touchdown altitude should be 1550 ft"

"Small-prop 505"

"Small-prop 505, 4 miles from touchdown, altitude should be 1240 ft, slightly left of track, turn right 4 degrees heading 264"

"Heading 264, Small-prop 505"

"Small-prop 505, 3 miles from touchdown, altitude should be 940 ft, on track, turn left 2 degrees heading 262, do not reply further instructions"

"Small-prop 505, heading 262 is good"

"Small-prop 505, runway 26 cleared to land, surface wind is calm"

"Small-prop 505, approaching 2 miles from touchdown, altitude should be 640 ft, check decision altitude"

"Small-prop 505, 2 miles from touchdown, approach completed, out"

Automatic Dependent Surveillance - Broadcast (ADS-B)

- **Introduction** - Automatic Dependent Surveillance - Broadcast (ADS-B) is a cooperative surveillance technology in which an aircraft determines its position via satellite navigation and periodically broadcasts it, enabling it to be tracked. The information can be received by air traffic control ground stations as a replacement of secondary radar. It can also be received by other aircraft to provide situational awareness and allow self separation.

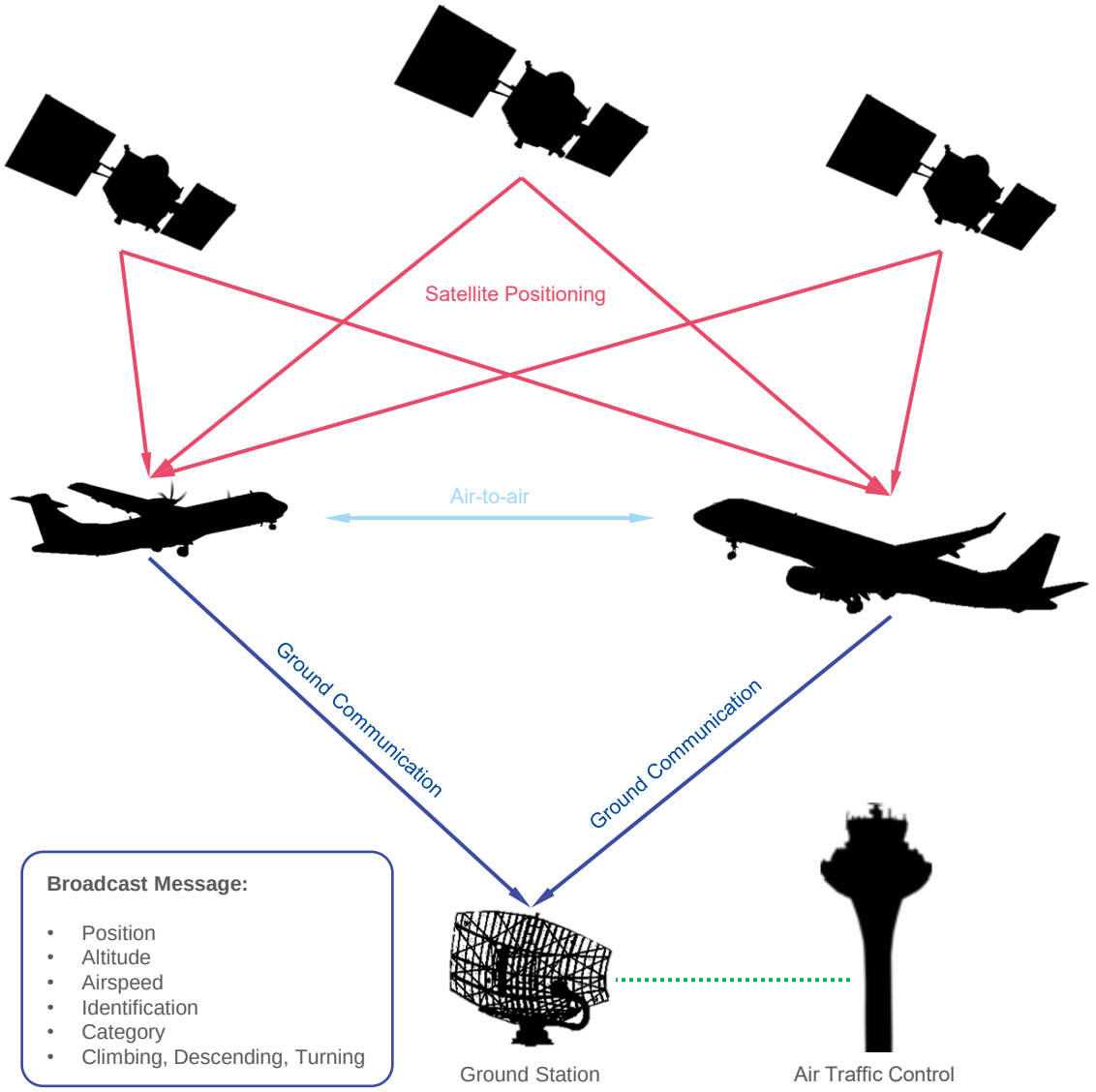
- ADS-B is *automatic* in that it requires no pilot or external input. It is *dependent* considering it depends on data from the aircrafts navigation system. The system relies on two avionic components: a GPS navigation source and a ADS-B data link which essentially is a modified Mode S transponder.

- ADS-B is an element of the US Next Generation air transportation system (NextGen) and the Single European Sky ATM Research (SESAR). From the 7 June 2020, all aircraft that weigh more than 5700 kg, or have a max cruise speed greater than 250 kts needs to be equipped with ADS-B capabilities to be operated in European airspace.

- **Operation** - ADS-B consists of two different services, ADS-B OUT and ADS-B IN, it could potentially replace radar as the primary surveillance method for controlling aircraft worldwide. ADS-B enhances safety by making an aircraft visible in realtime to air traffic control and to other appropriately equipped ADS-B aircraft with position and velocity data transmitted every second.

- **ADS-B OUT** periodically broadcasts information about each aircraft, such as identification, current position, altitude and velocity through an onboard transmitter, in most cases more accurate than the information from radar-based systems. With more accurate information, ATC will be able to position and separate aircraft with improved precision and timing.

- **ADS-B IN** is the reception by aircraft of weather data and other ADS-B data such as nearby aircraft.



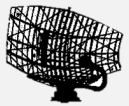
8.33 KHz Channel Spacing

- **Airband** - Frequencies for voice transmissions range from 118.000 to 136.975 MHz, in steps of 25 KHz. In Europe it became common to further divide those channels into three channels, potentially permitting 2280 channels.
- **8.33 KHz Spacing** - The introduction of the 8.33 KHz channel spacing is a result of the need for more facilities in the aviation channels. Additional channels are for instance required for air traffic control or ATIS.
- Comparing a 25 KHz radio to a 8.33 KHz radio, the spacing between two 25 KHz channels is divided into three new channels: $\frac{25}{3}$ = 8.33 KHz.

25 KHz		8.33 KHz	
Displayed	Frequency	Displayed	Frequency
132.00	132.000	132.000	132.0000
		132.005	132.0000
		132.010	132.0083
		132.015	132.0166
132.02	132.025	132.025	132.0250
		132.030	132.0250
		132.035	132.0333
		132.040	132.0416

- **Background** - 8.33 KHz channel spacing has been implemented step by step in European airspace by different mandates from 1999 to 2014.

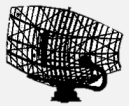
The following phraseology shall only be used referring to 8.33 KHz channels to request the capability of the radio equipment:



"PH-ABC, confirm eight point three three"

"Affirm / negative eight point three three, PH-ABC"

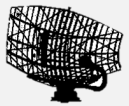
To request the status regarding exemptions:



"P-BC, confirm eight point three three exempted"

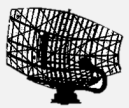
"Affirm / negative eight point three three exempted, P-BC"

To indicate that a clearance is given because otherwise a non-equipped aircraft would enter the airspace of mandatory carriage:



"P-BC, ... (clearance or instruction), due eight point three three requirement"

To request UHF capability:

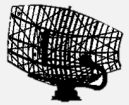


"Regional-jet 347, confirm UHF"

"Affirm / negative UHF, Regional-jet 347"

RNAV / GNSS Phraseology

General - Pilot-interpreted RNAV (GNSS) instrument approach procedures are available for use by suitably equipped aircraft at certain aerodromes. The phraseology to be used is illustrated below. Where traffic conditions permit, controllers shall clear the pilot to follow the procedure, indicating the runway designator and initial approach fix to be used.



"Big-prop 1233, request RNP approach runway 27 via LOKSA"

"Big-prop 1233, cleared RNP approach runway 27, report LOKSA"

Position Reporting - For traffic sequencing and to aid situational awareness, controllers may request the pilot to report when established on final approach track or to report at any other relevant point in the procedure, as shown below:

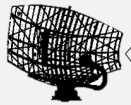
"Big-prop 1233, report established on final approach track" or,

"Big-prop 1233, report 2 miles from final approach track" or,

"Big-prop 1233, report final approach fix"

Reporting GNSS Problems - When aware of problems with the GNSS system, controllers will notify the pilot specifying, where known, applicability in terms of type of operation, location, geographical boundaries and times.

A RAIM (Receiver Autonomous Integrity Monitoring) alert indicates to the pilot that the GNSS system is unavailable either due to insufficient satellites in view or a fault in the system. In these cases the pilot will break-off the approach or continue visually if sufficient visual references. Following a RAIM indication, pilots shall inform the controller of the event together with their intentions.



"Big-prop 1233, GNSS reported unreliable" or,

"Big-prop 1233, GNSS may not be available due to interference in the vicinity of ELRIT until further notice"

"Big-prop 1233, unable RNAV due loss of RAIM, request LOC approach runway 27" or,

*"Big-prop 1233, **RAIM ALERT, GOING AROUND!**"*

End of Module

Table of Contents

Air Traffic Management
❷ Basic Radiotelephony

Basic Radiotelephony

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Introduction

- **Introduction** - Radiotelephony provides the means by which pilots of aircraft and ground personnel communicate with each other. To ensure communications are clear and fully understood it is of vital importance that transmissions by radiotelephony should comply with internationally agreed procedures and phraseology.
- The use of standard procedures and phraseology will avoid misunderstanding and reduce the need for repeating transmissions. Incidents and accidents have occurred in which a contributing factor has been the misunderstanding caused by the use of non-standard phraseology and not understanding the important elements of the message. **The importance of using correct and precise standard phraseology cannot be over-emphasised.**

Types of Messages

Used properly, clearances, instructions and information transmitted will greatly assist in the safe and expeditious operation of aircraft. A transmitted radiotelephony message will contain at least one of the elements listed but can contain all three elements if required. Pilots and ground personnel should be aware of the elements of each transmission to ensure only those elements that are required to be read back are transmitted. Read back of items which do not require read back must be avoided. One of the common faults in radiotelephony is the unnecessary re-transmission of simple instructions and information.

Message Type	Compliance	Remark
Clearance	Requires strict compliance.	Clearances transmitted by ground personnel (e.g. ATC) are to be strictly complied with and the clearance issued is to be read back.
Instruction	To be followed and carried out where practically possible and safe to do so.	Instructions transmitted are to be complied with and in most cases should be read back to reduce the chance of misunderstanding. However, if the instruction is short, clear and unambiguous, acknowledgement of the instruction using standard phraseology such as **"ROGER"** or **"WILCO"** is preferred to reduce radio transmission time.
Information	Of benefit and usefulness between pilot and ground personnel in the interest of safety.	Information is provided to assist the safe conduct of the flight and should not be read back. If the information is not understood, a request to repeat the information is sufficient.

The categories of messages are in the following order of priority:

1. Distress messages
2. Urgency messages
3. Communications relating to direction finding
4. Flight safety messages
5. Meteorological messages
6. Flight regularity messages
7. Other aeronautical communications

Example Clearance:

"Regional-jet 347, cleared to Stockholm, PETOT 1S departure, squawk 1234"

"Cleared to Stockholm, PETOT 1S departure, squawk 1123, Regional-jet 347"

Example Instruction:

"Big-prop 1233, taxi stand E78 via taxiway B, taxiway V and taxiway T, report marshaller in sight"

"Taxi stand E78 via taxiway B, taxiway V and taxiway T, wilco, Big-prop 1233"

Example Information:

"PH-ABC, surface wind 240 degrees, 15 knots"

(No response)

Transmitting Technique

The following transmitting techniques will assist in ensuring that transmitted speech is clearly and satisfactorily received:

- Before transmitting check that the receiver volume is set at the optimum level and listen out on the frequency to be used to ensure that there will be no interference with a transmission from another station.
- Be familiar with microphone operating techniques and do not turn your head away from it whilst talking or vary distance between it and your mouth. Severe distortions of speech may arise from:
  a) Talking to close to the microphone
  b) Touching the microphone with the lips
  c) Holding the microphone or boom
- Use a normal conversation tone, speak clearly and distinctly.
- Maintain an even rate of speech not exceeding 100 words per minute. When it is known that elements of the message will be written down by the recipients, speak at a slightly slower rate.
- Maintain the speaking at a constant level.
- A slight pause before and after numbers will assist in making them easier to understand.
- Avoid hesitation sounds such as “er”.
- Avoid excessive use of courtesies and entering non-operational conversations.
- Depress the transmit switch fully before speaking and do not release until the message is complete. This will ensure that the entire message is transmitted. However, do not depress transmit switch until ready to speak.
- Be aware that the mother tongue of the person receiving the message may not be English. Therefore, speak clearly and use standard radiotelephony (RTF) words and phrases wherever possible.
- Messages should not contain more than three specific phrases, comprising a clearance, instruction or pertinent information. In case of doubt e.g. a foreign pilot having difficulty with the English language or an inexperienced pilot unsure of the procedures, the controller should reduce the number of items and if necessary, these should be passed, and acknowledged singly.
- One of the most irritating and potentially dangerous situations in radiotelephony is a “stuck” microphone button. Operators should always ensure that the button is fully released after a transmission and the microphone placed in an appropriate place that will ensure that it will not inadvertently be switched on (hand-held microphone).
- After a call has been made, a period of at least 10 seconds should elapse before a second call is made. This should eliminate unnecessary transmissions while the receiving station is getting ready to reply to the initial call.

Letters & Numbers

The words in the table below shall be used when individual letters are required to be transmitted. The syllables to be emphasized are in bold. All numbers shall be transmitted by pronouncing each digit separately as follows:

a) When transmitting messages containing aircraft call signs, altimeter settings, flight levels.

b) All numbers used in the transmission of altitude, height, cloud height, visibility and runway visual range information which contain whole hundreds and whole thousands shall be transmitted by pronouncing each digit in the number of hundreds or thousands followed by the word **"HUN DRED"** or "**TOUSAND"** as appropriate.

c) Combinations of thousands and whole hundreds shall be transmitted by pronouncing each digit in the number of thousands followed by the word "**TOUSAND"** and the number of hundreds followed by the word "**HUN DRED".**

Letter	Phonetic Alphabet	Pronunciation	Letter	Phonetic Alphabet	Pronunciation	Number	Pronunciation
A	Alpha	**AL** FAH	**N**	November	NO **VEM** BER	**0**	**ZERO**
B	Bravo	**BRAH VOH**	**O**	Oscar	**OSS** CAR	**1**	**WUN**
C	Charlie	**CHAR** LEE	**P**	Papa	PAH **PAH**	**2**	**TOO**
D	Delta	**DELL** TAH	**Q**	Quebec	KEH **BECK**	**3**	**TREE**
E	Echo	**ECK** OH	**R**	Romeo	**ROW** ME OW	**4**	**FOW**ER
F	Foxtrot	**FOKS** TROT	**S**	Sierra	SEE **AIR** RAH	**5**	**FIFE**
G	Golf	GOLF	**T**	Tango	**TANG** GO	**6**	**SIX**
H	Hotel	HOH **TELL**	**U**	Uniform	**YOU** NEE FORM	**7**	**SEV**EN
I	India	**IN** DEE AH	**V**	Victor	**VIK** TAH	**8**	**AIT**
J	Juliett	**JEW** LEE **ETT**	**W**	Wiskey	**WISS** KEY	**9**	**NIN**ER
K	Kilo	**KEY** LOH	**X**	X-ray	**ECKS** RAY	**Decimal**	**DAYSEEMAL**
L	Lima	**LEE** MAH	**Y**	Yankee	**YANG** KEE	**Hundred**	**HUN DRED**
M	Mike	MIKE	**Z**	Zulu	**ZOO** LOO	**Thousand**	**TOUSAND**

Number	Transmitted as	Pronunciation
10	One zero	WUN ZERO
100	One hundred	WUN HUN DRED
2500	Two thousand five hundred	TOO TOUSAND FIFE HUN DRED
11000	One one thousand	WUN WUN TOUSAND
25000	Two five thousand	TOO FIFE TOUSAND
EST347	Regional-jet three four seven	Regional-jet TREE FOWER SEVEN
FL100	Flight level one zero zero	FLIGHT LEVEL WUN ZERO ZERO
FL200	Flight level two hundred	FLIGHT LEVEL TOO HUN DRED
FL180	Flight level one eight zero	FLIGHT LEVEL WUN AIR ZERO
150 degrees	One five zero degrees	WUN FIFE ZERO DEGREES
18 knots	One eight knots	WUN AIT KNOTS
122.1	One two two decimal one	WUN TOO TOO DAYSEEMAL WUN
Squawk 6500	Squawk six five zero zero	SQUAWK SIX FIFE ZERO ZERO

Frequencies & Time

Frequencies - All six figures shall be used when identifying frequencies irrespective of whether they are 25 kHz or 8.33 kHz spaced. Exceptionally, when the final two digits of the frequency are both zero, only the first four digits need to be given. In technical terms an 8.33 kHz frequency is referred to as a “channel”, however the word “channel” is not used in radiotelephony.

Frequency	Transmitted as	Pronunciation
118.125	One one eight decimal one two five	WUN WUN AIT DAYSEEMAL WUN TOO FIFE
119.050	One one nine decimal zero five zero	WUN WUN NINER DAYSEEMAL ZERO FIFE ZERO
122.500	One two two decimal five ~~zero zero~~	WUN TOO TOO DAYSEEMAL FIFE
118.000	One one eight decimal zero ~~zero zero~~	WUN WUN AIT DAYSEEMAL ZERO

Time - When transmitting time, only the minutes of the hour are normally required. However, the hour should be included if there is any possibility of confusion. Time checks shall be given to the nearest minute and preceded by the word **“TIME”**. Co-ordinated Universal Time (UTC) is to be used at all times, unless specified. 2400 hours designates midnight, the end of the day, and 0000 hours the beginning of the day.

Time	Transmitted as	Pronunciation
08:23	Two three (zero eight two three)	TOO TREE (ZERO AIT TOO TREE)
13:00	One three zero zero	WUN TREE ZERO ZERO
20:57	Five seven (two zero five seven)	FIFE SEVEN (TOO ZERO FIFE SEVEN)

Standard Phraseology

Phrase	Meaning
“ACKNOWLEDGE”	Let me know that you have received and understood this message.
“AFFIRM”	Yes.
“APPROVED”	Permission for proposed action granted.
“BREAK”	Indicates the separation between messages.
“BREAK BREAK”	Indicates the separation between messages transmitted to different aircraft in a busy environment.
“CANCEL”	Annul the previously transmitted clearance.
“CHANGING TO”	I intend to call ... (unit) on ... (frequency).
“CHECK”	Examine a system or procedure. (Not to be in any other context. No answer is normally expected)
“CLEARED”	Authorized to proceed under the conditions specified.
“CLIMB”	Climb and maintain.
“CONFIRM”	I request a verification of clearance, instruction, action, information.
“CONTACT”	Establish communication with ...
“CORRECT”	True or accurate.
“CORRECTION”	An error has been made in this transmission (or message indicated). The correct version is ...
“DESCEND”	Descend and maintain.
“DISREGARD”	Ignore.
“HOLD SHORT”	Stop before reaching the specified location.
“HOW DO YOU READ”	What is the readability of my transmission?
“I SAY AGAIN”	I repeat for clarity or emphasis.

Phrase	Meaning
“MAINTAIN”	Continue in accordance with the condition(s) specified or in its literal sense, e.g. “maintain VFR”.
“MONITOR”	Listen out on ... (frequency).
“NEGATIVE”	No, or permission not granted, or that is not correct or not capable.
“NEGATIVE I SAY AGAIN”	May be used if repeated incorrect readbacks are given by the pilot and additional emphasis is required.
“OUT”	This exchange of transmissions is ended, and no response is expected.
“OVER”	My transmission is ended, and I expect a response from you.
“GO AHEAD”	Proceed with your message.
“READ BACK”	Repeat all, or the specified part, of this message back to me exactly as received.
“RECLEARED”	This new clearance supersedes the old clearance.
“REPORT”	Pass requested information.
“REQUEST”	I should like to know ... or I wish to obtain ...
“ROGER” *1	I have received all your last transmissions.
“SAY AGAIN”	Repeat all, or the following part of your last transmission.
“SPEAK SLOWER”	Reduce you rate of speech.
“STANDBY”	Wait and I will call you.
“UNABLE” *2	I cannot comply with your request, instruction or clearance. *Unable is normally followed by a reason.*
“WILCO”	I understand your message and will comply with it. *Abbreviation for will-comply.*
“WORDS TWICE”	As a request: Communication is difficult. Please send every word twice. As information: Since communication is difficult, every word in this message will be send twice.

*1 Under no circumstances to be used in reply to a question requiring a direct answer in the affirmative (**“AFFIRM”**) or negative (**“NEGATIVE”**).

*2 No onward clearance is to be assumed. The caller would normally re-establish contact if delay is lengthy. **“STANDBY”** is not an approval nor a denial.

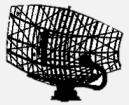
NOTE: The ICAO phrase **“GO AHEAD”** has the meaning **“PASS YOUR MESSAGE”**. **“GO AHEAD”** shall never be used where there is a risk of misinterpretation as an instruction to proceed. Pilots and controllers shall emphasize this fact when communicating.

Simultaneous Transmissions

Direct communications between pilots and ATSUs can be adversely affected by simultaneous transmissions which, effectively, block all or part of intended messages. Moreover, whilst the situation may be apparent to the controller or another pilot, the individuals who inadvertently make such transmissions may be unaware. Although not an official procedure, it can be helpful for the controller (or another pilot if it is the controller's transmission which has been blocked) to draw attention to the situation using the word **"BLOCKED"**. This not official ICAO phraseology and not included in PANS-ATM (doc. 4444).

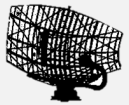
Controller example (where pilots have transmitted simultaneously):

[blocked transmission]



*"Transmission **BLOCKED**, Regional-jet 1233 (if callsign is known), say again"*

Pilot example (where another pilot has blocked a controllers transmission):



"Big-prop 1233, [blocked transmision]"

*"Transmission **BLOCKED**, Stockholm Approach, say again, Big-prop 1233*

Test Transmissions

The nature of the test shall be such that is identifiable as a test transmission and cannot be confused with other communications. To achieve this the following format shall be used.

- The callsign of the aeronautical station being called
- The aircraft identification
- The words **“RADIO CHECK”**
- The frequency being used

The operator of the aeronautical station being called will assess the transmission and will advise the aircraft making the test transmission in terms of the readability scale, together with a comment on the nature of any abnormality noted (e.g. excessive noise) using the following format:

- The aircraft identification
- The callsign of the aeronautical station replying
- **“READABILITY ...”**
- Additional information with respect to any noted abnormality

NOTE: For practical reasons it may be necessary for the operator of an aeronautical station to reply with **“STATION CALLING ... UNREADABLE”**.

Readability Scale	Meaning
“ONE”	Unreadable
“TWO”	Readable now and then
“THREE”	Readable but with difficulty
“FOUR”	Readable
“FIVE”	Perfectly readable

*“Tallinn Tower, Regional-jet 347, **RADIO CHECK**, 135.905”*

*“Regional-jet 347, Tallinn Tower, **READIBILITY 5**” or,*

*“Regional-jet 347, Tallinn Tower, **READIBILITY 3**, with a loud background whistle” or,*

*“Regional-jet 347, Tallinn Tower, **READIBILITY 1**” or,*

“STATION CALLING** Tallinn Tower, **UNREADABLE”

Callsigns

Aeronautical (Ground) Stations - Aeronautical stations are identified by the name of the location followed by a suffix. The suffix indicates the type of service being provided.

Service	Suffix
Area Control	**“CONTROL”**
Radar	**“RADAR”**
Approach Control	**“APPROACH”**
Aerodrome Control	**“TOWER”**
Approach Control Radar / Arrival / Departure	**“DIRECTOR” / “DEPARTURE” / “ARRIVAL”**
Ground Movement Control	**“GROUND”**
Precision Approach Radar (PAR)	**“TALKDOWN”**
Flight Information	**“INFORMATION”**
Air / Ground Communication Service	**“RADIO”**
Clearance Delivery	**“DELIVERY”**

There are three main categories of aeronautical communication services:

- Air Traffic Control service (ATC) which can only be provided by licensed Air Traffic Control Officers who are closely regulated by the relevant regulatory authority. In The Netherlands ATC is provided by LVNL (luchtverkeersleiding Nederland), the Dutch ministry of Defense and Eurocontrol.
- Flight Information Service (FIS) at aerodromes can only be provided by licensed Flight Information Service Officers (FISOs). who are also regulated by the CAA.
- Aerodrome Air/Ground Communication Service (AGSC) which can be provided by Radio Operators who are not licensed but have obtained a certificate of competency to operate radio equipment on aviation frequencies from the CAA. These operations come under the jurisdiction of the radio license holder but are not regulated in any other way.
- Other categories of aeronautical communications service include VOLMET and ATIS.

Aircraft Callsigns - After satisfactory communication has been established and provided that no confusion is likely to occur, the aeronautical station may abbreviate callsigns (see table below). A pilot may **ONLY** abbreviate the callsign of his aircraft if it has **FIRST** been abbreviated by the aeronautical station.

- Type A - aircraft registration mark (e.g. PH-ABC)
- Type B - Operating agency plus last 4 characters of the registration (e.g. Big-jet HABC)
- Type C - Operating agency plus flight number (e.g. Big-prop 1233)

The name of either the aircraft manufacturer (e.g. Cessna / Socata), or name of aircraft model (e.g. Tampico / Archer), or the name of the aircraft category (e.g. Helicopter) may be used as a prefix to a Type A callsign.

An aircraft shall not change its callsign during flight. However, where there is a likelihood that confusion may occur because of similar callsign, an aircraft may be instructed by an Air Traffic Service Unit (ATSU) to change the type of its callsign temporarily.

Type	Full Callsign	Abbreviated Callsign
A	**“PH-ABC”**	**“P-BC”**
A	**“Socata PH-ABC”**	**“Socata BC”**
A	**“D-IRTY”**	**“D-TY”**
A	**“N31029”**	**“N029”**
A	**“N753DA”**	**“N3DA”**
A	**“Helicopter G-ABCD”**	**“Helicopter CD”**
B	**“Regional-jet SATE”**	**“Regional-jet TE”**
C	**“Big-prop 1233”**	**No Abbreviation**

Callsign Confusion

WIP

WIP

Initial Radio Contact

Initial Contact - The use of the calling aeronautical station's callsign followed by the answering aeronautical station's callsign shall be considered the invitation to proceed with the transmission by the station calling. The use of the phrase **"GO AHEAD"** may be used when considered appropriate. When satisfactory communication has been established, and provided that it will not be confusing, the name of the location or the callsign suffix may be omitted.

Placement of the callsign - The placement of the callsign of both the aircraft and the ground station within an established RTF exchange should be as follows:

Ground to Air	• Aircraft **CALLSIGN** • Message or reply
Air to Ground	Initiation of new information / request etc.: • Aircraft **CALLSIGN** • Message or reply
	Reply: • Repeat of pertinent information / readback / acknowledgement • Aircraft **CALLSIGN**

(Super) Heavy Aircraft - Aircraft in the "heavy" or "super heavy" wake turbulence category shall include the word **"HEAVY"** or **"SUPER"** immediately after the aircraft callsign in the initial call to each ATSU. The purpose of this call is to confirm the aircraft type and / or wake turbulence category is that stated on the flight progress strip.

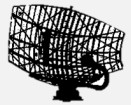
All Stations - When a ground station wishes to broadcast information to all aircraft, the message should be prefaced by the phrase **"ALL STATIONS".**

When establishing communication, either IFR or VFR, an aircraft shall use the full callsigns of both stations as below:

"Amsterdam Information, PH-ABC"

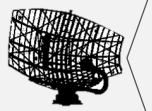
"PH-ABC, Amsterdam Information, go ahead"

"Langen Radar, Small-prop 505, FL180"



"Small-prop 505, Langen Radar, radar contact"

Pay close attention to the placement of the callsign in the next example:



*"**Regional-jet 347**, descent FL80"*

*"Descent FL80, **Regional-jet 347**"*

*"**Regional-jet 347**, request descent"*

*"**Regional-jet 347**, descent to altitude 5000 ft, QNH 1020"*

*"Descent to altitude 5000 ft, QNH 1020, **Regional-jet 347**"*

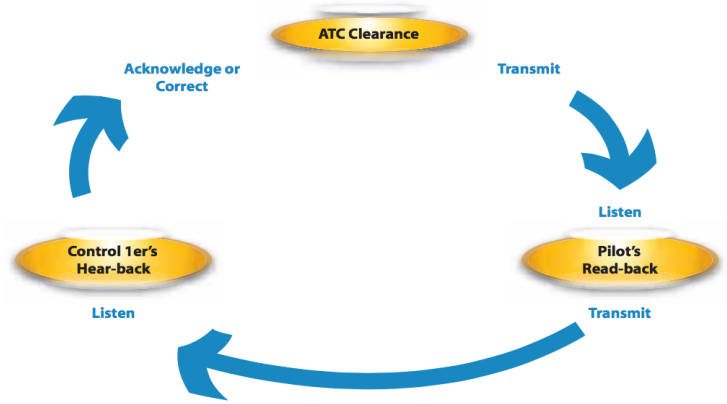
*"Schiphol Tower Bigjet 123 **HEAVY**, established ILS approach runway 36R"*

*"**ALL STATIONS**, Schiphol Tower, new QNH 1020"*

*"Schiphol Tower, Giant 456 **SUPER**, holding point V4, runway 36L, ready for departure"*

Read back

Communications between controllers and pilots can be improved by the mutual understanding of each others operating environment and of the communication process itself. The responsibilities of the pilot and controller overlap in many areas and provide backup. The pilot-controller confirmation / correction process is a “loop” that ensures effective communication.



During normal situations, but especially when adverse factors are likely to affect communication, the confirmation / correction process is a line of defense against communication errors. High workload, fatigue, distractions, interruptions and conflicts are among factors that may adversely affect pilot-controller communications and result in:

- Incomplete communication
- Omission of callsign or use of an incorrect callsign
- Use of non-standard phraseology
- Failure to hear or to respond
- Failure to implement effectively a confirmation or correction

Read back is vital for ensuring mutual understanding between the pilot and the controller of the intended plan for that aircraft.

- Following correct read back the flight crew must ensure that they carry out the correct action. Statistics show that one of the most common causes of a level bust in Europe is correct read back followed by **incorrect** action
- Strategies to prevent the above error include noting down the clearance prior to read back and ensuring that both flight crew members listen to all clearances, including taxi clearance. **If there is any doubt, restate the clearance!**

A clearance may vary in content from a detailed description of the route and levels to be flown to a brief standard instrument departure (SID) according to local procedures. Controllers will pass a clearance slowly and clearly since the pilot needs to write it down, wasteful repetition will thus be avoided. Whenever possible, a route clearance should be passed to an aircraft before start-up and the aircraft’s full callsign will always be used.

Generally, controllers will avoid passing a clearance to a pilot engaged in complicated taxiing maneuvers and in NO occasion when the pilot is engaged in line-up or take off maneuvers. A route clearance is NOT an instruction to take off or enter an active runway.

The word **“TAKE OFF”** is only used when an aircraft is cleared for takeoff. At all other times, the word **“DEPARTURE”** is used.

The stringency of the read back requirement is directly related to the possible seriousness of a misunderstanding in the transmission and receipt of ATC clearance and instructions. ATC route clearances shall always be read back. Read backs always include the aircraft callsign.

Checking the accuracy of a readback is far easier if the information is readback in the same order as given. Omissions are more difficult to pick up than incorrect data. When a readback is required ensure it is complete and in the order given, always listen for (and check) ATC confirmation or correction of read back.

Read back Requirements, Repetition & Corrections

Readback Requirements - The ATS messages listed below must be read back in full by the pilot. If a read back is not received the pilot will be asked to do so. Similarly, the pilot is expected to request that instructions are repeated or clarified if not fully understood.

- Taxi instructions
- Level instructions
- Heading instructions
- Speed instructions
- Airways or route clearances
- Approach clearances
- **Runway in use**
- Clearance to enter, land, takeoff, backtrack, cross or hold short of any active
- runway
- SSR operating instructions
- **Altimeter settings**, including units when value is below 1000 hectopascals
- VDF information
- Frequency changes
- Type of ATC service
- Transition Levels
- Frequency changes should always be read back in full

Items which do not appear in the above list may be acknowledged with an abbreviated read back (**"ROGER"** or **"WILCO"**). Acknowledgement of Information should be signified using the receiving stations callsign (e.g. **"Regional-jet 347")** or roger + callsign (e.g. **"Roger, Regional-jet 347"**), and not by messages such as: **"Regional-jet 347 copy the weather"** or **"Regional-jet 347 copy the traffic".**

If an aircraft readback of a clearance or instruction is incorrect, the controller shall transmit the word **"NEGATIVE"** followed by the correct version.

*"PH-ABC, **runway 23 in use**, visibility 10 kilometers or more, clouds few at 1200 ft, broken at 2500 ft, temperature 10, dewpoint 15, **QNH 1003**"*

"Runway 23, QNH 1013, PH-ABC"

*"P-BC, **NEGATIVE**, QNH 1003"*

Repetition of a Message - If there is doubt that a message has been correctly received, a repetition of the message shall be requested either full or in part.

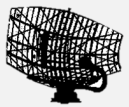
Phrase	Meaning
"SAY AGAIN"	Repeat entire message
"SAY AGAIN ..." (item)	Repeat specific item
"SAY AGAIN ALL BEFORE ..." (first word satisfactorily received)	Repeat specific part of message
"SAY AGAIN ALL AFTER ..." (last word satisfactorily received)	
"SAY AGAIN ... PORTION TO ..." (word before - after missing portion)	

When a station is called but is uncertain of the identification of the calling station, the calling station should be requested to repeat its callsign until identification is established.

"Arlanda Ground, Big-prop 1...3"

*"Station calling Arlanda Ground, **SAY AGAIN** your callsign"*

Corrections - When an error is made in a transmission the word **"CORRECTION"** shall be spoken, the last correct group or phrase repeated and then the correct version transmitted. If a correction can best be made by repeating the entire message, the operator shall use the phrase **"CORRECTION I SAY AGAIN"** before transmitting the message a second time.



*"Tallinn Radar, Regional-jet 347, FL120, **CORRECTION** FL140"*

"Regional-jet 347, Tallinn Radar, radar contact"

Amendments | Unable to Comply

Amendment to a Clearance - When an amendment is made to a clearance the new clearance shall be read in full to the pilot and shall automatically cancel any previous clearance. Controllers must be aware, therefore, that if the original clearance include a restriction (e.g. cross PAM FL150 or below) then the issue of a revised clearance automatically cancels the earlier restriction, unless it is repeated with the revised clearance.

When any doubt exists as to whether a message containing critical information has been passed by the controller or received and understood by the pilot, the message must be repeated. Critical information is, other than that required to enable routine flight, which must be received by pilots to ensure the safety and effective operation of their aircraft. The following can be considered as examples of critical information:

- Low visibility procedures
- Windshear information
- Essential aerodrome information
- Equipment servicebility (eg. ILS / navigational aids)
- Weather hazards (e.g. thunderstorms, hail, icing, etc.)

Unable to Comply - If at any time a pilot receives a clearance or instruction with which he / she cannot comply, he / she should advise the controller using the phrase **"UNABLE"** and state the reason(s).

Compliance with Clearances & Instructions

Pilots are expected to comply with clearances and instructions promptly, commensurate with normal aircraft operations. If, for any reason a pilot does not wish to comply with an instruction promptly, the pilot should advise the ATS unit and give an indication of when he intends to comply.

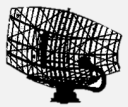
If an ATS unit wishes to indicate that time of compliance is at the pilot's discretion, the ATS message will include the phrase **"WHEN READY"**.

If an ATS unit wishes to indicate that the clearance or instruction is required to be complied with at a particular point in the flight, the message will include the phrase **"AFTER PASSING".**

If an ATS unit wishes to indicate that the instruction or clearance must be complied with at once, the controller's message will include the word **"NOW"** or **"IMMEDIATELY"**. Use of the word **"NOW"** indicates that the instruction should be complied with in accordance with normal aircraft operating procedures, but without delay.

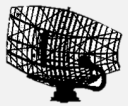
Use of the word **"IMMEDIATELY"** indicates a further degree of urgency exists (e.g. to avoid flight into terrain or restricted airspace, or for the provision of collision avoidance). In such circumstances, the pilot should take action to comply with the instruction as soon as practicable, subject to the safety of the aircraft.

In order to ensure any restriction is not blocked by a pilot acknowledgement, the phrase or word, indicating when a clearance or instruction should be complied with, will normally be placed before the executive instruction, but in certain cases the phrase or word may be placed between the instruction and the value of the instruction.



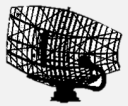
*"Big-prop 1233, **WHEN READY**, descend FL100, report leaving FL150"*

*"**WHEN READY**, descend FL100, wilco, Big-prop 1233"*



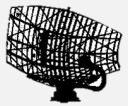
*"Big-prop 1233, **AFTER PASSING** LAMOX, descend to altitude 3000 ft"*

*"**AFTER PASSING** LAMOX, descend to altitude 3000 ft, Big-prop 1233"*



*"Big-prop 1233, reduce speed **NOW** 180 kts"*

*"Reduce speed **NOW** 180 kts, Big-prop 1233"*



*"Big-prop 1233, climb **IMMEDIATELY** to altitude 3000 ft!"*

*"Climb **IMMEDIATELY** to altitude 3000 ft, Big-prop 1233"*

Transfer of Communications

To transfer communications with an aircraft to another unit, controllers shall pass instructions giving:

- The identity of the unit to be contacted.
- The frequency to be used to establish contact.

*"Regional-jet 347, **CONTACT** Tallinn Radar, 127.905"*

"Tallinn Radar, 127.905, Regional-jet 347"

Aircraft flying in controlled airspace must obtain permission from the controlling authority before changing frequency. If no further communications is received from the pilot after an acknowledgement, satisfactory transfer of communication may be assumed.

An aircraft may be instructed to **"STANDBY"** on a frequency when it is intended that the ATSU will initiate communications, and to **"MONITOR"** a frequency on which information is being broadcast.

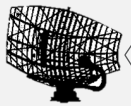
*"Small-prop 505, **STANDBY** for Zurrich Tower, 118.100"*

*"**STANDBY** for Zurrich Tower, 118.100, Small-prop 505"*

*"Big-prop 1233, **MONITOR** Arlanda ATIS, 119.005"*

*"**MONITOR** Arlanda ATIS, 119.005, Big-prop 1233"*

The controller may instruct the pilot to contact another agency on passing a specific point or when passing, leaving or reaching a specified level:



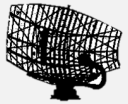
"Regional-jet 347, at PETOT contact Tallinn Radar, 127.905"

"At PETOT contact Tallinn Radar, 127.905, Regional-jet 347"

"Regional-jet 347, when passing FL100 contact Tallinn Radar, 127.905"

"When passing FL100, contact Tallinn Radar, 127.905, Regional-jet 347"

When the aircraft is transfered to another agency whilst on a radar heading, the controller will instruct the pilot to report the radar heading to the next agency:



*"Big-prop 1233, **REPORT** radar heading to Kastrup Arrival, 118.455"*

*"**REPORT** radar heading to Kastrup Arrival, 118.455, Big-prop 1233"*

If the airspace does not dictate that an aircraft must remain in contact with a specified ATSU and the pilot wishes to change frequency he / she should request or notify such an intention:

*"Dutch MIL Info, PH-ABC, **REQUEST CHANGE** to Texel Radio, 119.305"*

*"Texel Radio, PH-ABC, **CHANGING** to Dutch MIL info, 132.350"*

End of Module

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Air Traffic Management
❸ General Phraseology

General Phraseology

Table of Contents

Introduction

General - The phraseology detailed in this manual has been established for the purpose of ensuring uniformity in RTF communications. Communications shall be concise and unambiguous, using standard phraseology for all situations for which it is specified. Obviously, it is not practicable to detail phraseology examples suitable for every situation. However, if standard phrases are adhered to when composing a message, any possible ambiguity will be reduced to a minimum. Only when standard phraseology cannot serve an intended transmission, shall plain language be used.

Some abbreviations, which by their common usage have become part of aviation terminology, may be spoken using their constituent letters rather than the spelling alphabet, example:

- ILS
- QNH
- RVR, etc.

The following words may be omitted from transmissions provided that no confusion or ambiguity may result:

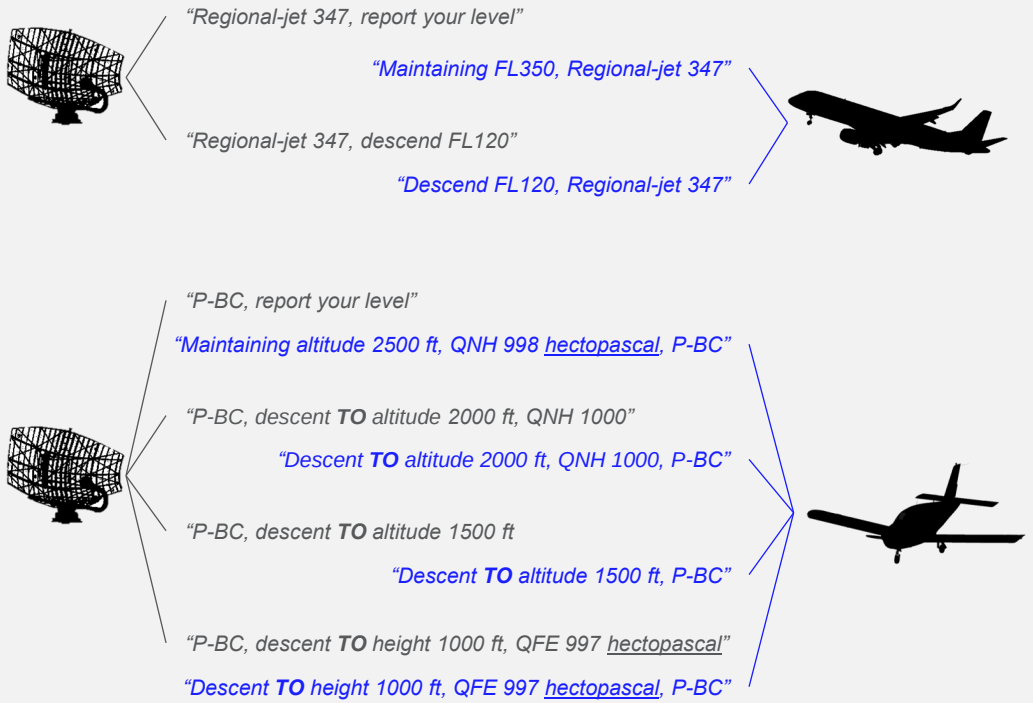
- **“SURFACE**” & **“KNOTS”** in relation to surface wind direction & speed.
- **“DEGREES”** in relation to surface wind direction.
- **“VISIBILITY”**, **“CLOUD”** and **“HEIGHT”** in meteorological reports.
- **“OVER”**, **“ROGER”** and **“OUT”.**

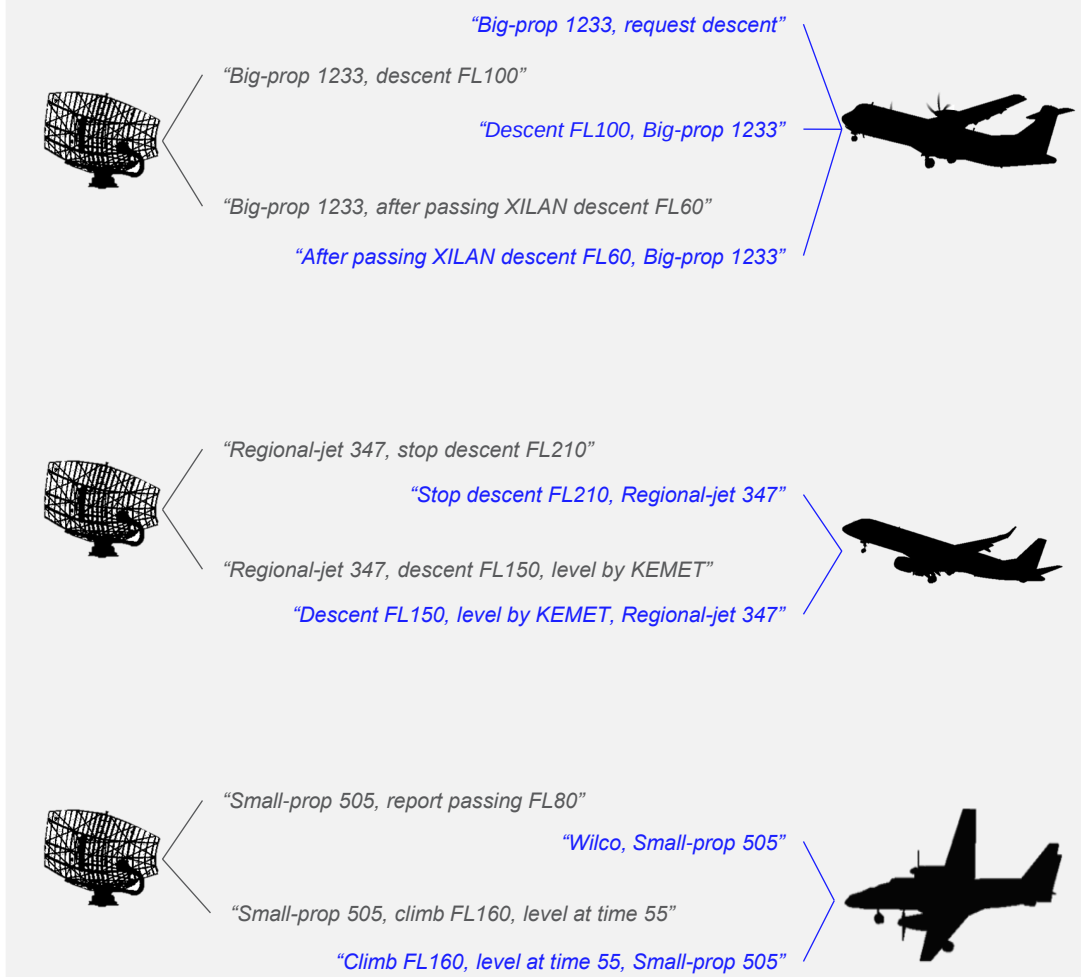
Level Instructions - Levels may be reported as altitude, height or flight levels according to the phase of flight and the altimeter setting. Therefore, when passing level messages, the following apply:

- The word **“TO”** is to be omitted from messages relating to flight levels.
- All messages relating to an aircrafts climb or descent to height or altitude employ the word **“TO”** followed immediately by the word **“HEIGHT”** or **“ALTITUDE”**. Furthermore, the initial message in any such RTF exchange will also include the appropriate QFE or QNH.
- For all transmissions, the word **“HECTOPASCAL”** shall be appended to figures when transmitting a pressure setting below 1000 hPa.
- The word “**HUNDRED**” shall not be used for either flight levels or headings.
- FL100 / 200 / 300 etc. is spoken as: **“FLIGHT LEVEL ... ZERO ZERO”.**
- Flight levels below FL100 are referred to as two-digit numbers to reduce risk of confusion with a heading instruction. (e.g. FL060 is spoken as: **“FLIGHT LEVEL SIX ZERO”** and not as **“FLIGHT LEVEL ZERO SIX ZERO”**).

Heading Instructions - For all transmissions, except for those used for surveillance radar approaches (SRA) or precision radar approaches (PAR), the word **“DEGREES”** shall be appended to heading figures where the heading ends in zero. While this is not standard ICAO phraseology and not included in PANS-ATM (doc. 4444) it is recommended by Eurocontrol to prevent confusion between headings and flight levels.

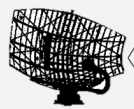
Level Instructions





Rate of Climb & Descent Instructions

Where the controller requires the aircraft to achieve a specific rate of climb or descent, the controller shall use the phraseology shown below:



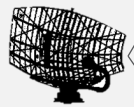
"Regional-jet 347, climb at 1500 ft per minute or greater"

"Climb at 1500 ft per minute or greater, Regional-jet 347"

"Regional-jet 347, descent at 1000 ft per minute or less"

"Descent at 1000 ft per minute or less, Regional-jet 347"

Exceptionally, a best rate of climb or descent may be required:



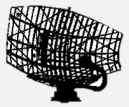
*"Big-prop 1233, **EXPEDITE** descent FL100"*

***"EXPEDITE** descent FL100, Big-prop 1233"*

*"Big-prop 1233, Climb FL180, **EXPEDITE** until passing FL150"*

*"Climb FL180, **EXPEDITE** until passing FL150, Big-prop 1233"*

Where the controller required the aircraft to increase the rate of climb / descent, but a best rate is not required, the controller shall use the phraseology shown below:



*"Small-prop 505, **INCREASE / DECREASE** rate of climb / descent"*

*"**INCREASE / DECREASE** rate of climb / descent, Small-prop 505"*

Under exceptional circumstances, if instant descent/climb is required, the word **"IMMEDIATELY"** shall be used. **Pilots are expected to comply with ATC instructions as soon as they are issued.** However, when a climb / descent is left to the discretion, the words **"WHEN READY"** shall be used. Except for the initial call, IFR flights receiving a Radar Control Service are not required to report leaving a level, passing a level, or reaching a level, unless specifically requested to do so.

When pilots are instructed to report leaving a level, they should advise ATC that they have left an assigned level only when the aircraft's altimeter indicates that the aircraft has actually departed from that level and is maintaining a positive rate of climb or descent, in accordance with published procedures.

*"Regional-jet 347, **WHEN READY** descent FL200, report leaving FL250"*

*"**WHEN READY** descent FL200, report leaving FL250, Regional-jet 347"*

"Regional-jet 347, leaving FL250, descending FL200"

"Regional-jet 347, roger"

⚠ REFERENCE ONLY

Heading Instructions

Aircraft may be given specific vectors to fly in order to establish separation. Pilots may be informed of the reasons for radar vectoring.

"Big-prop 1233, for spacing turn left heading 050 degrees"

"Left heading 050 degrees, Big-prop 1233"

It may be necessary for a controller to know the heading of an aircraft as separation can often be established by instructing an aircraft to continue on its exisiting heading.

"Regional-jet 347, continue present heading"

"Continue present heading, Regional-jet 347"

"Regional-jet 347, report heading"

"Heading 050 degrees, Regional-jet 347"

"Regional-jet 347, continue present heading and report that heading"

"Continue heading 050 degrees, Regional-jet 347"

"Regional-jet 347, continue heading 050 degrees"

"Continue heading 050 degrees, Regional-jet 347"

Heading instructions may be combined with a turn instruction

"Regional-jet 347, turn left 30 degrees, report heading"

"Turning left 30 degrees, wilco, Regional-jet 347"

"Regional-jet 347, stop turn heading heading 245 ~~degrees~~"

"Stop turn heading 245 ~~degrees~~, Regional-jet 347"

"Regional-jet 347, continue turn heading 245 ~~degrees~~"

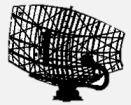
"Continue heading 245 ~~degrees~~, Regional-jet 347"

The controller may instruct the aircraft to fly a particular heading after passing a specific point.

"Big-prop 1233, leave HMR heading 195"

"Leave HMR heading 195, Big-prop 1233"

A controller may not know the aicrafts current heading but does require the aircraft to fly a particular heading (direction of turn required unknown).

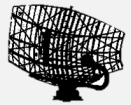


*"Regional-jet 347, **FLY** heading 275"*

"Roger, turning left heading 275, Regional-jet 347" or,

"Roger, turning right 20 degrees heading 275, Regional-jet 347"

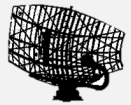
Occasionally an aircraft may be instructed to make a complete turn (known as an orbit or 360 turn), for delaying purposes or to achieve required spacing. Spoken as: **"THREE SIXTY TURN"** or **"ORBIT".**



*"Regional-jet 347, for spacing **ORBIT / MAKE A 360 TURN** left"*

***"ORBIT / 360 TURN** left, Regional-jet 347"*

When vectoring is complete, pilots will be instructed to resume their own navigation. Given position information if considered necessary by the controller and appropriate instructions, including direction of turn, as necessary. Where a direct route is required, the controller shall specify this in the instructions. **NOTE: "OWN NAVIGATION"** is an instruction to maneuver in only the lateral plane and does not imply a permission to climb or descend.

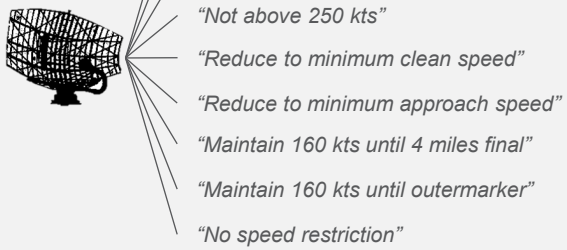


"Big-prop 1233, turn left resume own navigation inbound CDA"

"Wilco, turn left inbound CDA, Big-prop 1233"

Speed Instructions

Controllers may instruct pilots to increase / decrease speed in order to maintain appropriate separation. Examples of speed related phraseology:



"Reduce speed to Mach point 7"

"Maintain present speed"

"Maintain 250 knots or less"

"Not above 250 kts"

"Reduce to minimum clean speed"

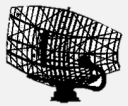
"Reduce to minimum approach speed"

"Maintain 160 kts until 4 miles final"

"Maintain 160 kts until outermarker"

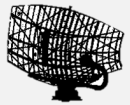
"No speed restriction"

Where the controller only requires speed control to apply following the point which the aircraft changes from Mach numbers to IAS, the phraseology to be used by the controller is:



"Regional-jet 347, descent FL120, on speed conversion 250 kts"

Where the controller requires the aircraft to fly at a specific Mach number until changeover to IAS and then fly a specified IAS, the phraseology used by the controller is:

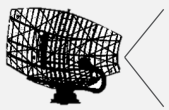


"Regional-jet 347, Mach point 78, on speed conversion 250 kts"

Where the controller requires the aircraft to fly the specified IAS as soon as practicable, the phraseology to be used by the controller is:

*"Regional-jet 347, **WHEN ABLE**, speed 250 kts"*

The procedures above may be used in reverse for the application of speed control to aircraft currently below FL280 but climbing to a level above FL280.



"Regional-jet 347, on speed conversion Mach point 78" or,

"Regional-jet 347, speed 250 kts, on speed conversion Mach point 78"

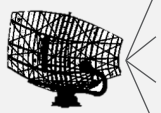
Flight Plans & Position Reporting

Flight Plan - A pilot may file a flight plan with an ATSU during flight if the flight plan only covers part of the flight. The use of busy RTF channels should be avoided, normally the FIS frequency should be used. A flight plan shall be filled at least 10 minutes before expected time of entering the relevant control areas. The format for an airborne flight plan:

- Aircraft identification and type
- Position and heading
- Level and flight conditions
- Departure aerodrome
- Estimated time at entry point
- Route and point of intended landing
- True airspeed
- Desired level on airway or advisory route

Position Reporting - Where adequate flight progress data is available from other sources, such as ground radar, aircraft may be exempted from the requirement to make compulsory position reports. Position reports shall contain the following elements of information:

- Aircraft identification
- Position
- Time
- Level
- Next position and ETA



"Next report at XILAN"

"Omit position reports"

"Omit position reports this frequency"

"Resume position reporting"

Activating a Flight Plan - Where the pilot is responsible for activating a flight plan, this may be done by asking an ATSU by radio:

"PH-ABC, departed Texel at 15, request activate flight plan"

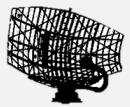
"PH-ABC, departure time 15, will activate flight plan"

IFR Position Reporting

"Small-prop 505"

"Small-prop 505, REFSO 47, FL220, LOGAN 57"

Canceling a Flight Plan - During a flight, a pilot might choose to cancel an IFR flight plan. When a pilot has expressed his intention to cancel an IFR flight plan, the ATSU will pass the pilot any available meteorological information which makes it likely that flight in VMC cannot be maintained.



"Dutch MIL, Small-prop 505, Canceling IFR"

"Small-prop 505, roger, IFR canceled at time ..."

VFR Position Reporting

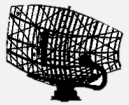
"PH-ABC"

"PH-ABC, mid-channel 25, altitude 3500 ft, Dover 40"

Wake Turbulence

ATC will provide the appropriate separation between IFR flights. When instructions are issued to regain wake turbulence separation, the controller shall use the following phraseology to the pilot:

- ICAO Wake Turbulence Categories
- RECAT - Wake Turbulence Re-categorization



"Regional-jet 347, for wake turbulence separation, turn left heading 270 degrees"

"Turning left heading 270 degrees, Regional-jet 347"

If a pilot elects to execute a visual approach, or is arriving as a VFR flight, it is his / her own responsibility to ensure an adequate distance from the preceding aircraft, although ATC will pass the appropriate distance.

"P-BC, caution wake turbulence, the recommended distance is ... miles"

"P-BC"

For departing flights ATC will issue take-off Clearance when the required wake turbulence separation minima will be achieved. The minima to be applied at the time the aircraft are airborne is dependent on aircraft sequence, wake turbulence categories, and runway departure configuration.

"Big-prop 1233, ready"

"Big-prop 1233, hold position, ... minutes delay due wake turbulence"

Traffic Information & Avoidance Action

Traffic Information - Whenever practicable, traffic information should be given in the following format:

- Relative bearing of the conflicting traffic in terms of the 12 hours clock with the optional prefix **"LEFT"** or **"RIGHT"** as appropriate, or, if the aircraft under service is established in a turn, the relative position of the conflicting traffic in relation to cardinal points, e.g. north-west, south etc.
- Distance from the conflicting traffic.
- Relative movement of the conflicting traffic, or, if the aircraft under service is established in a turn, the direction of flight of the conflicting traffic in relation to cardinal points.
- Level of the aircraft (if known).
- Speed of the conflicting traffic, if considered relevant.
- Type of aircraft, if considered relevant.

Relative movement - should be described by using one of the following terms as applicable:

- **"CROSSING"**, including the relative direction of movement either **"LEFT TO RIGHT"** or **"RIGHT TO LEFT"**, where there is relative movement, e.g. a change in the relative bearing between the conflicting traffic's flight path and that of the aircraft under service. Controllers should include the words **"AHEAD"** or **"BEHIND"** where appropriate to assist the pilot in assessing the conflicting traffic's flight path.
- **"CONVERGING"**, where there appears to be no change in relative bearing between the conflicting traffic's flight path and that of the aircraft under service and / or the controller perceives there to be a significant risk of mid-air collision.
- **"SAME DIRECTION TRAFFIC"** where the conflicting traffic's flight path is the same as that of the aircraft under service
- **"OPPOSITE DIRECTION"**, where the conflicting traffic's flight path is approximately 180° opposed to that of the aircraft under service but the flight paths are not converging.
- **"MANOEVERING"** where the conflicting traffic's flight path and/or level information is unpredictable and/or showing significant variation.

Level Information - The level of the conflicting traffic, if known, should be described by using one of the following terms as applicable and most appropriate for the circumstances (the terms climbing or descending may be added as required).

- **"... FT ABOVE / BELOW"**
- **"SAME LEVEL"**
- **"… FT ABOVE / BELOW CLEARED LEVEL"**
- **"INDICATING … FT ABOVE / BELOW"**
- **"INDICATING SAME LEVEL"**
- **"INDICATING … FT ABOVE / BELOW CLEARED LEVEL"**
- **"AT ..."**
- **"INDICATING ..."**
- **"NO HEIGHT INFORMATION"**

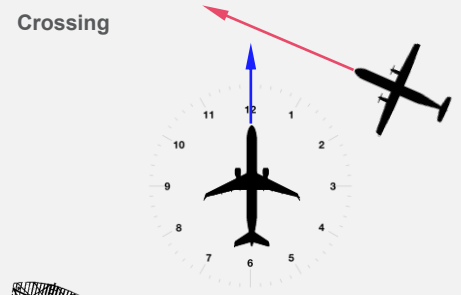
The phrase **"ABOVE / BELOW CLEARED LEVEL"** is used when the aircraft receiving traffic information is climbing or descending, while the phrase **"ABOVE / BELOW"** is used when the aircraft receiving traffic information is in level flight. The phrase **"INDICATING"** is used when the intentions of the conflicting traffic are unknown. The phrase **"NO HEIGHT INFORMATION''** is used when the conflicting traffic displays no mode C information or conflicting traffic is squawking 0000 (transponder unserviceable).

NOTE: The terms **"CO-ORDINATED"**, **"VERIFIED"**, **"UNVERIFIED"** shall not be used in traffic information phraseology.

Speed Information: Speed should be described by using one of the following terms as applicable:

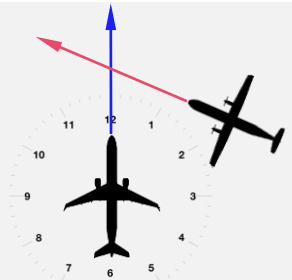
- **"FAST MOVING"**
- **"SLOW MOVING"**

Crossing



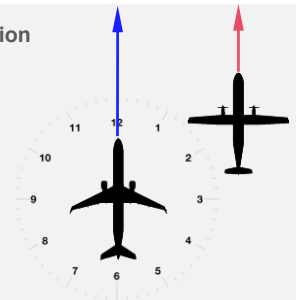
"Regional-jet 347, traffic 2 o'clock 4 miles, crossing right to left ahead, indicating 1000 ft below, slow moving"

Converging



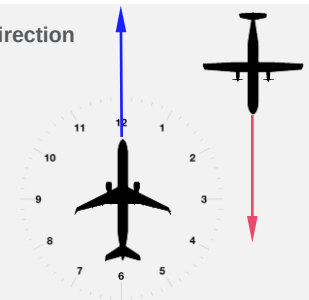
*"Regional-jet 347, **AVOIDING ACTION**, turn left **IMMEDIATELY** heading 270 degrees, traffic right 2 o'clock 4 miles **CONVERGING**, indicating 100 ft below, slow moving"*

Same Direction



"Regional-jet 347, traffic 2 o'clock 6 miles, similar heading, 1000 ft below, slow moving, climbing"

Opposite Direction



"Regional-jet 347, traffic between 1 and 2 o'clock 6 miles, opposite direction, indicating 1000 ft below cleared level, slow moving, climbing"

Examples of Traffic Infomation & Avoiding Action Phraseology

"Big-prop 1233, traffic 11 o'clock 6 miles, crossing left to right behind, no height information, fast moving"

"Traffic in sight, Big-prop 1233" or, "Traffic not sighted, Big-prop 1233"

*"Big-prop 1233, **AVOIDING ACTION**, descent **IMMEDIATELY** FL150, traffic 12 o'clock 10 miles, opposite direction, same level"*

*"Descent **IMMEDIATELY** FL150, Big-prop 1233"*

"Big-prop 1233, traffic 9 o'clock 6 miles crossing left to right behind, no height information, fast moving, if not sighted turn right heading 040 degrees"

"Right heading 040 degrees, Big-prop 1233"

"Big-prop 1233, clear of traffic"

"Roger, Big-prop 1233"

Meteorological Information

Meteorological Information in the form of reports, forecasts or warnings is made available to pilots using the aeronautical mobile service either by broadcast (e.g. VOLMET or ATIS) or by means of specific transmissions from the ATSU to the pilots. Standard meteorological abbreviations and terms should be used and the information should be transmitted slowly and enunciated clearly in order that the recipient may record such data as is necessary.

"Big-prop 1233, Aarhus Tower, 0950 weather, surface wind 360 degrees, 5 knots, visibility 10 kilometers or more, nil weather, 2 octas 2500 ft, temperature plus 10, dewpoint plus 3, QNH 1010"

"QNH 1010, Big-prop 1233"

Clouds can be reported as: *"Scattered at 5000 ft, scattered cumulonimbus at 1000 ft, broken at 2500 ft"*

Runway Service Conditions - When conditions of standing water, with or without reports of braking action, are brought to the attention. Reports normally include the conditions for each third of the runway sequentially. See Runway Condition Report (RCR).

*"Regional-jet 347, runway 26 surface is **DAMP, WATER PATCHES, WET**"*

*"Regional-jet 347, runway 26 surface is **WET, WET, WET**"*

Unofficial Observation - Based on observations from the control tower or from pilot reports that indicate that the amount of water present on the runway surface is greater than that assessed, may be passed to pilots. Such additional information will be prefixed by the words **"UNOFFICIAL OBSERVATION"**.

*"Big-prop 1233, **UNOFFICIAL OBSERVATION**, based on pilot report, runway 22L surface conditions appears to be **WET**"*

Additional Information - When suitable equipment is available reports of braking action will be passed to pilots. Other runway surface conditions, which may be of concern to a pilot, will be passed by ATS. When windshear is forecasted or is reported by aircraft, ATC will warn other aircraft until such time as aircraft report the phenomenon no longer exists.

"Regional-jet 347, displaced threshold runway 26 100 meters due broken surface"

*"Regional-jet 347, braking action reported by ATR 72 at 1456 **POOR**"*

"Regional-jet 347, at 0745 a departing Boeing 757 reported windshear passing 800 ft, airspeed loss 20 kts, strong right drift"

Automatic Terminal Information Service (ATIS) - To alleviate RTF loading at some busy airports, ATIS messages are broadcast to pass routine arrival & departure information on a discrete RTF frequency or on an appropriate VOR. Pilots inbound to these airports are normally required, on first contact with the aerodrome ATSU, to acknowledge receipt of current information by quoting the code letter of the broadcast. Pilots of outbound aircraft are not normally required to acknowledge receipt of departure ATIS except when requested on the actual ATIS broadcast. If, however, pilots report receipt of a departure ATIS broadcast the QNH should be included, thereby allowing ATC to check that the quoted QNH is up-to-date. Aerodromes possessing ATIS, the hours of ATIS operation and the frequency employed are published in the applicable Aeronautical Information Publication (AIP) of the country concerned. Example of ATIS broadcast:

"This is Schiphol departure information T, main takeoff runway 24, main landing runway 06, wind 340 degrees 4 kts, variable between 310 and 010 degrees, CAVOK, temperature 8, dewpoint 2, QNH 1018 hectopascal, end of information T"

NOTES:

- A trend may be included in an ATIS broadcast.
- Rapid changing meteorological conditions sometimes make it impractical to include weather reports in the broadcast. In these circumstances ATIS messages will indicate that weather information will be passed on RTF.
- Any significant change to the current ATIS message will be passed to pilots by RTF until such time as a new message is broadcast.
- Voice ATIS may be transmitted on a dedicated VHF communications frequency or as the voice element of a navigational facility (e.g. VOR).
- At busy airports, separate ATIS broadcasts may be available for departures and arrivals.

End of Module

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Air Traffic Management

❹ Aerodrome Operations

Aerodrome Operations

- Aerodrome Info, En-route & Start-up Clearance
- Taxi Instructions
- Conditional Taxi Clearance
- Pre-departure
- Line-up
- Takeoff
- Final Approach & Landing
- Go-around | After Landing

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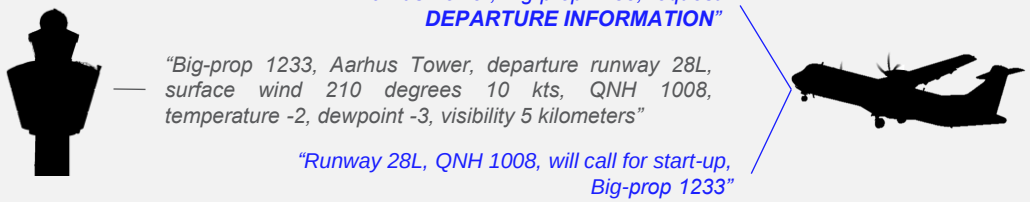
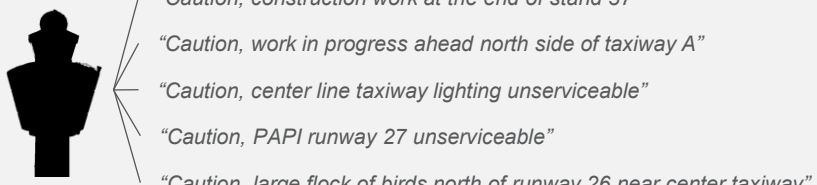
Aerodrome Information, En-route & Start-up Clearance

Aerodrome Information - When no ATIS is provided, the pilot can request current aerodrome information before requesting start-up or en-route IFR clearance.



Essential Aerodrome Information - Essential Aerodrome Information is information regarding the maneuvering area and its associated facilities which is necessary to ensure the safe operation of aircraft. Essential Aerodrome Information is passed to aircraft whenever possible prior to start-up or taxi and prior to the commencement of final approach.

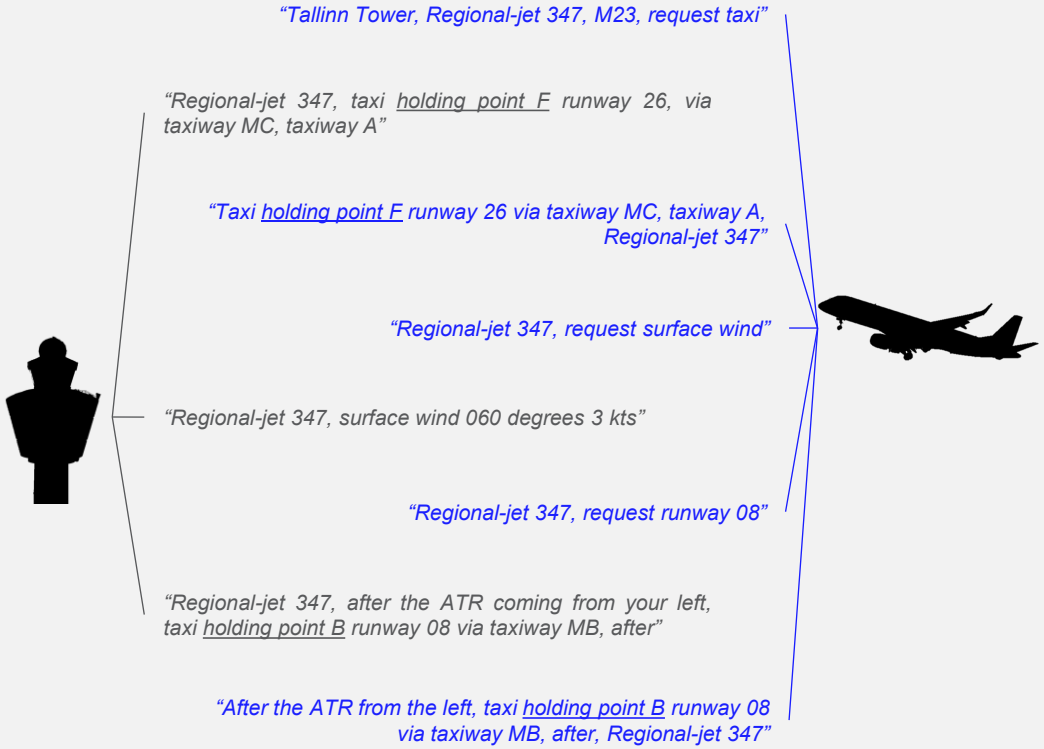


Start-up / En-route Clearance (if applicable) - requests to start engines are normally made to facilitate ATC planning and to avoid excessive fuel wastage by aircraft delayed on the ground. When there will be a delay to the departure of the aircraft the controller will normally indicate a time to start up or expect to start-up. En-route clearance or request for start-up shall include the following (after initial contact established):

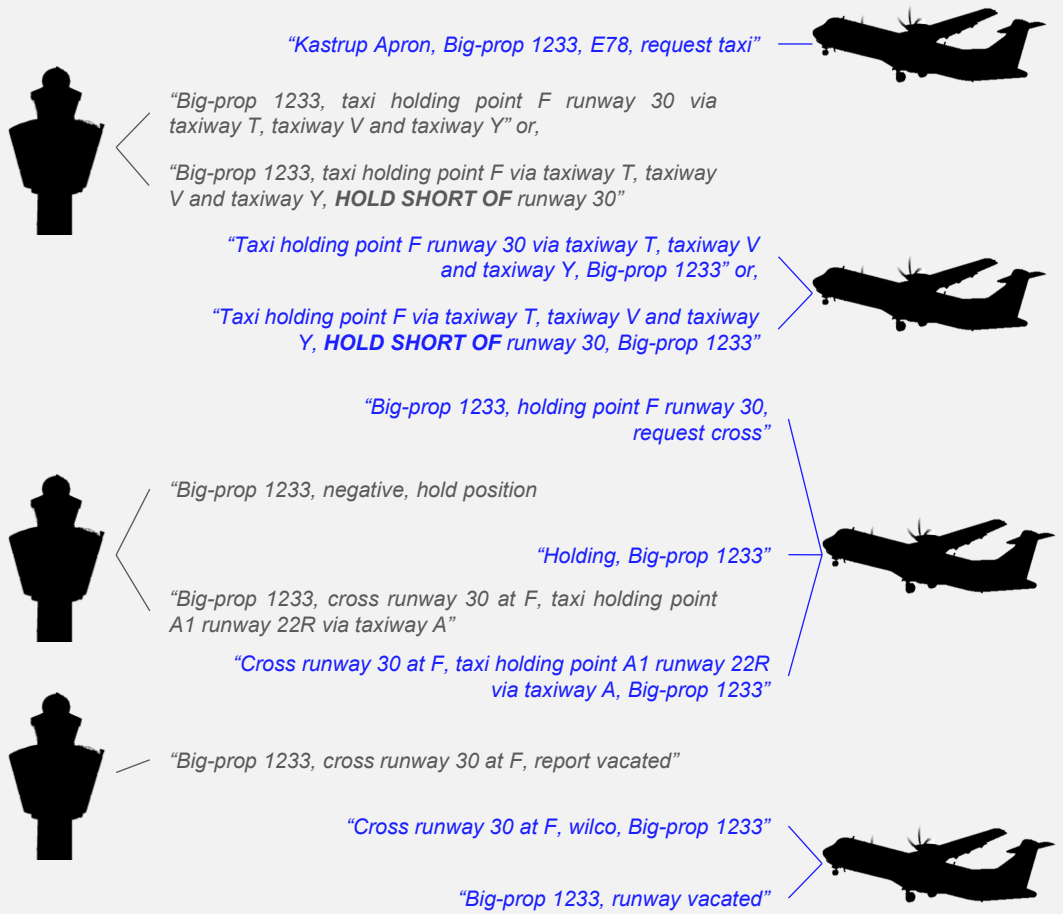
- Aircraft type
- Parking position
- ATIS
- QNH
- Flight rules and destination
- Request ("**REQUEST START-UP / EN-ROUTE CLEARANCE"**)

Taxi Instructions

Taxi Instructions issued by a controller will always contain a clearance limit, which is the point at which the aircraft must stop, unless further permission to proceed is given. For departing aircraft, the clearance limit will normally be the holding point of the runway in use, but it may be any other position on the aerodrome depending on the prevailing traffic. Taxi clearances should, wherever possible, be noted down by pilots. Where an ATIS broadcast is established the controller does not need to pass departure information to the pilot when giving taxi instructions. He will, however, check that the aircraft is in possession of the latest QNH. In the examples given below, the clearance limit (point at which the aircraft must stop) is underlined for clarification.



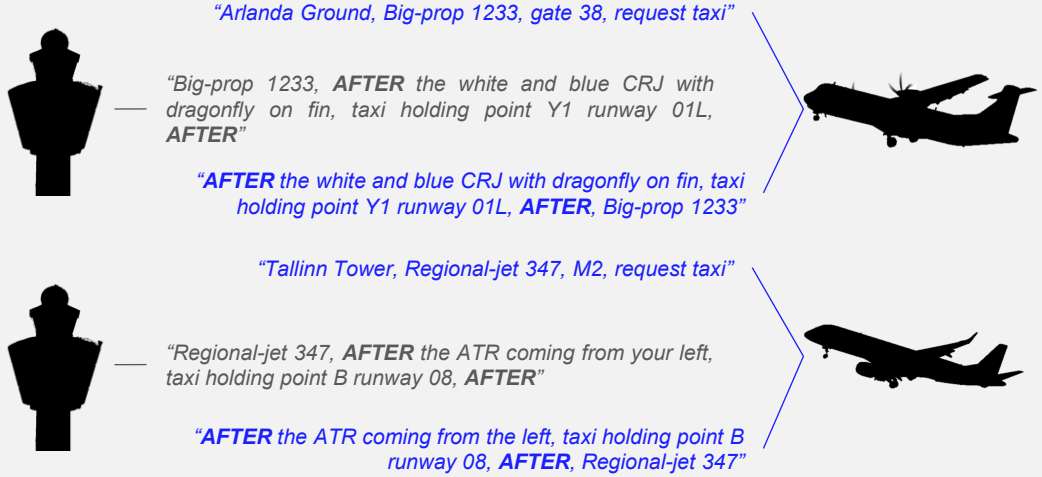
Crossing a Runway - When a taxi routing involves crossing a runway, whether active or not, specific clearance to cross that runway is required. When passing taxi instructions that will position an aircraft to cross a runway the controller may, optionally, insert the phrase **"HOLD SHORT OF"** prior to the runway designator. This phrase is intended to reinforce the need to stop at the holding point. ATC may request an aircraft to report when the runway has been vacated. Instruction to report vacated may be omitted when aerodrome control has continuously sight of the aircraft crossing.



Conditional Taxi Clearance

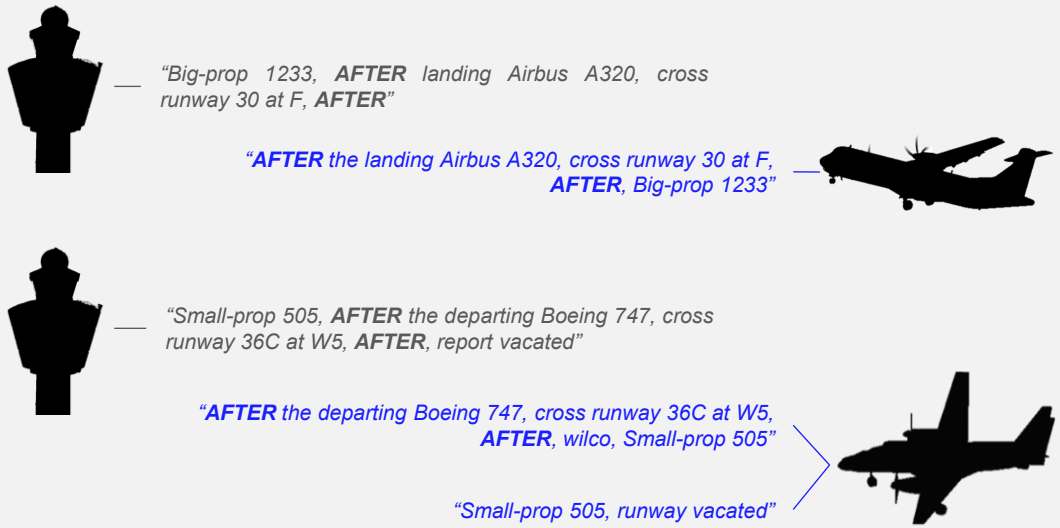
Taxi Instructions - Conditional clearances may expedite traffic flow, but there are risks. Read back must be in full and in the same sequence as given. A taxi clearance, shown below, allows taxi after another action has first taken place i.e. the condition of the clearance. Where there may be ambiguity as to the subject of the condition, additional details such as livery and / or color are given to aid identification.

A conditional taxi clearance allows the aircraft to taxi only after another action has taken place (e.g. aircraft crossing). The structure and order of conditional clearances is essential to their safe execution. The phrase **"BEHIND"** or **"AFTER"** is used at the beginning and end of the conditional clearance.



Crossing a Runway - Conditional phrases, such as **"BEHIND LANDING AIRCRAFT"** or **"AFTER DEPARTING AIRCRAFT"**, shall not be used for movements affecting the active runway(s), except when the aircraft or vehicles concerned are seen by the appropriate controller and pilot. The aircraft or vehicle causing the condition in the clearance issued shall be the first aircraft / vehicle to pass in front of the other aircraft concerned.

NOTE - Beware - there have been cases where the ICAO phrase **"BEHIND"** has been misinterpreted as an instruction to get close to the preceding aircraft, leading to serious jet blast incidents.



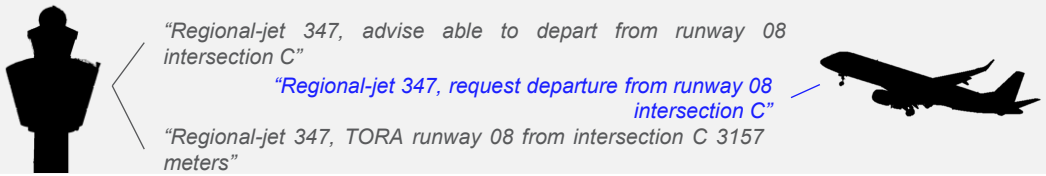
Pre-departure

General - Meticulous care has been taken to ensure that the phraseology which is to be employed during the pre-departure maneuvers cannot be interpreted as a takeoff clearance. This is to avoid any misunderstanding in the granting or acknowledgement of takeoff clearances and the serious consequences that could result. Example of the above is departure delay information such as **"NUMBER 5 TO DEPART"** or **"EXPECT DEPARTURE IN ..."**. This is **NOT** a take-off clearance, nor does it clear a pilot to enter an active runway.

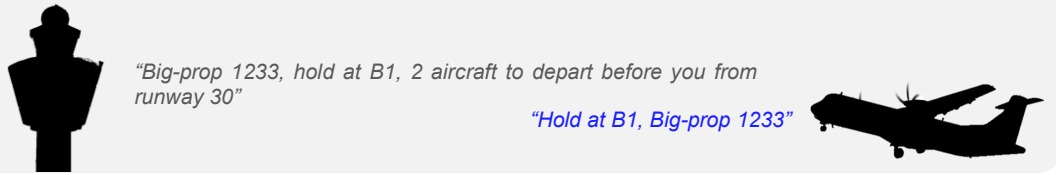
NOTE - The words **"TAKE OFF"** are only used when an aircraft is cleared for takeoff. At all other times, the word **"DEPARTURE"** is used.

Transfer of Communication - After any transfer of communication on the ground, either to a different ground controller or tower frequency, the aircraft shall state its position. At busy aerodromes with a separate ground and tower function, aircraft are usually transferred to the tower frequency at or approaching the holding point. It may be necessary for the controller to instruct the pilot to hold at a specified holding point. Where appropriate the controller should include the reason for the instruction.

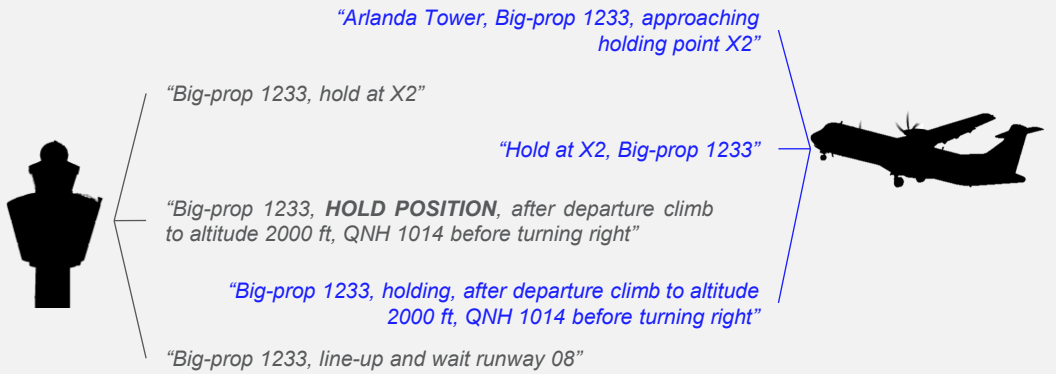
Intersection Departure - Air Traffic controllers may ask if a pilot can accept an intersection departure. Or alternately, a pilot may request an intersection departure. Information on the Take-Off Run Available (TORA) (pronounced **"TOR AH"**) from the intersection shall be issued when requested by a pilot or whenever deemed necessary by the controller.



Holding Position - It may be necessary for the controller to instruct the pilot to hold at a specified holding point. Where appropriate the controller should include the reason for the instruction.



Amendment to Departure Clearance - Amendments to departure clearances are known to contribute to runway incursion incidents. The phraseology for amendments to departure clearances where the aircraft is approaching the runway will begin with **"HOLD POSITION"**.



Line-up

Line-up Clearance - For reason of expedition a controller may wish to line-up an aircraft for departure before conditions allow takeoff.

*"Regional-jet 347, **LINE-UP AND WAIT** runway 08, vehicle crossing upwind end of runway"*

*"**LINE-UP AND WAIT** runway 08, Regional-jet 347"*

*"Regional-jet 347, runway 08, cleared for **TAKEOFF**"*

*"Runway 08, cleared for **TAKEOFF**, Regional-jet 347"*

*"Big-prop 1233, via holding point A1, **LINE-UP AND WAIT** runway 22R, one aircraft to depart before you from holding point A2"*

*"Via holding point A1, **LINE-UP AND WAIT** runway 22R, number two for departure, Big-prop 1233"*

Conditional Line-up Clearance - Conditional clearances are only to be provided subject to conditions specified by the relevant authority. Conditional phrases will not be used for movements affecting the active runway(s), except when the aircraft or vehicles concerned are seen by the controller and pilot. Conditional clearances are to relate to one movement only and, in the case of landing traffic, this must be the first aircraft on approach. A conditional instruction shall be given as follows:

- Aircraft identification
- The words **"AFTER"** or **"BEHIND"**
- The condition
- Identification of subject of the condition
- The clearance
- Reiteration of the condition (the words "**AFTER**" or **"BEHIND"**)

*"Regional-jet 347, **AFTER** the landing Boeing 737, line-up and wait runway 08, **AFTER**"*

*"**AFTER** the landing Boeing 737, line-up and wait runway 08, **AFTER**, Regional-jet 347"*

*"Big-prop 1233, **AFTER** the departing company Airbus A320, line-up and wait runway 22R, **AFTER**"*

*"**AFTER** the departing company Airbus A320, line-up and wait runway 22R, **AFTER**, Big-prop 1233"*

Intermediate Holding Point - When line-up will take place at a position other than for a full-length runway departure the intermediate holding point designator shall be included in the line-up instruction. Controllers may include the runway holding point designator in any other line-up instruction when considered necessary.

"Revel 347, ready for departure"

"Regional-jet 347, via C, line-up and wait runway 08"

"Via C, line-up and wait runway 08, Regional-jet 347"

Local Departure Instructions may be given prior to the take off clearance. Such instructions are normally given to ensure separation between aircraft operating in the vicinity of the aerodrome. Some examples are:

"After departure maintain runway track"

"After departure climb straight ahead"

"After departure fly heading 240 degrees, climb to altitude 2000 ft"

"After departure right hand circuit"

"After departure climb to altitude 2000 ft, turn left heading 360 degrees passing altitude 1000 ft"

Takeoff

Takeoff Clearance shall be issued separately from any other clearance message. Except in cases of emergency, messages will not be transmitted to an aircraft in the process of taking off or in the final stages of an approach and landing. When several runways are in use and / or there is any possibility that the pilot may be confused as to which one to use, the runway number will be stated prior to the clearance. The surface wind will be passed if there is a significant difference to that already passed.

"Regional-jet 347, (runway 08) ***CLEARED FOR TAKE OFF****"*

"(Runway 08) ***CLEARED FOR TAKE OFF****, Regional-jet 347"*

Expedited Takeoff - For traffic reasons a controller may consider it necessary for an aircraft to perform an "**IMMEDIATE TAKE OFF"**, the pilot is expected to act as follows:

- Taxi immediately on to the runway and commence takeoff without stopping the aircraft or,
- When already lined up - takeoff without delay.

Should an immediate takeoff not be possible, the pilot is to advise the controller. Due to unexpected traffic developments or a departing aircraft taking longer to takeoff than anticipated, it is occasionally necessary to rescind the takeoff clearance or quickly free the runway for landing traffic.

"Big-prop 347, Airbus A330 4 miles on final approach, runway 01R cleared for ***IMMEDIATE TAKE OFF****, surface wind 050 degrees 8 kts"*

"Runway 01R cleared for ***IMMEDIATE TAKE OFF****, Big-prop 1233"*

"Regional-jet 347, takeoff immediately or vacate runway"

"Takeing off, Regional-jet 347"

"Regional-jet 347, takeoff immediately or hold short of runway"

"Holding, Regional-jet 347"

Aborted Takeoff - When an aircraft is about to takeoff or has commenced the takeoff roll, and it is necessary that the aircraft should abandon takeoff, the aircraft will be instructed to cancel takeoff or stop immediately, these instructions will be repeated.

When a pilot abandons takeoff he should, as soon as practicable, inform the tower that he is doing so. Likewise, as soon as practicable, he should inform the tower of the reasons for abandoning takeoff if applicable and request further maneuvering instructions.

"Regional-jet 347, HOLD POSITION, CANCEL TAKE OFF! I SAY AGAIN, CANCEL TAKE OFF! ACKNOWLEDGE!"

"Holding, Regional-jet 347"

"Regional-jet 347, STOP IMMEDIATELY! I SAY AGAIN STOP IMMEDIATELY! ACKNOWLEDGE!"

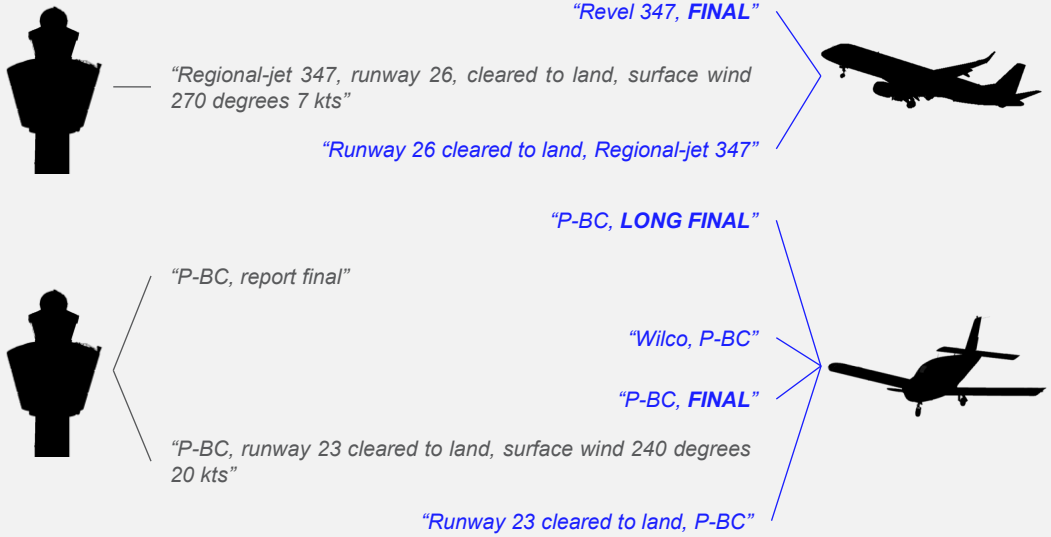
"STOPPING! Regional-jet 347"

"Big-prop 1233, STOPPING!"

"Big-prop 1233"

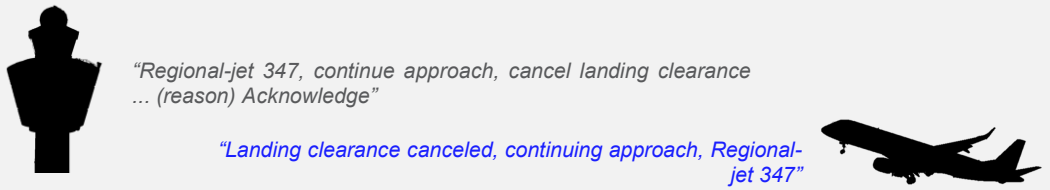
Final Approach & Landing

Landing Clearance - A **"FINAL"** report is made when an aircraft has turned onto final approach. If the turn is made at a distance greater than 4 NM from touchdown a **"LONG FINAL"** report is made. The landing / touch & go / low approach clearance will include the runway designation.



Delayed Landing Clearance - The runway may be obstructed when the aircraft makes its **"FINAL"** report at 4 nm or less from touchdown but is expected to be available in good time for the aircraft to make a safe landing. On these occasions, the controller will delay landing clearance. The controller may or may not explain why the landing clearance has been delayed but the instruction to **"CONTINUE"** is NOT an invitation to land and the pilot must wait for landing clearance or initiate a missed approach.

Where a controller cancels a landing clearance but feels that a landing clearance will be re-issued in good time for the aircraft to make a safe landing, he should, if time permits, give the reason for cancelling the landing clearance.



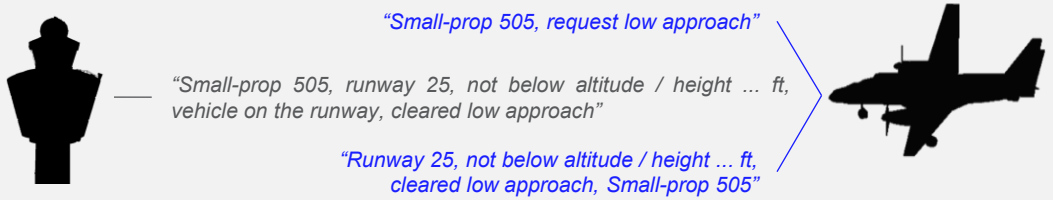
Land after Procedure - A landing aircraft may be permitted to touch down before a preceding landing aircraft has vacated the runway provided that:

- The runway is long enough to allow safe separation between the two aircraft and there is no evidence to indicate that braking may be adversely affected
- It is during daylight hours
- The preceding landing aircraft is not required to backtrack in order to vacate the runway
- The controller is satisfied that the landing aircraft will be able to see the preceding aircraft which has landed, clearly and continuously, until it has vacated the runway
- The pilot of the following aircraft is warned (responsibility for ensuring adequate separation rests with the pilot of the following aircraft.)

Low Pass / Low Approach - A pilot may request to fly past the control tower or other observation point for the purpose of visual inspection from the ground. If the low pass is made for the purpose of observing the landing gear, one of the following replies could be used to describe its condition:

- **"LANDING GEAR APPEARS DOWN"**
- **"RIGHT (or left, or nose) WHEEL APPEARS UP (or down)"**
- **"WHEELS APPEAR UP"**
- **"RIGHT (or left, or nose) WHEEL DOES NOT APPEAR UP (or down)"**

If the runway in use is occupied by aircraft or vehicles, an approaching aircraft may be cleared to carry out a low approach which includes a descent not below a specified height or altitude. The minimum height or altitude is defined in regulatory documentation and / or local instructions as appropriate. In such circumstances, the pilot is to be informed of the aircraft or vehicles on the runway.



Go-around | After Landing

Go-around - Instructions to carry out a missed approach may be given to avert an unsafe situation. When a missed approach is initiated cockpit workload is inevitably high. Any transmissions to aircraft going around shall be brief and kept to a minimum.

An aircraft on an instrument approach is to carry out the published missed approach procedure and an aircraft operating VFR is to continue into the normal traffic circuit unless instructions are issued to the contrary. In the event of missed approach being initiated, the phrase **"GOING AROUND"** shall be used.

"Regional-jet 347, GO AROUND! I SAY AGAIN GO AROUND! ACKNOWLEDGE!"

"GOING AROUND, Regional-jet 347"

"Big-prop 1233, GOING AROUND!"

"Big-prop 1233, roger"

Unless absolutely necessary, controllers will not give taxi instructions to pilots until the landing roll is complete. Unless otherwise advised, pilots should remain on tower frequency until the runway is vacated.

NOTE: At some airports, the switch from tower to ground after landing is automatic (without controller instructions).

"Big-prop 1233, vacate left"

"Vacate left, Big-prop 1233"

"Big-prop 1233, when vacated contact Arlanda Ground 121.930"

"When vacated contact Arlanda ground 121.930, Big-prop 1233"

"Arlanda Ground, Big-prop 1233, runway 26 vacated at X3"

"Big-prop 1233, Arlanda Ground, taxi gate 38 via taxiway Z and ZG"

"Taxi gate 38 via taxiway Z and ZG, Big-prop 1233"

"Small-prop 505, taxi to the end, report runway vacated"

"Taxi to the end, wilco, Small-prop 505"

"Small-prop 505, runway vacated"

"Small-prop 505, give way to the Embraer on taxiway D, taxi stand 7 via taxiway A and taxiway D"

End of Module

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Air Traffic Management

❺ VFR Phraseology

VFR Phraseology

- Controlled Aerodrome
- Departure
- En-route
- Arrival
- Approach & Landing
- Uncontrolled Aerodrome
- Diversion

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Controlled Aerodrome

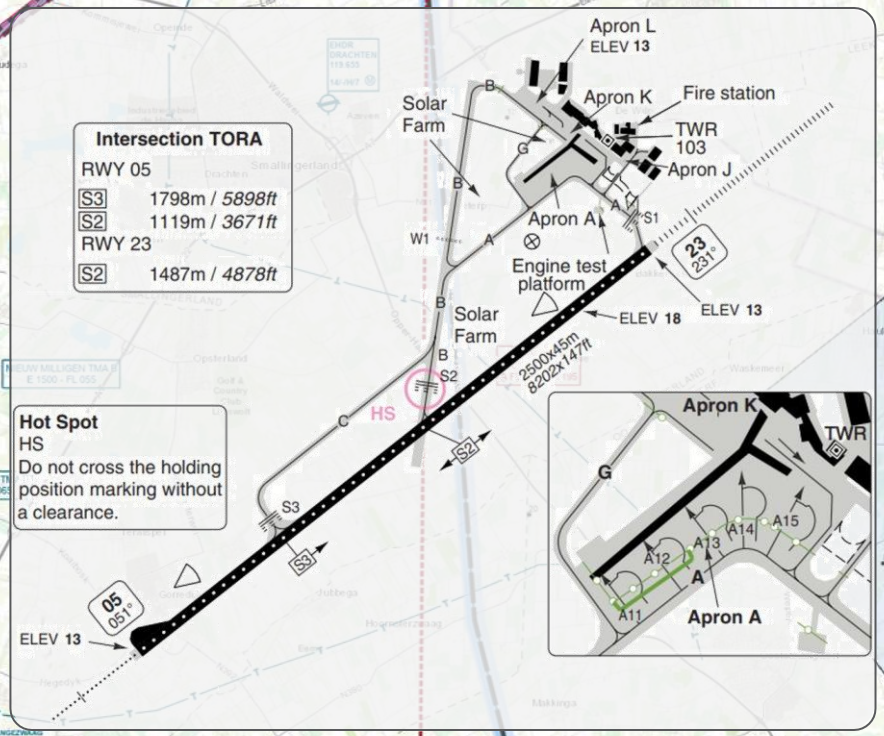
EXAMPLE

In the following example we use Groningen airport Eelde (EHGG - GRQ) in the Netherlands to simulate a VFR flight. Aerodrome procedures already explained in full details (e.g. requesting start-up, taxi etc.) is quickly glossed over and focus is put on specific VFR RTF phraseology.

Departure: PH-ABC is parked at the Kilo apron (in front of the TWR). The pilot will request start-up for a VFR flight, taxi to the active runway, take-off and fly a Uniform departure to the south.

En-route: Requesting Flight Information Service (FIS) and CTR crossing.

Arrival: Upon return, the Romeo arrival is requested followed by pattern entry, landing and taxi to the Kilo apron.



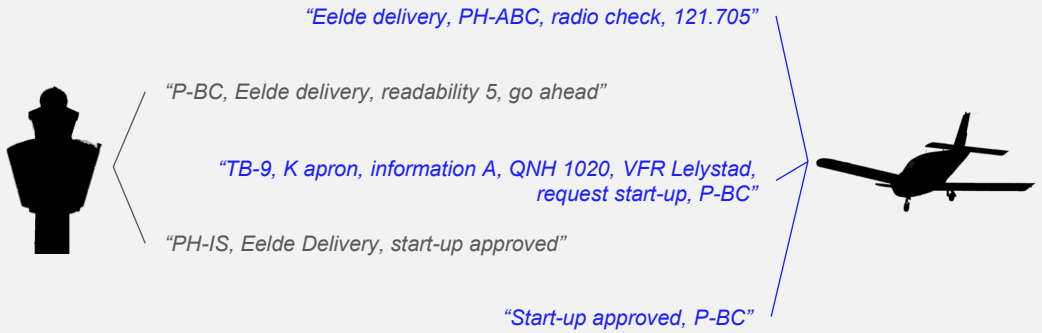
Non-compulsory VFR reporting points

Compulsory VFR reporting points

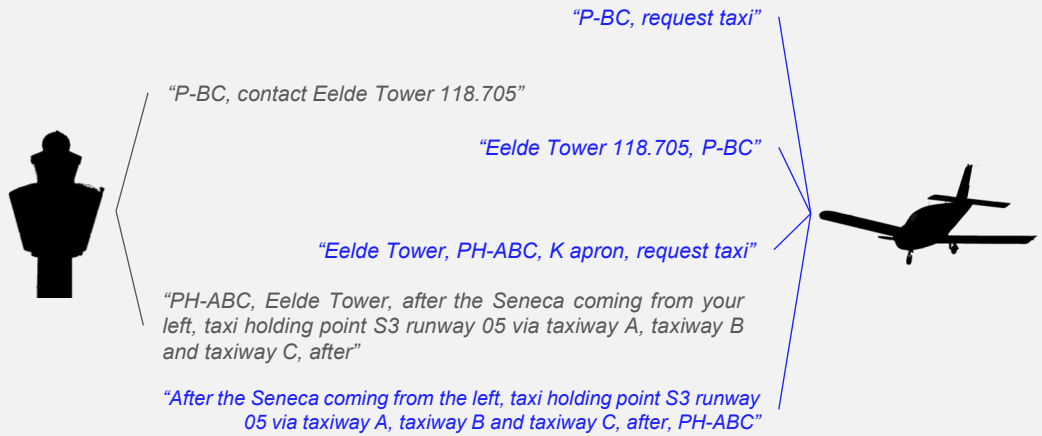
⚠ REFERENCE ONLY

Departure

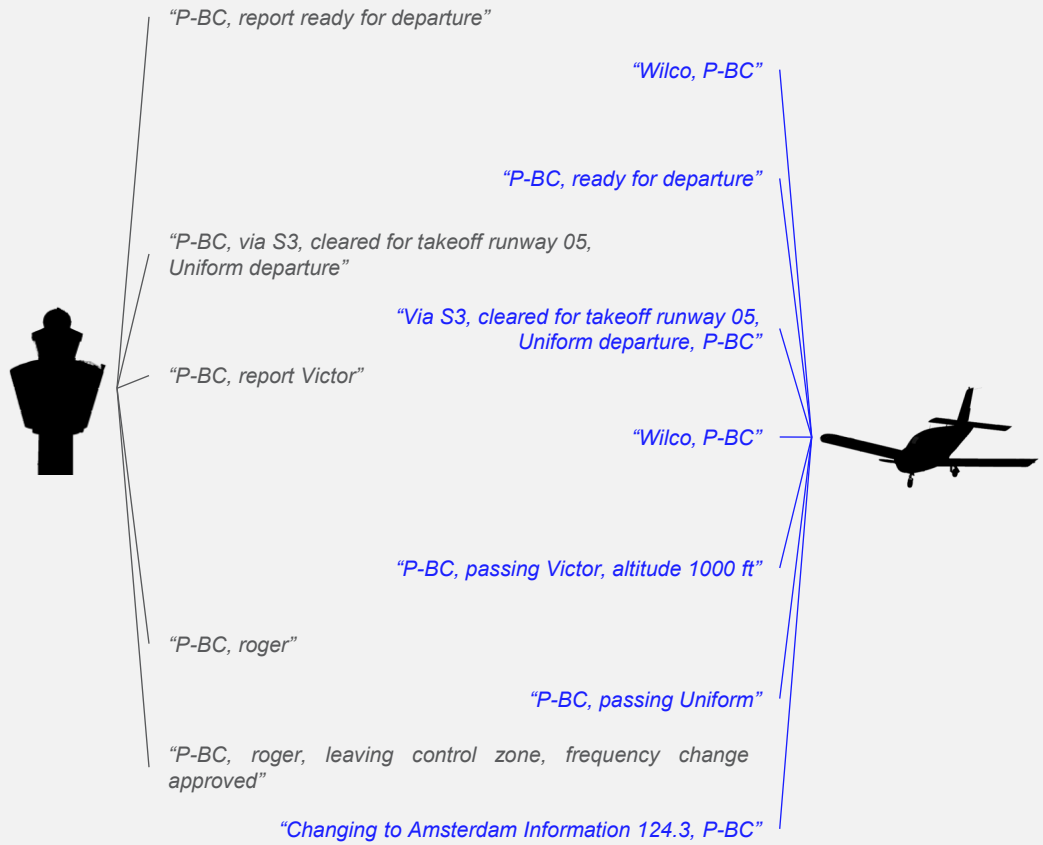
Start-up



Taxi



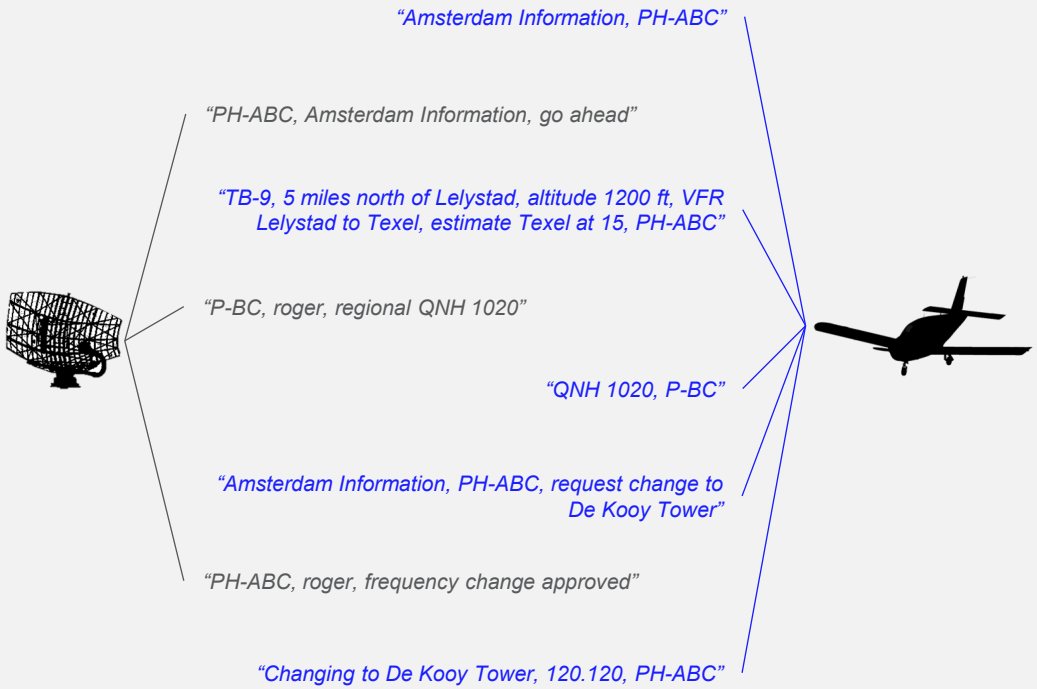
Departure



En-route

Flight Information Service - After establishing contact, the reply should contain the following information, whenever possible in the order specified:

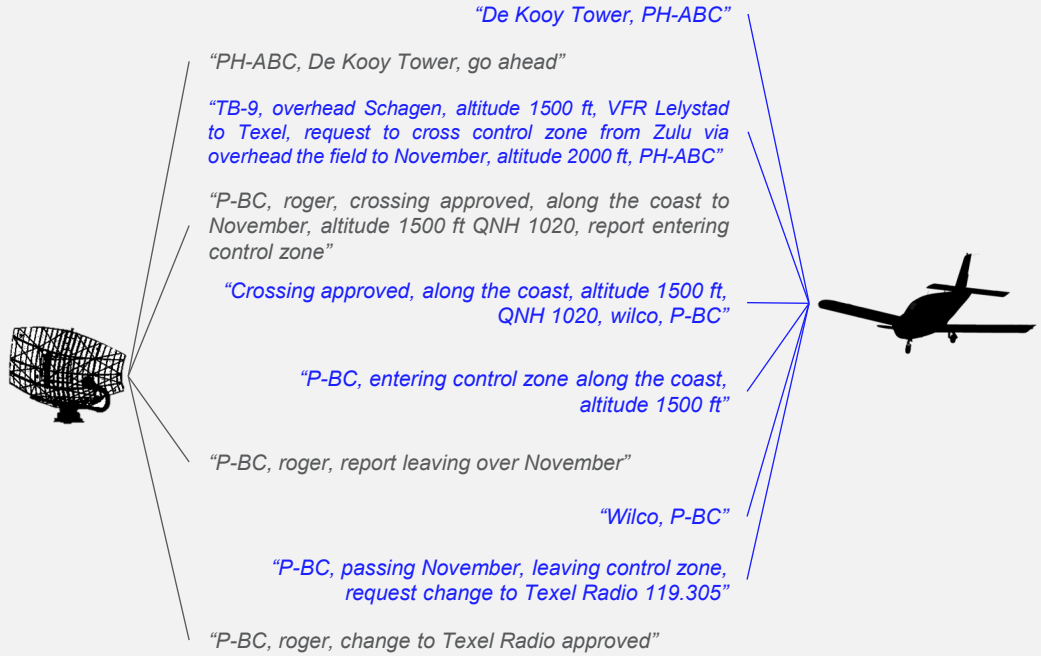
- Aircraft type
- Position and level
- Flight rules
- Departure and destination aerodrome
- Additional details / intentions (ETA, route etc.)



CTR Crossing - Request for crossing an active control zone shall include the following (after making initial contact):

- Aircraft type
- Position and level
- Flight rules
- Departure and destination aerodrome
- Intentions **("REQUEST TO CROSS CONTROL ZONE")**
- Entry point, subsequent routing and exit point
- Requested level during crossing

Two compulsory points exists when crossing a control zone, which are the point of entry and the point of exit together with any other point(s) on request of ATC.



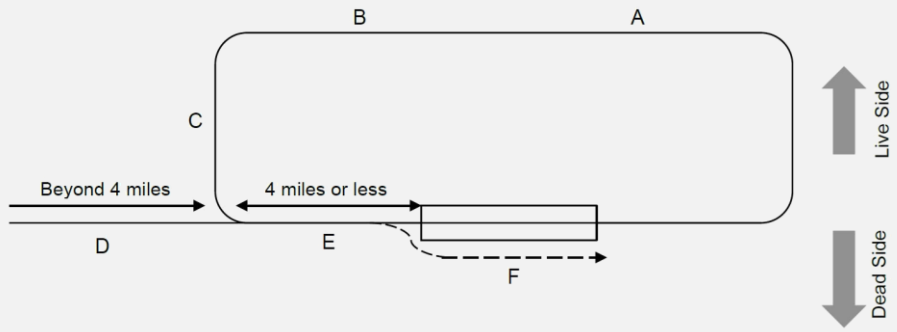
Arrival

Introduction - Requests for entering a control zone should be made in sufficient time for a planned entry into the circuit taking other traffic into account. Where ATIS is established, receipt of the broadcast should be acknowledged in the initial call to an aerodrome. When the traffic circuit is a right-hand pattern it shall be specified. A left-hand pattern need not be specified.

Concise and unambiguous phraseology used at the correct time is vital to the smooth, safe and expeditious running of an aerodrome and associated ATZ. It is not only the means by which instructions and information are passed but it also assists pilots in maintaining an awareness of other traffic in their vicinity, particularly in poor visibility conditions.

Messages will not be transmitted to an aircraft during take-off, the last part of final approach or the landing roll, unless it is necessary for safety reasons since it will be distracting to the pilot at a time when the cockpit workload is often at its highest. Local procedures vary from aerodrome to aerodrome and it is impossible to give examples to cover every situation which may arise at the multiplicity of different types of aerodromes.

Aerodrome Traffic Circuit

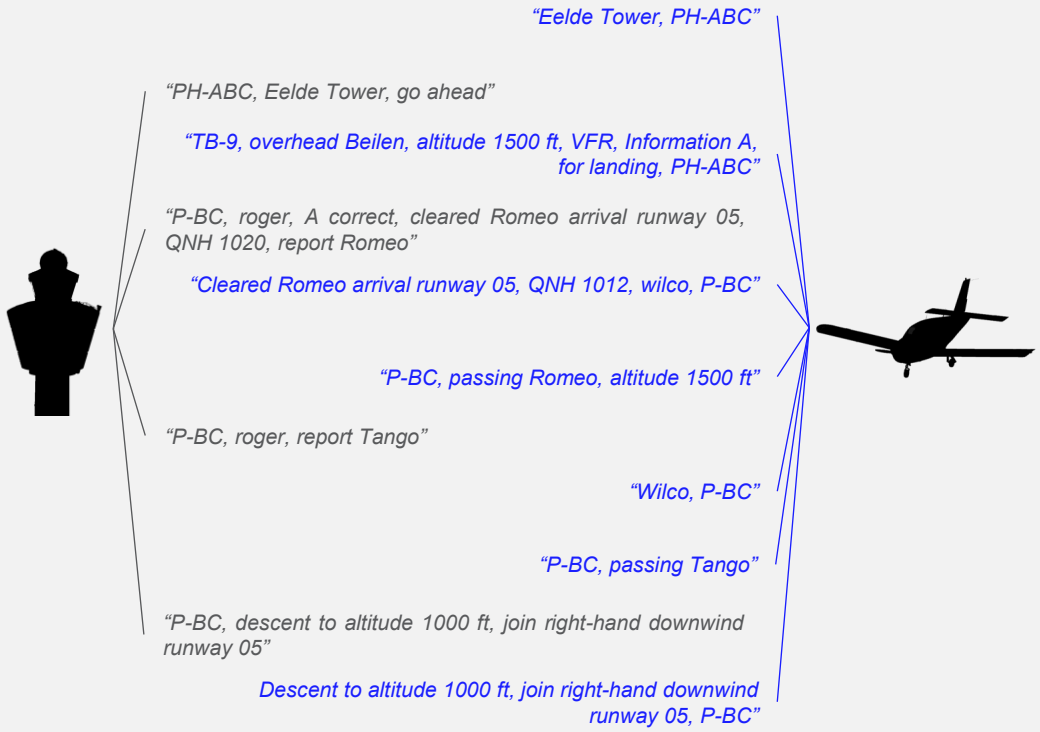


A. **"DOWNWIND"** leg.
B. **"LATE DOWNWIND"** if it is on downwind leg and was unable to report **"DOWNWIND"**.
C. **"BASE"** (if required).
D. **"LONG FINAL"** (between 8 and 4 miles) when on a straight-in approach.
E. **"FINAL"**, clearance to land (if required) is issued here.
F. **"GOING AROUND"**.

Entry Instructions - When establishing contact for entry instructions (after initial contact):

- Aircraft Type
- Position and altitude
- Flight rules
- ATIS
- ETA at Victor (in case of Schiphol)
- Intentions (**"FOR LANDING"**)

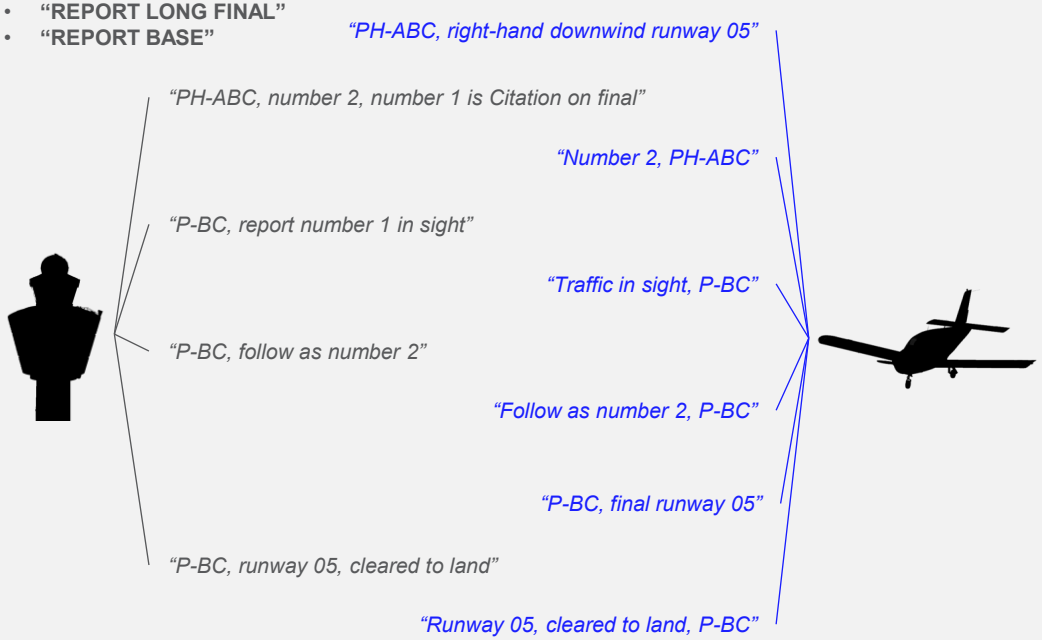
When arriving at Schiphol an ETA for reporting point Victor shall be specified.



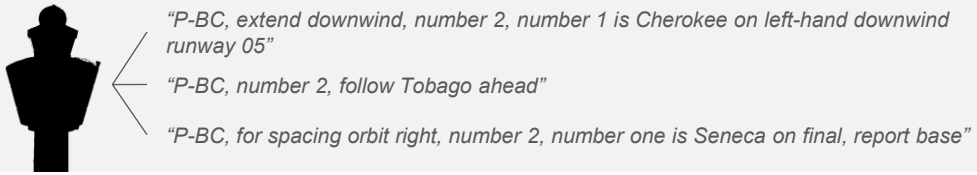
Approach & Landing

Traffic Circuit - the pilot having joined the traffic circuit makes routine reports as required by local procedures, most commonly **"DOWNWIND"** and **"FINAL"** have to be reported. Where necessary the controller may instruct the pilot to report at a specified position, e.g.:

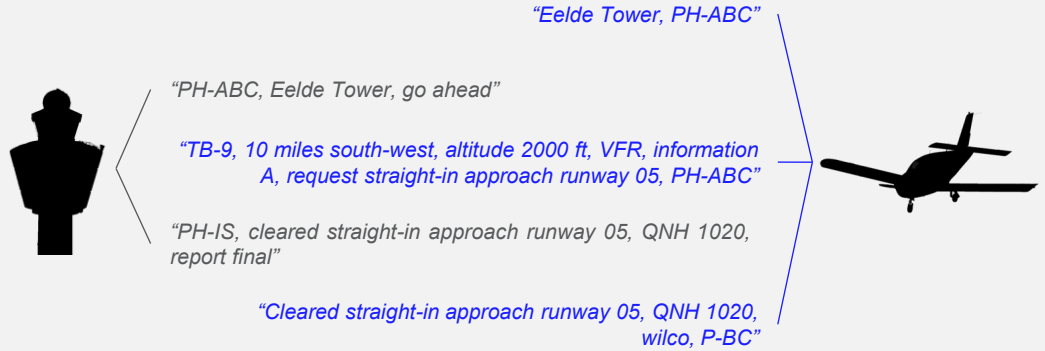
- **"REPORT OVERHEAD"**
- **"REPORT DOWNWIND"**
- **"REPORT LONG FINAL"**
- **"REPORT BASE"**



Traffic Information & Sequencing - It may be necessary in order to co-ordinate traffic in the circuit, to issue a pilot his number in the sequence along with the position of the preceding aircraft and delaying action if necessary.



Straight-in Approach - Depending on prevailing traffic conditions and the direction from which an aircraft is arriving, it may be possible to make a straight-in approach.



Touch & Go Landing - In order to save taxiing time when training in the traffic circuit pilots may wish to carry out a **"TOUCH AND GO"**, i.e. the aircraft lands, continues rolling and takes off, without stopping. It is helpful for circuit management purposes if a controller is informed when an aircraft which has been engaged in multiple approaches is on his last circuit.

Uncontrolled Aerodrome

Introduction - Concise and unambiguous phraseology used at the correct time is vital to the smooth, safe and expeditious running of an aerodrome and associated ATZ. It is not only the means by which instructions and information are passed but it also assists pilots in maintaining an awareness of other traffic in their vicinity, particularly in poor visibility conditions.

Messages will not be transmitted to an aircraft during take-off, the last part of final approach or the landing roll, unless it is necessary for safety reasons, because it will be distracting to the pilot at a time when the cockpit workload is often at its highest.

Local procedures vary from aerodrome to aerodrome and it is impossible to give examples to cover every situation which may arise at the multiplicity of different types of aerodrome, check the applicable AIP for local aerodrome RTF procedures before conducting flight to such aerodrome.

Traffic Information - The FISO might give information about other traffic:

"PH-ABC, traffic is a Cessna 172 reported final"

"PH-ABC, holding" or,

"PH-ABC, taking off"

Departure - The initial call should consist of (after establishing initial contact):

- Aircraft Type
- POB (if required)
- Name PIC (some airfields)
- Flight rules
- Intentions (e.g. **"LOCAL FLIGHT"**, **"VFR / IFR TO ..."**)
- Request **("REQUEST DEPARTURE INFORMATION")**

"Texel Radio, PH-ABC, radio check 119.305"

"PH-ABC, readability 5, go ahead"

"TB-9, 3 POB, pilot in command ..., VFR to Lelystad, request departure information"

"PH-ABC, departure runway 22, left-hand circuit, QNH 1020"

"Departure runway 23, left-hand circuit, QNH 1020, PH-ABC"

"PH-ABC, lining-up for departure runway 22"

"PH-ABC, leaving the circuit, changing to Dutch MIL Info 132.350"

Arrival - after establishing initial communication:

- Aircraft Type
- POB (if required)
- Name PIC (some airfields)
- Flight rules and departure aerodrome
- Position and altitude
- Request **("REQUEST ARRIVAL INFORMATION")**

"Texel Radio, PH-ABC"

"PH-ABC, go ahead"

"TB-9, 2 POB, pilot in command ..., VFR from Lelystad, overhead Den Burg, altitude 1000 ft, request arrival information, PH-ABC"

"PH-ABC, runway 22 left-hand circuit, QNH 1020"

"Runway 22 left hand circuit, QNH 1020, PH-ABC"

"PH-ABC, downwind runway 22, for landing / touch & go"

"PH-ABC, final runway 22, for landing / touch & go"

"PH-ABC, switching off"

Diversion

Diversion from Circuit Area:

- Aircraft Identification
- **“LEAVING THE CIRCUIT”**
- **“DIVERTING TO ...”**
- **“PRACTISE DIVERSION”** when diverting for training purposes

“PH-ABC, leaving the circuit, diverting to Eelde (practise diversion)”

Flight Information Service - after initial contact:

- Aircraft type
- Position and altitude
- Flight rules
- Departure and destination aerodrome
- **“DIVERTING TO ...**
- **“DUE ... / PRACTISE DIVERSION”**
- Additional details / intentions (ETA, route etc.)

“TB-9, south of Texel, altitude 1500 ft, VFR Lelystad to Texel, diverting to Eelde due ... (reason) / practise diversion, estimate Eelde at ..., PH-ABC”

Arrival at Alternate - after initial contact:

- Aircraft type
- POB (if required)
- Position and altitude
- Flight rules
- Departure and destination aerodrome
- **“DIVERTING TO ...**
- **“DUE ... / PRACTISE DIVERSION”**
- ATIS
- Intentions (**“FOR LANDING”**)

“TB-9, overhead Beilen, VFR Lelystad to Texel, diverting to Eelde, due ... (reason) / practise diversion, infromation A, for landing, PH-ABC”

End of Module

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Air Traffic Management

❻ IFR Phraseology

IFR Phraseology

- Low Visibility Procedures (LVP)
- Regional Airport - Departure
- International Airport - Departure
- En-route IFR Phraseology
- International Airport - Arrival
- International Airport - Approach
- International Airport - Landing

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Low Visibility Procedures (LVP)

Runway Visual Range (RVR) - When transmitting the Runway Visual Range the abbreviation RVR will be used without using the phonetic word for each letter, e.g. **"RVR RUNWAY 27, 800 METERS".**

The runway designator may be omitted if there is no possibility of confusion. Where instrumented RVR is not available, RVR for the purposes of Category 1 and non-precision instrument approach operations may be assessed by human observer and transmitted by the controller to the pilot.

If the assessed value is more than the maximum reportable value, controllers are to advise the pilot. If no lights are visible controllers are to state **"RVR LESS THAN … METERS"**, inserting the value corresponding to one light.

"Regional-jet 347, RVR 400 meters"

"Regional-jet 347, RVR is greater than 1200 meters"

"Regional-jet 347, RVR is less than 30 meters"

RVR not available & Multiple RVR - Where RVR is not available the pilot is to be advised. Where Runway Visual Range (RVR) observations are available, more than one reading may be required (each 1/3 runway segment).

"Small-prop 505, RVR runway 25 not available"

"Small-prop 505, RVR runway 25 not reported"

"Regional-jet 347, RVR runway 08, 650, 600, 550 meters"

"Regional-jet 347, RVR runway 08, touchdown not available, mid-point 600 meters, stop-end 550 meters"

Pilot / Controller Observation - Occasionally pilots of aircraft may report, or observations from the control tower may indicate that the visibility conditions on the runway are significantly different to those being reported. Under no circumstances is a controller to pass a pilot information which suggests that the visibility is better than the RVR reported. However, when a pilot's report or an observation from the tower indicates a worse condition on the runway this information is to be passed to the pilot with subsequent RVR reports for as long as the condition is considered to exist. Where

"Big-prop 1233, RVR 400 meters, thicker patches reported further along the runway by pilot of a landing aircraft"

"Big-prop 1233, Thicker patches observed further along the runway from the control tower"

Low Visibility Procedures (LVP) - Aerodromes that wish to continue operating in poor visibility or are available for instrument approaches in conditions of low cloud are required to develop and maintain Low Visibility Procedures (LVP). Controllers shall advise pilots of the implementation and subsequent cancellation of LVP at an aerodrome. Low Visibility Procedures are not to be confused with Low Visibility Takeoff (LVTO) (RVR < 400 m) or low visibility landing (weather minima < CAT I) requirements.

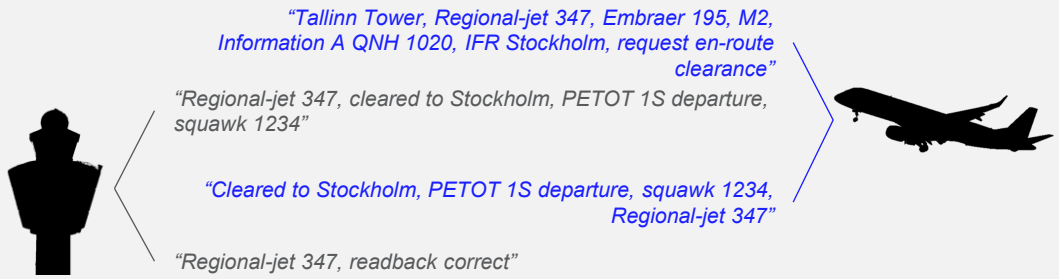
*"Big-prop 1233, **LOW VISIBILITY PROCEDURES** in force"*

*"All stations, **LOW VISIBILITY PROCEDURES** cancelled"*

Regional Airport - Departure

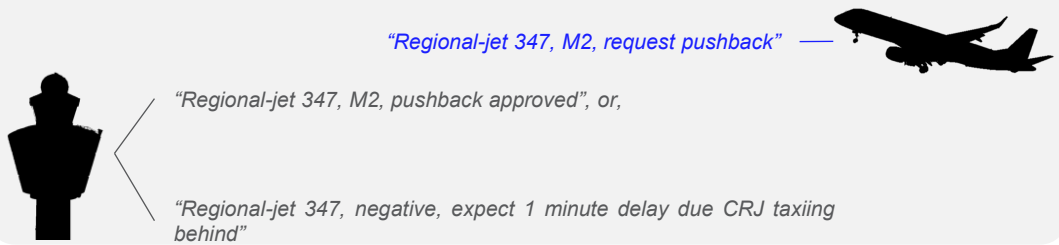
En-route Clearance - At most regional airports one, multiple or even all ATS elements are combined. At Tallinn airport (example) all ATS elements are provided by Tallinn Tower. An automatic frequency change-over from Tallinn Tower to Tallinn Radar exists after take-off.

- Name ATSU
- Aircraft identification
- Aircraft type
- Parking position
- ATIS & QNH
- Flight rules & destination
- **"REQUEST EN-ROUTE CLEARANCE"**



Pushback & Powerback - At many aerodromes at which large aircraft operate, the aircraft are parked nose-in to the terminal in order to save parking space. Aircraft must be pushed backwards by a tow-truck before they can taxi for departure.

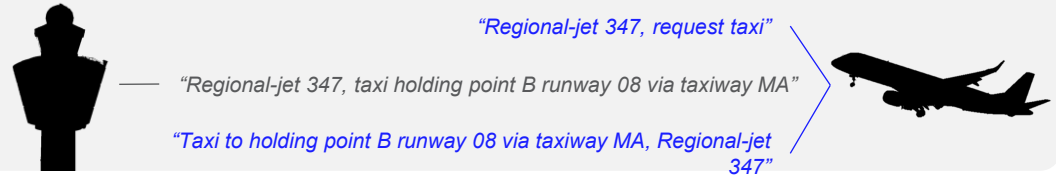
Some aircraft also have the capability to reverse from a nose-in position to the terminal under their own power. This procedure is known as "power back". Requests for pushback or power back are made to ATC and subject to local regulations.



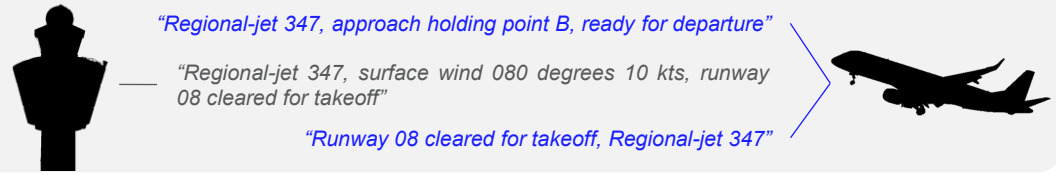
Start-up request is done to the relevant ATS unit and is dependent on local regulations and type of aircraft. Many turboprop aircraft for example are not equipped with an Auxiliary Power Unit (APU) and therefore might need to start-up at least one engine at the gate before disconnection of the Ground Power Unit (GPU) and pushback / power back while aircraft equipped with an APU have more flexibility to start-up engines either before, during or after pushback

Before, during or after pushback:

Taxi



Take-off



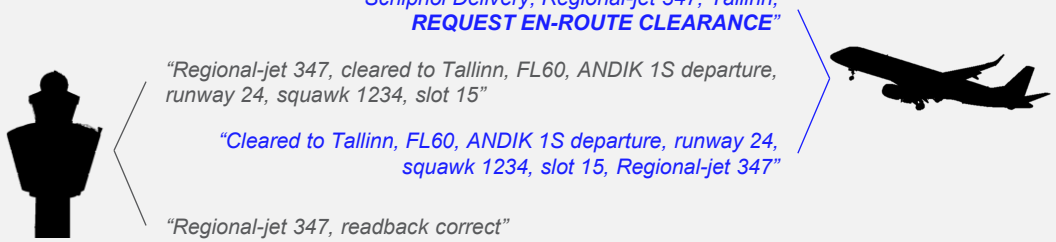
Departure - Pilots of aircraft flying instrument departures (including those outside controlled airspace) shall include the following information on initial contact with approach / departure control:

- Name ATSU
- Aircraft identification
- Current or passing altitude
- Initial climb altitude / level
- Routing (e.g. SID)

International Airport - Departure

Schiphol Delivery - En-route clearance may be requested to Schiphol DLV MAX 20 min (30 min if RWY 36L is used) prior to EOBT or 35 min (45 min if RWY 36L is used) prior CTOT. After en-route clearance is obtained and either read back via RTF or confirmed via datalink, pilots shall immediately (without ATC instruction) select and monitor Schiphol Planner. En-route clearance request should consist of:

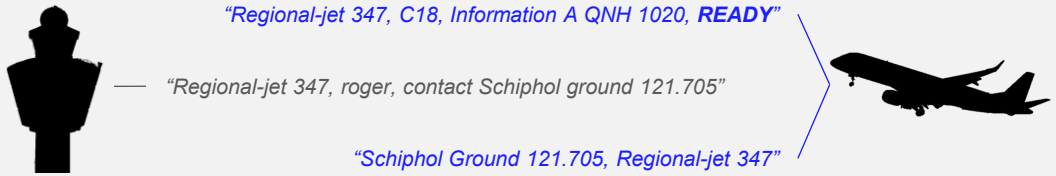
- Name ground station
- Aircraft identification
- Destination
- **"REQUEST EN-ROUTE CLEARANCE"**



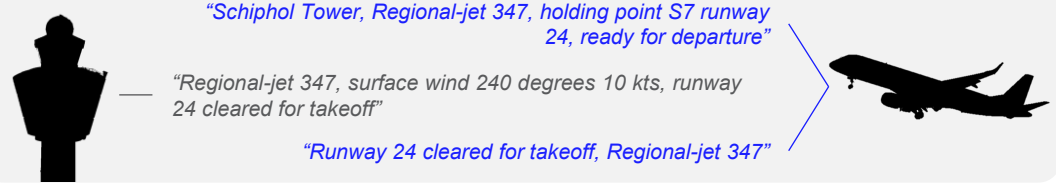
Schiphol Ground - Pilots should only request start-up and push back having confirmed the ground crew is ready. The flight crew shall read back to ATC all instructions contained in the push back clearance. The flight crew shall ensure that the complete push back clearance from ATC is communicated word-for-word to the push back crew.

Schiphol Planner - The flight crew shall only report ready to Schiphol Planner when all handling processes (doors closed, handling equipment removed, etc.) are finished, the pushback truck connected, the ACFT lifted, and ready for immediate pushback (if required), and within the Target Start-up Approval Time (TSAT) window (TSAT +/- 5MIN). When instructed by Schiphol Planner, the flight crew shall directly contact Schiphol Ground and immediately comply with start-up, pushback and taxi permission. The report to Schiphol Planner shall include:

- Aircraft Identification
- Parking position
- ATIS information & QNH
- **"READY"**



Schiphol Tower



Schiphol Departure - CTC Schiphol DEP 119.055 when passing 2000 ft:

- Name ATSU
- Aircraft identification
- Current or passing altitude
- Initial climb altitude / level
- Routing (e.g. SID)

En-route IFR Phraseology

Amsterdam Radar - When changing channel from Schiphol Departure to Amsterdam ACC, initial contact consist of **"AMSTERDAM RADAR"** + callsign only. When a speed or heading has been assigned, this information shall be included in the initial call.

"Amsterdam Radar, Regional-jet 347" or,

"Amsterdam Radar, Regional-jet 347, radar heading / speed ..."

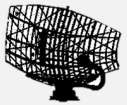
Subsequent Frequency Changes - Unless otherwise instructed when changing communication channel to an ATSU (including changes within the same ATSU), the initial call on the new channel shall include aircraft identification and level. Other information shall be included during frequency changes as follows:

- If the aircraft is in level flight but cleared to another level, the callsign shall include the aircraft identification followed by the current level and the cleared level.
- If the aircraft is not in level flight, the call shall include the aircraft identification followed by cleared level.
- If the aircraft has been assigned a speed or a heading, the initial call shall also include the assigned speed and / or heading.

"Amsterdam Control, Regional-jet 347, maintaining FL350, cleared FL250"

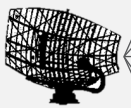
"Amsterdam Control, Regional-jet 347, (Climbing / Descending) FL350"

"Amsterdam Control, Regional-jet 347, FL100, radar heading / speed ..."



"Regional-jet 347, Amsterdam Control, radar contact"

Radar Control - The phrase **"RADAR CONTROL"** shall only be used when a radar control service is being provided. Normally however, the callsign suffix used by the radar unit is sufficient to indicate its function. In a radar environment heading information given by the pilot and heading instructions given by controllers are normally in degrees magnetic. An aircraft must be identified before it can be provided with ATS surveillance service. The pilot will be warned if identification is lost, or about to be lost, and appropriate instructions given. When using SSR the controller does not have to inform the position of the aircraft and within controlled airspace does not have to inform that the aircraft is identified.



"Regional-jet 347, report heading", or,

"Regional-jet 347, report heading and level"

"Regional-jet 347, for identification turn left heading 320 degrees"

"Regional-jet 347, identified 18 miles south-west of Groningen",
or,
"Regional-jet 347, not identified"

Reduced Vertical Separation Minima (RVSM) - Phraseology applicable for RVSM operations:

Phrase	Meaning
"CONFIRM RVSM APPROVED"	To ascertain the RVSM approval status of a flight.
"AFFIRM RVSM"	Pilot indication of RVSM approved status.
"NEGATIVE RVSM"	Pilot indication of non RVSM approval status.
"UNABLE ISSUE CLEARANCE INTO RVSM AIRSPACE, MAINTAIN / CLIMB / DESCEND ..."	To deny ATC clearance into RVSM airspace.
"UNABLE RVSM DUE TURBULENCE"	In case of an individual aircraft reporting severe turbulence or other severe weather-related phenomenon.
"UNABLE RVSM DUE EQUIPMENT"	The phraseology required for a pilot to communicate those circumstances which would cause an aircrafts equipment to degrade to below altimetry Minimum Aircraft Systems Performance Specifications (MASPS).
"REPORT WHEN ABLE TO RESUME RVSM"	To request an aircraft provide information as soon as RVSM approved status has been regained or the pilot is ready to resume RVSM operations.
"CONFIRM ABLE TO RESUME RVSM"	To request confirmation that an aircraft has regained RVSM approved status or the pilot is ready to resume RVSM operations.
"READY TO RESUME RVSM"	The pilot shall communicate his / her ability to resume operation within the RVSM airspace after an equipment related contingency, or his / her ability to resume RVSM operations after a weather-related contingency.

During operations in, or vertical transit through, Reduced Vertical Separation Minimum (RVSM) airspace with aircraft not approved for RVSM operations, pilots shall report non-approved status in accordance with the above table as follows:

- At initial call on any channel within RVSM airspace
- In all requests for level changes
- In all readbacks of level clearances

Air traffic controllers shall explicitly acknowledge receipt of messages from aircraft reporting RVSM non-approved status.

International Airport - Arrival

General - Radar vectors are given to arriving flights to position them onto a pilot interpreted approach aid, or to a point from which a radar-assisted approach or visual approach is made.

MLS equipment will provide an ILS look-a-like straight in approach and the terms localizer and glidepath are retained. Due to the possibility of confusion between the words ILS and MLS, an MLS approach is referred to as a **"MICROWAVE APPROACH"** in RTF communication.

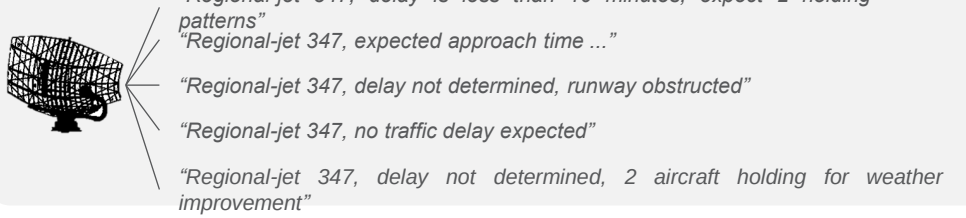
Controllers shall not instruct pilots to establish on a localizer or descend on a glidepath when outside the Designated Operational Coverage (DOC).

Amsterdam Radar - While being transferred to Amsterdam ACC, initial contact shall be restricted to **"AMSTERDAM RADAR"** + callsign only in order to avoid channel congestion. In specific situations, pilots may be requested to report additional information to Amsterdam ACC in the initial contact. At or before entering the Amsterdam Control Area, an arrival clearance will be issued by Amsterdam ACC containing:

- Standard arrival route or direct route
- Main landing runway
- Level instructions (normally descent instructions)
- An other necessary instruction or information

Delays - Where an aircraft is required to hold before making an approach the expected delay shall be passed to the pilot. Expected Approach Time (EAT) is the time that approach control estimate that an aircraft will be able to leave the holding facility, following a delay, to commence its approach to land.

- If for reasons other than weather, e.g. an obstruction on the runway, the extent of the delay is not known, aircraft are to be advised **"DELAY NOT DETERMINED"** followed by the reason for the delay.
- If aircraft holds for the weather to improve at the landing aerodrome, the controller shall inform the first aircraft entering the holding pattern that **"NO TRAFFIC DELAY EXPECTED".** Subsequent aircraft will be passed **"DELAY NOT DETERMINED"** followed by an indication of the number of aircraft holding.
- To avoid excessive delays to traffic when ATS surveillance systems are not available, controllers may authorize an aircraft to climb or descent in VMC, subject to a number of safe-guards, including the pilot agreeing to maintain his own separation from other aircraft.



Stack Controller - Transfer to the ACC / Stack Controller takes place after initial descent has been issued and the aircraft is clear of en-route traffic. The ACC / Stack Controller will issue additional instructions with respect to: (further) descent, Estimate Approach Time (EAT), if delay is effected by holding over the IAF.

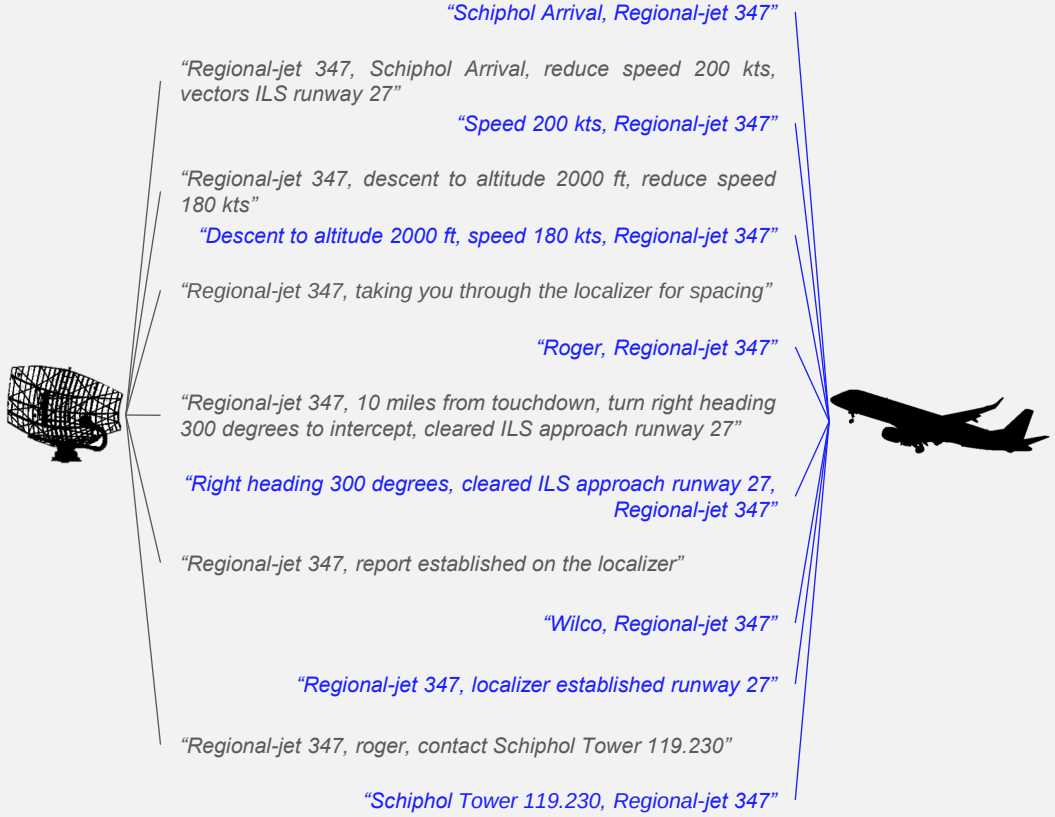
International Airport - Approach

Schiphol Approach - Transfer to the approach controller takes place when the aircraft is clear of the holding area at the IAF. While being transferred from Amsterdam Radar to Schiphol Approach, initial contact shall be restricted to **"SCHIPHOL APPROACH"** + callsign only in order to avoid channel congestion. In specific situations, Amsterdam Radar may request pilots to report additional information to Schiphol Approach in the initial contact. Instructions issued by the approach controller will contain as applicable:

- Clearance limit and level instructions
- Type of approach
- QNH
- When ATIS is out of service: runway in use, transition level, MET information and runway condition.

Schiphol Arrival - Transfer to the arrival controller takes place before the aircraft enters the final approach vector area. While being transferred from Schiphol Approach to Schiphol Arrival, initial contact shall be restricted to **"SCHIPHOL ARRIVAL"** + callsign only in order to avoid channel congestion. The arrival controller will issue instructions for descent and interception of final approach. Traffic sequencing will be established and maintained based on pre-planned slots for the final approach gate.

If it is necessary to vector an aircraft through the final approach track before subsequently joining the approach from the opposite side, the controller shall advise the pilot prior to the aircraft passing through the final approach track. When it is judged that this will aid situational awareness, controllers may request aircraft to report established on the localizer.



International Airport - Landing

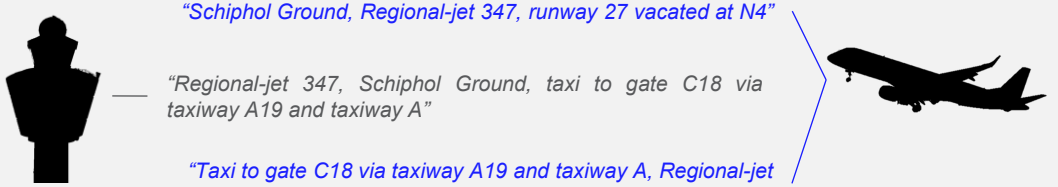
Schiphol Tower - Transfer to Schiphol Tower takes place after the aircraft is established on final approach. Pilots of arriving aircraft will be instructed by Schiphol Approach / Arrival which channel they shall use. While being transferred from Schiphol Approach / Arrival to Schiphol Tower, initial contact shall consist of

- "**SCHIPHOL TOWER"**
- Callsign
- Runway

Schiphol Ground - Pilots shall contact Schiphol Ground (without ATC instructions) immediately after vacating the landing runway on the following channels, depending on the landing runway used as follows:

- Runway 04 / 22 - 121.805
- Runway 06 / 24 - 121.705
- Runway 09 / 27 - 121.805
- Runway 18C / 36C - 121.905
- Runway 18R - 121.560
- Runway 36R - 121.805

Pilots will receive information concerning the stand (entry, pier and number). Aircraft shall follow the main taxi lines and adhere to the route-indications for the apron and the stand. Aircraft may only leave the taxiway center line after visual contact with the marshaller or the activated visual docking guidance system has been established.



End of Module

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Air Traffic Management

7 Emergency Phraseology

Emergency Phraseology

- Emergency Communications
- Air Traffic Control Response
- Emergency Phraseology
- Fuel Shortage | Cancelling Distress
- Communication Failure

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Emergency Communications

- The pilot should start the emergency call with the appropriate international RTF prefix. The states of emergency are classified as follows:
  - Distress: **“MAYDAY, MAYDAY, MAYDAY”,** a condition of being threatened by serious and / or imminent danger and requiring immediate assistance
  - Urgency: **“PAN PAN, PAN PAN, PAN PAN”**, a condition concerning the safety of an aircraft or other vehicle, or of some person on board or within sight, but does not require immediate assistance.
- Pilots should address their emergency calls to the ATSU they are in contact with or otherwise on 121.500 MHz or 243.0 MHz. Once two-way communication has been established, pilots should not leave 121.500 MHz or 243.0 MHz without telling the controller.
- Pilots are urged in their own interest to request assistance from the emergency service as soon as there is any doubt about the safe conduct of their flight. Even then, the provision of assistance may be delayed if a pilot does not pass clear details of his difficulties and requirement, using the international standard RTF prefix **“MAYDAY, MAYDAY, MAYDAY”** or **“PAN PAN, PAN PAN, PAN PAN”** as appropriate. For example, a vague request from a pilot for “confirmation of position” is unlikely to be accorded as much priority as would be given to a statement that he is lost. If, subsequent to the transmission of a **“MAYDAY”** or **“PAN PAN”**, a pilot considers the problem not to be as serious as first thought and priority attention is no longer required, the emergency condition may be cancelled at the pilot's discretion. It is invariably preferable for pilots believing themselves to be facing emergency situations to declare them as early as possible and then cancel later if they decide the situation allows.
- If a pilot is already in communication with a civil or military ATSU, before the emergency arises, assistance should be requested from the controller on the frequency in use. In this case, any SSR code setting previously assigned by ATC (other than the conspicuity code 7000) should be retained until instructions are received to change the transponder code setting.
- If, however, the pilot is not in direct communication with an ATSU and the aircraft is equipped with an SSR transponder it should be switched, preferably before the emergency call is made, to emergency code 7700, with mode C if available. If the transponding aircraft is high enough to be within secondary radar cover, the selection of the emergency 7700 code will alert the emergency controller to the presence of an incident by means of audio and visual warning. The received SSR plot will show the precise location of the aircraft on the controller's display and will then obviate the need for the emergency controller to carry out the more time-consuming manual aicraft position plotting procedure.
- If no acknowledgement of the distress or urgency message is made by the station addressed by the aircraft, other stations shall render assistance. Due to the nature of distress and urgency situations, the originator of messages addressed to an aircraft in distress or urgency condition shall restrict to the minimum the number and volume and content of such messages as required by the condition.
- Following the initial distress or urgency message, it is permissible for pilots and controllers to use **“MAYDAY”** and **“PAN”** as a callsign prefix (e.g. ***“MAYDAY Regional-jet 347”***) at their discretion, where it is judged that this would have a beneficial effect on the outcome.

Air Traffic Control Response

General - Controllers should recognize that, when faced with an emergency situation, the flight crews most important needs are:

- Time
- Airspace
- Silence

ASSIST - The controller's response to the emergency situation could be patterned after a memory aid such as ASSIST:

- **Acknowledge** the call,
- **Separate** the aircraft from other traffic, give it room to maneuver,
- **Silence** on the frequency, where possible, change the frequency for other traffic, or provide a separate frequency, this prevents unnecessary clutter for the pilots,
- **Inform** those who need to know and those who can help, inform others as appropriate,
- **Support** the pilots in any way possible, start to think of alternative routings etc.
- **Time**, give pilots time to collect their thoughts, don't harass flight crew for information, time produces good decisions.

Imposition of Silence - Transmissions from aircraft in distress have priority over all other transmissions. On hearing a distress call, all stations must maintain radio silence on that frequency unless the distress is cancelled or the distress traffic is terminated, all distress traffic has been transferred to other frequencies, the station controlling communications gives permission, it has itself to render assistance. Any station which has knowledge of distress, shall nevertheless continue listening to such traffic until it is evident that assistance is being provided. Stations should take care not to interfere with the transmission of urgency calls. The aircraft in distress or the station in control of a distress incident may impose silence either on all stations in the area or on any station that interferes with distress transmissions.

Transfer of Non-distress Traffic - The aeronautical station acknowledging a distress message on a particular frequency may consider it prudent to transfer other aircraft from that frequency in order to avoid any disruption of a transmission from or to the emergency aircraft.

*"All stations, Tallinn Tower, **STOP TRANSMITTING**, MAYDAY"*

*"Small-prop 505, **STOP TRANSMITTING,** MAYDAY"*

"MAYDAY Regional-jet 347, remain this frequency, break break, all other aircraft contact Tallinn Radar 127.905, out"

Emergency Descent - When an emergency descent is in progress controllers may broadcast an emergency message on appropriate frequencies to warn other aircraft. The broadcast may include specific instructions, clearances or traffic information, as necessary.

"Attention all aircraft, in the vicinity of RKN VOR, emergency descent in progress from FL410 passing FL310, standby for instructions"

Emergency Phraseology

Emergency Message - The emergency message shall contain the following information (time and circumstance permitting) and, whenever possible, should be passed in the exact order given:

- **"MAYDAY MAYDAY MAYDAY"** or **"PAN PAN, PAN PAN, PAN PAN",**
- Name of the station adressed,
- Aircraft identification,
- Aircraft type,
- Nature of urgency / emergency,
- Intention of the pilot in command,
- Present or last know position, flight level / altitude and heading,
- Other useful information such as endurance, POB, aircraft color / markings and survival aids.

*"**MAYDAY MAYDAY MAYDAY**, Tallinn Tower, Regional-jet 347, Embraer 195, engine failure, continuing SID, passing TN850 2000 ft, climbing to altitude 4000 ft, endurance 2½ hrs,112 POB"*

*"(MAYDAY) Regional-jet 347, Tallinn Tower, roger **MAYDAY**"*

*"**MAYDAY MAYDAY MAYDAY**, Kastrup Tower, Big-prop 1233, ATR 72, right-hand engine fire, continuing approach runway 22L, after landing stopping on the runway, 5 miles final, altitude 1600 ft descending, 64 POB"*

*"(MAYDAY) Big-prop 1233, Kastrup Tower, roger **MAYDAY**, runway 22L cleared to land, wind 260 degrees 10 kt, emergency services alerted"*

Relayed Emergency Message - Any aeronautical station aware of an emergency may transmit a distress message whenever such action is necessary to obtain assistance for the aircraft or vessel in distress. In such circumstances, it should be made clear that the aircraft transmitting is not itself in distress.

*"**MAYDAY MAYDAY MAYDAY**, Lelystad Tower, PH-ABC, have intercepted **MAYDAY** from PH-DEF, I say again PH-DEF, Cessna 172, engine failure, forced landing 5 miles south of Harderwijk, altitude 1200 ft descending, heading 125, 3 POB"*

*"PH-ABC, Lelystad Tower, roger your relayed **MAYDAY** from PH-DEF"*

PAN PAN Medical - The use of **"PAN PAN MEDICAL"** indicates that the message which follows concerns a protected "Medical Transport" as defined in the 1949 Geneva Conventions and Additional Protocols, which refers to "any means of transportation by land, water or air, whether military or civilian, permanent or temporary, assigned exclusively to medical transportation and under the control of a competent authority of a party to the conflict. The message shall convey the following data:

- The callsign or other recognized means of identification of the medical transports,
- Position of the medical transports,
- Number and type of medical transports,
- Intended route,
- Estimated time en-route and of departure and arrival, as appropriate,
- Any other information such as flight altitude, radio frequencies guarded, languages used, and secondary surveillance radar modes and codes.

Short Emergency Message - When there is a problem, the workload during the first moments is high and the flight crew may elect to inform air traffic control immediately by the most direct means. This normally entails the use of an initial call incorporating the word **"STANDBY"**. Further details shall be passed when workload permits.

*"**MAYDAY MAYDAY MAYDAY**, Tallinn Tower, Regional-jet 347, Embraer 195, engine failure, **STANDBY**"*

*"(MAYDAY) Regional-jet 347, Tallinn Tower, roger **MAYDAY**"*

Ballistic Recovery Systems which take the form of a parachute, are fitted to some general aviation aircraft for use in situations where a pilot considers continued safe flight is no longer possible. Such situations could include engine failure and loss of control. The following phrase should be used by pilots, where time permits, as part of additional information within the emergency message.

*"**MAYDAY MAYDAY MAYDAY**, Lelystad Tower, PH-ABC, TB-9, structural damage, 5 miles south of Harderwijk, altitude 1200 ft descending, 2 POB, **BALISTIC RECOVERY SYSTEM DEPLOYED**"*

*"(MAYDAY) PH-ABC, Lelystad Tower, roger **MAYDAY**"*

Fuel Shortage | Cancelling Distress

Fuel Shortage - Pilots should advise ATC of a minimum fuel state by broadcasting **"MINIMUM FUEL"** when further delays may result in landing at the destination aerodrome with less than the planned final reserve fuel. Controllers are not required to provide priority to pilots of aircraft that have indicated or suggested that they are becoming short of fuel or have used the RTF phraseology **"MINIMUM FUEL"**. Controllers shall respond to pilots who indicate or suggest that they are becoming short of fuel, or who have declared **"MINIMUM FUEL"** by asking the pilot to confirm whether or not he wishes to declare an emergency after confirming to the pilot:

- The estimated delay he can expect to receive expressed in minutes, if the pilot is en-route to, is joining, or is established in an airborne hold,
- By expressing the remaining track mileage from touchdown, if the aircraft is being vectored to an approach

Pilots shall declare a situation of fuel emergency by broadcasting **"MAYDAY MAYDAY MAYDAY FUEL"**, when the calculated usable fuel predicted to be available upon landing at the nearest aerodrome where a safe landing can be made is less than the planned final reserve fuel.

*"Regional-jet 347, **MINIMUM FUEL**"*

*"**MAYDAY MAYDAY MAYDAY FUEL**, Schiphol Approach, Regional-jet 347, Embraer 195, fuel emergency, request straight-in approach runway 27, passing ARTIP FL100, radar heading 270 degrees, endurance 45 minutes, 112 POB"*

Termination of Distress Communications - When an aircraft is no longer in distress it shall transmit a message cancelling the emergency condition. When a distress situation has been resolved, the station which has been controlling the emergency traffic will transmit a message indicating that normal working may be resumed.

*"Tallinn Tower, Regional-jet 347, **CANCEL MAYDAY**, engine restarted, runway in sight, request visual approach"*

"Regional-jet 347, runway 26 cleared to land, surface wind 260 degrees 10 knots."

"Runway 26 cleared to land, Regional-jet 347"

"All stations, Tallinn Tower, distress traffic ended"

Communication Failure

Air to Ground - The following should be taken into consideration:

- The correct frequency has been selected for the route being flown.
- The aeronautical station being called is open for watch.
- The aircraft is not out of radio range.
- Receiver volume is correctly set.
- Check headset and radio installation appropriate to the aircraft.
- Attempt to establish contact on another frequency appropriate to the route being flown.
- If above attempts fails, the aircraft station shall attempt to establish communication with other aircraft or other aeronautical stations on frequencies appropriate to the route.
- If unable to establish communication on any aeronautical station or with any aircraft, then the pilot is to transmit his message twice on the designated frequency including the addressee for whom the message is intended, preceded by the phrase **"TRANSMITTING BLIND"** in case the transmitter is still functioning.
- When a transmitter failure is suspected, check or change the microphone. Listen out on the designated frequency for instructions. It should be possible to answer questions by the use of carrier wave if the microphone is not functioning.
- In case a receiver failure transmit reports twice at the scheduled times or positions on the designated frequency preceded by the phrase: **"TRANSMITTING BLIND".**
- An aircraft which is being provided with Air Traffic Control Service, Advisory Service or Aerodrome Flight Information Service or to transmit information regarding the intention of the pilot in command with respect to the continuation of the flight. Specific procedures for the action to be taken by pilots of IFR and special VFR flights are contained in the appropriate AIP ENR and/or AD section.
- **NOTE:** An aircraft experiencing a radio communications failure is expected to select the appropriate SSR code (7600).

121.500 MHz Monitoring - Over recent years the number of reported radio failure incidents has increased considerably. With the heightened awareness in airborne security, ATCs inability to contact an aircraft experiencing a radio failure could lead to that aircraft's interception by military aircraft.

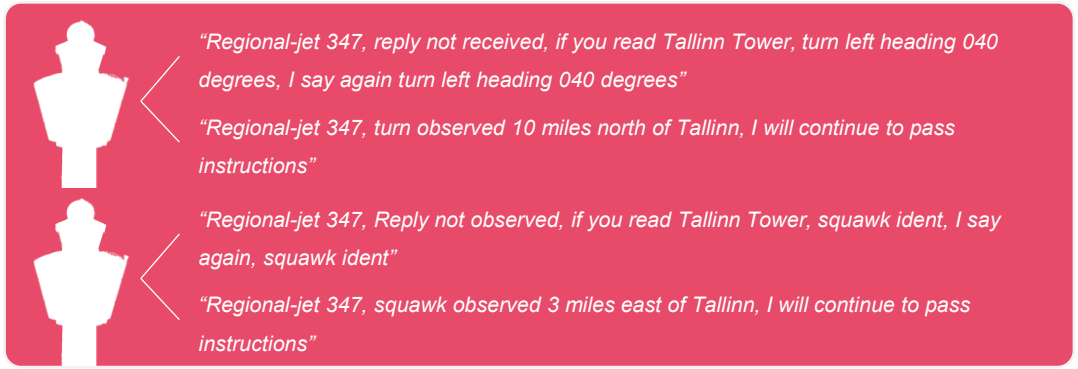
Pilots should familiarize themselves with loss of communications procedures and / or sleeping receiver procedures, including the use of 121.500 MHz. Reports following interception by military aircraft suggest that civil pilots do not routinely monitor the international emergency frequency (121.500 MHz), since military pilots involved were unable to contact the civil pilots on that frequency. If for any reason communications on the designated frequency are lost, pilots should be able to refer to a list of alternative frequencies in use on their sector.

Ground to Air - After completing checks of ground equipment (most airports have standby and emergency communications equipment) the ground station will request other aeronautical stations and aircraft to attempt to communicate with the aircraft which has failed to maintain contact.

If still unable to establish communication the aeronautical station will transmit messages addressed to the aircraft by blind transmission on the frequency on which the aircraft is believed to be listening. These will consist of:

- The level, route and EAT (or ETA) to which it is assumed the aircraft is adhering
- The weather conditions at the destination aerodrome and suitable alternate and, if practicable, the weather conditions in an area or areas suitable for descent through cloud procedure to be effected.

When a controller suspects that an aircraft is able to receive but not transmit messages, the radar may be used to confirm that the pilot has received instructions. When further instructions are given, they should be passed slowly, clearly and be repeated.



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❽ Quick Reference

Quick Reference

- VFR Radiotelephony - Quick Reference Sheet
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- Emergency Radiotelephony - Quick Reference Sheet
- Miscellaneous - Quick Reference Sheet

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VFR Radiotelephony - Quick Reference Sheet

	Departure	Arrival	En-route
Controlled	**Departure** • Aircraft type • POB (if required) • Position • ATIS & QNH • Flight rules & destination • **"REQUEST START-UP"** *"TB-9, Kilo apron, information A, QNH 1020, VFR to Lelystad, **REQUEST START-UP**, PH-ABC"*	**Arrival** • Aircraft type • POB (if required) • Position and altitude • Flight rules • ATIS • **"FOR TOUCH & GO / LANDING"** *"TB-9, overhead Beilen, altitude 1500 ft, VFR, information A, **FOR LANDING**, PH-ABC"*	**CTR Crossing** • Aircraft type • POB (If required) • Position & altitude • Flight rules • Departure & destination • **"REQUEST TO CROSS CONTROL ZONE"** • Entry point, routing, exit point, altitude *"TB-9, overhead Schagen, altitude 1500 ft, VFR Lelystad to Texel, **REQUEST TO CROSS CONTROL ZONE** from Zulu via overhead the field to November, altitude 1500 ft, PH-ABC"*
Uncontrolled	**Departure** • Aircraft type • POB • Name PIC • Flight rules • Intentions • **"REQUEST DEPARTURE INFORMATION"** *"TB-9, 2 POB, pilot in command ... , VFR to Lelystad, **REQUEST DEPARTURE INFORMATION**, PH-ABC"*	**Arrival** • Aircraft type • POB • Name PIC • Flight rules & departure • Position (bearing) & altitude • **"REQUEST ARRIVAL INFORMATION"** *"TB-9, 2 POB, pilot in command ... , VFR from Eelde, overhead Den Burg, altitude 1500 ft, **REQUEST ARRIVAL INFORMATION**, PH-ABC"*	**Flight Information Service** • Aircraft type • Position & altitude • Flight rules • Departure & destination • Additional information (ETA) *"TB-9, overhead Beilen, altitude 2200 ft, VFR Eelde to Lelystad, estimate Lelystad at 15, PH-ABC"*

IFR Radiotelephony - Quick Reference Sheet

	En-route Clearance	Start-up & Pushback	Taxi	Takeoff	Radar
Tallinn (Example)	**Tallinn Tower** • Name ATSU • Callsign • Aircraft type • Position • ATIS & QNH • Flight rules & destination • **"REQUEST EN-ROUTE CLEARANCE"** *"Tallinn Tower, Regional-jet 347, Embraer 195, M2, information A, QNH 1020, IFR Stockholm, **REQUEST EN-ROUTE CLEARANCE**"*	**Tallinn Tower** • Callsign • Position • **"REQUEST PUSHBACK / START-UP"** *"Regional-jet 347, M2, **REQUEST PUSHBACK / START-UP**"*	**Tallinn Tower** • Callsign • **"REQUEST TAXI"** *"Regional-jet 347, **REQUEST TAXI**"*	**Tallinn Tower** • Callsign • Position • **"READY FOR DEPARTURE"** *"Regional-jet 347, holding point B, **READY FOR DEPARTURE**"*	**Tallinn Radar** • Name ATSU • Callsign • Current or passing altitude • Initial climb altitude / level • Routing (e.g. SID) *"Tallinn Radar, Regional-jet 347, passing altitude 1200 ft, climbing to altitude 4000 ft, PETOT 1S departure"*
Schiphol (Example)	**Schiphol Delivery** • Name ATSU • Callsign • Destination • **"REQUEST EN-ROUTE CLEARANCE"** *"Schiphol Delivery, Regional-jet 347, Tallinn, **REQUEST EN-ROUTE CLEARANCE**"* **Schiphol Planner** • Callsign • Position • ATIS & QNH • **"READY"** *"Regional-jet 347, C18, Information A, QNH 1020, **"READY"***"	**Schiphol Ground** • Name ATSU • Callsign • Position • **"REQUEST PUSHBACK / START-UP"** *"Schiphol Ground, Regional-jet 347, C18, **REQUEST PUSHBACK / START-UP**"*	**Schiphol Ground** • Callsign • **"REQUEST TAXI"** *"Regional-jet 347, **REQUEST TAXI**"*	**Schiphol Tower** • Name ATSU • Callsign • Position • **"READY FOR DEPARTURE"** *"Schiphol Tower, Regional-jet 347, holding point S7 runway 24, **READY FOR DEPARTURE**"*	**Schiphol Departure** • Name ATSU • Callsign • Current or passing altitude • Initial climb altitude / level • Routing (e.g. SID) *"Schiphol Departure, Regional-jet 347, passing altitude 2200 ft, climbing FL60, ANDIK 1S departure"*

Emergency Radiotelephony - Quick Reference Sheet

Emergency / Urgency Message

- **"MAYDAY"** x3 or **"PAN PAN"** x3
- Name ATSU
- Callsign
- Aircraft type
- Nature of emergency or urgency
- Intentions
- Position, altitude / level, heading (as applicable)
- Other relevant info. (endurance, POB etc.)

*"**MAYDAY MAYDAY MAYDAY**, Tallinn Tower, Regional-jet 347, Embraer 195, engine failure, continuing runway track, passing altitude 1200 ft, climbing to MSA, endurance 2½ hrs, 112 POB"*

Short Urgency / Emergency Message

- **"MAYDAY"** x3 or **"PAN PAN"** x3
- Name ATSU
- Callsign
- Nature of emergency
- **"STANDBY"**

*"**MAYDAY MAYDAY MAYDAY**, Tallinn Tower, Regional-jet 347, Embraer 195, engine failure, **STANDBY**"*

Cancelling Distress

- Name ATSU
- Callsign
- **"CANCEL MAYDAY"**
- Other relevant information

*"Tallinn Tower, Regional-jet 347, **CANCEL MAYDAY**, engine restarted"*

Rejected Take-off

- Callsign
- **"STOPPING"**

*"Big-prop 1233, **STOPPING**"*

Communication Failure

- **"TRANSMITTING BLIND"**
- Name ATSU
- Callsign & aircraft type
- Intentions
- Position, altitude / level, heading (as applicable)
- Other relevant info. (endurance, POB etc.)
- Time of next transmission
- **"I SAY AGAIN ..."**

*"**TRANSMITTING BLIND,** Tallinn Tower, Regional-jet 347, Embraer 195, continuing OSMUR 1L arrival to MOKEX to join the published hold over MOKEX, altitude 2200 ft, starting approach time ... , Endurance 1½ hr, 112 POB, next transmission at time ... , **I SAY AGAIN ...** (repeat entire message)"*

Diversion

- Aircraft type
- POB (if required)
- Position & altitude / level
- Flight rules, departure & destination
- **"DIVERING TO ..."**
- **"DUE ... / PRACTISE DIVERSION"**
- ATIS
- Intentions

*"TB-9, overhead Beilen, VFR Lelystad to Texel, diverting to Eelde, **DUE ... (reason) / PRACTISE DIVERSION**, information A, for landing, PH-ABC"*

Miscellaneous - Quick Reference Sheet

VHF Direction Finding (VDF)

- Name ATSU
- Callsign
- **“REQUEST QDM / FIX”**
- Callsign

*“Texel Radio, PH-ABC, **REQUEST QDM / FIX**, PH-ABC”*

When requested to transmit for bearing:

- **“TRANSMITTING FOR BEARING”**
- Callsign

***“TRANSMITTING FOR BEARING,** PH-ABC”*

Position Reporting

- Callsign
- Position & time
- Altitude / level
- Next position and ETA

“Regional-jet 347, REFSO 47, FL350, LOGAN 57”

TCAS

- Callsign
- **“TCAS RA”**

*“Big-prop 1233, **TCAS RA**”*

When “clear of conflict”:

- Callsign
- **“CLEAR OF CONFLICT”**
- **“RETURNING ...” / “... RESUMED”**

*“Big-prop 1233, **CLEAR OF CONFLICT, RETURNING FL150 / FL150 RESUMED**”*

End of Module

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