RAC – RULES OF THE AIR AND AIR TRAFFIC SERVICES

1.0 GENERAL INFORMATION

1.1 AIR TRAFFIC SERVICES

The following is a list of control, advisory and information services that are available to pilots.

1.1.1 ATC and Information Services

The following air traffic control and information services are provided by ACCs and TWRs.

(a) Airport control service is provided by airport TWRs to aircraft and vehicles on the manoeuvring area of an airport and to aircraft operating in the vicinity of an airport.

(b) Area control service is provided by ACCs to IFR and CVFR flights operating within specified control areas.

(c) Terminal control service is provided by ACCs to IFR and CVFR flights operating within specified control areas.

(d) Terminal radar service is an additional service provided by IFR units to VFR aircraft operating within Class C airspace.

(e) Alerting service notifies appropriate organizations regarding aircraft in need of search and rescue services, or alerts crash equipment, ambulances, doctors and any other safety services.

(f) Altitude reservation service includes the service of the altitude reservation East (Gander) and altitude reservation West (Edmonton) in co-ordination with ACCs in providing reserved altitude for specified air operations in controlled airspace, and in providing information concerning these reservations and military activity areas in controlled and uncontrolled airspace.

(g) AMIS is provided by ACCs for the collection, processing and dissemination of aircraft movement information for use by air defence units relative to flights operating into or within Canadian ADIZ.

(i) Flight information service is provided by ATC units to assist pilots by supplying information concerning known hazardous flight conditions. This information will include data concerning unfavourable flight conditions and other known hazards; which may not have been available to the pilot prior to takeoff or which may have developed along the route of flight.

The ATC service has been established primarily for the prevention of collisions and the expediting of traffic. The provision of such service will take precedence over the provision of flight information service, but every effort will be made to provide flight information and assistance.

Flight information will be made available, whenever practicable, to any aircraft in communication with an ATC unit, prior to takeoff or when in flight, except where such service is provided by the aircraft operator. Many factors (such as volume of traffic, controller workload, communications frequency congestion and limitations of radar equipment) may prevent a controller from providing this service.

VFR flights will be provided with information concerning:

(a) severe weather conditions along the proposed route of flight;

(b) changes in the serviceability of navigation aids;

(c) conditions of airports and associated facilities;

(d) other items considered pertinent to safety of flight.

IFR flights will be provided with information concerning:

(a) severe weather conditions;

(b) weather conditions reported or forecast at destination or alternate aerodromes;

(c) changes in the serviceability of navigation aids;

(d) condition of airports and associated facilities; and

(e) other items considered pertinent to the safety of flight.

Flight information messages are intended as information only. If a specific action is suggested, the message will be prefixed by the term “ATC SUGGESTS…” or “SUGGEST YOU…” and the pilot will be informed of the purpose of the suggested action. The pilot is responsible for making the final decision concerning any suggestion.

Surveillance radar equipment is frequently used in the provision of information concerning hazards, such as chaff drops, bird activity and possible traffic conflictions. Due to limitations inherent in all radar systems, aircraft, chaff, etc., cannot be detected in all cases.

Whenever practicable, ATC will provide flights with severe weather information pertinent to the area concerned. Pilots may assist ATC by providing pilot reports of severe weather conditions they encounter. ATC will endeavour to suggest alternate routes available in order to avoid areas experiencing severe weather.

ATC will provide pilots intending to operate through chaff areas with all available information relating to proposed or actl chaff drops:

(a) location of chaff drop area;

(b) time of drop;

(c) estimated speed and direction of drift;

(d) altitudes likely to be affected; and

(e) relative intensity of chaff.

Information concerning bird activity, obtained through controller's observations or pilot reports, will be provided to aircraft operating in the area concerned. In addition, pilots may be warned of possible bird hazards if radar observation indicates the possibility of bird activity. Information will be provided concerning:

(a) size or species of bird, if known;

(b) location;

(c) direction of flight; and

(d) altitude, if known.

Radar traffic information and radar navigation assistance to VFR flights are contained in RAC 1.5.

1.1.2 Flight Advisory and Information Services

The following flight advisory and information services are provided by FICs and FSSs.

1.1.2.1 A FIC provides:

(a) *Pilot briefing service*: the provision of, or consultation on, meteorological and aeronautical information to assist pilots in pre-flight planning for the safe and efficient conduct of flight. The flight service specialist adapts meteorological information, including satellite and radar imagery, to fit the needs of flight crew members and operations personnel, and provides consultation and advice on special weather problems. Flight service specialists accept flight plan information during a briefing (see RAC 3.2 for details).

(b) *FISE*: the exchange on the FISE frequency of information pertinent to the en-route phase of flight. Air traffic information is not provided. Upon request from an aircraft, a FIC provides:

(i) meteorological information: SIGMET, AIRMET, PIREP, aviation routine weather report (METAR), aviation selected special weather report (SPECI), aerodrome forecast (TAF), altimeter setting, weather radar, lightning information and briefing update;

(ii) aeronautical information: NOTAM, RSC, CRFI, MANOT and other information of interest for flight safety; and

(iii) relay of communications with ATC: IFR clearance and SVFR authorization.

En-route aircraft may submit to a FIC: PIREPs, IFR and VFR position reports (including arrival and departure times), revised flight plan or flight itinerary information and other reports, such as vital intelligence sightings (CIRVIS), fireball (meteorite) observations or pollution reports (see RAC 1.12 for details on pilot reports). Fuel dumping information may also be submitted for coordination with the appropriate ACC and for aeronautical broadcast needs (see RAC 6.3.4 for details).

(c) *Aeronautical broadcast service*: the broadcast on the FISE frequency, and on 126.7 MHz, of SIGMET, urgent PIREP and information concerning fuel dumping operations.

(d) *VFR flight plan alerting service*: the notification of RCCs and provision of communications searches when an aircraft on a VFR flight plan or flight itinerary becomes overdue and needs SAR aid.

(e) *Flight regularity message service*: the relay by FICs of messages between an aircraft in flight and the aircraft operating agency, and vice versa, when an agency with AFTN access subscribes to the service for an annual cost. Agencies interested in subscribing to this service should contact the NAV CANADA Customer Service Centre.

1.1.2.2 An FSS provides:

(a) *AAS*: the provision of information pertinent to the arrival and departure phases of flight at uncontrolled aerodromes and for transit through an MF area. AAS is provided on the MF and is normally in conjunction with VCS.

The elements of information listed below are provided, if appropriate, by the flight service specialist during initial aerodrome advisory communications with an aircraft:

(i) active or preferred runway (see *Glossary of Aeronautical Terms,* GEN 5.1);
(ii) wind direction and speed;
(iii) air traffic that warrants attention;
(iv) vehicle traffic;
(v) wake turbulence cautionary;
(vi) aerodrome conditions;
(vii) weather conditions; and
(viii) additional information of interest for the safety of flight.

The flight service specialist updates this information, when appropriate, after the initial advisory. Pilots are encouraged to indicate in initial transmissions to the FSS that information has been obtained from the ATIS or from an AWOS (or LWIS) broadcast, or use the phrase "HAVE NUMBERS" if runway, wind and altimeter information from the previous aerodrome advisory have been received, so that the flight service specialist does not repeat the information.

Mandatory reports by aircraft on the MF are critical for the FSS to be able to provide effective air traffic information. At certain FSS locations, air traffic information may also be based on radar display (see RAC 1.5.8 for details on the use of radar by an FSS). A pilot remains responsible for avoidance of traffic in Class E airspace.

Communications regarding TCAS events and displayed information should be limited to that required to inform the flight service specialist that the aircraft is responding to an RA. Discretion should be used in using the TCAS traffic display to ask questions regarding traffic in the vicinity of an aircraft. As would be expected, aircraft shown on a TCAS display may not match the traffic information provided by the flight service specialist.

NOTAM, RSC and CRFI are included in advisories for a period of 12 hr for domestic traffic, and 24 hr for international traffic, after dissemination by means of telecommunication. Aerodrome conditions published prior to these time limits should have been received in the pilot briefing or can be obtained on request.

Aerodrome lighting is operated by the FSS, unless otherwise indicated in the CFS. The flight service specialist relays ATC clearances, SVFR authorizations, and routinely informs the ACC of all IFR arrival times. The specialist also relays a VFR arrival report to a FIC upon request from an aircraft.

Pilots should be aware that a flight service specialist will alert the appropriate agencies for any aircraft that has received a landing advisory for an aerodrome that lies within an MF area and within radio communication range, if it fails to arrive within 5 min of its latest ETA, and communication cannot be re-established with the aircraft.

(b) *VCS*: the provision, at locations where AAS is provided, of instructions to control the movements of vehicles, equipment and pedestrians on manoeuvring areas of uncontrolled aerodromes. Flight service specialists will normally instruct vehicle traffic to leave the intended runway at least 5 min prior to the estimated time of landing or before a departing aircraft enters the manoeuvring area. The specialist will coordinate with the pilot prior to authorizing traffic to operate on the intended runway within less than 5 min of the estimated time of landing or the time an aircraft is ready for takeoff.

(c) *VDF service*: the provision of VDF navigation assistance to VFR aircraft. This service includes provision of the aircraft's bearing and a reciprocal heading, but is not intended as a substitute for normal VFR navigation (see RAC 1.6 for details).

1.1.2.3 FICs and FSSs may provide:

(a) *RAAS*: the provision, via RCO, of information pertinent to the arrival and departure phases of flight and for transit through an MF area.

RAAS consists in the issuance of the same type of information as in AAS, except that it is provided from a remote location. It is emphasized that the flight service specialist cannot observe the runways, taxiways, airspace or weather conditions in the vicinity of the aerodrome. Wind, altimeter and other weather information is usually extracted from the latest METAR or SPECI, and may not always be as representative of actual conditions as in AAS.

(b) *VAS:* the provision, via RCO, of information and advisories concerning the movements of vehicles, equipment and pedestrians on manoeuvring areas at designated uncontrolled aerodromes. VAS is provided at locations where RAAS is also provided. The flight service specialist will request vehicle traffic to leave the intended runway at least 5 min prior to the estimated time of landing, but cannot ascertain visually if the traffic has actually vacated the runway.

(c) *Alerting service*: the notification of appropriate organizations regarding aircraft in need of SAR services or alerts of crash equipment, ambulances, doctors and any other safety services. Alerting of a responsible authority, if experiencing unlawful interference (hijack), bomb threat or inability to communicate in the clear, is also included in this service.

(d) *Emergency assistance service*: the provision of aid to a pilot when in an emergency, or potential emergency situation, such as being lost, encountering adverse weather conditions or experiencing aircraft-related emergencies or equipment failure. At some locations, emergency navigational assistance is provided to a pilot who is lost or experiencing IMC, through the use of VDF equipment or by transferring the pilot to ATC for radar service (see RAC 1.6 for VDF service).

(e) *NOTAM information service*: the collection and dissemination of NOTAM, RSC and CRFI information by the flight service specialist. A pilot may report to a FIC or an FSS any hazards to the air navigation system that may need NOTAM distribution. The flight service specialist will distribute the information if it meets the criteria established in the *Canadian NOTAM Procedures Manual*.

(f) *Weather observation service*: the observation, recording and dissemination of surface weather information for aviation purposes.

1.1.2.4 International Flight Service Station (IFSS)

An aeronautical station that provides a communications service for international air operators. Gander is the only IFSS in Canada.

1.1.3 RCOs and DRCOs

(a) RCOs are VHF transmitters/receivers installed at designated aerodromes to permit communications between aircraft and an FSS or FIC for the provision of FISE or RAAS. An RCO may also be installed at an off-aerodrome location to enhance en-route communication coverage for the provision of FISE by FICs.

The RCO system is being redesigned. Currently, in most areas of the country, these services are provided on one frequency, i.e. 126.7 MHz. In the final system configuration, FISE RCOs will use one of the following four frequencies: 123.275, 123.375, 123.475, or 123.55 MHz. At most RCO sites where one of these four FISE frequencies is used, 126.7 MHz will be retained but will not be active or monitored by a FIC. At these sites, as required, the FIC activates and transmits on 126.7 MHz to provide aeronautical broadcast service (broadcast of SIGMET or urgent PIREP) and to conduct communication searches for overdue aircraft. When the FIC transmits on 126.7 MHz, the FISE frequency is also automatically activated so that broadcasts occur simultaneously on the FISE frequency and on 126.7 MHz. RCOs with 126.7 MHz operated in this manner are published as 126.7 (bcst).

At certain isolated RCO sites, 126.7 MHz is the frequency used to provide all the required services (FISE, aeronautical broadcast service and to conduct communication searches for overdue aircraft). In these circumstances, it is continuously monitored by a FIC, and is published in the CFS as 126.7 (FISE) and on charts/maps as 126.7.

(b) A DRCO is a standard RCO that has had a dial-up unit installed to connect the pilot with an ATS unit (e.g. FIC) via a commercial telephone line. In this manner, the line is only "opened" after the communication has been initiated by the pilot or ATS. The radio range of the RCO is unaffected by the conversion.

Activation of the system by the pilot is accomplished via the aircraft radio transmitter, and is effected by keying the microphone button four times with a deliberate and constant action on the published DRCO frequency. The microphone push-to-talk button should be held down for a fraction of a second (¼ of a second, to be technically correct) for each keying action with no more than 1 second between each action. The entire process should take slightly less than 10 seconds.

The remote dial unit is designed to accept this constant and deliberate action so as to reduce the possibility of inadvertent activation from other sources. Consequently, if a microphone is keyed more than four times, or too rapidly (or too slowly), the system will not activate.

Once the communication link has been established, the DRCO equipment will answer the pilot with a pre-recorded voice message: "link established." The link can only be actively disconnected by the ATS unit.

(i) Activation of the DRCO—Pilot Procedures

(A) Select the published RCO frequency on the aircraft radio transceiver.

(B) Key the radio microphone distinctly four times in a row, with no more than 1 second between each keying. If the keying procedure is successful, the pilot will hear a dial tone, signalling pulses (e.g. touch tones), and finally a ringing signal (see **NOTE**). If the keying procedure has been successful, but the line is not available, the equipment will automatically disconnect, and the message, "try again" will be broadcast.

(C) Wait for the DRCO equipment to answer with the pre-recorded voice message, "link established." This reply confirms that the phone link with ATS has been established. The pilot must now initiate the radio conversation as per standard radiotelephony practices, e.g. "Quebec Radio, this is CESSNA GOLF ALFA DELTA TANGO, over." It is important to note that the ATS specialist may be performing other duties (e.g. working on another frequency or taking a weather observation) and may not be able to acknowledge the pilot's radio call right away.

(D) The RCO line can only be actively disconnected by the ATS unit.

(E) A "call terminated" message indicates that the telephone line has been inadvertently disconnected.

NOTE: If the dial tone, signalling, and ringing are not heard, the pilot can assume that either:

(a) the RCO is not within the radio range of the aircraft's transceiver; or

(b) the RCO line has already been opened, and there is a pause in the communication between the pilot of another aircraft and the ATS unit.

The pilot may assume that the line is open and attempt to initiate communications with ATS. If no reply is received from ATS within a reasonable time interval, the pilot should reattempt the keying procedure when in closer proximity to the RCO site.

1.1.4 Arctic Radio

Arctic Radio operates from the North Bay FIC (Ontario). It provides FISE and emergency communication to aircraft operating in the Northwest Territories and Nunavut and in the vicinity of the ADIZ. It also provides radar position information (latitude and longitude, bearing and distance, altitude and ground speed) upon pilot request.

1.1.5 Military Flight Advisory Unit

DND operates Military Flight Advisory Unit (MFAU) which provide flight information services that enhance flight safety

and efficiency. These services are available by calling the appropriate station followed by "Advisory", i.e., "Namao Advisory". MFAU provide en route flight information, airport advisory, ground control, field condition reports, flight planning, alerting service, navigation assistance, NOTAM, PIREPs, and weather reports. An MFAU may be used to accept and relay VFR and IFR position reports and ATC clearances.

1.2 Services Other Than Air Traffic Services

1.2.1 Universal Communications

Universal Communications (UNICOM) is an air-to-ground communications facility operated by a private agency to provide Private Advisory Station (PAS) service at uncontrolled aerodromes. At these locations the choice of frequencies are 122.7, 122.8, 123.0, 123.3, 123.5, 122.75, 122.95, 123.35, 122.725, 122.775 and 122.825 MHz.

The use of all information received from a UNICOM station is entirely at the discretion of the pilot. The frequencies are published in aeronautical information publications as a service to pilots, but Transport Canada takes no responsibility for the use made of a UNICOM frequency.

An approach UNICOM (AU) is an air-ground communications service that can provide approach and landing information to IFR pilots. The service provider is required to ensure that

(a) meteorological instruments used to provide the approach and landing information meet the requirements stipulated under CAR 804.01(c) or the applicable exemption; and

(b) UNICOM operators meet the training requirements stipulated under CAR 804.01(c) or the applicable exemption.

Where the above standards are met, the AU operator may provide a station altimeter setting for the conduct of an instrument procedure as well as the wind speed and direction for the conduct of a straight-in landing from an instrument approach.

Operators providing AU services may also advise pilots of the runway condition and the position of vehicles or aircraft on the manoeuvring area. Regulations and standards regarding the provision of these services from an AU are under development.

An AU will be indicated as "UNICOM" (AU*) in the Canada* Air Pilot *and the Canada Flight S*upplement.

1.2.2 Airport Radio/Community Aerodrome Radio Station

Airport radio (APRT RDO), in most cases, is provided by a community aerodrome radio station (CARS) and has been established to provide aviation weather and communication services to enhance aircraft access to certain aerodromes.

APRT RDO/CARS service is provided by observer-communicators (O/C) who are certified to conduct aviation weather observations and radio communications to facilitate aircraft arrivals and departures.

Hours of operation are liste*d in the Canada Flight Supplement* (CFS) Aerodrome/ Facility Directory under the subheadings COM/APRT RDO.

Services provided by APRT RDO/CARS include the following:

(a) *Emergency Service*: The O/C will respond to all emergency calls (distress, urgency and ELT signals), incidents or accidents by alerting a designated NAV CANADA FIC and appropriate local authorities.

(b) *Communication Service*: The O/C will provide pilots with information in support of aircraft arrivals and departures, including wind, altimeter, runway and aerodrome status (including vehicle intentions and runway condition), current weather conditions, PIREPs and known aircraft traffic.

NOTES

1: O/Cs are authorized to provide an altimeter setting for an instrument approach.

2: O/Cs provide limited traffic information. APRT RDOs/CARS are located at uncontrolled aerodromes within MF areas. Pilots must communicate on the MF as per uncontrolled aerodrome procedures (see RAC 4.5.1 to 4.5.7, RAC 9.12, 9.13 and 9.14).

3: O/Cs do not provide ATC services. At aerodromes within controlled airspace served by APRT RDO/CARS, pilots must contact ATS via the RCO, PAL or telephone to obtain special VFR authorization or IFR clearances.

(d) *Weather Observation Service:* The O/C will monitor, observe, record and relay surface weather data for aviation purposes (METARs or SPECIs) in accordance with CAR 804 standards. The O/C may request PIREPs from pilots to confirm weather conditions, such as height of cloud bases.

(e) *Flight Plan/Flight Information Service*: If necessary, at most APRT RDOs/CARS, O/Cs will accept flight plans/ itineraries; however, pilots are encouraged to obtain a full pre-flight briefing and then file their flight plan/itinerary with a FIC.

NOTE: Pilots should be aware that O/Cs are only authorized to provide NOTAMs and weather information

(METARs or SPECIs) for their own aerodrome. Information for other areas/aerodromes should be obtained from an FIC.

At APRT RDO/CARS sites colocated with an RCO, pilots should open and close flight plans/itineraries, pass position reports and obtain FISE directly from the FIC via the RCO. At sites with no RCO, when requested by the pilot, the APRT RDO/CARS O/C will relay messages to open and close flight plans/ itineraries and position reports (IFR, VFR, DVFR) to a FIC.

(f) *Monitoring of Equipment/NAVAIDs*: During the APRT RDO/CARS hours of operation, O/Cs will monitor the status of equipment related to aerodrome lighting, weather, communications, etc. Malfunctions will be reported to the designated NAV CANADA facility, and a NOTAM will be issued as required. For site-specific NAVAID monitoring by APRT RDO/CARS, refer to the CFS and Enroute Low Altitude and Enroute High Altitude charts.

1.2.3 Private Advisory Stations (PAS)—Controlled Airports

Aeronautical operators may establish their own private facilities at controlled airports for use in connection with company business, such as servicing of aircraft, availability of fuel, and lodging. The use of PAS at controlled aerodromes shall not include information relative to ATC, weather reports, condition of landing strips, or any other communication normally provided by ATC units.

1.2.4 Apron Advisory Service

Apron advisory service at most controlled airports is provided by ATS. However, some large airports are providing advisory service on aprons through a separate apron management unit staffed by airport or terminal operator personnel. This service normally includes gate assignment, push-back instructions, and advisories on other aircraft and vehicles on the apron. Aircraft entering the apron will normally be instructed by the ground controller to contact apron prior to or at the designated change-over point. Aircraft leaving the apron shall contact ground on the appropriate frequency to obtain taxi clearance before exiting the apron and before entering the manoeuvring area.

1.3 ATIS

ATIS is the continuous broadcasting of recorded information for arriving and departing aircraft on a discrete VHF/UHF frequency. Its purpose is to improve controller and flight service specialist effectiveness and to relieve frequency congestion by automating the repetitive transmission of essential but routine information.

ATIS messages are recorded in a standard format and contain such information as:

(a) airport name and message code letter;

(b) weather information, including:
- (i) time,
- (ii) surface wind, including gusts,
- (iii) visibility,
- (iv) weather and obstructions to vision,
- (v) ceiling,
- (vi) sky condition,
- (vii) temperature,
- (viii) dew point,
- (ix) altimeter setting,
- (x) pertinent SIGMETs, AIRMETs and PIREPs, and
- (xi) other pertinent remarks;

(c) type of instrument approach in use, including information on parallel or simultaneous converging runway operations;

(d) landing runway, both IFR and VFR, including information on hold short operations and the stopping distance available;

(e) departure runway, both IFR and VFR;

(f) a NOTAM or an excerpt from a NOTAM, pertinent information regarding the serviceability of a NAVAID, or field conditions applicable to arriving or departing aircraft. These may be deleted from an ATIS message after a broadcast period of 12 hr at domestic airports or 24 hr at international airports;

(g) instruction that aircraft are to acknowledge receipt of the ATIS broadcast on initial contact with ATC/FSS.

Each recording will be identified by a phonetic alphabet code letter, beginning with ALFA. Succeeding letters will be used for each subsequent message.

Example of an ATIS Message:
TORONTO INTERNATIONAL INFORMATION BRAVO. WEATHER AT ONE FOUR ZERO ZERO ZULU: WIND ZERO FIVE ZERO AT TWO ZERO, VISIBILITY FIVE HAZE, CEILING THREE THOUSAND OVERCAST, TEMPERATURE ONE EIGHT, DEW POINT ONE SIX, ALTIMETER TWO NINER FOUR SIX, PARALLEL ILS APPROACHES ARE IN PROGRESS. IFR LANDING ZERO SIX RIGHT, ZERO SIX LEFT. VFR LANDING ZERO SIX LEFT. DEPARTURE ZERO SIX LEFT. NOTAM: GLIDE PATH ILS RUNWAY ONE FIVE OUT OF SERVICE. INFORM ATC YOU HAVE INFORMATION BRAVO.

NOTE: Current time and RVR measurements will not be included in the ATIS message, but will be issued in accordance with current practices. Temperature and dew point information is derived only from the scheduled hourly weather observations.

Pilots hearing the broadcast should inform the ATC/FSS unit on initial contact that they have received the information, by repeating the code letter that identifies the message, thus obviating the need for the controller/specialist to issue information.

Example: …*WITH BRAVO.*

During periods of rapidly changing conditions that would create difficulties in keeping the ATIS message current, the following message will be recorded and broadcasted:

BECAUSE OF RAPIDLY CHANGING WEATHER/AIRPORT CONDITIONS, CONTACT ATC/FSS FOR CURRENT INFORMATION.

The success and effectiveness of ATIS is largely dependent upon the co-operation and participation of airspace users; therefore, pilots are strongly urged to take full advantage of this service.

1.4 Use of Term "CAVOK"

The term "CAVOK" (KAV-OH-KAY) may be used in air-to-ground communications when transmitting meteorological information to arriving aircraft.

CAVOK refers to the simultaneous occurrence of the following meteorological conditions at an airport:

(a) no cloud below 5 000 feet, or below the highest minimum sector altitude, whichever is higher, and no cumulonimbus;

(b) a visibility of 6 SM or more;

(c) no precipitation, thunderstorms, shallow fog, or low drifting snow.

This term, coupled with other elements of meteorological information, such as wind direction and speed, altimeter setting and pertinent remarks, will be used in transmissions directed to arriving aircraft and, where applicable, in the composition of ATIS messages. A pilot, on receipt of CAVOK, may request that detailed information be provided.

CAVOK does not apply to the provision of meteorological information to en route aircraft and, therefore, will not be used when such information is transmitted to aircraft engaged in that particular phase of flight.

1.5 Radar Service

1.5.1 General

The use of radar increases airspace utilization by allowing ATC to reduce the separation interval between aircraft. In addition, radar permits an expansion of flight information services, such as traffic information, radar navigation assistance and information on chaff drops and bird activity. Due to limitations inherent in all radar systems, it may not always be possible to detect aircraft, weather disturbances, etc. Where radar information is derived from secondary surveillance radar (SSR) only (i.e., without associated primary radar coverage), it is not possible to provide traffic information on aircraft that are not transponder-equipped or to provide some of the other flight information. Radar systems are described in COM 3.13.

1.5.2 Procedures

Before providing radar service, ATC will establish identification of the aircraft concerned either through the use of position reports, identifying turns, or transponders. Pilots will be notified whenever radar identification is established or lost.

Examples:

IDENTIFIED; or IDENTIFICATION LOST.

Pilots are cautioned that radar identification of their flight does not relieve them of the responsibility for collision avoidance or terrain (obstacle) clearance. ATC will normally provide radar-identified IFR and CVFR flights with information on observed radar targets. At locations where an SSR is used without collocated primary radar equipment, ATC cannot provide traffic information on aircraft without a functioning transponder.

ATC assumes responsibility for terrain (obstacle) clearance when vectoring en route IFR and CVFR flights and for IFR aircraft being vectored for arrival until the aircraft resumes normal navigation.

Vectors are used when necessary for separation purposes, when required by noise abatement procedures, when requested by the pilot, or whenever vectors will offer operational advantages to the pilot or the controller. When vectors are initiated, the pilot will be informed of the location to which the aircraft is being vectored.

Example:

VECTORS TO VICTOR THREE ZERO ZERO, TURN LEFT HEADING ZERO FIVE ZERO. VECTORS TO THE VANCOUVER V-O-R ZERO FIVE THREE RADIAL, FLY HEADING ZERO TWO ZERO. VECTORS TO FINAL APPROACH COURSE, DEPART KLEINBURG BEACON ON HEADING TWO FOUR ZERO.

Pilots will be informed when vectors are terminated, except when an arriving aircraft is vectored to the final approach course or to the traffic circuit.

Example: RESUME NORMAL NAVIGATION.

When an aircraft is vectored to final approach or to the traffic circuit, the issuance of approach clearance indicates that normal navigation should be resumed.

Normally radar service will be continued until an aircraft leaves the area of radar coverage, enters uncontrolled airspace, or is transferred to an ATC unit not equipped with

radar. When radar service is terminated the pilot will be informed accordingly.

Example: RADAR SERVICE TERMINATED.

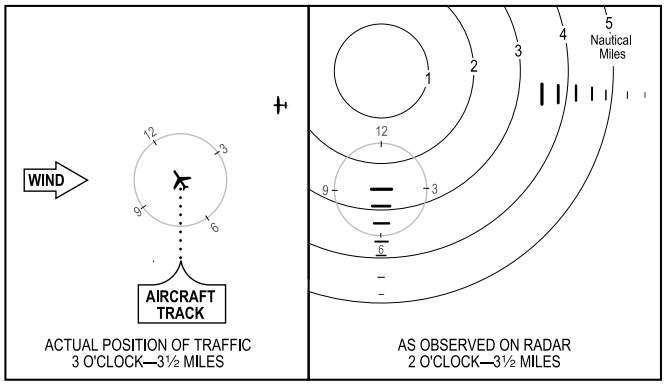
1.5.3 Radar Traffic Information

Traffic (or workload) permitting, ATC will provide IFR and CVFR flights with information on observed radar targets whenever the traffic is likely to be of concern to the pilot, unless the pilot states that the information is not wanted. This information may be provided to VFR aircraft when requested by the pilot.

If requested by the pilot, ATC will attempt to provide radar separation between identified IFR aircraft and the unknown observed aircraft.

When issuing radar information, ATS units will frequently define the relative location of the traffic, weather areas, etc., by referring to the clock position. In this system, the 12 o'clock position is based on the observed radar track rather than the actual nose of the aircraft. In conditions of strong crosswind, this can lead to a discrepancy between the position as reported by the controller and the position as observed by the pilot.

The following diagram illustrates the clock positions.



Issue traffic information to radar-identified aircraft as follows:

1. Position of the traffic in relation to the aircraft's observed track.

2. Direction of flight.

3. Type of aircraft, if known, or the relative speed and the altitude, if known.

NOTE: Direction of flight may be expressed as OPPOSITE DIRECTION or SAME DIRECTION, while the altitude may be expressed as a number of feet above or below the aircraft receiving the traffic information.

Example:

TRAFFIC, TWO O'CLOCK, THREE AND A HALF MILES, WESTBOUND, B747, ONE THOUSAND FEET ABOVE YOUR ALTITUDE.

Issue traffic information to non-radar-identified aircraft as follows:

1. Position of the traffic in relation to a fix.

2. Direction of flight.

3. Type of aircraft, if known, or the relative speed and the altitude, if known.

NOTE: Direction of flight may be expressed as OPPOSITE DIRECTION or SAME DIRECTION, while the altitude may be expressed as a number of feet above or below the aircraft receiving the traffic information.

Example:

TRAFFIC, SEVEN MILES SOUTH OF RESOLUTE BAY VOR, NORTHBOUND, B737, FL300.

1.5.4 Radar Navigation Assistance to VFR Flights

When requested by pilots, radar-equipped ATC units will provide assistance to navigation in the form of position information, vectors or track, and ground speed checks. Flights requesting this assistance must be operating within areas of radar and communication coverage, and be radar-identified.

VFR flights may be provided with this service:

(a) at the request of a pilot, when traffic conditions permit;

(b) when the controller suggests and the pilot agrees; or

(c) in the interest of flight safety.

The pilot is responsible for avoiding other traffic and avoiding weather below VFR minima while on a VFR flight on radar vectors.

If a radar vector will lead a VFR flight into IFR weather conditions, the pilot must inform the controller and take the following action:

(a) if practicable, obtain a vector which will allow the flight to remain in VFR weather conditions; or

(b) if an alternative vector is not practicable, revert to navigation without radar assistance; or

(c) if the pilot has an IFR rating and the aircraft is equipped for IFR flight, the pilot may file an IFR flight plan, and request an IFR clearance.

Emergency radar assistance will be given to VFR flights which are able to maintain two-way radio communication with the unit, are within radar coverage, and can be radar identified.

Pilots requiring radar assistance during emergency conditions should contact the nearest ATC unit and provide the following information:

1. Declaration of emergency (state nature of difficulty and type of assistance required).

2. Position of aircraft and weather conditions within which the flight is operating.

3. Type of aircraft, altitude, and whether equipped for IFR flight.

4. Whether pilot has an IFR Rating.

Pilots unable to contact radar but in need of emergency assistance may alert radar by flying a triangular pattern (see SAR 4.5).

1.5.5 Obstacle Clearance During Radar Vectors

(a) *IFR Flights*

The pilot of an IFR flight is responsible for ensuring that the aircraft is operated with adequate clearance from obstacles and terrain; however, when the flight is being radar-vectored, ATC will ensure that the appropriate obstacle clearance is provided.

Minimum radar vectoring altitudes (lowest altitude at which an aircraft may be vectored and still meet obstacle clearance criteria), which may be lower than minimum altitudes shown on navigation and approach charts, have been established at a number of locations to facilitate transitions to instrument approach aids. When an IFR flight is cleared to descend to the lower altitude, ATC will provide terrain and obstacle clearance until the aircraft is in a position from which an approved instrument approach or a visual approach can be commenced.

If a communication failure occurs while a flight is being vectored at an altitude below the minimum IFR altitudes shown in the instrument approach chart, the pilot should climb immediately to the appropriate published minimum altitude, unless the flight is able to continue in Visual Meteorological Conditions (VMC).

(b) *VFR Flights*

The pilot of a VFR aircraft remains responsible for maintaining adequate clearance from obstacles and terrain when the flight is being radar-vectored by ATC.

If adequate obstacle or terrain clearance cannot be maintained on a vector, the pilot must inform the controller and take the following action:

(i) if practicable, obtain a heading that will enable adequate clearance to be maintained, or climb to a suitable altitude, or

(ii) revert to navigation without radar assistance.

1.5.6 Misuse of Radar Vectors

Pilots have, on occasion, for practice purposes, followed radar instructions issued to other pilots without realizing the potential hazard that accompanies such action.

ATC may require aircraft to make turns for radar identification; however, when more than one aircraft target is observed making a turn, identification becomes difficult or impossible. Should misidentification be the result of more than one aircraft following the instructions issued by ATC, it could be hazardous to the aircraft involved.

Any pilot wishing to obtain radar practice, however, needs only to contact the appropriate ACC or TCU and request practice radar vectors. Practice vectors will be issued to the extent that air traffic conditions permit.

1.5.7 Canadian Forces Radar Assistance

The Canadian Forces can provide assistance in an emergency to civil aircraft operating within the ADIZ.

No responsibility for the direct control of aircraft is accepted and radar assistance does not absolve the captain of the responsibility of complying with ATC clearances or other required procedures. Assistance consists of:

(a) track and ground speed checks—speeds in kt;

(b) position of the aircraft in geographic reference, or by bearing and distance from the station—distances are in NM and bearings in degrees True; and

(c) position of heavy cloud in relation to the aircraft.

To obtain assistance in the NWS area, call “Radar Assistance” on 126.7 MHz; or when circumstances require a MAYDAY call, use 121.5 MHz, giving all the necessary details. When assistance is required in ADIZ areas contact will have to be made on the 121.5 MHz frequency or on the UHF frequencies 243.0 or 364.2 MHz. Initial contact should be made at the highest practicable altitude. If air defence commitments preclude the granting of radar assistance, the ground station will transmit the word “UNABLE” and no further explanation will be given.

1.5.8 The Use of Radar in the Provision of AAS and RAAS by FSSs

Certain FSSs are equipped with a radar display to aid the flight service specialist in monitoring the aircraft traffic situation and to enhance the accuracy of traffic information provided in AAS or RAAS.

An FSS equipped with a radar display:

(a) may instruct an aircraft to "SQUAWK IDENT" or assign a specific SSR code to the aircraft;

(b) will acknowledge the squawk transmission or SSR code change by stating the phrase "ROGER IDENT";

(c) will issue the reminder "NO CONTROL SERVICE AVAILABLE, THIS IS AN ADVISORY SERVICE," if deemed appropriate;

(d) may issue radar-observed traffic information with reference to the 12-hr clock position or geographical locations.

It is important for pilots to keep in mind that:

(a) flight service specialists may stop monitoring the radar display at any time without prior notice to aircraft;

(b) FSSs do not inform aircraft when radar identification is lost;

(c) FSSs do not provide control services such as vectors and conflict resolution;

(d) pilots are responsible for maintaining a visual lookout outside the cockpit at all times for the purpose of avoiding a collision with other aircraft, terrain and obstacles.

1.6 VDF Service

VDF equipment is available at selected airports across Canada (see COM 3.10).

1.6.1 Purpose

The purpose of the VDF is to provide navigation assistance to VFR aircraft. This equipment is not intended as a substitute for normal VFR navigation, but rather as an aid in times of difficulty.

A VFR aircraft encountering IMC is not normally given VDF headings; rather, on request, it is provided with position information relevant to the VDF site or some other location. However, should a VFR aircraft encountering IMC declare an emergency, navigation assistance to the VDF site will be provided, if appropriate.

1.6.2 Equipment Operation

VDF information is electronically derived from radio signals transmitted from the aircraft. Since VHF transmissions are restricted to line-of-sight, the altitude and location of the aircraft may limit the provision of the service. As in radio communication, the power of the transmitted signal will affect reception distance. Information may be obtained from either a modulated signal (speech transmission) or an un-modulated signal (microphone button pressed—no speech). The length of the transmission is not critical since information can be obtained from a very short transmission (2 s).

1.6.3 Provision of Service

VDF navigation assistance is provided when requested by the pilot or when suggested by the VDF operator (either an airport controller or a flight service specialist) and accepted by the pilot.

The VDF operator will provide the pilot with heading and bearing information relevant to the VDF site. Pilots planning to use the direction indicator as a heading reference during VDF navigation assistance should reset the direction indicator to the magnetic compass before requesting VDF navigation assistance. Thereafter, the direction indicator should not be reset without advising the VDF operator.

1.6.4 Procedures

Pilots requesting VDF navigation assistance will be asked to provide the VDF operator with the following information:

(a) the position of aircraft, if known; and

(b) the altitude.

In order to derive VDF information from the radio signals transmitted from the aircraft, when asked to "transmit for bearing" pilots should transmit the aircraft call-sign, hold the microphone button for a few seconds, and repeat their call-sign.

Pilots receiving VDF navigation assistance retain their responsibility to see and avoid other traffic, to maintain appropriate terrain and obstacle clearance, and to remain in VFR weather conditions.

Example:

Pilot: *KINGSTON RADIO. THIS IS PIPER GOLF HOTEL GOLF BRAVO. REQUEST VDF NAVIGATION ASSISTANCE. APPROXIMATELY TWENTY MILES NORTHEAST OF KINGSTON, AT FIVE THOUSAND.*

Based on the aircraft's VDF bearing indication, the VDF operator will provide the pilot with the aircraft's reciprocal heading to the VDF site.

VDF operator: *GOLF HOTEL GOLF BRAVO, KINGSTON RADIO, TRANSMIT FOR BEARING.*

VDF operator: *GOLF HOTEL GOLF BRAVO, YOUR HEADING TO THE AIRPORT* IS TWO-TWO ZERO.*

***NOTE**: In instances where the VDF site is located more than one mile from the airport, the VDF operator will transmit to the pilot: "YOUR HEADING TO THE VDF SITE IS…"

1.7 ATC Clearances, Instructions and Information

Whenever an ATC clearance is received and accepted by the pilot, compliance shall be made with the clearance. If a clearance is not acceptable, the pilot should immediately inform ATC of this fact since acknowledgement of the clearance alone will be taken by a controller as indicating acceptance. For example, upon receiving a clearance for takeoff, the pilot should acknowledge the clearance and take off without undue delay or, if not ready to take off at that particular time, inform ATC of his or her intentions, in which case the clearance may be changed or cancelled.

A pilot shall comply with an ATC instruction that is directed to and received by the pilot, provided the safety of the aircraft is not jeopardized.

A clearance will be identified by the use of some form of the word "clear" in its contents. An instruction will always be worded in such a manner as to be readily identified, although the word "instruct" will seldom be included. Pilots shall comply with and acknowledge receipt of all ATC instructions directed to and received by them (CAR 602.31).

CAR 602.31 permits pilots to deviate from an ATC instruction or clearance in order to follow TCAS/ACAS resolution advisories. Pilots responding to a resolution advisory shall advise the appropriate ATC unit of the deviation as soon as practicable and shall expeditiously return to the last ATC clearance received and accepted, or the last ATC instruction received and acknowledged prior to the resolution advisory manoeuvre. Aircraft manoeuvres conducted during a resolution advisory should be kept to the minimum necessary to satisfy the resolution advisory. For more information on TCAS/ACAS, see RAC 12.15.2.

ATC is not responsible for the provision of IFR separation to an IFR aircraft which carries out a TCAS or an ACAS resolution advisory manoeuvre until one of the following conditions exist:

(a) the aircraft has returned to the last ATC clearance received and accepted, or last ATC instruction received and acknowledged prior to the resolution advisory; or

(b) an alternate ATC clearance or instruction has been issued.

TCAS or ACAS does not alter or diminish the pilot-in-command's responsibility to ensure safe flight. Since TCAS/ACAS does not respond to aircraft which are not transponder-equipped or aircraft with a transponder failure, TCAS/ACAS alone does not ensure safe operation in every case. The services provided by ATC units are not predicated upon the availability of TCAS or ACAS equipment in an aircraft.

It should be remembered that control is predicated on known air traffic only and, when complying with clearances or instructions, pilots are not relieved of the responsibility of practicing good airmanship.

A clearance or instruction is only valid WHILE IN CONTROLLED AIRSPACE. Pilots crossing between controlled and uncontrolled airspace should pay close attention to the terrain and obstacle clearance requirements.

ATS personnel routinely inform pilots of conditions, observed by others or by themselves, which may affect flight safety and are beyond their control. Examples of such conditions are observed airframe icing and bird activity. These are meant solely as assistance or reminders to pilots and are not intended in any way to absolve the pilot of the responsibility for the safety of the flight.

Denial of Clearance

The following are scenarios in which ATC may not be able to provide a clearance:

Below minima operations

If arrivals and departures on the active runway are suspended or restricted due to reduced visibility operations plan (RVOP) or low visibility operations plan (LVOP) by the aerodrome operator, ATC will inform the pilot and request his intentions.

Example:

ATC: *ACA123, LVOP IN EFFECT, STATE YOUR INTENTIONS.*

If the pilot persists in his intention to land or take off, ATC will inform the pilot that a landing/takeoff clearance cannot be issued and provide required information, which may include traffic, hazards, obstructions, runway exit or wind.

Example:

ATC: *SINCE LANDING/TAKEOFF CLEARANCE CANNOT BE ISSUED, YOU ARE LANDING/TAKING OFF ON YOUR OWN RESPONSIBILITY.*

ATC will then notify the airport operator and complete an aviation occurrence report.

Obstructed Runway Protected Area

If the Runway Protected Area is obstructed, ATC will inform the pilot and request his intentions.

Example:

ATC: *RUNWAY PROTECTED AREA OBSTRUCTED.*

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If the pilot persists in his intention to land or take off, ATC will provide any pertinent information, NOTAM or directive regarding airport conditions.

When traffic permits, ATC will inform the pilot that landing/takeoff clearance cannot be issued and provide required landing information, which may include traffic, hazards, obstructions, runway exit or wind.

Example:

ATC: *SINCE LANDING/TAKEOFF CLEARANCE CANNOT BE ISSUED, YOU ARE LANDING/TAKING OFF ON YOUR OWN RESPONSIBILITY.*

ATC will then complete an aviation occurrence report.

Landings and takeoffs from a surface other than a runway

ATC will provide information concerning known traffic and obstructions to fixed-wing aircraft landing on or taking off from a surface other than a runway or another area that is approved for that purpose.

Example:

ATC: *TRAFFIC (description), LAND/TAKE OFF AT YOUR DISCRETION.*

Other reasons

ATC may deny clearance when:

(a) directed by a NAV CANADA manager or an appropriate authority.

(b) an airport or any part of an airport is closed or restricted from use by the airport operator.

RAC

1.8 Flight Priority

1.8.1

Normally, ATC provides control service on a first-come, first-served basis. However, controllers may adjust the arrival or departure sequence in order to facilitate the maximum number of aircraft movements with the least average delay. Altitude assignment may also be adjusted in order to accommodate the maximum number of aircraft at their preferred altitudes, or to comply with ATFM requirements.

Flight priority is provided to:

(a) an aircraft that is known or believed to be in a state of emergency;

NOTE: This category includes aircraft subjected to unlawful interference or other distress or urgency conditions that may compel the aircraft to land or require flight priority.

(b) a MEDEVAC flight;

(c) military or civilian aircraft participating in SAR missions and identified by the radiotelephony call sign "RESCUE" and the designator "RSCU," followed by an appropriate flight number;

(d) military aircraft that are departing on:
  (i) operational air defence flights,
  (ii) planned and co-ordinated air defence training exercises, and
  (iii) exercises to an altitude reservation; or

(e) an aircraft carrying Her Majesty the Queen, the Governor General, the Prime Minister, heads of state, or foreign heads of government.

1.8.2 Minimum Fuel Advisory

Pilots may experience situations where traffic, weather or other delays result in concern about the aircraft's fuel state. The term MINIMUM FUEL describes a situation where the aircraft's fuel supply has reached a state where the flight is committed to land at a specific aerodrome and no additional delay can be accepted. The pilot should advise ATC as soon as possible that a MINIMUM FUEL condition exists. This is not an emergency situation, but merely an advisory that indicates an emergency is possible should any undue delay occur.

A minimum fuel advisory does not imply an ATC traffic priority; however, ATC special flight handling procedures are as follows:

(a) Be alert for any occurrence or situation that might delay the aircraft;

(b) Respond to the declaration and keep the pilot informed of any anticipated delay as soon as you become aware, using the following phraseology:
  ROGER or
  ROGER NO DELAY EXPECTED or
  ROGER EXPECT (delay information).

(c) Inform the next sector or unit of the minimum fuel status of the aircraft and

(d) Record the information in the unit log, reduce unnecessary radio transmissions and ensure appropriate responses; use of internationally recognized fuel-related phraseology among pilots and controllers is essential.

Traffic priority is given to a pilot who declares an emergency for fuel by broadcasting MAYDAY MAYDAY MAYDAY FUEL. Use of standardized pilot phraseology distinguishes minimum fuel from a fuel emergency, assuring pilot intent without further verification.

1.9 Transponder Operation

1.9.1 General

Transponders substantially increase the capability of radar to detect aircraft. The use of automatic pressure altitude reporting equipment (Mode C) enables controllers to quickly determine where potential conflicts could occur. Proper transponder operating procedures and techniques provide both VFR and IFR aircraft with a higher degree of safety. In addition, proper usage of transponders with Mode C capability results in reduced communications and more efficient service.

When pilots receive ATC instructions concerning transponder operation, they shall operate transponders as directed until receiving further instructions or until the aircraft has landed, except in an emergency, communication failure or hijack.

ATC radar units are equipped with alarm systems that respond when an aircraft is within radar coverage and the pilot selects the emergency, communication failure or hijack transponder code. It is possible to unintentionally select these codes momentarily when changing the transponder from one code to another. To prevent unnecessary activation of the alarm, pilots should avoid inadvertent selection of 7500, 7600 or 7700 when changing the code if either of the first two digits to be selected is a seven. For example, when changing from Code 1700 to Code 7100, first change to Code 1100 (and NOT Code 7700) and then change to Code 7100. Do not select "STANDBY" while changing codes as this will cause the target to be lost on the ATC radar screen.

Pilots should adjust transponders to "STANDBY" while taxiing for takeoff, to "ON" (or "NORMAL") as late as practicable before takeoff, and to "STANDBY" or "OFF" as soon as practicable after landing. In practice, transponders should be turned on only upon entering the active runway for departure and turned off as soon as the aircraft exits the runway after landing. Calgary, Montréal/Pierre Elliott Trudeau and Toronto/Lester B. Pearson International airports have implemented surface surveillance services using multilateration (MLAT). MLAT relies on transponder returns; therefore, pilots of transponder equipped aircraft should leave their transponders in the transmit mode at all times when manoeuvring on the airfield. Pilots should ensure that the transponder code issued by ATC is selected before switching the transponder out of "STANDBY". In the event that no code has been issued by ATC, transponder code 1000 should be selected.

When the transponder or the automatic pressure altitude reporting equipment (Mode C) fails during flight where its use is mandatory, an aircraft may be operated to the next airport of intended landing and, thereafter, to complete an itinerary or to a repair base, if authorized by ATC.

ATC may, upon receiving a request, authorize an aircraft not equipped with a functioning transponder or Mode C to operate in airspace where its use is mandatory. The purpose of this advanced written request is to enable ATC to determine if the operation of the aircraft can be handled in the airspace at the time requested without compromising the safety of air traffic. Approval may be subject to such conditions and limitations deemed necessary to preserve safety. Pilots must obtain approval before entering airspace within which it is mandatory to be equipped with a functioning transponder and automatic pressure altitude reporting equipment. (This includes aircraft proposing to take off from an airport located within that airspace.)

1.9.2 Transponder Requirements

CAR 605.35 outlines the transponder operating rule, as well as the circumstance in which operation with an unserviceable transponder is permitted. It also outlines the procedures to follow in order to operate an aircraft within transponder airspace without being equipped with a transponder and automatic pressure-altitude reporting equipment. CAR 601.03 states that transponder airspace consists of:

(a) all Class A, B and C airspace as specified in the *Designated Airspace Handbook*; and

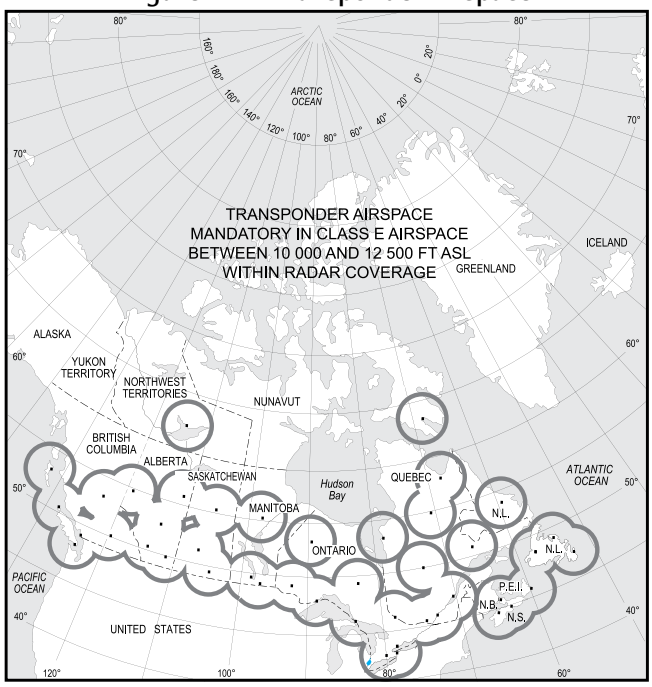
(b) any Class D or E airspace specified as transponder airspace in the *Designated Airspace Handbook*.

This includes all Class E airspace extending upwards from 10 000 ft ASL up to and including 12 500 ft ASL within radar coverage, as shown in Figure 1.1.

Pilots of IFR aircraft operating within controlled or uncontrolled high-level airspace should adjust their transponder to reply on Mode A, Code 2000 and on Mode C, unless otherwise instructed by ATC.

NOTE: Pilots instructed to squawk a discrete code should not adjust their assigned transponder code when informed that radar or surveillance service is terminated, except as specified in RAC 11.14. The termination of radar or surveillance service does not necessarily constitute direction to change to Code 2000.

Figure 1.1 – Transponder Airspace



1.9.3 IFR Operations in Other Low Level Airspace

During IFR flight in controlled low level airspace other than that described in RAC 1.9.2, adjust your transponder to reply on Mode A, Code 1000, and on Mode C (if available), unless otherwise instructed by ATC. If an IFR flight plan is cancelled or changed to a VFR flight plan, the transponder should be adjusted to reply on the appropriate VFR code, as specified in the following paragraphs, unless otherwise instructed by ATC.

To enhance the safety of IFR flight in uncontrolled low level airspace, pilots are encouraged to adjust their transponders to reply on Mode A, Code 1000, plus Mode C (if available), unless otherwise instructed by ATC.

1.9.4 VFR Operations

During VFR flight in low-level airspace, adjust your transponder to reply on the following unless otherwise assigned by an ATS unit:

(a) Mode A, Code 1200, for operation at or below 12 500 ft ASL; or

(b) Mode A, Code 1400, for operation above 12 500 ft ASL.

Upon leaving the confines of an airspace for which a special Code assignment has been received, the pilot is responsible for changing to the Code shown in (a)or (b), unless assigned a new Code by an ATS unit.

NOTE: When climbing above 12 500 ft ASL, pilot should select Code 1200 until he/ she leaves 12 500 ft ASL, then select Code 1400. When descending from above 12 500 ft ASL, a VFR pilot should select Code 1200 upon reaching 12 500 ft ASL. Aircraft equipped with a transponder capable of Mode C automatic altitude reporting should adjust their transponder to reply on Mode C when operating in Canadian airspace unless otherwise assigned by an ATS unit.

1.9.5 Phraseology

ATS personnel will use the following phraseology when referring to transponder operation.

SQUAWK (code) – Operate transponder on designated Code in Mode A.

SQUAWK IDENT – Engage the "IDENT" feature of the transponder.

NOTE: A pilot should operate the identification ("IDENT") feature only when requested by an ATS unit.

SQUAWK CHARLIE – Activate Mode C with automatic altitude reporting.

STOP SQUAWK CHARLIE – Turn off automatic altitude reporting function.

RESET TRANSPONDER – Reset your transponder, and transmit the SQUAWK (code) currently assigned. This phraseology may be used if the target or identity tag data is not being displayed as expected.

REPORT YOUR ALTITUDE – This phraseology may be used when it is necessary to validate altitude readouts by comparing the readouts value with an altitude reported by the aircraft. An altitude readout is considered valid if the readout value does not differ from the aircraft-reported altitude by more than 200 ft, and invalid if the difference is 300 ft or more.

NOTE: Readout values are displayed in 100–ft increments.

Example:

SQUAWK STANDBY – SQUAWK (code) - The PPS disappears or changes to a PSR symbol after the aircraft is instructed to change its transponder to "standby" and the PPS reappears or changes back to an SSR symbol after the aircraft is requested to return the transponder to normal operation.

1.9.6 Emergencies

In the event of an emergency and if unable to establish communication immediately with an ATC unit, a pilot wishing to alert ATC to the emergency situation should adjust the transponder to reply on Code 7700. Thereafter, communication should be established with ATC as soon as possible, and the transponder should be operated as directed by ATC.

1.9.7 Communication Failure

In the event of a communication failure, the pilot should adjust the transponder to reply on Code 7600 to alert ATC to the situation. This does not relieve the pilot of the requirement to comply with the appropriate communications failure procedures for IFR flight.

1.9.8 Unlawful Interference (Hijack)

Canada, along with other nations, has adopted a special SSR transponder code (7500) for use by pilots whose aircraft are hijacked. ATC does not assign this code unless the pilot informs ATC of a hijack in progress.

Selection of the code activates an alarm system and points out the aircraft on radar displays. If the controller doubts that an aircraft is being hijacked (as could occur when a code change was requested and the hijack code appeared, rather than the assigned code), the controller will say, CONFIRM SQUAWK SEVEN FIVE ZERO ZERO. If the pilot answers yes, the controller will alert the ATC system. If the pilot replies no, the controller will re-assign the proper code. If the pilot does not reply, the controller will take this as confirmation that the use of code 7500 is intentional. If, after using code 7500, an aircraft changes to code 7700, or transmits a message including the phrase TRANSPONDER SEVEN SEVEN ZERO ZERO, it indicates that the aircraft is threatened by grave and imminent danger and requires immediate assistance.

1.10 Collision Avoidance—Right of Way (CARs)

Reckless or Negligent Operation of Aircraft

602.01

No person shall operate an aircraft in such a reckless or negligent manner as to endanger or be likely to endanger the life or property of any person.

Right-of-Way – General

602.19

(1) Notwithstanding any other provision of this section,
- (a) the pilot-in-command of an aircraft that has the right-of-way shall, if there is any risk of collision, take such action as is necessary to avoid collision; and
- (b) where the pilot-in-command of an aircraft is aware that another aircraft is in an emergency situation, the pilot-in-command shall give way to that other aircraft.

(2) When two aircraft are converging at approximately the same altitude, the pilot-in-command of the aircraft that has the other on its right shall give way, except as follows:
- (a) a power-driven, heavier-than-air aircraft shall give way to airships, gliders and balloons;
- (b) an airship shall give way to gliders and balloons;
- (c) a glider shall give way to balloons; and
- (d) a power-driven aircraft shall give way to aircraft that are seen to be towing gliders or other objects or carrying a slung load.

(3) When two balloons operating at different altitudes are converging, the pilot-in-command of the balloon at the higher altitude shall give way to the balloon at the lower altitude.

(4) Where an aircraft is required to give way to another aircraft, the pilot-in-command of the first-mentioned aircraft shall not pass over or under, or cross ahead of, the other aircraft unless passing or crossing at such a distance as will not create any risk of collision.

(5) Where two aircraft are approaching head-on or approximately so and there is a risk of collision, the pilot-in-command of each aircraft shall alter its heading to the right.

(6) An aircraft that is being overtaken has the right-of-way and the pilot-in-command of the overtaking aircraft, whether climbing, descending or in level flight, shall give way to the other aircraft by altering the heading of the overtaking aircraft to the right, and no subsequent change in the relative positions of the two aircraft shall absolve the pilot-in-command of the overtaking aircraft from this obligation until that aircraft has entirely passed and is clear of the other aircraft.

(7) Where an aircraft is in flight or manoeuvring on the surface, the pilot-in-command of the aircraft shall give way to an aircraft that is landing or about to land.

(8) The pilot-in-command of an aircraft that is approaching an aerodrome for the purpose of landing shall give way to any aircraft at a lower altitude that is also approaching the aerodrome for the purpose of landing.

(9) The pilot-in-command of an aircraft at a lower altitude, as described in subsection (8), shall not overtake or cut in front of an aircraft at a higher altitude that is in the final stages of an approach to land.

(10) No person shall conduct or attempt to conduct a takeoff or landing in an aircraft until there is no apparent risk of collision with any aircraft, person, vessel, vehicle or structure in the takeoff or landing path.

Right-of-Way – Aircraft Manoeuvring on Water

602.20

(1) Where an aircraft on the water has another aircraft or a vessel on its right, the pilot-in-command of the first-mentioned aircraft shall give way.

(2) Where an aircraft on the water is approaching another aircraft or a vessel head-on, or approximately so, the pilot-in-command of the first-mentioned aircraft shall alter its heading to the right.

(3) The pilot-in-command of an aircraft that is overtaking another aircraft or a vessel on the water shall alter its heading to keep well clear of the other aircraft or the vessel.

Avoidance of Collision

602.21

No person shall operate an aircraft in such proximity to another aircraft as to create a risk of collision.

Formation Flight

602.24

No person shall operate an aircraft in formation with other aircraft except by pre-arrangement between.

(a) the pilots-in-command of the aircraft; or

(b) where the flight is conducted within a control zone, the pilots-in-command and the appropriate air traffic control unit.

1.11 Aerobatic Flight (CARs 602.27 and 602.28)

Aerobatic Manoeuvres – Prohibited Areas and Flight conditions

602.27

No person operating an aircraft shall conduct aerobatic manoeuvres

(a) over a built-up area or an open-air assembly of persons;

(b) in controlled airspace, except in accordance with a special flight operations certificate issued pursuant to Section 603.67;

(c) when flight visibility is less than three miles; or

(d) below 2 000 feet AGL, except in accordance with a special flight operations certificate issued pursuant to Section 603.02 or 603.67.

Aerobatic Manoeuvres with Passengers

602.28

No person operating an aircraft with a passenger on board shall conduct aerobatic manoeuvres unless the pilot-in-command of the aircraft has engaged in

(a) at least 10 hours dual flight instruction in the conducting of aerobatic manoeuvres or 20 hours conducting aerobatic manoeuvres; and

(b) at least one hour of conducting aerobatic manoeuvres in the preceding six months.

1.12 Pilot Reports

1.12.1 General

Pilots are requested to make the following reports in the interests of national security, meteorite research and forest fire and pollution control.

1.12.2 CIRVIS Reports – Vital Intelligence Sightings

CIRVIS reports should be made immediately upon a vital intelligence sighting of any airborne and ground objects or activities which appear to be hostile, suspicious, unidentified or engaged in possible illegal smuggling activity.

Examples of events requiring CIRVIS reports are: unidentified flying objects, submarines, or surface warships identified as being non-Canadian or non-American; violent explosions; unexplained or unusual activity, including the presence of unidentified or suspicious ground parties in Polar regions, at abandoned airstrips or other remote, sparsely populated areas.

These reports should be made to the nearest Canadian or U.S. government FIC or ATC unit.

A report via air/ground communications should include the words “CIRVIS CIRVIS CIRVIS”, followed by:

(a) the identification of the reporting aircraft;

(b) a brief description of the sighting (number, size, shape, etc.);

(c) the position of the sighted object or activity;

(d) the date and time of sighting in UTC;

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(e) the altitude of the object;

(f) the direction of movement of the object;

(g) the speed of the object; and

(h) any identification.

1.12.3 Meteorite Reports

Reports of spectacular meteors (fireballs), which may be bright enough to cast shadows, that may be accompanied by a "sonic boom", that may trail glowing particles, and that may explode with a burst of light and a loud sound several times in flight, should be reported by radio to the nearest ATS unit or to:

Meteorites and Impacts Advisory Committee (MIAC)
http://miac.uqac.ca

Fax: 403-284-0074

1.12.4 Fire Detection – Northern Areas

The Department of Indian and Northern Affairs have requested the co-operation of all persons connected with aviation, in the prevention, detection and suppression of fires in the northern areas of Canada.

If smoke or other indications of fire are seen in any area, the local Forestry Warden, Game Management Officer, or member of the RCMP should be notified at once. If they are not available, the fire should be reported by collect telephone call to:

(a) Superintendent of Forestry, Fort Smith, Northwest Territories, for fires in the Northwest Territories and Wood Buffalo National Park. [Tel. no. (867) 872-7700].

(b) Superintendent of Forestry, Whitehorse, Yukon Territory, for fires in the Yukon Territory. [Tel. no. 1-888-798-FIRE(3473)].

Reports should give the size and location of the fire, and the name and address of the person making the report. This information will assist fire crews in getting to fires with minimum delay and with the right type of equipment.

1.12.5 Pollution Reports

Any aircraft in the airspace above Canadian waters, Fishing Zones or Arctic Shipping Control Zones should inform the nearest Canadian FIC upon sighting any vessel discharging pollutants (oil) in Canadian waters, Fishing Zones or Arctic Shipping Control Zones.

On the east and west coasts, the waters extend to approximately 200 NM from the coast line. In the north, the area includes virtually all of the waters in the Canadian Arctic.

The FIC will relay any reported pollution incidents to the appropriate Coast Guard Centres.

1.13 ATS Reports—Possible Contravention of the Canadian Aviation Regulations (CARs)

Under current regulation, ATS units are required to report to the Minister of Transport any aviation occurrence that may contravene the CARs.

Any investigation of the circumstances or subsequent decision on whether a breach has taken place is the responsibility of TC. Any necessary follow-up action will be conducted by TC Civil Aviation regulatory authorities.

1.14 Conservation

1.14.1 Fur and Poultry Farms

Experience has shown that aviation noise caused by rotary wing and fixed wing aircraft flying at low altitudes can cause serious economic losses to the farming industry. The classes of livestock particularly sensitive are poultry (including ostriches and emus), because of the crowding syndrome and stampeding behaviour they exhibit when irritated and frightened, and foxes who, when excited, will eat or abandon their young. Avoid overflying these farms below 2 000 feet AGL.

Fur farms may be marked with chrome yellow and black strips painted on pylons or roofs. In addition, a red flag may be flown during whelping season (February – May).

Pilots are, therefore, warned that any locations so marked should be avoided and that during the months of February, March, April and May, special vigilance should be maintained.

1.14.2 Protection of Wildlife

It is desired to impress on all pilots the importance of wildlife conservation; to urge them to become familiar with the game laws in force in the various provinces; and to encourage them to co-operate with all game officers to see that violations of game laws do not occur.

The following is a list of addresses where provincial and territorial game officers may be contacted in Canada. To obtain information with regard to the preservation of wildlife within the various provinces, please contact a game officer at one of the locations shown below. Information pertaining to migratory bird regulations may be obtained directly from the Director General, Canadian Wildlife Service, Environment Canada, Ottawa ON K1A 0H3.

Fish and Wildlife Division
Alberta Environment and Sustainable Resource Development
Main Floor, Great West Life Building
9920 108 Street
Edmonton AB T5K 2M4

Tel.: 780-944-0313
Fax: 780-427-4407

RAC

Fish and Wildlife Branch
Dept. of Natural Resources
Province of New Brunswick
P.O. Box 6000
Fredericton NB E3B 5Hl

Tel.: 506-453-3826
Fax: 506-453-6699

Wildlife Division
Environment and Natural Resources
Government of the Northwest Territories
P.O. Box 1320
Yellowknife NT X1A 2L9

Tel.: 867-920-8046
Fax: 867-873-0293

Fish and Wildlife Branch
Ministry of Forests, Lands and Natural Resources
Operations
Province of British Columbia
P.O. Box 9391, STN PROV GOVT
Victoria BC V8W 9M8

Tel.: 250-387-9771
Fax: 250-387-0239

Wildlife Branch
Conservation and Water Stewardship
Province of Manitoba
P.O. Box 24
200 Saulteaux Crescent
Winnipeg MB R3J 3W3

Tel.: 204-945-7775
Fax: 204-945-3077

Wildlife Division
Department of Environment and Conservation
Province of Newfoundland and Labrador
117 Riverside Drive
Corner Brook NL A2H 7S1

Tel.: 709-637-2025
Fax: 709-637-2032

Wildlife Division
Department of Natural Resources
Province of Nova Scotia
136 Exhibition Street
Kentville NS B4N 4E5

Tel.: 902-679-6091
Fax: 902-679-6176

Fish and Wildlife
Ministry of Natural Resources
Province of Ontario
300 Water Street
Peterborough ON K9J 8M5

Tel.: 705-755-2000
Fax: 705-755-1677

Forests, Fish and Wildlife Division
Department of Agriculture and Forestry
Province of Prince Edward Island
P.O. Box 2000
183 Upton Road
Charlottetown PE C1A 7N8

Tel: 902-368-4700
Fax: 902-368-4713

Société de la faune et des parcs du Québec
Ressources naturelles
Province de Québec
880, chemin Sainte-Foy, RC-80
Québec QC G1S 4X4

Tel.: 418-627-8688
Fax: 418-646-4223

Customer Service
880, chemin Sainte-Foy, RC 120-C
Québec QC G1S 4X4

Tel.: 418-627-8600
Fax: 418-644-6513
Toll free: 1-866-248-6936
E-mail: services.clientele@mrnf.gouv.qc.ca

Fish and Wildlife Branch
Ministry of Natural Resources
Government of Saskatchewan
3211 Albert Street
Regina SK S4S 5W6

Tel.: 306-787-7196
Fax: 306-787-9544

Fish and Wildlife Branch
Department of Environment
Government of Yukon
P.O. Box 2703
10 Burns Road
Whitehorse YT Y1A 2C6
Tel.: 877-667-5652
Toll free (in Yukon): 1-800-661-0408, ext. 5652
Fax: 867-393-7197

Wildlife Management
Department of Environment
Government of Nunavut
Igloolik NU X0A 0L0

Tel.: 867-934-2183
Fax: 867-934-2190

1.14.3 Reindeer, Caribou, Moose and Muskoxen Conservation

Pilots should be aware that flying low over herds of reindeer, caribou, moose or muskoxen may result in reducing the animal population. Accidents resulting in broken bones may increase. Exhausted and disorganized animals are more susceptible to be attacked by wolves; feeding is interrupted; and normal herd movement and reproductive functions may be seriously disrupted.

It is important that all pilots flying aircraft in the north country realize the value of these animals to native welfare. The co-operation of all is requested in eliminating any action which might lead to unnecessary losses of these valuable animals.

Pilots should not fly at an altitude less than 2 000 feet AGL when in the vicinity of herds of reindeer or caribou.

1.14.4 Migratory Bird Protection

The migratory bird regulations prohibit the killing of game birds through the use of an aircraft.

Pilots should be aware that serious damage can be done to migratory bird harvest areas due to low flying aircraft. Geese particularly are in great fear of aircraft; and their movements may be seriously disorganized by such interference. These geese are a valuable asset to Canada. As several species are nearing extinction, it is felt that every effort should be made to preserve them.

1.14.5 National, Provincial and Municipal Parks, Reserves and Refuges

To preserve the natural environment of parks, reserves and refuges and to minimize the disturbance to the natural habitat, overflights should not be conducted below 2 000 feet AGL.

The landing or takeoff of aircraft in the national parks and national park reserves may take place at prescribed locations.

To assist pilots in observing this, boundaries are depicted on the affected charts. The following is taken *from the National Parks Aircraft Access Re*gulations (98-01-29):

(1) Subject to subsection (2) and Section 5 no person shall take off or land an aircraft in a park except in a park set out in column I of an item of the schedule, at a take-off and landing location set out in column II of that item.

(2) No person shall take off or land an aircraft in a park set out in column I of any of items 1 to 6 of the schedule unless that person holds a permit.

Schedule (Sections 2 and 5)

Item	*Column I Park*	*Column II Take-off and Landing Location*
1.	Auyuittuq Reserve	Any location
2.	Ellesmere Island Reserve	Any location
3.	Northern Yukon National	(a) Margaret Lake at latitude 68˚50'00"N, longitude 140˚08'48"W (b) Nunaluk Spit at latitude 69˚34'17"N, longitude 139˚32'48"W (c) Sheep Creek at latitude 69˚10'07"N, longitude 140˚08'48"W (d) Stokes Point at latitude 69˚19'49"N, longitude 138˚44'13"W
4.	Kluane Reserve	(a) Big Horn Lake at latitude 61˚08'30"N, longitude 139˚22'40"W (b) Quinteno Sella Glacier at latitude 60˚36'20"N, longitude 140˚48'30"W (c) Hubbard Glacier at latitude 60˚34'00"N, longitude 140˚07'30"W (d) Cathedral Glacier at latitude 60˚14'15"N, longitude 138˚58'00"W (e) South Arm Kaskawulsh Glacier at latitude 60˚30'30"N, longitude 138˚53'00"W
5.	Kluane National Park	(a) Lowell Lake and Lowell Lake Bar at latitude 60˚17'10"N, longitude 137˚57'00"W (b) Onion Lake at latitude 60˚05'40"N, longitude 138˚25'00"W
6.	Nahanni Reserve	(a) Rabbit kettle Lake at latitude 61˚57'00"N, longitude 127˚18'00"W (b) Virginia Falls at latitude 61˚38'00"N, longitude 125˚38'00"W
7.	Wood Buffalo National Park	Garden Creek Airstrip at latitude 58˚42'30"N, longitude 113˚53'30"W

1.15 Wildlife Hazards

1.15.1 Introduction

Trends indicate that there is a growing risk of collisions between wildlife and aircraft. This risk is due largely to corresponding increases in the populations of some hazardous species—such as deer, geese and gulls—and the numbers of aircraft operations across Canada.

All aviation stakeholders have a role to play in reducing the risks of wildlife strikes. Pilots can take three simple steps to help improve safety:

1. Increase awareness of wildlife and the hazards they pose to aviation.

2. Learn what risk-reduction and communication measures are in place at frequented airports.

3. Become familiar with the bird/wildlife strike report form, and be sure to file a report in the event of any wildlife encounter.

This section provides information to help pilots gain a better appreciation of:

- measures airports must take to identify and control wildlife hazards, and to communicate with pilots about these hazards;

- bird/wildlife-strike reporting procedures; and

- migratory bird activity.

1.15.2 Airport Wildlife Management

In force since May 16, 2006, a new CAR recognizes that lands on and around airports often provide food and shelter for wildlife species that can be hazardous to air travel. Division III of CAR 302—*Airport Wildlife Planning and Management*, requires most Canadian certified airports to minimize risks, primarily by identifying and countering potentially hazardous species. Airports that are subject to the regulation must develop, implement and maintain plans for the management of these species.

The process of identifying wildlife hazards and measuring the risks they pose is called risk analysis. Under CAR 302, an airport operator must conduct a risk analysis as one of the first steps in creating an airport wildlife management plan. Pilots should be aware that these analyses must include consultations with representative samples of airport users, such as flight schools, airlines and pilots.

1.15.3 Communication of Wildlife Hazards

Provisions of CAR 302 also require airport operators to put in place effective communication and alerting procedures to quickly notify pilots of wildlife hazards.

- Pilots should monitor ATIS and air-ground communications for information concerning wildlife hazards, particularly during spring and autumn migration periods when bird activity is at its peak. In unusual circumstances, a NOTAM may be used to identify these hazards.

- Pilots who encounter wildlife on an airport are asked to immediately:
  notify ATS, and
  take appropriate steps to minimize the risk associated with their flight.

- Pilots who frequent Canadian certified airports are encouraged to ask about measures in place to ensure effective communication and to counter wildlife hazards.

1.15.4 Bird/Wildlife-Strike Reporting Procedures

To comply with CAR 302, airport wildlife management plans must be based on current wildlife-strike data, which is compiled by, and made available through, Transport Canada. Airports must report all bird/wildlife strikes to Transport Canada and keep records of these events; however, bird/wildlife strike reports can be filed by anyone, including airline personnel, ground crews and pilots.

Strike reporting is one of the most valuable contributions members of the aviation community can make in an effort to reduce wildlife risks. The data is vital to national and international airport wildlife management efforts, and one of the most important tools in tracking wildlife trends and determining hazards at locations across Canada.

Pilots are asked to report any knowledge of bird/wildlife strikes, no matter how inconsequential the event may seem. Even information about a near miss can help authorities learn more about the presence of potentially-hazardous species, and the nuances of encounters between aircraft and wildlife.

In cases of bird strikes, reports should include the species whenever possible. Species identification provides airport operators with important data that enables them to effectively focus risk mitigation efforts. If the species is unknown, but bird remains are available from the incident, pilots may consult with airport wildlife management personnel for help identifying the species. Airport personnel may also decide to submit the remains to the Smithsonian Institution, Division of Birds. Transport Canada maintains a formalized agreement with this organization for the purpose of species identification.

An important regulatory trigger

CAR 302 requires an airport operator to amend its wildlife management plan, and submit it to Transport Canada for review within 30 days of the amendment, if a turbine-powered aircraft:

suffers damage as a result of a collision with wildlife other than a bird;
collides with more than one bird; or
ingests a bird through an engine.

This process of review and amendment helps ensure wildlife management plans are as current as possible, addressing continual fluctuations in the wildlife hazards at airports.

The review-and-amendment process is also set in motion when a variation in the presence of wildlife hazards is observed in an airport's flight pattern or movement area. Pilots can help mitigate risk by reporting to Transport Canada any significant changes in the numbers or behaviour of hazardous wildlife at airports that are visited regularly.

Bird/wildlife strike report form

Hard copy forms (form number 51-0272) are available in bulk from the Transport Canada Order Desk:

Web site: ..... *www.tc.gc.ca/transact*
Toll-free (North America only): 1-888-830-4911
Local: 613-991-4071
Fax: 613-991-2081
E-mail: ..... *mps@tc.gc.ca*

To complete and submit a bird/wildlife strike report online:

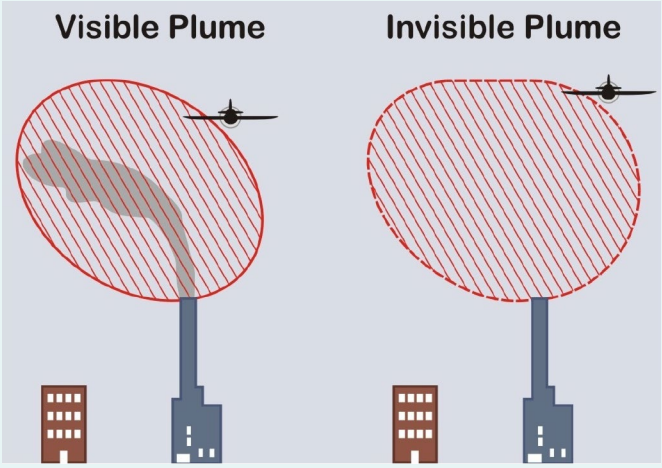
http://wwwapps.tc.gc.ca/Saf-Sec-Sur/2/bsis/s_r.aspx?lang=eng

Reports can also be made through a toll-free hotline:

1-888-282-BIRD (282-2473)

1.16 Potential Flight Hazards

1.16.1 Avoid Flight in the Vicinity of Exhaust Plumes



Exhaust plumes are defined as visible or invisible emissions from power plants, industrial production facilities or other industrial systems that release large amounts of vertically directed unstable gases. High temperature exhaust plumes may cause significant air disturbances, such as turbulence and vertical shear. Other identified potential hazards include, but are not necessarily limited to, reduced visibility, oxygen depletion, engine particulate contamination, exposure to gaseous oxides, and/or icing.

When able, pilots should fly upwind of possible exhaust plumes. Results of encountering a plume may include airframe damage, aircraft upset, and/or engine damage/failure. These hazards are most critical during low altitude flight in calm and cold air, especially in and around approach and departure corridors or airport traffic areas.

When a plume is visible via smoke or a condensation cloud, remain clear and realize that a plume may have both visible and invisible characteristics. Exhaust stacks without visible plumes may still be in full operation, and airspace in the vicinity should be treated with caution. As with mountain wave turbulence or clear air turbulence, an invisible plume may be encountered unexpectedly.

Whether plumes are visible or invisible, the total extent of their turbulent affect is difficult to ascertain. Some studies predict that significant turbulent effects of a thermal plume can extend to heights of over 1 000 ft above the height of the top of the stack or cooling tower. Any effects will be more pronounced in calm stable air where the plume is very hot and the surrounding area is still and cold. Fortunately, studies also predict that crosswinds will help dissipate the effects. However, the size of the tower or stack is not a good indicator of the predicted effect the plume may produce. The effects are primarily related to the heat or size of the plume effluent, the ambient air temperature, and the wind speed affecting the plume. Smaller aircraft can expect to feel an effect at a higher altitude than heavier aircraft.

Pilots are encouraged to reference the CFS where notations caution pilots of the location of structure(s) emitting exhaust plumes, such as cooling towers, power plant stacks, exhaust fans and other similar structures.

Pilots encountering hazardous plume conditions should report time, location and intensity (light, moderate, severe or extreme) to the facility with which they are maintaining radio contact.

Figure 1.2 – Bird/Wildlife Strike Report

Transport Canada Safety and Security / Transports Canada Sécurité et sûreté — Canada

Bird/Wildlife Strike Report — Rapport d'impact d'oiseau/de mammifère

TYPE			DATE	LOCAL TIME / HEURE LOCALE
☐ Bird Strike/Impact d'oiseau ☐ Bird Near Miss/Quasi-impact d'oiseau	☐ Mammal Strike/Impact de mammifère ☐ Mammal Near Miss/Quasi-impact de mammifère			

REPORTING SOURCE / SOURCE DU RAPPORT			OPERATOR / EXPLOITANT	HEIGHT (AGL,feet) / ALTITUDE (AGL,pieds)	SPEED (IAS knots) / VITESSE (vi-noeuds)
☐ Pilot/Pilote ☐ Site ☐ Other/Autre	☐ Airline/Compagnie aérienne ☐ Museum/Musée				

AIRCRAFT INFORMATION – INFORMATION SUR L'AÉRONEF

Model/Modèle	Registration/Immatriculation	Engine Type/Type de moteur
Make/Marque	Flight No./Nº de vol	Engine Make/Marque du moteur

AIRPORT / AÉROPORT	Name/Nom	Code	Province	Region/Région	Runway/Piste

PHASE OF OPERATION / PHASE DE L'OPÉRATION

☐ Takeoff Run/Roulement au décollage ☐ Approach/Approche ☐ Landing Roll/Roulement à l'atterrissage
☐ Climb/Montée ☐ Descent/Descente ☐ Taxi/Circulation au sol
☐ En route/Croisière (Distance from Airport/Distance de l'aéroport _____) ☐ Parked/Stationnement

PART(S) STRUCK/DAMAGED / PARTIE(S) TOUCHÉE(S)/ ENDOMMAGÉE(S)	Struck / Touchée	Damaged / Endommagée
Radome/Radôme		
Windshield/Pare-brise		
Nose/Partie avant de l'appareil		
Engine/Moteur 1		
Engine/Moteur 2		
Engine/Moteur 3		
Engine/Moteur 4		
Propeller/Hélice		
Wings/Ailes		
Rotor/Rotor		
Fuselage		
Landing Gear/Train d'atterrissage		
Tail/Queue		
Lights/Feux		
Pitot Static/Antenne Pitot		
Tail Rotor/Rotor anticouple		
Other/Autre_____		

EFFECT(S) ON AIRCRAFT/FLIGHT / EFFET(S) SUR L'AÉRONEF/LE VOL	
None / Aucun	
Aborted Takeoff / Décollagé interrompu	
Precautionary Landing / Atterrissage de précaution	
Engine(s) Shut Down / Arrêt de(s) moteur(s)	
Forced Landing / Atterrissage forcé	
Fire / Feu	
Penetration of Airframe / Pénétration de la cellule	
Vision Obscured / Visibilité réduite	
Engine Ingestion / Ingestion dans le moteur	
Engine Uncontained Failure / Panne de moteur avec perforation	
Other / Autre _____	

LIGHT CONDITION / CONDITION D'ÉCLAIRAGE	
Dawn / Aube	
Day / Jour	
Dusk / Crépuscule	
Night / Nuit	

SKY CONDITION / ÉTAT DU CIEL	
No Cloud / Pas de nuage	
Some Cloud / Quelques nuages	
Overcast / Couvert	

PRECIPITATION / PRÉCIPITATION	
Rain / Pluie	
Fog / Brouillard	
Snow / Neige	
Other / Autre _____	

BIRD / MAMMAL INFORMATION / INFORMATION CONCERNANT L'OISEAU /LE MAMMIFÈRE

SPECIES – COMMON NAME / ESPÈCE – NOM COMMUN

SCIENTIFIC NAME / NOM SCIENTIFIQUE

SIZE OF BIRD / TAILLE DE L'OISEAU
☐ Small/Petit
☐ Medium/Moyen
☐ Large/Grand

NUMBER OF BIRDS / NOMBRE D'OISEAUX	Seen / Aperçus	Struck / Touchés
0		
1		
2-10		
11-100		
More/Plus		

BIRD REMAINS SUBMITTED FOR IDENTIFICATION? / LES RESTES DE L'OISEAU ONT-ILS ÉTÉ EXPÉDIÉS POUR IDENTIFICATION? ☐ Yes/Oui ☐ No/Non

PILOT WARNED OF BIRDS? / PILOTE AVERTI DE LA PRÉSENCE DES OISEAUX? ☐ Yes/Oui ☐ No/Non

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EXAMPLE

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Bird/Wildlife Strike Report — Rapport d'impact d'oiseau/de mammifère

INFORMATION ON ENGINE DAMAGE STRIKES
INFORMATION CONCERNANT LE MOTEUR ENDOMMAGÉ PAR L'IMPACT D'OISEAUX

Reason for Failure/Shutdown Raison de la panne/de l'arrêt du moteur	Engine Motor No. – Nº du moteur				Comments – Commentaires
	1	2	3	4	
Engine Uncontained Failure Panne de moteur avec perforation des parois					
Fire Feu					
Shutdown - Vibration Arrêt-moteur - Vibrations					
Shutdown - Temperature Arrêt-moteur - Température					
Shutdown - Fire Warning Arrêt-moteur - Alarme incendie					
Shutdown - Arrêt-moteur Other (specify)/Autre (précisez)					
Shutdown Unknown Arrêt-moteur inconnu					
Estimated % of Thrust Lost Estimation en % de la perte de puissance					
Estimated Number of Birds Ingested Estimation du nombre d'oiseaux impliqués					

ADDITIONAL INFORMATION
INFORMATION SUPPLÉMENTAIRE

COST INFORMATION INFORMATION SUR LES COÛTS		DAMAGE CATEGORY (DND) CATÉGORIE ENDOMMAGÉE (MDN)
Aircraft Time Out of Service/ Durée de la mise hors service de l'aéronef _____ Hours Heures	Estimated Cost of Repairs or Replacement/ Estimation des coûts de réparation ou de remplacement $CDN_____ (In Thousands/En milliers)	Estimated Other Costs (e.g., Loss of Revenue, Hotels) Estimation des autres coûts(ex. perte de revenus, hôtels) $CDN_____ (In Thousands/En milliers)

REMARKS – REMARQUES

REPORT BY / DÉPOSÉ PAR: _____ DATE: _____

ORGANIZATION / ORGANISATION: _____ TELEPHONE #/Nº DE TÉLÉPHONE #: (_____) _____

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Figure 1.3(a) –Spring Migration Routes – Cranes, Ducks and Canada Geese

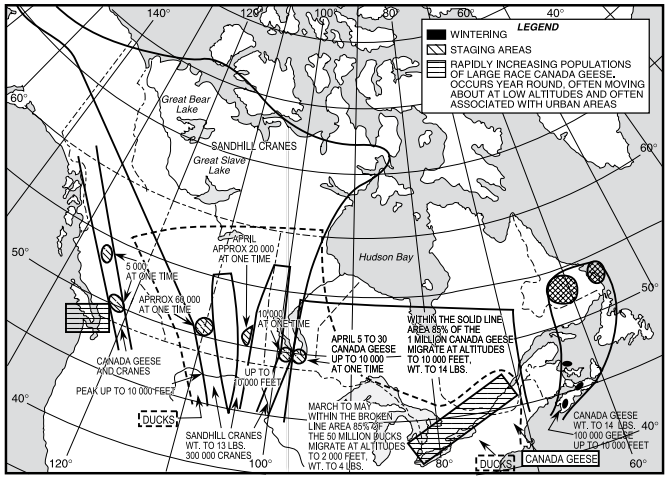


Figure 1.3(b) –Spring Migration Routes – Other Geese

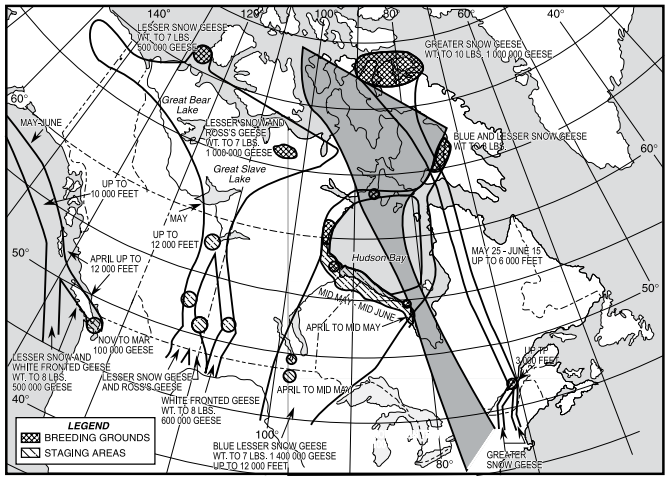


Figure 1.3(c) –Spring Migration Routes – Swans (Flight Altitudes to 12 000 feet)

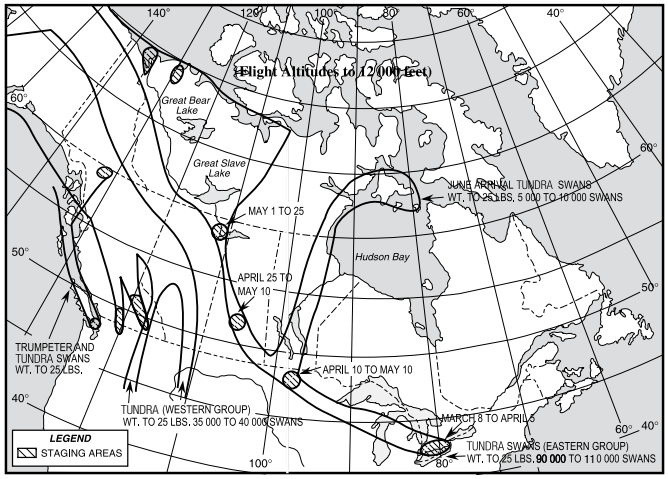


Figure 1.4(a)–Autumn Migration Routes – Cranes, Ducks and Canada Geese)

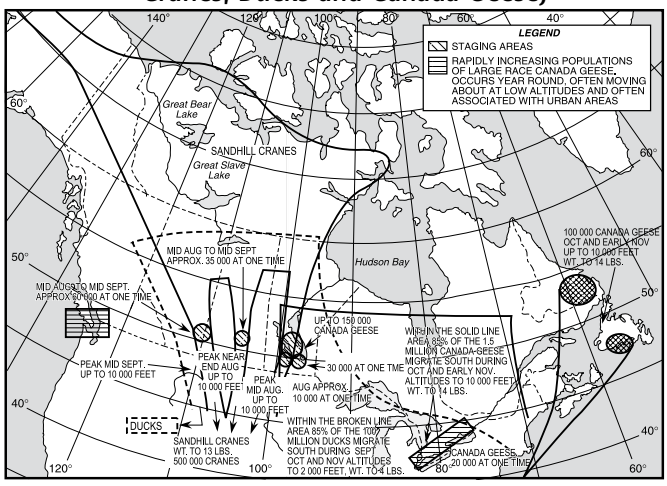


Figure 1.4(b)–Autumn Migration Routes – Other Geese)

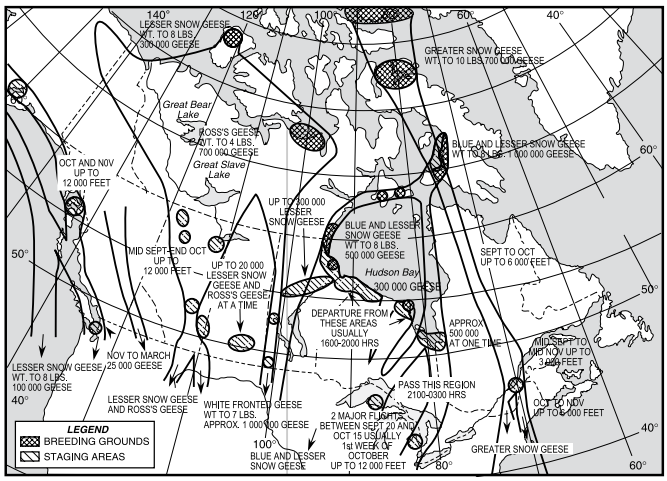
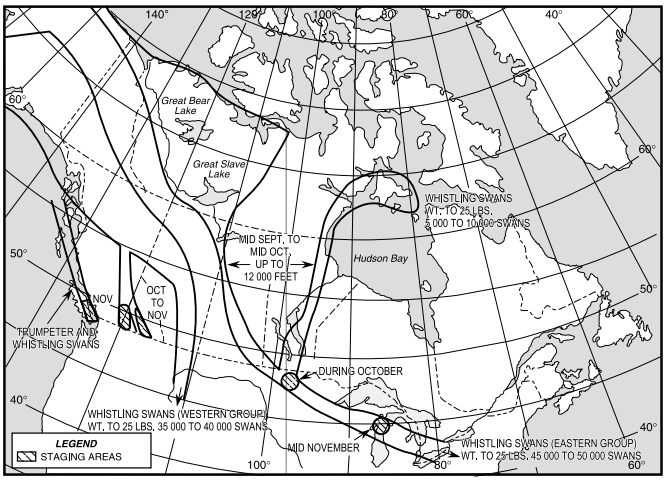


Figure 1.4(c)–Autumn Migration Routes – Swans



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2.0 AIRSPACE – REQUIREMENTS AND PROCEDURES

2.1 General

Canadian airspace is divided into a number of categories, which in turn are subdivided into a number of areas and zones. The various rules are simplified by the classification of all Canadian airspace. This section describes all of the above in detail, as well as the regulations and procedures specific to each. The official designation of all airspace is published in the DAH. Canadian airspace is managed by NAV CANADA in accordance with the terms established for the transfer of the air navigation system (ANS) from government operation to NAV CANADA, and with the rights granted to the corporation pursuant to the *Civil Air Navigation Services Commercialization Act*.

2.2 Canadian Domestic Airspace

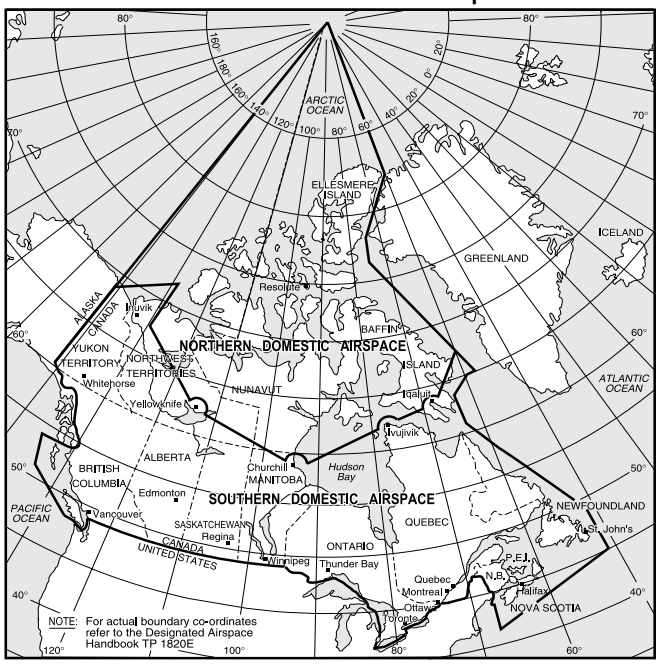
Canadian Domestic Airspace (CDA) includes all airspace over the Canadian land mass, the Canadian Arctic, Canadian Archipelago and those areas of the high seas within the airspace boundaries. These boundaries are depicted on the Enroute Charts.

2.2.1 Northern Domestic Airspace

Canadian Domestic Airspace is geographically divided into the Southern Domestic Airspace and the Northern Domestic Airspace as indicated in Figure 2.1. In the Southern Domestic Airspace, magnetic track is used to determine cruising altitude for direction of flight.

The Magnetic North Pole is located near the centre of the Northern Domestic Airspace, therefore magnetic compass indications may be erratic. Thus, in this airspace, runway heading is given in true and true track is used to determine cruising altitude for direction of flight in lieu of magnetic track.

Figure 2.1 – Boundaries of Canadian Domestic Airspace, Northern Domestic Airspace and Southern Domestic Airspace



2.3 High and Low Level Airspace

The CDA is further divided vertically into low level airspace, which consists of all of the airspace below 18 000 ft ASL; and high level airspace which consists of all airspace from 18 000 ft ASL and above.

2.3.1 Cruising Altitudes and Flight Levels Appropriate to Aircraft Track

General Provisions

1. The appropriate altitude or flight level for aircraft in level cruising flight is determined in accordance with:
   (a) the magnetic track, in SDA; and
   (b) the true track, in NDA.

2. When an aircraft is operated in level cruising flight:
   (a) at more than 3 000 ft AGL, in accordance with VFR;
   (b) in accordance with IFR; or
   (c) during a CVFR flight;

the pilot-in-command of an aircraft shall ensure that the aircraft is operated at an altitude or flight level appropriate to the track, unless he/she is assigned an altitude or flight level by an ATC unit or by written authority from the Minister.

3. RVSM cruising flight levels appropriate to aircraft track are applicable in designated RVSM airspace.

4. The pilot-in-command of an aircraft operating within controlled airspace between 18 000 ft ASL and FL600, inclusive, shall ensure that the aircraft is operated in accordance with IFR unless otherwise authorized in writing by the Minister. (CAR 602.34).

NOTE: As per the table in CAR 602.34(2), a vertical separation of 2 000 ft is required from FL290 to FL410 inclusive. Please refer to AIC 27/06 for more information.

ALTITUDES OR FLIGHT LEVELS	AIRCRAFT TRACK	
	000° - 179°	180° - 359°
ABOVE FLIGHT LEVEL 290: FLY 4000 FT INTERVALS	BEGINNING AT FLIGHT LEVEL 290 (FL 290, 330, 370, 410, 450)	BEGINNING AT FLIGHT LEVEL 310 (FL 310, 350, 390, 430, 470)
RVSM	FL 290, 310, 330, 350, 370, 390, 410	FL 300, 320, 340, 360, 380, 400
AT OR ABOVE 18 000 ASL BUT BELOW FL 290: FLY 2 000 FT INTERVALS	ODD FLIGHT LEVELS (FL 190, 210, 230, etc.)	EVEN FLIGHT LEVELS (FL 180, 200, 220, etc.)
BELOW 18 000 ASL: (FLY CORRESPONDING FLIGHT LEVELS IN STANDARD PRESSURE REGION) FLY 2 000 FT INTERVALS	IFR and CVFR	IFR and CVFR
	ODD THOUSANDS ASL (1 000, 3 000, 5 000, etc.)	EVEN THOUSANDS ASL (2 000, 4 000, 6 000, etc.)
	VFR	VFR
	ODD THOUSANDS plus 500 FT ASL (3 500, 5 500, 7 500, etc.)	EVEN THOUSANDS plus 500 FT ASL (4 500, 6 500, 8 500, etc.)

2.4 Flight Information Regions

A Flight Information Region (FIR) is an airspace of defined dimensions extending upwards from the surface of the earth, within which flight information service and alerting services are provided. The Canadian Domestic Airspace is divided into the Vancouver, Edmonton, Winnipeg, Toronto, Montréal, Moncton and Gander Domestic Flight Information Regions. Gander Oceanic is an additional FIR allocated to Canada by ICAO for the provision of flight information and alerting services over the high seas.

Canadian Flight Information Regions are described *in the Designated Airspace* Handbook (TP l820E), and are depicted on the Enroute Charts and illustrated in Figure 2.2.

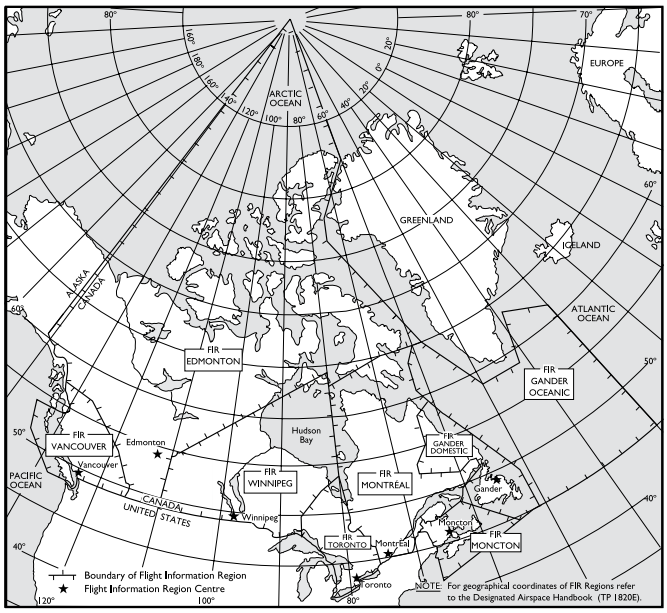
Agreements have been effected between Canada and the United States to permit reciprocal air traffic control services outside of the designate national FIR boundaries. An example is V300 and J500 between SSM and YQT. The control of aircraft in US airspace delegated to a Canadian ATC unit is effected by applying the Canadian rules, procedures and separation minima with the following exceptions:

(a) aircraft will not be cleared to maintain "1 000 feet on top";

(b) ATC vertical separation will not be discontinued on the basis of visual reports from the aircraft; and

(c) Canadian protected airspace criteria for track separation will not be used.

Figure 2.2 – Flight Information Regions



2.5 Controlled Airspace

Controlled airspace is the airspace within which air traffic control service is provided and within which some or all aircraft may be subject to air traffic control. Types of controlled airspace are:

(a) in the High Level Airspace:
– the Southern, Northern and Arctic Control Areas.

NOTE: Encompassed within the above are high level airways, the upper portions of some military terminal control areas and terminal control areas.

(b) in the Low Level Airspace:
– low level airways,
– terminal control areas,
– control area extensions,
– control zones,
– transition areas,
– military terminal control areas.

2.5.1 Use of Controlled Airspace by VFR Flights

Due to the speeds of modern aircraft, the difficulty in visually observing other aircraft at high altitudes and the density of air traffic at certain locations and altitudes, the "see and be seen"

principle of VFR separation cannot always provide positive separation. Accordingly, in certain airspace and at certain altitudes VFR flight is either prohibited or subject to specific restrictions prior to entry and during flight.

2.5.2 Aircraft Speed Limit Order

According to CAR 602.32, no person shall operate an aircraft in Canada;

(a) below 10 000 ft ASL at more than 250 KIAS; or

(b) below 3 000 ft AGL within 10 NM of a controlled airport and at more than 200 KIAS, unless authorized to do so in an air traffic control clearance.

Exceptions

(a) A person may operate an aircraft at an indicated airspeed greater than the airspeeds referred to in (a) and (b) above where the aircraft is being operated in accordance with a special flight operations certificate – special aviation event issued under CAR 603.

(b) If the minimum safe speed, given the aircraft configuration, is greater than the speed referred to in (a) or (b) above, the aircraft shall be operated at the minimum safe speed.

2.6 High Level Controlled Airspace

Controlled airspace within the High Level Airspace is divided into three separate areas. They are the Southern Control Area (SCA), the Northern Control Area (NCA) and the Arctic Control Area (ACA). Their lateral dimensions are illustrated in Figure 2.3. Figure 2.4 illustrates their vertical dimensions which are: SCA, 18 000 feet ASL and above; NCA, FL230 and above; ACA, FL270 and above. The volume and concentration of international air traffic transiting the NCA and ACA on random tracks can create enroute penalties to users by preventing maximum utilization of the airspace. To ensure the flow of traffic is accommodated efficiently, a track system has been established which interacts with the established airway system in the SCA and Alaska. Use of these tracks is mandatory at certain periods of the year.

Pilots are reminded that both the NCA and the ACA are within the Northern Domestic Airspace; therefore, compass indications may be erratic, and true tracks are used in determining the flight level at which to fly. In addition, the airspace from FL330 to FL410 within the lateral dimensions of the NCA, the ACA and the northern part of the SCA has been designated CMNPS airspace. Special procedures apply within this airspace. See RAC 12.5 for details.

Figure 2.3 – Southern, Northern and Arctic Control Areas

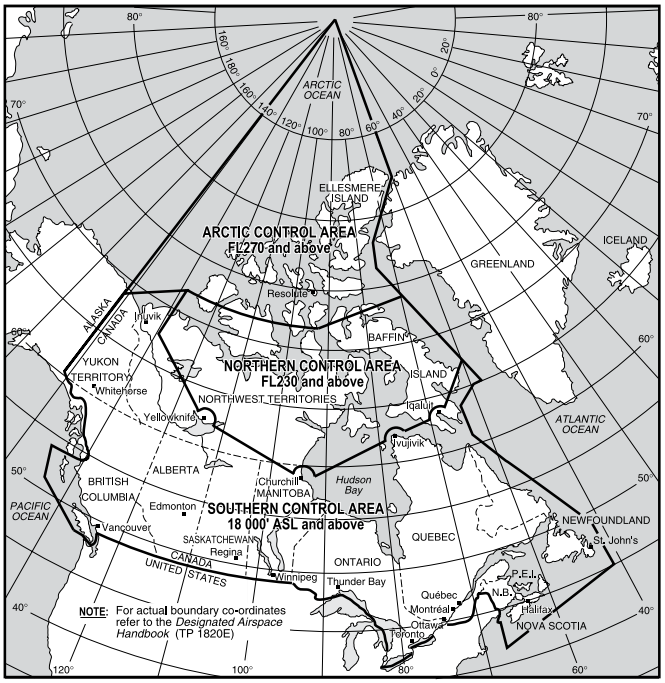
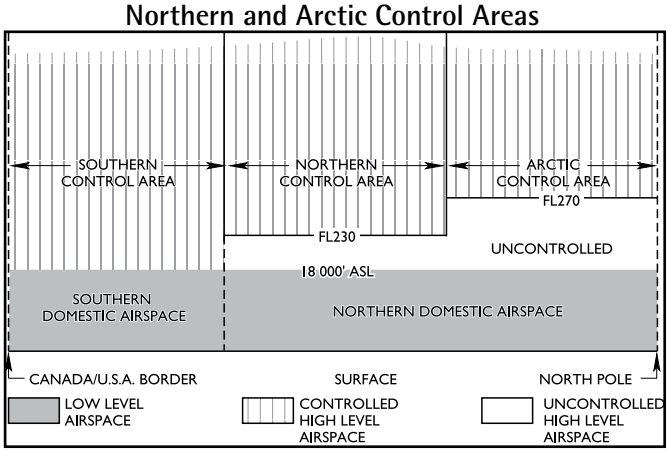


Figure 2.4 – Vertical Dimensions of Southern, Northern and Arctic Control Areas



2.7 Low-Level Controlled Airspace

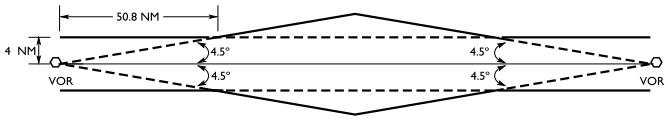
2.7.1 Low-Level Airways

Controlled low-level airspace extends upward from 2 200 ft AGL up to, but not including, 18 000 ft ASL, within the following specified boundaries:

(a) *VHF/UHF Airways*: The basic VHF/UHF airway width is 4 NM on each side of the centreline prescribed for such an airway. Where applicable, the airway width shall be increased between the points where lines, diverging 4.5° on each side of the centreline from the designated facility, intersect the basic width boundary; and where they meet, similar lines projected from the adjacent facility.

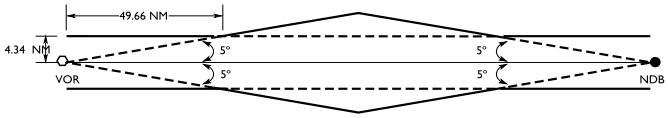
RAC

Figure 2.5(a)– VHF/UHF Airway Dimensions



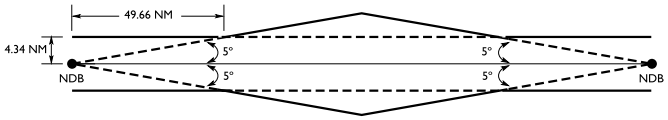
Where a Victor airway is established based on a VOR/VORTAC and NDB, the boundaries of that airway will be those of an LF/MF airway [see Figure 2.5(b)].

Figure 2.5(b)– VHF/UHF Airway Based on VOR and NDB



(b) *LF/MF Airways*: The basic LF/MF airway width is 4.34 NM on each side of the centreline prescribed for such an airway. Where applicable, the airway width shall be increased between the points where lines, diverging 5˚ on each side of the centreline from the designated facility, intersect the basic width boundary; and where they meet, similar lines projected from the adjacent facility.

Figure 2.6 – LF/MF Airway Dimensions



(c) (c) *T-Routes:* Low-level controlled fixed RNAV routes have dimensions of 4 NM of primary obstacle protection area, plus 2 NM of secondary obstacle protection area on each side of the centreline. The airspace associated with RNAV T-routes is 10 NM on each side of the centreline. RNAV T-route airspace and protection areas do not splay.

Figure 2.7(a) – Fixed RNAV Route

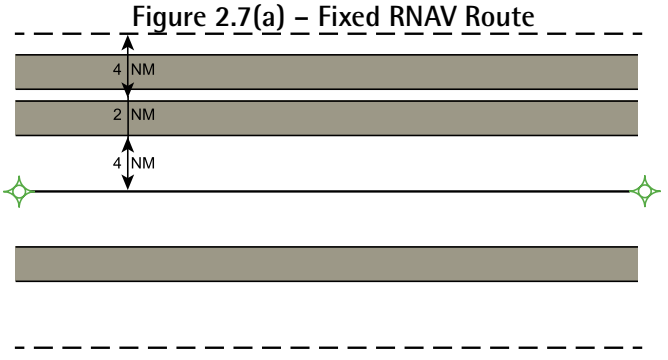
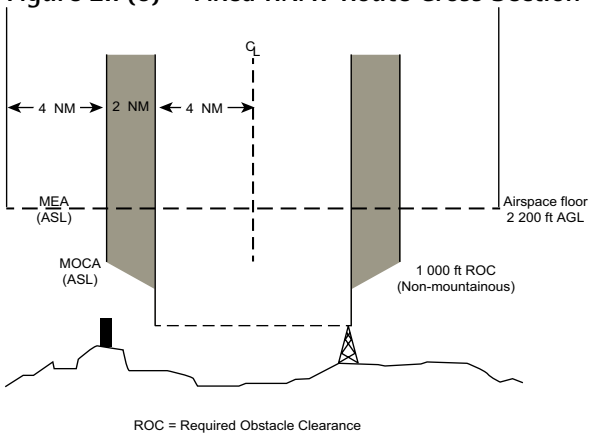


Figure 2.7(b) – Fixed RNAV Route Cross Section



2.7.2 Control Area Extensions

Control area extensions are designated around aerodromes where the controlled airspace provided is insufficient to permit the required separation between IFR arrivals and departures and to contain IFR aircraft within controlled airspace. A control area extension provides:

(a) additional controlled airspace around busy aerodromes for IFR control. The controlled airspace contained within the associated control zone and airway(s) width is not always sufficient to permit the manoeuvring required to separate IFR arrivals and departures; or

(b) connecting controlled airspace, e.g., a control area extension is used to connect a control zone with the enroute structure.

Control area extensions are based at 2 200 ft AGL unless otherwise specified and extend up to, but not including 18 000 ft ASL. Some control area extensions, such as those which extend to the oceanic controlled airspace, may be based at other altitudes such as 2 000, 5 500 or 6 000 ft ASL. The outer portions of some other control area extensions may be based at higher levels. Even if described with an ASL floor, the base of a Control Area Extension shall not extend lower than 700 ft AGL.

2.7.3 Control Zones

Control zones are designated around certain aerodromes to keep IFR aircraft within controlled airspace during approaches and to facilitate the control of VFR and IFR traffic.

Control zones having a civil control tower within a terminal control area normally have a 7-NM radius. Others have a 5-NM radius, with the exception of a few which have a 3-NM radius. Control zones are capped at 3 000 feet AAE unless otherwise specified. Military control zones usually have a 10-NM radius and are capped at 6 000 feet AAE. All control zones are depicted on VFR aeronautical charts and the

Enroute Low Altitude Charts. Control zones will be classified as "B", "C", "D" or "E" depending on the classification of the surrounding airspace.

The VFR weather minima for control zones are outlined in Figure 2.7. When weather conditions are below VFR minima, a pilot operating VFR may request special VFR (SVFR) authorization in order to enter the control zone. This authorization is normally obtained through the local tower or FSS, and must be obtained before SVFR is attempted within a control zone. ATC will issue an SVFR authorization, traffic and weather conditions permitting, only upon a request for SVFR from a pilot. SVFR will not be initiated by ATS. Once having received SVFR authorization, the pilot continues to remain responsible for avoiding other aircraft and weather conditions beyond the pilot's own flight capabilities and the capabilities of the aircraft.

Figure 2.7 – VFR Weather Minima*

AIRSPACE		FLIGHT VISIBILITY	DISTANCE FROM CLOUD	DISTANCE AGL
Control Zones		not less than 3 miles**	horizontally: 1 mile vertically: 500 feet	vertically: 500 feet
Other Controlled Airspace		not less than 3 miles	horizontally: 1 mile vertically: 500 feet	–
Uncontrolled Airspace	1 000 feet AGL or above	not less than 1 mile (day) 3 miles (night)	horizontally: 2 000 feet vertically: 500 feet	–
	below 1 000 feet AGL – fixed-wing	not less than 2 miles (day) 3 miles (night) (see Note 1)	clear of cloud	–
	below 1 000 feet AGL – helicopter	not less than 1 mile (day) 3 miles (night) (see Note 2)	clear of cloud	–

* See CAR 602, Division VI – Visual Flight Rules ≥
** Ground visibility when reported ≥

NOTES

1: Notwithstanding CAR 602.115, an aircraft other than an helicopter may be operated in visibilities less than 2 miles during the day, when authorized to do so in an air operator certificate or in a private operator certificate.

2: Notwithstanding CAR 602.115, a helicopter may be operated in visibilities less than 1 mile during the day, when authorized to do so in an air operator certificate or in a flight training unit operator certificate helicopter.

Special VFR weather minimum and requirements applicable within control zones are found in CAR 602.117, and are summarized as follows:

Where authorization is obtained from the appropriate ATC unit, a pilot-in-command may operate an aircraft within a control zone, in IFR weather conditions without compliance with the IFR, where flight visibility and, when reported, ground visibility are not less than:

(a) 1 mile for aircraft other than helicopters; and

(b) 1/2 mile for helicopters.

NOTES

1: All aircraft, including helicopters, must be equipped with a radio capable of communicating with the ATC unit and must comply with all conditions issued by the ATC unit as part of the SVFR authorization.

2: Aircraft must operate clear of cloud and within sight of the ground at all times.

3: Helicopters should operate at such reduced airspeeds so as to give the pilot-in-command adequate opportunity to see other air traffic or obstructions in time to avoid a collision.

4: When the aircraft is not a helicopter and is being operated at night, ATC will only authorize special VFR where the authorization is for the purpose of allowing the aircraft to land at the destination aerodrome.

Figure 2.8 - Special VFR Weather Minima

	Flight Visibility (Ground when reported)	Distance from cloud
Aircraft other than Helicopter	1 mile	Clear of cloud
Helicopter	1/2 mile	

2.7.4 VFR Over-the-Top

A person may operate an aircraft VFR over-the-top (VFR OTT), provided certain conditions are met. Those conditions include weather minima, aircraft equipment and pilot qualifications. Pilots should indicate that the flight is VFR OTT during communications with ATS units. Deviations from the intended route of flight may be necessary when transiting CZs or TCAs. Pilots should take into consideration the additional fuel requirements this may cause.

CAR 602.116 specifies the weather minima for VFR OTT. A summary of the minima follows:

(a) VFR OTT is allowed during the day only, and during the cruise portion of the flight only.

(b) The aircraft must be operated at a vertical distance from cloud of at least 1 000 ft.

(c) Where the aircraft is operated between two cloud layers, those layers must be at least 5 000 ft apart.

(d) The flight visibility at the cruising altitude of the aircraft must be at least 5 mi.

(e) The weather at the destination aerodrome must have a sky condition of scattered cloud or clear, and a ground visibility of 5 mi. or more, with no forecast of precipitation, fog, thunderstorms, or blowing snow, and these conditions must be forecast to exist
   (i) in the case of an aerodrome forecast (TAF), for the period from 1 hr before to 2 hr after the ETA; and
   (ii) in the case of an area forecast (GFA) because a TAF is not available, for the period from 1 hr before to 3 hr after the ETA.

CARs 605.14 and 605.15 outline the aircraft equipment requirements for VFR OTT. In part, the equipment requirements are the same as for VFR flight, with extra requirements for VFR OTT.

Pilot qualifications for VFR OTT flight are specified in CARs Part IV—*Personnel Licensing and Training.*

2.7.5 Transition Areas

Transition areas are established when it is considered advantageous or necessary to provide additional controlled airspace for the containment of IFR operations.

Transition areas are of defined dimensions, based at 700 ft AGL unless otherwise specified, and extend upwards to the base of overlying controlled airspace. The area provided around an aerodrome will normally be 15 NM radius of the aerodrome coordinates, but shall be of sufficient size to contain all of the aerodrome published instrument approach procedures. Even if described with an ASL floor, the base of a transition area shall not extend lower than 700 ft AGL.

2.7.6 Terminal Control Areas

Terminal control areas are established at high volume traffic airports to provide an IFR control service to arriving, departing and enroute aircraft. Aircraft operating in the TCA are subject to certain operating rules and equipment requirements. The TCA operating rules are established by the classification of the airspace within the TCA. These rules will be based on the level of ATC service that is appropriate for the number and type of aircraft using the airspace as well as the nature of the operations being conducted.

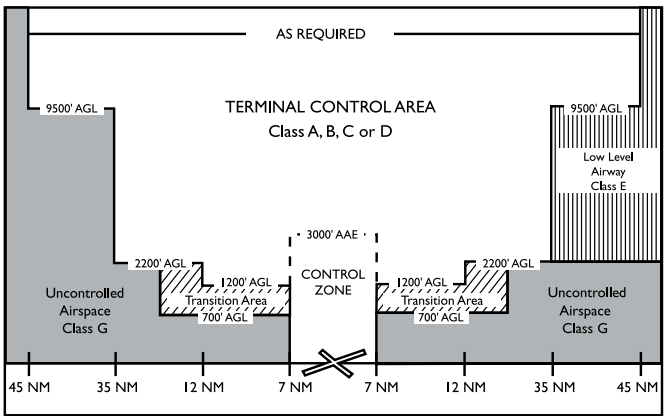
A TCA is similar to a control area extension except that:

– a TCA may extend up into the high level airspace;

– IFR traffic is normally controlled by a terminal control unit. The ACC will control a TCA during periods when a TCU is not in operation; and

– TCA airspace will normally be designed in a circular configuration, centred on the geographic coordinates of the primary aerodrome. The outer limit of the TCA should be at 45 NM radius from the aerodrome geographic coordinates based at 9 500 ft AGL, with an intermediate circle at 35 NM based at 2 200 ft AGL and an inner circle at 12 NM radius based at 1 200 ft AGL. Where an operational advantage may be gained, the area may be sectorized. For publication purposes the altitudes may be rounded to the nearest appropriate increment and published as heights ASL. The floor of a TCA shall not extend lower than 700 ft AGL.

A military terminal control area is the same as a TCA, except that special provisions prevail for military aircraft while operating within the MTCA. MTCAs may be designated at selected military aerodromes where the control service will be provided by a military TCU, or by ATC, through agreement with DND.



2.8 Airspace Classification

Canadian Domestic Airspace is divided into seven classes, each identified by a single letter – A, B, C, D, E, F, or G. Flight within each class is governed by specific rules applicable to that class and are contained in CAR 601, *Division I, Airspace Structure, Classification* and Use.

The rules for operating within a particular portion of airspace depends on the classification of that airspace and not on the name by which it is commonly known. Thus, the rules for flight within a high level airway, a terminal control area or a control zone depend on the class of airspace within all or part of those areas. Weather minima are specified for controlled or uncontrolled airspace, not for each class of airspace.

2.8.1 Class A Airspace

Class A airspace is designated where an operational need exists to exclude VFR aircraft.

All operations must be conducted under Instrument Flight Rules and are subject to ATC clearances and instructions. ATC separation is provided to all aircraft.

All aircraft operating in Class A airspace must be equipped with a transponder and automatic pressure altitude reporting equipment.

Class A airspace will be designated from the base of all high-level controlled airspace, or from 700 ft AGL, whichever is higher, up to and including FL600.

2.8.2 Class B Airspace

Class B airspace is designated where an operational need exists to provide air traffic control service to IFR and to control VFR aircraft.

Operations may be conducted under IFR or VFR. All aircraft are subject to ATC clearances and instructions. ATC separation is provided to all aircraft.

All low level controlled airspace above 12 500 feet ASL or at and above the MEA, whichever is higher, up to but not including 18 000 feet ASL will be Class B airspace.

Control zones and associated terminal control areas may also be classified as Class B airspace.

NOTES

1: No person shall operate an aircraft in Class B controlled airspace in VFR flight unless:

(a) the aircraft is equipped with:

(i) radio communication equipment capable of two-way communication with the appropriate ATS facility, and

(ii) radio navigation equipment capable of using navigation facilities to enable the aircraft to be operated in accordance with the flight plan, and

(iii) a transponder and automatic pressure altitude reporting equipment;

(b) a continuous listening watch is maintained by a flight crew member on a radio frequency assigned by ATC;

(c) except as otherwise authorized by ATC, when the aircraft is over a reporting point a position report is transmitted to the appropriate unit or, when so directed by ATC, to an FSS; and

(d) the aircraft is operated in VMC at all times.

2: A person operating an aircraft on a VFR flight in Class B airspace shall operate the aircraft in VMC at all times. When it becomes evident that flight in VMC will not be possible at the altitude or along the route specified, the pilot shall:

(a) request an ATC clearance which will enable the aircraft to be operated in VMC to the filed destination, or to another aerodrome;

(b) where the person is the holder of a valid instrument rating, request an IFR clearance for flight under the instrument flight rules; or

(c) where the Class B airspace is a control zone, request an authorization for special VFR flight.

3: A person operating an aircraft in Class B controlled airspace in VFR flight who is unable to comply with the requirements of the preceding paragraphs shall ensure that:

(a) the aircraft is operated in VMC at all times;

(b) the aircraft leaves Class B controlled airspace:

(i) by the safest and shortest route, either exiting horizontally or descending, or

(ii) when that airspace is a control zone, by landing at the aerodrome on which the control zone is based, and

(c) an ATC unit is informed as soon as possible of the actions taken pursuant to paragraph (b).

2.8.3 Class C Airspace

Class C airspace is a controlled airspace within which both IFR and VFR flights are permitted, but VFR flights require a clearance from ATC to enter. ATC separation is provided between all aircraft operating under IFR and, as necessary to resolve possible conflicts, between VFR and IFR aircraft. Aircraft will be provided with traffic information. Conflict resolution will be provided, upon request, after VFR aircraft is provided with traffic information.

Traffic information is issued to advise pilots of known or observed air traffic which may be in proximity to their aircraft's position or intended route of flight warranting their attention. Conflict resolution is defined as the resolution of potential conflicts between IFR/VFR and VFR/VFR aircraft that are radar identified and in communication with ATC.

Airspace classified as Class C becomes Class E airspace when the appropriate ATC unit is not in operation.

Terminal control areas and associated control zones may be classified as Class C airspace.

A person operating an aircraft in VFR flight in Class C airspace shall ensure that:

(a) the aircraft is equipped with
  (i) radio communication equipment capable of two-way communication with the appropriate ATC unit, and
  (ii) a transponder and automatic pressure altitude reporting equipment; and

(b) a continuous listening watch is maintained by a flight crew member on a radio frequency assigned by ATC.

A person wishing to operate an aircraft that is not equipped with functioning communication and transponder equipment for VFR flight in Class C airspace may, during daylight hours and in VMC, enter Class C airspace provided that permission to enter and to operate within the airspace is obtained from ATC prior to the operation being conducted.

2.8.4 Class D Airspace

Class D airspace is a controlled airspace within which both IFR and VFR flights are permitted, but VFR flights must establish two-way communication with the appropriate ATC agency prior to entering the airspace. ATC separation is provided only to IFR aircraft. Aircraft will be provided with traffic information. Equipment and workload permitting, conflict resolution will be provided between VFR and IFR aircraft, and upon request between VFR aircraft.

Airspace classified as Class D becomes Class E airspace when the appropriate ATC unit is not in operation.

A terminal control area and associated control zone could be classified as Class D airspace.

A person operating an aircraft in VFR flight in Class D airspace shall ensure that:

(a) the aircraft is equipped with
  (i) radio communication equipment capable of two-way communication with the appropriate ATC unit, and
  (ii) where the Class D airspace is specified as Transponder Airspace (see RAC 1.9.2), a transponder and automatic pressure altitude reporting equipment; and

(b) a continuous listening watch is maintained by a flight crew member on a radio frequency assigned by ATC.

A person operating an aircraft in VFR flight that is not equipped with the required radio communication equipment may, during daylight hours in VMC, enter Class D airspace provided that permission to enter is obtained from the appropriate ATC unit prior to operating within the airspace.

2.8.5 Class E Airspace

Class E airspace is designated where an operational need exists for controlled airspace but does not meet the requirements for Class A, B, C, or D.

Operations may be conducted under IFR or VFR. ATC separation is provided only to aircraft operating under IFR. There are no special requirements for VFR.

Aircraft are required to be equipped with a transponder and automatic pressure altitude equipment to operate in Class E airspace that is specified as transponder airspace (see RAC 1.9.2).

Low level airways, control area extensions, transition areas, or control zones established without an operating control tower may be classified as Class E airspace.

2.8.6 Class F Airspace

Class F airspace is airspace of defined dimensions within which activities must be confined because of their nature, and within which limitations may be imposed upon aircraft operations that are not a part of those activities.

Special-use airspace may be classified as Class F advisory or as Class F restricted, and can be controlled airspace, uncontrolled airspace, or a combination of both. An advisory area, for example, may have the floor in uncontrolled airspace and the ceiling in controlled airspace. The significance, in this instance, is that the weather minima would be different in the controlled and uncontrolled portions.

Unless otherwise specified, the rules for the appropriate airspace apply in areas of Class F airspace, no matter if they are active or inactive.

Class F airspace shall be designated in the DAH (TP 1820E) in accordance with the airspace regulations, and shall be published on the appropriate aeronautical charts.

Charting of Class F Airspace

All designated Class F restricted and advisory airspace is published on HI or LO charts, as applicable, and on VFR aeronautical charts.

Each restricted and advisory area within Canada has been assigned an identification code group, which consists of the four following parts:

Part (a) the nationality letters CY;

Part (b) the letter R for restricted area (the letter D for danger area if the restricted area is established over international waters) or the letter A for advisory area;

Part (c) a three-digit number that will identify the area. This number will indicate the Canadian region within which the area lies as follows:

101 to 199 –	British Columbia
201 to 299 –	Alberta
301 to 399 –	Saskatchewan
401 to 499 –	Manitoba
501 to 599 –	Ontario
601 to 699 –	Quebec
701 to 799 –	New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland
801 to 899 –	Yukon Territory
901 to 999 –	Northwest Territories and Nunavut (including the Arctic Islands)

Part (d) in the case of advisory areas, the letter A, F, H, M, P, S or T in parentheses after the three-digit number that will indicate the type of activity within the area as follows:

A	–	acrobatic
F	–	aircraft test
H	–	hang gliding
M	–	military operations
P	–	parachuting
S	–	soaring
T	–	training

Example: The identification code group CYA113(A) means the following:

CY	–	indicates Canada
A	–	indicates advisory
113	–	indicates the number of an area in British Columbia
(A)	–	indicates acrobatic activity takes place within the area.

All altitudes will be inclusive, unless otherwise indicated (e.g. 5 000 to 10 000 ft). To indicate when either the bottom or upper altitude is not included, the words below and above will be placed before the appropriate altitude (e.g. above 5 000 to 10 000 ft, or 5 000 to below 10 000 ft).

Danger Area (International Waters)

Any restricted area that may be established over international waters, but controlled by Canadian ATC, will be indicated as a "danger area" in accordance with ICAO requirements. ICAO defines a danger area as airspace of defined dimensions within which activities dangerous to the flight of aircraft may exist at specified times.

Advisory Airspace

Airspace may be classified as Class F advisory airspace if it is airspace within which an activity occurs that, for flight safety purposes, non-participating pilots should be aware of, such as training, parachuting, hang gliding, military operations, etc.

There are no specific restrictions that apply to the use of advisory airspace. VFR aircraft are, however, encouraged to avoid flight in advisory airspace unless participating in the activity taking place therein. If necessary, pilots of non-participating flights may enter advisory areas at their own discretion; however, due to the nature of the aerial activity, extra vigilance is recommended. Pilots of participating aircraft, as well as pilots flying through the area, are equally responsible for collision avoidance.

ATC will not clear IFR aircraft through Class F airspace, except if:

(a) the pilot states that permission has been obtained from the user agency to enter the airspace;

(b) the aircraft is operating on an altitude reservation approval (ALTRV APVL); or

(c) the aircraft has been cleared for a contact or visual approach.

IFR aircraft shall be provided 500 ft vertical separation from an active Class F advisory airspace, unless wake turbulence minima is applicable, in which case 1 000 ft vertical separation shall be applied.

Pilots intending to fly in Class F advisory airspace are encouraged to monitor an appropriate frequency, to broadcast their intentions when entering and leaving the area, and to communicate, as necessary, with other users to ensure flight safety in the airspace. In a Class F advisory uncontrolled airspace area, 126.7 MHz would be an appropriate frequency.

NOTE: Military operations in Class F airspace may be UHF only.

Restricted Airspace

A restricted area is airspace of defined dimensions above the land areas or territorial waters within which the flight

of aircraft is restricted in accordance with certain specified conditions. Restricted airspace is designated for safety purposes when the level or type of aerial activity, the surface activity, or the protection of a ground installation requires the application of restrictions within that airspace.

No person may conduct aerial activities within active Class F restricted airspace, unless permission has been obtained from the user agency. In some instances, the user agency may delegate the appropriate controlling agency the authority to approve access. IFR flights will not be cleared through active restricted areas, unless the pilot states that permission has been obtained.

The user agency is the civil or military agency or organization responsible for the activity for which the Class F airspace has been provided. It has the jurisdiction to authorize access to the airspace when it is classified restricted. The user agency must be identified for Class F restricted airspace, and where possible, it should be identified for Class F advisory airspace.

Special-use areas will be designated restricted areas and identified by the prefix CYR, followed by a three-digit number that identifies the location of the area.

Elements of existing airspace structure may also be designated as restricted airspace if it would facilitate the efficient flow of air traffic.

There are two additional methods of restricting airspace.

(a) CAR 601.16—*Issuance of NOTAM for Forest Fire Aircraft Operating Restrictions*, is designed to allow the Minister to issue a NOTAM to restrict flight around and over forest fire areas or areas where forest fire control operations are being conducted. The provisions of this section can be invoked quickly via NOTAM by Transport Canada (see RAC 2.9.2).

(b) Section 5.1 of the *Aeronautics Act* allows the Minister to restrict flight in any airspace, for any purpose, by NOTAM. This authority is delegated by the Minister to cover specific situations, such as well fires, disaster areas, etc., for the purpose of ensuring safety of flight for air operations in support of the occurrence.

It should be noted that airspace that is restricted by invoking CAR 601.16 or section 5.1 of the *Aeronautics Act* is not Class F restricted airspace; the airspace has not been classified in accordance with the airspace regulations. This distinction is important to those who are charged with the responsibility for restricting airspace, since their actions are governed by the provisions of the *Statutory Instruments Act*.

Joint-Use Airspace

Joint-use airspace is Class F airspace within which operations may be authorized by the controlling agency when it is not being utilized by the user agency.

Class F restricted airspace should be available for use by non-participating aircraft when all or part of the airspace is not required for its designated purpose.

To ensure maximum utilization of restricted airspace, user agencies should be encouraged to make restricted airspace available for the conduct of operations or training of other agencies or commands on a joint-use basis.

The ATC agency may be designated to provide air traffic control or information service within the Class F airspace involved. A controlling agency will normally be assigned when there is joint use of the airspace.

NOTAM

It is permissible to designate Class F restricted airspace by NOTAM, if the following prerequisites are met:

(a) the area of restricted airspace is required for a specified period of time of relative short duration (i.e. several hours or days); and

(b) the appropriate NOTAM is issued at least 24 hr in advance of the area's activation.

2.8.7 Class G Airspace

Class G airspace is airspace that has not been designated Class A, B, C, D, E or F, and within which ATC has neither the authority nor the responsibility to exercise control over air traffic.

However, ATS units do provide flight information and alerting services. The alerting service will automatically alert SAR authorities once an aircraft becomes overdue, which is normally determined from data contained in the flight plan or flight itinerary.

In effect, Class G is all uncontrolled domestic airspace.

Low-level air routes are contained within Class G airspace. They are basically the same as a low-level airway, except that they extend upwards from the surface of the earth and are not controlled. The lateral dimensions are identical to those of a low-level airway (see RAC 2.7.1).

2.9 OTHER AIRSPACE DIVISIONS

Additional airspace divisions have been designated in order to increase safety or make allowances for the remote or mountainous regions within Canada. These divisions (or regions) are: altimeter setting region, standard pressure region and designated mountainous region.

2.9.1 Altitude Reservation

An altitude reservation is airspace of defined dimensions within controlled airspace reserved for the use of a civil or military agency during a specified period. An altitude reservation may be confined to a fixed area (stationary) or moving in relation to the aircraft that operates within it (moving). Information on the description of each altitude reservation is normally published by NOTAM. Civil altitude reservations are normally for a single aircraft, while those for military use are normally for more than one aircraft.

Pilots should plan to avoid known altitude reservations. ATC will not clear an unauthorized flight into an active reservation. IFR and CVFR flights are provided with standard separation from altitude reservations.

2.9.2 Temporary Flight Restrictions—Forest Fires

In the interest of safe and efficient fire fighting operations, the Minister may issue a NOTAM restricting flights over a forest fire area to those operating at the request of the appropriate fire control authority (i.e. water bombers), or to those with written permission from the Minister.

The NOTAM would identify the following:

(a) the location and dimensions of the forest fire area;

(b) any airspace in which forest fire control operations are being conducted; and

(c) the length of time during which flights are restricted in the airspace.

No person shall operate an aircraft in the airspace below 3 000 ft AGL within 5 NM of the limits of a forest fire area, or as described in a NOTAM (CARs 601.15, 601.16, and 601.17).

2.9.3 Flight Operations Over or in the Vicinity of Nuclear Power Plants

Pilots are reminded that overflights of nuclear power plants shall be carried out in accordance with the provisions of CAR 602.14(2) (see RAC 5.4).

Pilots should also be aware that loitering in the vicinity of, or circling, nuclear power plants should be avoided. Aircraft observed operating in this manner in the vicinity of nuclear power plants could be intercepted by government or law-enforcement aircraft, and escorted away from the facility to the nearest suitable aerodrome to be interviewed by police authorities.

2.10 Altimeter Setting Region

The altimeter setting region is an airspace of defined dimensions below 18 000 feet ASL (see CAR 602.35 and Figure 2.9) within which the following altimeter setting procedures apply:

Departure – Prior to takeoff, the pilot shall set the aircraft altimeter to the current altimeter setting of that aerodrome or, if that altimeter setting is not available, to the elevation of the aerodrome.

En route – During flight the altimeter shall be set to the current altimeter setting of the nearest station along the route of flight or, where such stations are separated by more than 150 NM, the nearest station to the route of flight.

Arrival – When approaching the aerodrome of intended landing the altimeter shall be set to the current aerodrome altimeter setting, if available.

2.11 Standard Pressure Region

The standard pressure region includes all airspace over Canada at or above 18 000 feet ASL (the high level airspace), and all low level airspace that is outside of the lateral limit of the altimeter setting region (see Figure 2.9 and CAR 602.36). Within the standard pressure region the following flight procedures apply;

General – Except as otherwise indicated below, no person shall operate an aircraft within the standard pressure region unless the aircraft altimeter is set to standard pressure, which is 29.92 inches of mercury or 1013.2 mbs. (See *Note).*

Departure – Prior to takeoff the pilot shall set the aircraft altimeter to the current altimeter setting of that aerodrome or, if the altimeter setting is not available, to the elevation of that aerodrome. Immediately prior to reaching the flight level at which flight is to be conducted, the altimeter shall be set to standard pressure (29.92 inches of mercury or 1013.2 mbs). If the planned cruising flight level is above FL180, resetting the altimeter to 29.92 inches of mercury or 1013.2 mbs at 18 000 feet ASL is acceptable and meets the requirement of CAR 602.36.

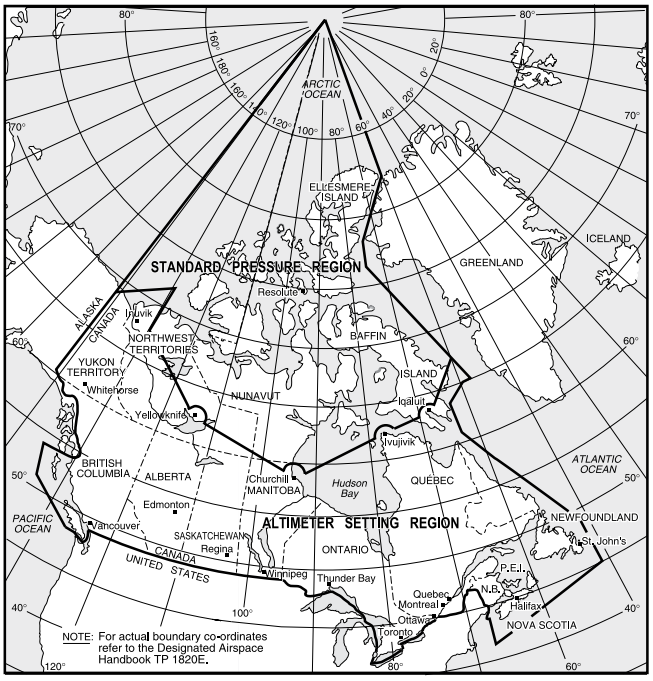
Arrival – Prior to commencing descent with the intention to land, the altimeter shall be set to the current altimeter setting of the aerodrome of intended landing, if available. However, if a holding procedure is conducted, the altimeter shall not be set to the current aerodrome altimeter setting until immediately prior to descending below the lowest flight level at which the holding procedure is conducted. Pilots of aircraft descending from cruising flight levels above FL180 may reset altimeters

to the current altimeter setting of the aerodrome of intended landing when approaching FL180 provided no holding or cruise level flight below FL180 is to be made or anticipated.

Transition – CAR *602.37 – Altimeter Setting and Operating Procedures in Transition betwee*n Regions, specifies that except as otherwise authorized by ATC, aircraft progressing from one region to another shall make the change in the altimeter setting while within the standard pressure region prior to entering, or after leaving, the altimeter setting region. If the transition is to be made into the altimeter setting region while in level cruising flight, the pilot should obtain the current altimeter setting from the nearest station along the route of flight as far as practical before reaching the point at which the transition is to be made. When climbing from the altimeter setting region into the standard pressure region, pilots shall set their altimeters to standard pressure (29.92 inches of mercury or 1013.2 mbs) immediately after entering the standard pressure region. When descending into the altimeter setting region, pilots shall set their altimeters to the appropriate station altimeter setting immediately prior to descending into the altimeter setting region. Normally, the pilot will receive the appropriate altimeter setting as part of the ATC clearance prior to descent. If it is not incorporated in the clearance, it should be requested by the pilot.

NOTE: When an aircraft is operating in the standard pressure region with standard pressure set on the altimeter subscale, the term "flight level" is used in lieu of "altitude" to express its height. Flight level is always expressed in hundreds of feet. For example FL250 represents an altimeter indication of 25 000 feet; FL50, an indication of 5 000 feet.

Figure 2.9 – Altimeter Setting and Standard Pressure Regions



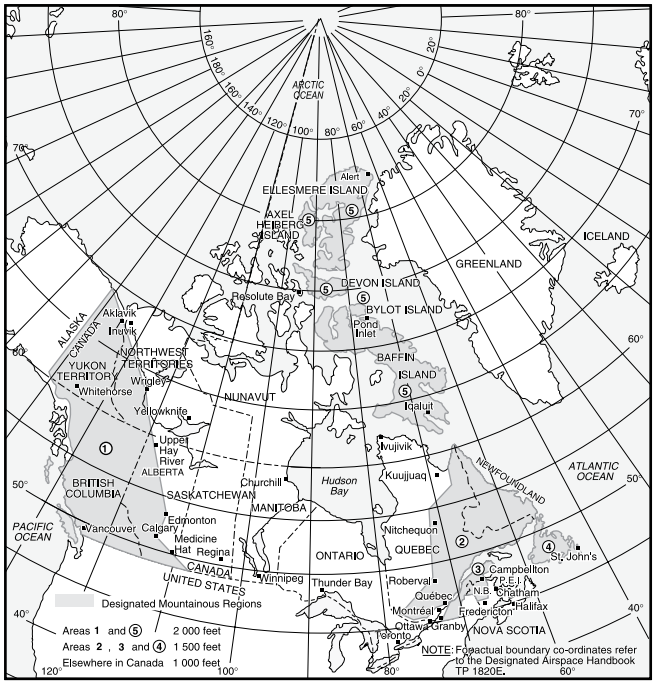
2.12 Mountainous Regions

Designated mountainous regions are areas of defined lateral dimensions, specifie*d in the Designated Airspace* Handbook, above which special rules concerning minimum IFR altitudes to ensure obstacle clearance (CAR 602.124) apply.

An aircraft, when operated in accordance with IFR within designated mountainous regions, but outside of areas for which minimum altitudes for IFR operations have been established (including minimum radar vectoring altitudes, MOCAs, transition altitudes, 100NM safe altitudes, MSAs and AMAs), shall be flown at an altitude of at least 2000 feet above the highest obstacle within 5NM of the aircraft in flight when in areas 1 and 5, and at least 1500 feet above the highest obstacle within 5NM when in areas 2, 3 and 4. (See Figure 2.10.)

As minimum enroute IFR altitudes have been established for designated airways and air routes, such minimum altitudes shall be applied when flying in accordance with IFR along airways or air routes within designated mountainous regions, except that aircraft should be operated at an altitude which is at least 1000 feet higher than the minimum enroute IFR altitude, when there are large variations in temperature and/or pressure. (See RAC 8.6)

Figure 2.10 – Designated Mountainous Regions in Canada



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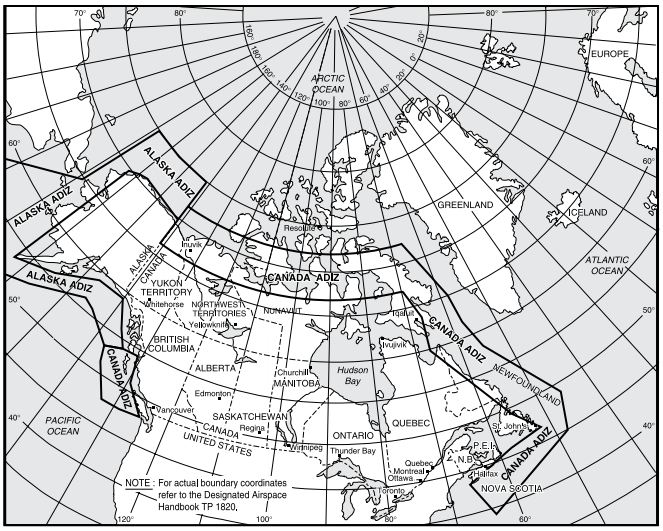
2.13 Emergency Communications and Security

The rules for operating within the Air Defence Identification Zone (ADIZ) are specified in CAR 602.145 – ADIZ, and are repeated in RAC 3.9.

Figure 2.11 – Air Defence Identification Zone



3.0 FLIGHT PLANNING

3.1 General

The flight planning requirements contained in this Section are based, in part, on the CAR, Part VI, General Operating and Flight Rules.

The pilot-in-command of an aircraft shall, before commencing a flight, be familiar with the available information that is appropriate to the intended flight (CAR 602.71).

The pilot-in-command of an aircraft shall, before commencing a flight, be familiar with the available weather information that is appropriate to the intended flight (CAR 602.72). Pilots should refer to the MET Section for aviation weather information.

3.2 Pilot Briefing Service

The pilot briefing service is provided by FICs to assist pilots at the pre-flight planning stage and for information updates while en route. Pilot requests for initial briefings while airborne are not encouraged because this practice leads to frequency congestion.

The telephone numbers of NAV CANADA FICs are found in the General and Aerodrome/Facility Directory sections of the CFS or CWAS. Long distance phone calls can be made to an FIC toll-free at 1-866-WXBRIEF (1-866-992-7433). A call to this number is routed to the FIC that serves the area from which the call originates. A call to 1-866-GOMÉTÉO (1-866-466-3836) is routed to the Québec FIC for the provision of bilingual service. A specific FIC may be contacted at the number shown in the CFS or CWAS, General section, Flight Planning (FLT PLN) sub-section. Collect calls from pilots are accepted at all FICs.

When requesting a briefing, identify yourself as a pilot; provide the aircraft identification and the following:

(a) type of flight (VFR, IFR, CVFR, composite) planned;

(b) type of aircraft;

(c) aerodrome of departure and estimated time of departure (ETD);

(d) destination aerodrome and estimated elapsed time (EET);

(e) planned cruising level(s) or altitude(s);

(f) route to be flown and estimated times of arrival at, and departure from, any intermediate aerodrome(s);

(g) alternate aerodrome, if appropriate;

(h) type of meteorological information requested, i.e. whether a briefing or consultation; and

(i) information already on hand, if any.

The flight service specialist requires this information to tailor the briefing to the planned flight and the needs of the pilot. The flight service specialist may omit information normally provided in a briefing if the pilot has indicated having the data on hand or requested the briefing be limited to specific information. The flight service specialist will terminate the briefing by soliciting flight plan information not already obtained at the beginning of the briefing and PIREP, if appropriate. (See RAC 3.16 for details concerning flight plan content).

3.3 Aeronautical Information

Aeronautical information (NOTAM, RSC, CRFI, flow control, etc.) is available at ATS units and at certain operations offices. Aeronautical information is routinely provided by FICs during a pilot briefing and upon request in FISE. Telephone numbers and RCO frequencies for all FICs are listed in the CFS and the CWAS.

Canadian domestic NOTAMs are disseminated via AFTN and stored electronically on a NOTAM file concept. There are three categories of NOTAM files: National NOTAMs, FIR NOTAMs and aerodrome NOTAMs. Before commencing a flight, pilots must ensure that each NOTAM file category has been reviewed, in order to be familiar with all NOTAMs appropriate to the intended flight (see MAP 5.0 for details).

Canadian domestic and international NOTAMs have different distribution lists. Only Canadian domestic NOTAMs that concern international flights are sent out internationally (in the ICAO format). All pertinent Canadian domestic NOTAM files must be consulted to obtain NOTAM information for flights within Canada (see MAP 5.2 for details).

3.4 DUATS

Flight plans and flight itineraries may also be filed via DUATS.

3.5 Weight and Balance Control

3.5.1 Definitions

The following definitions and abbreviations are used in weight and balance control:

(a) *Actual Weight*: With respect to weight and balance control, weight obtained by actually weighing all passengers, personal clothing and carry-on baggage just before boarding the flight. When weighing scales are not available or serviceable, the following weights may be used instead of the actual weight of each passenger:

(i) Volunteered Weight: Weight obtained by asking the passenger for his or her weight, adding 4.5 kg (10 lbs) to the disclosed value, and using the result as the passenger's weight; or

(ii) Estimated Weight: Weight obtained by making a reasonable estimate of the passenger's weight when actual weight or volunteered weight is not provided.

NOTE: In all cases, the allowances for passenger clothing and carry-on baggage should be included in the weight of the passenger.

(b) *Air Operator Segmented Weight*: Approved segmented weights derived by the air operator from statistically computed data in accordance with procedures that are acceptable to the Minister. These weights may be used instead of the segmented weights published by TCCA and are applicable only to that air operator. Furthermore, they may be used only in the circumstances consistent with those under which the survey was conducted.

(c) *Air Operator Standard Weight*: Approved standard weights derived by the air operator from statistically computed data in accordance with procedures that are acceptable to the Minister. These may be used instead of the standard weights published by TCCA and are applicable only to that air operator. Furthermore, they may be used only in the circumstances consistent with those under which the survey was conducted.

(d) *Basic Empty Weight:* Basic weight of the aircraft as determined in accordance with the Aircraft Flight Manual (AFM).

(e) *Carry-On Baggage*: Baggage that a passenger carries on board; its weight should be included in the weight of each passenger. Based on the particular aircraft stowage limitations, the operator may limit the number, size, shape and weight of the carry-on baggage so it can be stowed under the passenger's seat or in the storage compartment. Otherwise, the standard allowance is 5.9 kg (13 lbs) of carry-on baggage per passenger, a figure that remains the same throughout the year.

NOTE: The only circumstance under which the weight of the carry-on baggage may not be added to the weight of each passenger is when no carry-on baggage is permitted on the flight.

(f) *Checked Baggage*: Bags that are individually checked in, weighed and placed in the cargo compartment of the aircraft. This includes bags that are too large to be placed in the cabin of the aircraft and bags that are required to be carried in the cargo compartment by regulation, security program, or company policy. For bags checked plane-side, see the definition for plane-side loaded bags.

(g) *Empty Weight*: Total weight of the following parts or contents, which are part of, or carried on board, the aircraft:

(i) the airframe, including the rotor of a helicopter or gyroplane;

(ii) the power plant;

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(iii) the fixed ballast;
(iv) the unusable fuel;
(v) the maximum amount of normal operating fluids, including oil, power-plant coolant, hydraulic fluid, de-icing fluid and anti-icing fluid, but not including potable water, lavatory pre-charge fluid or fluid intended for injection into the engines; and
(vi) all of the installed equipment.

(h) *Female to Male Mix Ratio*: Ratio of female to male passengers who are actually carried on board a flight, often expressed as a percentage, and that is independent of the aircraft certificated seating capacity.

(i) *Large Aeroplane*: Aeroplane with an MCTOW of over 5 700 kg (12 566 lbs).

(j) *Maximum Certificated Take-Off Weight (MCTOW)*: Weight identified as such in the type certificate of an aircraft.

(k) *Maximum Permissible Take-Off Weight or Maximum Take-Off Weight (MTOW)*: Maximum take-off weight for an aircraft as authorized by the aircraft's state of registry or as provided for in the aircraft type certificate.

(l) *On-Board Weight and Balance System*: System that weighs the aircraft and its payload, then calculates the CG using equipment on board the aircraft.

(m) *Operational Empty Weight*: Actual weight of the aircraft before loading for dispatch, consisting of the aircraft basic empty weight. The operational empty weight may include removable equipment, flight crew members and crew members (including baggage), oil, unusable fuel, as well as emergency equipment, and should be defined by the air operator.

(n) *Operations Personnel*: Personnel whose duties and responsibilities involve maintenance, loading, unloading, dispatching, servicing, weight and balance, passenger escort, scheduling, de-icing, or working on the ramp. This also includes members of the flight crew and cabin crew, as well as anyone involved in the aircraft's operation.

(o) *Passenger*: Person, other than a crew member, who is carried on board an aircraft and, for weight and balance control, is categorized as:
(i) Adult: Person, regardless of sex, who is aged 12 years or older and who may be subcategorized as male or female;
(ii) Child: Person who is between 2 to less than 12 years of age; or
(iii) Infant: Person who is less than 2 years of age.

(p) *Personal Clothing*: Weight of personal clothing that a passenger carries on board the aircraft, which is standardized as 3.6 kg (8 lbs) for summer and 6.4 kg (14 lbs) for winter, and that must be added to the passenger's weight for the purpose of weight and balance calculation.

(q) *Plane-Side Loaded Bag*: Any bag or item that is placed at the door or steps of an aircraft because it cannot be accommodated as carry-on baggage and that is subsequently placed in the aircraft cargo compartment or cargo bin.

(r) *Segmented Weight*: Statistically derived average passenger weight modified by appropriate standard deviations to increase the likelihood that the actual weight will not exceed the average weight. Segmented weights are further modified to cater for variations in aircraft passenger seating capacity and the distribution of passengers according to sex. They are designed to be representative of the average weight of adult passengers, including personal clothing and carry-on baggage allowances, and are intended for use in weight and balance calculation of aircraft. In a Canadian context, segmented weights are applicable for aircraft that are certificated for 5 to 11 (inclusive) passenger seats.

(s) *Small Aircraft*: Aeroplane with a maximum permissible take-off weight of 5 700 kg (12 566 lbs) or less, or a helicopter with a maximum permissible take-off weight of 2 730 kg (6 018 lbs) or less.

(t) *Standard Weight*: Weights published by TCCA as standard average passenger weights, including personal clothing and carry-on baggage allowances, for use in weight and balance calculations that do not involve actual weighing.

3.5.2 Weight Control

Pilots must recognize the effect of weight and balance on the performance and handling of aircraft, particularly in combination with performance-reducing factors, such as contaminated runways, aircraft icing, degraded engine performance, severe or uncoordinated manoeuvres, turbulence, high ambient temperatures and emergency situations.

It is mandatory to calculate weight and balance accurately for every flight and ensure that they are within the aircraft's permissible limits in order to comply with the aircraft airworthiness certificate and conform to the regulations. Before the aircraft takes off, it is equally important that the pilot-in-command (PIC) of the aircraft ensures that the load carried by the aircraft is of an appropriate weight and distributed and secured in such a way that it may be carried safely on the intended flight. If weight and centre-of-gravity (balance) limitations are not observed, the pilot is failing to comply with a legal condition for the operation of the aircraft, which therefore nullifies its airworthiness certificate.

It must be recognized that with many four- and six-seat aircraft, it is not possible to fill all the seats, use the maximum baggage allowance, fill all the fuel tanks and still remain within the approved weight and centre-of-gravity limitations.

Estimating baggage weight can result in gross inaccuracies. If it is possible that the aircraft is operating close to its maximum

take-off weight, the baggage must be weighed. Even a pocket-sized spring balance can be used as a handy standby if weighing scales are not available. This reduces the risk involved in guesswork. Note that on some aircraft, restrictions are placed on rear-seat occupancy if the maximum baggage allowance is used. When the aircraft is carrying freight, check for discrepancies with the declared weight. Ensure the weight per unit area limitation on the baggage compartment floor is not exceeded. It is critical to ensure that the baggage/freight is properly stowed, cannot move during flight, and does not obstruct exits or access to emergency equipment.

If the aircraft is suspected to be operating anywhere close to its maximum weight, passengers must be weighed. The risk of embarrassment is not a reason for risking safety or crossing weight limits. It is important to remember that a passenger's weight is not his or her stripped weight, but must include personal clothing and carry-on baggage allowances.

Fuel is supplied in pounds (lbs), kilograms (kg), litres (l) or gallons (gal). Pilots should note which unit is being used and calculate the fuel weight accordingly. Incorrect conversion could be hazardous in terms of endurance and fuel weight estimation.

3.5.3 Balance

Balance refers to the location of the centre of gravity (CG) along the longitudinal axis of the aircraft. There are forward and aft limits established during certification flight testing; they are the maximum CG positions at which the longitudinal stability requirements can be met. If an aircraft is being operated outside these limits, its handling is either unsatisfactory or has not been investigated. The limits for each aircraft are contained in the Pilot Operating Handbook and the Aircraft Flight Manual (AFM). The aircraft must not be flown outside these limits.

In many aircraft, there is significant CG movement as fuel is being consumed. Pilots should familiarize themselves with the CG movement associated with fuel consumption in their aircraft.

3.5.4 Operational Requirements

It is the responsibility of the PIC of the aircraft to ensure that the weight and balance report of the flight accurately represents the actual load and that the actual load does not exceed the maximum allowable weight limits specified in the AFM for any phase of the flight.

The report may be prepared by the crew or another qualified person authorized by the company or the operator of the aircraft.

Companies and operators may establish specific procedures with respect to preparing and retaining weight and balance documentation in order to meet regulatory requirements and standards, as applicable.

3.5.5 Computerized Systems

When a company or operator generates load data from a computerized weight and balance system, the integrity of the output data must be checked at regular intervals (preferably not greater than 6 months). The length of the intervals must be specified in the company operations manual.

There must be a means in place to identify the person inputting the data for the preparation of every load manifest. Moreover, the identity of that person must be verified and authenticated by the system and retained as required.

3.5.6 Segmented Weights

In practice, it was found that the use of standard passenger weights, regardless of aircraft size, increases the probability of overloading the aircraft when its passenger-carrying capacity decreases, and vice versa. For example, when the standard passenger weight is used for an aircraft certificated for 12 passengers, like the Twin Otter, the statistical probability of overloading the aircraft is as high as 25%, whereas when used for large passenger aircraft, like the Boeing 747, this probability diminishes to 0.0014%.

Furthermore, a single weight could not account for the weight differences between men and women and cater for variations in aircraft seating capacity. To minimize the probability of overloading the aircraft, an alternative to standard passenger weights, called segmented weights, was implemented. It is based on the seating capacity of the aircraft and accounts for weight differences between men and women. In order to obtain more accurate results, two tables were designed, one for summer and one for winter, to cater for seasonal variations.

When using segmented weights, a person can be 95% confident that the actual total weight of passengers will not exceed the total weight of passengers obtained by using segmented weights for the given number of passengers on board.

3.5.6.1 Derivation of Segmented Weights

A specific methodology was used to calculate the precise values published in the segmented weight tables. First, TCCA updated the average weight of Canadian males and females aged 12 and over based on a study entitled the Canadian Community Health Survey (CCHS), Cycle 2.1 (2003), which obtained large-scale weight data by surveying some 130 000 Canadians through interviews. Next, standard deviations of 16.8 kg (37 lbs) for males and 14.6 kg (32.2 lbs) for females were applied to obtain a revised average weight for each sex. These weights were modified again to cater for specific seating capacity ranges of the aircraft so as to be representative of the highest average weight amongst all sample sizes for that range. These values were further revised to cater for the various female to male passengers mix ratios. A constant value of 5.9 kg (13 lbs) for carry-on baggage was then added to obtain the average weight of a passenger, regardless of sex. Finally, two tables were developed to cater for seasonal variations in

personal clothing—one for summer, which included 3.6 kg (8 lbs) for summer clothing, and the other for winter, which included 6.4 kg (14 lbs) for winter clothing. These tables are reproduced below (see segmented weight tables).

3.5.7 Computation of Passenger and Baggage Weights

(a) The following methods are used to calculate the weight of passengers and baggage. In all cases, the allowances for personal clothing and carry-on baggage are included in the passenger's weight. Checked bags are individually weighed, and their weight is included when calculating the aircraft passenger and baggage load.

(i) Actual Weights: By actually weighing all passengers, personal clothing and carry-on baggage. In such cases, standard allowances for personal clothing and carry-on baggage should not be used;

(ii) Standard Weights: By using standard weights, which could be published by TCCA or established by air operators; or

(iii) Segmented Weights: By using segmented weights, which could be published by TCCA or established by air operators.

NOTE: For aircraft with a passenger seating capacity of less than 5, the use of actual weights provides the greatest accuracy in calculating the weight and balance of the aircraft. The use of standard or segmented passenger weights is not recommended.

(b) By Actual Weights:

(i) In determining the actual weight by weighing, an air operator must ensure that personal clothing and carry-on baggage are also actually weighed. Weighing should be conducted just before boarding (to avoid the chances of the passenger acquiring additional load just before boarding the aircraft).

(ii) When a passenger refuses to be weighed, the air operator should ask the passenger to volunteer their weight (volunteered weight); if they refuse, the air operator should estimate their weight (estimated weight), ensuring in both cases that the allowances for personal clothing and carry-on baggage are included in the passenger's weight.

(iii) Personnel boarding passengers based on volunteered weights or estimated weights should be able to assess the validity of the disclosed weight or estimate passengers' weight with a reasonable degree of accuracy; they should also take great care to avoid gross inaccuracies. Due diligence should be exercised to ensure that the passenger weights used to calculate the passenger and baggage load accurately reflect the actual weight to be carried on any given flight.

(c) By Standard Weights:

(i) The weight of each passenger is calculated using standard weights published by TCCA or established by the air operator. In such cases, a standard allowance for personal clothing and carry-on baggage is included in the weight of each passenger. The standard weights are reproduced in the tables below (Table 1 – Standard Weights of Passengers Aged 12 Years or Older and Table 4 – Standard Weights of Children and Infants).

(d) By Segmented Weights:

(i) Segmented weights should be used only when actual weights are not available or cannot be implemented; they are not applicable for aircraft certificated for 12 or more passenger seats. Subpart 703 prohibits air operators from using standard weights. Instead, they are recommended to use either actual weights or the segmented weights that are published by TCCA or established by the air operator.

(ii) In order to use these tables, an air operator must follow these steps:

Step 1: Select the applicable summer or winter table.

Step 2: Select the row that is applicable to the maximum certificated passenger seating capacity range of the aircraft (not the number of passengers on board the flight).

Step 3: Select the column that represents the mix ratio of female to male passengers in percentage (may be interpolated to derive a meaningful female to male passengers mix ratio).

Step 4: Determine the applicable weight value, published or interpolated, for each passenger aged 12 or over. The cell at the intersection of the row that represents the maximum certificated passenger seating capacity range and the column that represents the passenger mix ratio, either published or interpolated, should contain the weight value to be used.

Step 5: Multiply the weight value obtained in Step 4 by the number of passengers aged 12 or older on board (not the certificated seating capacity), regardless of sex, to calculate the total weight of adult passengers (including personal clothing and carry-on baggage).

NOTE: Actual weights should be used on any flight identified as carrying a significant number of passengers whose weight or number of carry-on bags are deemed to be in excess of those specified in the segmented weights published by TCCA or established by the air operator.

(e) When Carry-On Baggage Weight Is Not Included: The only circumstance under which the weight of the carry-on baggage may not be included in the actual weight of each passenger is in the case of flights on which passenger carry-on baggage is not permitted.

(f) Weight of Children and Infants:
  (i) Infants should be weighed with the accompanying adult. When an infant's weight is over 10% of the adult passenger's weight, the infant's weight should be included separately at the rate of 13.6 kg (30 lbs) per infant.
  (ii) Infants occupying separate seats should be treated as children for the purpose of weight and balance calculation, and their weight should be included at the standard rate per child.
  (iii) Each child should be weighed, or their weight should be included at the standard rate.
  (iv) Standard weights of children and infants are indicated in Table 4 below.

TABLE 1 – STANDARD WEIGHTS OF PASSENGERS AGED 12 YEARS OR OLDER

(**NOTE**: These average weights are obtained from a Statistics Canada survey entitled Canadian Community Health Survey - Cycle 2.1, 2003.)

Summer		Winter
200 lbs or 90.7 kg	MALES (12 yrs up)	206 lbs or 93.4 kg
165 lbs or 74.8 kg	FEMALES (12 yrs up)	171 lbs or 77.5 kg

TABLE 2 – SEGMENTED WEIGHTS OF PASSENGERS AGED 12 YEARS OR OLDER
(IN POUNDS; SUMMER)

Maximum Certificated Passenger Seating Capacity	Ratio of Male (M) to Female (F) Passengers (in Percentages)										
	0M/100F	10M/90F	20M/80F	30M/70F	40M/60F	50M/50F	60M/40F	70M/30F	80M/20F	90M/10F	100M/0F
1 to 4	Use Actual Weights, Volunteered Weights or Estimated Weights										
5	196	200	204	208	212	216	220	224	228	232	236
6 to 8	192	196	200	204	208	211	215	219	223	227	231
9 to 11	185	189	193	197	201	204	208	212	216	220	223

TABLE 3 – SEGMENTED WEIGHTS OF PASSENGERS AGED 12 YEARS OR OLDER
(IN POUNDS; WINTER)

Maximum Certificated Passenger Seating Capacity	Ratio of Male (M) to Female (F) Passengers (in Percentages)										
	0M/100F	10M/90F	20M/80F	30M/70F	40M/60F	50M/50F	60M/40F	70M/30F	80M/20F	90M/10F	100M/0F
1 to 4	Use Actual Weights, Volunteered Weights or Estimated Weights										
5	202	206	210	214	218	222	226	230	234	238	242
6 to 8	198	202	206	210	214	217	221	225	229	233	237
9 to 11	191	195	199	203	207	210	214	218	222	226	229

NOTE: Multiply pounds (lbs) by 0.4536 to obtain kilogram (kg) value and correct to first decimal place. For example: To convert 220 lbs to kg, complete the calculation below.

=220 x 0.45360
=99.792
=99.8 kg

TABLE 4 – STANDARD WEIGHTS OF CHILDREN AND INFANTS

Summer		Winter
75 lbs or 34 kg	Children 2–11 years of age	75 lbs or 34 kg
30 lbs or 13.6 kg	Infants less than 2 years of age	30 lbs or 13.6 kg

(g) Checked Baggage and Cargo: The air operator must use the actual weight of checked baggage and cargo.

3.5.8 Fuel and Oil Weights

Fuel and oil weights were obtained from the Canadian Government Standards Bureau specifications. It should be remembered that the capacity of tanks is often expressed in U.S. gallons. The standard weights of fuel and oil are:

Temperature	-40°C			-20°C			0°C			15°C			30°C		
Fuel	LBS per			LBS per			LBS per			LBS per			LBS per		
	litre	imp. gal.	U.S. gal.	litre	imp. gal.	U.S. gal.	litre	imp. gal.	U.S. gal.	litre	imp. gal.	U.S. gal.	litre	imp. gal.	U.S. gal.
Aviation Kerosene CAN 2-3, 23-M81 (JET A, JET A-1, JET A-2) and Arctic Diesel	1.93	8.80	7.32	1.90	8.65	7.19	1.87	8.50	7.09	1.85	8.39	7.00	1.83	8.27	6.91
Aviation Wide Cut Fuel CAN 2-3, 23-M80 [F-40 (JP4) and JET B]	1.85	8.38	6.99	1.82	8.24	6.88	1.79	8.11	6.78	1.77	8.01	6.68	1.74	7.92	6.60
Aviation Gasoline All Grades CAN 2-3, 25-M82 (AV GAS)	1.69	7.68	6.41	1.65	7.50	6.26	1.62	7.33	6.12	1.59	7.20	6.01	1.56	7.07	5.90

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Temperature	-10°C			0°C			10°C			20°C			30°C		
Lubricating oil	LBS per			LBS per			LBS per			LBS per			LBS per		
	litre	imp. gal.	U.S. gal.	litre	imp. gal.	U.S. gal.	litre	imp. gal.	U.S. gal.	litre	imp. gal.	U.S. gal.	litre	imp. gal.	U.S. gal.
Piston Engine 65 Grade	1.98	8.98	7.46	1.97	8.92	7.46	1.95	8.85	7.38	1.94	8.78	7.33	1.92	8.71	7.28
120 Grade	2.01	9.10	7.59	1.99	9.03	7.54	1.97	8.96	7.46	1.96	8.88	7.41	1.94	8.82	7.35

Turbine engine lubricating oil densities at 15˚C

3cS oils 2.09 lbs/litre; 9.4 lbs/imp. gal.; 7.92 lbs/U.S. gal.

5cS oils 2.15 lbs/litre; 10.1 lbs/imp. gal.; 8.14 lbs/U.S. gal.

NOTE: The weights shown are for the maximum density of the various temperatures. The actual fuel weight for specific conditions can usually be obtained from the dealer supplying the fuel.

Conversion factors for litres to imperial gallons and kilograms to pounds are found in GEN 1.9.2.

3.6 Flight Plans and Flight Itineraries

3.6.1 When Required

CAR 602.73 states that no pilot-in-command shall operate an aircraft in VFR flight unless a VFR flight plan or a VFR flight itinerary has been filed, except where the flight is conducted within 25 NM of the departure aerodrome.

No pilot-in-command shall operate an aircraft in IFR flight unless an IFR flight plan has been filed. A pilot-in-command may file an IFR flight itinerary instead of an IFR flight plan where:

(a) the flight is conducted, in part or in whole, outside controlled airspace; or

(b) facilities are inadequate to permit the communication of flight plan information to an ATC unit, an FSS or a CARS.

Notwithstanding any of the requirements mentioned above, pilots are required to file a flight plan when operating between Canada and a foreign state.

3.6.2 Filing (CAR 602.75)

602.75

(1) A flight plan shall be filed with an air traffic control unit, a flight service station or a community aerodrome radio station.

(2) A flight itinerary shall be filed with a responsible person, an air traffic control unit, a flight service station or a community aerodrome radio station.

(3) A flight plan or flight itinerary, shall be filed by

(a) sending, delivering or otherwise communicating the flight plan or flight itinerary or the information contained therein; and

(b) receiving acknowledgement that the flight plan or flight itinerary or the information contained therein has been received.

A "responsible person" means an individual who has agreed with the person who has filed a flight itinerary to ensure that, if the aircraft is overdue, the following are notified in the manner prescribed in this Section:

(a) an ATC unit, an FSS or a CARS; or

(b) an RCC.

NOTES: 1. The notification requires the flight itinerary information.

2. The expression flight service station used in the regulation includes a FIC. Flight plan information should be filed with an FIC, where complete briefing information is available. An IFR flight plan should be submitted to the flight planning section of an ACC.

The timely filing of IFR flight plans or flight itineraries is essential to allow ATC personnel time to extract and record the relevant content, correlate these new data with available information on other traffic under control, coordinate as necessary, and determine how the flight may best be integrated with the other traffic.

Accordingly, in order to assist ATS in improving the service provided and to allow sufficient time for input into the ATS data processing system, pilots are encouraged to file IFR flight plans or flight itineraries as early as practicable, preferably at least 30 min prior to their proposed departure time. Pilots

are expected to depart in accordance with the flight plan ETD. Some delay could be experienced if an IFR clearance is required less than 30 min after filing. It is also important that ATS be informed of the circumstances if commencement of an IFR flight is to be delayed. IFR flight itineraries are limited to one departure from and one entry into controlled airspace; multiple exits and entries into controlled airspace will not be accepted by ATS.

3.6.3 Flight Plan Requirements—Flights Between Canada and a Foreign State

A VFR or IFR flight plan must be filed prior to conducting any flight between Canada and a foreign state. If the flight is to any country other than the U.S., an ICAO flight plan must be filed.

For transborder flights departing from Canada to the U.S. or from the U.S. to Canada, it is solely the pilot's responsibility to make sure that U.S. Customs is properly notified. Failure to do so may subject the pilot to a penalty. (See FAL 2.3.2 for additional details).

ADCUS notification is no longer accepted on flight plans for transborder flights departing from Canada to the U.S. or from the U.S. to Canada. Pilots must make their own customs arrangements before departing on a transborder flight.

3.6.4 Opening a VFR Flight Plan or Flight Itinerary

A VFR flight plan or flight itinerary should normally be opened with a TWR, an FSS, an FIC or a CARS upon departure to activate the alerting service. The pilot is responsible for extending or cancelling the flight plan or flight itinerary if the flight is delayed or cancelled. If an extension or cancellation is not received by the proposed departure time, the responsible ATS unit will activate the flight plan or flight itinerary, using the ETD as the actual time of departure (ATD).

3.7 Changes To The Information In A Flight Plan Or Flight Itinerary

Since control and alerting services are based primarily on information provided by the pilot, it is essential that modifications to flight plans and flight itineraries be communicated to an ATC unit, an FIC, a CARS or, as applicable, a responsible person concerned, as soon as practicable.

3.7.1 VFR Flight Plan or Flight Itinerary

CAR 602.76(3) and (4) specify that a pilot "shall notify as soon as practicable an air traffic control unit, a flight service station, a community aerodrome radio station or the responsible person," of any change to:

(a) the route of flight,

(b) the duration of the flight; or

(c) the destination aerodrome.

3.7.2 IFR Flight Plan or Flight Itinerary

CAR 602.76(1) and (2) specify that a pilot shall notify as soon as practicable an air traffic control unit, a flight service station, a community aerodrome radio station or a responsible person, as the case may be, of any change to:

(a) the cruising altitude or cruising flight level;

(b) the route of flight;

(c) the destination aerodrome;

(d) when in controlled airspace:
- (i) the true airspeed at the cruising altitude or cruising level where the change intended is 5% or more of the TAS specified in the IFR flight plan; or
- (ii) the Mach number, where the change intended is 0.01 or more of the Mach number that has been included in the ATC clearance.

Where the flight is being conducted in controlled airspace, the pilot shall receive ATC clearance before making the intended change.

3.8 Composite Flight Plan Or Flight Itinerary—VFR And IFR

A composite flight plan or flight itinerary may be filed that describes part(s) of the route as operating under VFR and part(s) of the route as operating under IFR. All rules governing VFR or IFR apply to that portion of the route of flight. A composite flight plan or flight itinerary shall not be filed for an aircraft that will enter airspace controlled by the FAA, including CDA delegated to the FAA, as composite data cannot be correctly processed between NAV CANADA and FAA systems.

A pilot who files IFR for the first part of a flight and VFR for the next part will be cleared by ATC to the point within controlled airspace at which the IFR part of the flight ends. A pilot who files VFR for the first part of a flight and IFR for the next part is expected to contact the appropriate ATC unit for clearance prior to approaching the point where the IFR portion of the flight commences. If direct contact with an ATC unit is not possible, the pilot may request ATC clearance through an FIC. It is important that the flight continue under VFR conditions until appropriate IFR clearance within controlled airspace is issued by ATC and acknowledged by the pilot.

3.9 Defence VFR Flight Plans and Defence Flight Itineraries (CAR 602.145)

CAR 602.145 outlines the requirements when operating into or within the Air Defence Identification Zone (ADIZ). In order to ensure that the Air Traffic System (ATS) is aware that VFR flights will be operating into or within the ADIZ, ATS requires that pilots file a Defence Flight Plan or Flight Itinerary as depicted at RAC 3.16.2.

CAR 602.145 ADIZ states:

602.145 ADIZ

(1) This Section applies in respect of aircraft before entering into and while operating within the ADIZ, the dimensions of which are specified *in the Designated Airspace* Handbook.

(2) Every flight plan or flight itinerary required to be filed pursuant to this Section shall be filed with an air traffic control unit, a flight service station or a community aerodrome radio station.

(3) The pilot-in-command of an aircraft whose point of departure within the ADIZ or last point of departure before entering the ADIZ has facilities for the transmission of flight plan or flight itinerary information shall:
- (a) before takeoff, file a defence flight plan or defence flight itinerary;
- (b) in the case of a VFR aircraft where the point of departure is outside the ADIZ,
  - (i) indicate in the flight plan or flight itinerary the estimated time and point of ADIZ entry, and
  - (ii) as soon as possible after takeoff, communicate by radio to an air traffic control unit, a flight service station or a community aerodrome radio station a position report of the aircraft's location, altitude, aerodrome of departure and estimated time and point of ADIZ entry; and
- (c) in the case of a VFR aircraft where the point of departure is within the ADIZ, as soon as possible after takeoff, communicate by radio to an air traffic control unit, a flight service station or a community aerodrome radio station a position report of the aircraft's location, altitude and aerodrome of departure.

(4) The pilot-in-command of an aircraft whose point of departure within the ADIZ or last point of departure before entering the ADIZ does not have facilities for the transmission of flight plan or flight itinerary information shall:
- (a) as soon as possible after takeoff, file by radio communication a flight plan or flight itinerary; and
- (b) in the case of a VFR aircraft, indicate in the flight plan or flight itinerary the estimated time and point of ADIZ entry, if applicable.

(5) The pilot-in-command of a VFR aircraft shall revise the estimated time and point of ADIZ entry and inform an air traffic control unit, a flight service station or a community aerodrome radio station, when the aircraft is not expected to arrive:
- (a) within plus or minus five minutes of the estimated time at:
  - (i) a reporting point,
  - (ii) the point of ADIZ entry, or
  - (iii) the point of destination within the ADIZ; or
- (b) within 20 nautical miles of:
  - (i) the estimated point of ADIZ entry, or
  - (ii) the centreline of the route of flight indicated in the flight plan or flight itinerary.

3.10 Intermediate Stops

Intermediate stops may not be included in a single IFR flight plan. Except for transborder flights, a single VFR flight plan or an IFR or VFR flight itinerary including one or more intermediate stops en route may be filed provided:

(a) for VFR flight plans, the stop will be of short duration (for purposes such as boarding passengers, and refuelling);

(b) for IFR flight itineraries, the stop will be in uncontrolled airspace; and

(c) each intermediate stop is indicated by repeating the name of the stopping point and its duration in the route Section of the flight plan/itinerary. Record the duration of the stopover in hours and minutes with four consecutive digits. Example: CYXU 0045 CYXU. You may include a phone number for the stopover in the "Remark" section of the flight plan or flight itinerary, if available, as this may be useful in case of search and rescue.

Transborder Canada / U.S.A. flight plans shall be filed to the customs point of entry only to avoid unnecessary alerting service procedures from being initiated due to delays created in the process of clearing customs. Flight plans for locations beyond the customs point of entry may be filed with an FAA Flight Service Station.

When intermediate stops are planned, the "Estimated Elapsed Time" must be calculated as the total time to the final destination, including the duration of the intermediate stop(s). It should be noted that Search and Rescue (SAR) action would only be initiated at the specified SAR time or, in the event that a SAR time is not indicated, 60 minutes for a flight plan and 24 hours for a flight itinerary after the ETA at the final destination. Pilots wishing SAR action based on every leg of a flight should file one flight plan or flight itinerary for each stop.

3.10.1 Consecutive IFR Flight Plans

Consecutive IFR flight plans may be filed at the initial point of departure providing the following points are adhered to:

(a) initial point of departure and enroute stops must be in Canada except that one flight plan will be accepted for a departure point within United States controlled airspace;

(b) the sequence of stops will fall within one 24-hour period;

(c) the flight planning unit must be provided with at least the following items of information for each stage of the flight:
- (i) point of departure,
- (ii) altitude,
- (iii) route,
- (iv) destination,
- (v) proposed time of departure,
- (vi) estimated elapsed time,
- (vii) alternate,
- (viii) fuel on board, and, if required,
  - (A) TAS,
  - (B) number of persons on board, and
  - (C) where an arrival report will be filed.

3.11 Cross Country Instrument Training Flights

A cross country instrument training flight is one in which there are no intermediate stops and one or more instrument approaches are made enroute. For example, an aircraft departs Airport A, completes a practice approach at Airport B and either lands at destination Airport C or returns to land at Airport A.

The following apply:

(a) A single flight plan is filed.

(b) Those enroute locations at which instrument approaches and overshoots are requested shall be listed in the "Other Information" portion of the flight plan form, together with the estimated period of time to carry out each approach (i.e., REQ NDB RWY 32 AT B-15 MIN.).

(c) The estimated elapsed time (EET) of the flight plan form is NOT to include the estimated time to carry out approaches at the enroute locations.

(d) ATC will normally clear the aircraft to final destination.

(e) If it is not practicable to clear the aircraft to final destination or to assign an operationally suitable altitude with the initial clearance, a time or specific location for the aircraft to expect further clearance to the destination or to a higher altitude will be issued with the initial clearance.

(f) When an enroute approach clearance is requested, a missed approach clearance will be issued to the aircraft prior to the commencement of the approach.

(g) If traffic does not permit an approach, holding instructions will be issued to the aircraft if requested by the pilot.

3.12 Closing

In order to comply with CAR 602.77, an arrival report for a flight plan shall be submitted to an ATC unit, an FSS (or an FIC) or a CARS as soon as practicable after landing but not later than:

(a) the SAR time specified in the flight plan; or

(b) where no SAR time is specified in the flight plan, one hour after the last reported ETA.

A pilot who terminates a flight itinerary shall ensure that an arrival report is filed with an ATC unit, an FSS (or an FIC), a CARS or, where the flight itinerary was filed with a responsible person, the responsible person as soon as practicable after landing but not later than:

(a) the SAR time specified in the flight itinerary; or

(b) where no SAR time was specified in the flight itinerary, 24 hours after the last reported ETA.

A pilot who terminates an IFR flight at an aerodrome where there is an operating ATC unit, FSS or where RAAS is provided, is not required to file an arrival report unless requested to do so by the appropriate ATC unit or FSS.

When submitting an arrival report, the pilot should clearly indicate that he/she was operating on a flight plan or flight itinerary and wishes it to be closed. Failure to close a flight plan or flight itinerary will initiate SAR action. It should not be assumed that ATS personnel will automatically file arrival reports for VFR flights at locations served by control towers and FSSs or an RCO. Toll-free calls, as outlined in the CFS, may be made to an ATS facility for this purpose.

3.12.1 Arrival Report

CAR 602.78 specifies that the contents of an arrival report for a flight plan or flight itinerary, which are listed in the CFS, shall include:

(a) the aircraft registration mark, flight number or radio call sign;

(b) the type of flight plan or flight itinerary;

(c) the departure aerodrome;

(d) the arrival aerodrome, and

(e) the date and time of arrival.

3.12.2 Closing of a Flight Plan or Flight Itinerary Prior to Landing

A pilot, who conducts a flight in respect of which a flight plan or flight itinerary has been filed with an ATC unit, FIC, FSS, or CARS, has the option of closing the flight plan or flight itinerary with any of these agencies prior to landing.

The closing of a flight plan or flight itinerary prior to landing is considered as filing an arrival report, and as such, it will result in the termination of all alerting services with respect to SAR notification.

When flying IFR in airspace under the jurisdiction of Canadian ATC, use of the phrase "Cancelling IFR" results in ATC discontinuing the provision of IFR separation, but it does not automatically close the flight plan or itinerary. Therefore, alerting service with regard to SAR notification is still active and is based on the information submitted in the original flight plan or itinerary. Because the pilot is now flying in accordance with VFR, the flight plan or itinerary must either be closed prior to landing, or an arrival report filed after landing, with an ATC unit, a FIC, a FSS or a CARS.

When flying IFR in the U.S.A. or landing at a Canadian airport that underlies airspace delegated to the control of the FAA, use of the phrase "Cancelling IFR" results in ATC discontinuing the provision of IFR separation and also closes the flight plan or itinerary. Therefore, alerting service with regard to SAR notification is also terminated, unless the pilot files and activates a VFR flight plan.

3.13 Fuel Requirements

The fuel requirements contained in this Section do not apply to gliders, balloons or ultra-light aeroplanes. (CAR 602.88)

In addition to VFR and IFR fuel requirements, every aircraft shall carry an amount of fuel that is sufficient to provide for

(a) taxiing and foreseeable delays prior to takeoff;

(b) meteorological conditions;

(c) foreseeable air traffic routings and traffic delays;

(d) landing at a suitable aerodrome in the event of loss of cabin pressurization or, in the case of a multi-engined aircraft, failure of any engine, at the most critical point during the flight; and

(e) any other foreseeable conditions that could delay the landing of the aircraft.

3.13.1 VFR Flight

An aircraft operated in VFR flight shall carry an amount of fuel that is sufficient to allow the aircraft

(a) in the case of an aircraft other than a helicopter,
  (i) when operated during the day, to fly to the destination aerodrome and then to fly for 30 minutes at normal cruising speed, or
  (ii) when operated at night, to fly to the destination aerodrome and then to fly for 45 minutes at normal cruising speed, or

(b) in the case of a helicopter, to fly to the destination aerodrome and then to fly for 20 min. at normal cruising speed.

3.13.2 IFR Flight

An aircraft operated in IFR flight shall carry an amount of fuel that is sufficient to allow the aircraft

(a) in the case of a propeller-driven aeroplane,
  (i) where an alternate aerodrome is specified in the flight plan or flight itinerary, to fly to and execute an approach and a missed approach at the destination aerodrome, to fly to and land at the alternate aerodrome, and then to fly for a period of 45 minutes, or
  (ii) where an alternate aerodrome is not specified in the flight plan or flight itinerary, to fly to and execute an approach and a missed approach at the destination aerodrome and then to fly for a period of 45 minutes; or

(b) in the case of a turbojet powered aeroplane or a helicopter,
  (i) where an alternate aerodrome is specified in the flight plan or flight itinerary, to fly to and execute an approach and a missed approach at the destination aerodrome, to fly to and land at the alternate aerodrome, and then to fly for a period of 30 minutes, or
  (ii) where an alternate aerodrome is not specified in the flight plan or flight itinerary, to fly to and execute an approach and a missed approach at the destination aerodrome and then to fly for a period of 30 minutes.

3.14 Requirements for Alternate Aerodrome – IFR Flight

Except as otherwise authorized by the Minister in an air operator certificate (AOC) or in a private operator certificate, no pilot-in-command shall operate an aircraft in IFR flight unless the IFR flight plan or IFR flight itinerary that has been filed for the flight includes an alternate aerodrome having a landing area suitable for use by that aircraft. No pilot-in-command of an aircraft shall include an alternate aerodrome in an IFR flight plan or IFR flight itinerary unless available weather information indicates that the ceiling and ground visibility at the alternate aerodrome will, at the expected time of arrival, be at or above the alternate aerodrome weather minima criteria specified in the CAP. (CARs 602.122 and 602.123)

Aerodrome forecasts (TAF) that contain the terms BECMG, TEMPO or PROB may be used to determine the weather suitability of an aerodrome as an alternate, provided that:

(a) where conditions are forecast to improve, the forecast BECMG condition shall be considered to be applicable as of the end of the BECMG time period, and these conditions shall not be below the published alternate minima requirements for that aerodrome;

(b) where conditions are forecast to deteriorate, the forecast BECMG condition shall be considered to be applicable as of the start of the BECMG time period, and these conditions shall not be below the published alternate minima requirements for that aerodrome;

(c) the forecast TEMPO condition shall not be below the published alternate minima requirements for that aerodrome; and

(d) the forecast PROB condition shall not be below the appropriate landing minima for that aerodrome.

3.14.1 Alternate Aerodrome Weather Minima Requirements

Authorized weather minima for alternate aerodromes are to be determined using the information presented in the tables below. The "Alternate Weather Minima Requirements" table presented in the CAP GEN (reproduced below) applies to all approach charts, except where use as an alternate is not authorized on the chart. The minima derived for an alternate aerodrome shall be consistent with aircraft performance, navigation-equipment limitations, functioning navigation aids, type of weather forecast and runway to be used.

Pilots can take credit for a GNSS approach at an alternate aerodrome, provided that the planned destination aerodrome is served by a functioning traditional approach aid; and the pilot verifies that the integrity, provided by RAIM or WAAS (wide area augmentation system), and that is required for a lateral navigation (LNAV) approach, is expected to be available at the planned alternate aerodrome at the expected time of arrival at the alternate, as explained in COM 3.15.12. Note that if credit is taken for a GNSS approach at an alternate aerodrome to fulfill the legal requirements for flight planning, no part of the approach at the destination may rely on GNSS. Otherwise, when determining alternate aerodrome weather minima requirements, the pilot shall only take credit for functioning traditional aids at that aerodrome.

If credit is being taken for a GNSS-based approach at the alternate, the published LNAV minima are the lowest landing limits for which credit may be taken when determining alternate weather minima requirements. No credit may be taken for lateral navigation / vertical navigation (LNAV/VNAV) or localizer performance with vertical guidance (LPV) minima.

Pilots may take credit for the use of GNSS in lieu of traditional ground-based NAVAIDs at a filed alternate aerodrome, as per COM 3.15.9 and COM 3.15.12.

ALTERNATE WEATHER MINIMA REQUIREMENTS	
FACILITIES AVAILABLE AT SUITABLE ALTERNATE	WEATHER REQUIREMENTS
TWO OR MORE USABLE PRECISION APPROACHES, each providing straight-in minima to separate suitable runways	**400-1** or 200-1/2 above lowest usable HAT and visibility, whichever is greater.
ONE USABLE PRECISION APPROACH	**600-2*** or 300-1 above the lowest usable HAT and visibility, whichever is greater.
NON-PRECISION ONLY AVAILABLE	**800-2*** or 300-1 above the lowest usable HAT/HAA and visibility, whichever is greater.
NO IFR APPROACH AVAILABLE	Forecast weather must be no lower than 500 ft above a minimum IFR altitude that will permit a VFR approach and landing.
FOR HELICOPTERS, where instrument approach procedures are available	Ceiling 200 ft above the minima for the approach to be flown, and visibility at least 1 SM, but never less than the minimum visibility for the approach to be flown.

* 600-2 and 800-2, as appropriate, are considered to be STANDARD ALTERNATE MINIMA. >

Should the selected alternate weather requirements meet the standard minima, then the following minima are also authorized:

STANDARD ALTERNATE MINIMA		IF STANDARD IS APPLICABLE, THEN THE FOLLOWING MINIMA ARE ALSO AUTHORIZED	
CEILING	VISIBILITY	CEILING	VISIBILITY
600	2	700 800	1 1/2 1
800	2	900 1000	1 1/2 1

RAC

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NOTES 1: These requirements are predicated upon the aerodrome having a TAF available.

2: Aerodromes served with an AERODROME ADVISORY forecast may qualify as an alternate, provided the forecast weather is no lower than 500 ft above the lowest usable HAT/HAA and the visibility is not less than 3 mi.

3: Aerodromes served with a GRAPHIC AREA FORECAST (GFA) may qualify as an alternate, provided the forecast weather contains:

(a) no cloud lower than 1 000 ft above the lowest usable HAT/HAA;

(b) no cumulonimbus; and

(c) a visibility that is not less than 3 mi.

4: Ceiling minima are calculated by reference to the procedure HAA or HAT. Ceiling values in aviation forecasts are established in 100–ft increments. Up to 20 ft, use the lower 100–ft increment; above 20 ft, use the next higher 100–ft increment:

Examples:

HAA 620 ft = ceiling value of 600 ft;
HAA 621 ft = ceiling value of 700 ft;
HAT 420 ft = ceiling value of 400 ft;
HAT 421 ft = ceiling value of 500 ft;.

5: Calculated visibilities should not exceed 3 mi.

Caution: All heights specified in a GFA are ASL, unless otherwise indicated.

The emphasis of these criteria is placed upon the availability of the lowest usable landing HAT/HAA and visibility for an aerodrome. In determining the lowest usable landing HAT/HAA and visibility, the pilot should consider:

(a) the operational availability of the ground navigational equipment by consulting NOTAM;

(b) the compatibility of the aircraft equipment with the ground navigational equipment;

(c) the forecast surface wind conditions could dictate the landing runway and associated approach minima;

(d) the operational applicability of terms BECMG, TEMPO and PROB within the forecast (see RAC 3.14);

(e) all heights mentioned within a GFA are ASL heights, unless otherwise indicated, and the terrain elevation must be applied in order to determine the lowest forecast ceiling at a particular location; and

(f) alternate minima values determined from a previous flight operation may not be applicable to a subsequent flight operation.

3.15 Completion of Canadian Flight Plans and Flight Itineraries and ICAO Flight Plans

3.15.1 General

The flight plan form is to be used for Canadian flight plans or flight itineraries and ICAO flight plans. Completion of the form is simply a matter of inserting the requested information in the appropriate boxes. The white boxes relate to required information for Canadian flight plans and for flight itineraries and for ICAO flight plans. The shaded boxes indicate the information which is applicable only to Canadian flight plans and flight itineraries.

NOTE: A Canadian flight plan is used for flights from Canada to the United States.

3.15.2 Canadian

A Canadian flight plan or flight itinerary shall contain such information as is specified in the CFS, including:

- aircraft identification
- flight rules
- type of flight
- number of aircraft (if more than one)
- type of aircraft
- wake turbulence category
- equipment
- departure aerodrome
- time of departure (UTC)—proposed/actual
- cruising speed
- altitude/level
- route
- destination aerodrome
- EET en-route
- SAR time*
- destination alternate aerodrome(s)
- other information
- endurance (flight time in hours and minutes)
- total number of persons on board
- type of ELT*
- survival equipment (type, jackets, dinghies)
- aircraft colour and markings
- remarks (regarding other survival equipment)
- arrival report—where it will be filed*
- name and number or address of person or company to be notified if SAR action is initiated*
- pilot's name
- pilot's licence number (Canadian pilot licence only)*

* Not required for an ICAO flight plan >

3.15.3 ICAO

Flight plans for international flights originating in, or entering, Canada shall be filed in the ICAO format, as specified in ICAO Doc 4444—*Operations* 5-2 PANS-RAC (DOC 4444-RAC/501 Mil GPH 204 DOC FLIGHT INFO PUBLICATION).

For the purpose of flight planning, flights between Canada and the continental United States are not classed as "international flights".

3.15.4 Instructions for Completing the Form

3.15.4.1 General

Adhere closely to the prescribed formats and manner of specifying data.

Commence inserting data in the first space provided. Where excess space is available, leave unused spaces blank.

All times should be indicated in UTC, using four digits.

Indicate all EETs using four digits (hours and minutes) for flight plans.

NOTE: Because EETs on a flight itinerary may include days as well as hours and minutes, insert the EET using six digits, if required.

The shaded area preceding Item 3 is to be completed by ATS and COM services, unless the responsibility for originating flight plan messages has been delegated.

NOTE: The term "aerodrome," where used in the flight plan, is intended to also cover sites other than aerodromes that may be used by certain types of aircraft, e.g. helicopters or balloons.

3.15.4.2 Instructions for Insertion of ATS Data

Complete Items 7 to 18 as indicated hereunder.

Complete Item 19 as well to facilitate alerting of SAR services.

NOTE: Item numbers on the form are not consecutive as they correspond to Field Type numbers in ATS messages.

Use location indicators listed in Canadian AIPs (defined in CAR 300.01), in ICAO Doc 7910—*Location Indicators*, and in FAA Order 7350.7—*Location Identifiers*.

3.16 Contents of a Flight Plan and Flight Itinerary

3.16.1 Item 7: Aircraft Identification (not exceeding seven alphanumeric characters and without hyphens or symbols)

Canadian:

Normally, this consists of the aircraft registration letters or the company designator followed by the flight number.

Examples:

- Aircraft registration: N123B, CGABC, 4XGUC
- Operating agency and flight number: ACA123, KLM672
- Tactical call sign: BRUNO12, SWIFT45, RED1

ICAO:

(a) the ICAO designator for the aircraft operating agency followed by the flight identification (e.g. KLM511, NGA213, JTR25) when in radiotelephony the call sign to be used by the aircraft will consist of the ICAO telephony designator for the operating agency followed by the flight identification (e.g. KLM511, NIGERIA213, JESTER25); OR

(b) the nationality or common mark and registration mark of the aircraft (e.g. E1AKO, 4XBCD, N2567GA), when:
  (i) in radiotelephony, the call sign to be used by the aircraft will consist of this identification alone (e.g. CGAJS), or will be preceded by the ICAO telephony designator for the aircraft operating agency (e.g. BLIZZARD CGAJS); or
  (ii) the aircraft is not equipped with radio.

NOTES

1: Standards for nationality, common and registration marks to be used are contained in ICAO Annex 7, Chapter 2.

2: Provisions for the use of radiotelephony call signs are contained in ICAO Annex 10, Volume II, Chapter 5. ICAO designators and telephony designators for aircraft operating agencies are contained in ICAO Doc 8585—*Designators for Aircraft Operating Agencies, Aeronautical Authorities and Services.*

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3.16.2 Item 8: Flight Rules and Type of Flight

3.16.2.1 Flight Rules (one character) (Canadian and ICAO)

INSERT one of the following letters to denote the category of flight rules with which the pilot intends to comply:

I if it is intended that the entire flight will be operated under IFR;

V if it is intended that the entire flight will be operated under VFR;

Y if the flight initially will be operated under IFR, followed by one or more subsequent changes of flight rules; or

Z if the flight initially will be operated under VFR, followed by one or more subsequent changes of flight rules.

If "Y" or "Z" is filed, specify, in the Route section of the flight plan (Item 15), the point(s) where a change in flight rules is planned. Similarly, where there is more than one change in the type of flight rules, the code to be used is to reflect the first rule, i.e. use "Z" for VFR/IFR/VFR.

3.16.2.2 Type of Flight (up to two characters, as applicable)

INSERT up to two of the following letters to denote the type of flight when so required by the appropriate ATS authority:

First character (Canadian only, as applicable):

C for controlled VFR;

D for defence flight plan;

E for defence flight itinerary;

F for flight itinerary.

Second character (ICAO, as applicable):

S for scheduled air service;

N for non-scheduled air transport operation;

G for general aviation;

M for military;

X for other than the preceding categories.

Specify the status of a flight following the indicator "STS" in Item 18, or when necessary to denote other reasons for specific handling by ATS, indicate the reason following the indicator "RMK/" in Item 18.

3.16.3 Item 9: Number and Type of Aircraft and Wake Turbulence Category

3.16.3.1 Number of Aircraft (one or two characters)

INSERT the number of aircraft, if more than one.

3.16.3.2 Type of Aircraft (two to four characters)

INSERT the appropriate ICAO aircraft type designator. If no such designator has been assigned, or in the case of formation flights comprising more than one type, insert "ZZZZ" and specify in Item 18 the number(s) and type(s) of aircraft preceded by "TYP/".

3.16.3.3 ICAO Wake Turbulence Category (one character)

INSERT one of the following letters to indicate the wake turbulence category of the aircraft:

H (HEAVY) to indicate an aircraft type with a maximum certificated take-off mass of 136 000 kg (300 000 lbs) or more.

M (MEDIUM) to indicate an aircraft type with a maximum certificated take-off mass of less than 136 000 kg (300 000 lbs) but more than 7 000 kg (15 500 lbs).

L (LIGHT) to indicate an aircraft type with a maximum certificated take-off mass of 7 000 kg (15 500 lbs) or less.

3.16.4 Item 10: Equipment and Capabilities (Canadian and ICAO)

Capabilities comprise the following elements:

(a) presence of relevant serviceable equipment on board the aircraft;

(b) equipment and capabilities commensurate with flight crew qualifications; and

(c) where applicable, authorization from the appropriate authority.

The communication (COM), navigation (NAV), approach aid and SSR equipment on board and its serviceability must be inserted by adding the appropriate suffixes. The first suffixes will denote the COM, NAV and approach aid equipment, followed by an oblique stroke, and another suffix to denote the SSR equipment.

3.16.4.1 Radio Communication, Navigation and Approach Aid Equipment and Capabilities

INSERT one letter as follows:

"N" if no COM, NAV or approach aid equipment for the route to be flown is carried, or the equipment is unserviceable; OR

"S" if standard COM, NAV and approach aid equipment for the route to be flown is carried and available (see NOTE 1)

Information on navigation capability is provided to ATC for clearance and routing purposes.

AND/OR INSERT one or more of the following letters to indicate the serviceable COM, NAV and approach aid equipment and capabilities available.

A	GBAS landing system	J7	CPDLC FANS 1/A SATCOM (Iridium)
B	LPV (APV with SBAS)	K	MLS
C	LORAN C	L	ILS
D	DME	M1	ATC RTF SATCOM (INMARSAT)
E1	FMC WPR ACARS	M2	ATC RTF (MTSAT)
E2	D-FIS ACARS	M3	ATC RTF (Iridium)
E3	PDC ACARS	O	VOR
F	ADF	P1–P9	Reserved for RCP
G	GNSS (see NOTE 2)	R	PBN approved (see NOTE 4)
H	HF RTF	T	TACAN
I	Inertial Navigation	U	UHF RTF
J1	CPDLC ATN VDL Mode (see NOTE 3)	V	VHF RTF
J2	CPDLC FANS 1/A HFDL	W	RVSM approved
J3	CPDLC FANS 1/A VDL mode 4	X	MNPS approved
J4	CPDLC FANS 1/A VDL mode 2	Y	VHF with 8.33 kHz channel spacing capability
J5	CPDLC FANS 1/A SATCOM (INMARSAT)	Z	Other equipment carried or other capabilities (see NOTE 5)
J6	CPDLC FANS 1/A SATCOM (MTSAT)		

Any alphanumeric characters not indicated above are reserved.

NOTES

1: If the letter "S" is used, standard equipment is considered to be VHF, RTF, VOR and ILS, unless another combination is prescribed by the appropriate ATS authority.

2: **ICAO**: If the letter "G" is used, the types of external GNSS augmentation, if any, are specified in Item 18 following the indicator "NAV/" and separated by a space.

Canadian:

Then using the letter "G" on an IFR flight plan, the GPS receiver must be approved in accordance with the requirements specified in Technical Standard Order (TSO) C-129 (Class A1, A2, B1, B2, C1 or C2), installed and approved in accordance with the appropriate sections of the *Airworthiness Manual*, and operated in accordance with the approved flight manual or flight manual supplement. Pilots are encouraged to use the letter "G" on VFR flight plans when using GPS to assist VFR navigation. TSO C-129 receivers are not mandatory for VFR flights.

3: See *RTCA/EUROCAE Interoperability Requirements Standard For ATN Baseline 1* (ATN B1 INTEROP Standard—DO-280B/ED-110B) for data link services, ATC clearance and information, ATC communications management, and ATC microphone check.

4: If the letter "R" is used, the performance-based navigation levels that can be met are specified in Item 18 following the indicator "PBN/". Guidance material on the application of performance-based navigation to a specific route segment, route or area is contained in the *Performance-Based Navigation Manual* (ICAO Doc 9613).

5: If the letter "Z" is used, specify in Item 18 the other equipment carried, or other capabilities, preceded by "COM/", "NAV/" and/or "DAT/", as appropriate.

3.16.4.2 Surveillance Equipment and Capabilities

INSERT "N" if no surveillance equipment for the route to be flown is carried, or the equipment is unserviceable, OR

INSERT one or more of the following descriptors, to a maximum of 20 characters, to describe the serviceable surveillance equipment and/or capabilities on board:

SSR Modes A and C

A Transponder—Mode A (four digits—4096 codes);

C Transponder—Mode A (four digits—4096 codes) and Mode C

SSR Mode S

E Transponder—Mode S, including aircraft identification, pressure-altitude and extended squitter (ADS-B) capability;

H Transponder—Mode S, including aircraft identification, pressure-altitude and enhanced surveillance capability;

I Transponder—Mode S, including aircraft identification, but no pressure-altitude capability;

L Transponder—Mode S, including aircraft identification, pressure-altitude, extended squitter (ADS-B) and enhanced surveillance capability;

P Transponder—Mode S, including pressure-altitude transmission, but no aircraft identification capability;

S Transponder—Mode S, including both pressure-altitude and aircraft identification capability;

X Transponder—Mode S with neither aircraft identification nor pressure-altitude capability.

NOTE: Enhanced surveillance capability is the ability of the aircraft to down-link aircraft-derived data via a Mode S transponder.

ADS-B

B1 ADS-B with dedicated 1090 MHz ADS-B "out" capability;

B2 ADS-B with dedicated 1090 MHz ADS-B "out" and "in" capability;

U1 ADS-B "out" capability using UAT;

U2 ADS-B "out" and "in" capability using UAT;

V1 ADS-B "out" capability using VDL Mode 4;

V2 ADS-B "out" and "in" capability using VDL Mode 4.

ADS-C

D1 ADS-C with FANS 1/A capabilities;

G1 ADS-C with ATN capabilities.

Alphanumeric characters not indicated above are reserved.

Example: ADE3RV/HB2U2V2G1

NOTE: Additional surveillance application should be listed in Item 18 following the indicator "SUR/".

3.16.5 Item13: Departure Aerodrome and Time

3.16.5.1 Departure Aerodrome (maximum four characters)

ICAO:

INSERT the ICAO four-letter location indicator of the departure aerodrome as specified in ICAO Doc 7910—*Location Indicators*; OR

Canadian:

INSERT the four-character location indicator of the departure aerodrome; OR

Canadian and ICAO:

If no location indicator has been assigned:

INSERT "ZZZZ" and specify in Item 18 the name and location of the aerodrome preceded by "DEP/"; OR

INSERT the first point of the route or the marker radio beacon preceded by "DEP/", if the aircraft has not taken off from the aerodrome.

3.16.5.2 Time (maximum four characters)

Indicate the hour and minutes in UTC.

NOTE: Pilots may file a flight plan or flight itinerary up to 24 hr in advance of the departure time.

3.16.6 Item 15: Cruising Speed, Altitude/Level and Route

Canadian:

NOTES 1: On designated airways and air routes, IFR flights may be operated at the published MEA/MOCA, except that in winter, when air temperatures may be much lower than those of the ICAO Standard Atmosphere (ISA), aircraft should be operated at an altitude which is at least 1 000 ft higher than the published MEA/MOCA (see RAC 8.5 and RAC 9.5).

2: Preferred IFR routes, published in the CFS—Planning section, have been established to aid in the efficient and orderly management of air traffic between selected aerodromes. Pilots are encouraged to file these routes.

Canadian and ICAO:

INSERT

- the first cruising speed as described in (a),
- the first cruising level as described in (b), and
- the route description as described in (c).

(a) *Cruising speed* (maximum five characters)

INSERT the true airspeed for the first or the whole cruising portion of the flight, in terms of:

- Kilometres per hour (ICAO only), expressed as "K" followed by four figures (e.g. K0830); OR
- Knots, expressed as "N" followed by four figures (e.g. N0485); OR
- True Mach number, when so prescribed by the appropriate ATS authority, to the nearest hundredth of unit Mach, expressed as "M "followed by three figures (e.g. M082).

(b) *Cruising level* (maximum five characters)

INSERT the planned cruising level for the first or the whole portion of the route to be flown, in terms of:

- Flight level, expressed as "F" followed by three figures (e.g. F085, F330); OR
- Standard metric level in tens of metres (ICAO only), expressed as "S" followed by four figures (e.g. S1130), when so prescribed by the appropriate ATS authorities; OR
- Altitude in hundreds of feet, expressed as "A" followed by three figures (e.g. A045, A100); OR
- Altitude in tens of metres (ICAO only), expressed as "M" followed by four figures (e.g. M0840); OR
- For uncontrolled VFR flights, the letters "VFR" (ICAO only).

(c) *Route* (including changes of speed, level and/or flight rules)

3.16.6.1 Flights Along Designated ATS Routes:

INSERT

- if the departure aerodrome is located on, or connected to, the ATS route:
  - the designator of the first ATS route (e.g. if the departure aerodrome is Carp: T614 TUKIR, etc.); OR
- if the departure aerodrome is not located on, or connected to, the ATS route:
  - (ICAO only) the letters "DCT", followed by the joining point of the first ATS route, followed by the designator of the ATS route (e.g. if the departure aerodrome is Ottawa: DCT IKLAX T634, etc.);
  - (Canadian only) the joining point of the first ATS route, followed by the designator of the ATS route (e.g. if the departure aerodrome is Ottawa: YOW T616, etc.).

INSERT each point at which a change of speed or level is planned to commence, or a change of ATS route, or a change of flight rules is planned (e.g. AGLUK/N0200A170 IFR).

NOTE: When a transition is planned between a lower and an upper ATS route and the routes are oriented in the same direction, the point of transition need not be inserted.

FOLLOWED IN EACH CASE BY

- the designator of the next ATS route segment, even if it is the same as the previous one (e.g. if the departure aerodrome is Québec: DICEN T680 LETAK T616, etc.); OR
- if the flight to the next point is outside a designated route:
  - (ICAO only) the letters "DCT", unless both points are defined by geographical coordinates (e.g. if the departure aerodrome is Québec: DCT YQB DCT FLEUR DCT YYY, etc.);
  - (Canadian only) the next point (e.g. if the departure aerodrome is Québec: YQB FLEUR YYY etc.). The absence of "DCT" between points on a Canadian flight plan or flight itinerary indicates direct flight.

3.16.6.2 Flights Outside Designated ATS Routes:

ICAO:

INSERT points normally not more than 30 min flying time or 370 km (200 NM) apart, including each point at which a change of speed or level, a change of track, or a change of flight rules is planned; OR

When required by appropriate ATS authority(ies),

DEFINE the track of flights operating predominantly in an east-west direction between 70°N and 70°S by reference to significant points formed by the intersections of half or whole degrees of latitude with meridians spaced at intervals of 10° of longitude. For flights operating in areas outside those latitudes, the tracks shall be defined by significant points formed by the intersection of parallels of latitude with meridians normally spaced at 20° of longitude. The distance between significant points shall, as far as possible, not exceed one hour's flight time. Additional significant points shall be established as deemed necessary.

For flights operating predominantly in a north-south direction, define tracks by reference to significant points formed by the intersection of whole degrees of longitude with specified parallels of latitude which are spaced at 5°.

INSERT "DCT" between successive points unless both points are defined by geographical coordinates or by bearing and distance.

Canadian:

INSERT points at which a change of speed or level, a change of track, or a change of flight rules is planned. Absence of "DCT" between points on a Canadian flight plan or itinerary indicates direct flight; OR

When required by appropriate ATS authority(ies),

Canadian and ICAO:

USE the conventions in (1) to (5), below, and SEPARATE each sub-item by a space.

(1) ATS route (two to seven characters):

The coded designator assigned to the route or route segment including, where appropriate, the coded designator assigned to the standard departure or arrival route (e.g. BCN1, B1, R14, UB10, KODAP2A).

NOTE: Provisions for the application of route designators are contained in ICAO Annex 11, Appendix 1.

(2) Significant point (two to eleven characters):

The coded designator (two to five characters) assigned to the point (e.g. LN, MAY, HADDY), OR

If no coded designator has been assigned, one of the following ways:

(i) Degrees only (seven characters):
Two figures describing latitude in degrees, followed by "N" (North) or "S" (South), followed by three figures describing longitude in degrees, followed by "E" (East) or "W" (West). Make up the correct number of figures, where necessary, by insertion of zeros, e.g. 46N078W.

(ii) Degrees and minutes (11 characters):
Four figures describing latitude in degrees, and tens and units of minutes followed by "N" (North) or "S" (South), followed by five figures describing longitude in degrees and tens and units of minutes, followed by "E" (East) or "W" (West). Make up the correct number of figures, where necessary, by insertion of zeros, e.g. 4620N07805W.

(iii) Bearing and distance from a significant point:
The identification of the significant point followed by the bearing from the point in the form of three figures giving degrees magnetic followed by the distance from the point in the form of three figures expressing nautical miles. In areas of high latitude where it is determined by the appropriate authority that reference to degrees magnetic is impractical, degrees true may be used. Make up the correct number of figures, where necessary, by insertion of zeros, e.g. a point 180° magnetic at a distance of 40 NM from VOR "DUB" should be expressed as DUB180040.

(3) Change of speed or level (maximum 21 characters):

The point at which a change of speed (5 percent TAS or 0.01 Mach or more) or a change of level is planned to commence, expressed exactly as in (2), above, followed by an oblique stroke and both the cruising speed and the cruising level, expressed exactly as in (a) and (b), above, without a space between them, even when only one of these quantities will be changed.

Examples:

LN/N0284A045

MAY/N0305F180

HADDY/N0420F330

4602N07805W/N0500F350

46N078W/M082F330

DUB180040/N0350M0840

(4) Change of flight rules (maximum three characters):

The point at which the change of flight rules is planned, expressed exactly as in (2) or (3), above, as appropriate, followed by a space and one of the following:

VFR if from IFR to VFR

IFR if from VFR to IFR

Examples:

LN VFR

LN/N0284A050 IFR

(5) Cruise climb (maximum 28 characters):

The letter "C" followed by an oblique stroke; THEN the point at which cruise climb is planned to start, expressed exactly as in (2), above, followed by an oblique stroke; THEN the speed to be maintained during cruise climb, expressed exactly as in (a), above, followed by the two levels defining the layer to be occupied during cruise climb, each level expressed exactly as in (b), above, or the level above which cruise climb is planned followed by the letters "PLUS", without a space between them.

Examples:

C/48N050W/M082F290F350

C/48N050W/M082F290PLUS

C/52N050W/M220F580F620

3.16.7 Item 16: Destination Aerodrome, Total EET, SAR Time (for flights in Canada only) and Destination Alternate Aerodrome(s)

3.16.7.1 Destination Aerodrome and Total EET (maximum 10 characters)

ICAO:

INSERT the ICAO four-letter location indicator of the destination aerodrome as specified in ICAO Doc 7910—*Location Indicator*s; OR

Canadian:

INSERT the four-character location indicator of the destination aerodrome; OR

NOTE: In the case of a Canadian flight itinerary, as applicable, the EET may also include the number of days. The total duration of the flight itinerary shall not exceed 30 days.

Canadian and ICAO:
If no location indicator has been assigned,

INSERT "ZZZZ" and specify in Item 18 the name and location of the aerodrome, preceded by "DEST/".

THEN, without a space, INSERT the total EET.

NOTE: For a flight plan received from an aircraft in flight, the total EET is the estimated time from the first point of the route to which the flight plan applies to the termination point of the flight plan.

INSERT SAR time (four digits) (maximum of 24 hr)

3.16.7.2 Destination Alternate Aerodrome(s)

ICAO:

INSERT the ICAO four-letter location indicator(s) of not more than two destination alternate aerodromes, as specified in ICAO Doc 7910—*Location Indicators*, separated by a space; OR

Canadian:

INSERT the four-character location indicator of not more than two destination alternate aerodromes, separated by a space; OR

Canadian and ICAO:
If no location indicator has been assigned to the destination alternate aerodrome(s),

INSERT "ZZZZ" and specify in Item 18 the name and location of the destination alternate aerodrome(s), preceded by "ALTN/".

NOTES:1: If departure alternate required insert ZZZZ for second alternate aerodrome and SPECIFY in Item 18 the departure alternate, i.e.: DEP ALTN/ CYOW.

2: No alternate is required on a VFR flight plan or itinerary.

3.16.8 Item 18: Other Information

NOTE: Use of indicators not included under this item may result in data being rejected, processed incorrectly or lost.

Hyphens or oblique strokes should only be used as prescribed below.

INSERT "0" (zero) if no other information; OR

Any other necessary information in the sequence shown hereunder, in the form of the appropriate indicator selected from those defined hereunder, followed by an oblique stroke and the information to be recorded.

STS/ Reason for special handling by ATS, e.g. a SAR mission, as follows:

ALTRV: for a flight operated in accordance with an altitude reservation;

ATFMX: for a flight approved for exemption from ATFM measures by the appropriate ATS authority;

FFR: for fire-fighting;

FLTCK: for a flight check for calibration of NAVAIDs;

HAZMAT: for a flight carrying hazardous material;

HEAD: for a flight with Head of State status;

HOSP: for a medical flight declared by medical authorities;

HUM: for a flight operating on a humanitarian mission;

MARSA: for a flight for which a military entity assumes responsibility for separation of military aircraft;

MEDEVAC: for a life critical medical emergency evacuation;

NONRVSM: for a non-RVSM capable flight intending to operate in RVSM airspace;

SAR: for a flight engaged in a search and rescue mission; and

STATE: for a flight engaged in military, customs or police services.

Other reasons for special handling by ATS shall be denoted under the designator "RMK/".

PBN/ Indication of RNAV and/or RNP capabilities. Include as many of the descriptors below as apply to the flight, up to a maximum of eight entries, i.e. not more than 16 characters.

RNAV SPECIFICATIONS	
A1	RNAV 10 (RNP 10)
B1	RNAV 5 all permitted sensors
B2	RNAV 5 GNSS
B3	RNAV 5 DME/DME
B4	RNAV 5 VOR/DME
B5	RNAV 5 INS or IRS
B6	RNAV 5 LORAN C
C1	RNAV 2 all permitted sensors
C2	RNAV 2 GNSS
C3	RNAV 2 DME/DME
C4	RNAV 2 DME/DME/IRU
D1	RNAV 1 all permitted sensors
D2	RNAV 1 GNSS
D3	RNAV 1 DME/DME
D4	RNAV 1 DME/DME/IRU

RNP SPECIFICATIONS	
L1	RNP 4
O1	Basic RNP 1 all permitted sensors
O2	Basic RNP 1 GNSS
O3	Basic RNP 1 DME/DME
O4	Basic RNP 1 DME/DME/IRU
S1	RNP APCH
S2	RNP APCH with BARO-VNAV
T1	RNP AR APCH with RF (special authorization required)
T2	RNP AR APCH without RF (special authorization required)

Combinations of alphanumeric characters not indicated above are reserved.

NAV/ Significant data related to navigation equipment other than specified in PBN/, as required by the appropriate ATS authority. Indicate GNSS augmentation under this indicator, with a space between two or more methods of augmentation, e.g. NAV/GBAS SBAS.

COM/ Indicate communications applications or capabilities not specified in Item 10(a).

DAT/ Indicate data applications or capabilities not specified in 10(a).

SUR/ Include surveillance applications or capabilities not specified in Item 10(b).

DEP/ Name and location of departure aerodrome, if "ZZZZ" is inserted in Item 13, or the ATS unit from which supplementary flight plan data can be obtained, if "AFIL" (airfile) is inserted in Item 13. For aerodromes not listed in the relevant AIP, indicate location as follows:

With four figures describing latitude in degrees and tens and units of minutes followed by "N" (North) or "S" (South), followed by five figures describing longitude in degrees and tens and units of minutes, followed by "E" (East) or "W" (West). Make up the correct number of figures, where necessary, by insertion of zeros, e.g. 4620N07805W (11 characters); OR

Bearing and distance from the nearest significant point, as follows:

The identification of the significant point followed by the bearing from the point in the form of three figures giving degrees magnetic, followed by the distance from the point in the form of three figures expressing nautical miles. In areas of high latitude where it is determined by the appropriate authority that reference to degrees magnetic is impractical, degrees true may be used. Make up the correct number of figures, where necessary, by insertion of zeros, e.g. a point of 180° magnetic at a distance of 40 NM from VOR "DUB" should be expressed as DUB180040; OR

The first point of the route (name or LAT/LONG) or the marker radio beacon, if the aircraft has not taken off from an aerodrome.

DEST/ Name and location of the destination aerodrome, if "ZZZZ" is inserted in Item 16. For aerodromes not listed in the relevant AIP, indicate location in LAT/LONG or bearing and distance from the nearest significant point, as described under DEP/, above.

DOF/ The date of flight departure in a six-figure format (YYMMDD, where YY equals the year, MM equals the month and DD equals the day).

REG/ The nationality or common mark and registration mark of the aircraft, if different from the aircraft identification in Item 7.

EET/ Significant points or FIR boundary designators and accumulated EETs from takeoff to such points or FIR boundaries, when so prescribed on the basis of regional air navigation agreements, or by the appropriate ATS authority.

Examples: EET/CAP0745 XYZ0830/
EET/EINN0204

SEL/ SELCAL Code, for aircraft so equipped.

TYP/ Type(s) of aircraft, preceded if necessary without a space by number(s) of aircraft and separated by one space, if "ZZZZ" is inserted in Item 9.

Example: TYP/2F15 5F5 3B2

DLE/ En-route delay or holding, insert the significant point(s) on the route where a delay is planned to occur, followed by the length of delay using four-figure time in hours and minutes (hhmm).

Example: DLE/MDG0030

OPR/ ICAO designator or name of the aircraft operating agency, if different from the aircraft identification in Item 7.

ORGN/ The originator's eight-letter AFTN address or other appropriate contact details, in cases where the originator of the flight plan may not be readily identified, as required by the appropriate ATS authority.

NOTE: In some areas, flight plan reception centres may insert the "ORGN/" identifier and originator's AFTN address automatically.

PER/ Aircraft performance data, indicated by a single letter as specified in the P*rocedures for Air Navigation Services—Aircraft Operations* (PANS-OPS, ICAO Doc 8168), *Volume I — Flight Procedures*, if so prescribed by the appropriate ATS authority.

ALTN/ Name of destination alternate aerodrome(s), if "ZZZZ" is inserted in Item 16. For aerodromes not listed in the relevant AIP, indicate location in LAT/LONG or bearing and distance from the nearest significant point, as described in DEP/, above.

RALT/ ICAO four-letter indicator(s) for en-route alternate(s), as specified in ICAO Doc 7910—*Location Indicators*, or name(s) of en-route alternate aerodrome(s), if no indicator is allocated. For aerodromes not listed in the relevant AIP, indicate location in LAT/LONG or bearing and distance from the nearest significant point, as described in DEP/, above.

TALT/ ICAO four-letter indicator(s) for takeoff alternate, as specified in ICAO Doc 7910—*Location Indicators*, or name of takeoff alternate aerodrome, if no indicator is allocated. For aerodromes not listed in the relevant AIP, indicate location in LAT/LONG or bearing and distance from the nearest significant point, as described in DEP/, above.

RIF/ The route details to the revised destination aerodrome, following by the ICAO four-letter location indicator of the aerodrome. The revised route is subject to reclearance in flight.

Examples: RIF/DTA HEC KLAX

RIF/ESP G94 CLA YPPH

RMK/ Any other plain-language remarks when required by the appropriate ATS authority or deemed necessary, e.g. TCAS- equipped—ICAO only.

3.16.9 Item 19: Supplementary Information

3.16.9.1 Endurance

AFTER "E/"

INSERT a four-figure group giving the fuel endurance in hours and minutes.

3.16.9.2 Persons On Board

AFTER "P/"

INSERT the total number of persons (passengers and crew) on board, when required by the appropriate ATS authority. INSERT "TBN" (to be notified) if the total number of persons is not known at the time of filing.

3.16.9.3 Emergency and Survival Equipment

R/(RADIO)

CROSS OUT indicator "U" if UHF on frequency 243.0 MHz is not available. CROSS OUT indicator "V" if VHF on frequency 121.5 MHz is not available. CROSS OUT indicator "E" if an ELT is not available. Canadian use only: ELT categories should be entered in the "ELT TYPE" box on the flight plan and flight itinerary forms. These categories (types) are described in SAR 3.2.

S/(SURVIVAL EQUIPMENT)

CROSS OUT all indicators if survival equipment is not carried. CROSS OUT indicator "P" if polar survival equipment is not carried. CROSS OUT indicator "D" if desert survival equipment is not carried. CROSS OUT indicator "M" if maritime survival equipment is not carried. CROSS OUT indicator "J" if jungle survival equipment is not carried.

J/(JACKETS)

CROSS OUT all indicators if life jackets are not carried. CROSS OUT indicator "L" if life jackets are not equipped with lights. CROSS OUT indicator "F" if life jackets are not equipped with fluorescein. CROSS OUT indicator "U" or "V" or both (as in R/, above) to indicate radio capability of jackets, if any.

D/(DINGHIES) (NUMBER)

CROSS OUT indicators "D" and "C" if no dinghies are carried, or INSERT number of dinghies carried; and

(CAPACITY)

INSERT total capacity, in persons, of all dinghies carried; and

(COVER)

CROSS OUT indicator "C" if dinghies are not covered; and

(COLOUR)

INSERT colour of dinghies, if carried.

A/(AIRCRAFT COLOUR AND MARKINGS)

INSERT colour of aircraft and significant markings. Canadian use only: Tick appropriate box for wheels, skis, etc.

N/(REMARKS)

CROSS OUT indicator "N" if no remarks, or INDICATE any other survival equipment carried and any other remarks regarding survival equipment. INDICATE if aircraft is equipped with a ballistic parachute system.

ARRIVAL REPORT

Canadian use only: Fill in the required information.

AIRCRAFT

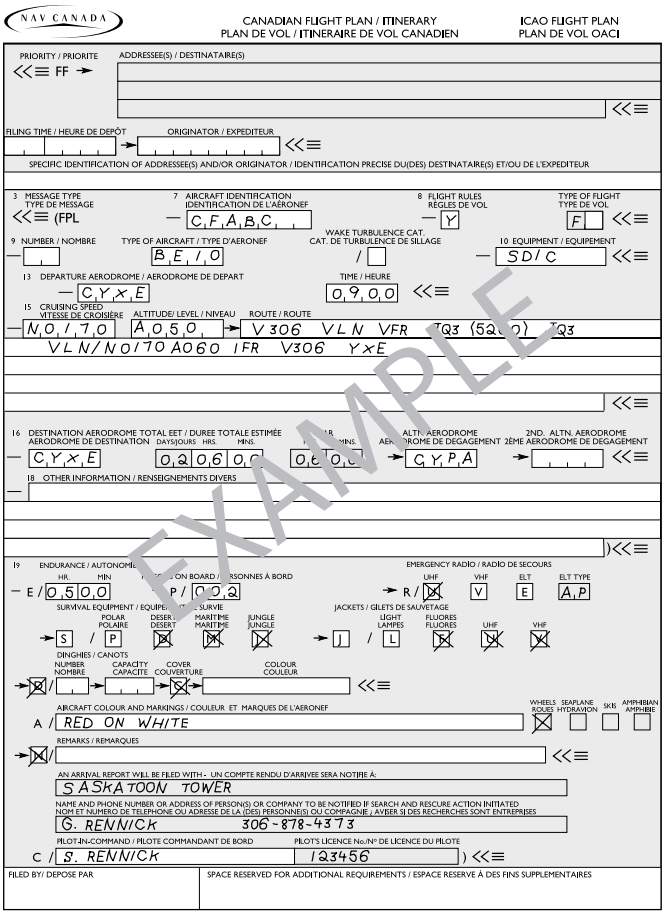
Canadian use only: Indicate the aircraft owner, person(s) or company to be notified if SAR action is initiated.

C/(PILOT)

INSERT name of pilot-in-command.

Canadian use only: INSERT pilot's licence number.

Figure 3.1—Composite IFR/VFR/IFR Flight Itinerary



Explanation of Figure 3.1—Composite IFR/VFR/IFR Flight Itinerary

Item 7:
Aircraft identification

Item 8:
"Y" indicates that the flight will be initially operated under the IFR, followed by one or more subsequent changes of flight rules.

"F" indicates that it is a flight itinerary.

Item 9:
Aircraft is a Beechcraft 100.

Item 10:
"S" indicates standard COM/NAV equipment of VHF, RTF, VOR and ILS.

"D" indicates DME equipped.

"/C" indicates transponder Mode A (four digits—4096 codes) and Mode C.

Item 13:
Departure aerodrome is Saskatoon at 0900 UTC.

Item 15:

Speed is 170 KIAS.

Altitude is 5 000 ft.

Route is V306 to the Lumsden VOR.

"VFR" indicates a change in flight rules to VFR at Lumsden.

"JQ3" indicates direct flight from Lumsden to the aerodrome at Carlyle.

"(5200)" indicates a stopover at Carlyle in hours and minutes.

Second "JQ3" indicates there will be a stopover at Carlyle.

"VLN" indicates direct flight from Carlyle to the Lumsden VOR.

"N0170A060IFR" indicates that the altitude is changed to 6 000 ft and the next leg will be IFR (although the speed did not change; if there is a change to either speed or altitude, both have to be indicated).

Route is V306 from Lumsden to the Saskatoon VOR.

Item 16:

Destination aerodrome is Saskatoon.

EET from takeoff to landing at Saskatoon is 2 days and 6 hours (this includes the flight time and the stopover time at Carlyle).

SAR time of 6 hours indicates the pilot's desire to have SAR action initiated at 6 hours after the total EET of the trip; in other words, 2 days and 12 hours after takeoff from Saskatoon (if there is no entry in this block the SAR activation time would be 24 hours after the EET).

Alternate aerodrome is Prince Albert.

Item 18:

Although no other information is provided in this example, this section is for listing any other information as previously described in RAC 3.0.

Item 19:

Flying time endurance is 5 hr. There are two people in the aircraft (including crew).

"X" over "U" indicates there is no UHF emergency radio.

Unaltered "V" indicates there is VHF emergency radio.

Unaltered "E" under ELT indicates there is an emergency locator transmitter.

"AP" under ELT TYPE indicates an automatic portable ELT.

Unaltered "P" under POLAR indicates polar equipment is carried.

Unaltered "J" and "L" indicates that life jackets with lights are carried.

"Xs" on "D" and "C" indicate there are no dinghies.

Aircraft colour and markings are self explanatory.

"X" on "N" indicates there are no additional remarks on survival gear.

Example indicates closure with Saskatoon tower.

Contact name and number is self explanatory.

Pilot's licence number assists SAR specialists in their search.

Figure 3.2—IFR Flight Plan (ICAO)

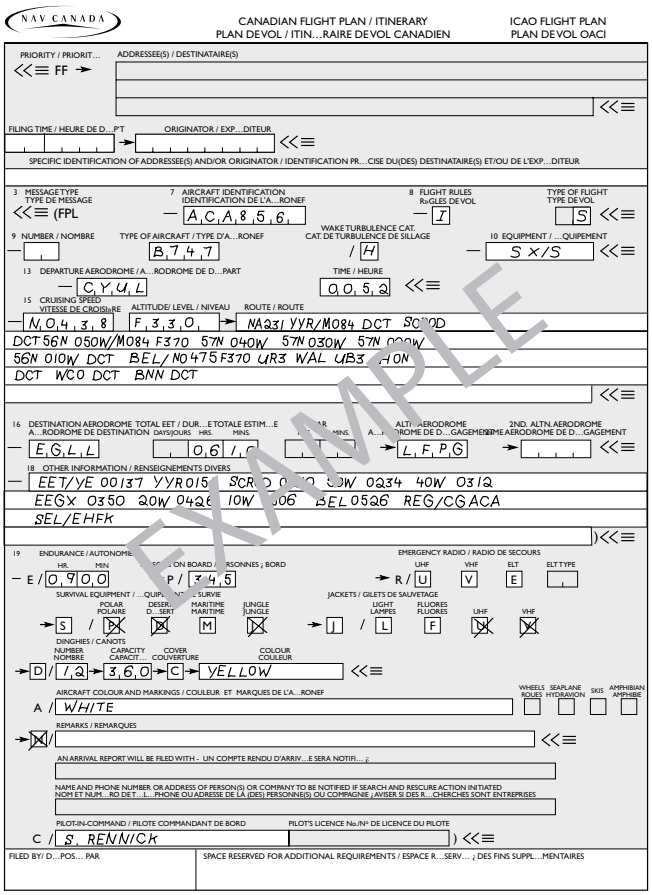
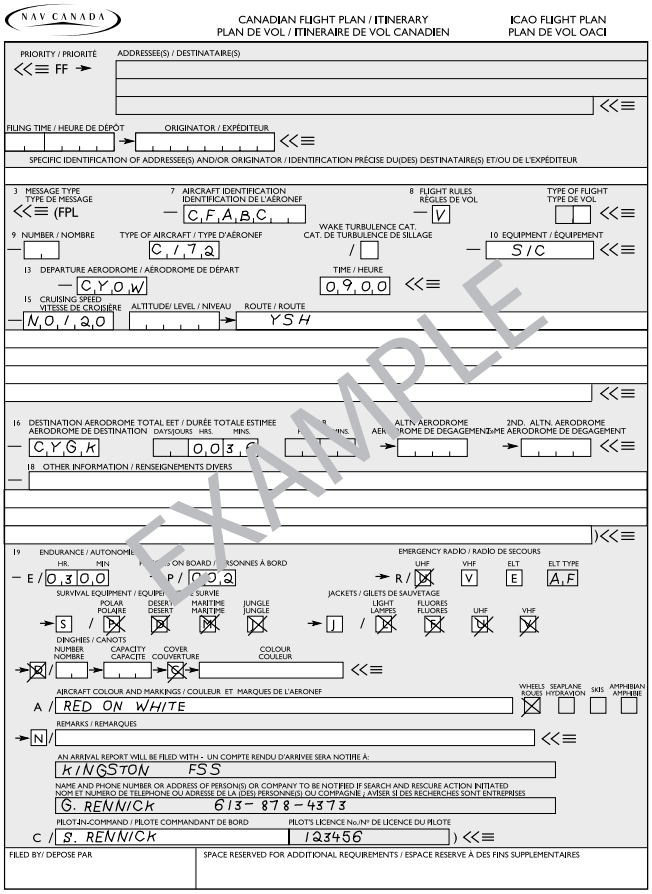


Figure 3.3—VFR Flight Plan



RAC

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4.0 AIRPORT OPERATIONS

4.1 General

Pilots must be particularly alert when operating in the vicinity of an airport. Increased traffic congestion, aircraft in climb and descent attitudes, and pilots preoccupied with cockpit duties are some of the factors that increase the accident potential near airports. The situation is further compounded when the weather only just meets VFR requirements.

Several operators have, for some time, been using their landing lights when flying at lower altitudes and within terminal areas, both during daylight hours and at night. Pilot comment has confirmed that the use of landing lights greatly increases the probability of the aircraft being seen. An important side benefit for improved safety is that birds appear to see aircraft showing lights in time to take avoiding action. In view of this, it is recommended that, when so equipped, all aircraft use landing lights during the takeoff and landing phases and when flying below 2 000 ft AGL within terminal areas and aerodrome traffic patterns.

ATC towers equipped with radar have the capability of providing an increased level of service to the aviation community. The class of airspace determines the controller's responsibilities vis-à-vis separation between IFR and VFR aircraft, and between VFR and VFR aircraft. Control staff in certain towers will be able to assist aircraft in establishing visual separation through the provision of radar vectors, radar monitoring and altitude assignments. Use of the radar will also result in more efficient control of VFR aircraft.

While aircraft shall not be operated at speeds greater than 200 KIAS below 3 000 ft AGL and within 10 NM of a controlled aerodrome (CAR 602.32), there is no mandatory speed restriction when operating in the vicinity of an uncontrolled aerodrome. As traffic levels at some of these aerodromes may be high from time to time, the risk of a possible mid-air collision is somewhat elevated during these periods. For this reason, it is recommended that pilots reduce their aircraft speed to the maximum extent possible when operating below 3 000 ft AGL and within 10 NM of an uncontrolled aerodrome.

Incidents have occurred when aircraft are being operated VFR within control zones, when the flight visibility is less than three miles due to local smoke, haze, rain, snow, fog or other condition. CAR 602.114 requires a minimum of three miles ground visibility for VFR flight within a control zone. This visibility is, of course, taken by a person on the ground and does not preclude the possibility that the visibility aloft may be less. Good airmanship requires that a pilot encountering less than three miles flight visibility within a control zone will either:

(a) take action to avoid the area of reduced visibility; or

(b) remain clear of the area of reduced visibility and request a special VFR clearance from ATC.

Pilots shall maintain a listening watch on the appropriate tower frequency while under control of the tower. Whenever possible, requests for radio checks and taxi instructions should be made on the appropriate ground control frequency. After establishing initial contact with the control tower, pilots will be advised of any frequency changes required.

4.1.1 Wake Turbulence

Wake turbulence has its greatest impact on departure and arrival procedures; however, pilots should not assume that it will only be encountered in the vicinity of aerodromes. Caution should be exercised whenever a flight is conducted anywhere behind and at less than 1 000 ft below a large aircraft.

Radar Vectoring

Controllers apply the following wake turbulence radar separation minima between a preceding IFR/VFR aircraft and an aircraft vectored directly behind it and at less than 1 000 ft during any phase of flight.

Categories, weight limits, aircraft examples and separation criteria are indicated in the table below.

Category	Limits	Examples	Separation (NM)
SUPER HEAVY (S)	This category currently only applies to Airbus A380 aircraft with a maximum takeoff mass of 560 000 kg.	A380-800	Super Heavy behind a Super Heavy - 4 mi.
HEAVY (H)	Aircraft types weighing less than 560 000 kg but more than 136 000 kg	B747/B777/B767 A340A330/MD11	Heavy behind a Super Heavy - 6 mi. Heavy behind a Heavy - 4 mi.
MEDIUM (M)	Aircraft types weighing less than 136 000 kg but more than 7 000 kg	B757/B737/A320 ERJ145/TU154	Medium behind a Super Heavy - 7 mi. Medium behind a Heavy - 5 mi.
LIGHT (L)	Aircraft types weighing 7 000 kg or less	C150/C152 C172/ C182/PA38/PA2	Light behind a Super Heavy - 8 mi.
			Light behind a Heavy - 6 mi.
			Light behind a Medium - 4 mi.

Non-Radar Departures

Controllers will apply a two-minute separation interval to any aircraft that takes off into the wake of a known heavy aircraft if:

(a) the aircraft concerned commences the takeoff from the threshold of the same runway; or

(b) any following aircraft departs from the threshold of a parallel runway that is located less than 2 500 ft away from the runway used by the preceding heavy aircraft.

NOTE: ATC does not apply this two-minute spacing interval between a light following a medium aircraft in the above circumstances, but will issue wake turbulence advisories to light aircraft. Controllers will apply a three-minute separation interval to any aircraft that takes off into the wake of a known heavy aircraft, or a light aircraft that takes off into the wake of a known medium aircraft if:

(a) the following aircraft starts its takeoff roll from an intersection or from a point further along the runway than the preceding aircraft; or

(b) the controller has reason to believe that the following aircraft will require more runway length for takeoff than the preceding aircraft.

ATC will also apply separation intervals of up to three minutes when the projected flight paths of any following aircraft will cross that of a preceding heavy aircraft.

In spite of these measures, ATC cannot guarantee that wake turbulence will not be encountered.

Pilot Waivers

ATC tower controllers are required to advise pilots whenever a requested take-off clearance is denied solely because of wake turbulence requirements. The intention of this advisory is to make pilots aware of the reason for the clearance denial so that they may consider waiving the wake turbulence requirement. To aid in the pilot's decision, the tower controller will advise the type and position of the wake-creating aircraft. The following phraseologies will be used by the controller in response to a request for take-off clearance when wake turbulence is a consideration:

Tower: *NEGATIVE, HOLD SHORT WAKE TURBULENCE. HEAVY BOEING 747, ROTATING AT 6 000 FT*; or

Tower: *LINE UP AND WAIT, WAKE TURBULENCE, HEAVY DC10 AIRBORNE AT 2 MI.*

Pilots are reminded that there are some circumstances where wake turbulence separation cannot be waived.

There may be departure situations, such as with a steady crosswind component, where the full wake turbulence separation minima is not required. The pilot is in the best position to make an assessment of the need for wake turbulence separation. Although controllers are not permitted to initiate waivers to wake turbulence separation minima, they will issue takeoff clearance to pilots who have waived wake turbulence requirements on their own initiative, with the following exceptions:

(a) a light or medium aircraft taking off behind a heavy aircraft and takeoff is started from an intersection or a point significantly further along the runway, in the direction of takeoff; or

(b) a light or medium aircraft departing after a heavy aircraft takes off or makes a low or missed approach in the opposite direction on the same runway; or

(c) a light or medium aircraft departing after a heavy aircraft makes a low or missed approach in the same direction on the same runway.

A pilot-initiated waiver for a VFR departure indicates to the controller that the pilot accepts responsibility for wake turbulence separation. The controller will still issue a wake turbulence cautionary with the takeoff clearance. Controllers are responsible for ensuring wake turbulence minima are met for IFR departures. More information on wake turbulence can be found in AIR 2.9.

4.1.2 Noise Abatement

Pilots and operators must conform to the applicable provisions of CAR 602.105— *Noise Operating Criteria*, and CAR 602.106—*Noise Restricted Runways* (see RAC Annex) and the applicable noise abatement procedures published in the CAP.

Noise operating restrictions may be applied at any aerodrome where there is an identified requirement. When applied at an aerodrome, the procedures and restrictions will be set out in the CFS, and shall include procedures and requirements relating to:

(a) preferential runways;

(b) minimum noise routes;

(c) hours when aircraft operations are prohibited or restricted;

(d) arrival procedures;

(e) departure procedures;

(f) duration of flights;

(g) the prohibition or restriction of training flights;

(h) VFR or visual approaches;

(i) simulated approach procedures; and

(j) the minimum altitude for the operation of aircraft in the vicinity of the aerodrome.

Transport Canada recognizes the need for analysis and consultation in the implementation of proposed new or amended noise abatement procedures or restrictions at airports and aerodromes. A process has been developed that includes consultation with all concerned parties before new or amended noise abatement procedures or restrictions can be published in the CAP or the CFS. When the following checklist has been completed for the proposed noise abatement procedures or restrictions, and the resulting analysis has been completed and approved by Transport Canada, the noise abatement procedure or restriction will be published in the appropriate aeronautical publication.

1. Description of the problem
2. Proposed solution (including possible exceptions)
3. Alternatives (such as alternative procedures or land uses in the community)
4. Costs (such as revenue impact, direct and indirect costs to the community, airport operator and airport users)
5. Noise impacts of the proposed solution
6. Effects on aircraft emissions
7. Effect on current and future airport capacity
8. Implications of not proceeding with the proposal
9. Implementation issues (e.g. aircraft technology, availability of replacement aircraft, ground facilities)
10. Impact on the aviation system
11. Safety implications
12. Air traffic management
13. Fleet impact

A complete description of the process involved is available on the Internet at: *<http://www.tc.gc.ca/eng/civilaviation/opssvs/managementservices-referencecentre-acs-300-302-002-469.htm >*

4.1.3 Preferential Runway Assignments

At controlled airports, when selecting preferential runways for noise abatement or for other reasons, air traffic controllers consider the runway condition, the effective crosswind component and the effective tailwind component.

The maximum effective crosswind component considered in determining runway selection is 25 kt for arrivals and departures on DRY runways, and 15 kt on WET runways. The maximum effective tailwind component is 5 kt.

During consultation between NAV CANADA, aviation stakeholders and Transport Canada, it was decided that operations on the preferential runway should be allowed to continue when more than 25 percent of the runway is covered with a TRACE contaminant, provided:

1. the airport operator has issued an Aircraft Movement S*urface Condition Report (AMSCR) with a reported CRFI* value in all segments of the runway greater than .40 or, if no AMSCR is received, an aircraft reports the braking action as being “good”; and

2. the maximum crosswind component, including gusts, is 15 kt or less.

In conditions where more than 25 percent of the preferential runway is covered with a TRACE contaminant, the runway most nearly aligned into the wind must be selected if:

1. the reported CRFI value in any segment of the runway is .40 or lower;

2. the crosswind component rises above 15 kt; or

3. a less than "good" braking action report is received from a pilot.

Although air traffic controllers may select a preferential runway in accordance with the foregoing criteria, pilots are not obligated to accept the runway for taking off or landing. It remains the pilot's responsibility to decide if the assigned runway is operationally acceptable.

4.1.4 Runway Protected Area

Runway protected area procedures aim to ensure the runway protected area will be free of objects, which will provide a safe environment during aircraft operations in the event of a runway excursion, arrival undershoot, or departure overrun by an aircraft.

ATC and FSS will hold vehicles and pedestrians and ATC will hold taxiing aircraft at published holding positions or at least 200 ft from the runway edge until an aircraft taking off or landing has passed the holding traffic.

The airport operator may designate an alternate holding position at a distance from the runway edge that ensures no hazard is created for arriving or departing aircraft. The airport operator may also permit pedestrians to operate within the runway protected area when an aircraft is taking off or landing.

Controlled Airports

ATC will not clear an aircraft to take off or land if a holding position is transgressed. If a holding position is transgressed after a takeoff or landing clearance has been issued, ATC will cancel the clearance, unless doing so would create a hazardous situation for the aircraft.

Uncontrolled Airports

FSS will inform pilots of aircraft taking off or landing of runway protected area transgressions and seek the pilots' intentions.

4.2 Departure Procedures – Controlled Airports

The following departure procedures are based on those applicable for an aerodrome that have all available services, and are listed in the order that they would be used. At smaller, less equipped airports, some services will be combined, e.g., the IFR clearance would be obtained from ground control where there is no separate clearance delivery frequency. Procedures solely applicable to IFR flight are briefly introduced here to establish their sequence. An elaboration thereof may be found in RAC 7.0, Instrument Flight Rules –Departure Procedures.

4.2.1 ATIS Broadcasts

If ATIS is available, a pilot should obtain the ATIS information prior to contacting either the ground control or tower. See RAC 1.3 for information on ATIS broadcasts.

4.2.2 Clearance Delivery

At locations where a "clearance delivery" frequency is listed, IFR departures should call on this frequency, prior to requesting taxi authorization, normally no more than 5 minutes prior to engine start. Where a clearance delivery frequency is not listed, the IFR clearance will normally be given after taxi authorization has been received. At several major aerodromes, departing VFR aircraft are required to contact "clearance delivery" before taxiing. These frequencies, where applicable, are found in the COMM Section of the CFS, for the appropriate aerodrome.

4.2.3 Radio Checks

If required, radio checks should, wherever possible, be requested on frequencies other than ATC frequencies (see COM 5.10 for readability scale). Normally, the establishment of two-way contact with an agency is sufficient to confirm that the radios are functioning properly.

4.2.4 Requests for Push-back or Power-back

Since controllers may not be in a position to see all obstructions an aircraft may encounter during push-back or power-back, clearance for this manoeuvre will not be issued by the tower. Pilots are cautioned that it is their responsibility to ensure that push-back or power-back can be accomplished safely prior to initiating aircraft movement.

4.2.5 Taxi Information

Taxi authorization should be requested on the ground control frequency. At locations where a "Clearance Delivery" frequency is listed, pilots should obtain their IFR clearance or a VFR code where applicable on this frequency prior to contacting ground control. Where no "Clearance Delivery" frequency is listed, the IFR clearance will normally be relayed by ground control before or after taxi authorization has been issued. If no flight plan has been filed, the pilot should inform the tower "Clearance Delivery", where available, or ground control of the nature of the flight on initial contact, such as "local VFR" or "proceeding VFR to (destination)".

Pilot: *WINNIPEG GROUND, AZTEC GOLF JULIETT VICTOR HOTEL AT HANGAR NUMBER THREE, REQUEST TAXI–IFR EDMONTON EIGHT THOUSAND.*

Ground control: *AZTEC GOLF JULIETT VICTOR HOTEL, WINNIPEG GROUND, RUNWAY (number), WIND (in magnetic degrees and knots), ALTIMETER (four-digit group giving the altimeter in inches of mercury), TAXI VIA (runway or other specific point, route), (other information, such as traffic, airport conditions), (CRFI, RSC, or RVR when applicable), CLEARANCE ON REQUEST.*

Pilot: *GOLF JULIETT VICTOR HOTEL.*

Under no circumstances may a taxiing aircraft, whether proceeding to or from the active runway, taxi onto an active runway unless specifically authorized to do so (see RAC 4.2.6 and 4.2.7).

Upon receipt of a normal taxi authorization, a pilot is expected to proceed to the taxi-holding position for the runway assigned for takeoff. If a pilot is required to cross any runway while taxiing towards the departure runway, the ground or airport controller will issue a specific instruction to cross or hold short. If a specific authorization to cross was not received, pilots should hold short and request authorization to cross the runway. Pilots may be instructed to monitor the tower frequency while taxiing or until a specific point, or they may be advised to "contact tower holding short." The term "holding short," when used during the communications transfer, is considered as a location and does not require a readback.

To emphasize the protection of active runways and to enhance the prevention of runway incursions, ATC is required to obtain a readback of runway "hold" instructions. As a good operating practice, taxi authorizations that contain the instructions "hold" or "hold short" should be acknowledged by the pilot by providing a readback or repeating the hold point.

Examples of "hold" instructions that should be read back:

HOLD or HOLD ON (runway number or taxiway);

HOLD (direction) OF (runway number); or

HOLD SHORT OF (runway number, or taxiway).

Reminder: In order to reduce frequency congestion, readback of ATC taxi instructions, other than those listed above, is not required in accordance with CAR 602.31(1)*(a)*; such instructions are simply acknowledged. With the increased simultaneous use of more than one runway, however, instructions to enter, cross, backtrack or line up on any runway should also, as a good operating practice, be acknowledged by a readback.

Example:

An aircraft is authorized to backtrack a runway to the holding bay and to report clear when in the holding bay.

Pilot: *CHARLIE FOXTROT ALFA BACKTRACKING RUNWAY TWO FIVE AND WILL REPORT IN THE HOLDING BAY.*

NOTE: To avoid causing clutter on controllers' radar displays, pilots should adjust their transponders to "STANDBY" while taxiing and should not switch them to "ON" (or "NORMAL") until immediately before takeoff.

The tower may instruct aircraft to "line up and wait." Controllers will issue the name of the runway intersection or taxiway with the authorization if the line-up position is not at the threshold of the departing runway. When more than one entry point for the same runway is in use, ATC will also specify the runway entry point with the instruction to line up at the threshold.

4.2.6 Taxi Holding Positions

Authorization must be obtained before leaving a taxi holding position, or where a holding position marking is not visible or has not been established, before proceeding closer than 200 feet from the edge of the runway in use. At airports where it is not possible to comply with this provision, taxiing aircraft are to remain at a sufficient distance from the runway in use to ensure that a hazard is not created to arriving or departing aircraft.

4.2.7 Taxiway Holding Positions During IFR Operations

It is imperative that aircraft do not proceed beyond taxiway holding signs at controlled airports until cleared by ATC. Aircraft proceeding beyond the taxiway holding position signs may enter electronically sensitive areas and cause dangerous interference to the glide path or localizer signals. In Canada, holding position signs and holding position markings normally indicate the boundaries of electronically sensitive areas, and provide safe obstruction clearance distances from landing runways.

When an airport is operating under CAT II/III weather conditions or when its CAT II/III operations plan is in effect, pilots are to observe CAT II or III mandatory holding position signs. When an airport is not operating under CAT II/III weather conditions, or its low visibility operations plan is not in effect, pilots need not abide by the CAT II or III taxiway holding positions and are expected to taxi to the normal taxiway holding position markings, unless advised otherwise by ATC.

AGA 5.4.3 and 5.8.3 provide information on the taxiway holding position markings and signs.

At uncontrolled aerodromes, pilots awaiting takeoff should not proceed beyond the holding position signs or holding position markings until there is no risk of collision with aircraft landing, taxiing or departing.

4.2.8 Take-Off Clearance

When ready for takeoff, the pilot shall request a take-off clearance and should include the runway number. Upon receipt of the take-off clearance, the pilot shall acknowledge and take off without delay, or inform ATC if unable to do so.

Pilot: *TOWER, JULIETT GOLF TANGO READY FOR TAKEOFF, RUNWAY THREE SIX.*

Tower: *JULIETT GOLF TANGO, (any special information—hazards, obstructions, turn after takeoff, wind information if required, etc.), CLEARED FOR TAKEOFF RUNWAY THREE SIX (or JULIETT GOLF TANGO, FROM GOLF, CLEARED FOR TAKEOFF RUNWAY THREE SIX).*

Pilot: *JULIETT GOLF TANGO.*

Pilots may request to use the full length of the runway for takeoff at any time. If the runway is to be entered at an intersection and back tracking is required, pilots should indicate their intentions and obtain a clearance for the manoeuvre before entering the runway.

Pilots may request, or the controller may suggest, takeoff using only part of a runway. The pilot's request will be approved, provided noise abatement procedures, traffic, and other conditions permit. If suggested by the controller, the available length of the runway will be stated. It is the pilot's responsibility to ensure that the portion of the runway to be used will be adequate for the take-off run.

To expedite movement of airport traffic and achieve spacing between arriving and departing aircraft, take-off clearance may include the word "immediate." In such cases, "immediate" is used for the purpose of air traffic separation. On acceptance of the clearance, the aircraft shall taxi onto the runway and take off in one continuous movement. If, in the pilot's opinion, compliance would adversely affect their operations, the pilot should refuse the clearance. Pilots planning a static takeoff (i.e. a full stop after "lined up" on the runway), or a delay in takeoff, should indicate this when requesting take-off clearance. ATC will specify the name of the taxiway or intersection with the clearance for takeoff from a taxiway or runway intersection. When more than one entry point for the same runway is in use, ATC will also specify the threshold as the point from which the take-off run will commence for those aircraft departing from the threshold. A controller may not issue a clearance that would result in a deviation from established noise abatement procedures or wake turbulence separation minima.

4.2.9 Release from Tower Frequency

Unless otherwise advised by ATC, pilots do not require permission to change from tower frequency once clear of the control zone and should not request release from this frequency or report clear of the zone when there is considerable frequency congestion. When practicable, it is recommended that a pilot of a departing aircraft monitor tower frequency until 10 NM from the control zone.

VFR flights will not normally be released from tower frequency while operating within the control zone. Once outside control zones, or when departing from an uncontrolled aerodrome where an MF has been assigned, beyond the range within which MF procedures apply, pilots should monitor frequency 126.7 MHz.

4.2.10 Departure Procedures - NORDO Aircraft

Before proceeding to any portion of the manoeuvring area of a controlled airport, it is the pilot's responsibility to inform the control tower of his/her intentions and make appropriate arrangements for visual signals.

NOTE: Before operating within a control zone with Class C airspace, a clearance shall be obtained from the control tower.

A pilot should remain continuously alert for visual signals from the control tower.

An aircraft should remain at least 200 ft from the edge of any runway where holding position markings or signs are not visible or have not been established unless a clearance for takeoff or to cross the runway has been received.

When stopped by a red light, a pilot must wait for a further clearance before proceeding.

When ready for takeoff by day, the pilot may attract the attention of the airport controller by turning the aircraft toward the tower.

Acknowledgement of Visual Signals – pilot shall, where practical, acknowledge all clearances and instructions received by visual signals by day, by full movement of rudder or ailerons, whichever can be seen most easily (such movement should be repeated at least three times in succession), or by taxiing the aircraft to the authorized position.

4.2.11 Visual Signals

Visual signals used by the tower and their meanings are as follows:

TO AIRCRAFT ON THE GROUND:		
1	SERIES OF GREEN FLASHES	Cleared to taxi.
2	STEADY GREEN LIGHT	Cleared for takeoff.
3	SERIES OF RED FLASHES	Taxi clear of landing area in use.
4	STEADY RED LIGHT	Stop.
5	FLASHING WHITE LIGHT	Return to starting point on airport.
6	BLINKING RUNWAY LIGHTS	Advises vehicles and pedestrians to vacate runways immediately.

4.2.12 Departure Procedures – RONLY Aircraft

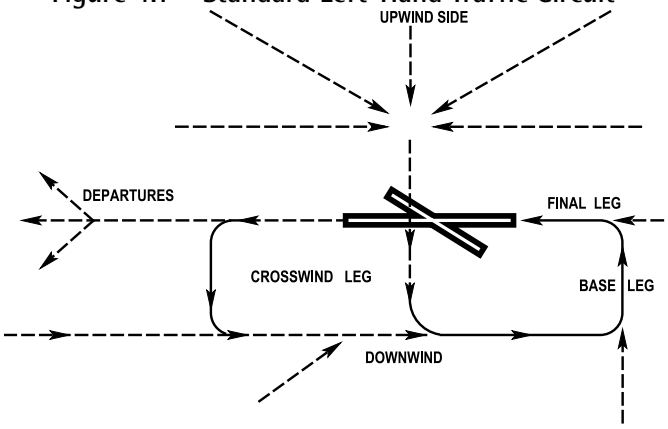
The procedures which apply to aircraft without radio also apply to aircraft equipped with receiver only, except that an airport controller may request the pilot to acknowledge a transmission in a specific manner. After the initial acknowledgement, no further acknowledgement, other than compliance with clearances and instructions, is necessary, unless otherwise requested by the controller.

4.3 Traffic Circuits – Controlled Aerodromes

The following procedures apply to all aerodromes at which a control tower is in operation.

The traffic circuit consists of the crosswind leg, downwind leg, base leg and final approach leg.

Figure 4.1 – Standard Left-Hand Traffic Circuit



NOTES

1: Circuit normally flown at 1 000 ft AAE.

2: Where a right-hand circuit is required in accordance with CAR 602.96, the opposite of this diagram is applicable.

Entry to the circuit shall be made in such a manner so as to avoid cutting off other aircraft, conforming as closely as possible to the altitude (normally 1 000 ft AAE), speed and size of the circuit being flown by other traffic.

In order to increase safety by reducing the possibility of conflicting with departing traffic, aircraft approaching the active runway from the upwind side are to join the downwind leg abeam a point approximately midway between each end of the runway, taking into account aircraft performance, wind and/or runway length.

Pilots of NORDO and RONLY aircraft, who have made specific arrangements to operate within the control zone (RAC 4.4.5 and RAC 4.4.6), should approach the circuit from the upwind side, join crosswind at circuit height and, taking due account of other traffic, join the circuit on the downwind leg. Pilots are cautioned to remain clear of the approach and/or departure path of the active runway when joining the circuit (see Figure 4.1). Flights which are not in communication with the tower shall, at all times, be on the alert for visual signals. Pilots are reminded that below 3 000 ft AGL and within 10 NM of a controlled aerodrome, aircraft shall not be operated at speeds greater than 200 KIAS. However, where the minimum safe speed of the aircraft is greater than 200 KIAS, the aircraft may be operated at the minimum safe speed (CAR 602.32).

4.4 Arrival Procedures – Controlled Airports

If ATIS is available, all arrivals should monitor this frequency to obtain the basic aerodrome information prior to contacting the tower. (See RAC 1.3 for ATIS information and refer to RAC 5.8 for arrival procedures in Class C airspace, other than a control zone.)

4.4.1 Initial Contact

Pilots must establish and maintain radio communications with the appropriate control tower prior to operating within any control zone served by an operational control tower. Also, if the control zone is Class B or C airspace, the appropriate clearance must be received from the controlling agency prior to entry.

When practical, it is recommended that the pilot make initial contact at least 5 minutes prior to requiring clearance or entering the zone.

4.4.2 Initial Clearance

On initial contact with the tower, unless the pilot advises receipt of ATIS, the airport controller will inform the pilot of runway in use, wind direction and speed, altimeter setting and any other pertinent information. Following this, the pilot will receive clearance to proceed, including any necessary restrictions. The shortest routing to the runway may be expected if traffic permits. Pilots of VFR aircraft should check the CFS (or a VTA chart if applicable) for special procedures at the time of flight planning.

When a pilot is given a clearance "to the circuit" by ATC, it is expected that the aircraft will join the circuit on the downwind leg at circuit height. Depending on the direction of approach to the airport and the runway in use, it may be necessary to proceed crosswind prior to joining the circuit on the downwind leg.

The ATC phraseology "cleared to the circuit" authorizes a pilot to make a right turn in order to join crosswind, or partial right turn to join a left-hand circuit provided that the right turn or partial right turn can be carried out safely.

A straight-in approach is an approach where an aircraft joins the traffic circuit on the final leg without having executed any other portion of the circuit.

When an aircraft is cleared for a right-hand approach while a left-hand circuit is in effect, it shall be flown so as to join the circuit on the right-hand downwind leg, or join directly into the right-hand base leg, as cleared by the airport controller.

Pilot: *KELOWNA TOWER, CESSNA FOXTROT ALFA BRAVO CHARLIE, ONE FIVE MILES NORTH, SIX THOUSAND FIVE HUNDRED FEET VFR, REQUEST LANDING INSTRUCTIONS.*

Tower: *CESSNA FOXTROT ALFA BRAVO CHARLIE, KELOWNA TOWER, RUNWAY (number), WIND (direction in degrees magnetic, speed in knots), ALTIMETER (4-digit group in inches), (other pertinent instructions or information if deemed necessary), CLEARED TO THE CIRCUIT or CLEARED TO LEFT BASE LEG or CLEARED STRAIGHT-IN APPROACH.*

Pilot: *ALFA BRAVO CHARLIE.*

When a pilot has received current landing information from the tower or the ATIS broadcast, initial clearance may be requested as follows:

Pilot: *VICTORIA TOWER, CESSNA FOXTROT ALFA BRAVO CHARLIE (aircraft position), ALTITUDE, CHECK LANDING INFORMATION (or) WITH INFORMATION (ATIS code). REQUEST CLEARANCE TO THE CIRCUIT (or other type of approach).*

Once established in the circuit as cleared, the pilot is to advise the tower accordingly.

Pilot: *TOWER, ALFA BRAVO CHARLIE DOWNWIND.*

Tower: *ALFA BRAVO CHARLIE NUMBER (approach sequence number). If not Number 1, the tower will give the type, position and colour if significant, of aircraft to follow and other instructions or information.*

Pilot: *ALFA BRAVO CHARLIE.*

Common ATC Phraseologies:

FOLLOW (aircraft type) NOW ON BASE LEG.
EXTEND DOWNWIND.
WIDEN APPROACH.

VFR Holding Procedures

When it is required by traffic, VFR flights may be asked to ORBIT visually over a geographic location, VFR checkpoint or call-up point (when these are published in the CFS or VTA charts) until they can be cleared to the airport. If the request is not acceptable, pilots should inform ATC and state their intentions.

Pilot: *TORONTO TOWER, CESSNA FOXTROT ALFA BRAVO CHARLIE, OVER PORT CREDIT AT THREE THOUSAND FIVE HUNDRED FEET WITH INFORMATION ROMEO.*

Tower: *CESSNA FOXTROT ALFA BRAVO CHARLIE, TORONTO TOWER, ORBIT THE FOUR STACKS, ANTICIPATE A FIVE MINUTE DELAY, TRAFFIC IS A CESSNA ONE SEVEN TWO OVER THE FOUR STACKS, LAST REPORTED AT TWO THOUSAND FEET.*

The pilot is expected to proceed to the FOUR STACKS, orbit within visual contact of the checkpoint and be prepared to proceed to the airport immediately upon receipt of a further clearance. Left turns are recommended as terrain and collision avoidance are the pilot's responsibilities.

Tower: *ALFA BRAVO CHARLIE, REPORT LEFT BASE FOR RUNWAY TWO FOUR LEFT. CLEARED TO THE CIRCUIT.*

Pilot: *ALFA BRAVO CHARLIE DEPARTING THE FOUR STACKS AT THIS TIME, WILL REPORT LEFT BASE TO RUNWAY TWO FOUR LEFT; or*

Pilot: *ALFA BRAVO CHARLIE*

4.4.3 Landing Clearance

At controlled airports, a pilot must obtain landing clearance prior to landing. Normally, the airport controller will initiate landing clearance without having first received the request from the aircraft; however, should this not occur, the onus remains upon the pilot to request such clearance in sufficient time to accommodate the operating characteristics of the aircraft being flown. NORDO and RONLY aircraft should be considered as intending to land when they join and conform to the traffic circuit. Landing clearance will normally be given when an aircraft is on final approach. If landing clearance is not received, the pilot should, except in case of emergency, pull up and make another circuit.

Pilot: TOWER, ALFA BRAVO CHARLIE LANDING CLEARANCE RUNWAY TWO SIX.

Tower: ALFA BRAVO CHARLIE, CLEARED TO LAND RUNWAY TWO SIX.

Pilot: ALFA BRAVO CHARLIE.

Controllers may, on occasion, authorize ground traffic to cross the landing runway after a landing clearance has been issued. Any such authorization by ATC is given with the assurance that the runway will be clear of conflicting traffic at the time the arriving aircraft crosses the landing threshold. When it appears that the runway may not be clear for landing, the pilot will be advised to "CONTINUE APPROACH, POSSIBLE PULL-UP." When a "pull-up" is necessary (before or after the landing clearance has been issued), the pilot shall abandon the approach and make another circuit.

Tower: ALFA BRAVO CHARLIE, TRAFFIC STILL ON RUNWAY, PULL UP AND GO AROUND.

Common ATC Phraseologies:

CAUTION, POSSIBLE TURBULENCE FROM LANDING (aircraft type and position).

MAKE LEFT/RIGHT THREE SIX ZERO.

MAKE FULL-STOP LANDING.

CONTACT TOWER/GROUND ON (frequency) WHEN OFF RUNWAY/ NOW.

The "cleared for the option" procedure has been introduced to give a pilot the option to make touch-and-gos, low approach, missed approach, stop-and-go, or a full stop landing. This procedure will normally be used during light traffic conditions.

Pilot: TOWER, ALFA BRAVO CHARLIE, DOWNWIND RUNWAY TWO SEVEN, REQUEST THE OPTION.

Tower: ALFA BRAVO CHARLIE, CLEARED FOR THE OPTION RUNWAY TWO SEVEN.

A clearance for multiple touch-and-gos permits the pilot to perform more than one touch-and-go during a single pass along the runway without stopping. The procedure is intended for student pilots training with an instructor and will only be authorized during light traffic conditions.

Pilot: TOWER, ALFA BRAVO CHARLIE, DOWNWIND RUNWAY TWO SEVEN, REQUEST MULTIPLE TOUCH-AND-GOS.

Tower: ALFA BRAVO CHARLIE, CLEARED MULTIPLE TOUCH-AND-GOS, RUNWAY TWO SEVEN.

4.4.4 Taxiing

A pilot must obtain an ATC authorization to taxi on the manoeuvring area at a controlled airport. Unless otherwise instructed by the airport controller, aircraft are expected to continue in the landing direction to the nearest suitable taxiway, exit the runway without delay and obtain further authorization to taxi. No aircraft should exit a runway onto another runway unless instructed or authorized to do so by ATC. When required, ATC will provide the pilot with instructions for leaving the runway. These instructions will normally be given to the pilot prior to landing or during the landing roll. When an aircraft is instructed to exit onto another runway, the pilot must:

(a) obtain further authorization to taxi; and

(b) remain on tower frequency until clear of that runway or until communication is transferred to ground control.

After landing on a dead-end runway, the pilot will normally be given instructions to backtrack. In all cases, after leaving the runway, unless otherwise instructed by ATC, pilots should continue to taxi forward across the taxi holding position lines or to a point at least 200 ft from the edge of the runway where a taxi holding position line is not available. The aircraft is not considered clear of the runway until all parts of the aircraft are past the taxi holding position line or the 200-ft point. When clearing landing runways onto taxiways or other runways, pilots should exercise good airmanship by continuing to taxi well clear of the hold position while contacting ground control to obtain taxi clearance. This is to prevent aircraft from blocking a runway exit to following aircraft. If unable to establish contact with ground control, pilots should stop and not cross any runway without receiving ATC authorization.

Tower: *ALFA BRAVO CHARLIE (instructions for leaving runway), CONTACT GROUND (specific frequency).*

Towers will normally provide the aircraft down time only when requested by the pilot.

Normally, aircraft will not be changed to ground control until off the active runway or runways.

Tower: *ALFA BRAVO CHARLIE, TAXI TO (apron or parking area)(any special instructions such as routing, traffic, cautionary or warning regarding construction or repair on the manoeuvring areas).*

4.4.5 Arrival Procedures – NORDO Aircraft

Before operating into a controlled aerodrome, pilots shall contact the control tower, inform the tower of their intentions and make arrangements for clearance through visual signals.

NOTE: Before operating within a control zone with Class C airspace, a clearance shall be obtained from the control tower.

Pilots should remain continuously alert for visual signals from the control tower.

Traffic Circuit – The pilot should approach the traffic circuit from the upwind side of the runway, join crosswind at circuit height abeam a point approximately midway between each end of the runway and join the circuit on the downwind leg. While within the circuit the pilot should conform to the speed and size of the circuit, maintaining a separation from aircraft ahead so that a landing can be made without overtaking it. If it is necessary for a flight to cross the airport prior to joining crosswind, this should be done at least 500 feet above circuit height, and descent to circuit height should be made in the upwind area of the active runway.

Final Approach – Before turning on final approach, a pilot shall check for any aircraft on a straight-in approach.

Landing Clearance – Landing clearance will be given on final approach. If landing clearance is not received, the pilot shall, except in case of emergency, pull up and make another circuit. (Landing clearance may be withheld by the tower when there are preceding aircraft which have not landed or if the runway is occupied.)

Taxiing – No taxi clearance is required after landing, except to cross any runway or to taxi back to a turn-off point. When an aircraft's landing run carries it past the last available turn-off point, it should proceed to the end of the runway and taxi to one side, waiting there until instruction is received to taxi back to the nearest turn-off point.

4.4.6 Arrival Procedures – RONLY Aircraft

The procedures which apply to aircraft without radio also apply to aircraft equipped with receiver only, except that an airport controller may request the pilot to acknowledge

a transmission in a specified manner. After initial acknowledgement, no further acknowledgement other than compliance with clearances and instructions is necessary, unless otherwise requested by the controller.

4.4.7 Visual Signals

Visual signals used by the tower and their meanings are as follows:

TO AIRCRAFT IN FLIGHT:		
1	STEADY GREEN LIGHT	Cleared to land.
2	STEADY RED LIGHT	Give way to other aircraft and continue circling.
3	SERIES OF GREEN FLASHES	Return for landing. (This shall be followed at the proper time by a steady green light.)
4	SERIES OF RED FLASHES	Airport unsafe; do not land.
5	THE FIRING OF A RED PYROTECHNICAL LIGHT (see NOTE)	Whether by day or night and notwithstanding previous instructions, means do not land for the time being.

NOTE: Military control towers only.

Acknowledgement of Visual Signals – A pilot shall, where practicable, acknowledge all clearances and instructions received by visual signals. Signals may be acknowledged as follows:

(a) distinct rocking of aircraft in flight;

(b) at night, by a single flash of a landing light.

4.4.8 Communications Failure - VFR

(a) CAR 602.138 specifies that where there is a two-way radio communication failure between the controlling air traffic control unit and a VFR aircraft while operating in Class B, Class C or Class D airspace, the pilot-in-command shall:
  (i) leave the airspace
    (A) where the airspace is a control zone, by landing at the aerodrome for which the control zone is established, and
    (B) in any other case, by the shortest route;
  (ii) where the aircraft is equipped with a transponder, set the transponder to Code 7600; and
  (iii) inform an air traffic control unit as soon as possible of the actions taken pursuant to (i).

(b) Should the communications failure occur while operating outside of Class B, C, or D airspace precluding the pilot from obtaining the appropriate clearance to enter or establishing radio contact, and if no nearby suitable aerodrome is available, the pilot may enter the Class B, C or D airspace, continue under VFR, and shall carry out the remaining procedures listed in (a).

Should the communications failure occur and there is a suitable aerodrome nearby at which the pilot wishes to land, it is recommended that the pilot comply with the established NORDO arrival procedure outlined in RAC 4.4.5.

Pilots operating VFR in either Class E or G airspace may follow the procedures in (a) even though there is no intention to enter Class B, C, or D airspace.

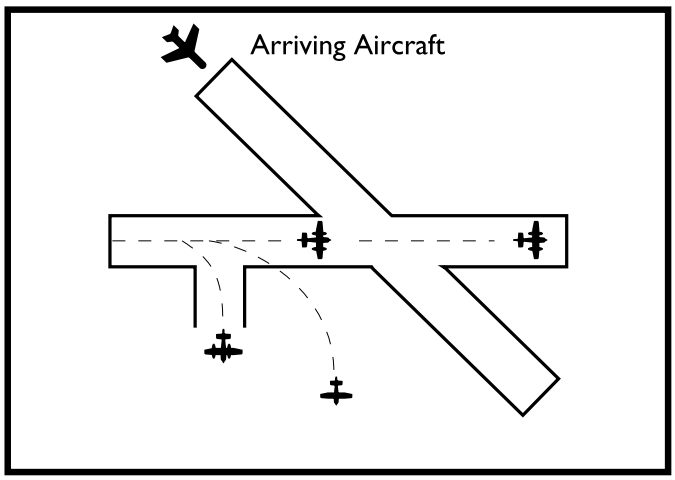
4.4.9 Operations on Intersecting Runways

ATC procedures allow for sequential and/or simultaneous operations on intersecting runways. Their intent is to increase airport traffic capacity, thus reducing delays and saving fuel. These operations differ only in the controllers' application of ATC procedures; ATC advisories will specify the type of operation(s) in progress.

(a) *Sequential Operations*: Sequential operations do not permit controllers to allow either an arriving aircraft to cross the arrival threshold or a departing aircraft to commence its takeoff roll until certain conditions are met.

For an arriving aircraft (Figure 4.2) the conditions are as follows:
  (i) the preceding departing aircraft has:
    (A) passed the intersection, or
    (B) is airborne and has turned to avoid any conflict;
  (ii) the preceding arriving aircraft has:
    (A) passed the intersection, or
    (B) completed its landing roll and will hold short of the intersection (i.e.,stopped or at taxi speed), or
    (C) completed its landing roll and turned off the runway.

Figure 4.2 – Arriving Aircraft



For a departing aircraft (Figure 4.3) the sequential conditions are listed below:
  (iii) the preceding departing aircraft
    (A) has passed the intersection; or
    (B) is airborne and has turned to avoid any conflict.

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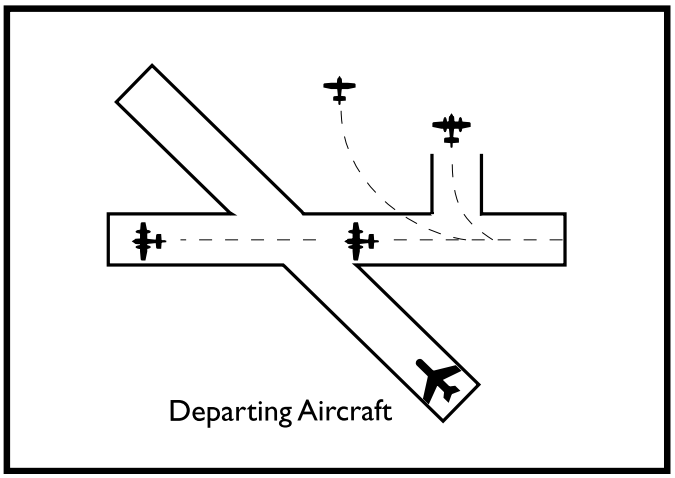
(iv) the preceding arriving aircraft has
  (A) passed the intersection;
  (B) completed its landing roll and will hold short of the intersection (i.e., is stopped or at taxi speed); or
  (C) completed its landing roll and turned off the runway.

Figure 4.3—Departing Aircraft



(b) *Simultaneous Operations*: Simultaneous operations differ from sequential operations in the application of ATC procedures. The procedures for simultaneous use of intersecting runways are applied only between two arrivals or an arrival and a departure. Air traffic controllers will permit an arriving aircraft to cross the runway threshold or a departing aircraft to begin its takeoff roll without adhering to the conditions in RAC 4.4.9(a)(ii)(B) and RAC 4.4.9(a)(iv)(B) provided one of the aircraft has accepted a clearance to land and hold short of the intersecting runways (Figure 4.4). These operations are known as land and hold short operations (LAHSO).

General

LAHSO may be carried out under the following conditions:

(i) the LDA, measured from the threshold or displaced threshold to 200 ft short of the nearest edge of the runway being intersected must be published in the CAP and in the CFS. ATC shall also broadcast LAHSO advisories, including LDAs, through an ATIS or voice advisory, well in advance of the final approach descent;

(ii) the weather minima of a 1 000-ft ceiling and visibility of three statute miles are required. In specific cases, these criteria may be reduced by the Regional Director, Civil Aviation, but only with a written agreement between ATC and the operator;

(iii) the reported braking action must be not less than good. The runway must be bare. (No snow, slush, ice, frost, or standing water is visible from the tower or reported by a competent person. In order to accommodate small accumulations of ice or snow at the runway edge during winter operations, only the centre 100 ft of the runway must be bare.);

(iv) a tailwind of less than five knots is acceptable for normal LAHSO on both dry and wet runway operations. The maximum allowable crosswind component for dry runways is 25 kt and 15 kt for LAHSO. Controllers will not initiate or approve a request for LAHSO on any runway when crosswinds on that runway exceed the maximum;

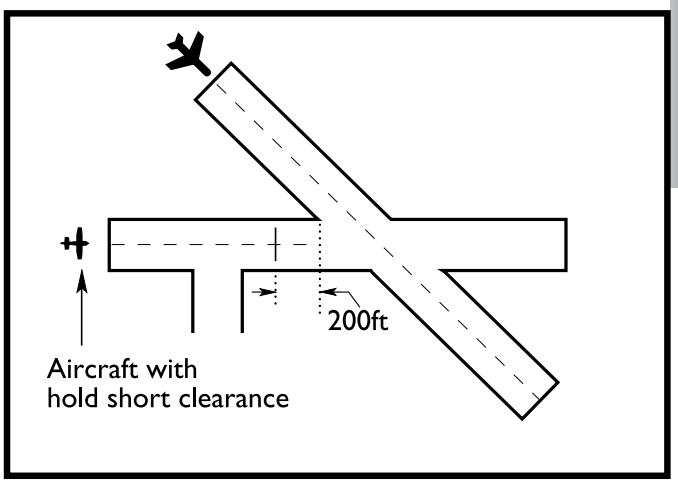
(v) ATC must include specific directions to hold short of an intersecting runway (e.g., "cleared to land Runway 27, hold short of Runway 36"). Pilots, in accepting the clearance, must read back "cleared to land Runway 27, hold short of Runway 36." Having accepted the hold-short clearance, pilots are obligated to remain 200 ft short of the closest edge of the runway being intersected. If, for any reason, a pilot is unsure of being able to comply with a hold-short clearance, the pilot must advise ATC immediately of non-acceptance of the clearance; it is far better to be safe than sorry;

(vi) the lines are the same as taxiway exit and holding markings, as described in AGA 5.4.3. These lines shall be located on the runway 90° to the hold-short runway centreline, 200 ft short of the nearest edge of the runway being intersected. Red and white mandatory instruction signs, illuminated for night LAHSO, shall be located at either end of the lines. More details on lines can be found in *Aerodrome Standards and Recommended Practices* (TP 312E); and

(vii) for tactical ATC reasons, controllers may offer or approve a pilot request for the use of a dry runway for landing with a tailwind not exceeding ten knots. LAHSO will not be authorized on wet runways if the tailwinds are five knots or more.

NOTE: LAHSO are not authorized if thunderstorms, turbulence, wind shear or other conditions exist that would adversely affect the restricted aircraft's ability to hold short after landing.

Figure 4.4—Aircraft with Hold-short Clearance



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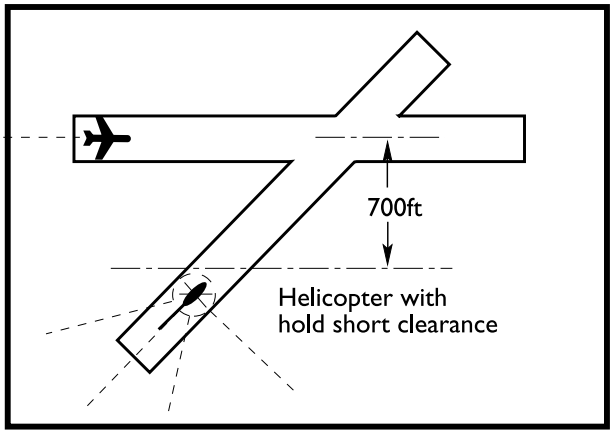
For simultaneous operations involving helicopters (Figure 4.5), if the arriving helicopter has a hold-short clearance, its point of landing is at least 700 ft from the centreline of the other runway.

Figure 4.5—Helicopter with Hold-short Clearance



Wet Runways

The following conditions are applicable for wet runway operations:

(i) no Group 6 aircraft shall be instructed to hold short of an intersecting runway;

(ii) stopping distances for Group 1, 2 and 3 aircraft are increased by 15% (see Note); and

(iii) the coefficient of friction on LAHSO runways must meet a minimum standard. The coefficient of friction will be measured in accordance with *Airport Pavement Evaluation—Surface Friction* (AK-68-35-000/TP 3716); only those runways with average coefficients of friction above 0.6 will be approved for wet runway LAHSO.

NOTE: Aircraft are categorized into groups requiring the following stopping distances:

	Dry Runway	Wet Runway
Group 1	1 650 ft	1 900 ft
Group 2	3 000 ft	3 500 ft
Group 3	4 500 ft	5 200 ft
Group 4	6 000 ft	6 000 ft
Group 5	8 000 ft	8 000 ft
Group 6	8 400 ft	8 400 ft

These stopping distances are based on ISA conditions for sea-level runways. For higher airport elevations, the distances are adjusted for pressure altitude. An aircraft's grouping is such that its normal stopping distance is approximately 50% of the available stopping distance.

(c) General Provisions

1. All pilots will be advised that simultaneous LAHSO are in progress.
2. Controllers will issue appropriate traffic information.
3. Acceptance of a hold-short landing clearance indicates to the controller that a pilot is able to comply with the clearance. If for any reason a pilot elects to use the full length of a runway, or a different runway, the pilot should inform ATC on or before receipt of the hold-short landing clearance.

NOTE: During sequential and/or simultaneous operations, ATC procedures and pilot compliance with clearance conditions will ensure aircraft separation (i.e., spacing between aircraft). Notwithstanding this, conflicts between aircraft may occur, particularly at runway intersections, if a pilot does not comply with a clearance or is unable to comply as a result of unforeseen circumstances, such as missed approaches, misjudged landings, balked landings or brake failures. In these circumstances, ATC will endeavour to provide traffic advisories and/or instructions to assist pilots with collision avoidance.

4.4.10 High Intensity Runway Operations (HIRO)

Several of Canada's airports rank among North America's busiest in total aircraft movements. HIRO, as a concept, have evolved from procedures developed by high density terminals in North America and Europe. It is intended to increase operational efficiency and maximize the capacity at those airports where it is employed through the use of disciplined procedures applied by both pilots and air traffic controllers. HIRO is intended to minimize the occurrence of overshoots that result from slow-rolling and/or slow-clearing aircraft and offers the prospective of reducing delays overall, both on the ground and in the air. In its fullest application, HIRO enables ATC to apply minimum spacing to aircraft on final approach to achieve maximum runway utilization.

The tactical objective of HIRO is to minimize runway occupancy times (ROT) for both arriving and departing aircraft, consistent with both safety and passenger comfort. Effective participation in HIRO results when the pilot of an arriving aircraft exits the runway expeditiously, allowing the following arriving aircraft to cross the threshold with a minimum time interval. In the case of an arrival and a subsequent departure, the arriving pilot clears the runway in a minimum ROT, permitting a departure before the next arrival crosses the threshold. The air traffic controller's objective in HIRO is to optimize approach spacing. This can be best achieved when pilots reach and adhere to assigned speeds as soon as practicable.

Effective participation in HIRO is achieved by satisfying the following key elements.

Key elements for arrivals:

- The pilot's objective should be to achieve minimum ROT, within the normally accepted landing and braking performance of the aircraft, by targeting the earliest suitable exit point and applying the right deceleration rate so that the aircraft leaves the runway as expeditiously as possible at the nominated exit.

- The expected runway exit point to achieve minimum ROT should be nominated during approach briefing. It is better, in terms of ROT, to select an exit you know you can make, rather than choose an earlier one, miss it, and then roll slowly to the next available exit.

- Upon landing, pilots should exit the runway without delay.

High-speed exits have specific maximum design speeds. These speeds may be available through the appropriate airport authority. Key elements for departures:

- On receipt of a line-up clearance, pilots should ensure that they are able to line up on the runway as soon as the preceding aircraft has commenced its takeoff roll.

- ATC will expect aircraft to enter the runway at a suitable angle to quickly line-up on the centreline and, when possible, continue in to a rolling takeoff when cleared. Pilots should ensure that they are able to commence the takeoff roll immediately when a takeoff clearance is issued.

- Aircraft that need to enter the runway at right angles, to backtrack, or to use the full length of the runway will require extra time on the runway. Therefore, pilots should notify ATC before arriving at the holding area so that the controller can re-sequence departures to provide the extra time.

- Cockpit checks should be completed prior to line-up, and any checks requiring completion on the runway should be kept to a minimum. If extra time is required on the runway, ATC should be informed before the aircraft arrives at the holding area so that the controller can re-sequence departures to provide the extra time.

4.5 Aircraft Operations—Uncontrolled Aerodromes

4.5.1 General

An uncontrolled aerodrome is an aerodrome without a control tower, or one where the tower is not in operation. There is no substitute for alertness while in the vicinity of an uncontrolled aerodrome. It is essential that pilots be aware of, and look out for, other traffic, and exchange traffic information when approaching or departing from an uncontrolled aerodrome, particularly since some aircraft may not have communication capability. To achieve the greatest degree of safety, it is essential that all radio-equipped aircraft monitor a common designated frequency, such as the published MF or ATF, and follow the reporting procedures specified for use in an MF area, while operating on the manoeuvring area or flying within an MF area surrounding an uncontrolled aerodrome.

- *MF area* means an area in the vicinity of an uncontrolled aerodrome for which an MF has been designated. The area within which MF procedures apply at a particular aerodrome is defined in the Aerodrome/Facility Directory Section of the CFS, under the heading COMM. Normally, the MF area is a circle with a 5-NM radius capped at 3 000 ft AAE.

At uncontrolled aerodromes without a published MF or ATF, the common frequency for the broadcast of aircraft position and the intentions of pilots flying in the vicinity of that aerodrome is 123.2 MHz.

At aerodromes within an MF area, traffic information may be exchanged by communicating with an FSS, CARS, UNICOM operator, vehicle operator, or by a broadcast transmission. The VCS in conjunction with AAS is normally provided at aerodromes served by an FSS. Some uncontrolled aerodromes are indirectly served by an FSS through an RCO and may provide RAAS. As flight service specialists may be located some distance from an aerodrome, it is essential that they be kept fully informed of both aircraft and vehicle activity.

Other aerodromes are designated as having an ATF. At some aerodromes with a control tower or FSS, an ATF is designated for use when the air traffic facility is closed. If a radio-equipped vehicle is present at ATF aerodromes, pilots can contact the vehicle operator directly on the ATF to ascertain that no vehicle-aircraft conflict exists. Operators of such radio-equipped vehicles will also provide pilots with any other available information on runway status and presence of other aircraft or vehicles on the runway.

There are some remote airports where a voice generator module (VGM) connected to an AWOS (or LWIS) continuously broadcasts weather information. An AWOS (or LWIS) broadcasts weather information that may differ from the aviation routine weather report (METAR) or aviation selected special weather report (SPECI) issued for the location. There may also be significant differences between broadcasts only

a few minutes apart. Transport Canada recognizes that for any given site at any given time there can be only one official weather observation (METAR or SPECI), whether from a human observer or an automated station. As a result, it has been determined that although an AWOS (or LWIS) broadcast constitutes an additional source of accurate, up-to-the-minute weather information, it does not constitute an official weather observation (METAR or SPECI).

The wind and altimeter data obtained from an AWOS (or LWIS) via a VGM broadcast can be used to conduct an instrument approach. Therefore, at aerodromes where RAAS is provided and where AWOS (or LWIS) weather information is also available via a VGM broadcast, the wind and altimeter data may be omitted from the RAAS if the pilot indicates in the initial call to the FSS that the weather information has already been obtained from the VGM broadcast. To avoid unnecessary frequency changes and to assist in reducing frequency congestion, it is desirable that pilots acquire this weather information prior to entering either the MF or ATF area and inform the flight service specialist that they have the wind and altimeter information. On start-up at such an aerodrome, it would be desirable to listen to the VGM broadcast prior to taxiing.

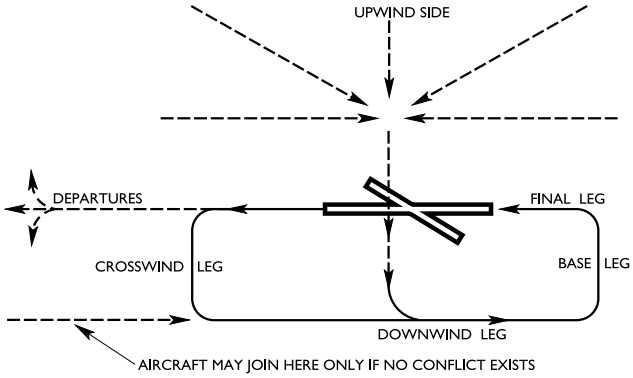
The flight service specialist will advise pilots of below-minima conditions reported in the current official METAR or SPECI. This will ensure a common reference for pilots and ATS personnel since IFR or SVFR authorization would then be required to operate within the control zone. Pilots will also be advised of any other significant weather conditions reported in current METAR, SPECI, SIGMET, AIRMET or PIREP, as appropriate, which may affect the safety of the flight. The flight service specialist will provide, upon request, the complete current METAR or SPECI for the location.

4.5.2 Traffic Circuit Procedures — Uncontrolled Aerodromes

The following procedures apply to all aircraft operating at aerodromes where airport control service is not provided except those aircraft following a standard instrument approach procedure. For procedures that apply to aircraft on a standard instrument approach, refer to RAC 9.0. Prior to joining a traffic circuit, all pilots should announce their intentions (see RAC 4.5.6). All turns shall be to the left while operating in the circuit, unless a right-hand circuit has been specified in the CFS.

Pilots operating aircraft under IFR or VFR are expected to approach and land on the active runway. The active runway is a runway that other aircraft are using or are intending to use for the purpose of landing or taking off. Should it be necessary for aircraft to approach to, land on, or take off from a runway other than the active runway, it is expected that the appropriate communication between pilots and the ground station will take place to ensure there is no conflict with other traffic. Some pilots operating under VFR at many sites prefer to give commercial IFR and larger type of aircraft priority. This practice, however, is a personal airmanship courtesy, and it should be noted that these aircraft do not establish any priority over other aircraft operating VFR at that aerodrome.

Figure 4.6—Standard Left-hand Circuit Pattern



NOTES 1: The circuit is normally flown at 1 000 ft AAE.

2: If a right-hand circuit is required in accordance with CAR 602.96, the opposite of this diagram is applicable.

(a) *Joining the Circuit*

(i) Landing and takeoff should be accomplished on or parallel to the runway most nearly aligned into the wind. However, the pilot has the final authority and responsibility for the safe operation of the aircraft and another runway may be used if it is determined to be necessary in the interest of safety.

(ii) Unless otherwise specified or required by the applicable distance from cloud criteria, aircraft should approach the traffic circuit from the upwind side. Alternatively, once the pilot has ascertained without any doubt that there will be no conflict with other traffic entering the circuit or traffic established within the circuit, the pilot may also join the circuit on the downwind leg (Figure 4.6). When joining from the upwind side, plan the descent to cross the runway in level flight at 1 000 ft AAE or the published circuit altitude. Maintain that altitude until further descent is required for landing.

(iii) If it is necessary for an aircraft to cross the airport before joining the circuit, it is recommended that the crossover be accomplished at least 500 ft above the circuit altitude.

(iv) All descents should be made on the upwind side or well clear of the circuit pattern.

(v) Aerodromes not within an MF area: Where no MF procedures are in effect, aircraft should approach the traffic circuit from the upwind side. Alternatively, once the pilot has ascertained without any doubt that there will be no conflict with other traffic entering the circuit or traffic established within the circuit, the pilot may join the circuit on the downwind leg (Figure 4.6).

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(vi) Aerodromes within an MF area when airport advisory information is available: Aircraft may join the circuit pattern straight-in or at 45° to the downwind leg or straight-in to the base or final legs (Figure 4.1). Pilots should be alert for other VFR traffic entering the circuit at these positions and for IFR straight-in or circling approaches.

(vii) Aerodromes within an MF area when airport advisory information is not available: Aircraft should approach the traffic circuit from the upwind side. Alternatively, once the pilot has ascertained without any doubt that there will be no conflict with other traffic entering the circuit or traffic established within the circuit, the pilot may join the circuit on the downwind leg (Figure 4.6).

NOTE: Where an uncontrolled aerodrome lies within an MF area, the pilot must follow the MF reporting procedures set out in CARs 602.97 to 602.103 inclusive. (See RAC 4.5.4 and 4.5.7.)

(b) *Continuous Circuits*: Aircraft performing a series of circuits and landings should, after each takeoff, reach circuit altitude before joining the downwind leg.

(c) *Departing the Circuit or Airport*: Aircraft departing the circuit or airport should climb straight ahead on the runway heading until reaching the circuit traffic altitude before commencing a turn in any direction to an en route heading. Turns back toward the circuit or airport should not be initiated until at least 500 ft above the circuit altitude.

4.5.3 Helicopter Operations

Pilots of helicopters at uncontrolled aerodromes are urged to avoid air taxiing or low flying across runways and taxiway areas where risk of collision with unseen aircraft or vehicles exists.

In addition to maintaining a sharp look-out and practising good airmanship, generally, pilots should avoid ground or air taxiing and hovering where blown dust, sand or gravel could prove hazardous to other aircraft, or when debris could be blown onto paved surfaces.

4.5.4 Mandatory Frequency

Transport Canada has designated a Mandatory Frequency (MF) for use at selected uncontrolled aerodromes, or aerodromes that are uncontrolled between certain hours. Aircraft operating within the area in which the MF is applicable (MF area), on the ground or in the air, shall be equipped with a functioning radio capable of maintaining two-way communication. Reporting procedures shall be followed, as specified in CARs 602.97 to 602.103 inclusive.

An MF area will be established at an aerodrome if the traffic volume and mix of aircraft traffic at that aerodrome is such that there would be a safety benefit derived from implementing MF procedures. There may or may not be a ground station in operation at the aerodrome for which the MF area has been established. When a ground station is in operation, for example, an FSS, an RCO through which RAAS is provided, a CARS, or an Approach UNICOM, then all aircraft reports that are required for operating within, and prior to entering an MF area, shall be directed to the ground station. However, when the ground station is not in operation, then all aircraft reports that are required for operating within and prior to entering an MF area shall be broadcast. The MF will normally be the frequency of the ground station which provides the air traffic advisory services for the aerodrome. For the aerodromes with an MF, the specific frequency, distance and altitude within which MF procedures apply will be published in the CFS.

Examples

1. *MF—rdo 122.2 5 NM 3100 ASL*
2. *MF—UNICOM (AU) ltd hrs O/T tfc 122.75 5 NM 3100 ASL*

4.5.5 Aerodrome Traffic Frequency

An Aerodrome Traffic Frequency (ATF) is normally designated for active uncontrolled aerodromes that do not meet the criteria listed in RAC 4.5.4 for an MF. The ATF is established to ensure that all radio-equipped aircraft operating on the ground or within the area are listening on a common frequency and following common reporting procedures. The ATF will normally be the frequency of the UNICOM where one exists or 123.2 MHz where a UNICOM does not exist. Trained vehicle operators who possess a valid radiotelephone licence and authorized to do so, can communicate with pilots using two-way communication on the ATF and provide information such as:

(a) position of vehicles on the manoeuvring area;

(b) position of other aircraft on the manoeuvring area; and

(c) runway condition, if known.

The specific frequency, distance and altitude within which use of the ATF is required will be published in the CFS. Example: *ATF – tfc 123.2 5 NM 5500 ASL*

Personnel providing Approach UNICOM service, can also advise pilots on the ATF of the runway condition and position of vehicles or aircraft on the manoeuvring area.

NOTE: Pilots may be able to communicate with either the UNICOM or the vehicle operator if radio-equipped, and co-ordinate their arrival or departure while using normal vigilance to ensure safe operations. When communications cannot be established (no reply or NORDO) or the status of the runway is unknown, it is the pilot's responsibility to visually ascertain the runway condition before landing or taking off.

The designation of an ATF is not limited to aerodromes only. An ATF may also be designated for use in certain areas other than the area immediately surrounding an aerodrome, where VFR traffic activity is high, and there is a safety benefit to ensuring that all traffic monitor the same frequency. For example, an ATF area could be established along a frequently flown corridor between two uncontrolled aerodromes. All aircraft operating within the area, below a certain altitude, would be requested to monitor and report intentions on one frequency. When such an area is designated, it will be specified either in an Aviation Notice, or in the CFS.

4.5.6 Use of MF and ATF

When operating in accordance with VFR, or in accordance with IFR but in VMC, pilots have sole responsibility for seeing and avoiding other aircraft. Aural and visual alertness are required to enhance safety of flight in the vicinity of uncontrolled aerodromes. At uncontrolled aerodromes for which an MF or ATF has been designated, certain reports shall be made by all radio-equipped aircraft.

NOTE: Pilots operating VFR en route in uncontrolled airspace or VFR on an airway should continuously monitor 126.7 MHz when not communicating on the MF or ATF.

Reports on either the MF or ATF have three formats:

(a) a directed transmission made to a ground station;

(b) a directed transmission made to a vehicle operator on the ATF; or

(c) a broadcast transmission that is not directed to any particular receiving station.

Whenever the CFS indicates that reports are to be made to a ground station, the initial transmission should be made to the station. To assist in reducing frequency congestion, pilots are encouraged to use the phrase "HAVE NUMBERS" on the initial call to a ground station (arrival or departure) to indicate that they have received runway, wind and altimeter information from the previous aerodrome advisory. When operating outside an MF area, and when frequency congestion prevents pilots from making their mandatory calls, it is their responsibility to remain clear of the MF area until contact can be established with the FSS. If operating inside an MF area, the pilot should continue as stated in previous radio transmissions.

Pilot: *FREDERICTON RADIO, PIPER FOXTROT X-RAY YANKEE ZULU. WE HAVE THE NUMBERS, SIX MILES SOUTHWEST AT THREE THOUSAND FIVE HUNDRED VFR. INBOUND FOR LANDING.*

Should there be no acknowledgement of a directed transmission to a ground station or a vehicle operator, reports shall be made in the broadcast format unless the ground station or vehicle operator subsequently establishes two-way contact, in which case pilots shall resume communicating by directed transmission.

Examples:

Directed: *FREDERICTON RADIO, THIS IS PIPER FOXTROT X-RAY YANKEE ZULU BEACON INBOUND LANDING RUNWAY EIGHTEEN.*

or,

FREDERICTION VEHICLES, THIS IS PIPER FOXTROT X-RAY YANKEE ZULU...

Broadcast: *FREDERICTON TRAFFIC, THIS IS PIPER FOXTROT X-RAY YANKEE ZULU...*

4.5.7 VFR Communication Procedures at Uncontrolled Aerodromes with MF and ATF Areas

(a) *Radio-equipped Aircraft*: The following reporting procedures shall be followed by the pilot-in-command of radio-equipped aircraft at uncontrolled aerodromes within an MF area and should also be followed by the pilot-in-command at aerodromes with an ATF:

(i) *Listening Watch and Local Flying* [CAR 602.97 (2)] Maintain a listening watch on the mandatory frequency specified for use in the MF area. This should apply to ATF areas as well.

(ii) *Before Entering Manoeuvring Area* [(CAR 602.99)] Report the pilot-in-command's intentions before entering the manoeuvring area.

(iii) *Departure* (CAR 602.100)

(A) Before moving onto the take-off surface, report the pilot-in-command's departure intentions on the MF or ATF frequency. If a delay is encountered, broadcast intentions and expected length of delay, then rebroadcast departure intentions prior to moving onto the take-off surface;

(B) Before takeoff, ascertain by radio on the MF or ATF frequency and by visual observation that there is no likelihood of collision with another aircraft or a vehicle during takeoff; and,

(C) After takeoff, report departing from the aerodrome traffic circuit, and maintain a listening watch on the MF or ATF frequency until clear of the area.

(iv) *Arrival* (CAR 602.101)

(A) Report before entering the MF area and, where circumstances permit, shall do so at least five minutes before entering the area, giving the aircraft's position, altitude and estimated time of landing and the pilot-in-command's arrival procedure intentions;

(B) Report when joining the aerodrome traffic circuit, giving the aircraft's position in the circuit;

(C) Report when on downwind leg, if applicable;

(D) Report when on final approach; and,

(E) Report when clear of the surface on which the aircraft has landed.

(v) *Continuous Circuits* (CAR 602.102)

(A) Report when joining the downwind leg of the circuit;

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(B) Report when on final approach; stating the pilot-in-command's intentions; and,
(C) Report when clear of the surface on which the aircraft has landed.

(vi) *Flying Through an MF Area* (CAR 602.103)
(A) Report before entering the MF or ATF area and, where circumstances permit, shall do so at least five minutes before entering the area, giving the aircraft's position and altitude and the pilot-in-command's intentions; and,
(B) Report when clear of the MF or ATF area.

NOTE: In the interest of minimizing possible conflict with local traffic and minimizing radio congestion on the MF or ATF, pilots of en-route VFR aircraft should avoid passing through MF or ATF areas.

(b) *NORDO*: NORDO aircraft will only be included as traffic to other aircraft and ground traffic as follows:
(i) *Arrival*: from five minutes before the ETA until ten minutes after the ETA, and
(ii) *Departure*: from just prior to the aircraft departing until ten minutes after the departure, or until the aircraft is observed/reported clear of the MF area.

4.5.8 Aircraft Without Two-Way Radio (NORDO/RONLY)

4.5.8.1 Prior Arrangements

Aircraft without a functioning two-way radio may operate on the manoeuvring area or within the MF area associated with an uncontrolled aerodrome, provided:

(a) an FSS, a CARS, or an RCO through which RAAS is provided, is located at the aerodrome and is operating at the time proposed for the operation; and

(b) prior arrangements have been made, by telephone or in person, with the appropriate agency, FSS, CARS, or in the case of a RAAS, the FSS.

NOTES:

1: Prior arrangements for an AAS location: phone the "emergency only" number listed in the CFS under COMM / RADIO for the FSS serving the AAS location.

2: Prior arrangements for a RAAS location: the FSS or FIC serving a RAAS location is shown in the CFS under COMM / RCO for the RAAS location.

(a) If an FSS serves the RAAS location: phone the "emergency only" number listed in the CFS under COMM / RADIO for the FSS serving the RAAS location; or

(b) If an FIC serves the RAAS location: phone the number listed in the CFS under FLT PLAN / FIC for the RAAS location.

When a pilot-in-command intends to operate at an uncontrolled aerodrome for which an MF has been designated, the pilot-in-command shall ascertain by visual observations that no other aircraft or vehicle is likely to come into conflict with the aircraft during takeoff or landing.

Pilots of NORDO/RONLY aircraft must be extremely vigilant when operating at either controlled or uncontrolled aerodromes and ensure through prior arrangements that other aircraft and vehicles will be informed of their presence within the area.

4.5.8.2 Traffic Circuits - NORDO/RONLY

When approaching an aerodrome, pilots of NORDO/RONLY aircraft shall enter the circuit as illustrated in Figure 4.6 and ensure that the aircraft completes at least two sides of a rectangular circuit before turning on to the final approach path.

4.5.8.3 RONLY

When operating an aircraft equipped with a VHF receiver capable of receiving transmissions on the MF, pilots shall maintain a listening watch on the MF when operating on the manoeuvring area or within the MF area.

4.6 Helicopter Operations at Controlled Airports

Two modes of helicopter airborne taxiing operations have been defined to accommodate the movement of helicopters at controlled airports; these are HOVER TAXI and AIR TAXI.

Hover taxi is the movement of a helicopter above the surface of an aerodrome, in ground effect, and at airspeeds less than approximately 20 KIAS. The actual height may vary; some helicopters require hover taxi above 25 ft AGL to reduce ground effect turbulence or provide clearance for cargo slingloads.

Air taxi is the movement of a helicopter above the surface of an aerodrome normally below 100 ft AGL. The pilot is solely responsible for selecting an appropriate height and airspeed for the operation being conducted and consistent with existing traffic and weather conditions. Pilots are cautioned of the possibility of the loss of visual references when conducting air taxi operations. Because of the greater operating flexibility, an air taxi clearance is to be expected unless traffic conditions will not permit this mode of operation.

When a helicopter is wheel-equipped and the pilot wishes to taxi on the ground, ATC should be informed when the clearance is requested.

NOTE: Helicopter pilots are reminded that aircraft, vehicle and personnel movements are not controlled on airport aprons, and that caution must be exercised at all times during any surface movement, hover or air taxiing.

5.0 VFR EN ROUTE PROCEDURES

5.1 Monitoring, Broadcasting on 126.7 MHz and Position Reporting En Route

Pilots operating VFR en route in uncontrolled airspace when not communicating on an MF, or an ATF, or VFR on an airway should continuously monitor 126.7 MHz and whenever practicable, broadcast their identification, position, altitude and intentions on this frequency to alert other VFR or IFR aircraft that may be in the vicinity. Although it is not mandatory to monitor 126.7 MHz and broadcast reports during VFR or VFR-OTT flights, pilots are encouraged to do so for their own protection.

Pilots are encouraged to make position reports on the appropriate FISE frequency to an FIC where they are recorded by the flight service specialist and are immediately available in the event of SAR action. The following reporting format is recommended:

1. Identification
2. Position
3. Time over
4. Altitude
5. VFR / VFR-OTT
6. Destination

Example:

Pilot: *QUEBEC RADIO, THIS IS CESSNA GOLF INDIA GOLF BRAVO ON THE GATINEAU R-C-O, VFR (or VFR OVER-THE-TOP) POSITION REPORT.*

Radio: *CESSNA GOLF INDIA GOLF BRAVO, QUEBEC RADIO, GO AHEAD.*

Pilot: *QUEBEC RADIO, GOLF INDIA GOLF BRAVO, BY OTTAWA AT FIVE EIGHT, FOUR THOUSAND FIVE HUNDRED, VFR (or VFR OVER-THE-TOP), DESTINATION SUDBURY.*

NOTES:
1. As shown in the example, it is important on initial contact that the pilot alerts the FIC to the fact that it is a VFR or VFR-OTT position report and indicates the name of the location of the RCO followed by the letters R-C-O in a non-phonetic form.
2. The ETA destination or next reporting point may be included.
3. Under certain conditions position reports are required prior to entering the ADIZ when operating on a DVFR flight plan or a defence flight itinerary. (See RAC 2.13 and 3.9.)

5.2 Acknowledgement of Clearances

Pilots of VFR flights shall read back the text of an ATC clearance when requested by an ATC unit.

5.3 Altitudes and Flight Levels – VFR

Aircraft shall be operated at altitudes or flight levels appropriate to the direction of flight when in level cruising flight above 3 000 feet AGL.

5.4 Minimum Altitudes – VFR (CARs 602.14 and 602.15)

Minimum Altitudes and Distances

602.14

(1) This subsection was repealed on 2003/03/01.

(2) Except where conducting a takeoff, approach or landing or where permitted under Section 602.15, no person shall operate an aircraft
- (a) over a built-up area or over an open-air assembly of persons unless the aircraft is operated at an altitude from which, in the event of an emergency necessitating an immediate landing, it would be possible to land the aircraft without creating a hazard to persons or property on the surface, and, in any case, at an altitude that is not lower than
  - (i) for aeroplanes, 1,000 feet above the highest obstacle located within a horizontal distance of 2,000 feet from the aeroplane,
  - (ii) for balloons, 500 feet above the highest obstacle located within a horizontal distance of 500 feet from the balloon, or
  - (iii) for an aircraft other than an aeroplane or a balloon, 1,000 feet above the highest obstacle located within a horizontal distance of 500 feet from the aircraft; and
- (b) in circumstances other than those referred to in paragraph (a), at a distance less than 500 feet from any person, vessel, vehicle or structure.

Permissible Low Altitude Flight

602.15

(1) A person may operate an aircraft at altitudes and distances less than those specified in subsection 602.14(2) where the aircraft is operated at altitudes and distances that are no less than necessary for the purposes of the operation in which the aircraft is engaged, the aircraft is operated without creating a hazard to persons or property on the surface and the aircraft is operated
- (a) for the purpose of a police operation that is conducted in the service of a police authority;
- (b) for the purpose of saving human life;
- (c) for fire-fighting or air ambulance operations;
- (d) for the purpose of the administration of the Fisheries Act or the Coastal Fisheries Protection Act;
- (e) for the purpose of the administration of the national or provincial parks; or
- (f) for the purpose of flight inspection.

(2) A person may operate an aircraft, to the extent necessary for the purpose of the operation in which the aircraft is engaged, at altitudes and distances less than those set out in
- (a) paragraph 602.14(2)(a), where operation of the aircraft is authorized under Subpart 3 or Section 702.22; or

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(b) paragraph 602.14(2)(b), where the aircraft is operated without creating a hazard to persons or property on the surface and the aircraft is operated for the purpose of
  (i) aerial application or aerial inspection,
  (ii) aerial photography conducted by the holder of an air operator certificate,
  (iii) helicopter external load operations, or
  (iv) flight training conducted by or under the supervision of a qualified flight instructor.

NOTES: The hazards of low flying cannot be over-emphasized. In addition to the normal hazards of low flying, such as impact with the ground, two issues regarding man-made structures should be stressed.

1. All obstructions extending 300 ft AGL or higher, or lower if deemed hazardous by TC, will be charted on VNCs and VTAs.

   New obstructions, correctly reported by the owner to TC and NAV CANADA, will be NOTAMed and inserted in the CFS and eventually (next edition) charted on the applicable VNC and VTA. (Pilots noting obstructions not depicted are asked to alert TC).

2. Wire-strikes account for a significant number of low flying accidents. A number of these accidents occur over level terrain, in good weather and at very low altitudes.

   The regulations governing low level flight are located in several areas of the CARs. It is the responsibility of the pilots and the companies they work for to ensure that all regulations are strictly adhered to.

5.5 Minimum Altitudes – Overflying Aerodromes [CARs 602.96(4) and (5)]

602.96

(4) Unless otherwise authorized by the appropriate air traffic control unit, no pilot-in-command shall operate an aircraft at a height of less than 2 000 feet over an aerodrome except for the purpose of landing or taking off or if the aircraft is operated pursuant to subsection (5).

602.96

(5) Where it is necessary for the purposes of the operation in which the aircraft is engaged, a pilot-in-command may operate an aircraft at less than 2 000 feet over an aerodrome, where it is being operated
  (a) in the service of a police authority;
  (b) for the purpose of saving human life;
  (c) for fire-fighting or air ambulance operations;
  (d) for the purpose of the administration of the *Fisheries Act or the Fisheries Protection Act*;
  (e) for the purpose of the administration of the national or provincial parks;
  (f) for the purpose of flight inspection;
  (g) for the purpose of aerial application or aerial inspection;
  (h) for the purpose of highway or city traffic patrol;
  (i) for the purpose of aerial photography conducted by the holder of an air operator certificate;
  (j) for the purpose of helicopter external load operations; or
  (k) for the purpose of flight training conducted by the holder of a flight training unit operator certificate.

5.6 Controlled VFR (CVFR) Procedures

Pilots intending to fly CVFR shall file a flight plan and obtain an ATC clearance prior to entering Class B airspace. The ATC clearance will not normally be issued prior to takeoff unless the airspace within a control zone is Class B. The ATC clearance will normally be issued upon receipt of a position report filed by the pilot upon reaching the last 1 000 feet altitude below the base of Class B or before entering laterally. This procedure is intended to ensure that the radio equipment is operating and to remind the pilots that, while outside of Class B airspace, ATC separation is not provided and that they must maintain a vigilant watch for other traffic. The ATC clearance will contain the phrase "MAINTAIN (altitude) VFR".

CVFR flights must be conducted in accordance with procedures designed for use by IFR flights, except when IFR weather conditions are encountered, the pilot of a CVFR flight must avoid such weather conditions. This should be accomplished by:

(a) requesting an amended ATC clearance which will enable the aircraft to remain in VFR weather conditions

(b) requesting an IFR clearance if the pilot has a valid instrument rating and the aircraft is equipped for IFR flight.

(c) request special VFR if within a control zone.

If unable to comply with the preceding, ensure that the aircraft is in VFR weather conditions at all times and leave Class B airspace horizontally or by descending. If the airspace is a control zone, land, at the aerodrome on which the control zone is based. In both cases, inform ATC as soon as possible of the action taken.

5.7 En route Radar Surveillance

When operating in areas where radar coverage exists, VFR flights with transponder equipped aircraft may request radar traffic information. ATC will provide this information, traffic (or workload) permitting (see RAC 1.5.3).

The service is provided by the ACC or TCU responsible for IFR control service in the area(s) concerned. The appropriate frequency for the controlling ATC unit may be found in the CFS (nearest controlled airport), enroute (IFR) charts or by request to a FIC.

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Phraseology: "*REQUEST RADAR SURVEILLANCE*"

Example:

"*EDMONTON ADVISORY, CESSNA SKYLANE FOXTROT ALPHA BRAVO CHARLIE, TEN NORTHEAST OF CAMROSE AT 6500 VFR SQUAWKING 1200 EN ROUTE TO VILLENEUVE; REQUEST RADAR SURVEILLANCE.*"

5.8 VFR Operations Within Class C Airspace

The following are the basic procedures for entry into, and for operation within Class C airspace. Pilots should consult the applicable VTA chart for any additional procedures that may be required for that particular Class C airspace.

(a) *Pilot Procedures*

(i) Obtain ATIS information (when available) prior to contacting ATC.

(ii) Contact ATC on VFR advisory frequency (depicted on VTA charts) prior to entry into Class C airspace and provide the following information:

- aircraft type and identification,
- position (preferably over a call-up point depicted on the VTA chart or a bearing and distance from it, otherwise another prominent reporting point or a VOR radial or VOR/DME fix),
- altitude,
- destination and route, and
- transponder code (if transponder equipped), and ATIS (code) received.

(iii) Comply with ATC instructions received. Any ATC instruction issued to VFR flights is based on the firm understanding that a pilot will advise ATC immediately if compliance with the instructions would result in not being able to maintain adequate terrain or obstacle clearance, or to maintain flight in accordance with VFR. If so advised, ATC will issue alternate instructions.

(b) *ATC Procedures*

(i) Identify the aircraft with radar. (Pilots may be required to report over additional fixes, or squawk ident on their transponder.) The provision of an effective radar service is dependent upon communications equipment capabilities and the adequacy of the radar-displayed information. In the latter case, it may be difficult to maintain radar identification of aircraft which are not operating on specific tracks or routes (i.e., sightseeing, local training flights, etc.), and pilots will be advised when radar service cannot be provided.

(ii) Issue landing information on initial contact or shortly thereafter unless the pilot states that the appropriate ATIS information has been received.

(iii) Provide the aircraft with routing instructions or radar vectors whenever necessary. The pilot will be informed when vectoring is discontinued except when transferred to a tower. Occasionally, an aircraft may be held at established fixes within Class C airspace to await a position in the landing sequence.

(iv) Issue traffic information when two or more aircraft are held at the same fix, or whenever in the controller's judgement a radar-observed target might constitute a hazard to the aircraft concerned.

(v) When required, conflict resolution will be provided between IFR and VFR aircraft, and upon request, between VFR aircraft.

(vi) Visual separation may be effected when the pilot reports sighting a preceding aircraft and is instructed to follow it.

(vii) Inform the pilot when radar service is terminated, except when the aircraft has been transferred to a tower.

6.0 INSTRUMENT FLIGHT RULES (IFR) – GENERAL

6.1 ATC Clearance

An ATC clearance shall be obtained before takeoff from any point within controlled airspace or before entering controlled airspace for flight under IFR or during IMC.

A clearance received by a pilot must be read back to the controller (CAR 602.31), except in certain circumstances. When the clearance is received on the ground, before departing a controlled aerodrome, and a SID is included in the clearance, the pilot only needs to acknowledge receipt of the clearance by repeating the aircraft call sign and the transponder Code that was assigned. If there is an amendment to the altitude contained in the SID, that altitude shall also be read back. At any time that the controller requests a full readback, the pilot shall comply. Also, the pilot may, at any time, read back a clearance in full to seek clarification.

Whenever a clearance is received and accepted by the pilot, the pilot shall comply with the clearance. If a clearance is not acceptable, the pilot shall immediately notify ATC of this fact because acknowledgement of the clearance alone will be taken by the controller as acceptance.

Deviations from a clearance shall not be made except in an emergency that necessitates immediate action or in order to respond to an ACAS/TCAS resolution advisory or a warning from a ground proximity warning system (GPWS). In these cases, the pilot shall inform ATC as soon as possible and obtain an amended clearance (CAR 602.31).

6.2 IFR Flights in VMC

A pilot may elect to conduct a flight in accordance with IFR in VMC. Flights operating in accordance with IFR shall continue in accordance with IFR, regardless of weather conditions. An IFR clearance provides separation between IFR aircraft in controlled airspace only. Pilots operating IFR must be aware of the need to provide their own visual separation from VFR aircraft when operating in VMC and from any other aircraft when operating in uncontrolled airspace.

A pilot may cancel IFR, or close the IFR flight plan, provided the aircraft is operating in VMC, is outside Class A or B airspace, and it is expected that the flight will not return to IMC. If the pilot closes the IFR flight plan or cancels IFR, ATC will discontinue the provision of IFR control service.

Refer to RAC 3.12.2 for information on the requirement to submit an arrival report and on the provision of alerting service upon closure or cancellation of IFR. Provided the destination remains the same, a pilot may change an IFR fight plan to a VFR fight plan without having to file a new flight plan. ATS will, however, confirm the aircraft's destination and ETA and obtain a search and rescue time from the pilot.

6.2.1 IFR Clearance with VFR Restrictions

ATC may issue an IFR clearance for an aircraft to depart, climb or descend VFR until a specified time, altitude, or location provided

(a) the pilot requests it;

(b) the aircraft is outside Class A airspace;

(c) the aircraft is within Class B airspace at or below 12 500 ft ASL or within Class C, D or E airspace; and

(d) the weather conditions permit.

Pilots are reminded that during such a VFR restriction they must provide their own separation, including wake turbulence separation, from other IFR aircraft as well as from the VFR traffic. Controllers normally issue traffic information concerning other IFR aircraft, particularly in marginal weather conditions. If compliance with the restriction is not possible, the pilot should immediately advise ATC and request an amended clearance.

6.2.2 VFR Release of an IFR Aircraft

When a delay is experienced in receiving an IFR departure clearance, a pilot may request approval to depart and maintain VFR until an IFR clearance can be received. The conditions in RAC 6.2.1 also apply in this situation. If the request for a VFR departure is approved, the pilot will be given a time, altitude or location at which to contact ATC for an IFR clearance. Depending upon the reasons for the IFR departure clearance delay, a VFR departure of an IFR flight may not be approved by the IFR unit. In situations such as these, it may be desirable for the pilot to wait for the IFR departure clearance.

6.3 Emergencies and Equipment Failures — IFR

6.3.1 Declaration of Emergency

Whenever pilots are faced with an emergency situation, ATC expects the pilot to take whatever action is considered necessary. ATC will assist pilots in any way possible whenever an emergency is declared. Pilots are requested to advise ATC of any deviations from IFR altitudes or routes necessitated by an emergency situation as soon as it is practicable in order that every effort can be made to minimize conflicts with other aircraft.

Pilots of transponder-equipped aircraft, when experiencing an emergency and unable to establish communications immediately with an ATC unit, may indicate "Emergency" to ATC by adjusting the transponder to reply to Mode A/3 Code 7700. Thereafter, radio communications should be established with ATC as soon as possible.

It should be pointed out, however, that when Code 7700 is used, the signal may not be detected because the aircraft may not be within the range of SSR coverage.

6.3.2 Two-Way Communications Failure

It is impossible to provide regulations and procedures applicable to all possible situations associated with a two-way communications failure. During a communications failure, when confronted by a situation not covered in the regulations, pilots are expected to exercise good judgment in whatever action they elect to take. The following procedures are the standard communications failure procedures; however, they may be superseded by specific procedures that take precedence. For example, some SID procedures may have specific published communications failure procedures.

6.3.2.1 General

Unless otherwise authorized by ATC, the pilot-in-command of an aircraft that experiences a two-way communications failure when operating in or cleared to enter controlled airspace under IFR, or when operating in or cleared to enter Class B or C airspace under VFR shall:

(a) select the transponder to reply to Mode A/3 Code 7600 interrogations, if the aircraft is transponder-equipped;

(b) maintain a listening watch on appropriate frequencies for control messages or further clearances; acknowledge receipt of any such messages by any means available, including the use of approved satellite voice equipment or the selective use of the normal/standby functions of transponders;

(c) attempt to contact any ATC facility or another aircraft, inform them of the difficulty, and request they relay the information to the ATC facility with whom communications are intended;

(d) comply with the procedures specified by the Minister in the CAP and the CFS, except where specific instructions to cover an anticipated communications failure have been received from an ATC unit; and

(e) attempt to contact the appropriate NAV CANADA ATS unit by means of a conventional cell or satellite phone, when all of the above attempts have failed (see COM 5.15).

NOTE: Approved SATCOM voice equipment refers to on board embedded equipment. Permanent satellite voice equipment is installed and tested in accordance with appropriate certification and airworthiness standards.

6.3.2.2 IFR Flight Plan

(a) *Visual Meteorological Conditions (VMC)*: If the failure occurs in VMC, or if VMC are encountered after the failure, the pilot-in-command shall continue the flight under VFR and land as soon as practicable.

NOTE: This procedure applies in any class of airspace. The primary purpose is to preclude extended IFR operation in controlled airspace in VMC. However, it is not intended that the requirement to "land as soon as practicable" be construed to mean "land as soon as possible." The pilot retains the prerogative of exercising his/her best judgment and is not required to land at an unauthorized airport, at an airport unsuitable for the type of aircraft flown, or to land only minutes short of destination.

(f) *Instrument Meteorological Conditions (IMC)*: If the failure occurs in IMC, or if the flight cannot be continued under VMC, the pilot-in-command shall continue the flight according to the following:

(i) *Route*

(A) by the route assigned in the last ATC clearance received and acknowledged;

(B) if being radar-vectored, by the direct route from the point of communications failure to the fix, route, or airway specified in the vector clearance;

(C) in the absence of an assigned route, by the route that ATC has advised may be expected in a further clearance; or

(D) in the absence of an assigned route or route that ATC has advised may be expected in a further clearance, by the route filed in the flight plan.

(ii) *Altitude*: At the highest of the following altitudes or FLs for *the route segment being flown*:

(A) the altitude(s) or FLs assigned in the last ATC clearance received and acknowledged;

(B) the minimum IFR altitude (see RAC 8.6.1); or

(C) the altitude or FL ATC has advised may be expected in a further clearance. (The pilot shall commence climb to this altitude/FL at the time or point specified by ATC to expect further clearance/ altitude change.)

NOTES

1: The intent of this is that an aircraft that has experienced a communications failure will, during any segment of a flight, be flown at an altitude that provides the required obstacle clearance.

2: If the failure occurs while being vectored at a radar vectoring altitude that is lower than a published IFR altitude, the pilot shall immediately climb to and maintain the appropriate minimum IFR altitude until arrival at the fix, route or airway specified in the clearance.

(iii) *Descent for Approach*: Maintain en route altitude to the navigation facility or the approach fix to be used for the IAP selected and commence an appropriate descent procedure at whichever of the following times is the most recent:

(A) the ETA [ETA as calculated from take-off time plus the estimated time en route filed or amended (with ATC)];

(B) the ETA last notified to and acknowledged by ATC; or

(C) the EAT last received and acknowledged.

If failure occurs after you have received and acknowledged a holding instruction, hold as directed and commence an instrument approach at the EAT or expected further clearance time (EFC), whichever has been issued.

NOTES

1: If the holding fix is not a fix from which an approach begins, leave the fix at the expected further clearance time if one has been received. If none

has been received, proceed to a fix from which an approach begins upon arrival over the clearance limit. Commence descent and/or approach as close as possible to the ETA as calculated from the filed estimated time en route or as amended with ATC.

2: If cleared for a STAR, maintain the appropriate altitude described in RAC 6.3.2.2(b) and proceed to the final approach fix (FAF):

(a) via the published routing;
(b) via the published routing to the segment where radar vectors are depicted to commence, then direct to the facility or fix serving the runway advised by ATIS or specified in the ATC clearance, for a straight-in approach, if able, or for the full procedure if one is published;
(c) for a CLOSED RNAV STAR, by flying the arrival as published, including any vertical and speed restraints depicted in the procedure, and intercepting the final approach course for a straight-in approach; or
(d) for an OPEN RNAV STAR, by flying the arrival as published, including any vertical and speed restraints depicted in the procedure. The pilot is expected to delete the heading leg at the DTW, to initiate an auto-turn at the DTW and FACF and to intercept the final approach course for a straight-in approach.

For flights to the United States, communications failure procedures are essentially the same, but it is the pilot's responsibility to consult the appropriate American publications. Some instrument procedures do not include a procedure turn but include the statement "RADAR OR RNAV REQUIRED" as part of the procedure. The initial approach segment of these instrument procedures is being provided by ATC radar vectors. Without ATC radar vectoring, the instrument procedure may not have a published initial approach segment.

Should an aircraft communications failure occur while the aircraft is being vectored on one of these approaches, separately or as part of a STAR, the pilot is expected to comply with the communications failure procedure by selecting the transponder to Mode A/3 Code 7600 immediately. Pilots should always be aware of the traffic situation. For example, ATC may have indicated that your aircraft was second for an approach to Runway 06L; under these circumstances, the flight should be continued along the route that normally would have been expected under radar vectoring. In some cases of communications failure, pilots may need to revert to dead reckoning navigation (DR) to the final approach course. It is important to other aircraft and ATC for the aircraft experiencing a communications failure to continue the flight along a route that would permit the aircraft to conduct a straight-in approach and landing without unexpected manoeuvring. Pilots are expected to exercise good judgment in these cases. Unexpected manoeuvres, such as turns away from the final approach course, may cause traffic disruptions and conflicts.

If the communications failure occurs while being vectored at a radar vectoring altitude that is lower than a published IFR altitude (e.g., minimum sector altitude 25 NM), the pilot shall immediately climb to and maintain the appropriate minimum IFR altitude until arrival at a fix associated with the instrument procedure.

Modern technology has introduced new on-board communications capabilities, such as airborne telephone communications. Pilots who are confronted with an aircraft communications failure may, if circumstances permit, use this new on-board technology to establish communications with the appropriate ATC units. NAV CANADA publishes the phone numbers of ACCs, control towers, FICs and FSSs in the CFS.

6.3.3 Reporting Malfunctions of Navigation and Communications Equipment

The pilot-in-command of an aircraft in IFR flight within controlled airspace should report immediately to the appropriate ATC unit any malfunction of navigation or air-to-ground communications equipment.

Examples:

1. Loss of VOR, ADF or low frequency navigation capability.
2. Complete or partial loss of ILS capability.
3. Impairment of air-to-ground communications capability.
4. Impairment of transponder serviceability.

Having received this information, ATC will take into account any limitations in navigation or air-to-ground communications equipment in further clearances to the aircraft.

6.3.4 Fuel Dumping

Whenever it is necessary to jettison fuel, the pilot should immediately notify ATC and provide information such as the course to be flown, the period of time and weather conditions. To allow for adequate vaporization, fuel dumping should be carried out at least 2 000 feet above the highest obstacle within 5 NM of the track to be flown. ATC may suggest an alternate area where fuel should be dumped; aircraft will be encouraged to dump fuel on a constant heading over unpopulated areas and clear of heavy traffic. When necessary information has been obtained, ATC will broadcast on appropriate frequencies a "fuel dumping" advisory. Pilots should advise ATC immediately when fuel dumping has been completed.

6.4 IFR Separation

6.4.1 General

The following information is intended to acquaint pilots with some of the basic non-radar separation standards applied by ATC and so facilitate flight planning and understanding of ATC techniques.

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6.4.2 Vertical Separation — General

The standard vertical separation minima is as follows:

FL290 and below – 1 000 feet;
above FL290 – 2 000 feet.

6.4.3 Vertical Separation Between Flight Levels and Altitudes ASL

When the altimeter setting is less than 29.92" Hg, there will be less than 1 000 feet vertical separation between an aircraft flying at 17 000 feet ASL with that altimeter setting and an aircraft flying at FL180, (with altimeter set at 29.92" Hg); therefore, the lowest usable flight level will be assigned or approved in accordance with the following table:

Altimeter Setting	Lowest Usable Flight Level
29.92" or higher	FL180
29.91" to 28.92"	FL190
28.91" to 27.92"	FL200

6.4.4 Longitudinal Separation—Distance-Based

Longitudinal separation of IFR flights based on distance is established by ATC on the basis of position reports, expressed in units of distance, from the concerned aircraft determined in relation to a common point. To account for the effect of slant range, controllers must know when distance reports are derived from DME when establishing longitudinal separation between a mix of RNAV/GPS- and DME-equipped aircraft.

To this end, pilots should report distances based on RNAV and GPS in miles, e.g. 30 mi. from "Someplace." When distance reports are based on DME, pilots should state DME, e.g. 30 DME from "Someplace."

NOTE: RNAV position reports derived from DME-DME computations are not affected by slant range.

6.4.5 Lateral Separation — General

Lateral separation of IFR flights is provided by ATC in the form of "airspace to be protected" in relation to a holding procedure, instrument approach procedure or the approved track. The dimensions of protected airspace for a particular track take into account the accuracy of navigation that can be reasonably expected. For track segments within signal coverage of NDB, VOR or TACAN stations and along bearings/courses/radials of such facilities, protected airspace takes into account the accuracy of available track guidance, accuracy of airborne receiver and indicator equipment, and a small pilotage tolerance. Separation is considered to exist provided the airspaces protected for each aircraft do not overlap. It is essential, therefore, that accuracy capability of navigation equipment be maintained.

Pilots of IFR or controlled VFR flights must adhere as closely as practicable to the centreline of their approved airway or track. If the aircraft inadvertently deviates from the approved track, immediate action must be taken to regain the centreline as soon as practicable. Pilots realizing that they are outside the airspace protected for their approved track must notify the appropriate ATC unit immediately.

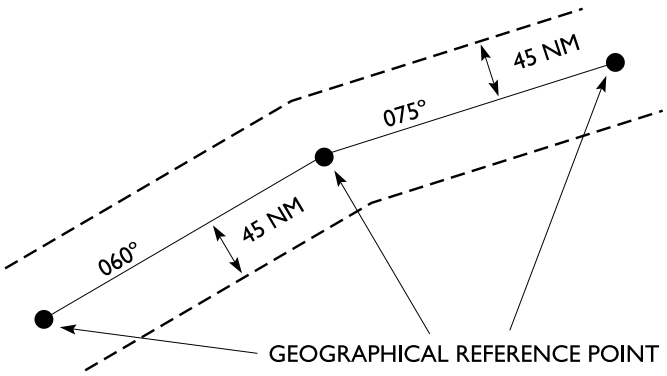
6.4.6 Lateral Separation — Airways and Tracks

In the low level airspace, the airspace to be protected is the full width of the airway as illustrated in RAC 2.7.1.

In the high level airspace, all airspace is controlled within the Southern, Northern, and Arctic Control Areas. As a result, a high level airway is "a prescribed track between specified radio aids to navigation" and, thus, has no defined lateral dimensions. Therefore, the airspace to be protected for airways and/or tracks in the high level airspace is the same as that for low level airways.

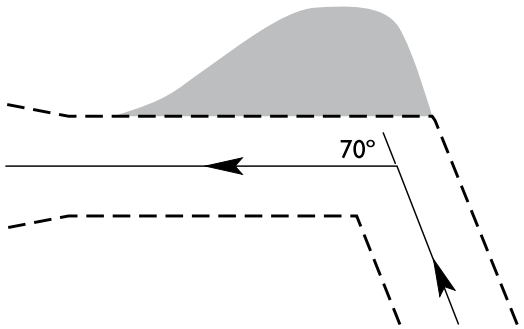
Along off-airway tracks the "airspace to be protected" is 45 NM each side of that portion of the track which is beyond navigational and signal coverage range.

Figure 6.1 — Airspace to be Protected Along Off-Airway Tracks



Additional airspace will be protected at and above FL180 on the manoeuvring side of tracks that change direction by more than 15° overhead navigation aids or intersections. It is expected that pilots of aircraft operating below FL180 will make turns so as to remain within the normal width of airways or airspace protected for off-airway tracks.

Figure 6.2 – Additional Airspace to be Protected for Turns



Normally, the airspace to be protected for an approved track will be based on the premise that the changeover from one navigation reference to another will take place approximately midway between facilities. Where this is not possible due to a difference in the signal coverage provided by two adjacent navigation aids, the equal signal point on an airway segment will be shown.

To remain clear of restricted areas, active danger or alert areas, or active areas such as the Churchill Rocket Range, pilots should file a flight plan so that the airspace-to-be-protected for the intended track do not overlap the area of concern.

6.4.7 Lateral Separation — Instrument Approach Procedure

Air traffic controllers have been authorized to consider the basic horizontal dimensions of intermediate approach areas, final approach areas and missed approach areas, for obstacle clearance purposes, as the airspace-to-be-protected for aircraft conducting standard instrument approach procedures. Adequate horizontal separation is then deemed to exist when the airspace-to-be-protected for such aircraft do not overlap the airspace-to-be-protected for aircraft enroute, holding or conducting simultaneous adjacent instrument approaches.

As with other separation standards based on the airspace-to-be-protected concept, it will be the pilot's responsibility to remain within the limits of airspace-to-be-protected. This can be accomplished by following the procedures published in CAP or approved for company use. If a pilot who is operating in controlled airspace anticipates being unable to conduct the approach as published, the pilot should inform ATC so that separation from other aircraft concerned can be increased as necessary.

6.5 Visual Separation

6.5.1 General

Visual separation is a means of separating IFR aircraft using visual observation and is performed by an airport controller or by a pilot, when a pilot is assigned responsibility for separation. Visual separation may be applied in a CZ or TCA at 12 500 ft ASL and below.

6.5.2 Speed Control Instructions on Departure

Visual departure separation procedures require airport controllers to consider aircraft performance, wake turbulence, closure rate, routes of flight and known weather conditions. Airport controllers do not issue speed control instructions coincident with takeoff clearances. In addition, there is no increase in the incidence of speed control instructions issued by the departure controller.

6.5.3 Controller-Applied Visual Separation

The airport controller ensures separation through visual observation of the aircraft involved. This type of visual separation cannot be applied if departure routes or aircraft performance preclude maintaining separation. ATC does not use visual separation between successive departing IFR aircraft if wake turbulence separation is required. Controller-applied visual separation is normally seamless to pilots.

6.5.4 Pilot-Applied Visual Separation

Pilot-applied visual departure separation procedures require a pilot to see the other aircraft involved and, upon instructions from the controller, maintain visual separation from the other aircraft.

Pilots who accept responsibility for visual separation must maintain constant visual contact, without referring to an airborne surveillance system, with the other aircraft involved until visual separation is discontinued. This responsibility does not eliminate the pilot's regulatory responsibility to see and avoid other aircraft; meet noise abatement requirements; or meet obstacle clearance requirements and is not intended to restrict pilots from completing other necessary tasks.

ATC does not use pilot-applied visual separation between successive departing IFR aircraft if wake turbulence separation is required. If, for any reason, the pilot refuses pilot-applied visual separation, ATC will separate departures using another form of IFR separation.

Example phraseology for pilot-applied visual departure separation:

Tower: AIRLINE ONE TWO THREE, TRAFFIC [position, type of aircraft, intentions, etc.] CONFIRM TRAFFIC IN SIGHT?

Pilot: AIRLINE ONE TWO THREE, TRAFFIC IN SIGHT.

Tower: AIRLINE ONE TWO THREE, MAINTAIN VISUAL SEPARATION [other information or instructions, as required] CLEARED FOR TAKE-OFF.

Pilot: AIRLINE ONE TWO THREE, MAINTAINING VISUAL SEPARATION [read back additional instructions, as appropriate].

Visual separation is discontinued when either aircraft is observed on a diverging heading, unless otherwise advised by ATC.

Pilots must notify ATC as soon as possible if:

(a) they anticipate losing sight of the other aircraft;

(b) course deviations are required to maintain visual separation with preceding traffic; or

(c) they suspect they will be unable to maintain visual separation for any reason.

In these cases, another form of IFR separation will be applied by ATC.

6.6 Development of Instrument Procedures

Instrument procedure development worldwide follows one of two existing standards: *ICAO Procedures for Air Navigation Services—Aircraft Operations*, Volume II—*Construction of Visual and Instrument Flight Procedures* (Doc 8168); or the *United States Standard for Terminal Instrument Procedures* (TERPS). Instrument procedures in CDA are developed in accordance with a document entitled *Criteria for the Development of Instrument Procedures* (TP 308). This document is a joint TC/DND publication and prescribes standardized methods for use in designing both civil and military instrument flight procedures.

In order to achieve ICAO regional commonality, the instrument procedure design standards and criteria contained in TP 308 are modeled after the standards and criteria contained in the TERPS.

Strict adherence by pilots to the published instrument procedures will ensure an acceptable level of safety in flight operations.

7.0 INSTRUMENT FLIGHT RULES – DEPARTURE PROCEDURES

7.1 Aerodrome Operations

Pilots should read RAC 4.2 to 4.5 in conjunction with the IFR departure procedures listed in this section.

7.2 ATIS Broadcasts

If available, the basic aerodrome information should be obtained from ATIS prior to requesting taxi clearance.

7.3 Initial Contact

On initial contact with ATC (clearance delivery or ground control), a pilot departing IFR should state the destination and planned initial cruising altitude.

7.4 IFR Clearances

At locations where a "Clearance Delivery" frequency is listed, pilots should obtain their IFR clearance on this frequency prior to contacting ground control. Where no clearance delivery frequency is listed, the IFR clearance will normally be relayed by ground control after taxi authorization has been issued. However, due to high fuel consumption during ground running time, some pilots of turbojet aircraft may wish to obtain their IFR clearance prior to starting engines. Pilots using this procedure should call ATC, using a phrase such as READY TO START NOW or READY TO START AT (TIME). Normally this request should be made within 5 minutes of the planned engine start time.

New technology available in some control towers permits the electronic delivery of initial IFR clearances via air-ground data link (AGDL). This new delivery method is known as pre-departure clearance (PDC) and is available to those airline companies with an on-site computer capable of interfacing with ATC and the data link service provider.

7.5 SID

At certain airports, an IFR departure clearance may include departure instructions known as a standard instrument departure (SID). A SID is a planned IFR ATC departure procedure, published in the CAP, for the pilot's and controller's use in graphic and textual form. SIDs provide a transition from the terminal to the appropriate en route structure, and may be either:

(a) *pilot navigation SIDs*—established where the pilot is required to use the chart as reference for navigation to the en route phase; or

(b) *vector SIDs*—established where ATC will provide radar navigational guidance to a filed/assigned route or to a fix depicted on the chart. Pilots are expected to use the SID chart as reference for navigation until radar vectoring has commenced.

Pilots of aircraft operating at airports for which SIDs have been published will normally be issued a SID clearance by ATC. No pilot is required to accept a SID clearance. If any doubt exists as to the meaning of such a clearance, the pilot should request a detailed clearance.

Routings contained in SIDs will normally be composed of two segments:

(a) an initial segment from the departure end of the runway to the position where the aircraft will first turn from the initial departure heading; and

(b) a second segment, either via radar vectors or by pilot navigation, from the first turning point to the SID termination point.

When instructed to fly on the runway heading, or when flying a SID for which no specific heading is published, pilots are expected to fly or maintain the heading that corresponds with the extended centreline of the departure runway until otherwise instructed by ATC. Drift correction must not be applied, e.g. Runway 04, if the actual magnetic heading of the runway centreline is 044°, then fly a heading of 044°M.

When flying a SID for which a specific heading is published, the pilot is expected to steer the published SID heading until radar vectoring commences. This is because initial separation is based on divergence between assigned headings until radar separation is established.

When assigning SIDs, ATC will include the following:

(a) the name of SID;

(b) the SID termination fix, if appropriate;

(c) the transition, if necessary; and

(d) the time or location for the aircraft to expect a climb to an operationally suitable altitude or flight level, if necessary. (**NOTE**: An "expect further clearance" statement may be included in the SID chart.)

Example:

CLEARED TO THE CALGARY AIRPORT, TORONTO ONE DEPARTURE, FLIGHT PLANNED ROUTE.

NOTE: A SID termination fix may be a NAVAID, intersection, or DME and is normally located on an established airway where the SID terminates and the en route phase of flight commences. The SID, as published, contains an altitude to climb to after departure; however, ATC may assign an altitude different from the altitude specified in the SID, provided the altitude is stated and a readback is obtained from the pilot prior to departure. In addition, where vector SIDs are used, ATC may assign a different initial departure heading. However, an ATC revision to any item of a SID does not cancel the SID.

Example:

CLEARED TO THE CALGARY AIRPORT, TORONTO ONE DEPARTURE, FLIGHT PLANNED ROUTE, CLIMB TO AMENDED ALTITUDE, SEVEN THOUSAND...

If an aircraft is issued a vector SID, radar vectors will be used, as traffic permits, to provide navigational guidance to the filed/assigned route and over the SID termination fix. However, if the controller or the aircraft will gain an operational advantage, the aircraft may be vectored on a route that will not take the aircraft over the SID termination fix.

In this case, if ATC had previously specified a SID termination fix as the location for the aircraft to expect to climb to an operationally suitable altitude or flight level, the controller shall cancel the SID. If, with the change of clearance, it is not practicable for the controller to assign an operationally suitable altitude or flight level, the controller will specify another location or time to expect the higher altitude.

Example:

SID CANCELLED, VECTORS TO (fix or airway) (heading). EXPECT FLIGHT LEVEL THREE FIVE ZERO AT FOUR FIVE D-M-E WEST OF EDMONTON VORTAC.

It is impossible to precisely define "operationally suitable altitudes" to meet requirements in all circumstances.

The following are considered operationally suitable altitudes or flight levels:

(a) piston aircraft—flight planned altitude or lower; and

(b) other aircraft—flight planned altitude or altitude as near as possible to the flight planned altitude, taking into consideration the aircraft's route of flight. As a guideline, an altitude not more than 4 000 ft below the flight planned flight level in the high level structure will be considered as operationally suitable in most cases.

If it is not practicable for the controller to assign the flight planned altitude and if the pilot has not been informed as to when they may expect a clearance to another altitude, it is the pilot's responsibility to advise ATC if the currently assigned altitude is not satisfactory to permit the aircraft to proceed to the destination airport, should a communications failure occur.

The controller will then be required to issue an appropriate "expect further clearance" statement or issue alternative instructions.

Controllers are required to issue a clearance to the altitude or flight level the pilot was told to expect prior to the time or location specified in an "expect further clearance" statement. [See RAC 6.3.2.2*(b)*(ii)(C)]. The pilot must ensure that further clearance is received because the "altitude to be expected" included in the clearance is not applicable:

(a) once the aircraft has proceeded beyond the fix specified in the "expect further clearance" statement; or

(b) once the time designated in the "expect further clearance" statement has expired.

SIDs may include specific communications failure procedures. These specific procedures supersede the standard communication failure procedures.

It is the pilot's responsibility to follow the noise abatement procedures. SIDs, as published, will not contravene them. When ATC issues radar vectors, they will commence only after the requirements of the noise abatement procedure have been complied with.

The initial call to departure control should contain at least:

(a) the aircraft call sign;

(b) the departure runway;

(c) the present vacating altitude (to the nearest 100-ft increment); and

(d) the assigned (SID) altitude.

Example:

OTTAWA DEPARTURE, BEECH GOLF ALFA BRAVO TANGO, OFF RUNWAY 25, HEADING 250, LEAVING 1 900 FOR 4 000.

NOTE: An altitude readout is valid if the readout value does not differ from the aircraft reported altitude by more than 200 ft. Pilot altitude reports should be made to the nearest 100-ft increment.

7.6 Noise Abatement Procedures — Departure

7.6.1 General

These aeroplane operating procedures for the takeoff and climb have been developed so as to ensure that the necessary safety of flight operations is maintained whilst minimizing exposure to noise on the ground. One of the two procedures listed in RAC 7.6.3 should be applied routinely for all takeoffs where noise abatement procedures are in effect.

Nothing in these procedures shall prevent the pilot-in-command from exercising his/ her authority for the safe operation of the aeroplane, except that when a climb gradient is published, it must be maintained, or alternate procedures must be adopted.

The procedures herein describe the methods for noise abatement when a noise problem is evident. They can comprise any one or more of the following:

(a) use of noise preferential runways to direct the initial and final flight paths of aeroplanes away from noise-sensitive areas;

(b) use of noise preferential routes to assist aeroplanes in avoiding noise-sensitive areas on departure and arrival, including the use of turns to direct aeroplanes away from noise-sensitive areas located under or adjacent to the usual takeoff and approach flight paths; and

(c) use of noise abatement takeoff or approach procedures, designed to minimize the overall exposure to noise on the ground and, at the same time, maintain the required levels of flight safety.

7.6.2 Noise Preferential Runways

Preferred runway directions for takeoff are designated for noise abatement purposes; the objective being to use, whenever possible, those runways that permit aeroplanes to avoid noise-sensitive areas during the initial departure and final approach phases of flight.

Noise abatement is not the determining factor in runway designation under the following circumstances:

(a) if the runway is not clear and dry, i.e., it is adversely affected by snow, slush, ice, water, mud, rubber, oil or other substances;

(b) when the crosswind component, including gusts, exceeds 25 KIAS; and

(c) when the tail wind component, including gusts, exceeds 5 kt.

NOTE: Although ATS personnel may select a preferential runway in accordance with the foregoing criteria, pilots are not obligated to accept the runway for taking off or landing. It remains the pilot's responsibility to decide if the assigned runway is operationally acceptable.

7.6.3 Noise Abatement Departure Procedures (NADP)

NADP are designed to minimize the environmental impact of departing aircraft without compromising safety. Typically, operators require two procedures: one to minimize close-in noise (NADP1), the other to minimize noise over a more distant noise-sensitive area (NADP2).

Under the NADP concept, airport operators identify their noise and emission control needs and may identify specific noise-sensitive areas. Aircraft operators choose the departure method that safely meets the airport operator's objectives.

When deciding on a noise abatement strategy, it is important to keep in mind that each procedure minimizes noise in its target area at the expense of relatively increased noise elsewhere. NADP1 reduces noise immediately after takeoff, but results in higher downrange noise than NADP2, and vice versa. For each aircraft type, powerplant and set of takeoff conditions, there is a distance at which the NADP1 and NADP2 noise contours cross over. The area from the takeoff to the crossover point defines the 'close-in' zone of NADP1, while the area beyond the crossover point is the effective range of NADP2.

When developing a noise abatement strategy, airports and air operators should consider the following:

- a noise abatement departure shall not invalidate an engine failure strategy;
- aircraft limitations, including maximum body angle limits, shall be respected at all times;
- where possible, each aircraft type should base its standard departure procedure on the noise abatement strategy that minimizes its overall noise impact;

- operators serving certain noise-sensitive airports may need to follow specific, non-standard departure procedures. Crew training and departure information shall address identification and procedural differences associated with alternate noise abatement procedures; and

- where applicable, air traffic control agencies should be involved in the development of noise abatement procedures, especially regarding take-off flight path in the event of an engine failure.

In addition to the above general requirements, the following operational limitations apply:

- NADPs requiring reduced take-off thrust settings may only be flown when reduced thrust is permitted by the aircraft flight manual or aircraft operating manual;

- noise abatement procedures shall not be executed below 800 ft AAE;

- noise abatement procedures are not to be used when wind shear warnings exist, or the presence of wind shear or downburst activity is suspected; and

- conduct of noise abatement procedures is secondary to the satisfaction of obstacle requirements.

NADPs start at or above 800 ft and initiate the final stage at or below 3 000 ft AAE, allowing operators to develop specific procedures to suit their local situations.

Operators transitioning from VNAP to NADP will note that the NADP1 envelope includes the former VNAP A procedure, while NADP2 includes the former VNAP B procedure.

To illustrate the NADP concept, two examples of compliant procedures appear below. Operators are free to design other procedures that fit within the NADP envelopes.

NADP 1 (criteria for a close-in noise abatement procedure): This procedure involves a power reduction at or above the prescribed minimum altitude (no less than 800 ft) AAE and delaying flap/slat retraction until the prescribed maximum altitude (3 000 ft) AAE is attained. At the prescribed maximum altitude, accelerate and retract flaps/slats on schedule, while maintaining a positive rate of climb, and complete the transition to normal en-route climb speed. The initial climbing speed to the noise abatement initiation point is no less than V_2 + 10 KIAS.

Specific example of NADP 1:

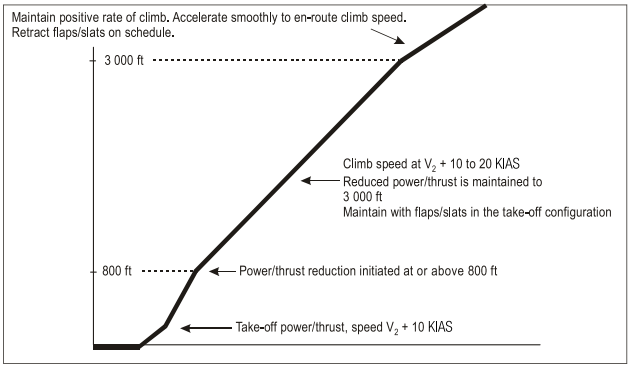
- Initial climb to 800 ft AAE with take-off thrust and V_2 + 10 to 20 KIAS.

- Upon reaching an altitude of 800 ft AAE, adjust and maintain engine thrust in accordance with the noise abatement thrust schedule provided in the aircraft operating manual. Maintain a climb speed of V_2 + 10 to 20 KIAS with flaps and slats in the take-off configuration.

- At 3 000 ft AAE, while maintaining a positive rate of climb, accelerate and retract flaps/slats on schedule.

- At 3 000 ft AAE, accelerate to normal en-route climb speed.

NOTE: To assist in planning departure spacing, pilots intending to use NADP 1 at Canadian airports are to notify ATC Clearance Delivery or Ground Control. At airports where NADP 1 is the only procedure to follow, ATC does not need to be notified.



Noise abatement take-off climb — Example of a procedure alleviating noise close to the aerodrome (NADP 1)

NADP 2 (criteria for distant noise abatement procedure): This procedure involves the initiation of flap/slat retraction at or above the prescribed minimum altitude (800 ft) AAE but before reaching the prescribed maximum altitude (3 000 ft) AAE. The flaps/slats are to be retracted on schedule, while maintaining a positive rate of climb. The thrust reduction is to be performed with the initiation of the first flaps/slats retraction or when the zero flaps/slats configuration is attained. At the prescribed maximum altitude, complete the transition to normal en-route climb procedures. The initial climbing speed to the noise abatement initiation point is no less than V_2 + 10 KIAS and the noise abatement procedure is not to be initiated at less than 800 ft AAE.

Specific example of NADP 2:

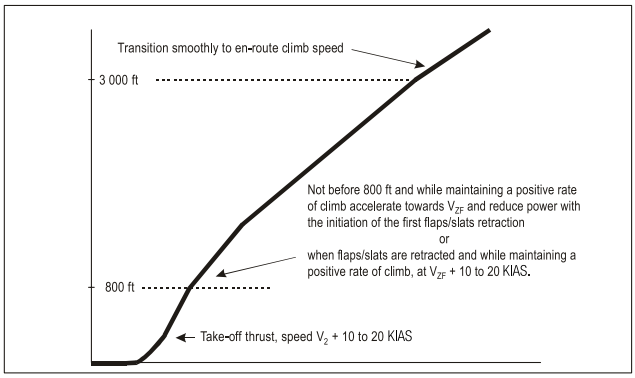
- Initial climb to 800 ft AAE with take-off thrust and V_2 + 10 to 20 KIAS.

- Upon reaching an altitude equivalent to 800 ft AAE, decrease aircraft body angle while maintaining a positive rate of climb, accelerate towards V_{ZF} speed and reduce thrust after flaps/slats retraction.

- Maintain a positive rate of climb and accelerate to and maintain a climb speed of V_{ZF} + 10 to 20 KIAS until 3 000 ft AAE.

- At 3000 ft AAE, accelerate to normal en-route climb speed.

The use of this guidance material should be limited to acquiring general insight into NADPs. In applying this guidance, users should seek expert noise and emissions advice.



Noise abatement take-off climb — Example of a procedure alleviating noise distant from the aerodrome (NADP 2)

7.7 Obstacle and Terrain Clearance

Aerodromes that have an instrument approach procedure published in CAP also have a procedure referred to as an IFR departure procedure. IFR departure procedures are expressed in the form of "Takeoff Minima" on the aerodrome chart, and meet obstacle and terrain clearance requirements. These procedures are based on the premise that on departure an aircraft will:

(a) cross at least 35 feet above the departure end of the runway;

(b) climb straight ahead to 400 feet AAE before commencing any turns; and

(c) maintain a climb gradient of at least 200 feet per NM throughout the climb to a minimum IFR altitude for en route operations. Climb gradients greater than 200 feet per NM may be published. In this case, the aircraft is expected to achieve and maintain the published gradient to the specified altitude or fix, then continue climbing at a minimum of 200 feet per NM until reaching a minimum IFR altitude for en route operations.

For flight planning purposes, departure procedures assume normal aircraft performance in all cases

IFR departure procedures in the "Takeoff Minima" box are shown as either:

(a) *1/2* – This indicates that IFR departures from the specified runway(s) will be assured of obstacle and terrain clearance in any direction if the aircraft meets the previously stated premise. Pilots may consider this procedure as "Takeoff, climb on course". The minimum visibility (unless otherwise approved by the appropriate approving authority) for takeoff in these circumstances is 1/2 SM. IFR takeoffs for rotorcraft are permitted when the takeoff visibility is one-half the CAP value, but no less than 1/4 SM.

(b) * – The asterisk (*) following all or specific runways refers the pilot to the applicable minimum takeoff visibility (1/2 or SPECVIS) and corresponding procedures which, if followed, will ensure obstacle and terrain clearance. Procedures may include specific climb gradients, routings, visual climb requirements, or a combination thereof. Where a visual climb or manoeuvre is stated in the departure procedure, pilots are expected to comply with the Specified Takeoff Minimum Visibility (SPEC VIS) corresponding to the appropriate speed associated with the aircraft category listed in the following table:

AIRCRAFT CATEGORY	A	B	C	D
Specified Takeoff Minimum Visibility (SPEC VIS) in SM	1	1 1/2	2	2

(c) *NOT ASSESSED* – IFR departures have not been assessed for obstacles. Pilots-in-command are responsible for determining minimum climb gradients and/or routings for obstacle and terrain avoidance.

In absence of a published visibility for a particular runway, a pilot may depart IFR by using a takeoff visibility that will allow avoidance of obstacles and terrain on departure. In no case should the takeoff visibility be less than 1/2 SM (1/4 SM for rotorcraft).

Where aircraft limitations or other factors preclude the pilot from following the published procedure, it is the pilot-in-command's responsibility to determine alternative procedures which will take into account obstacle and terrain avoidance.

ATC terms such as "on departure, right turn climb on course" or "on departure, left turn on course" are not to be considered specific departure instructions. It remains the pilot's responsibility to ensure that terrain and obstacle clearance has been achieved by conforming with the IFR departure procedures.

SIDs incorporate obstacle and terrain clearance within the procedure. Pilots should note that SIDs published only in textual form at military aerodromes do not incorporate obstacle and terrain clearance. At these aerodromes, it is the pilot's responsibility to ensure appropriate obstacle and terrain clearance on departure.

7.7.1 Visual Climb Over the Airport (aerodrome)

The visual climb over the airport (VCOA)—sometimes referred to as "climb visual" or "visual climb" in the *Canada Air Pilot* (CAP)—was developed to provide an alternate IFR departure procedure for aircraft that cannot meet the greater-than-standard climb gradient specified in the primary instrument departure procedure.

NOTE: Occasionally, the VCOA may be the only available departure procedure developed for an aerodrome.

The VCOA differs from other instrument departure procedures in that the pilot must maintain certain visual references with the ground (and obstacles) until reaching a given altitude over the aerodrome.

NOTE: Even though the aircraft is being operated with visual references to the ground, it is still departing on an IFR clearance.

The VCOA text includes a specified take-off minimum visibility (SPEC VIS) and a climb-to altitude (ASL). The SPEC VIS is the minimum visibility (in SM) that a pilot requires to manoeuvre the aircraft while also maintaining a visual reference with the centre of the aerodrome. The climb-to altitude is the minimum altitude the aircraft must reach before departing from over the aerodrome.

It is the pilot's responsibility to see and avoid obstacles while climbing visually. The visual climb segment ends when the aircraft crosses the aerodrome at or above the required minimum altitude. Unless otherwise stated, from this point on, or when the expression "before proceeding on course" (BPOC) is used, obstacles will be cleared if the aircraft maintains a minimum climb gradient of 200 ft/NM to the en-route structure,.

The pilot-in-command (PIC) should ensure that the reported ceiling is above the climb-to altitude and that the local prevailing visibility is equal to or greater than that required in the procedure. Additionally, before taxiing for departure, the PIC should inform ATC of the intention to perform a VCOA so that the appropriate coordination can be ensured. If ATC services are not available, then intentions should be broadcast on the ATF frequency (see RAC 7.9).

7.8 Release from Tower Frequency

If the departure airport is located within a terminal control area, the departing IFR flight will be cleared by the tower to contact a specific control unit on a specified frequency once clear of conflicting airport traffic. At certain locations, flights will be advised prior to takeoff to change to a specified departure frequency. In this case, the change should be made as soon as practicable after takeoff.

If the departure airport is not located within a terminal control area, the pilot, when requesting release from tower frequency, should advise the tower of the agency or frequency to which he/she will change unless directions for the change were included in the ATC clearance.

7.9 IFR Departures from Uncontrolled Airports

Where a pilot-in-command intends to take off from an uncontrolled aerodrome, the pilot shall:

(a) obtain an ATC clearance if in controlled airspace;

(b) report their departure procedure and intentions on the appropriate frequency before moving on to the runway or before aligning the aircraft on the take off path; and

(c) ascertain by radio on the appropriate frequency and by visual observation that no other aircraft or vehicle is likely to come into conflict with the aircraft during takeoff.

The pilot-in-command shall maintain a listening watch:

(a) during takeoff from an uncontrolled aerodrome; and

(b) after takeoff from an uncontrolled aerodrome for which a MF has been designated, until the aircraft is beyond the distance or above the altitude associated with that frequency.

As soon as possible after reaching the distance or altitude associated with the MF, the pilot-in-command shall communicate with the appropriate ATC unit or a ground station on the appropriate en-route frequency.

Where IFR departures are required to contact an IFR control unit or ground station after takeoff, it is recommended that, if the aircraft is equipped with two radios, the pilot should also monitor the MF during the departure.

If the aerodrome is located in uncontrolled airspace, these procedures shall be followed except that an ATC clearance is not required. In addition to maintaining a listening watch, it is recommended that the pilot-in-command communicate with the appropriate ATC unit, FIC, or other ground station on the appropriate en-route frequency.

NOTE: It is recommended that pilots inform ATC if a flight will not commence within 60 min of the proposed departure time stipulated in an IFR flight plan. Failure to do so will result in activating the SAR process.

At an uncontrolled aerodrome, the initial IFR clearance may contain a time or an event-based departure restriction or clearance cancellation.

Examples:

ATC CLEARS AIRLINE123 (IFR clearance) DO NOT DEPART UNTIL 1340; CLEARANCE CANCELLED IF NOT AIRBORNE BEFORE 1349.

or

ATC CLEARS AIRLINE123 (IFR clearance) DO NOT DEPART UNTIL CESSNA ABC HAS LANDED; CLEARANCE CANCELLED IF NOT AIRBORNE BEFORE 1349.

In the first example, the clearance is valid the moment the time turns 1340, and in both examples, the clearance is cancelled the moment the time turns 1349.

7.10 Alerting Service IFR Departures from Uncontrolled Airports

At locations where communication with ATS is difficult, pilots may elect to depart VFR and obtain their IFR clearance once airborne. In Canada, if IFR clearance is not received prior to departure, SAR alerting service is activated based on the ETD filed in the flight plan. However, if departing from a Canadian

airport that underlies airspace delegated to FAA control, then responsibility for SAR alerting service is transferred to the FAA and FAA procedures apply. In such cases, alerting service is not activated until the aircraft contacts ATS for IFR clearance. Therefore, if the aircraft departs before obtaining its IFR clearance, alerting service is not provided until contact is established with ATS.

8.0 INSTRUMENT FLIGHT RULES (IFR) – EN ROUTE PROCEDURES

8.1 Position Reports

Pilots of IFR and controlled VFR flights are required to make position reports over compulsory reporting points specified on IFR charts, and over any other reporting points specified by ATC.

As specified in CAR 602.125—*Enroute IFR Position Reports*, the position report shall include the information in the sequence set out in the CFS, that is:

(a) the identification;

(b) the position;

(c) the time over the reporting point in UTC;

(d) the altitude or flight level;

(e) the type of flight plan or flight itinerary filed;

(f) the name of the next designated reporting point and ETA over that point in UTC;

(g) the name only of the next reporting point along the route of flight (see Note); and

(h) any additional information requested by ATC or deemed necessary by the pilot.

NOTE: Reporting points are indicated by a symbol on the appropriate charts. The "designated compulsory" reporting point is a solid triangle and the "on request" reporting point symbol is an open triangle. Position reports over an "on request" reporting point are only necessary when requested by ATC. Therefore, no mention of an "on request" reporting point needs to be made in any position report unless it has been requested by ATC.

Enroute IFR and controlled VFR flights should establish DCPC wherever possible. PALs have been established at a number of locations to extend the communications coverage. Some PAL locations also employ a radio re-transmit unit (RRTU). The purpose of the RRTU is to transmit a pilot's broadcast from one PAL location over another frequency at a different PAL location. This allows the pilot to know when the controller is working communications traffic on a different PAL frequency. Controllers at an ACC can disable this equipment when communications workload warrants. However, it must be remembered that, while the DCPC provides direct contact with the IFR unit at locations where there is no VFR control and an AAS or RAAS is provided, pilots must also communicate with the FSS or FIC for local traffic information. Whenever DCPC cannot be established, or ATC has instructed a pilot to contact a FIC, position reports shall be made through the assigned FIC or the nearest communications agency enroute.

When the pilot-in-command of an IFR aircraft is informed that the aircraft has been RADAR IDENTIFIED, position reports over compulsory reporting points are no longer required. Pilots will be informed when to resume normal position reporting.

In order that flight information and alerting service may be provided to all IFR flights outside controlled airspace, pilots should make position reports over all navigation aids along the route of flight to the nearest station having air-to-ground communications capability.

If the time estimate for the next applicable reporting point differs from the previously reported estimate by 3 min or more, a revised estimated time should be reported to the appropriate ATS unit as soon as possible.

In the NCA and ACA, there are special position-reporting procedures for flights tracking outside airways. See RAC 12.6 and 12.7 for further details.

8.2 Future Air Navigation Systems 1/A Automatic Dependent Surveillance Waypoint Position Reporting (FANS 1/A ADS WPR)

8.2.1 ADS WPR

ADS WPR is a service that allows aircraft equipped with FANS 1 (the Boeing implementation of FANS) and FANS A (the Airbus implementation of FANS) to provide certain ATS units with position reports (including intent information) based on information received directly from the FMS. ADS contracts are established with flights that will cause an ADS position report to be downlinked to the appropriate ATS unit as each waypoint along the route of flight is passed. Where available, this service may be used as an alternative to voice reporting by flights that receive appropriate authorization.

This service has been successfully introduced in the NAT region, and non-radar portion of the Edmonton FIR/CTA. Information regarding FANS 1/A ADS WPR in the NAT region is provided in Guidance Material for ATS Data Link Services in North Atlantic Airspace, which is available on the North Atlantic Programme Coordination Office (NAT-PCO) Web site at < *http://www.paris.icao.int/* >.

8.2.2 ATS Facilities Notification (AFN) Logon

An ADS contract is initiated by the ground system in response to an AFN logon received from the aircraft. The AFN logon address for flights entering the Edmonton FIR/CTA is CZEG.

It is important, when initializing the flight management computer (FMC), to ensure the aircraft identification matches the one displayed in the filed ATC flight plan (FP) message. If a flight becomes aware that incorrect flight identification data was provided in the AFN logon, ADS must immediately be terminated and a new AFN logon performed with the correct information.

Flights entering Edmonton ADS airspace from airspace where FANS 1/A ATS data link services are being received do not need to perform another AFN logon to continue participating in ADS WPR. Flights entering Edmonton ADS airspace from airspace where no FANS 1/A ATS data link services are being received should ensure their ADS function is turned on and perform an AFN logon:

(a) 15 to 45 min prior to entering the airspace; or

(b) prior to departure if departing airports are adjacent to, or underlying, the airspace.

Flights exiting Edmonton ADS airspace into adjacent airspace where ADS and controller-pilot data link communications (CPDLC) services are offered do not need to perform another AFN logon to continue participating in ADS or to initiate a CPDLC connection.

NOTE: Currently, CPDLC services are not available in the Edmonton FIR. Until CPDLC services are available, flights identifying themselves as CPDLC will be advised "CPDLC SERVICE NOT AVAILABLE IN THE EDMONTON FIR."

8.2.3 Using ADS WPR

Once the ADS contract has been established by the ground system, ADS reports are sent automatically without notification to, or action required by, the flight crew. In the event that an ADS report is not received, ATC will attempt to contact the flight to obtain the position report via voice. If this occurs, or in the event of ADS WPR service interruptions, aircraft equipment failures or loss of signal coverage, flight crews shall resume voice reporting. Flight crews should be aware of the limitations associated with available aircraft equipment and the signal coverage over the intended route.

Flight crews should not insert non-ATC waypoints in the cleared route of flight. Inserting such waypoints will result in the transmission of unwanted position reports to ATC and may prevent the provision of data required by ATC to provide control services.

If deviations around weather are required, flight crews should establish voice contact and advise ATC of their intentions. Position reports via voice should be made abeam waypoints until the flight is back on its cleared route.

8.2.4 Aeradio Communications

8.2.4.1 Flight Crew Initial Contact with Edmonton Centre (Flight Is Radar Identified)

Aircraft entering the Edmonton FIR from radar-controlled airspace should not identify themselves as ADS-equipped on initial contact. "A–D–S" after the aircraft call sign should only be used leaving radar coverage and approaching the Edmonton ADS airspace. The Edmonton ACC will advise the aircraft that radar service is terminated. This cancellation of radar service should serve to remind ADS-equipped aircraft to commence using "A–D–S" in conjunction with their call sign.

8.2.4.2 Flight Crew Initial Contact with Edmonton Centre (Flight Is Not Radar Identified)

Flights that are not radar identified when making initial contact with Edmonton Centre should:

1. use "A–D–S" after the aircraft call sign; and
2. not include a voice position report.

Flight crews can expect the reply from Edmonton Centre to include:

1. acknowledgement that the flight is ADS;
2. the advisory "VOICE POSITION REPORTS NOT REQUIRED"; and
3. the assigned frequency for the next station en route.

8.2.4.3 Flight Crew Initial Contact with Gander Radio

Upon initial contact with Gander Radio, flight crews should:

1. use "A–D–S" after the aircraft call sign;
2. not include a voice position report;
3. state the name of the first reporting point;
4. for northbound (polar) flights, state the last point exiting the Edmonton FIR/CTA; and
5. request a SELCAL check, if necessary.

Flight crews can expect the reply from Gander Radio to include:

1. acknowledgement that the flight is ADS;
2. the advisory "VOICE POSITION REPORTS NOT REQUIRED IN THE EDMONTON FIR";
3. a frequency to monitor;
4. the assigned frequency for the next station en route; and
5. a SELCAL check.

8.2.4.4 Flight Crew Initial Contact with Arctic Radio

Upon initial contact with Arctic Radio, flight crews should:

1. use "A–D–S" after the aircraft call sign; and
2. not include a voice position report.

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Flight crews can expect the reply from Arctic Radio to include:

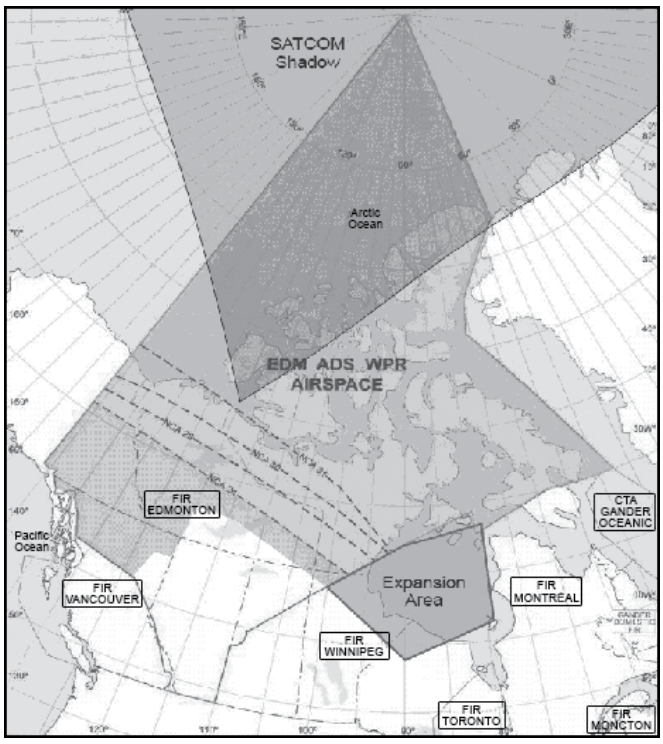
1. acknowledgement that the flight is ADS;
2. the advisory "VOICE POSITION REPORTS NOT REQUIRED IN THE EDMONTON FIR";
3. a frequency to monitor; and
4. the assigned frequency for the next station en route.

8.2.5 Satellite Communications (SATCOM) Shadow

The airspace where ADS WPR will be conducted is affected by an area of satellite communication (SATCOM) unreliability (see map below). This area, referred to as the SATCOM shadow, extends from the North Pole to 70°N. Unreliability is most pronounced at 120°W, where the two satellites servicing the area are furthest away. Coverage improves to the east and west of 120°W, where reliable coverage can be expected as far north as 80°N at 80°W. The exact extent and effect of the shadow depends on atmospheric conditions, aircraft antenna placement, and direction of flight.

Aircraft observing an indication that SATCOM has been lost should expect that their ADS reporting has been terminated. Flight crews can re-logon to CZEG if it is felt that the outage has been overcome. Otherwise, ensuing position reports must be provided.

Figure 8.1 – SATCOM Shadow



8.3 Mach Number/True Airspeed—Clearances and Reports

8.3.1 Mach Number

Clearances to turbojet aircraft equipped with a Machmeter may include an appropriate Mach number. If the Mach number cannot be adhered to, ATC is to be so informed when the clearance is issued. Once accepted, the Mach number shall be adhered to within .01 Mach, unless ATC approval is obtained to make a change. If an immediate temporary change in Mach number is necessary (e.g. because of turbulence), ATC must be notified as soon as possible. When a Mach number is included in a clearance, the flight concerned should transmit its current Mach number with each position report.

8.3.2 TAS

ATC is to be notified as soon as practicable of an intended change to the TAS at the cruising altitude or flight level, where the change intended is five percent or more of the TAS specified in the IFR flight plan or flight itinerary.

8.4 Altitude Reports

Although the CARs do not specifically direct pilots to report altitude information to ATC, pilots, if not operating in radar airspace (i.e. radar-identified by ATC), should report reaching the altitude to which the flight has been initially cleared. When climbing or descending en route, pilots should report when leaving a previously-assigned altitude and when reaching the assigned altitude.

On initial contact with ATC, or when changing from one ATC frequency to another, when operating in radar or non-radar airspace, pilots of IFR and CVFR flights should state the assigned cruising altitude and, when applicable, the altitude through which the aircraft is climbing or descending.

In order for ATC to use Mode C altitude information for separation purposes, the aircraft Mode C altitude readout must be verified. The Mode C altitude is considered valid if the readout value does not differ from the aircraft reported altitude by more than 200 ft. The readout is considered invalid if the difference is 300 ft or more. Therefore, it is expected that pilot altitude reports, especially during climbs and descents, will be made to the nearest 100-ft increment.

Example:

EDMONTON CENTRE AIR CANADA 801 HEAVY, LEAVING 8 300 FEET, CLIMBING TO FLIGHT LEVEL 350.

If the phrase "report reaching", "report leaving" or "report passing" is used by ATC, the pilot shall comply (CAR 602.31—*Compliance with Air Traffic Control Instructions and Clearances*).

8.5 Climb or Descent

8.5.1 General

During any phase of flight, pilots should adhere to the following procedures:

(a) When an altitude clearance is issued, the pilot should begin the climb or descent promptly on acknowledgement of the clearance. The climb or descent should be made at an optimum rate consistent with the operating characteristics of the aircraft. If the above is not the case, or if it becomes necessary to stop the climb or descent, the pilot should advise ATC of the interruption or the delay in vacating an altitude.

(b) If the phrase "when ready" is used in conjunction with an altitude clearance or instruction, the change of altitude may be initiated whenever the pilot wishes. The climb or descent should be made at an optimum rate consistent with the operating characteristics of the aircraft. Pilots are expected to advise ATC when the altitude change is initiated. Compliance with assigned or published altitude crossing restrictions and speeds is mandatory (CAR 602.31—*Compliance with Air Traffic Control Instructions and Clearances*), unless specifically cancelled by ATC. (MEAs are not considered restrictions; however, pilots are expected to remain at or above MEAs.)

When an aircraft reports vacating an altitude, ATC may assign the altitude to another aircraft. Control will be based on the pilot following these procedures and on the normal operating characteristics of the aircraft.

If a descending aircraft must level off at 10 000 ft ASL to comply with CAR 602.32—*Airspeed Limitations* while cleared to a lower level, the pilot should advise ATC of the descent interruption .

(c) ATC may authorize aircraft to employ cruise climb techniques either between two levels or above a specified level. A clearance or instruction to cruise climb authorizes climb at any given rate as well as temporary levelling at intermediate altitudes. Pilots are expected to advise ATC of the altitude they temporary level off at to the nearest 100 ft. Once the aircraft has vacated an altitude during a cruise climb, it may not return to that altitude. ATC will use the following phraseology:

CRUISE CLIMB TO (altitude)
or
CLIMB TO (altitude) CRUISE CLIMB BETWEEN (levels)
(or ABOVE [level])

8.5.2 Visual Climb and Descent

8.5.2.1 General

Application of visual climbs and descents in VMC, under certain circumstances, provides both controllers and pilots with an operational advantage in the conduct of safe and orderly flow of air traffic.

8.5.2.2 Visual Separation from Other Aircraft

ATC may authorize the pilot of an IFR aircraft to conduct a visual climb or descent while maintaining visual separation with the appropriate traffic only if a pilot requests it. Controllers will not initiate or suggest a visual climb/descent in this application. During this altitude change in VMC, pilots must provide their own separation, including wake turbulence separation, from all other aircraft. This application may be exercised in both radar and non-radar environments.

IFR separation is required for all altitude changes in Class A and B airspace. Accordingly, visual climbs or descents will not be approved for aircraft operating in these classes of airspace.

8.6 Minimum IFR Altitudes

Except when taking off or landing, aircraft in IFR flight shall be operated at least 1 000 ft above the highest obstacle within a horizontal radius of 5 NM of the aircraft (CAR 602.124). Exceptions to this are flights within designated mountainous regions, but outside areas for which minimum altitudes for IFR operations have been established (see RAC 2.12 and RAC Figure 2.11).

NOTE: The established MOCA for IFR operations provides obstacle clearance above the highest obstacle within the following areas:

(a) *1 000 ft*:
- (i) airways and air routes outside of designated mountainous areas;
- (ii) certain airway and air route segments within designated mountainous areas, which are used in the arrival or departure phase of flight;
- (iii) Safe Altitude 100 NM outside of designated mountainous areas;
- (iv) all MSA;
- (v) instrument approach transitions (including DME arcs);
- (vi) radar vectoring areas [except as in (c)(iii)]; and
- (vii) AMA outside of designated mountainous areas as shown on the Enroute and Terminal Area Charts.

(b) *1 500 ft*:
- (i) airways and air routes within designated mountainous areas 2, 3, and 4; or
- (ii) Safe Altitude 100 NM within designated mountainous areas 2, 3, and 4.

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(c) *2 000 ft*:
- (i) airways and air routes within designated mountainous areas 1 and 5 with the exception of those segments described in (a)(ii);
- (ii) Safe Altitude 100 NM within designated mountainous areas 1 and 5;
- (iii) certain radar vectoring areas within designated mountainous areas; and
- (iv) AMA within designated mountainous areas as shown on the Enroute and Terminal Area Charts.

MEAs have been established for all designated low-level airways and air routes in Canada. An MEA is defined as the published altitude ASL between specified fixes on airways or air routes, which assures acceptable navigational signal coverage, and which meets IFR obstacle clearance requirements.

The minimum flight plan altitude shall be the nearest altitude or flight level consistent with the direction of flight (CAR 602.34). This altitude should be at or above the MEA. Unless the MEA is one which is consistent with the direction of flight, it is not to be used in the flight plan or flight itinerary.

As different MEAs may be established for adjoining segments of airways or air routes, aircraft are, in all cases, to cross the specified fix at which a change in the MEA takes place, at the higher MEA.

To ensure adequate signal coverage, many of the MEAs on low-level airways are established at altitudes which are higher than those required for obstacle clearance. When this occurs, a MOCA is also published to provide the pilot with the minimum IFR altitude for obstacle clearance. A MOCA is defined as the altitude between radio fixes on low-level airways and air routes, which meets the IFR Air routes clearance requirements for the route segment. Where the MOCA is lower than the MEA, the MOCA is published in addition to the MEA on the Enroute Charts. Where the MEA and MOCA are the same, only the MEA is published.

The MOCA, or the MEA when the MOCA is not published, is the lowest altitude for the airway or air route segment at which an IFR flight may be conducted under any circumstances. These altitudes are provided so that pilots will be readily aware of the lowest safe altitude that may be used in an emergency, such as a malfunctioning engine or icing conditions. Under ISA conditions, they provide a minimum of 1 000 ft of clearance above all obstacles lying within the lateral limits of all airways and air routes, including those in designated mountainous regions.

Pressure altimeters are calibrated to indicate true altitude under ISA conditions, and any deviation from ISA will result in an erroneous altimeter reading. When temperatures are extremely cold, true altitudes will be significantly lower than indicated altitudes. Although pilots may fly IFR at the published MEA/MOCA, in the winter, when air temperatures are much lower than ISA, they should operate at altitudes of at least 1 000 ft above the MEA/MOCA.

NOTE: When flying at a flight level in an area of low pressure, the true altitude will always be lower than the corresponding flight level. For example, this "pressure error," in combination with a temperature error, can produce errors of up to 2 000 ft while flying in the standard pressure region at FL100. Further, mountain waves in combination with extremely low temperatures may result in an altimeter over-reading by as much as 3 000 ft. For further details, see AIR 1.5.

8.7 ATC Assignment of Altitudes

8.7.1 Minimum IFR Altitude

Within controlled airspace, ATC is not permitted to approve or assign any IFR altitude below the minimum IFR altitude. To ATC, the minimum IFR altitude is the lowest IFR altitude established for use in a specific airspace and, depending on the airspace concerned, this maybe:

(a) a minimum enroute altitude (MEA);

(b) a minimum obstacle clearance altitude (MOCA);

(c) a minimum sector altitude;

(d) a safe altitude 100 NM;

(e) an area minimum altitude (AMA); or

(f) a minimum vectoring altitude.

A controller is not permitted to clear an aircraft flying on an airway at an altitude below the MEA. However, flight below the MEA, but not below the MOCA, may be approved when specifically requested by the pilot in the interest of flight safety (e.g.: icing/turbulence), to conduct a flight check, for MEDEVAC, or when navigating using GPS.

Navigational signal coverage is not guaranteed below the MEA; when navigating using NAVAIDS, the pilot should ensure that the aircraft is within, and will remain within, the lateral limits of the airway before requesting approval to fly below the MEA. It should also be noted that flight below the MEA does not guarantee the aircraft will remain in controlled airspace.

8.7.1.1 DME Intersections on a Minimum En-Route Altitude

The purpose of these fixes is to develop an airway segment where lower MEAs may be applied, thus reducing the high descent rates that otherwise are required when on initial approach to destination.

Pilots without DME normally will not be able to use these lower MEAs and may conceivably experience delays in receiving approach and departure clearances due to other traffic operating below the conventional MEA (i.e., the MEA required for non-DME equipped aircraft). However, in a radar environment, the non-DME equipped aircraft may be cleared at the lower MEA where it will be provided with radar service while operating below the conventional MEA.

8.7.2 Altitudes and Direction of Flight

Pilots will normally file flight plans and be assigned altitudes appropriate to the airway, air route or direction of flight. There are exceptions, and the following information is intended to familiarize pilots with the circumstances of those exceptions.

ATC may assign an altitude that is not appropriate to the airway, air route or direction of flight if:

(a) a pilot requests it because of icing, turbulence, or fuel considerations, provided:
  (i) the pilot informs ATC of the time or location at which an appropriate altitude can be accepted, and
  (ii) the altitude has been approved by affected units/sectors; or

(b) an aircraft is:
  (i) holding, arriving or departing;
  (ii) conducting a flight inspection of a NAVAID;
  (iii) operating within an altitude reservation;
  (iv) engaged in an aerial survey, mapping flight or test flight;
  (v) operating on a polar route (see RAC 12.6.7); or

(c) no alternative separation minima can be applied, provided:
  (i) the altitude has been approved by affected units/sectors, and
  (ii) the aircraft is cleared to an appropriate altitude as soon as possible;

(d) the airspace is structured for a one-way traffic flow.

NOTES 1: In situation (a), the pilot, when able to accept an appropriate altitude, will be requested to advise ATC. In situation (c), the aircraft will be re-cleared to an appropriate altitude as soon as operationally feasible. Due to safety implications, use of altitudes inappropriate for the direction of flight must be limited, and requests must not be made solely for fuel efficiency reasons. Pilots should make requests only to avoid a fuel situation that might cause an otherwise unnecessary refuelling stop short of the flight-planned destination. ATC will not ask the pilot to substantiate a request; if ATC is unable to approve the request, the controller will state the reason and request the pilot's intention.

2: In the application of (a) or (c) in high-level radar-controlled airspace, aircraft at an altitude not appropriate for the direction of flight will be issued radar vectors or offset tracks to establish the aircraft at least 5 NM from the centreline of an airway or published track displayed on the radar. Phraseology:

VECTORS TO (direction) OF (airway, track) TURN (left/right) TO HEADING (degrees).

ADVISE IF ABLE TO PROCEED PARALLEL OFFSET.

PROCEED OFFSET (number) MILES (right/left) OF CENTRELINE (track/route) AT (significant point/time) UNTIL (significant point/time). CANCEL OFFSET.

8.8 "1 000-ft-on-Top" IFR Flight

1 000-ft-on-top IFR flight may be conducted provided that

(a) the flight is made at least 1 000 ft above all cloud, haze, smoke, or other formation;

(b) the flight visibility above the formation is at least three miles;

(c) the top of the formation is well defined;

(d) the altitude appropriate to the direction of flight is maintained when cruising in level flight;

(e) the "1 000-ft-on-top" flight has been authorized by the appropriate ATC unit; and

(f) the aircraft will operate within Class B airspace at or below 12 500 ft ASL, Class C, D, or E airspace.

NOTES: ATC does not apply separation to aircraft operating 1 000-ft-on-top except in the following conditions:

1: at night, separation is applied between an aircraft operating 1 000-ft-on-top and other aircraft if any of the aircraft are holding; and

2: between aircraft operating 1 000-ft-on-top and an aircraft operating on an altitude reservation approval.

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8.9 Clearances—Leaving or Entering Controlled Airspace

ATC will use the phrase "while in controlled airspace" in conjunction with the altitude if an aircraft will be entering or leaving controlled airspace. In addition, ATC will specify the lateral point and altitude at which an aircraft is to leave or enter controlled airspace if the instruction is required for separation purposes (see Note).

Example:

LEAVE/ENTER CONTROLLED AIRSPACE (number) MILES (direction) OF (fix) AT (altitude).

LEAVE/ENTER CONTROLLED AIRSPACE AT (altitude).

NOTE: The altitude assigned by ATC need only reflect the minimum safe IFR altitude within controlled airspace. A pilot should be alert to the possibility of a higher minimum safe IFR altitude outside of controlled airspace. If uncertain (or unable to determine) when to enter or leave the area where the higher minima is applied, a request for clearance to maintain an altitude that will accommodate the higher minimum IFR altitude should be made.

8.10 Clearance Limit

The clearance limit, as specified in an ATC clearance, is the point to which an aircraft is cleared. Further clearance is delivered to a flight prior to arrival at the clearance limit. However, occasions may arise when this may not be possible. In the event that further clearance is not received, the pilot is to hold at the clearance limit, maintain the last assigned altitude and request further clearance. If communications cannot be established with ATC, the pilot should then proceed in accordance with communications failure procedures as described in RAC 6.3.2.

The responsibility rests with the pilot to determine whether or not a received clearance can be complied with in the event of a communications failure. Under such circumstances, a clearance may be refused, but such refusal should specify acceptable alternatives.

8.11 Class G Airspace—Recommended Operating Procedures—En-Route

When aircraft are manoeuvring in the vicinity of uncontrolled aerodromes or cruising in Class G airspace, the lack of information on the movements of other aircraft operating in close proximity may occasion a potential hazard to all concerned. To alleviate this situation, all pilots are advised that:

(a) when operating in Class G airspace, they should continuously monitor frequency 126.7 MHz whenever practicable;

(b) position reports should be made over all NAVAIDs along the route of flight to the nearest station having air-to-ground communications capability. These reports should be made on frequency 126.7 MHz whenever practicable. If it is necessary to use another frequency to establish communications with the ground station, the report should also be broadcast on 126.7 MHz for information of other aircraft in the area. The report should contain present position, track, altitude, altimeter setting in use, next position and ETA;

(c) immediately before changing altitude, commencing an instrument approach or departing IFR, pilots should broadcast their intentions on 126.7 MHz whenever practicable. Such broadcasts should contain adequate information to enable other pilots to be fully aware of the position and intentions so that they can determine if there will be any conflict with their flight paths;

(d) at aerodromes where an MF has been designated, arriving pilots shall first broadcast their intentions on 126.7 MHz before changing to the MF. If conflicting IFR traffic becomes evident, this change should be delayed until the conflict is resolved. Pilots departing IFR should broadcast their intentions on 126.7 MHz, in addition to the MF, prior to takeoff; and

(e) the preceding reporting requirements are considered as the minimum necessary. Pilots are encouraged to make additional reports whenever the possibility of conflicting IFR traffic is suspected. An example would be reporting prior to overflying a facility where cross traffic is probable or where there is a published instrument approach procedure.

NOTE: There is no frequency comparable to 126.7 MHz for use by aircraft equipped only with UHF; however, pertinent UHF traffic information will be relayed on the MF by the flight service specialist.

9.0 INSTRUMENT FLIGHT RULES (IFR) — ARRIVAL PROCEDURES

9.1 ATIS Broadcasts

If ATIS is available, all pilots should use it to obtain the basic arrival or departure and aerodrome information as soon as it is practicable.

9.2 Standard Terminal Arrival (STAR), Minimum Sector Altitude (MSA) and Terminal Arrival Area (TAA)

The objective of the STAR, the MSA and the TAA depictions is to provide arriving aircraft with a seamless transition from the en route structure to the terminal environment.

Unlike the MSAs and TAAs, the STARs are developed to simplify clearance procedures at higher density airports and are individually depicted in the CAP. The MSA and TAA depictions are also in the CAP, but are found in the plan view of the associated approach chart.

A STAR requires the pilot to follow a predetermined route, whereas the MSA and the TAA are less prescriptive and simply offer safe altitudes to which the pilot can descend before commencing the approach.

Pilots are to review each STAR issued and to follow the procedure as published. If there is any doubt as to what is required, clarification should be obtained from ATC. Pilots are not required to accept a STAR clearance, and, if they are unable to follow it, they should request alternate instructions.

9.2.1 Conventional STAR

A conventional STAR is defined as a STAR that can be flown by a pilot using ground-based NAVAIDs or specified headings. Most conventional STARs end with ATC providing radar. A conventional STAR should be filed on a flight plan. If a conventional STAR is filed, ATC expects the aircraft to fly the STAR track as depicted and, once descent clearance has been received, to comply with any charted altitude restrictions above the assigned altitude, unless specifically cancelled by ATC.

9.2.2 RNAV Equipment

With the widespread deployment of RNAV systems and the advent of GPS-based navigation, greater flexibility is now possible in defined routings, procedures and airspace design. This permits an associated increase in flight safety as well as a potential for significant fuel savings and reduced pilot-controller communications.

Pilots interested in flying RNAV STAR procedures should file them as part of their flight plan and must have the following equipment:

(a) at least one RNAV system or FMS certified for terminal use that meets either of the following standards:
- AC 20-130 or later approved, Airworthiness Approval of Navigation or Flight Management Systems Integrating Multiple Navigation Sensors; or
- AC 20-138 or later approved, Airworthiness Approval of Global Positioning System (GPS) Navigation Equipment for use as a VFR and IFR Supplemental Navigation System, and TSO C129a, Airborne Supplemental Navigation Equipment Using the Global Positioning System (GPS);

(b) at least one automatic radio-updated inertial reference unit (IRU), if the RNAV system or FMS does not use a GPS sensor;

(c) a current database containing the waypoints for the RNAV STAR to be flown that can be automatically loaded into the RNAV system or FMS active flight plan;

(d) a system capable of following the RNAV system or FMS lateral flight path path and limiting the cross-track error deviation to +/- ½ the navigation accuracy associated with the procedure or route; and

(e) an electronic map display.

Where the DTW and FACF are not joined ("open" procedure), there will be a discontinuity in the database flight plan. This has caused problems with some onboard equipment when attempting to link the procedure after receiving the approach clearance prior to the DTW. Therefore, prior to filing an RNAV STAR as part of the flight plan, pilots should have procedures in place to ensure that, when required, they will be able to successfully link the DTW to the FACF.

NOTE: If unable to successfully link the procedure, pilots should advise ATC in order to receive radar vectors to the FACF.

Pilots should also be aware that above 180 knots indicated airspeed (KIAS), turn anticipation might not function properly between the DTW and FACF.

9.2.3 RNAV STAR Procedure

Definition:
An RNAV STAR is an IFR ATC arrival procedure coded in an aircraft FMS database and published in graphic and textual form for use by aircraft appropriately equipped and authorized.

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General Procedures

The RNAV STAR defines a lateral route for an aircraft to fly from a significant point along the en-route phase of flight to the approach phase with minimal, or no, ATC intervention. Altitude and speed restrictions may be depicted as required on any RNAV STAR. All charted altitude and speed restrictions, including those at the DTW or FACF, are mandatory unless specifically cancelled by ATC.

Altitude Restrictions

Altitude restrictions may be included in the STAR for terrain and obstacle clearance as well as for operational requirements. Although an aircraft is expected to follow the charted lateral track of the cleared STAR without further ATC clearance, such is not the case with the vertical profile. ATC will issue descent clearance, and once a lower altitude is issued by ATC, the pilot shall descend on the STAR profile to the assigned altitude. The pilot will comply with all charted altitude restrictions above the ATC-assigned altitude, unless specifically cancelled by ATC. When an approach clearance is received, all altitude restrictions on the STAR profile remain mandatory, unless specifically cancelled by ATC.

Example:

An aircraft maintaining 12 000 ft is cleared to descend to 6 000 ft and the next two waypoints along the RNAV STAR route have altitude restrictions of 9 000 ft or above and 7 000 ft or above, respectively. The aircraft must cross the first waypoint at 9 000 ft or above and the next at 7 000 ft or above while descending to the ATC-assigned altitude of 6 000 ft. If the aircraft is cleared for the instrument approach in this example, the 9 000-ft and 7 000-ft restrictions remain mandatory, unless specifically cancelled by ATC.

Examples of ATC cancelled restrictions:

DESCEND TO (altitude), ALL STAR ALTITUDE RESTRICTIONS CANCELLED.

DESCEND TO (altitude), ALTITUDE RESTRICTION AT (fix) CANCELLED.

Speed Restrictions

Speed restrictions may be included on the RNAV STAR for operational reasons or because of design criteria. Similar to altitude restrictions, all speed restrictions are mandatory, unless specifically cancelled by ATC. The speed restriction depicted at all DTWs (maximum 200 KIAS) is also mandatory even after an approach clearance has been issued. It is the pilot's responsibility to adhere to all charted speed restrictions, unless specifically cancelled by ATC.

Flight Planning

Any authorized aircraft and crew meeting the RNAV equipment list (see RAC 9.2.2) may file the RNAV STAR in their flight plan. When included in a flight plan, the RNAV STAR forms part of the flight-planned route received in the initial ATC clearance. When a flight plan that includes an RNAV STAR has been filed, or the pilot receives and acknowledges a clearance that includes an RNAV STAR, the pilot is expected to fly the charted lateral track, without further clearance, from the entry point of the RNAV STAR to the end point (FACF or DTW). However, descent clearance must be obtained from ATC before commencing the vertical profile and, when a lower altitude or approach clearance is received, all charted altitude and speed restrictions remain mandatory, unless specifically cancelled by ATC.

Cancelling an RNAV STAR

An RNAV STAR may be cancelled by ATC, if required. Receipt of a visual approach clearance automatically cancels the STAR procedure. An RNAV STAR that has been cancelled may be reinstated if ATC or the pilot wishes the aircraft to resume the STAR.

Examples:

STAR CANCELLED, FLY HEADING ZERO ONE ZERO FOR VECTORS TO FINAL.

STAR CANCELLED, PROCEED DIRECT HALIFAX V-O-R, EXPECT VISUAL APPROACH RUNWAY THREE TWO.

Amended Routes

ATC may amend (shorten) RNAV STAR routes by clearing the aircraft direct to an intermediate waypoint depicted within the RNAV STAR. ATC will confirm what to expect and the status of the STAR if initiating radar vectors or clearance via a waypoint that is not part of the RNAV STAR. If an amended route bypasses a fix over which there is a published altitude restriction then the altitude restriction at that fix is automatically cancelled.

Examples:

PROCEED DIRECT ROCTO, RESUME WATERLOO TWO ARRIVAL, CROSS ROCTO AT SIX THOUSAND OR ABOVE.

FLY HEADING THREE ONE ZERO FOR SEQUENCING, EXPECT DIRECT VERKO (when vectors terminate), PROCEED DIRECT VERKO RESUME YOUTH TWO ARRIVAL.

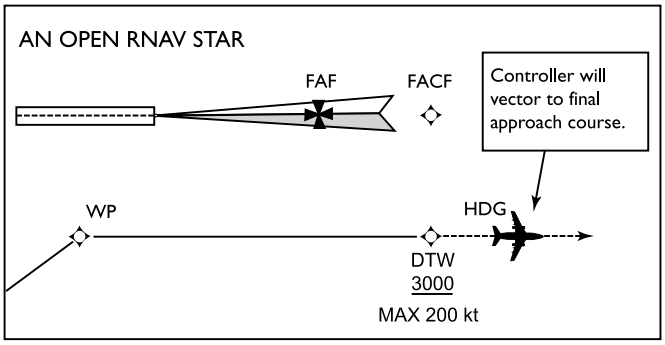
ALTITUDE RESTRICTION AT TETOS CANCELLED, PROCEED DIRECT ROCTO, CROSS ROCTO AT ONE ONE THOUSAND.

RNAV STAR Procedures

There are two types of RNAV STAR procedures: open and closed.

Open RNAV STAR Procedures

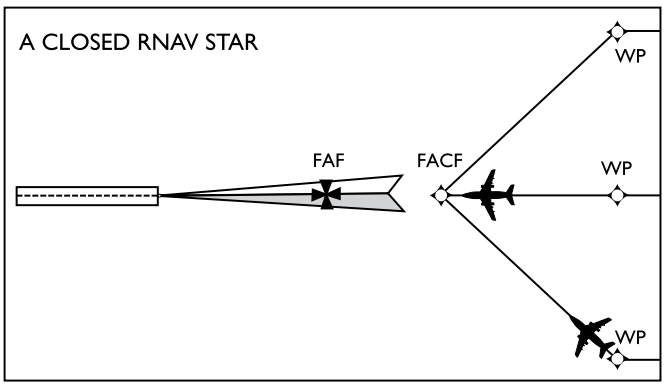
An open RNAV STAR terminates at a DTW. This procedure is used for aircraft approaching the active runway via the downwind leg to the DTW.



An open RNAV STAR procedure provides a continuous track from the en-route structure via the RNAV STAR entry point to the DTW. Unless specifically cancelled by ATC, all charted altitude and speed restrictions are mandatory, even when a lower altitude or approach clearance is received from ATC. The pilot shall comply with all ATC-assigned altitudes in accordance with ATC clearances received and acknowledged. ATC may close the RNAV STAR by issuing an approach clearance at least 3 NM prior to the DTW. When the approach clearance is issued, the pilot shall comply with charted altitude and speed restrictions and fly the RNAV STAR track to the DTW, then to the FACF (turn anticipation), intercept the final approach course and conduct a straight-in approach. This procedure does not include a procedure turn. If an approach clearance is not received prior to the DTW, the pilot shall maintain the charted heading after the DTW and ATC will provide vectors to a point from which the aircraft can fly the straight-in approach. ATC may, after the DTW, clear the aircraft direct to the FACF for the straight-in approach.

Closed RNAV STAR Procedures

A closed RNAV STAR terminates at an FACF. This procedure is normally used when the inbound track is within plus or minus 90˚ of the final approach course to the runway.



A closed RNAV STAR procedure provides a continuous track from the en-route structure via the RNAV STAR entry point to the FACF. Unless specifically cancelled by ATC, all charted altitude and speed restrictions are mandatory, even when a lower altitude or approach clearance is received. The pilot shall comply with all ATC-assigned altitudes in accordance with ATC clearances received and acknowledged. When an approach clearance is received, the pilot shall comply with all published altitude and speed restrictions and fly the charted track to the FACF, intercept the final approach course, and fly the straight-in approach. This procedure does not include a procedure turn.

Communications Failures

If communications with ATC cannot be maintained or established, the pilot is expected to indicate a loss of communication (squawk 7600) and, except if following the procedure for two-way communications failure in VMC, as described in RAC 6.3.2.2(a), fly the lateral route of the RNAV STAR associated with the active runway. The pilot is expected to comply with all assigned or charted altitudes and speeds and conduct an approach as indicated below.

Open Procedure

If a communication failure occurs prior to the DTW, the pilot is expected to select transponder code 7600 and, unless alternative instructions or clearances have been received from ATC, continue to the DTW, then to the FACF, intercept the final approach course, and fly the straight-in approach. All charted altitude and speed restrictions remain mandatory. All approaches from RNAV STARs are to be conducted as straight-in procedures with no associated procedure turns.

If a communication failure occurs after the aircraft has passed the DTW, the pilot is expected to select transponder code 7600 and, unless alternative instructions or clearances have been received from ATC, proceed direct to the FACF, and fly the straight-in approach. All charted altitude and speed restrictions remain mandatory. All approaches from RNAV STARs are to be conducted as straight-in procedures with no associated procedure turns.

Closed Procedure

If a communication failure occurs prior to reaching the FACF, the pilot is expected to select transponder code 7600 and, unless alternative instructions or clearances have been received from ATC, continue on the RNAV STAR route to the FACF, intercept the final approach course, and fly the straight-in approach to the active runway. All charted altitude and speed restrictions remain mandatory. All approaches from RNAV STARs are to be conducted as straight-in procedures with no associated procedure turns.

9.2.4 MSA

The MSA, as depicted on the approach chart (see the CAP), provides a minimum of 1 000 ft clearance above all obstacles within a sector of a circle having a radius of at least 25 NM centred on a radio aid to navigation or on a waypoint located near the aerodrome. Where required, the depiction may be divided into several pie-shaped sectors of varying minimum altitudes. Pilots can locate their sector by superimposing their track to the selected NAVAID onto the MSA depiction.

Unlike TAA depictions, MSA depictions do not allow the sectors to be further partitioned into step-down arcs of varying distances.

NOTE: RNAV approaches may use either an MSA or a TAA depiction. RNAV approaches that use the MSA shall depict the common minimum altitude only.

9.2.5 TAA

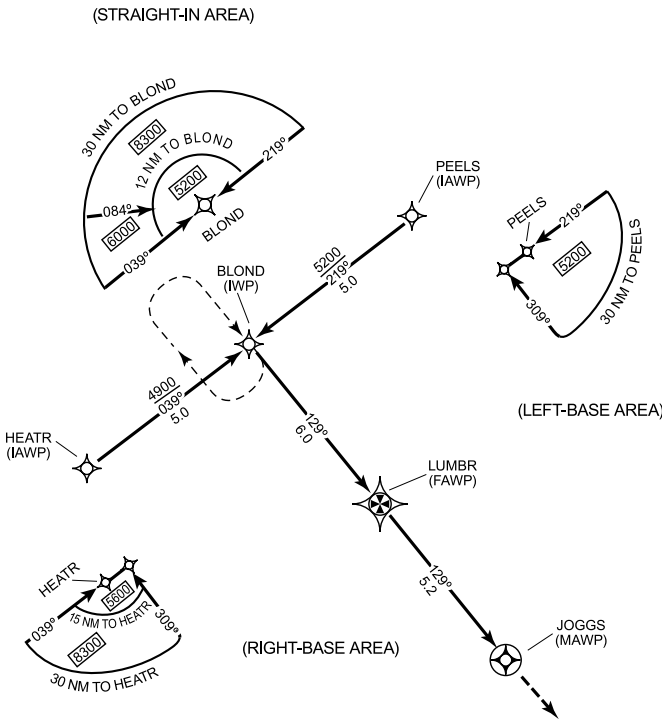
TAAs are developed for aircraft equipped with an FMS and/or a GNSS.

When a TAA is published, it replaces the MSA depiction on the approach chart (see the CAP).

The main advantage of the TAA over the MSA is that it can allow step-down arcs, based on RNAV distances, within its divided areas. This allows the aircraft to descend to lower minimum altitudes while still providing a minimum clearance of 1 000 ft above all obstacles.

The standard TAA consists of three areas which are defined by the extension of the initial and intermediate approach segments. These are called the straight-in, left-base, and right-base areas.

BASIC "T" APPROACH WITH TAA DEPICTION*



NOTE: The standard "T" design of the approach courses may be modified by the procedure designer where required by terrain or for ATC considerations. For instance, the "T" design may appear more like a regularly or irregularly shaped "Y", or may even have one or both outboard initial approach waypoints (IAWP) eliminated, resulting in an upside down "L" or an "I" configuration.

Prior to arriving at the TAA boundary, the pilot should determine which area of the TAA the aircraft will enter by selecting the intermediate approach waypoint (IWP) to determine the magnetic bearing TO the waypoint. That bearing should then be compared with the published bearings that define the lateral boundaries of the TAA areas.

CAUTION: Using the end IAWPs (instead of the IWP) may give a false indication of which area the aircraft will enter. This is critical when approaching the TAA near the extended boundary between the left- and right-base areas, especially where these areas contain different minimum altitude requirements.

A standard racetrack holding pattern may be provided at the center IWP/IAWP and, if present, may be necessary for course reversal and for altitude adjustment for entry into the procedure. In the latter case, the pattern provides an extended distance for the descent required by the procedure.

9.3 Approach Clearance

When using direct controller pilot communications, ATC normally advises pilots of the ceiling, visibility, wind, runway, altimeter setting, approach aid in use, and pertinent aerodrome conditions (CRFI, RSC, etc.) immediately prior to or shortly after descent clearance. Upon acknowledging receipt of the current ATIS broadcast, the pilot is advised by ATC of the current airport conditions only if they are changing rapidly.

Aircraft destined to airports which underlie controlled low level airspace and for which there is a published instrument approach procedure, will be cleared out of controlled airspace (vertically) via the published instrument approach procedure.

Example:

ATC CLEARS (aircraft identification) OUT OF CONTROLLED AIRSPACE VIA (name, type) APPROACH.

Aircraft destined to airports which underlie controlled low level airspace and for which there is not a published instrument approach procedure will be cleared to descend out of controlled airspace and informed of the appropriate minimum IFR altitude.

Example:

ATC CLEARS (aircraft identification) TO DESCEND OUT OF CONTROLLED AIRSPACE VICINITY OF (aerodrome name). THE (minimum IFR altitude) IS (number) feet.

The pilot may elect to cancel IFR as soon as visual conditions permit the continuation of the flight under VFR, or remain on the IFR flight plan until the aircraft has landed and the pilot files an arrival report (see RAC 3.12.2). Should the pilot anticipate that visual conditions to permit continued flight

under VFR may not be achieved, the pilot may arrange with ATC to have the MEA protected, as specified in RAC 9.4.

Aircraft destined to airports which underlie controlled high level airspace and where there is no minimum IFR altitude established that would prohibit such a manoeuvre will be cleared out of controlled high level airspace.

Example:

ATC CLEARS (aircraft identification) OUT OF (type of airspace).

When an approach clearance is issued, the published name of the approach is used to designate the type of approach if adherence to a particular procedure is required. If visual reference to the ground is established before completion of a specified approach, the aircraft should continue with the entire procedure unless further clearance is obtained.

Examples:

CLEARED TO THE OTTAWA AIRPORT, STRAIGHT-IN ILS RUNWAY ZERO SEVEN APPROACH.

CLEARED TO THE TORONTO AIRPORT, ILS RUNWAY ZERO SIX LEFT APPROACH.

The number of the runway on which the aircraft will land is included in the approach clearance when a landing will be made on a runway other than that aligned with the instrument approach aid being used.

Example:

CLEARED TO THE OTTAWA AIRPORT, STRAIGHT-IN ILS RUNWAY ZERO SEVEN APPROACH/CIRCLING PROCEDURE SOUTH FOR RUNWAY THREE TWO.

NOTE: If the pilot begins a missed approach during a circling procedure, the published missed approach procedure as shown for the instrument approach just completed shall be flown. The pilot does not use the procedure for the runway on which the landing was planned.

At some locations during periods of light traffic, controllers may issue clearances that do not specify the type of approach.

Example:

CLEARED TO THE LETHBRIDGE AIRPORT FOR AN APPROACH.

When such a clearance is issued by ATC and accepted by the pilot, the pilot has the option of conducting any published instrument approach procedure. In addition, the pilot also has the option of proceeding by the route so cleared by ATC in a previous clearance, by any published transition or feeder route associated with the selected procedure, or by a route present position direct to a fix associated with the selected instrument approach procedure. Pilots who choose to proceed to the instrument procedure fix via a route that is off an airway, air route or transition are responsible for maintaining the appropriate obstacle clearance, complying with noise abatement procedures and remaining clear of Class F airspace. As soon as practicable after receipt of this type of clearance, it is the pilot's responsibility to advise ATC of the type of published instrument approach procedure that will be carried out, the landing runway and the intended route to be flown.

This clearance does not constitute authority for the pilot to execute a contact or visual approach. Should the pilot prefer to conduct a visual approach (published or non-published) or a contact approach, the pilot must specifically communicate that request to the controller.

Upon changing to the tower or FSS frequency, pilots should advise the agency of the intended route and published instrument approach procedure being carried out.

The pilot should not deviate from the stated instrument approach procedure or route without the concurrence of ATC because such an act could cause dangerous conflict with another aircraft or a vehicle on a runway.

A clearance for an approach may not include any intermediate altitude restrictions. The pilot may receive this clearance while the aircraft is still a considerable distance from the airport, in either a radar or non-radar environment. In these cases, the pilot may descend, at his/her convenience, to whichever is the lowest of the following IFR altitudes applicable to the position of the aircraft:

(a) minimum en route altitude (MEA);

(b) published transition or feeder route altitude;

(c) minimum sector altitude (MSA) specified on the appropriate instrument approach chart;

(d) safe altitude 100 NM specified on the appropriate instrument approach chart; or

(e) when in airspace for which the Minister has not specified a higher minimum, an altitude of at least 1 000 ft above the highest obstacle within a horizontal radius of 5 NM (1 500 ft or 2 000 ft within designated mountainous regions, depending on the zone) from the established position of the aircraft.

NOTE: When a pilot receives and accepts an ATC clearance which authorizes descent to MSA or a safe altitude 100 NM during normal IFR operations, descent below the MEA for the preceding enroute phase should not commence until the pilot can positively establish the aircraft's position by means of a bearing, radial, DME, radar or visual means.

Caution: Pilots are cautioned that descents to MSA or Safe Altitude 100 NM may, under certain conditions, exit controlled airspace. ATC provides IFR separation within controlled airspace only.

9.4 Descent Out of Controlled Airspace

ATC may not clear an aircraft to operate below the MEA of an airway, nor below the minimum IFR altitude in other controlled low level airspace. The pilot, however, may operate at the MOCA, and ATC will approve flight at the MOCA at the pilot's request. If unable to cancel IFR at the MEA, the pilot may advise that he/she intends to descend to the MOCA. By prior arrangement with ATC, the MEA will be protected in the event that the pilot does not encounter visual conditions at the MOCA. Under this arrangement, the MEA will be protected:

(a) until the pilot files an arrival report (see RAC 3.12.1);

(b) for 30 min; to allow descent to the MOCA and return to the MEA when communication is restored with ATC; or

(c) if ATC does not hear from the pilot under (a) or (b), until the aircraft is estimated to have arrived at the filed alternate plus 30 min.

9.5 Advance Notice of Intent in Minimum Weather Conditions

ATC can handle missed approaches more efficiently if the controller knows the pilot's intentions in advance. They can use the extra time to plan for the possibility of a missed approach and thus provide better service in the event of an actual missed approach.

Pilots should adopt the following procedures as the occasion arises.

On receipt of approach clearance, when the ceiling and visibility reported at the destination airport is such that a missed approach is probable, the pilot should advise the controller as follows:

IN THE EVENT OF MISSED APPROACH REQUEST (altitude or level) VIA (route) TO (airport).

Implementation of this procedure increases the amount of communications, but the increase can be minimized if pilots employ it only when there is a reasonable chance that a missed approach may occur.

9.6 Contact and Visual Approaches

9.6.1 Contact Approach

A contact approach is an approach wherein an aircraft on an IFR flight plan or flight itinerary having an ATC clearance, operating clear of clouds with at least 1 NM flight visibility and a reasonable expectation of continuing to the destination airport in those conditions, may deviate from the IAP and proceed to the destination airport by visual reference to the surface of the earth. In accordance with CAR 602.124, the aircraft shall be flown at an altitude of at least 1 000 ft above the highest obstacle located within a horizontal radius of 5 NM from the estimated position of the aircraft in flight until the required visual reference is acquired in order to conduct a normal landing. Pilots are cautioned that conducting a contact approach in minimum visibility conditions introduces hazards to flight not experienced when flying IFR procedures. Familiarity with the aerodrome environment, including local area obstacles, terrain, noise sensitive areas, Class F airspace and aerodrome layout, is paramount for a successful contact approach in minimum visibility conditions. Pilots are responsible for the adherence to published noise abatement procedures and compliance with any restrictions that may apply to Class F airspace when conducting a contact approach.

NOTE: This type of approach will only be authorized by ATC when:

(a) the pilot requests it; and

(b) there is an approved functioning instrument approach, a published GPS or a GPS overlay approach for the airport.

An aircraft that requests a contact approach to an airport served only by a GPS approach is indicating to ATS that the pilot understands that no ground based approach is available and is confirming that it is able to conduct a GPS approach.

ATC will ensure IFR separation from other IFR flights and will issue specific missed approach instructions if there is any doubt that a landing will be accomplished. Pilots are cautioned that when any missed approach is initiated while conducting a contact approach, obstacle and terrain avoidance is the pilot's responsibility even though specific missed approach instructions may have been issued by ATC (see RAC 9.26). ATC only ensures appropriate IFR separation from other IFR aircraft during contact approaches.

NOTE: ATC will not issue an IFR approach clearance that includes clearance for a contact approach unless there is a published and functioning IAP or a restricted instrument approach procedure (RIAP) authorized by TC for the airport. Where a GPS or GPS overlay approach is the only available IAP or RIAP, this fulfils the requirement for a "functioning instrument approach."

9.6.2 Visual Approach

A visual approach is an approach wherein an aircraft on an IFR flight plan (FP), operating in VMC under the control of ATC and having ATC authorization, may proceed to the destination airport.

To gain operational advantages in a radar environment, the pilot may request or ATC may initiate a visual approach, provided that:

(a) the reported ceiling is at least 500 ft above the established minimum IFR altitude and the ground visibility is at least 3 SM;

(b) the pilot reports sighting the airport (controlled or uncontrolled); and

(c) at a controlled airport:
  (i) the pilot reports sighting the preceding aircraft and is instructed by ATC to follow or maintain visual separation from that aircraft; or
  (ii) the pilot reports sighting the airport but not the preceding aircraft, in which case ATC will ensure separation from the preceding aircraft until:
    (A) the preceding aircraft has landed; or
    (B) the pilot has sighted the preceding aircraft and been instructed to follow or maintain visual separation from it.

ATC considers acceptance of a visual approach clearance as acknowledgement that the pilot should be responsible for:

(a) at controlled airports, maintaining visual separation from the preceding aircraft that the pilot is instructed to follow or from which the pilot is instructed to maintain visual separation;

(b) maintaining adequate wake turbulence separation;

(c) navigating to the final approach;

(d) adhering to published noise abatement procedures and complying with any restrictions that may apply to Class F airspace; and

(e) at uncontrolled airports, maintaining appropriate separation from VFR traffic that, in many cases, will not be known to ATC.

A visual approach is not an IAP and therefore has no missed approach segment. If a go-around is necessary for any reason, aircraft operating at controlled airports will be issued an appropriate advisory/clearance/instruction by the tower. At uncontrolled airports, aircraft crews are required to remain clear of clouds and are expected to complete a landing as soon as possible. If a landing cannot be accomplished, the aircraft crew is required to remain clear of clouds, maintain separation from other airport traffic and is expected to contact ATC as soon as possible for further clearance. ATC separation from other IFR aircraft is only assured once further ATC clearance has been received and acknowledged by the aircraft crew.

9.7 Radar Arrivals

9.7.1 General

Radar separation is applied to arriving aircraft in order to establish and maintain the most desirable arrival sequence to avoid unnecessary "stacking". In the approach phase, radar vectoring is carried out to establish the aircraft on an approach aid. The initial instruction is normally a turn to a heading for radar vectors to a final approach to the runway in use. Should a communications failure occur after this point, the pilot should continue and carry out a straight-in approach if able, or carry out a procedure turn and land as soon as possible. Aircraft are vectored so as to intercept the final approach course approximately 2 NM from the point at which final descent will begin.

Example:

JULIETT WHISKEY CHARLIE, TURN LEFT HEADING ONE SEVEN ZERO TO INTERCEPT FINAL APPROACH COURSE. SEVEN MILES FROM AIRPORT. CLEARED FOR STRAIGHT-IN ILS RUNWAY ONE FIVE LEFT APPROACH. CONTACT TORONTO TOWER ON ONE ONE EIGHT DECIMAL SEVEN NOW.

9.7.2 Radar Required

Traditionally, instrument approach procedures have been developed to include a procedure turn initial approach segment. Procedure turns permitted the pilot to "self navigate" the aircraft within the procedure in order to place the aircraft in a position to conduct a normal landing. Introducing DME and other feeder routes or transitions permitted the pilot to conduct a straight-in procedure without conducting the procedure turn. Most instrument procedures today are accomplished without conducting a procedure turn.

Instrument approaches at Canada's major airports are conducted by radar vectors to the final approach course. While procedure turns are depicted on the instrument approach procedures at these airports, procedure turns are never flown. ATC route and space all aircraft within the terminal area in order to provide a systematic flow of the air traffic. An aircraft conducting a procedure turn manoeuvre at these major centres would cause serious traffic disruptions which may lead to losses of separation or possibly a mid-air collision.

Instrument procedures are being introduced eliminating the procedure turn as well as including a statement "RADAR REQUIRED" as part of the procedure. The initial approach segment of these instrument procedures is being provided by ATC radar vectors. Without ATC radar vectoring, the instrument procedure may not have a published initial approach segment.

Should an aircraft communication failure occur while being vectored for one of these approaches, refer to the communications failure procedures detailed in RAC 6.3.2.

9.7.3 Speed Adjustment – Radar-Controlled Aircraft

NOTE: This section is for information only. It describes directives to controllers and in no way alters the applications of CAR 602.32, which prescribes the following maximum speeds for all aircraft:

- below 10 000 ft ASL, 250 KIAS; and
- below 3 000 ft AGL and within 10 NM of controlled airports, 200 KIAS.

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To assist with radar vectoring, it is sometimes necessary to issue speed adjustments. While ATC will take every precaution not to request speeds beyond the capability of the aircraft, it is the pilot's responsibility to ensure that the aircraft is not operated at an unsafe speed. If ATC issues a speed reduction that is inconsistent with safe operation, the pilot must inform ATC when unable to comply.

Speed adjustment will be expressed in units of 10 KIAS or multiples of 10 KIAS. Pilots complying with a speed adjustment are expected to maintain a speed within 10 KIAS of the specified speed.

Pilots may be asked to:

(a) maintain present speed; or

(b) increase or reduce speed to a specified speed or by a specified amount.

Unless prior concurrence in the use of a lower speed is obtained from the pilot, the following minimum speeds will be applied to:

(a) aircraft operating 20 NM or more from destination airport:
  (i) at or above 10 000 ft ASL: 250 KIAS; and
  (ii) below 10 000 ft ASL: 210 KIAS;

(b) turbojet aircraft operating less than 20 NM from destination airport: 160 KIAS; and

(c) propeller-driven aircraft operating less than 20 NM from destination airport: 120 KIAS.

Pilots of aircraft that cannot attain speeds as high as the minimum speeds specified may be requested to:

(a) maintain a specified speed equivalent to that of a preceding or succeeding aircraft; or

(b) increase or decrease speed by a specified amount.

The issuance of an approach clearance normally cancels a speed adjustment; however, if the controller requires that a pilot maintain a speed adjustment after the issuance of the approach clearance, the controller will restate it. Otherwise, ATC may use the phrase "resume normal speed" to advise a pilot that previously issued speed restrictions are cancelled. Unless specifically stated by ATC, an instruction to "resume normal speed" does not cancel speed restrictions that are applicable to published procedures of upcoming segments of flight.

9.7.4 Precision Radar Approaches

(a) Precision Radar Approaches (PARs) are provided at aerodromes with military PAR units. The aircraft is vectored by surveillance radar to a predetermined position, at which point control is transferred to the PAR controller for the approach.

Example:
JULIETT WHISKEY CHARLIE, EIGHT MILES FROM AIRPORT, TURN LEFT HEADING TWO SEVEN ZERO FOR FINAL APPROACH. CLEARED FOR PRECISION RADAR APPROACH RUNWAY TWO FOUR. CONTACT TRENTON PRECISION ON ONE TWO EIGHT DECIMAL SEVEN NOW.

(b) In an emergency, where surveillance radar coverage permits it, air traffic controllers will provide a surveillance radar approach if no alternative method of approach is available and the pilot declares an emergency and requests a radar approach.

NOTE: NAV CANADA radars are not flight-checked or commissioned for surveillance approaches, nor are NAV CANADA controllers specifically trained to provide them.

9.8 Initial Contact with Control Towers

Pilots should establish contact with the control tower as follows:

(a) If in direct communication with an ACC or a TCU, the IFR controller shall advise the pilot when contact is to be made with the tower. Unless on radar vectors to final approach, pilots should give the tower their ETA to the facility for the approach they intend to fly.

(b) If the conditions above do not apply, pilots should establish communication with the tower when approximately 25 NM from the airport, give their ETA, obtain an ATC approach clearance (if not already received), advise approach intentions and remain on tower frequency.

NOTE: Whenever an ETA is passed, the pilot should specify the point, fix or facility to which the ETA applies.

9.9 Approach Position Reports— Controlled Airports

Pilots conducting an instrument approach to, or landing at, a controlled airport should only make position reports that are requested by the appropriate ATC unit. As an example, pilots may expect ATC to request a report by the Final Approach Fix (FAF) or a specified distance on final. Position reports made under these circumstances are expected to be stated by reporting the position only.

9.10 Control Transfer— IFR Units to Towers

Tower controllers may accept responsibility for control of an arriving IFR flight within the CZ if VMC exist at an airport, and the aircraft has been sighted and will remain in sight. The transfer of control to the tower does not cancel the IFR flight plan, but rather indicates that the aircraft is now receiving airport control service. In such instances, IFR separation minima may not continue to be applied. The tower controller may use visual separation procedures, or issue clearances and instructions as necessary to maintain a safe, orderly and

expeditious flow of airport traffic. Occasionally the tower controller may issue instructions that supersede previous instructions and clearances that the pilot had received from the IFR unit. Acknowledgement of these instructions indicates to the tower that the pilot shall comply with them. A pilot must not assume that the control tower has radar equipment or that radar service is being provided.

9.11 Initial Contact with Air-to-Ground (A/G) Facility at Uncontrolled Aerodromes

Pilots shall establish communications with the A/G facility (FSS, RCO, CARS or UNICOM) on the appropriate frequency if in direct communication with an ACC or a TCU, when directed to do so by the ACC or TCU.

Notwithstanding this, in accordance with CAR 602.104, pilots shall establish communication with the facility on the appropriate frequency no later than five minutes prior to the estimated time of commencing the approach procedure. If the ATC approach clearance has not already been received, it should be obtained from the agency listed on CAP approach charts, unless otherwise directed by ATC.

NOTES 1: If a pilot is instructed to remain on the ATC frequency rather than being transferred to the appropriate frequency for the uncontrolled aerodrome, it remains the pilot's responsibility to notify the associated destination aerodrome ground station, or to broadcast where no ground station exists, and report in accordance with RAC 9.12(a). This may be accomplished by taking one of the following actions:

(a) if the aircraft is equipped with more than one two-way communication radio, the pilot is expected to make the report on the appropriate frequency with the secondary radio, while monitoring the ATC frequency on the primary radio; or

(b) if the aircraft is equipped with a single two-way communication radio, the pilot must first request and receive permission to leave the ATC frequency in order to transmit this directed or broadcast report and then return to the ATC frequency; or, if this is not possible, the pilot should specifically request ATC to notify the associated ground station of their approach intentions and estimated time of landing.

2: At aerodromes where RAAS is provided via an RCO and where AWOS (or LWIS) weather information is also broadcast via a voice generator module (VGM), it is recommended that pilots listen to the broadcast prior to contacting the A/G facility, and upon contact, advise that they have the wind and altimeter information.

Because a VGM weather broadcast contains up-to-the-minute weather, it will be more current and may differ slightly from the most recently disseminated aviation routine weather report (METAR) or aviation selected special weather report (SPECI). The latest METAR or SPECI for the remote aerodrome will be provided, upon request, from the ATS unit controlling the RCO.

9.12 Reporting Procedures for IFR Aircraft when Approaching or Landing at an Uncontrolled Aerodrome (CAR 602.104) (see RAC 4.5.4 and 4.5.5)

The pilot-in-command of an IFR aircraft who intends to conduct an approach to or a landing at an uncontrolled aerodrome, whether or not the aerodrome lies within an MF area, shall report:

(a) the pilot-in-command's intentions regarding the operation of the aircraft
  (i) five minutes before the estimated time of commencing the approach procedure, stating the estimated landing time,
  (ii) when commencing a circling manoeuvre, and
  (iii) as soon as practicable after initiating a missed approach procedure; and

(b) the aircraft's position
  (i) when passing the fix outbound, when the pilot-in-command intends to conduct a procedure turn, or, if no procedure turn is intended, when the aircraft first intercepts the final approach course,
  (ii) when passing the final approach fix or three minutes before the estimated landing time where no final approach fix (FAF) exists, and
  (iii) on final approach.

In addition to these requirements, pilots operating aircraft under IFR into an uncontrolled aerodrome, when the weather conditions at the aerodrome could permit VFR circuit operations, are expected to approach and land on the active runway that may be established by the aircraft operating in the VFR circuit. Pilots operating aircraft under IFR at an uncontrolled aerodrome do not establish any priority over aircraft operating under VFR at that aerodrome. Should it be necessary for the IFR aircraft to approach to and/or land on a runway contrary to the established VFR operation, it is expected that appropriate communications between pilots, or pilots and the air-to-ground facility, will be effected in order to ensure there is no conflict of traffic.

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9.13 IFR Procedures at an Uncontrolled Aerodrome in Uncontrolled Airspace

Pilots operating under IFR in uncontrolled airspace should, whenever practical, monitor 126.7 MHz and broadcast their intentions on this frequency immediately prior to changing altitude or commencing an approach. Therefore, when arriving at an aerodrome where another frequency is designated as the MF, descent and approach intentions should be broadcast on 126.7 MHz before changing to the MF. If conflicting IFR traffic becomes evident, this change should be delayed until the conflict is resolved. Once established on the MF, the pilot shall make the reports listed in RAC 9.12 (see RAC 4.5.4 for MF procedures, and RAC 4.5.5 for the use of 123.2 MHz where a UNICOM does not exists).

A straight-in landing from an IFR approach should not be used at an uncontrolled aerodrome where air-ground advisory is not available to provide the wind direction and speed and runway condition reports required to conduct a safe landing. The pilot should determine the wind and verify that the runway is unobstructed before landing. Where pilots lack any necessary information, they are expected to ensure that a visual inspection of the runway is completed prior to landing. In some cases, this can only be accomplished by conducting a circling approach using the appropriate circling MDA.

Pilots operating aircraft under IFR into an uncontrolled aerodrome in uncontrolled airspace when the weather conditions at the aerodrome could permit VFR circuit operations are expected to approach and land on the active runway that may be established by the aircraft operating in the VFR circuit. Pilots operating aircraft under IFR at an uncontrolled aerodrome in uncontrolled airspace do not establish any priority over aircraft operating under VFR at that aerodrome. Should it be necessary for the IFR aircraft to approach to, land, or take off on a runway contrary to the established VFR operation, it is expected that appropriate communications between the pilots, or pilots and the air-to-ground facility, will be effected in order to ensure that there is no conflict of traffic.

9.14 Outbound Report

To apply the prescribed separation minima between aircraft intending to make a complete instrument approach procedure and other aircraft, ATC must often establish the position and direction of arriving aircraft with respect to the approach facility. When reporting "outbound", pilots should make these reports only after they are over or abeam the approach facility and proceeding in a direction away from the airport.

9.15 Straight-In Approach

ATC uses the term "straight-in approach" to indicate an instrument approach conducted so as to position the aircraft on final approach without performing a procedure turn.

9.16 Straight-In Approaches from an Intermediate Fix

Published transitions normally are designated from an en route navigation aid to the primary approach aid upon which the procedure turn is based. However, to accommodate aircraft with modern avionics equipment and to improve fuel economy, transitions at some locations direct the pilot to an intermediate fix (IF) on the final approach course. Subject to ATC requirements and local traffic conditions, a straight-in approach may be made from this fix.

Intermediate fixes are usually located on the final approach track at the procedure turn distance specified in the profile view. This distance, which is normally 10 NM, is the distance within which the procedure turn should be executed. Accordingly, after passing the fix and manoeuvring the aircraft onto the proper inbound track, descent may be made to the appropriate published altitude that would apply as if a procedure turn had been completed.

The abbreviation "NO PT" is used to denote that no procedure turn is necessary from the point indicated and will normally be shown adjacent to the IF. However, if the minimum altitude IF to the final approach fix (FAF) is not readily apparent, the "NO PT" abbreviation may be shown at some point between the fix and FAF, along with an altitude applicable for this segment.

Where more than one transition intersects the final approach track at different points, only the furthest intersection is designated as the IF. Pilots may begin a straight-in approach from any depicted transition that intersects the final approach track inside the designated IF provided that ATC is aware of their intentions and subsequent manoeuvring is within the capabilities of the aircraft.

If the aircraft is badly positioned, laterally or vertically, after being cleared by ATC for the straight-in approach, pilots should climb to the procedure turn altitude, or the minimum altitude at the facility if one is depicted, and proceed to the FAF requesting clearance for a procedure turn.

NOTE: If the FAF is behind the aircraft, the pilot must conduct a missed approach and request further clearance from ATC.

The depiction of radials on a DME arc transition to an IF are normally limited to the radial forming the IAF at the beginning of the arc, the lead radial (if required) to indicate where the turn to the final approach track should be commenced, and radials forming step-down fixes if descent to lower altitudes can be approved. However, the arc may be joined from any radial that intercepts the depicted arc.

9.17 Procedure Altitudes and Current Altimeter Setting

All altitudes published in the CAP are minimum altitudes that meet obstacle clearance requirements when International Standard Atmosphere (ISA) conditions exist and the aircraft altimeter is set to the current altimeter setting for that aerodrome. The altimeter setting may be a local or a remote setting when so authorized on the instrument approach chart. A current altimeter setting is one provided by approved direct reading or remote equipment or by the most recent routine hourly weather report. These readings are considered current up to 90 min from the time of observation. Care should be exercised when using altimeter settings older than 60 min or when pressure has been reported as falling rapidly. In these instances, a value may be added to the published DH/MDA in order to compensate for falling pressure tendency (0.01 inches of mercury = 10-ft correction). Under conditions of extreme cold, corrections to the published altitudes should be applied to ensure adequate obstacle clearance. When an authorized remote altimeter setting is used, the altitude correction shall be applied as indicated.

9.17.1 Corrections for Temperature

The calculated minimum safe altitudes must be adjusted when the ambient temperature on the surface is much lower than that predicted by the standard atmosphere. A correction should be obtained from the "Altitude Correction Chart" in the General Pages of the CAP (which is reproduced in RAC Figure 9.1). This chart is calculated for an aerodrome at sea level. It is, therefore, conservative when applied to aerodromes at higher altitudes. To calculate the reduced corrections for specific aerodrome or altimeter setting sources above sea level, or for values not tabulated, see the following paragraphs.

COLD TEMPERATURE CORRECTIONS

Pressure altimeters are calibrated to indicate true altitude under ISA conditions. Any deviation from ISA will result in an erroneous reading on the altimeter. In a case when the temperature is higher than the ISA, the true altitude will be higher than the figure indicated by the altimeter, and the true altitude will be lower when the temperature is lower than the ISA. The altimeter error may be significant, and becomes extremely important when considering obstacle clearances in very cold temperatures.

In conditions of extreme cold weather, pilots should add the values derived from the Altitude Correction Chart to the published procedure altitudes, including minimum sector altitudes and DME arcs, to ensure adequate obstacle clearance. Unless otherwise specified, the destination aerodrome elevation is used as the elevation of the altimeter source.

With respect to altitude corrections, the following procedures apply:

1. IFR assigned altitudes may be either accepted or refused. Refusal in this case is based upon the pilot's assessment of temperature effect on obstacle clearance.
2. IFR assigned altitudes accepted by a pilot should not be adjusted to compensate for cold temperatures, i.e., if a pilot accepts "maintain 3 000", an altitude correction should not be applied to 3 000 ft.
3. Radar vectoring altitudes assigned by ATC are temperature compensated and require no corrective action by pilots.
4. When altitude corrections are applied to a published final approach fix (FAF) crossing altitude, procedure turn or missed approach altitude, pilots should advise ATC how much of a correction is to be applied.

The "Altitude Correction Chart" was calculated assuming a linear variation of temperature with height. It is based on the following equation, which may be used with the appropriate value of t_o, H, L_o and H_{ss} to calculate temperature corrections for specific conditions. This equation produces results that are within five percent of the accurate correction for altimeter setting sources up to 10 000 ft and with minimum heights up to 5 000 ft above that source.

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Figure 9.1—Altitude Correction Chart

Aerodrome Temperature °C	Height above the elevation of the altimeter setting sources (feet)													
	200	300	400	500	600	700	800	900	1 000	1 500	2 000	3 000	4 000	5 000
0	20	20	30	30	40	40	50	50	60	90	120	170	230	290
-10	20	30	40	50	60	70	80	90	100	150	200	290	390	490
-20	30	50	60	70	90	100	120	130	140	210	280	430	570	710
-30	40	60	80	100	120	130	150	170	190	280	380	570	760	950
-40	50	80	100	120	150	170	190	220	240	360	480	720	970	1 210
-50	60	90	120	150	180	210	240	270	300	450	600	890	1 190	1 500

NOTES

1: The corrections have been rounded up to the next 10-ft increment.

2: Values should be added to published minimum IFR altitudes.

3: Temperature values from the reporting station nearest to the position of the aircraft should be used. This is normally the aerodrome.

Example: Aerodrome Elevation 2 262 ft Aerodrome Temperature -50˚C

	ALTITUDE	HAA	CORRECTION	INDICATED ALTITUDE
Procedure Turn	4 000 ft	1 738 ft	+521.4 ft[1]	4 600 ft[2]
FAF	3 300 ft	1 038 ft	+311.4 ft	3 700 ft
MDA Straight-in	2 840 ft	578 ft	+173.4 ft	3 020 ft
Circling MDA	2 840 ft	578 ft	+173.4 ft	3 020 ft

[1] CORRECTION derived as follows:
(2 000 ft at -50˚ error) 600 – (1 500 ft at -50˚error) 450 = 150
Altitude difference of above (2 000 – 1 500) = 500
Error per foot difference (150/500)= .3
HAA = 1 738
Error at 1 738 = (1 738 – 1 500) * 0.3 = 71.4 + 450 (error -50˚ at 1 500) = 521.4 ≥

[2] INDICATED ALTITUDE derived as follows:
Calculated error at 1 738 from above = 521.4
Procedure-turn altitude (4 000) + error (521.4) = 4 521.4
INDICATED ALTITUDE rounded next higher 100-ft increment = 4 600 ≥

$$Correction = H * ((15-t_o)/(273 + t_o - 0.5 * L_o * (H + H_{ss})))$$

where:

H = *minimum height above the altimeter setting source (the setting source is normally the aerodrome, unless otherwise specified)*

t_o = $t_{aerodrome} + L_o * h_{aerodrome}$ *aerodrome (or specified temperature reporting point) temperature adjusted to sea level*

L_o = *0.0065˚C per metre or 0.00198˚C per foot*

H_{ss} = *altimeter setting source elevation*

$t_{aerodrome}$ = *aerodrome (or specified temperature reporting point) temperature*

$h_{aerodrome}$ = *aerodrome (or specified temperature reporting point) elevation*

For occasions when a more accurate temperature correction is required, this may be obtained from the following formula, which assumes an off-standard atmosphere.

$$\Delta h_{CORRECTION} = \Delta h_{Paircraft} - \Delta h_{Gaircraft} = (-\Delta T_{std}/L_o) ln[1+L_o.\Delta h_{Paircraft} / (T_o + L_o.h_{Paerodrome})]$$

where:

$\Delta h_{Paircraft}$ = *aircraft height above aerodrome (pressure)*

$\Delta h_{Gaircraft}$ = *aircraft height above aerodrome (geopotential)*

ΔT_{std} = *temperature deviation from the ISA temperature*

L_o = *standard temperature lapse rate with pressure altitude in the first layer (sea level to tropopause) of the ISA.*

T_o = *standard temperature at sea level*

The above equation cannot be solved directly in terms of $\Delta h_{Gaircraft}$, and an iterative solution is required. This can be done with a simple computer or spreadsheet program.

NOTE: Geopotential height includes a correction to account for the variation of g (average 9.8067 m sec^2) with height. However, the effect is negligible at the minimum altitudes considered for obstacle clearance: the difference between geometric height and geopotential height increases from zero at mean sea level to –59 ft at 36 000 ft

Both the preceding equations assume a constant off-standard temperature lapse rate. The actual lapse rate may vary considerably from the assumed standard, depending on latitude and time of year. However, the corrections derived from the linear approximation can be taken as a satisfactory estimate for general application at levels up to 10 000 ft. The correction from the accurate calculation is valid up to 36 000 ft.

NOTES

1: Where accurate corrections are required for non-standard (as opposed to off-standard) atmospheres, appropriate methods are given in Engineering Sciences Data Unit (ESDU) Item 78012 "Height relationships for non-standard atmospheres." This allows for non-standard temperature lapse rates and lapse rates defined in terms of either geopotential height or pressure height.

2: Temperature values are those at the altimeter setting source (normally the aerodrome). When en route, the setting source nearest to the position of the aircraft should be used.

For practical operational use, it is appropriate to apply a temperature correction when the value exceeds 20 percent of the associated minimum obstacle clearance.

9.17.2 Remote Altimeter Setting

Normally, approaches shall be flown using the current altimeter setting only for the destination aerodrome. However, at certain aerodromes where a local pressure setting is not available, approaches may be flown using a current altimeter setting for a nearby aerodrome. Such an altimeter setting is considered a remote altimeter setting, and authorization for its use is published in the top left-hand corner of the approach chart plan view.

If the use of a remote altimeter setting is required for limited hours only, an altitude correction will be included with the authorization. When the remote altimeter setting is used, the altitude correction shall be applied as indicated. If the use of a remote altimeter setting is required at all times, then the correction is incorporated into the procedure at the time it is developed.

Examples:

1. When using the Mont-Joli altimeter setting, add *200 ft* to all procedure altitudes.
2. Use the London altimeter setting.

If the altitude correction results in the calculated rate of descent to exceed design parameters, the words "circling minima apply" will be added to the note in the top left-hand corner of the approach chart. The intent of this note is to draw attention to the pilot so that he/she cannot use straight-in minima when using the remote altimeter source. However, this does not prohibit the pilot from landing straight in if he/she has adequate visual reference at circling minima and is suitably located to land straight in.

Example:

When using St-Hubert altimeter, add 120 ft to all procedure altitudes; circling minima applies.

9.18 Departure, Approach and Alternate Minima

The civil minima published in the CAP shall, unless otherwise authorized, be observed by all pilots in accordance with their instrument rating as outlined in RAC Figure 9.2. Authorization to operate to special limits may be obtained by air operators in accordance with Part VII of the CARs or by private operators in accordance with subpart 604 of the CARs

9.18.1 Category II ILS Approach Minima

Category II operations are precision approaches in weather minima as low as 100 ft. DH and RVR 1 200 ft. These minima are restricted to aircraft and pilots specifically approved for such operations by TC and to runways specially equipped for the category of operation. Details on Category II requirements are contained in CAR 602.128, *Landing Minima, and the Manual of All Weather Operations (Categories II and III)* (TP 1490E).

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Figure 9.2 – Instrument Rating Minima

	AIRCRAFT	ROTORCRAFT
TAKEOFF VISIBILITY	CAP	1/2 CAP but not less than 1/4 SM.
LANDING DH or MDA	CAP	CAP
ALTERNATE WEATHER MINIMA REQUIREMENTS – CAP GEN		
FACILITIES AVAILABLE AT SUITABLE ALTERNATE	WEATHER REQUIREMENTS	
TWO OR MORE USABLE PRECISION APPROACHES Each providing straight-in minima to separate suitable runways.	400 - 1 or 200 - 1/2 above the lowest usable HAT and visibility, whichever is greater.	N/A
ONE USABLE PRECISION APPROACH	600 - 2* or 300-1 above the lowest usable HAT and visibility, whichever is greater.	N/A
NON-PRECISION ONLY AVAILABLE	800 - 2* or 300-1 above the lowest usable HAT/HAA and visibility, whichever is greater.	N/A
NO IFR APPROACH AVAILABLE	Forecast weather must be no lower than 500 ft above a minimum IFR altitude that will permit a VFR approach and landing.	N/A
FOR ROTORCRAFT Where instrument approach procedures are available.	N/A	Ceiling 200 ft above the minima for the approach to be flown, and visibility at least 1 SM but never less than the minimum visibility for the approach to be flown.

9.19 Application of Minima

9.19.1 Take-Off Minima

CAR 602.126, "Take-off Minima," specifies that takeoff for all aircraft is governed by visibility only.

IFR takeoffs for all aircraft are prohibited when the visibility is below the minimum specified in:

(a) the air operator certificate where the aircraft is operated in accordance with Part VII of the CARs;

(b) the private operator certificate where the aircraft is operated in accordance with Subpart 604 of the CARs;

(c) the operations manual of a foreign operator, when accepted by the Minister; or

(d) for other than the above, the visibility specified in the CAP.

Take-off visibility, in order of precedence, is defined as:

(a) the reported RVR of the runway to be used (unless it is fluctuating above and below minimum or is less than minimum because of a localized phenomenon);

(b) the ground visibility of the aerodrome (if the RVR is unavailable, fluctuating above and below minimum or less than minimum because of a localized phenomenon); or

(c) when neither (a) nor (b) is available, the visibility for the runway as observed by the pilot-in-command.

The ground visibility of an aerodrome is defined as the visibility reported by:

(a) an ATC unit;

(b) an FSS;

(c) a Community Aerodrome Radio Station (CARS);

(d) a ground-based radio station that is operated by an air operator; or

(e) an AWOS used for the purpose of making aviation weather observations.

With respect to takeoff visibility, RVR is not governing if below minimum but subject to "fluctuations" or "local phenomenon" effects. If this is the case at the time of takeoff, pilots will be advised of the governing ground visibility by the appropriate ATS unit. In the case of RVR fluctuations, if the reported minimum fluctuation value is below the required minimum

RVR, but the ground visibility is reported at or above minimum, a takeoff may be carried out. Likewise in the case of a local phenomenon reducing RVR below minimum, whether steady or fluctuating, a takeoff may be accomplished if the ground visibility is reported to be at or above the required minimum.

Example:

A takeoff is to be conducted from Runway 27; the pilot is authorized a takeoff minimum of RVR 2600 (1/2 SM).

1. ATC/FSS reports "… RVR Runway 27 is 2000, variable 1600-2800, tower visibility 1/2 mile".

   A takeoff is authorized although fluctuations are below minimum because the reported ground visibility of 1/2 mile is governing.

2. ATC/FSS reports "… RVR Runway 27 is 2200, visibility observed on-the-hour 1/4 mile, tower visibility now 1/2 mile".

   A takeoff is authorized because the RVR is reduced by a local phenomenon and therefore the reported ground visibility of 1/2 mile is governing. A local phenomenon is deemed to exist if the RVR readout is less than the tower visibility.

3. ATC/FSS reports "… RVR 2600, tower visibility 1/4 mile".

   A takeoff is authorized since the lowest RVR reported is at or above minimum and therefore governing.

4. ATC/FSS reports "… RVR Runway 27 is 2000, variable 1600-2800, tower visibility 1/4 mile".

   A takeoff is not authorized since the lowest RVR is below minimum and the reported ground visibility of 1/4 mile is governing.

5. ATC/FSS reports "… RVR Runway 27 is 2000 …".

   A takeoff is not authorized.

6. ATC/FSS/CARS reports only "… visibility observed on-the-hour 1/4 mile".

   A takeoff is not authorized.

7. RVR and/or visibility not reported;

   The pilot-in-command determines available visibility.

In summary, a takeoff is authorized whenever:

(a) the lowest reported RVR for the runway is at or above the minimum, regardless of reported ground visibility;

(b) a reported ground visibility for the aerodrome is at or above the minimum, regardless of the reported RVR for the runway; or

(c) in the absence of a reported RVR or reported ground visibility, pilot-in-command observed visibility is at or above minimum.

9.19.2 Approach Ban

9.19.2.1 General Aviation—Non-Precision Approach (NPA), Approach Procedure with Vertical Guidance (APV), CAT I or CAT II Precision Approach

(Commercial Operators, see RAC 9.19.2.3 Approach Ban—Commercial Operators)

CAR 602.129 specifies that instrument approaches by general aviation aircraft are governed by RVR values only. With certain exceptions, pilots of aircraft are prohibited from completing an instrument approach past the FAF (or where there is no FAF, the point where the final approach course is intercepted) to a runway served by an RVR, if the RVR values as measured for that runway are below the following minima:

MINIMUM RVR		
MEASURED RVR*	AEROPLANES	HELICOPTERS
RVR "A" only	1 200	1 200
RVR "A" and "B"	1 200/600	1 200/0
RVR "B" only	1 200	1 200

* RVR "A" located adjacent to the runway threshold.
RVR "B" located adjacent to the runway mid-point.

The following exceptions to the above prohibitions apply to all aircraft when:

(a) the below-minima RVR report is received, the aircraft is inbound on approach and has passed the FAF, or where there is no FAF, the point where the final approach course is intercepted;

(b) the pilot-in-command has informed the appropriate ATC unit that the aircraft is on a training flight and that the pilot-in-command intends to initiate a missed approach procedure at or above the DH or the MDA, as appropriate;

(c) the RVR is varying between distances less than and greater than the minimum RVR;

(d) the RVR is less than the minimum RVR, and the ground visibility at the aerodrome where the runway is located is reported to be at least one-quarter statute mile; or

(e) the pilot-in-command is conducting a precision approach to CAT III minima.

With respect to approach restrictions, in the case of a localized phenomenon or any fluctuations that affect RVR validity, where the ground visibility is reported by ATC or FSS to be at or above one-quarter statute mile, an approach may be completed.

Example:

An ILS approach is to be conducted to Runway 27; RVR sensors are located at positions A and B; the pilot is flying an aeroplane.

1. ATC/FSS reports "…RVR "A" 800, RVR "B" 800, observed visibility one-quarter statute mile."

   An approach to DH/MDA is authorized because the reported ground visibility of one-quarter statute mile is governing.

2. ATC/FSS reports "…RVR "A" not available, RVR "B" 1 000."

   An approach to DH/MDA is not authorized since RVR "B" is governing and is below 1 200 ft.

If, after commencing an approach (but before reaching the FAF, or where there is no FAF, the point where the final approach course is intercepted), a pilot must discontinue an approach because the RVR has gone below minima, the pilot shall continue as cleared, advise ATC of their intentions and request further clearance. If further clearance is not received by the time the aircraft reaches the FAF, or where there is no FAF, the point where the final approach course is intercepted, the pilot shall execute a missed approach and proceed via the missed approach procedure to the specified missed approach clearance limit.

In summary, an approach is authorized whenever:

(a) the lowest reported RVR for the runway is at or above minima (CAR 602.129), regardless of reported ground visibility;

(b) the RVR is reported to be varying between distances less than and greater than the minimum RVR;

(c) the RVR is below the minimum, and the ground visibility is reported to be at least one-quarter statute mile;

(d) the RVR for the runway is unavailable or not reported; or

(e) ATS is informed that an aircraft is on a training flight and will conduct a planned missed approach.

No pilot shall commence an NPA, an APV, or a CAT I or CAT II precision approach to an airport where low-visibility procedures are in effect. Low-visibility procedures are associated with CAT III operations. They are specified for an airport (for example, CYVR or CYYZ) in the CAP and restrict aircraft and vehicle operations on the movement area of the airport when the RVR is less than 1 200 ft.

9.19.2.2 Approach Ban—General Aviation—CAT III Precision Approach

(Commercial Operators, see RAC 9.19.2.3 Approach Ban—Commercial Operators)

CAR 602.130 specifies the general aviation CAT III precision approach ban. No pilot shall continue a CAT III precision approach in an IFR aircraft beyond the FAF inbound, or where there is no FAF, the point where the final approach course is intercepted, unless the RVR reported is equal to or greater than the minimum RVR specified in the CAP in respect of the runway or surface of intended approach for the IAP conducted.

MINIMUM RVR—AIRCRAFT—CAT III			
MEASURED RVR*	CAT IIIA	CAT IIIB	CAT IIIC
RVR "A", "B" and "C"	600/600/600	Not Authorized	Not Authorized

*RVR "A" located adjacent to the runway threshold.
RVR "B" located adjacent to the runway mid-point.
RVR "C" located adjacent to the runway end. ≥

9.19.2.3 Approach Ban—Commercial Operators—General—Non-Precision Approach (NPA), Approach Procedure with Vertical Guidance (APV), or CAT I Precision Approach

CAR 700.10 specifies the NPA, APV and precision approach ban that generally applies to commercial operators. With certain exceptions, pilots of commercial aircraft are prohibited from completing an NPA, an APV, or a CAT I precision approach past the FAF inbound, or where there is no FAF, the point where the final approach course is intercepted, if the visibility report is below the value corresponding to the CAP advisory visibility for the approach conducted.

MINIMUM VISIBILITY—AEROPLANES—NPA, APV, OR CAT I	
CAP ADVISORY VISIBILITY (SM, RVR x 100 ft)	VISIBILITY REPORT (Grnd Vis SM, RVR "A" or Rwy Vis ft)
1/2 RVR 26	3/8, RVR or Rwy Vis 1 600
3/4 RVR 40	5/8, RVR or Rwy Vis 3 000
1 RVR 50	3/4, RVR or Rwy Vis 4 000
1 1/4	1, RVR or Rwy Vis 5 000
1 1/2	1 1/4, RVR or Rwy Vis 6 000
1 3/4	1 1/2, RVR or Rwy Vis > 6 000
2	1 1/2, RVR or Rwy Vis > 6 000
2 1/4	1 3/4, RVR or Rwy Vis > 6 000
2 1/2	2, RVR or Rwy Vis > 6 000
2 3/4	2 1/4, RVR or Rwy Vis > 6 000
3	2 1/4, RVR or Rwy Vis > 6 000

MINIMUM VISIBILITY	
MEASURED RVR	HELICOPTERS
RVR "A" only	1 200
RVR "A" and "B"	1 200/0
RVR "B" only	1 200

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An RVR report takes precedence over a runway visibility report or a ground visibility report, and a runway visibility report takes precedence over a ground visibility report. Ground visibility will only impose an approach ban at aerodromes south of 60ºN latitude. If no RVR, runway visibility, or ground visibility is reported, there are no criteria to impose an approach ban. (This concept is similar to the present CAR 602 approach ban, where if there is no RVR reported, there is no criterion to impose an approach ban.)

The following exceptions to the above prohibitions apply to all aircraft when:

(a) the visibility report is below the required value, and the aircraft has passed the FAF inbound, or where there is no FAF, the point where the final approach course is intercepted;

(b) the pilot-in-command has informed the appropriate ATC unit that the aircraft is on a training flight and that the pilot-in-command intends to initiate a missed approach procedure at or above the decision altitude (height) [DA(H)] or the MDA, as appropriate;

(c) the RVR is varying between distances less than and greater than the minimum RVR;

(d) the ground visibility is varying between distances less than and greater than the minimum visibility;

(e) a localized meteorological phenomenon is affecting the ground visibility to the extent that the visibility on the approach to the runway of intended approach and along that runway, as observed by the pilot in flight and reported immediately to ATS, if available, is equal to or greater than the visibility specified in the CAP for the IAP conducted; or

(f) the approach is conducted in accordance with an Operations Specification issued in accordance with CAR 703, 704 or 705.

No pilot shall commence an NPA, an APV, or a CAT I precision approach to an airport where low-visibility procedures are in effect. Low-visibility procedures are associated with CAT III operations. They are specified for an airport (for example, CYVR or CYYZ) in the CAP and restrict aircraft and vehicle operations on the movement area of the airport when the RVR is less than 1 200 ft.

9.19.2.4 Approach Ban—Commercial Operators—CAT II and CAT III Precision Approach

CAR 700.11 specifies the CAT II and CAT III precision approach ban that applies to commercial operators. No pilot shall continue a CAT II or CAT III precision approach in an IFR aircraft beyond the FAF inbound, or where there is no FAF, the point where the final approach course is intercepted, unless the RVR reported is equal to or greater than the minimum RVR specified in the CAP in respect of the runway or surface of intended approach for the IAP conducted.

MINIMUM RVR—CAT II		
MEASURED RVR*	AEROPLANES	HELICOPTERS
RVR "A" and "B"	1 200/600	1 200/0

MINIMUM RVR—AIRCRAFT—CAT III			
MEASURED RVR *	CAT IIIA	CAT IIIB	CAT IIIC
RVR "A", "B" and "C"	600/600/600	Not Authorized	Not Authorized

* RVR "A" located adjacent to the runway threshold.
RVR "B" located adjacent to the runway mid-point.
RVR "C" located adjacent to the runway end. >

9.19.2.5 Approach Ban—Commercial Operators—Operations Specification—Non-Precision Approach (NPA), Approach Procedure with Vertical Guidance (APV), or CAT I Precision Approach

CARs 703.41, 704.37, and 705.48 specify the NPA, APV and precision approach ban that applies to commercial operators through an Operations Specification. CAR 703, 704 and 705 operators authorized through Operations Specification 019, 303 or 503 and who meet all the conditions related to the approach procedure, are permitted to conduct an approach at a visibility value less than those specified in the CAR 700 approach ban. With certain exceptions, pilots of commercial aircraft are prohibited from completing an NPA, an APV, or a CAT I precision approach past the FAF inbound, or where there is no FAF, the point where the final approach course is intercepted, if the visibility report is below the value corresponding to the CAP advisory visibility for the approach conducted.

MINIMUM VISIBILITY—AEROPLANES—703/704/705 OPERATIONS SPECIFICATION—NPA, APV, OR CAT I	
CAP ADVISORY VISIBILITY (SM, RVR x 100 ft)	VISIBILITY REPORT (Grnd Vis SM, RVR "A" or Rwy Vis ft)
1/2 RVR 26	1/4, RVR or Rwy Vis 1 200
3/4 RVR 40	3/8, RVR or Rwy Vis 2 000
1 RVR 50	1/2, RVR or Rwy Vis 2 600
1 1/4	5/8, RVR or Rwy Vis 3 400
1 1/2	3/4, RVR or Rwy Vis 4 000
1 3/4	1, RVR or Rwy Vis 5 000
2	1, RVR or Rwy Vis 5 000
2 1/4	1 1/4, RVR or Rwy Vis 6 000
2 1/2	1 1/4, RVR or Rwy Vis > 6 000
2 3/4	1 1/2, RVR or Rwy Vis > 6 000
3	1 1/2, RVR or Rwy Vis > 6 000

An RVR report takes precedence over a runway visibility report or a ground visibility report, and a runway visibility report takes precedence over a ground visibility report. Ground visibility will only impose an approach ban at aerodromes south of 60ºN latitude. If no RVR, runway visibility, or ground visibility is reportedthere are no criteria to impose an approach ban. (This concept is similar to the

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present CAR 602 approach ban, where if there is no RVR reported, there is no criterion to impose an approach ban.)

The following exceptions to the above prohibitions apply to aeroplanes when:

(a) the visibility report is below the required value and the aircraft has passed the FAF inbound, or where there is no FAF, the point where the final approach course is intercepted; or

(b) the RVR is varying between distances less than and greater than the minimum RVR.

9.19.2.6 Runway Visibility

CAR 602.131 specifies the concept of runway visibility as defined in CAR 101.01(1). The purpose of runway visibility is to determine and report a visibility at the TDZ of a runway that is not equipped with or is not reporting an RVR. An instrument-rated pilot or a qualified person (under CAR 804) can assess runway visibility when RVR sensor detection equipment is not available. In effect, a person is permitted to assess runway visibility from approximately the same position as an RVR "A" sensor installation. CAR Standard 622.131 (for pilots) and CAR Standard 824.25 (for qualified persons) describe how to assess and report runway visibility.

Runway visibility is assessed at or adjacent to the runway threshold, in the direction of the runway, based on runway lights or landmarks that can be seen and recognized. The assessment is made in feet based on a 200-ft runway edge light spacing, or using landmarks found on the applicable CAP aerodrome chart. A report of runway visibility should be reported immediately to ATS in the following format:

> "RUNWAY VISIBILITY, RUNWAY [*runway number*] ASSESSED AS [*distance assessed*] FEET AT [*time]* UTC," to the nearest 100-ft increment.

A runway visibility report is valid for a period of 20 min after it is assessed. If the runway visibility varies during the assessment, the lowest value is reported. The lowest value that is reported is 200 ft, with lower values reported as "… LESS THAN 200 FEET…" The highest value that is reported is 6 000 ft, with higher values reported as "…GREATER THAN 6 000 FEET…"

9.19.2.7 Localized Phenomenon

CAR 700.10 recognizes that certain localized meteorological conditions can reduce the reported ground visibility, thus imposing an approach ban when the flight visibility appears to be much greater. An example would be a localized fog bank that is covering the ground observer's observation point, resulting in a reported ground visibility of one-quarter statute mile at an aerodrome south of 60ºN latitude, while the flight visibility along the approach to the runway and on the runway itself (as observed by the pilot-in-command), is greater than 15 SM. In this case, the pilot can declare a localized phenomenon, and override an approach ban imposed by a ground visibility report. A pilot cannot use localized phenomena to override an RVR or a runway visibility report that imposes an approach ban. To legally continue the approach past the FAF inbound, the flight visibility on the approach path and along the runway must be equal to or greater than the advisory visibility published in the CAP, for the procedure flown, and the pilot-in-command must immediately report the conditions observed to ATS.

CAUTION: Pilots are reminded of the insidious hazard that thin ground-based layers, such as shallow fog, ice fog, or blowing snow can present. Such conditions may allow a pilot-in-command to override an approach ban based on what appears to be a localized phenomenon, when in fact extensive and very poor visibility will be encountered at low altitude during the later stages of the approach, landing and roll-out. The pilot-in-command should take all possible information into account before overriding an approach ban, based on what appears to be a localized phenomenon, in order to avoid conducting an approach during these hazardous conditions.

9.19.3 Landing Minima

CAR 602.128 specifies that landings are governed by published DH/MDAs. Pilots of aircraft on instrument approaches are prohibited from continuing the final approach descent below DH or descending below MDA, as applicable, unless the required visual reference has been established and maintained in order to complete a safe landing. When the required visual reference is not established or maintained, a missed approach must be initiated. Pilots must be cautioned that the missed approach segment that provides for obstacle clearance originates at the published missed approach point (MAP). The published MAP on a precision approach is coincidental with the DH. Missed approaches initiated beyond the MAP will not be assured obstacle clearance.

The visual references required by the pilot to continue the approach to a safe landing should include at least one of the following references for the intended runway, and should be distinctly visible and identifiable to the pilot by:

(a) the runway or runway markings;
(b) the runway threshold or threshold markings;
(c) the touchdown zone or touchdown zone markings;
(d) the approach lights;

(e) the approach slope indicator system;
(f) the runway identification lights;
(g) the threshold and runway end lights;
(h) the touchdown zone light;
(i) the parallel runway edge lights; or
(j) the runway centreline lights.

Aerodromes that have instrument approaches may not have all of the above items, therefore pilots should consult the appropriate charts and current NOTAM to ascertain the available aids.

Published landing visibilities associated with all instrument approach procedures are advisory only. Their values are indicative of visibilities which, if prevailing at the time of approach, should result in required visual reference being established. (See GEN 5.1 for the definition.) They are not limiting and are intended to be used by pilots only to judge the probability of a successful landing when compared against available visibility reports at the aerodrome to which an instrument approach is being carried out.

9.20 Runway Visual Range

9.20.1 Definitions

Prevailing Visibility: The maximum visibility value common to sectors comprising one-half or more of the horizontal circle.

NOTE: Prevailing visibility is determined by human observations.

Runway Visual Range (RVR): in respect of a runway, means the maximum horizontal distance, as measured by an automated visual landing distance system and reported by an ATC unit or an FSS for the direction of takeoff or landing, at which the runway, or the lights or markers delineating it, can be seen from a point above its centreline at a height corresponding to the average eye level of pilots at touchdown.

To compute RVR, three factors must be known. The first is the transmissivity of the atmosphere as provided by a visibility sensor. The second is the brightness of the runway lights which is controlled on request by the ATC controller. The third factor is whether it is day or night, since the eye can detect lights easier at night than during the day. There is a period during twilight where there is a problem similar to that with prevailing visibility when neither day, nor night conditions prevail.

RVR is measured by a visibility sensor such as a RVR sensor located near the runway threshold. For CAT II landing systems, a second sensor is provided about the mid-point of the runway. The RVR sensor near the threshold is identified as "A" and the second one as "B". Their locations are important for the assessment of visibility, and so their positions are indicated on the aerodrome diagrams in CAP.

A light emitted from a source is attenuated in the atmosphere due to snow, fog, rain, and so forth. The amount of this attenuation, or the transmissivity of the atmosphere, can be obtained by measuring the amount of light reaching a detector after being transmitted by a projector. The visibility sensor samples the atmosphere at a height that best represents the slant transmittance from the pilot's eye at cockpit level to the runway.

9.20.2 Operational Use of RVR

RVR information is available at the ATC IFR arrival control position, the PAR position, the control tower, the FSS and some EC weather stations.

When applicable, RVR information is given to the pilot as a matter of routine and can be used in the determination or application of visibility minima only if the active runway is served by the visibility sensor. RVR information, found in the Remarks section of surface weather reports, is not to be used for operational purposes and is superseded by any RVR information from ATS personnel.

NOTE: RVR reports are intended to provide an indication of how far the pilot can expect to see along the runway in the touchdown zone; however, the actual visibility at other points along the runway may differ due to differing weather conditions. This should be taken into account when decisions must be made based on reported RVR.

A pertinent phenomenon that occurs fairly often during periods of low visibility is large fluctuations that occur over extremely short time intervals. As per ICAO recommendations, the RVR computer automatically averages the readings over the last minute.

The controller will provide the RVR if it is less than 6 000 ft, or upon request. The RVR will be provided in 100-ft increments from 300 ft to 1 199 ft, in 200-ft increments from 1 200 ft to 2 999 ft, and in 500-ft increments from 3 000 ft to 6 000 ft. The RVR remains constant for runway light settings of 1, 2 and 3, but it can increase for settings of 4 and 5. If the latter settings are used, the pilot will be provided with both the RVR and the light setting.

NOTE: At aerodromes equipped with ARCAL, the light settings may not be known to ATS personnel.

In daytime, even a high intensity setting can fade into background brightness. For example, the pilot may be provided with an RVR of 4 000 ft while making an approach when shallow fog is occurring over a snow surface in bright sunlight. Because of the glare, runway lights will be difficult to see; therefore, visibility will be much less than the reported RVR. In situations such as this, the use of prevailing visibility would be more appropriate.

RVR may be used instead of prevailing visibility for landing and take-off minima, but only for runways equipped with an RVR system. In such cases, the following table can be used.

GROUND VISIBILITY	RVR
1 mile	5 000 feet
3/4 mile	4 000 feet
1/2 mile	2 600 feet
1/4 mile	1 400 feet
See Note 2	under 1 200 feet

NOTES 1: A comparative scale converting RVR-feet into RVR-metres is shown in GEN 1.9.3.

2: Ground visibility does not apply to operators with a takeoff limit below 1 200 feet.

ATS phraseology applicable to the foregoing is as follows:

Runway (number) visual range/ RVR three thousand six hundred feet.

Runway (number) visual range/ RVR less than three hundred feet.

Runway (number) visual range/ RVR more than six thousand feet.

Runway (number) visual range/ RVR (number) feet, fluctuating (number) to (number) feet, visibility (fraction) mile.

Runway (number) visual range/ RVR (number) feet, runway lights at setting four/five.

Runway (number) visual range/ RVR ALFA (number) feet, BRAVO (number) feet, CHARLIE (number) feet.

9.21 Aircraft Categories

Aircraft performance differences have an effect on the airspace and visibility needed to perform certain manoeuvres. In order that the appropriate obstacle clearance areas and landing and departure minima can be established, five different aircraft categories have been identified. Aircraft that are manoeuvred within these category speed ranges are to use the appropriate instrument approach minima for that category. For example, an aircraft that is flown on a straight-in approach at 135 KIAS is to use the Category C approach minima. However, if that same aircraft is required to manoeuvre on a circling approach at 143 KIAS, then the Category D circling minima applies. The category speed groupings are:

CATEGORY	A	B	C	D	E
SPEEDS	up to 90 KIAS (includes all rotorcraft)	91 to 120 KIAS	121 to 140 KIAS	141 to 165 KIAS	above 165 KIAS

NOTE: Category E Minima are not provided for on civil instrument approach procedure charts.

9.22 Straight-In Landing Minima

Minima for a straight-in landing are published when a normal rate of descent can be made from the final approach fix (FAF) to the runway threshold and when the final approach track intersects the extended runway centre-line within 30° and within a prescribed distance from the threshold. When either the normal rate of descent or the runway alignment exceeds the criteria, straight-in landing minima are not published and only circling minima apply. The fact that only circling minima are published does not preclude a pilot from landing straight-in if the required visual reference is available in sufficient time to make a normal approach and landing.

NOTE: The term straight-in used in connection with landing should not be confused with its use in straight-in approach minima (RAC 9.16). An ATC clearance for a straight-in approach merely clears the aircraft for an approach without first completing a procedure turn. The minima that will subsequently be used will be based on considerations such as the runway in use, published minima, aircraft category, etc.

The use of straight-in landing minima is predicated upon the pilot having the wind direction and speed and runway condition reports required to conduct a safe landing. At an uncontrolled aerodrome where the pilot may lack the necessary information, the pilot is expected to verify that the runway is unobstructed prior to landing. In some cases, this can only be accomplished by conducting a circling approach using the appropriate circling minima.

At an uncontrolled aerodrome, runway conditions (including any temporary obstructions such as vehicles) may be determined by the pilot by:

(a) contacting the appropriate FSS or UNICOM at the destination;

(b) a preflight telephone call to the destination to arrange for making the necessary information available when required for landing;

(c) a visual inspection;

(d) a NOTAM issued by the aerodrome operator; or

(e) any other means available to the pilot, such as message relay from preceding aircraft at the destination.

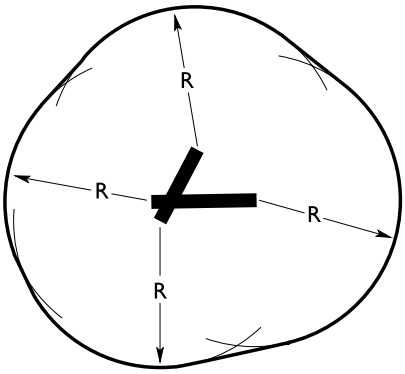
9.23 Circling

Circling is the term used to describe an IFR procedure that is conducted by visually manoeuvring an aircraft, after completing an instrument approach, into position for landing on a runway which is not suitably located for a straight-in landing (not usually applicable to rotorcraft).

The visual manoeuvring area for a circling approach is determined by drawing arcs centred on each runway threshold, and joining those arcs with tangent lines. The radius (R) of the

arcs are related to the aircraft category as follows: A, 1.3 NM; B, 1.5 NM; C, 1.7 NM; D, 2.3 NM; E, 4.5 NM. (Category E circling minima are published at DND aerodromes only.) The circling MDA provides a minimum of 300 feet above all obstacles within the visual manoeuvring area for each category.

Figure 9.3 – Visual Manoeuvring (Circling) Area



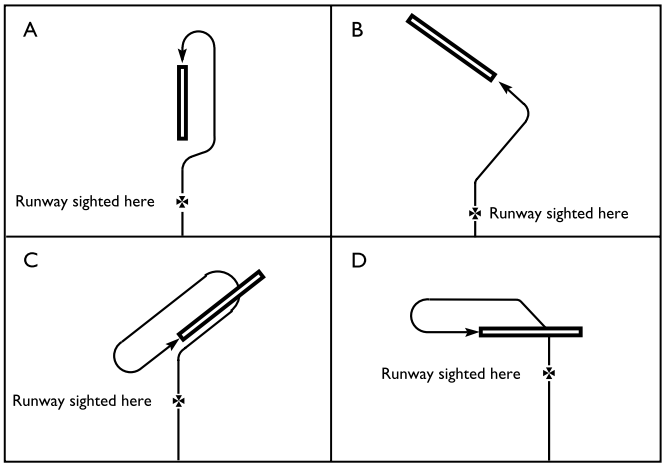
If it is necessary to manoeuvre an aircraft at a speed in excess of the upper limit of the speed range for its approach category, the circling minima for the next higher category should be used in order to ensure appropriate protection from obstacles.

Circling restrictions are published at some locations to prevent circling manoeuvres in certain sectors or directions where higher terrain or prominent obstacles exist. This practice allows the publication of lower minima than would otherwise be possible. In such cases, the circling MDA DOES NOT PROVIDE OBSTACLE CLEARANCE WITHIN THE RESTRICTED SECTOR.

9.24 Circling Procedures

An air traffic controller may specify manoeuvring in a certain direction or area due to traffic considerations; however, the selection of the procedure required to remain within the protected area and to accomplish a safe landing rests with the pilot. There can be no single procedure for conducting a circling approach due to variables such as runway layout, final approach track, wind velocity and weather conditions. The basic requirements are to keep the runway in sight after initial visual contact, and remain at the circling MDA until a normal landing is assured. Examples of various circling approach situations are illustrated in Figure 9.4.

Figure 9.4 – Typical Circling Manoeuvres



9.25 Missed Approach Procedure While Visually Manoeuvring in the Vicinity of the Aerodrome

The pilot may have to conduct a missed approach after starting visual manoeuvres. There are no standard procedures in this situation. Thus, unless the pilot is familiar with the terrain, it is recommended that:

(a) a climb be initiated;

(b) the aircraft be turned towards the centre of the aerodrome; and

(c) the aircraft be established, as closely as possible, in the missed approach procedure published for the instrument approach procedure just completed.

With the runway in sight at circling the MDA, the pilot should execute the missed approach if there is any doubt that the ceiling and visibility are inadequate for manoeuvring safely to the point of touchdown.

9.26 Missed Approach Procedures

Whenever a pilot conducts a published missed approach from an instrument approach procedure, the aircraft must continue along the published final approach course to the published Missed Approach Point (MAP) and follow the published missed approach instructions. The pilot may climb immediately to the altitude specified in the missed approach procedure or assigned by ATC. In the event of a missed approach when no missed approach clearance has been received, the pilot will follow the published missed approach instructions. Should the pilot arrive at the missed approach holding fix prior to receiving further clearance, the pilot will:

(a) hold in a standard holding pattern on the inbound track used to arrive at the fix;

(b) if there is a published missed approach track to the fix, hold in a standard holding pattern inbound to the fix on this track;

(c) if there is a published shuttle or holding pattern at the fix, hold in this pattern regardless of the missed approach track to the fix; or

(d) if there are published missed approach holding instructions, hold in accordance with these.

If a clearance to another destination has been received, the pilot shall, in the absence of other instructions, carry out the published missed approach instructions until at an altitude which will ensure adequate obstacle clearance before proceeding on course.

If specific missed approach instructions have been received and acknowledged, the pilot is required to comply with the new missed approach instructions before proceeding on course, e.g., "on missed approach, climb runway heading to 3 000 feet; right turn, climb on course" or "on missed approach, climb straight ahead to the BRAVO NDB before proceeding on course".

Civil and military air traffic control procedures do not require the air traffic controller to provide terrain and obstacle clearance in their missed approach instructions. Terms such as "on missed approach, right turn climb on course" or "on missed approach, left turn on course" are not to be considered specific missed approach instructions. It remains the pilot's responsibility to ensure terrain and obstacle avoidance and clearance.

9.27 Simultaneous Precision Instrument Approaches – Parallel Runways

When simultaneous precision instrument approaches are in progress, ATC will vector arriving aircraft to one or the other of the parallel localizers for a straight-in final approach. (When cleared for a straight-in approach, a procedure turn is not permitted.) Each of the parallel approaches has a "high side" and a "low side" for vectoring and to allow for vertical separation until each aircraft is established inbound on their respective parallel localizers.

The pilot will be instructed to change and report on the tower frequency prior to reaching the outer marker inbound. If an aircraft is observed to overshoot the localizer during the final turn, the pilot will be instructed to return to the correct localizer course immediately. After an aircraft is established on the localizer, the controller monitoring the final approach will issue control instructions only if an aircraft deviates or is expected to deviate by 1 500 feet from the localizer centreline. Information or instructions issued by the monitoring controller will be aimed at returning the aircraft to the localizer course. If the aircraft fails to take corrective action, the aircraft on the adjacent localizer may be issued appropriate control instructions. Monitoring of the approach is terminated without notification to the pilot when the aircraft is 1 NM from the runway threshold. If considered necessary, appropriate missed approach instructions will be issued.

THE APPROACH CLEARANCE WILL INCLUDE AN ALTITUDE THAT MUST BE MAINTAINED UNTIL INTERCEPTING THE GLIDE PATH. If the glide path is inoperative, the pilot will be cleared to maintain an altitude to a specified DME distance before commencing the descent.

When informed by ATIS or by the arrival controller that simultaneous precision instrument approaches are in progress, pilots should advise the arrival controller immediately of any avionics unserviceabilities having an impact on their capabilities to accept this procedure.

9.28 Simultaneous Precision Instrument Approaches – Converging Runways

ATC may clear pilots for precision instrument approaches simultaneously to converging runways at airports where this procedure has been approved.

Aircraft will be informed through ATIS or by the arrival controller as soon as feasible after initial contact when simultaneous precision instrument approaches to converging runways are in progress. When simultaneous approaches are in progress, ATC will vector arriving aircraft to the appropriate runway localizer for a straight-in final approach. Pilots should advise the arrival controller immediately of any malfunctioning or inoperative equipment making this procedure undesireable.

These are the restrictions for simultaneous precision approaches to converging runways:

- Converging runways (defined as an included angle between 15° and 100°).
- Radar available.
- Precision instrument approach systems (ILS/MLS) operating on each runway.
- Non-intersecting final approach courses.
- Missed approach points at least 3 NM apart.
- Non-overlapping primary missed approach protected airspace.
- Separate instrument approach charts denoting the procedures.
- If runways intersect, tower controllers must be able to apply visual separation as well as intersecting runway separation criteria.
- Only straight-in approaches and landing are authorized.

To emphasize the protection of active runways and to aid in preventing runway incursions, landing instructions which include the words "HOLD SHORT" should be acknowledged by a readback of the hold point by the pilot.

10.0 IN– HOLDING PROCEDURES

10.1 General

Pilots are expected to adhere to the aircraft entry and holding manoeuvres, as described in RAC 10.5, since ATC provides lateral separation in the form of airspace to be protected in relation to the holding procedure.

10.2 Holding Clearance

A holding clearance issued by ATC includes at least

(a) a clearance to the holding fix;

(b) the direction to hold from the holding fix;

(c) a specified radial, course, or inbound track;

(d) if DME is used, the DME distances at which the fix end and outbound end turns are to be commenced [e.g., hold between (number of miles) and (number of miles).];

NOTE: In the absence of an outbound DME being issued by ATC, pilots are expected to time the holding pattern in accordance with RAC 10.6.

(e) the altitude or FL to be maintained; and

(f) the time to expect further clearance or an approach clearance; or

(g) the time to leave the fix in the event of a communications failure.

NOTE: An expect-further-clearance time is usually followed by further en route clearance, which is followed by an expect-approach-clearance time when traffic conditions permit.

During entry and holding, pilots manually flying the aircraft are expected to make all turns to achieve an average bank angle of at least 25˚ or a rate of turn of 3˚ per second, whichever requires the lesser bank. Unless the ATC clearance contains instructions to the contrary, or a non-standard holding pattern is published at the holding fix, pilots are expected to make all turns to the right after initial entry into the holding pattern.

Occasionally, a pilot may reach a clearance limit before obtaining further clearance from ATC. In this event, where a holding pattern is published at the clearance limit, the pilot is to hold as published. Where no holding pattern is published, the pilot is to hold in a standard pattern on the inbound track to such clearance limit and request further clearance. (See RAC 10.10 for procedure to be used when the holding pattern is published on en route charts or terminal area charts.)

If communication cannot be established with ATC, the pilot should then proceed in accordance with communication failure procedures as described in RAC 6.3.2.

Examples

1. A westbound flight on R77, cleared to Greely NDB (YRR) reaches Ottawa before obtaining further clearance. The pilot is to hold at YRR on an inbound track of 287˚ and request further clearance.
2. The published missed approach procedure for an ILS RWY 23 approach at Halifax is the following: *"CLIMB TO 2 200 ON TRACK OF 234˚ TO "ZHZ" NDB."*

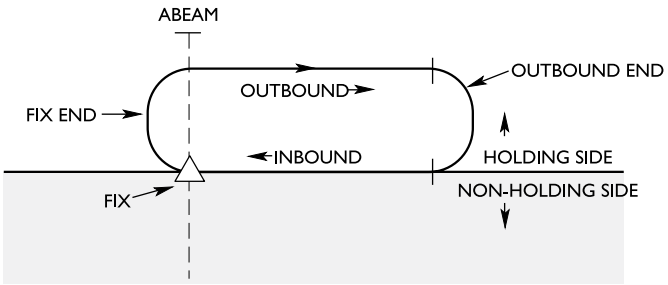
A pilot missing an ILS approach to RWY 23 and not in receipt of further clearance is to proceed directly to the "ZHZ" NDB, make a right turn and hold at the "ZHZ" beacon on an inbound track of 234º and request further clearance.

If for any reason a pilot is unable to conform to these procedures, ATC should be advised as early as possible.

10.3 Standard Holding Pattern

A standard holding pattern is depicted in Figure 10.1 in terms of still air conditions.

Figure 10.1 – Standard Holding Pattern



(a) Having entered the holding pattern, on the second and subsequent arrivals over the fix, the pilot executes a right turn to fly an outbound track that positions the aircraft most appropriately for the turn onto the inbound track. When holding at a VOR, the pilot should begin the turn to the outbound leg at the time of station passage as indicated on the TO–FROM indicator.

(b) Continue outbound for one minute if at or below 14 000 ft ASL, or one and a half minutes if above 14 000 ft ASL. (ATC specifies distance, not time, where a DME fix is to be used for holding.)

(c) Turn right to realign the aircraft on the inbound track.

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10.4 Non-Standard Holding Pattern

A non-standard holding pattern is one in which

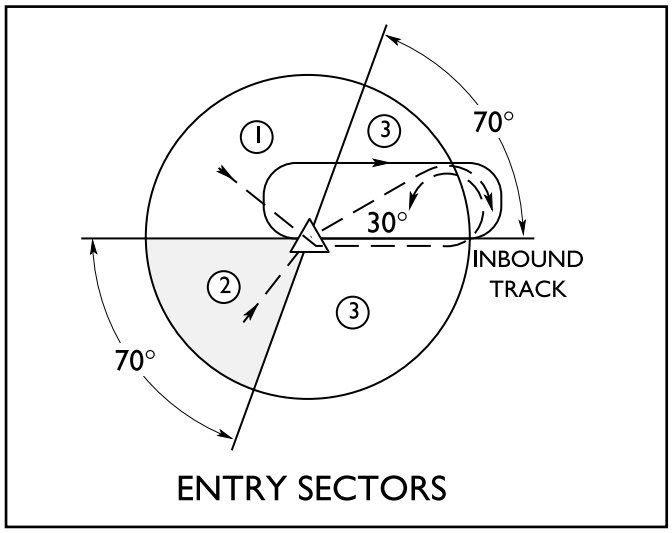
(a) the fix end and outbound end turns are to the left; and/or

(b) the planned time along the inbound track is other than the standard one-minute or one-and-a-half minute leg appropriate for the altitude flown.

10.5 Entry Procedures

The pilot is expected to enter a holding pattern according to the aircraft's heading in relation to the three sectors shown in Figure 10.2, recognizing a zone of flexibility of five degrees on either side of the sector boundaries. For holding on VOR intersections or VOR/DME/TACAN fixes, entries are limited to the radials or DME arcs forming the fix as appropriate.

Figure 10.2—Entry Sectors



Sector 1 procedures (parallel entry) are:

(a) Upon reaching the fix, turn onto the outbound heading of the holding pattern for the appropriate period of time.

(b) Turn left to intercept the inbound track or to return directly to the fix.

(c) On the second arrival over the fix, turn right and follow the holding pattern.

Sector 2 procedures (offset entry) are:

(a) Upon reaching the fix, turn to a heading that results in a track having an angle of 30˚ or less from the inbound track reciprocal on the holding side.

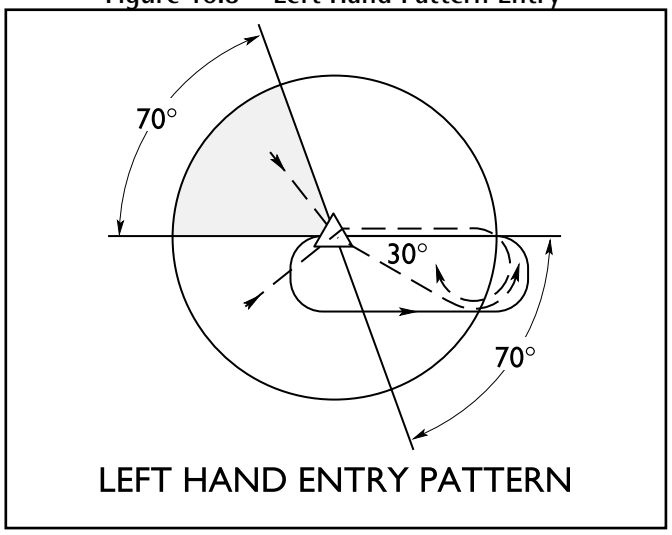
(b) continue for the appropriate period of time, then turn right to intercept the inbound track and follow the holding pattern.

Sector 3 procedure (direct entry) is:

(a) Upon reaching the fix, turn right and follow the holding pattern.

Entry procedures to a non-standard pattern requiring left turns are oriented in relation to the 70˚ line on the holding side (Figure 10.3), just as in the standard pattern.

Figure 10.3 – Left Hand Pattern Entry



When crossing the fix to enter a holding pattern, the appropriate ATC unit should be advised. ATC may also request that the pilot report "established in the hold". The pilot is to report "established" when crossing the fix after having completed the entry procedure.

10.6 Timing

The still air time for flying the outbound leg of a holding pattern should not exceed 1 min if at or below 14 000 ft ASL, or 1 1/2 min if above 14 000 ft ASL; however, the pilot should make due allowance in both heading and timing to compensate for wind effect.

After the initial circuit of the pattern, timing should begin abeam the fix or on attaining the outbound heading, whichever occurs later. The pilot should increase or decrease outbound times, in recognition of winds, to effect 1 or 1 1/2 min (appropriate to altitude) inbound to the fix.

When the pilot receives ATC clearance specifying the time of departure from the holding fix, adjustments should be made to the flight pattern within the limits of the established holding pattern to leave the fix as close as possible to the time specified.

10.7 Speed Limitations

Holding patterns must be entered and flown at or below the following airspeeds:

(a) Propeller Aircraft (including turboprop)
  (i) MHA to 30 000 ft 175 KIAS

(b) Civil turbojet
  (i) MHA to 14 000 ft 230 KIAS
  (ii) above 14 000 ft 265 KIAS

(c) Military Turbojet
  (i) all, except those aircraft listed below, 265 KIAS
  (ii) CF-5 310 KIAS
  (iii) CT-114 175 KIAS

(d) Climbing while in the holding pattern
  (i) turboprop aircraft, normal climb airspeed for aircraft type, subject to CAR 602.32
  (ii) jet aircraft, 310 KIAS or less, subject to CAR 602.32 (see RAC 10.9)

NOTE: 250 KIAS must be observed below 10 000 ft ASL and 200 KIAS below 3 000 ft AGL within 10 NM of a controlled aerodrome even if in climb (see CAR 602.32).

Minimum Holding Altitude (MHA) – The lowest altitude prescribed for a holding pattern which assures navigational signal coverage, communications and meets obstacle clearance requirements.

Pilots are to advise ATC immediately if airspeeds in excess of those specified above become necessary for any reason, including turbulence, or if unable to accomplish any part of the holding procedure. After such higher speed is no longer necessary, the aircraft should be operated at or below the specified airspeeds and ATC notified.

NOTE: Airspace protection for turbulent air holding is based on a maximum of 280 KIAS or Mach 0.8, whichever is lower. Considerable impact on the flow of air traffic may result when aircraft hold at speeds which are higher than those specified above.

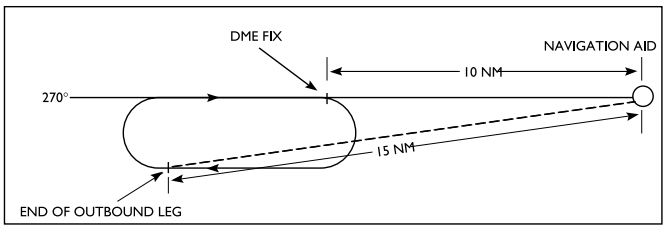
After departing a holding fix, pilots should resume normal speed subject to other requirements, such as speed limitations in the vicinity of controlled airports, specific ATC requests, etc.

10.8 DME Procedures

DME holding is subject to the same entry and holding procedures previously described except that distances, in NM are used in lieu of time values.

In describing the direction from the fix on which to hold and the limits of a DME holding pattern, an ATC clearance will specify the DME distance from the navigation aid at which the inbound and outbound legs are to be terminated. The end of each leg is determined by the DME indications.

Figure 10.4 –DME Hold



Example:

An aircraft cleared to the 270° RADIAL 10 mile DME FIX, to HOLD BETWEEN 10 AND 15 miles, will hold inbound on the 270° radial, commence turn to the outbound leg when the DME indicates 10 NM and commence turn to inbound leg when the DME indicates 15 NM.

10.9 Shuttle Procedure

A shuttle procedure is defined as a manoeuvre involving a descent or climb in a pattern resembling a holding pattern. Shuttles are generally prescribed on instrument procedure charts located in mountainous areas. In the approach phase, it is normally prescribed where a descent of more than 2 000 ft is required during the initial or intermediate approach segments. It can also be required when flying a missed approach or departure procedure from certain airports. A shuttle procedure shall be executed in the pattern as published unless instructions contained in an ATC clearance direct otherwise.

The standard holding airspeeds may not be adequate for climbing, primarily because operational climb airspeeds usually exceed level holding speeds. If no airspeed limit is published on a climb shuttle (e.g. departure or missed approach), then in accordance with CAR 602.32, normal climb airspeeds applicable to aircraft type and airspace classification could be flown (see RAC 10.7(d)). Likewise, if no airspeed limit is published on a descent shuttle (e.g. arrival or approach), then maximum airspeeds appropriate to aircraft type and airspace classification, subject to CAR 602.32, must be observed.

To ensure that the aircraft does not exceed the obstacle clearance protected airspace during a shuttle descent or climb, the aircraft must not exceed:

(a) the airspeed limit, as published on instrument procedure charts; and/or

(b) the normal climb or descent airspeed for aircraft type and airspace classification, subject to CAR 602.32 (if no airspeed limit is published); and/or

(c) the outbound/inbound still air time restrictions (see RAC 10.6); and/or

(d) the DME holding restrictions (see RAC 10.8).

NOTE: 250 KIAS must be observed below 10 000 ft ASL and 200 KIAS below 3 000 ft AGL within 10 NM of a controlled aerodrome even if in climb (see CAR 602.32).

10.10 Holding Patterns Published on En-Route and Terminal Charts

At some high traffic density areas, holding patterns are depicted on IFR terminal area and enroute charts. When pilots are cleared to hold at a fix where a holding pattern is published, or if clearance beyond the fix has not yet been received, pilots are to hold according to the depicted pattern using normal entry procedures as described in RAC 10.5, and timing in the hold as described in RAC 10.6. ATC will use the following phraseology when clearing an aircraft holding at a fix that has a published holding pattern;

CLEARED TO THE (fix), HOLD (direction) AS PUBLISHED EXPECT FURTHER CLEARANCE AT (time)

NOTE: The holding direction means the area in which the hold is to be completed in relation to the holding fix, e.g., east, northwest, etc. If a pattern is required that is different than that published, detailed holding instructions will be issued by ATC.

If a pilot is instructed to depart a fix that has a published hold, at a specified time, the pilot has the option to:

(a) proceed to the fix, then hold until the "depart fix" time specified;

(b) reduce speed to make good his "depart fix" time; or

(c) a combination of (a) and (b).

RAC

11.0 NORTH ATLANTIC OPERATIONS

11.1 Regulation Reference Documents and Guidance Material

11.1.1 Regulation

Canadian Aviation Regulation (CAR) 602.38 – *Flight Over the High Seas*, requires pilots of Canadian aircraft, when flying over the high seas, to comply with the applicable rules of the air set out in ICAO Annex 2, and with the applicable regional supplementary procedures set out in ICAO, Doc 7030/4.

11.1.2 NAT Documents and Guidance Material

(a) The following documents and guidance material are applicable to operations in the NAT Region:

(i) ICAO, Annex 2—*Rules of the Air*;
(ii) ICAO, Annex 11—*Air Traffic Services*;
(iii) ICAO, Doc 7030—*Regional Supplementary Procedures (NAT)*;
(iv) ICAO, Doc 4444—*Procedures for Air Navigation Services - Air Traffic Management (PANS-ATM)*;
(v) ICAO, NAT Doc 001—*Guidance and Information Material Concerning Air Navigation in the North Atlantic Region*;
(vi) *North Atlantic MNPS Airspace Operations Manual*;
(vii) *North Atlantic International General Aviation Operations Manual*;
(viii) Gander Data link Oceanic Clearance Delivery (OCD) Crew Procedures; and
(ix) Guidance Material for ATS Data Link Services in North Atlantic Airspace.

(b) Those documents listed under RAC 11.1.2(a)(v) to (ix) are available from the North Atlantic Programme Coordination Office Web site at <*www.paris.icao.int/*>.

(c) The *North Atlantic International General Aviation Operations Manual* is available to all operators from:

http://www.faa.gov/air_traffic/publications/.

11.2 General Aviation Aircraft

CAR 602.39 – *Transoceanic Flight*, specifies the following:

602.39

No pilot-in-command of a single-engined aircraft, or of a multi-engined aircraft that would be unable to maintain flight in the event of the failure of any engine, shall commence a flight that will leave Canadian Domestic Airspace and enter airspace over the high seas unless

(a) the pilot-in-command holds a pilot licence endorsed with an instrument rating;

(b) the aircraft is equipped with
(i) the equipment referred to in section 605.18,
(ii) a high frequency radio capable of transmitting and receiving on a minimum of two appropriate international air-ground general purpose frequencies, and
(iii) hypothermia protection for each person on board; and

(c) the aircraft carries sufficient fuel to meet the requirements of section 602.88 and, in addition, carries contingency fuel equal to at least 10 per cent of the fuel required pursuant to section 602.88 to complete the flight to the aerodrome of destination.

11.3 North American Routes

(a) The North American Routes (NAR) System interfaces with the NAT oceanic and domestic airspace, and is used by air traffic transiting the North Atlantic. NARs

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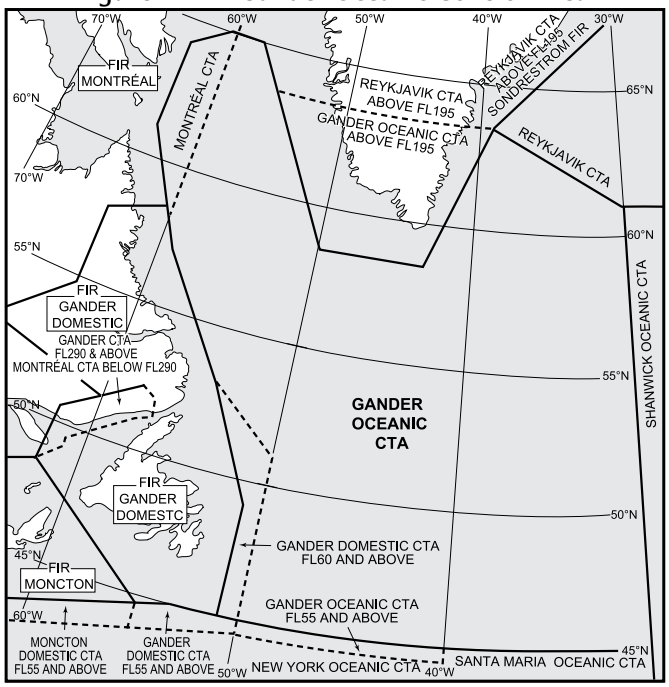
extend to/from established oceanic coastal fixes to major airports throughout Canada and the United States.

(b) NAR procedures and routes are published in the *Canada Flight Supplement* (CFS), Planning Section and in the *Airport Facility Directory – Northeast* (FAA).

Figure 11.1 – Gander Oceanic Control Area



11.4 NAT Organized Track System

(a) Organized tracks are formulated and published in a NAT Track Message via AFTN to all interested operators. The day-time structure is published by Shanwick Area Control Centre (ACC) and the night-time structure by Gander ACC. The hours of validity of the two Organized Track Systems (OTS) are normally:
(i) day-time OTS – 1130 – 1900 UTC at 30˚W
(ii) night-time OTS – 0100 – 0800 UTC at 30˚W

The hours of validity are specified in the track message.

(b) The most northerly track of a day OTS is designated as NAT Track Alpha; the adjacent track to the south, as NAT Track Bravo; etc. For the night OTS, the most southerly track is designated as Track Zulu; the adjacent track to the north, as Track Yankee; etc. Flight levels are allocated for use within the OTS and, in most cases, details of domestic entry and exit routings associated with individual tracks are provided in the NAT Track Message.

(c) To permit an orderly change-over between successive OTS, a period of several hours is interposed between the termination of one system and the commencement of the next. During these periods, operators are expected to file random routes or use the co-ordinates of a track in the system about to come into effect.

(d) Eastbound traffic crossing 30˚W at 1030 UTC or later and westbound traffic crossing 30˚W at 0000 UTC or later should plan to avoid the OTS.

11.5 Flight Rules

(a) Over the high seas, the lower limit of all NAT Oceanic Control Areas (OCA) is FL55 with no upper limit. Throughout the NAT Region, airspace at and above FL55 is Class A controlled airspace, and below FL55 is Class G uncontrolled airspace.

(b) Flights shall be conducted in accordance with the instrument flight rules (even when not operating in instrument meteorological conditions (IMC) when operated at or above FL60.

(c) Air traffic control (ATC) clearances to climb or descend maintaining one's own separation while operating in visual meteorological conditions (VMC) shall not be issued.

11.6 Flight Planning Procedures

11.6.1 Routes

(a) Flights conducted wholly or partially outside the OTS shall be planned along great circle tracks joining successive significant points.

(b) For flights operating predominately in an east–west direction:
(i) south of 70˚N, the planned tracks shall be defined by significant points formed by the intersection of half or whole degrees of latitude at each 10˚ of longitude (60˚W, 50˚W, 40˚W). For flights operating north of 70˚N, significant points are defined by the parallels of latitude expressed in degrees and minutes with longitudes at 20˚ intervals;
(ii) the distance between significant points shall, as far as possible, not exceed one hour of flight time. Additional significant points should be established when required because of aircraft speed or the angle at which meridians are crossed. When the flight time between successive significant points is less than 30 min one of the points may be omitted.

(c) For flights operating predominately in a north–south direction, the planned tracks shall be defined by significant points formed by the intersection of whole degrees of longitude with parallels of latitude spaced at 5˚ (65˚N, 60˚N, 55˚N).

(d) For flights planning to operate within the OTS from the entry point into oceanic airspace to the exit point as detailed in the daily NAT track message, the track shall be defined in Item 15 of the flight plan by the abbreviation "NAT" followed by the Code letter assigned to the track.

(e) For eastbound NAT flights planning to operate on the OTS, the second and third route options should be indicated at the end of Item 18 of the flight plan. Those operators who do not have the capability to provide this information in Item 18 of the flight plan should send the information by separate AFTN message to Gander ACC (CYQXZQZX).

Examples

1. RMKS/ … O2.X370 O3.V350 (Option 2 is Track X at FL370; Option 3 is Track V at FL350)
2. RMKS/ … O2.RS390 O3.Z370 (Option 2 is random track south at FL390; Option 3 is Track Z at FL370)

NOTE: In the preceding examples, Options 2 and 3 are indicated by the letter "O" and not the number zero.

(c) ATS requires flights entering or exiting the Gander OCA to flight plan in accordance with the published North Atlantic organized track system (NAT OTS) or, if entering or exiting by way of 53°N 050°W and south thereof, via the following oceanic entry points (OEP) and associated 50° west coordinates:

OEP	Coordinates	OEP	Coordinates
HECKK	53°N 050°W	NOVEP	48°N 050°W
CRONO	52°N 050°W	RONPO	47°N 050°W
DENDU	51°N 050°W	URTAK	46°N 050°W
KOBEV	50°N 050°W	VODOR	45°N 050°W
LOGSU	49°N 050°W		

These oceanic entry points are compulsory reporting points for westbound flights only. Eastbound flights are not required to provide a position report unless requested by ATC.

ATS requires flights entering or exiting the New York OCA through CDA to flight plan over NOVOK, JEBBY, BOBTU or TALGO, or via ELERI or MUSPO if arriving at or departing from Halifax Airport (CYHZ). Eastbound flights that exit the New York OCA via CDA and subsequently enter the Gander OCA are required to flight plan in accordance with the published NAT OTS or over an oceanic entry point and associated 50° west coordinate, as provided in the table above.

Flights exiting the New York OCA via BOBTU should contact Gander ACC five minutes prior to BOBTU on frequency 134.7 MHz. Operators should be aware that if the NAT OTS includes tracks that are at or south of BANCS URTAK 46°N 050°W (or 46°N 050°W URTAK BANCS), then optimal flight levels and routes may not be available.

To facilitate effective coordination for flights entering or exiting the Gander domestic CTA and the New York OCA via 44°N 050°W or south thereof:

- Eastbound flights exiting the Gander domestic CTA directly into the New York OCA are required to flight plan via LOMPI direct JAROM direct TALGO, direct 44°N 050°W, or south thereof.
- Eastbound flights exiting the New York OCA directly into the Gander domestic CTA are required to flight plan via BOBTU.
- Westbound flights exiting the New York OCA directly into the Gander domestic CTA are required to flight plan via BOBTU direct JAROM direct LOMPI.

NOTE: TALGO is not to be used for westbound flights.

(d) Pilots of potential non-stop westbound flights may submit a flight plan to any suitable aeronautical radio facility or designated intersection east of 70°W. The route and altitude to any of the approved regular or alternate aerodromes may be specified. Prior to reaching the flight planned fix or clearance limit, the pilot, after assessing the onward flight conditions, will advise ATC of the intended destination and request an ATC clearance accordingly. If flight to the airport of destination is undesirable, the pilot will request an appropriate ATC clearance to the alternate airport. If an onward ATC clearance from the fix designated in the flight plan is not obtained by the time the fix is reached, the pilot must proceed towards the alternate airport in accordance with the flight plan and amendments thereto.

(e) ATS system parameters require all westbound flights transiting from the Gander OCA to the Montréal FIR/CTA to flight plan via 60°W, followed by both a boundary reporting point and then one of the following inland reporting points: LAKES, LOPVI, RODBO, JELCO, FEDDY, TEFFO, DUTUM, or BEZED. KENKI and IRBIM are not to be used as boundary reporting points.

11.6.2 Airspeed

True airspeed (TAS) or Mach number is to be entered in Item 15 of the flight plan.

11.6.3 Altitude

(a) The planned cruising level(s) for the oceanic portion of the flight to be included in Item 15 of the flight plan.

NOTE: Flights planning to operate wholly or partly outside the OTS should indicate in a flight plan the cruising level(s) appropriate to direction of flight except that, within the Gander/Shanwick OCAs and the Reykjavik CTA, during the westbound OTS (valid from 1130 to 1900 UTC at 30°W) westbound aircraft may flight plan FL310 or FL330 and during the

eastbound OTS (valid from 0100 to 0800 UTC at 30°W) eastbound aircraft may file a flight plan at FL360 or FL380.

(b) For flight level allocations applicable to reduced vertical separation minimum (RVSM) refer to subparagraph RAC 11.21.3.

(c) Requests for a suitable alternative flight level may be indicated in Item 18 of the flight plan.

11.6.4 Estimated Times

(a) For flights operating on the OTS, the accumulated elapsed time only to the first oceanic flight information region (FIR) boundary are to be entered in Item 18 of the flight plan.

(b) For flights operating wholly or partly on the OTS, accumulated estimated times to significant points en route (EST) are to be entered in Item 18 of the flight plan.

11.6.5 Aircraft Approval Status and Registration

(a) For flights certified as being in compliance with minimum navigation performance specifications (MNPS) and intending to operate wholly or partly in MNPS airspace, the approval status (MNPS) shall be indicated in Item 10 by entering the letter "X". It is the pilots' responsibility to ensure that specific approval has been given for MNPS operations.

(b) For flights certified as being in compliance with Reduced Vertical Separation Minimum (RVSM) Minimum Aircraft System Performance Specification (MASPS) and intending to operate wholly or partly at RVSM designated altitudes, the approval status (RVSM) shall be indicated in Item 10 by entering the letter "W". It is the pilots' responsibility to ensure that specific approval has been given for RVSM operations.

(c) For those aircraft being in compliance with both MNPS and RVSM, the letters "X" and "W" shall be entered in Item 10.

(d) If the aircraft registration is not included in Item 7, the registration shall be indicated in Item 18.

11.6.6 Height Monitoring Unit (HMU)

Aircraft for HMU monitoring shall include in Item 18 of the flight plan the aircraft registration (if not included in Item 7) and the remarks "RMK/HMU FLT STU.

11.6.7 Filing

(a) NAT operators are to forward all flight plans for eastbound NAT flights to those Canadian ACCs in which the flight will traverse their FIR/CTAs. These flight plans are to include the Estimated Enroute Time (EET) for each CTA boundary in Item 18 of the flight plan. The AFTN address for Canadian ACCs are:

AFTN Address	Canadian ACCs	AFTN Address	Canadian ACCs
CZQXZQZX	Gander	CZWGZQZX	Winnipeg
CZQMZQZX	Moncton	CZEGZQZX	Edmonton
CZULZQZX	Montréal	CZVRZQZX	Vancouver
CZYZZQZX	Toronto		

(b) Flight plans for flights departing from points within adjacent regions and entering the NAT Region without intermediate stops should be submitted at least 3 hours prior to departure.

(c) Where possible, operators are to file eastbound NAT flight plans at least 4 hours prior to the ETA at the coast-out fix specified in the flight plan.

11.7 Preferred Routes Messages

(a) NAT operators are to send Preferred Routes Messages (PRM) for eastbound and westbound flights to the following:

- *EGGXZQZX (Shanwick ACC)*
- *EGTTZDZE (London Flow Management Unit)*
- *KCFCZDZX (FAA Air Traffic Control System Command Centre)*
- *KZNYZRZX (New York ARTCC)*
- *BIRDZQZX (Reykjavik ACC)*
- *LPPOZOZX (Santa Maria ACC)*
- *CZQXZQZX (Gander ACC)*
- *CZQMZQZX (Moncton ACC)*
- *CZULZQZX (Montréal ACC)*
- *CYHQZDZX (Canadian Air Traffic Management Unit)*

(b) The following format is to be used for westbound PRMs:
[PRIORITY] [DEST ADDRESS] [DEST ADDRESS] ---
[DATE TIME OF ORIGIN] [ORIGIN ADDRESS]
[MESSAGE TYPE]-[COMPANY]-[WB]-[YYMMDD AT 30W]-
[(DEP/DEST)(FIRST UK POINT)(ANCHOR POINT) (OCA RPS)
(LANDFALL)(INLAND FIX)(NUMBER OF FLT 01-99)]

NOTE: If there is no Inland Navigation Fix (INF), the latitude crossing 80°W is to be used.

Example:
FF EGGXZQZX EGTTZDZE CZQXZQZX CZQMZQZX CZULZQZX CYHQZDZX KCFCZDZX KZNYZRZX BIRDZQZK LPPOZOZX 111824 LSZHSWRW PRM-SWR-W-930212-LSZH/KJFK BNE BEL 55/10 56/20 57/30 55/40 53/50 YAY TOPPS 02 LSZH/KIAD BNE BURAK 53/15 53/20 52/30 51/40 50/50 YQX TUSKY 01

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(c) The following format is to be used for eastbound PRMs:
[PRIORITY] [DEST ADDRESS] [DEST ADDRESS] -----
[DATE TIME OF ORIGIN] [ORIGIN ADDRESS]
[MESSAGE TYPE]-[COMPANY]-[EB]-[YYMMDD AT 30W]-
[(DEP/DEST)(INLAND FIX)(ANCHOR POINT)(OCA RPS)
(LANDFALL)(LAST UK POINT)(NUMBER OF FLT 01-99)]

NOTE: If there is no INF, the latitude crossing 80°W is to be used.

Example:

FF EGGXZOZX EGTTZDZE CZOXZQZX CZQMZQZX CZULZQZX CYHQZDZX KCFCZDZX KZNYZRZX BIRDZQZK LPPOZOZX 120936 EHAMKLMW PRM-KLM-E-930213-KJFK/EHAM TOPPS YAY 53/50 53/40 54/30 54/20 54/15 BABAN BLUFA 03 CYMX/EHAM YML FOXXE 57/50 58/40 58/30 57/20 56/10 MAC BLUFA 01

(d) PRMs are to be sent for:
(i) eastbound flights: no later than 1000 UTC, and
(ii) westbound flights: no later than 1900 UTC.

11.8 Clearances

11.8.1 Oceanic Clearances

Pilots intending to operate in the Gander OCA should note the following:

(a) Clearances for VFR climb or descent will not be granted.

(b) The Mach number to be maintained will be specified for turbojet aircraft.

(c) ATC will specify the full route details for aircraft cleared on a route other than an organized track or flight plan route. The pilot is to read back the full details of the clearance, including the cleared track.

(d) ATC will issue an abbreviated oceanic clearance to aircraft that will operate along one of the NAT organized tracks. The abbreviated clearance will include the track letter, the flight level and the Mach number to be maintained (for turbojet aircraft). The pilot is to read back the clearance including the TMI number. ATC will confirm the accuracy of the readback and the TMI number.

NOTE: The eastbound OTS is identified by a TMI number, which is determined by using the Julian calendar for the day on which the eastbound tracks are effective. The TMI number is contained in the "Remarks" section on the eastbound NAT track message.

Amendments to already published tracks are indicated by appending a letter to the Julian date, e.g. TMI 320A. A revised TMI will be issued for changes to:

- any track coordinate(s), including named points;
- published track levels; or
- named points within European routes west.

A TMI revision will not be issued for changes to other items such as NARs.

(e) Whether received via data link or voice, the oceanic clearance to enter the Gander OCA has the following meaning:

- The clearance is valid only within oceanic airspace, and details the route, altitude and speed at which the flight is to enter oceanic airspace;
- The flight crew is not immediately authorized to change the route, altitude or speed in order to comply with the oceanic clearance;
- The flight crew is required to obtain a subsequent clearance in order to comply with the oceanic clearance; and
- If unable to obtain a subsequent clearance, the flight crew should revert to the procedures for radio communications failure detailed in section RAC 11.20 of the TC AIM, the CFS and the North Atlantic section of ICAO's *Regional Supplementary Procedures* (Doc 7030) in order to manoeuvre as necessary to comply with the oceanic clearance.

(f) If the aircraft is designated to report meteorological information, the pilot will be advised by the inclusion of the phrase "SEND MET REPORTS" in the clearance.

(g) Aircraft routed through the Shanwick, Gander, and New York OCAs that will proceed south of 39°N/067°W do not receive an oceanic clearance to landfall (LF). Shanwick will clear such flights to the first named fix in the New York OCA that is contained in the aircraft's filed flight plan, followed by the phraseology "VIA FLIGHT PLANNED ROUTE TO DESTINATION." The phraseology "VIA FLIGHT PLANNED ROUTE" is used once the flight is established in the Shanwick OCA.

The point to where an aircraft is cleared by Shanwick ACC within New York oceanic airspace, prior to the statement "flight planned route to destination," should not be misinterpreted as a "clearance limit." Aircraft are expected to continue on course.
It is imperative that operators file flight plans (FPL) and flight plan change (CHG) messages through the New York Oceanic CTA/FIR using the address KZWYZOZX. It must be noted that the oceanic address is separate from the New York domestic address (KZNYZRZX).

11.8.2 Domestic Clearances — NAT Westbound Traffic

(a) Pilots proceeding westbound across the NAT and entering CDA within the Gander, Moncton and Montréal FIRs should comply with the following procedures:

(i) Flights that have been cleared by ATC via the flight planned route prior to reaching CDA will not be issued en-route clearances upon entering domestic airspace, and are to follow the flight planned route as cleared. Domestic en-route clearances will be issued:

(A) for flights that have been rerouted and exit oceanic airspace at other than the flight planned exit fix;

(B) at a pilot's request for another routing; or

(C) if a flight plan has not been received by the ACC.

(ii) Flights that have been rerouted from the flight planned route and enter CDA within 120 NM of the flight planned oceanic exit point can anticipate a clearance to regain the flight planned route by the INF unless the pilot requests a different routing. For flights beyond 120 NM from the flight planned oceanic exit point, a clearance will be issued following consultation with the pilot.

(iii) ATC will use the latest flight plan received before a flight departs. Subsequent changes to the flight plan route after departure, including any changes received by the pilot from flight operations/dispatch, must be requested directly by the pilot on initial contact with the appropriate domestic ACC. Direct requests from flight operations/dispatch to ATC to re-clear aircraft will only be considered under exceptional circumstances, and are not an acceptable alternative to a pilot-initiated request for a re-clearance.

(iv) Domestic re-clearances by ATC may contain either the route specified in full detail or a NAR.

(b) If entering CDA within the Edmonton FIR, the onward domestic routing will have been established in co-ordination between the Reykjavik and Edmonton ACCs, and additional domestic clearance is not required. If there has been a change in route from the filed flight plan, clarification of the onward routing may be obtained from Edmonton ACC on request.

(c) Westbound turbojet aircraft that have proceeded across the NAT and have entered CDA shall maintain the last Mach number assigned by ATC:

(i) unless approval is obtained from ATC to make a change; or

(ii) until the pilot receives an initial descent clearance approaching destination.

11.8.3 Oceanic Clearance Delivery

(a) Unless otherwise advised by ATC, the following oceanic clearance delivery procedures are in effect daily between 2330 and 0730 UTC (DST 2230 and 0630 UTC) for all eastbound oceanic flights (including data link equipped aircraft) operating above FL280 that transit the Gander Domestic FIR/CTA:

(i) Clearance delivery frequencies are published daily in the "Remarks" section on the eastbound NAT track message. Pilots are to contact Gander clearance delivery on the frequency for the track/route as per the NAT track message to which the aircraft is proceeding. Contact with clearance delivery should be made when within 200 NM of the specified clearance delivery frequency location. In the event that contact cannot be established, pilots are to advise ATC on the assigned control frequency.

The following frequencies and frequency locations will normally be used:

- Natashquan (YNA) (50°11'N 61°47'W) – 135.45 MHz;
- Allen's Island (46°50'N 55°47'W) – 128.45 MHz;
- Churchill Falls (UM) (53°35'N 64°14'W) – 128.7 MHz;
- Stephenville (YJT) (48°34'N 58°40'W) – 135.05 MHz;
- Sydney (YQY) (46°09'N 60°03'W) – 119.42 MHz.
- Brevoort (63°20'N 64°08'W) – 132.025 MHz;
- Kuujjuaq (YVP) (58°05'N 68°25'W) – 134.2 MHz.

(ii) For those operators who do not receive the NAT track message, pilots are to contact Gander clearance delivery on one of the frequencies listed in RAC 11.8.3(a)(i) when within 200 NM of the frequency location. In the event that contact cannot be established, pilots are to advise ATC on the assigned control frequency.

(b) Pilots are to maintain a continuous listening watch on the assigned control frequency while obtaining the oceanic clearance.

(c) Unless the flight has received the message "CLA RECEIVED CLEARANCE CONFIRMED END OF MESSAGE," data link oceanic clearances must be verified with Gander clearance delivery during the times indicated above. Outside the indicated hours, oceanic clearances are to be verified on the appropriate control frequency.

(d) ATC will not normally advise pilots to contact Gander clearance delivery. There is no requirement for pilots to confirm receipt of an oceanic clearance (including a data link oceanic clearance) from Gander clearance delivery with the assigned control frequency.

(e) Due to frequency congestion on both the clearance delivery and control frequencies, pilots should refrain from unnecessary lengthy discussions with respect to oceanic clearances and procedures. Constructive comments and complaints should be processed post-flight through the company operations.

(f) Procedures and further information for flights intending to receive oceanic clearances via data link are published in Gander Datalink Oceanic Clearance Delivery (OCD) Crew Procedures.

11.9 Position Reports

11.9.1 Requirements

(a) Unless otherwise requested by ATC, flights shall make position reports at the significant points listed in the flight plan.

(b) The contents of a position report at geographical coordinates are to be expressed as follows:
  (i) for generally eastbound or westbound aircraft, latitude shall be expressed in degrees and minutes, longitude in degrees only; and
  (ii) for generally northbound or southbound aircraft, latitude shall be expressed in degrees only, longitude in degrees and minutes.

(c) Position reports shall include the reported position, the next reporting point and estimated time, and the succeeding reporting point as per the cleared route. If the estimated time over the next reporting point is found to be in error by three minutes or more, a revised estimated time shall be transmitted as soon as possible to the appropriate ATC unit.

(d) Position information shall be based on the best obtainable navigation fix. The time of fixing aircraft position shall be arranged so as to provide the most accurate position information and estimates possible.

(e) When making position reports, all times shall be expressed in UTC, giving both the hour and minutes.

11.9.2 Communications

(a) All flights operating in the Gander OCA should report on international air-to-ground frequencies.

(b) In addition to maintaining a listening watch on the appropriate en-route frequency, flights are to establish and maintain communication with Gander, Moncton, or Montréal as soon as possible in accordance with the following:
  (i) At FL290 or above:
    (A) 132.05, 230.3, 134.7 or 245.0 MHz for coastal fixes BOBTU to YYT when within 200 NM of YYT.
    (B) 133.9, 294.5, 125.9, 132.6 or 342.9 MHz for coastal fixes VIXUN to CYMON when within 200 NM of YQX.
    (C) 134.3 or 128.6 MHz for coastal fixes DOTTY to CARPE when within 200 NM of YAY.
    (D) 133.42 or 132.4 MHz for coastal fixes OYSTR and SCROD when within 200 NM of YYR.
    (E) 128.32 MHz for coastal fixes LOACH to MOATT when within 200 NM of HO.
    (F) 134.0 MHz when within 200 NM of YWK; 126.32 MHz when within 200 NM of YZV; 132.8 MHz when within 200 NM of YGR; 132.75, 133.7, 133.3 or 125.25 MHz when within 200 NM of YQY.
  (ii) At FL280 or below:
    (A) 133.15 or 227.3 MHz for coastal fixes BOBTU to VIXUN when within 150 NM of YYT.
    (B) 132.1 or 289.4 MHz for coastal fixes YQX and CYMON when within 150 NM of YQX
    (C) 133.0 or 371.9 MHz for coastal fixes DOTTY to CARPE when within 150 NM of YAY.
    (D) 120.4 or 294.5 MHz for coastal fixes OYSTR and SCROD when within 150 NM of YYR.
    (E) 135.4 MHz for coastal fixes LOACH to MOATT when within 150 NM of HO
    (F) 134.9 MHz when within 150 NM of Allen's Island (46°50'N 55°47'W); 132.3 or 247.0 when within 150 NM of YJT;

(c) Eastbound flights that traverse the Gander domestic FIR are required to establish contact with "Gander clearance delivery" in accordance with RAC 11.8.3.

(d) If an aircraft in the Gander OCA is unable to communicate with Gander Oceanic, pilots are to endeavour to pass position reports by relay through:
  (i) another oceanic centre with which communication has been established,
  (ii) another aircraft. In the NAT Region, when out of range of VHF ground stations, 123.45 MHz may be used for air-to-air communications, including the relaying of position reports; or
  (iii) another aircraft on frequency 121.5 or 243.0 MHz, if no other means is available.

11.10 Minimum Navigation Performance Specifications (MNPS)

(a) All operators are to ensure that aircraft used to conduct flights within NAT MNPSA have the minimum navigation equipment. For detailed requirements, refer to the following documents:
  (i) ICAO, Doc 7030—Regional Supplementary Procedures (NAT);
  (ii) ICAO, NAT Doc 001—Guidance and Information Material Concerning Air Navigation in the North (NAT Region);
  (iii) North Atlantic MNPS Airspace Operations Manual; and
  (iv) Parts VI and VII of the Canadian Aviation Regulations.

(b) Eastbound aircraft requesting an oceanic clearance from Gander ACC to enter MNPSA may be requested by ATC to confirm that they are approved for MNPS operations.

Pilots/operators unable to provide such confirmation will be issued an oceanic clearance to operate outside MNPSA (below FL285 or above FL420).

11.11 Reduced Vertical Separation Minimum (RVSM)—Minimum Aircraft System Performance Specifications (MASPS)

(a) All operators are to ensure that aircraft used to conduct flights within NAT MNPSA where RVSM is applied meet the MASPS. For detailed requirements, refer to the following publications:
   (i) ICAO, Doc 7030—Regional Supplementary Procedures (NAT);
   (ii) ICAO, NAT Doc 001—Guidance and Information Material Concerning Air Navigation in the North (NAT Region);
   (iii) North Atlantic MNPS Airspace Operations Manual; and
   (iv) Parts VI and VII of the Canadian Aviation Regulations.

(b) Eastbound aircraft requesting an oceanic clearance from Gander ACC to enter MNPSA at designated RVSM altitudes may be requested by ATC to confirm that they are approved for MNPS and/or RVSM operations. Pilots/operators unable to provide such confirmation will be issued an oceanic clearance to operate outside MNPSA (below FL285 or above FL420) and/or outside the RVSM designated altitudes, as applicable.

11.12 Adherence to Mach Number

(a) Turbojet aircraft, in oceanic airspace and Canadian Domestic Airspace, shall adhere to the Mach number assigned by ATC unless approval is obtained from ATC to make a change or until the pilot receives an initial descent clearance approaching destination. If it is essential to make an immediate temporary change in Mach number (e.g., as a result of turbulence), ATC shall be notified as soon as possible that such a change has been made.

(b) If it is not possible, because of aircraft performance, to maintain the last assigned Mach number during en route climbs and descents, pilots shall advise ATC at the time of the climb/descent request.

11.13 Operation of Transponders

The pilot should operate the transponder at all times on Mode A and C, Code 2000, during flight in the NAT Region. However, the last ATC assigned Code must be retained for a period of 30 min after entry into NAT airspace unless otherwise directed by ATC.

NOTE: This procedure does not affect the use of the special-purpose codes 7500, 7600 and 7700.

11.14 Meteorological Reports

On a routine basis, aircraft must make, record and report meteorological observations at each designated reporting point. However, aircraft cleared on an organized track should be required to make, record and report meteorological observations only upon a specific request by ATC. Such requests will be included in the oceanic clearance using the phrase "SEND MET REPORTS." ICAO AIREP form Model AR, as contained in Doc 4444, Air Traffic Management, Appendix 1, should be used for this purpose.

11.15 Adherence to Route

If an aircraft has inadvertently deviated from the route specified in its ATC clearance, it should take immediate action to regain the route within 100 NM from the position at which the deviation was observed.

11.16 Step-Climb Procedure

To facilitate the use of step-climbs, pilots should, on initial contact with ATC at each OCA boundary, include at the end of the position report the highest acceptable level and the time or position at which this level could be accepted.

Example:

POSITION AAL101, 51N 30W 0346 FL330 ESTIMATING 50N 40W 0440 NEXT 50N 50W WILL ACCEPT FL350 AT 40W.

11.17 Cruise Climbs and Altitude Reports

(a) Aircraft cleared for cruise climbs should report their level to the nearest 100 ft.

(b) For all altitude changes, either climbs or descents, pilots should report "reaching" the new level/cruising altitude to ATC.

11.18 In-Flight Contingencies

(a) All pilots transiting the North Atlantic should be thoroughly familiar with the in-flight contingency procedures for situations of rapid descent, turnback, diversion and reduction of navigation capability.

(b) In-flight contingency procedures are published in the following documents:
   (i) ICAO, Doc 7030—Regional Supplementary Procedures (NAT);
   (ii) ICAO, NAT Doc 001—Guidance and Information Material Concerning Air Navigation in the North Atlantic Region;
   (iii) North Atlantic MNPS Airspace Operations Manual; and
   (iv) ICAO, Doc 4444—Procedures for Air Navigation Services—Air Traffic Management (PANS-ATM)

11.19 Communications Failure–NAT Traffic

The following procedures are intended to provide general guidance for NAT aircraft experiencing a communications failure. These procedures are intended to complement and not supersede State procedures and regulations as contained in RAC 6.3.2. It is not possible to provide guidance for all situations associated with a communications failure.

11.19.1 General

(a) If the aircraft is so equipped, a pilot experiencing a two-way radio communications failure shall operate the transponder on Code 7600 and Mode C.

(b) The pilot shall attempt to contact any ATC facility, inform them of the difficulty, and request that information be relayed to the ATC facility with which communications are intended.

11.19.2 Communications Failure Prior to Entering NAT Oceanic Airspace

(a) If operating with a received and acknowledged oceanic clearance, the pilot should enter oceanic airspace at the cleared oceanic entry point, flight level and speed, and proceed in accordance with the received and acknowledged oceanic clearance. Any flight level or speed changes required to comply with the oceanic clearance should be completed within the vicinity of the oceanic entry point. The "cleared oceanic flight level" is the flight level contained in the oceanic clearance.

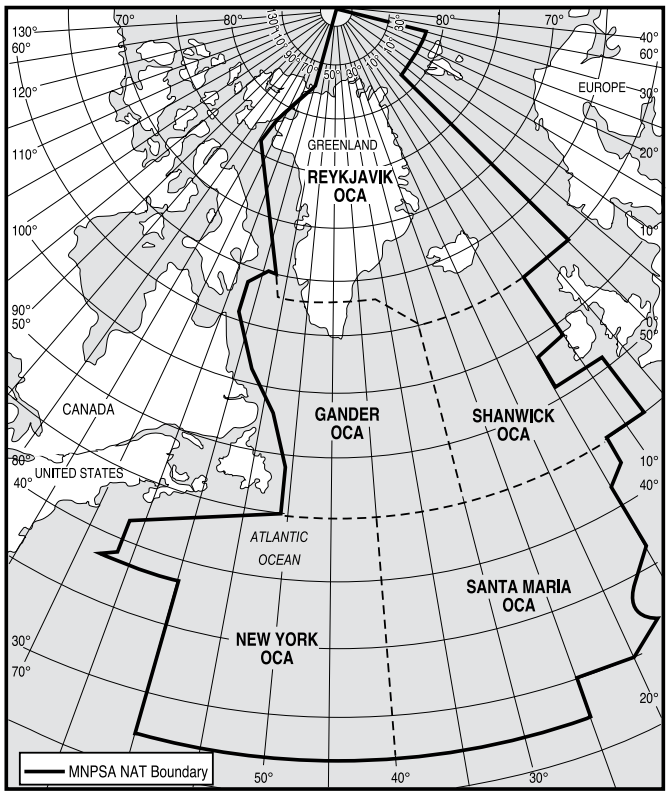
(b) If operating without a received and acknowledged oceanic clearance, the pilot should enter oceanic airspace at the first oceanic entry point, flight level and speed, as contained in the filed flight plan, and proceed via the filed flight plan route to landfall. The first oceanic flight level and speed should be maintained to landfall.

11.19.3 Communications Failure Prior to Exiting NAT Oceanic Airspace

(a) If cleared on the flight plan route, the pilot should proceed in accordance with the last received and acknowledged oceanic clearance, including flight level and speed, to the last specified oceanic route point, normally landfall; continue on the flight plan route; maintain the last assigned oceanic flight level and speed to landfall; and, after passing the last specified oceanic route point, conform with the relevant State procedures and regulations.

(b) If cleared on other than the flight plan route, the pilot should proceed in accordance with the last received and acknowledged oceanic clearance, including flight level and speed, to the last specified oceanic route point, normally landfall. After passing this point, the pilot should conform with the relevant State procedures and regulations, rejoining the filed flight plan route by proceeding, via published ATS routes where possible, to the next significant point ahead as contained in the filed flight plan.

Figure 11.2 – North Atlantic Minimum Navigation Performance Specification Airspace (NAT MNPSA) Between FL285 and FL420



11.20 North Atlantic Minimum Navigation Performance Specification Airspace

11.20.1 General

(a) Compliance with MNPS is required by all aircraft operating within the following defined airspace boundaries:
(i) between FL285 and FL420,
(ii) between latitudes 27˚N and the North Pole,
(iii) bounded in the east, by the eastern boundaries of CTAs Santa-Maria, Shanwick Oceanic and Reykjavik, and
(iv) in the west, by the western boundaries of CTAs Reykjavik and Gander and New York Oceanic, excluding the area west of 60˚W and south of 38˚30'N.

(b) Operators of Canadian-registered aircraft intending to fly in MNPS airspace will be required to show that they meet

all the applicable standards. Information on the measures necessary to gain approval may be obtained from:

Equipment Installation Approval:

Transport Canada Safety and Security
Regional Airworthiness Engineer
(See GEN 1.0 for the appropriate Regional Office)

Operating Standards Commercial Air Carriers and Private Operators:

Transport Canada Safety and Security
Director, Commercial and Business Aviation (AARX)
Ottawa ON K1A 0N8

Fax: 613 954-1602

11.20.2 Time Keeping Procedures

Prior to entry into MNPS airspace, the time reference system(s) to be used during the flight for calculation of way point Estimated Times of Arrival (ETAs) and way point Actual Times of Arrival (ATAs) should be synchronized to UTC. All ETAs and ATAs passed to ATC should be based on a time reference that has been synchronized to UTC or equivalent. Acceptable sources of UTC include the following:

(a) WWV – National Institute of Standards and Technology (NIST: Fort Collins, Colorado, U.S.). WWV operates 24 hours a day on 2500, 5000, 10000, 15000, 20000 kHz (AM/SSB) and provides UTC voice every minute;

(b) GPS (corrected to UTC) – Available 24 hours a day to those pilots that can access the time via approved on board GPS (TSO-C129) equipment;

(c) CHU – National Research Council (NRC: Ottawa, Canada). Available 24 hours a day on 3330, 7850, 14670 kHz (SSB). In the final ten-second period of each minute, a bilingual station identification and time announcement is made in UTC;

(d) BBC – British Broadcasting Corporation (Greenwich, U.K.). The BBC transmits on a number of domestic and worldwide frequencies and transmits the Greenwich time signal (referenced to UTC) once every hour on most frequencies, although there are some exceptions;

(e) Any other source shown to the State of Registry or State of Operator (as appropriate) to be an equivalent source of UTC.

11.20.3 Provisions for Partial Loss of Navigation Capability

If an aircraft suffers partial loss of navigation capability (only one long-range navigation system serviceable) prior to entry into oceanic airspace, the following routes should be considered:

(a) Stornoway – 60°N 10°W – 61°N 12°34'W – ALDAN – Keflavik;

Benbecula – 61°N 10°W – ALDAN – Keflavik;

(b) Machrihanish, Belfast, Glasgow, Shannon – 57°N 10°W – 60°N 15'W – 61°N 16'30'' BREKI – Keflavik;

(c) Keflavik – GIMLI – Kulusuk – Sondre Stromfjord – FROBAY;

(d) Keflavik – EMBLA – 63°N 30°W – 61°N 40°W – Prins Christian Sund;

(e) Prins Christian Sund – 59°N 50°W – PRAWN – NAIN;

(f) Prins Christian Sund – 59°N 50°W – PORGY – Hopedale;

(g) Prins Christian Sund – 58°N 50°W – LOACH – Goose VOR;

(h) Sondre Stromfjord – 67°N 60°W – Pangnirtung (YXP);

(i) Kook Islands – 66°N 60°W – Pangnirtung (YXP);

(j) Kook Islands – 64°N 60°W – 64°N 63°W (LESAM) – FROBAY; and

(k) Reykjanesskoli – 69°30'N 22°40'W – Constable Pynt.

These routes are subject to the following conditions:

(i) sufficient navigation capability remains to meet the MNPS and the requirements in ICAO Annex 6, Part I, Chapter 7 (sec. 3) and ICAO Annex 6, Part II, Chapter 7 (sec. 2) can be met by relying on the use of short-range navigation aids,

(ii) a revised flight plan is filed with the appropriate ATS unit, and

(iii) an ATC clearance is obtained.

NOTES

1: A revised oceanic clearance will be issued after co-ordination between all oceanic ACCs concerned.

2: If the organized track system extend to the northern part of the NAT Region, the aircraft concerned may be required to accept a lower than optimum flight level in the revised oceanic clearance, especially during peak traffic periods.

3: This guidance material does not relieve the pilot to take the best possible course of action in light of the prevailing circumstances.

11.20.4 Special Routes for Aircraft Fitted with a Single Long-Range Navigation System

Aircraft, having State approval for operating in MNPS airspace, which are equipped with normal short-range navigation equipment (VOR/DME, ADF) and at least one fully operational set of one of the following navigation equipment are considered capable of meeting the MNPS while operating along the following routes:

(a) Equipment

(i) DOPPLER with computer;

(ii) INS;
(iii) GPS approved in accordance with the requirements specified in Technical Standard Order (TSO) C-129 (Class A1, A2, B1, B2, C1, or C2); and
(iv) Flight Management System (FMS) or Inertial Reference System (IRS).

(b) Routes (referred to as Blue Spruce routes)
(i) Stornoway – 60˚N 10˚W – 61˚N 12˚34'W – ALDAN – Keflavik (HF required on this route), Benbecula – 61˚N 10ºW – ALDAN – Keflavik [VHF coverage exists and, subject to prior co-ordination with Scottish Airways and Prestwick (Shanwick OACC), this route may be used by non-HF equipped aircraft],
(ii) Machrihanish, Belfast, Glasgow, Shannon – 57˚N 10˚W – 60˚N 15˚W – 61˚N 16˚30'W – BREKI Keflavik (HF required on this route),
(iii) Keflavik – GIMLI – Kulusuk – Sondre Stromfjord – FROBAY,
(iv) Keflavik – EMBLA – 63˚N 30˚W – 61˚N 40˚W – Prins Christian Sund,
(v) Prins Christian Sund – 59˚N 50˚W – PRAWN – NAIN,
(vi) Prins Christian Sund – 59˚N 50˚W – PORGY – Hopedale,
(vii) Prins Christian Sund – 58˚N 50˚W – LOACH – Goose VOR,
(viii) Sondre Stromjford – 67˚N 60˚W – Pangnirtung (YXP),
(ix) Kook Islands – 66˚N 60˚W – Pangnirtung (YXP)
(x) Kook Islands – 64˚N 60˚W – 64˚N 63˚W (LESAM) – FROBAY,
(xi) Reykjanesskoli – 69˚30'N 22˚40'W – Constable Pynt,
(xii) Cork – 50˚N 09˚W – 49˚N 09˚W – 45˚N 09˚W – Santiago VOR Lands End – 51˚N 08˚W (HF required on this route),
(xiii) Funchal/Porto Santo – Santa Maria/Ponta Delgada, and
(xiv) Lisboa Porto Faro – Ponta Delgada/Santa Maria/ Lajes

11.20.5 Special Routes for Aircraft Fitted with Short-Range Navigation Equipment Operating Between Iceland and Other Parts of Europe

Aircraft having State approval for operating in MNPS airspace provided with normal short-range navigation equipment (VOR/DME, ADF) operating on the routes below and within MNPS airspace are considered capable of meeting the MNPS.

(a) Flesland – Myggences – INGO – Keflavik (G3); and

(b) Sumburgh – Akraberg – Myggenes (G11).

11.20.6 Aircraft Without MNPS Capability

(a) Non-approved MNPS aircraft will not be issued a clearance to enter into MNPS airspace.

(b) Non-approved MNPS aircraft may be cleared to climb or descend through MNPS airspace provided:
(i) the climb or descent can be completed within 200 NM of the Gander VORTAC (YQX), St. John's, VOR/DME (YYT), St.Anthony VOR/DME (YAY), Goose VOR/DME (YYR), or within the radar coverage of Gander, Moncton and Montréal ACCs; and
(ii) MNPS aircraft affected by such a climb or descent are not penalized.

11.20.7 Monitoring of Gross Navigation Errors

(a) In order to ensure that the required navigation standards are being observed within the MNPSA, a continuous monitoring of the navigation accuracy of aircraft in this airspace takes place using radars in Canada, Ireland, France, Iceland and the United Kingdom. In cases of a gross navigation error, the pilot will normally be notified by the ATC unit observing the error. The subsequent investigation to determine the error will involve the ATC unit, the operator and the State of Registry.

(b) If there is a serious increase in the number of large errors, it may become necessary to increase separation standards until remedial action has been determined. Alternatively, if rapid corrective action cannot be achieved, it may be necessary for the State of Registry or the State of the Operator to temporarily exclude offending types of aircraft or operators from the MNPS airspace.

11.21 North Atlantic Reduced Vertical Separation Minimum

11.21.1 General

In the North Atlantic, Reduced Vertical Separation Minimum (RVSM) airspace is that airspace within the geographic extent of the NAT Region from FL290 to FL410 inclusive.

11.21.2 RVSM Details and Procedures

For RVSM details and procedures applicable to both the NAT and Canadian Domestic airspace see RAC 12.17.

11.21.3 Flight Level Allocation Scheme

11.21.3.1 Flight Level Availability

Following statistical analysis and discussions between the NAT ATS Units, it was decided that the North Atlantic Flight Level Allocation System will:

(a) utilise additional levels made available by RVSM expansion;

(b) standardize the flight level profiles available for eastbound traffic originating in the New York/Santa Maria areas during the eastbound flow, with a view to incorporating the functionality of automated data transfer links; and

(c) ensure that economic profiles are available for westbound aircraft routing from the Reykjavik OAC.

11.21.3.2 Procedures

The procedures entail the establishment of a night datum line, south of which is reserved principally for traffic originating in New York/Santa Maria.

The procedures entail the establishment of a north datum line, on or north of which is reserved for late-running westbound traffic from Reykjavik to Gander.

Aircraft operators are advised to flight plan using the flight levels specified in this document, relative to their particular flight(s).

These procedures involve dedicating particular flight levels to eastbound traffic and allocating these flight levels to specific OACs, using the night datum line.

The westbound OTS message will be published using FL310 to FL390. Gander will publish the eastbound OTS message using FL310 to FL400. However, FL310 will only be used for "New York tracks" (see section 11.21.3.4).

The hours of validity for the westbound (day-time) OTS shall be published as 1130 to 1900 UTC at 030°W.

The hours of validity for the eastbound (night-time) OTS shall be published as 0100 to 0800 UTC at 030°W.

11.21.3.3 Delegated Opposite Direction Levels (ODL)

Gander will accept FL310 as a westbound flight level 24 hours a day, subject to eastbound Caribbean (CAR)/South American (SAM) traffic, as described in section 11.21.3.4.

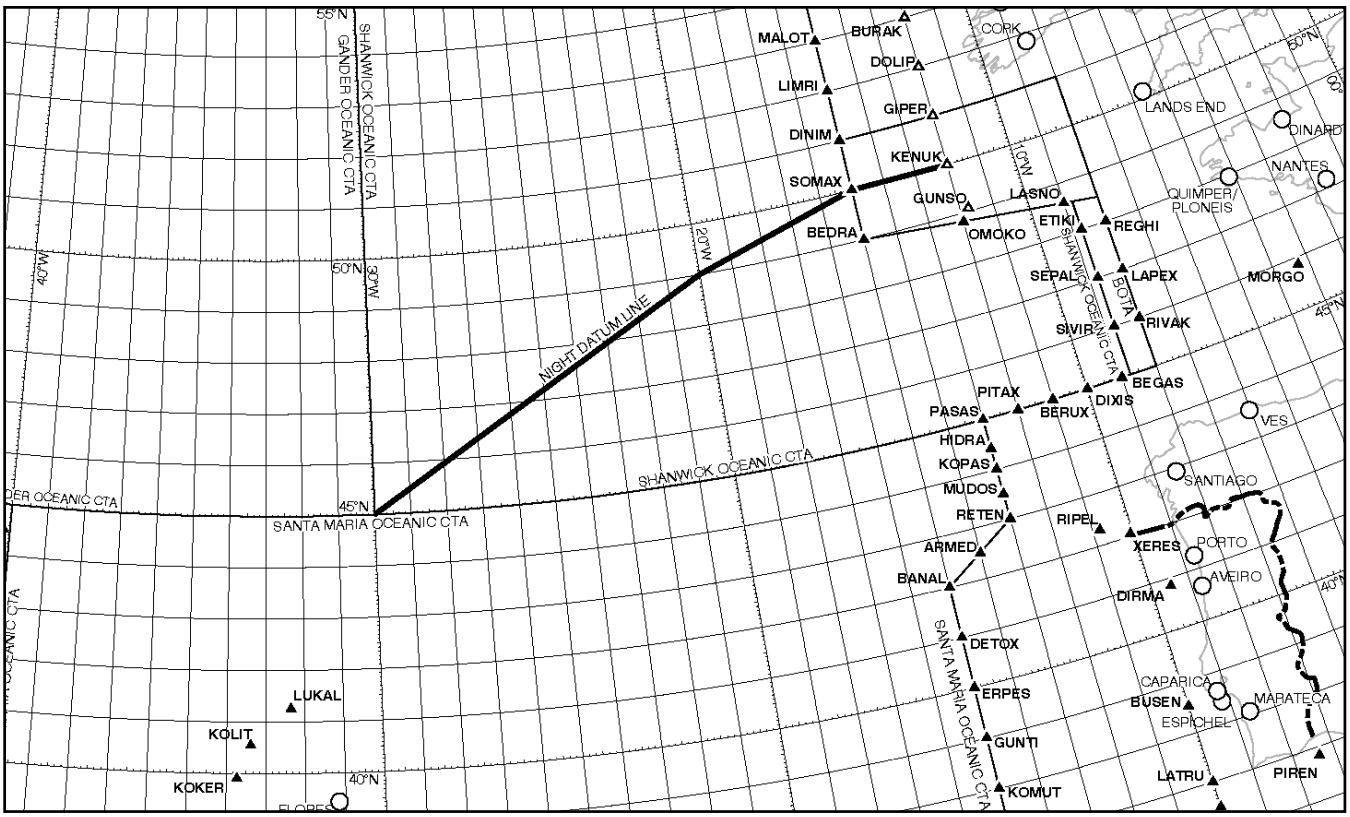
During the eastbound OTS hours of validity, a static datum line, known as the night datum line, is established with the following co-ordinates:

45°N 030°W 49°N 020°W SOMAX KENUK

FL360 and FL380 are delegated to Gander for use by eastbound traffic on and to the north of the night datum line.

FL360 will not be used for Gander eastbound traffic to the south of the night datum line.

FL380 will not be used for Gander eastbound traffic to the south of the night datum line or the eastbound OTS, whichever is further south.



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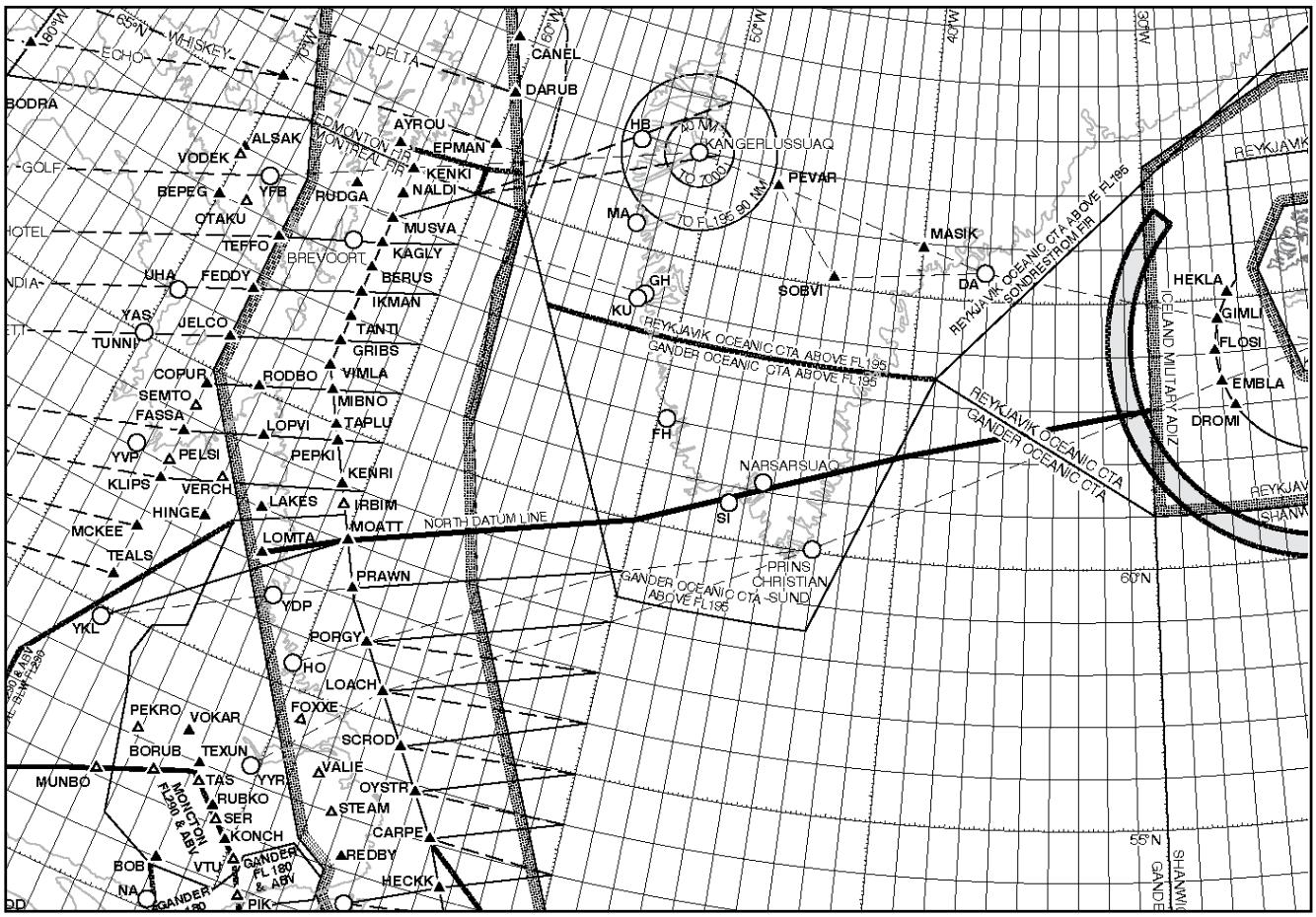
During the westbound OTS hours of validity, Gander delegates FL330 to Shanwick for use by westbound traffic.

Between 0300 and 0700 UTC, a static datum line, known as the north datum line, is established with the following co-ordinates:

LOMTA MOATT 60°N 050°W 62°N 040°W 63°N°030°W

On and to the north of the north datum line, FL380 is delegated to Reykjavik for use by westbound traffic.

In the event of a high volume of north random flights and/or OTS tracks, the north datum line may be suspended to accommodate the anticipated eastbound traffic demand.



11.21.3.4 Eastbound Traffic Originating in New York/Santa Maria During Eastbound OTS Hours of Validity

Eastbound traffic routing south of both the night datum line and the main OTS should flight plan using FL310, FL340, FL360 or FL380.

Eastbound traffic remaining south of the night datum line should flight plan using FL310 or FL360. The flight levels allocated to New York tracks entering Shanwick OCA that cross, or route south of, the night datum line may be any combination of FL310, FL340, FL360 and FL380, as agreed between Santa Maria and New York.

For this procedure, "New York tracks" are eastbound OTS tracks that originate in the New York area and are separated from the main OTS by more than one degree at 030°W.

11.21.3.5 Iberian Tracks

Iberian tracks are eastbound or westbound organized tracks, routing between New York and Santa Maria, which do not enter Gander or Shanwick airspace.

The flight levels allocated to Iberian tracks will be any combination of FL330, FL350 and FL370, as agreed between Santa Maria and New York.

11.21.3.6 OTS Design and Use

For all westbound tracks that landfall at or north of PRAWN, Reykjavik OAC requires FL340 to be omitted from those tracks to allow profiles for aircraft originating in the Reykjavik OCA. During the westbound OTS hours of validity, controllers at Shanwick shall not clear westbound aircraft that landfall at or north of PRAWN at FL340, except for random

flights that cross 61°N at or east of 020°W and route at or north of 63°N 030°W.

11.21.3.7 OTS Changeover Periods

The time period between one OTS expiring and another set commencing is known as the OTS changeover period. The following procedures are in place to accommodate the majority of aircraft.

Basic principles

All times relate to 030°W.

OTS changeover rules apply from 0801 to 1129 UTC and from 1901 to 0059 UTC. During these times, flight levels shall be applied in accordance with the direction of flight except as stated below.

General principles

Westbound traffic crossing 030°W from 2230 to 0059 UTC shall remain clear of the incoming OTS and shall not use delegated opposite direction levels (ODL) (FL360 and FL380). After 2230 UTC, the OTS and ODLs (FL360 and FL380) are released to Gander, who may clear eastbound aircraft, taking into account and giving priority to already cleared westbound aircraft.

Eastbound traffic crossing 030°W from 1000 to 1129 UTC shall remain clear of the incoming OTS at FL350 and shall not use the delegated ODL (FL330). After 1000 UTC, the OTS (at FL330 and FL350) and ODL (FL330) are released to Shanwick, who may clear westbound aircraft, taking into account and giving priority to already cleared eastbound aircraft.

Eastbound traffic at FL370 and FL390 and crossing 030°W from 1030 to 1129 UTC shall remain clear of the incoming OTS. After 1030 UTC, the OTS (at FL370 and FL390) are released to Shanwick, who may clear westbound aircraft, taking into account and giving priority to already cleared eastbound aircraft.

At the end of westbound (day-time) OTS, westbound aircraft crossing 030°W up until 1900 UTC at the ODL (FL330) or on the OTS shall have priority over eastbound aircraft. Eastbound aircraft shall be cleared by Shanwick, taking into account and giving priority to already cleared westbound aircraft.

At the end of eastbound (night-time) OTS, eastbound aircraft crossing 030°W up until 0800 UTC at the ODLs (FL360 and FL380) or on the OTS shall have priority over westbound aircraft. Westbound aircraft shall be cleared by Gander, taking into account and giving priority to already cleared eastbound aircraft.

The table below summarises the above:

Level	Time (UTC)	Direction
FL430	24 hours	Westbound May be flight planned as eastbound by non-RVSM aircraft.
FL410	24 hours	Eastbound
FL400	0801–2229 2230–0059 0100–0800	Westbound Westbound (avoiding OTS) Eastbound OTS (subject to westbounds) Westbound (avoiding OTS) Eastbound (OTS)
FL390	1901–1029 1030–1129 1130–1900	Eastbound Eastbound (avoiding OTS) Westbound OTS (subject to eastbounds) Eastbound (avoiding OTS) Westbound (OTS)
FL380	0300–0700 0801–2229 2230–0059 0100–0800	Westbound (ODL) Westbound Eastbound (subject to westbounds) Eastbound (OTS and ODL)
FL370	1901–1029 1030–1129 1130–1900	Eastbound Eastbound (avoiding OTS) Westbound OTS (subject to eastbounds) Eastbound (avoiding OTS) Westbound (OTS)
FL360	0801–2229 2230–0059 0100–0800	Westbound Eastbound (subject to westbounds) Eastbound (OTS and ODL)
FL350	1901–0959 1000–1129 1130–1900	Eastbound Eastbound (avoiding OTS) Westbound OTS (subject to eastbounds) Eastbound (avoiding OTS) Westbound (OTS)
FL340	0801–2229 2230–0059 0100–0800	Westbound Westbound (avoiding OTS) Eastbound OTS (subject to westbounds) Westbound (avoiding OTS) Eastbound (OTS)
FL330	1901–0959 1000–1129 1130–1900	Eastbound Westbound (subject to eastbounds) Westbound (OTS and ODL)
FL320	0801–2229 2230–0059 0100–0800	Westbound Westbound (avoiding OTS) Eastbound OTS (subject to westbounds) Westbound (avoiding OTS) Eastbound (OTS)
FL310	24 hours	Westbound
FL300	24 hours	Westbound
FL290	24 hours	Eastbound

11.21.4 NAT RVSM Aircraft Approvals

(a) An aircraft will not be permitted to operate at RVSM designated altitudes until RVSM (operational) approval has been awarded.

(b) For group aircraft to be approved for NAT RVSM operations, it is required to:
- (i) have MNPS (horizontal navigation performance) approval;
- (ii) obtain RVSM airworthiness approval (MASPS compliant); (iii) demonstrate acceptable height-keeping performance through monitoring; and
- (iii) obtain RVSM (operational) approval from the aircraft State authority.

(c) For non-group aircraft, operators must apply for operating authority individually. Monitoring by an HMU or GMU is a prerequisite to obtain RVSM (operational) approval unless flight test evidence can be provided to the State to show that each airframe is compliant with Altimetry System Error (ASE) targets.

(d) Operators of Canadian-registered aircraft intending to fly in NAT MNPS/RVSM airspace will be required to show that they meet all of the applicable standards. Further information on the measures necessary to gain approval may be obtained from the following:

Airworthiness Approvals

Transport Canada Safety and Security
Director, Aircraft Certification (AARD)
Ottawa ON K1A 0N8
Fax: 613 996-9178

Operational Standards – Commercial Air Carriers and Private Operators

Transport Canada Safety and Security
Director, Commercial and Business Aviation (AARX)
Ottawa ON K1A 0N8
Fax: 613 954-1602

RVSM Maintenance Programs

Transport Canada Safety and Security
Director, Aircraft Maintenance and Manufacturing (AARP)
Ottawa ON K1A 0N8
Fax: 613 996-9178

11.21.5 Central Monitoring Agency (CMA)

(a) The Regional Monitoring Agency for the NAT is the Central Monitoring Agency (CMA) located in Prestwick, U.K. and may be contacted as follows:

North Atlantic Central Monitoring Agency
c/o National Air Traffic Services
Room G41
Scottish & Oceanic Area Control Centre,
Sherwood Road,
Prestwick,
Ayrshire
KA9 2NR
United Kingdom

Tel: .....+44 (0) 1292 692412
HMU Status (recorded message).....+44 (0) 1292 692760
Fax: .....+44 (0) 1292 692754
E-mail: .....*natcma@nats.co.uk*

(b) Information on the responsibilities and procedures applicable to the CMA are contained in "ICAO, NAT Doc 001 – Guidance and Information Material concerning Air Navigation in the North Atlantic Region" and through the internet at *http://www.paris.icao.int/.*

11.21.6 Height Monitoring

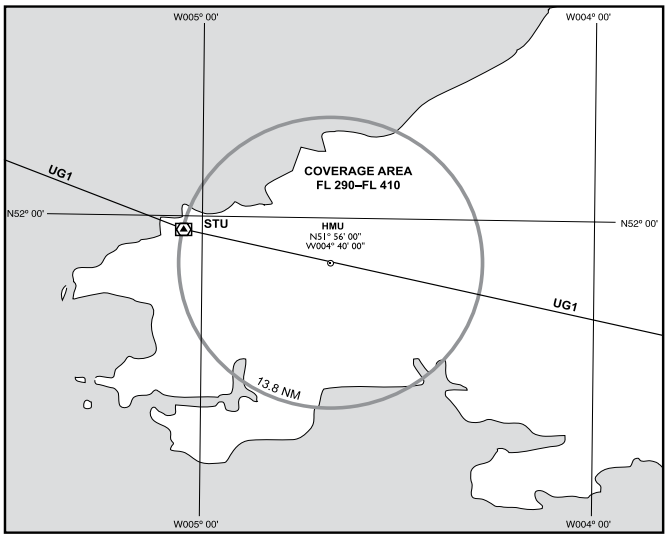
For the NAT, height monitoring is carried out using a hybrid system comprising a fixed ground-based height monitoring unit (HMU) and a GPS-based monitoring system comprising portable GPS monitoring units (GMU).

11.21.7 Height Monitoring Unit (HMU)

(a) The HMU site is located at Strumble, UK—15 NM east of the Strumble VOR/DME (STU), beneath Upper ATS UG1, at co-ordinates 51°56'00"N 04°40'00"W (Figure 11.3).

(b) The coverage area for the Strumble HMU is a 13.8 NM radius circle from FL290 to FL410 inclusive.

Figure 11.3—Strumble HMU



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Pre-flight Procedures

(a) Operators proposing to divert from an optimum route in order to fly over the Strumble HMU should check the HMU status at 44 171 832-6031 (UK) for serviceability information. Every effort will be made to ensure that the promulgated information is accurate, but operators should note that the equipment may become unserviceable on short notice.

(b) Aircraft for monitoring should be flight planned to route over STU. Item 18 of the flight plan is to include both the aircraft registration (if not included in Item 7) and the remarks "RMK/HMU FLT STU."

In-flight Procedures

Prior to an over-flight of an HMU, pilots are requested to transmit "for HMU flight" to London Control on initial contact. Operational requirements permitting, ATC will endeavour to accommodate the flight.

Post-flight Procedures

(a) ATC is not aware whether an aircraft has been successfully monitored by the HMU. Operators wishing to ascertain this information may send a fax to the NAT CMA.

(b) Operator queries for specific over-flights may be made to the NAT CMA. Such queries should include the Mode S or A codes and approximate time of over-flight.

11.21.8 GMU Monitoring

(a) GMUs are available for those aircraft that do not wish to be monitored by overflying an HMU.

(b) For GMU services to conduct a height-monitoring flight see RAC 12.16.9.

11.21.9 Further Information

Information on the RVSM program is available on the Internet by visiting the ARINC bulletin board at <*http://www.arinc.com*> and calling up the RVSM pages. Aircraft that are successfully monitored will be promulgated via the bulletin board. Operators will be notified by fax or telephone of individual access codes on the first occasion that its aircraft are placed on the board. More information may be obtained by contacting ARINC Inc.:

Tel.: 410 266-4891;
Fax: ..... 410 573-3007.

11.22 Strategic Lateral Offset Procedures (SLOP) in the North Atlantic

The Strategic Lateral Offset Procedure (SLOP) is now a standard operating procedure throughout the North Atlantic (NAT) Region. This procedure mitigates collision risk and wake turbulence encounters. Pilots conducting oceanic flights within the NAT Region with automatic offset programming capability are recommended to fly lateral offsets of either 1 or 2 NM right of centreline.

The introduction of very accurate aircraft navigation systems, along with sophisticated flight management systems, has drastically reduced the number of risk bearing lateral navigation errors reported in NAT airspace. Paradoxically, the capability of aircraft to navigate to such a high level of accuracy has led to a situation where aircraft on the same track but at different levels, are increasingly likely to be in lateral overlap. This results in an increased risk of collision if an aircraft departs from its cleared level for any reason.

SLOP reduces risk by distributing aircraft laterally. It is applicable within the New York Oceanic, Gander Oceanic, Shanwick Oceanic, Santa Maria Oceanic, Søndrestrøm and Reykjavik flight information regions, and within the Bodø Oceanic flight information region when flights are operated more than 185 km (100 NM) seaward from the shoreline.

SLOP conforms to direction in the International Civil Aviation Organization's (ICAO) Procedures for Air Navigation Services–Air Traffic Management (PANS–ATM, Doc 4444, 15.2.4) and is subject to the following guidelines:

- Aircraft without automatic offset programming capability must fly the route centreline.
- Operators capable of programming automatic offsets may fly the centreline or offset one or two nautical miles right of centreline, allowing for 3 possible positions along route. Offsets are not to exceed 2 NM right of centreline and offsets to the left of centreline are not permitted. An aircraft overtaking another aircraft should offset within the confines of this procedure, if capable, so as to create the least amount of wake turbulence for the aircraft being overtaken. The pilot should take into account wind and estimated wake vortex drift and time to descend. (Nominal descent rates for wakes are 300-600 fpm.)
- Pilots should use whatever means are available (e.g., TCAS, communications, visual acquisition) to determine the best flight path to fly. Pilots may contact other aircraft on frequency 123.45, as necessary, to coordinate the best wake turbulence offset option.
- Pilots may apply an offset outbound after the oceanic entry point and must return to centreline before the oceanic exit point. Position reports transmitted via voice should be based on the waypoints of the current ATC clearance and not the offset positions.

- Aircraft transiting oceanic radar areas may remain on their established offset positions.

- There is no ATC clearance required for this procedure and it is not necessary that ATC be advised.

12.0 AIR TRAFFIC CONTROL (ATC) SPECIAL PROCEDURES

12.1 Adherence to Mach Number

(a) Within CDA, aircraft shall adhere to the Mach number assigned by ATC, to within 0.01 Mach, unless approval is obtained from ATC to make a change or until the pilot receives the initial descent clearance approaching destination. If it is necessary to make an immediate temporary change in the Mach number (e.g. because of turbulence), ATC shall be notified as soon as possible that such a change has been made.

(b) If it is not possible to maintain the last assigned Mach number during en route climbs and descents because of aircraft performance, pilots shall advise ATC at the time of the climb/descent request.

12.2 Parallel Offset Procedures

(a) ATC may request that an aircraft fly a parallel offset from an assigned route. This manoeuvre and subsequent navigation is the responsibility of the pilot. When requested to offset or regain the assigned route, the pilot should change heading by 30˚ to 45˚ and report when the offset or assigned route is attained.

(b) In a radar environment, ATC will provide radar monitoring and the required separation.

(c) In a non-radar environment, ATC will apply parallel offsets to RNPC-certified aircraft operating within high-level RNPC airspace in order to accomplish an altitude change with respect to same direction aircraft.

(d) The following phraseology is normally used for parallel offset procedures:

PROCEED OFFSET (number) MILES (right/left) OF CENTRELINE (track/route) AT (significant point/time) UNTIL (significant point/time).

12.3 Structured Airspace

During specific periods, certain portions of domestic high-level airspace may be structured for one-way traffic in which cruising flight levels inappropriate to the direction of the aircraft track may be assigned by ATC. Aircraft operating in a direction contrary to the traffic flow will be assigned those cruising flight levels appropriate to the direction of track except in specific instances, such as turbulence. When the airspace is not structured for one-way traffic, appropriate cruising flight levels will be used. ATC will transition aircraft to the appropriate cruising flight level for the direction of track before aircraft exit the defined areas or before termination of the indicated times.

12.4 Required Navigation Performance Capability (RNPC) Airspace

12.4.1 Definition

(a) RNPC airspace is that controlled airspace within the CDA as defined in the *Designated Airspace Handbook* (DAH) (TP 1820E). This airspace is established to accommodate RNAV operations and is contained within the SDA and NCA.

(b) To conduct RNAV operations (fixed or random routes) in the designated airspace, in which reduced ATC separation criteria can be applied, the required aircraft navigation equipment must be certified as being capable of navigating within specified tolerances.

(c) Separation in accordance with RNPC may be applied for flights within those portions of the Gander Oceanic and New York Oceanic FIR that are designated part of the Gander Domestic or Moncton Domestic CTA.

12.4.2 Aircraft Navigation Equipment for RNPC

(a) Only aircraft certified by the State of Registry or the State of the Operator as meeting the RNPC are permitted to conduct RNAV operations.

(b) Long range RNAV systems must be certified and capable of navigation performance that permits position determination within ±4 NM. Such navigation performance capability shall be verified by the State of Registry or the State of the Operator, as appropriate.

(c) Aircraft that have the required navigation equipment for operations in CMNPS and NAT MNPS airspaces satisfy all requirements for RNPC.

(d) The minimum navigation equipment for RNPC operation is one certified long range RNAV system, plus a short range navigation system (VOR/DME or ADF).

12.4.3 Operator Certification for RNPC

(a) The requirement for operator certification for RNPC does not apply to general aviation. RNPC operator certification applies only to air, private and foreign operators conducting RNPC operations. Certification of operators is dependent upon crew training and navigation equipment that meets the

applicable *Commercial Air Service Standards* or *Private Operator Passenger Transportation Standards*. Such navigation performance capability shall be verified by the State of Registry or the State of the Operator, as appropriate.

(b) Canadian operators intending to operate in RNPC airspace using RNAV operations should contact the following for details of the certification requirements:

Equipment and Installation Approval

Transport Canada Safety and Security
Regional Aircraft Certification Engineer
(See GEN 1.0 for the appropriate regional office.)

Operating Standards Approval

Transport Canada Safety and Security
Director, Commercial and Business Aviation (AARX)
Tower C, Place de Ville
Ottawa ON K1A 0N8

Fax: 613-954-1602

12.4.4 Flight Planning Procedure

If operating in RNPC and conducting RNAV operations, flights may indicate one of the combinations in this table. The use of the equipment suffix "R" followed by the Performance Based Navigation in item 18 of the flight plans is acceptable for RNPC. The use of equipment suffix "X" (MNPS certification) and CMNPS (reference 12.5.5) are acceptable in lieu of RNPC certification.

RNPC Field 10 a	Field 18	Certification Specification
X		MNPS
G	NAV/	Indicate GNSS augmentation if any are specified
I		Inertial Navigation
R	PBN/A1	RNAV10 (RNP10)
R	PBN/L1	RNP4
R	PBN/B1	RNAV5 all permitted sensors
R	PBN/B2	RNAV5 GNSS
R	PBN/B2B3	RNAV5 GNSS + RNAV5 DME/DME
R	PBN/B2B4	RNAV5 GNSS + RNAV5 VOR/DME
R	PBN/B3B4	RNAV5 DME/DME + RNAV5 VOR/DME
R	PBN/B3B5	RNAV5 DME/DME + RNAV5 INS/IRS
R	PBN/B4B5	RNAV5 VOR/DME + RNAV5 INS/IRS
R	PBN/B5	RNAV5 INS/IRS
R	PBN/C1	RNAV2 all permitted sensors
R	PBN/C2	RNAV2 GNSS
R	PBN/C2C3	RNAV2 GNSS + RNAV2 DME/DME
R	PBN/C4	RNAV2 DME/DME/IRU

12.4.5 RNAV/DME Distance

ATC requests for distance information from RNAV-certified aircraft shall be based on RNAV distances. DME based on TACAN or VOR/DME shall be used only if ATC indicates such information in the request.

12.4.6 RNAV Equipment Failure Procedures

RNAV operations and the associated ATC separation minima depend upon the accuracy of the RNAV systems. ATC is to be advised immediately at any time that a pilot is uncertain of the aircraft position or of an on-board navigation system failure or degradation.

12.5 CMNPS AIRSPACE

12.5.1 Definition

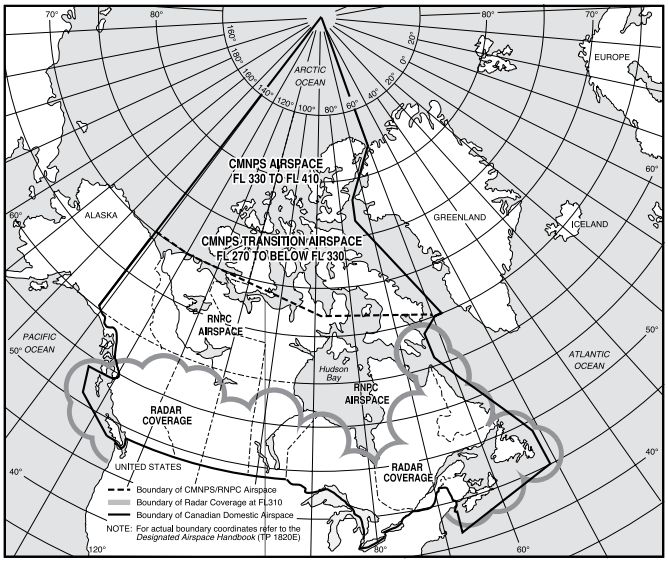
(a) CMNPS airspace is that controlled airspace within CDA, between FL 330 and FL 410 inclusive, as defined in the DAH (TP 1820E) and depicted in Figure 12.1. This airspace is contained for the most part in the ACA and NCA, with a small portion in the SCA.

(b) To conduct RNAV operations in CMNPS airspace, in which reduced ATC separation criteria can be applied, aircraft must be certified as being capable of navigating within specified tolerances.

12.5.2 CMNPS Transition Airspace

In order to permit both CMNPS-certified and non-certified aircraft to operate above FL 270, a transition area exists from FL 270 to below FL 330 underlying the lateral limits of CMNPS airspace.

Figure 12.1–CMNPS, RNPC and CMNPS Transition Airspace



RAC

12.5.3 Aircraft Navigation Equipment for CMNPS

(a) Only aircraft with navigation equipment certified by the State of Registry or the State of the Operator as meeting the MNPS of either the NAT or Canada are permitted to operate within CMNPS airspace, unless the ATC unit concerned indicates that the non-certified aircraft may be accommodated without penalizing certified aircraft.

(b) Required long range RNAV systems must be certified and shown capable of navigation performance such that:
- (i) the standard deviation of lateral track errors is less than 6.3 NM;
- (ii) the proportion of total flight time spent by aircraft 30 NM or more off the cleared track is less than 5.3 x 10-4 (i.e. less than 1 hr in about 2 000 flight hours); and
- (iii) the proportion of total flight time spent by aircraft between 50 and 70 NM off the cleared track is less than 13 x 10-5 (i.e. less than 1 hr in about 8 000 flight hours).

(c) Such navigation performance capability shall be verified by the State of Registry or the State of the Operator, as appropriate. Aircraft that operate within designated airways and company-approved routes, that are completely in signal coverage of ground-based NAVAIDs, satisfy CMNPS requirements when operating within the protected airspace for airways and company-approved routes.

(d) The following minimum navigation systems may be deemed to satisfy the CMNPS:
- (i) Aircraft transiting CDA to/from another continent must be equipped with two long range RNAV systems or one navigation system using the inputs from one or more sensor systems, plus one short range navigation system (ADF, VOR/DME).
- (ii) Aircraft operating within North America on routes that lie within reception of ground-based NAVAIDs must be equipped with a single long range RNAV system, plus a short range navigation system (ADF, VOR/DME).
- (iii) Aircraft operating on high-level airways or company-approved routes must be equipped with dual short range navigation systems (ADF, VOR/DME).

12.5.4 Operator Certificate for CMNPS

(a) CMNPS operator certification applies only to air, private and foreign operators conducting CMNPS operations. Certification of operators is dependent on crew training and navigation equipment that meets the applicable *Commercial Air Service Standard* or *Private Operator Passenger Transportation Standard*. Such navigation performance capability shall be verified by the State of Registry or the State of the Operator, as appropriate.

(b) Canadian operators intending to operate in CMNPS airspace should contact the following for details of certification requirements:

Equipment and Installation Approval

Transport Canada Safety and Security
Regional Aircraft Certification Engineer
(See GEN 1.0 for the appropriate regional office.)

Operating Standards Approval

Transport Canada Safety and Security
Director, Commercial and Business Aviation (AARX)
Tower C, Place de Ville
Ottawa ON K1A 0N8
Fax: 613-954-1602

12.5.5 Flight Planning Procedure

In consideration of the similar equipment and performance requirements associated with current CMNPS, MNPS, RNAV10 and RNP4 approvals, flights shall indicate eligibility to receive service in CMNPS airspace by one of the following:

MNPS: the use of the equipment suffix "X" is acceptable in lieu of CMNPS certification.

CMNPS: the use of the equipment suffix "R" followed by the Performance Based Navigation level "A1" to indicate RNAV10 (RNP10) approval or "L1" to indicate RNP4 approval in item 18 of the flight plan is acceptable for CMNPS.

12.5.6 Partial or Complete Loss of Navigation Capability While Operating within CMNPS Airspace

(a) CMNPS operations and the associated ATC separation minima depend upon the accuracy of the navigation systems. ATC is to be advised immediately at any time that a pilot is uncertain of the aircraft position, or of an on-board navigation system failure or degradation.

(b) Upon entry into CMNPS airspace, or as soon as practical thereafter, flight crews are to cross-check the accuracy of their long range RNAV system with information obtained from station-referenced aids. Navigation systems shall be updated if the cross-check indicates such action is considered necessary.

12.5.7 Communications

Aircraft operating in CMNPS airspace are to communicate with ATS facilities as published on the HI 1 and HI 2 charts. Communication with the Edmonton ACC is in the following order of priority:

1. Edmonton Centre on an RCO frequency as published on the HI 1 and HI 2 charts; 2. Arctic Radio on an RCO frequency as published on the HI 1 and HI 2 charts;

2. Gander Radio on HF. SATCOM voice may be used as an alternative to HF when communicating with Gander Radio (see COM 6.6.3); and

3. As a last resort because of limited means of forwarding information, Alert, Nun. (CYLT) (military) on 126.7 MHz or HF 5 680 kHz, 6 706 kHz or 11 232 kHz.

During periods of HF unreliability, the use of SATCOM voice for all communications is strongly encouraged. If unable to establish contact via HF or SATCOM voice, aircraft are to make position reports immediately upon coming within range (approximately 200 NM) of any published VHF facility.

12.6 Canadian Domestic Routes

12.6.1 General

Within North American Airspace, various route and track systems exist in order to provide effective management of airspace and traffic. Under specified conditions, random routes may be included in a flight plan or requested.

12.6.2 North American Route Program (NRP)

12.6.2.1 Introduction

The North American Route Program (NRP) is a joint FAA and NAV CANADA program that allows air operators to select operationally advantageous routings. The objective of the NRP is to harmonize and adopt common procedures, to the extent possible, applicable to random route flight operations at and above FL290 within the conterminous U.S. and Canada.

The NRP will be implemented through various phases with the end goal of allowing all international and domestic flight operations to participate in the NRP throughout the conterminous U.S. and Canada.

12.6.2.2 Eligibility

Flights may participate in the NRP under specific guidelines and filing requirements:

(a) provided the flight originates and terminates within conterminous U.S. and Canada; or

(b) for North Atlantic international flights, provided that they are operating within the North American Route (NAR) System.

12.6.2.3 Procedures

NRP common procedures and specific NAV CANADA requirements are contained in the "Planning" section of the CFS.

12.6.3 Preferred IFR Routes

Preferred IFR routes provide guidance in planning routes, minimize route changes, and allow for an efficient and orderly management of traffic. ATS automated systems and air traffic controllers are increasingly reliant on these routes in planning for a systematic air traffic flow, a process that is critical for reducing delays.

Although flight planning of preferred IFR routes is not mandatory, it is strongly encouraged in the interest of efficient departure, enroute, and arrival ATS. When preferred IFR routes are not utilized, ATC will most often be required to clear flights onto them, resulting in increased communication and processing workload and the potential for readback and FMS input errors.

Procedures for and descriptions of preferred routes are published in the CFS, "Planning" section.

12.6.4 Fixed RNAV Routes

Published fixed RNAV routes can be flight planned for use by aircraft with RNAV capability, subject to any limitations or requirements noted on the en route charts, in applicable advisory circulars, or by NOTAM.

(a) Q-routes are high-level fixed RNAV routes depicted on En Route High Altitude charts using black dashed lines and require an RNAV system with performance capabilities currently only met by GNSS or distance measuring equipment/inertial reference unit (DME/DME/IRU) systems. DME/DME/IRU navigation may be limited in some parts of Canada owing to navigational facility coverage. In such cases, the routes will be annotated as "GNSS only" on the chart.

(b) T-routes are low-level controlled fixed RNAV routes depicted on En Route Low Altitude charts using black dashed lines and require GNSS RNAV systems for use. The airspace associated with T-routes extends upward from 2 200 ft AGL, 10 NM either side of the centreline, and does not splay. The MOCA provides obstacle protection for only 6 NM either side of the track centreline and does not splay.

(c) L-routes are low-level uncontrolled fixed RNAV routes depicted on En Route Low Altitude charts using green dashed lines and require GNSS RNAV systems for use. The MOCA provides obstacle protection for only 6 NM either side of the track centreline and does not splay. Magnetic reference bearing (MRB) is the published bearing between two waypoints on a fixed RNAV route and will be published within the SDA. The MRB is calculated by applying magnetic variation at the waypoint to the calculated true course between two waypoints. Pilots should use this bearing as a reference only, because RNAV systems will fly the true course between the waypoints.

True reference bearings (TRB) will be published along fixed RNAV routes located in the NDA and shall be notated with the suffix "T."

12.6.5 Northern Control Area Random Routes

Within the Northern Control Area (NCA), flights operating on random routes shall flight plan and make positions reports as follows:

(a) flights operating on predominately north or south tracks (315˚T clockwise through 045˚T or the reciprocals) shall report over reporting line points formed by the intersection of parallels of latitude spaced at 5˚ intervals expressed in latitude by whole degrees and meridians of longitude expressed in either whole degrees or whole and half degrees;

(b) south of 75˚N latitude, flights operating on predominately east or west tracks (046˚T clockwise through 134˚T or the reciprocals) shall report over reporting line points formed by the intersection of either whole degrees or whole and half degrees of latitude coincident with each 10˚ of longitude. For flights operating north of 75˚N latitude, where 20˚ of longitude is traversed in less than 60 min, reporting line points are to be defined by parallels of latitude expressed in degrees and minutes coincident with meridians of longitude at 20˚ intervals;

(c) as requested by ATS.

12.6.6 Arctic Control Area Random Routes

Within the Arctic Control Area (ACA), flights operating on random routes shall flight plan and make positions reports as follows:

(a) at the reporting lines coincident with 141˚W, 115˚W and 60˚W meridians. If the route of flight is north of 87˚N latitude, the 115˚W report is not required;

(b) westbound flights which do not cross the 60˚W meridian on entry or prior to entry into the ACA shall report at the point of entry into the ACA;

(c) westbound flights which do not cross the 141˚W meridian prior to exiting the ACA shall report at the point of exit from the ACA;

(d) eastbound flights which do not cross the 141˚W meridian on entry into the ACA shall report at the point of entry;

(e) eastbound flights which do not cross the 60˚W meridian on or after exiting the ACA shall report the point of exit;

(f) northbound or southbound flights which do not cross significant reporting lines shall report at the entry and exit points of the ACA; and

(g) as requested by ATS.

12.6.7 Polar Routes

12.6.7.1. General

With the advent of aircraft capable of long-range flight, circumventing the globe via the North Pole has become routine. Polar routes are flight paths to or from the Americas and Eurasia via Russian polar airspace. Polar flights must file designated polar fixes on the Anchorage/Russian border but are otherwise random in Canadian airspace.

12.6.7.2. Flight Planning and Position Reporting

Polar routes can be flight planned by aircraft with CMNPS certification. Flight plan routing should be filed with a fix every 5˚ of latitude. Random points should be expressed in whole degrees of latitude and either whole degrees or whole and half degrees of longitude.

12.6.7.3 Altitude Assignment

Current cruising altitude for direction of flight requirements are based on east-west traffic flows. A shift in flight track (from east to west or vice versa) requires the assignment of a new flight level. Flights on north-south routes may shift track, from easterly to westerly or vice versa, depending on route segment. This shifting makes altitude assignment based on current regulations less than optimal.

In order to accommodate polar route flights, aircraft operating on polar routes within the Edmonton, Winnipeg and Montréal FIRs may be assigned altitudes inappropriate to the direction of flight. Altitude assignment is based on traffic management requirements for the movement of aircraft in a safe, orderly and expeditious manner.

12.7 Canadian Track Structures

12.7.1 ACA Track System

12.7.1.1 General

The ACA Track System consists of published tracks in the ACA serving international flights operating between Europe and Alaska/Orient. The routes are depicted on HI charts.

The ACA Track System is established to enhance the utilization of the airspace, and thus facilitate more efficient use of optimum flight levels and ATC separation minima. The use of named waypoints along the ACA Track System route will assist in the applications of data link technologies through automatic dependent surveillance (ADS) reporting and controller-pilot data link communications (CPDLC).

The ACA tracks are laterally separated throughout the Edmonton FIR and complement the fixed route system in the Anchorage FIR.

12.7.1.2 Flight Planning Procedures

The use of these tracks is not mandatory, but they have been published to facilitate flight planning.

If the flight is planned along the complete length of one of the ACA tracks, or a portion thereof, the track name shall be defined in Item 15 of the ICAO flight plan.

Examples:

(a) LT M452 TAYTA
(b) JESRU M451 PELRI
(c) ADREW DCT TAVRI M452 LT

Flights may leave or join the ACA Track System routes in the Edmonton FIR at the identified waypoints. Random flight planning requirements in the ACA are specified in RAC 12.6.6.

12.7.1.3 Position Reports

Flights operating on ACA Track System routes shall report at designated compulsory reporting points, or as requested by ATS.

Abbreviated position reports are not permitted along the ACA Track System routes in the Edmonton FIR.

12.7.2 NCA Track System

12.7.2.1 General

The NCA Track System allows for reduced lateral separation and facilitates the application of the Mach number technique. The tracks are contained within the SCA and NCA, and extend upward from FL280. The system is primarily used by international flights operating between North America and Europe (NAT) and between North America and Alaska-Orient (PAC). The tracks are depicted on HI charts. The operating conditions for the two traffic flows are indicated in the following paragraphs.

12.7.2.2 Flight Planning Procedures

For flight planning an NCA or lateral track, the flight plan routing is indicated by using the abbreviation "NCA" or "LAT," as appropriate, followed by the letter or number of the track.

Example:

- Track BRAVO: NCAB
- Lateral 3: LAT3
- Track 17: NCA17

12.7.2.3 Position Reports

For flights operating within the NCA Track System, position reports are to be indicated by the compulsory reporting point designator. In cases where these points have not been named, pilots should use the published coordinates for that point.

Example 1: For a flight on NCA Track BRAVO where it crosses 80°W: SIX SEVEN THREE ZERO NORTH, ZERO EIGHT ZERO WEST AT (time.)

Example 2: For a flight on NCA Track SIERRA where it crosses 90°W: SIGPI AT (time).

12.7.2.4 NCA Tracks—NAT Traffic

There are no special conditions applicable to eastbound or westbound NAT traffic transiting CDA.

NOTE: The requirement to flight plan and operate using the NAR system, as specified in the CFS, "Planning" section, remains in effect.

12.7.2.5 NCA Tracks—PAC Traffic

PAC traffic includes flights operating from North America to Alaska, the Orient and the Russian Far East. No special conditions apply as flight planning on NCA tracks is completely optional for PAC traffic.

12.7.3 SCA Track System

12.7.3.1 General

The SCA Track System is primarily used by international traffic operating between the mid-west and western United States and Europe via the NAT. The tracks are within the SCA and extend upwards from FL180. The tracks are depicted on HI charts.

12.7.3.2 Flight Planning Procedures

The SCA tracks are completely optional for flight planning. Entry or exit from the SCA tracks may be at designated reporting points or at the reporting points coincident with the longitudes 80°W and 90°W. Lateral transitions between tracks may be flight planned or requested between significant reporting points. For flight planning an SCA track, the route is indicated by using the abbreviation "SCA," followed by the letter of the track.

Example:

- Track HOTEL: SCAH

12.7.3.3 Position Reports

Flights operating within the SCA Track System shall report over reporting lines coincident with the longitudes 80°W and 90°W, designated reporting points, or as requested by ATS.

12.7.4 NAR System

(a) The NAR System provides an interface between NAT oceanic and domestic airspaces. Operating conditions and description of the NAR are contained in RAC 11.3 and the CFS, "Planning" section.

(b) For a detailed description of the NAR System, refer to the CFS NORTH AMERICAN ROUTES (NARs) for NORTH ATLANTIC TRAFFIC. Section 7(a) outlines the requirements to flight plan and operate using the NAR system.

12.8 Security Control of Air Traffic

12.8.1 General

(a) Pilots who will enter the ADIZ while in the ACA may forward the required estimated time and place of ADIZ entry as part of their 115°W longitude position report (CAR 602.145, which appears in RAC 3.9).

(b) Pilots who will enter or operate within the ADIZ while in the NCA, shall be governed by the requirements as set out in CAR 602.145.

12.8.2 ESCAT Plan

In Canadian airspace, the ESCAT Plan provides security control of civil and military air traffic to ensure effective use of airspace when the appropriate authority declares an air defence emergency or any situation involving aerial activities that threatens national security or vital Canadian interests. The Plan's outline highlights responsibilities, procedures, and instructions for the security control of civil and military air traffic with respect to diversion, landing, grounding and dispersal. The ESCAT plan was developed in co-ordination with DND, Transport Canada, and NAV CANADA.

The Commander, Canadian North American Aerospace Defence Command (NORAD) Region (CANR), is responsible for testing and implementing the ESCAT Plan. When the ESCAT Plan is implemented or tested, the appropriate NAV CANADA ACCs (through ATS units), under the direction of the National Defence Command Centre (NDCC), will take actions to broadcast instructions through civil and military ATS units as necessary.

Testing

To ensure the effectiveness of communications during the implementation of the ESCAT Plan, periodic tests may be conducted without any prior notice.

The test message will be broadcast as follows:

"ATTENTION—THIS IS AN ESCAT TEST. I SAY AGAIN, THIS IS AN ESCAT TEST."

As these tests are considered essential to national security, co-operation of all pilots and agencies is necessary.

Implementation

In an emergency situation, the appropriate NAV CANADA ACC (through their respective ATS units), under directions of the Commander, CANR, will broadcast the following message:

"ATTENTION ALL AIRCRAFT—AIR DEFENCE EMERGENCY—ALL AIRCRAFT WILL COMPLY WITH THE PROCEDURES FOR THE EMERGENCY SECURITY CONTROL OF AIR TRAFFIC. VFR TRAFFIC ON THIS FREQUENCY MUST LAND AT THE NEAREST SUITABLE AIRFIELD AND FILE AN IFR OR DVFR FLIGHT PLAN."

In accordance with CAR 602.146(2), the pilot-in-command of an aircraft who is notified by an ATC unit of the implementation of the ESCAT Plan shall

(a) before take-off, obtain approval for the flight from the appropriate ATC unit or FSS;

(b) comply with any instruction to land or to change course or altitude that is received from the appropriate ATC unit or FSS; and

(c) provide the appropriate ATC unit or FSS with position reports

  (i) when operating within controlled airspace, as required pursuant to CAR 602.125; and
  (ii) when operating outside controlled airspace, at least every 30 min.

ESCAT Plan Phases

The ESCAT Plan may be implemented in phases to facilitate a smooth transition from normal peacetime air traffic identification and control procedures to the more restrictive identification and control procedures that accompany the full implementation of the ESCAT Plan. When the ESCAT Plan has been implemented, the movement of civil and military aircraft is governed by the implementation of an Emergency Air Traffic Priority List (EATPL) and/or a Security Control Authorization (SCA).

There are two phases in the implementation process.

- Phase One: Requires all aircraft in designated areas to file IFR/DVFR flight plans in accordance with CARs 602.76(1) and (2), CAR 602.145, this Plan and the established procedures detailed in the CFS (GPH 205).

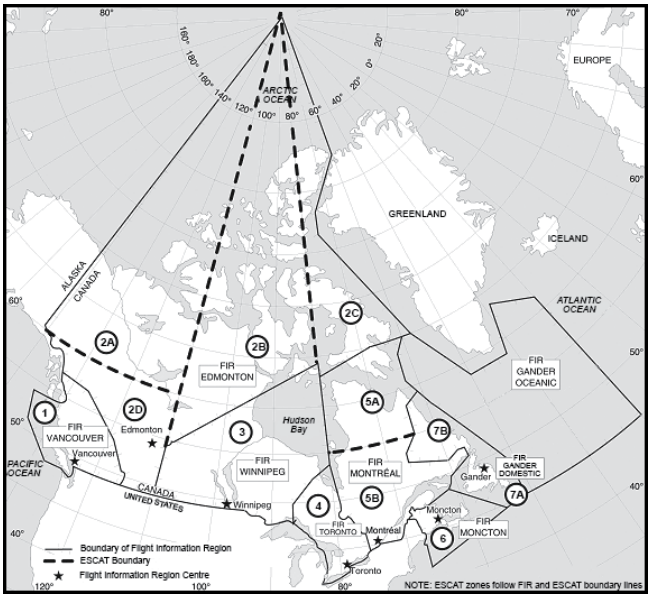
- Phase Two: The Commander, CANR, restricts aircraft movement within designated areas through the implementation of the EATPL and SCA process.

NOTE: EATPL and SCA approval request procedures will be promulgated by NOTAM.

ESCAT Zones

For the purpose of implementing the ESCAT Plan, Canadian airspace has been divided into seven zones. During implementation, one or more zones, or portions of zones, may be activated (see Figure 12.2).

Figure 12.2 – Map of ESCAT Zones



NOTE: Coordinates for the ESCAT Zones are published in the DAH (TP 1820).

Termination

Upon termination of ESCAT, the appropriate NAV CANADA ACC (through their respective ATS units) will broadcast the following message:

"ATTENTION ALL AIRCRAFT—EMERGENCY SECURITY CONTROL OF AIR TRAFFIC HAS BEEN TERMINATED. ROUTINE AIRSPACE PROCEDURES ARE NOW IN EFFECT."

For more information about the ESCAT Plan, please contact the Transport Canada Civil Aviation Contingency Operations (CACO) Division at 1-877-992-6853 or avops@tc.gc.ca.

12.9 Air Traffic Flow Management (ATFM)

ATFM programs have been developed to ensure that national ATC systems are used to maximum capacity and that the need for excessive en-route airborne holding, especially at low altitude, is minimized. ATFM also distributes required delays more equitably among users. Initiatives include the publication of SID and STAR, the rerouting of aircraft because of sector overloading and weather avoidance, flow-control metering of arriving aircraft into TCAs, and the implementation of flow-control restrictions whereby aircraft are more economically held on the ground at departure airports to partially absorb calculated arrival delays at a destination airport.

Pilots or operators can obtain ATFM information, which may be pertinent for their particular flight, by referring to ATFM Advisories at <*www.fly.faa.gov*> or NOTAMs. Additional information, if required, can be obtained by contacting the shift manager or ATFM unit of the applicable ACC:

NAV CANADA
National Operations Centre (Canada)..... 1-866-651-9053
National Operations Centre (U.S.)..... 1-866-651-9056
Gander ACC 709-651-5207
Moncton ACC 506-867-7173
Montréal ACC ..... 514-633-3028 or 3365
Toronto ACC (Canada)..... 1-800-268-4831
.....905-676-3528 or 4509
Toronto ACC (U.S.)..... 1-800-387-3801
Winnipeg ACC 204-983-8338
Edmonton ACC 780-890-4714
Vancouver ACC ..... 604-775-9673 or 9622

12.10 Flow Control Procedures

To minimize delays, air traffic management will use the least restrictive methods.

(a) Altitude

(b) Miles-in-trail/Minutes-in-trail

(c) Speed control

(d) Fix balancing

(e) Airborne holding

(f) Sequencing programs

(i) Departure Sequencing Program (DSP) DSP assigns a departure time to achieve a constant flow of traffic over a common point. Runway and departure procedures are considered for accurate projections.

(ii) *En route Sequencing Program (ESP)* ESP assigns a departure time that will facilitate integration into an en-route stream. Runway configuration and departure procedures will be considered for accurate projections.

(iii) *Arrival Sequencing Program (ASP)* ASP assigns meter fix times to aircraft destined to the same airport.

(g) *Ground delay programs*: A ground delay program is an air traffic management process administered by the flow manager whereby aircraft are held on the ground. The purpose of the program is to support the air traffic management mission and limit airborne holding. It is a flexible program and may be implemented in various forms depending on the needs of the air traffic system. Ground delay programs provide for equitable assignment of delays to all system users.

(h) *Ground stop*: The ground stop is a process whereby an immediate constraint can be placed on system demand. The constraint can be total or partial. The ground stop may be used when an area, centre, sector, or airport experiences a significant reduction in capacity. The reduced capacity may be the result of weather, runway closures, major component failures, or any other event that would render a facility unable to continue providing ATS.

This list is not inclusive and does not preclude the innovation and application of other procedures that result in improved customer service.

12.11 Fuel Conservation High Level Airspace

The following points are brought to the attention of pilots operating in the High Level Airspace, to ensure that each aircraft is operated as close as possible to its optimum flight level and Mach number.

(a) Pilots should request a change of flight level or Mach number whenever this would improve the operating efficiency of the aircraft. However, in this regard, a request for a flight level not appropriate to the direction of flight will still be subject to the restrictions for use of altitudes inappropriate for direction of flight as detailed in RAC 7.6.2, Note 1.

(b) Where possible pilots should give advance warning of a request (e.g., if a westbound flight wishes to climb at 30˚W, it will assist the controller if the request is made with the position report at 20˚W).

(c) When circumstances render this feasible, controllers will ask other aircraft to accept higher flight levels or changes of Mach number in order to facilitate clearances for aircraft which would otherwise experience a significant penalty. In agreeing to such requests, pilots will contribute to the overall economy in fuel used.

12.12 Altimeter Setting Procedures During Abnormally High Pressure Weather Conditions

12.12.1 General

Cold dry air masses can produce barometric pressures in excess of 31.00 inches of mercury. Because barometric readings of 31.00 inches of mercury or higher rarely occur, most standard altimeters do not permit the setting of barometric pressures above that level and are not calibrated to indicate accurate aircraft altitude above 31.00 inches of mercury. As a result, most altimeters cannot be set to provide accurate altitude readouts to the pilot in these situations.

ATC will issue actual altimeter settings and will confirm with the pilot that 31.00 inches of mercury is set on the pilot's altimeters for enroute operations below 18 000 feet ASL in the affected areas.

Aerodromes that are unable to accurately measure barometric pressures above 31.00 inches of mercury will report the barometric pressure as "in excess of 31.00 inches of mercury". Flight operations to and from those aerodromes are restricted to VFR weather conditions.

12.12.2 Flight Procedures

When the barometric pressure exceeds 31.00 inches of mercury, the following procedures take effect:

(a) Altimeters of all IFR, CVFR and VFR aircraft are to be set to 31.00 inches of mercury for enroute operations below 18 000 feet ASL. All pilots are to maintain this setting until beyond the area affected by the extreme high pressure or until reaching the final approach segment of an instrument approach for IFR aircraft or the final approach for VFR aircraft. At the beginning of the final approach segment, the current altimeter setting will be set by those aircraft capable of such a setting. Aircraft that are unable to set altimeter settings above 31.00 inches of mercury will retain a 31.00 inches of mercury setting throughout the entire approach. Aircraft on departure or missed approach will set 31.00 inches of mercury prior to reaching any mandatory or fix crossing altitude, or 1 500 feet AGL, whichever is lower.

(b) For aircraft operating IFR that are unable to set the current altimeter setting, the following restrictions apply:

(i) To determine the suitability of departure alternate aerodromes, destination aerodromes and destination alternate aerodromes, increase the ceiling requirements by 100 feet and visibility requirements by 1/4 SM for each 1/10 inch of mercury, or any portion thereof, over 31.00 inches of mercury. These adjusted values are then applied in accordance with the requirements of the applicable operating regulations and operations specifications.

Example:
Destination altimeter setting is 31.28 inches, ILS Decision Height (DH) is 250 feet (200-1/2). When flight planning, add 300-3/4 to the weather requirements, which would now become 500-11/4.

(ii) During the instrument approach, 31.00 inches of mercury will remain set. DH or Minimum Descent Altitude (MDA) will be deemed to have been reached when the published altitude is displayed on the altimeter.

NOTE: Although visibility is normally the limiting factor on an approach, pilots should be aware that when reaching DH, the aircraft will be higher than indicated by the altimeter, which in some cases could be as much as 300 feet higher.

(iii) Authorized CAT II and III ILS operations are not affected by the above restrictions.

(c) Night VFR pilots are advised that under conditions of altimeter settings above 31.00 inches of mercury and aircraft altimeters not capable of setting above 31.00 inches of mercury, the aircraft's true altitude will be higher than the indicated altitude; this must be taken into consideration. If an instrument approach procedures is to be flown, the night VFR pilot should follow the procedures described in RAC 12.12.2(b)(ii).

(d) For aircraft with the capability of setting the current altimeter setting and operating into aerodromes with the capability of measuring the current altimeter setting, no additional restrictions apply.

(e) For aircraft operating VFR, no additional restrictions apply; however, extra diligence in flight planning and in operating in these conditions is essential.

12.13 Formation Flight Procedures

12.13.1 General

Formation flight is considered to be more than one aircraft which, by prior arrangement between each of the pilots involved within the formation, operates as a single aircraft with regard to navigation and ATC procedures. Separation between aircraft within the formation is the responsibility of the flight leader and the pilots of the other aircraft within the formation. This includes transition periods when aircraft within the formation are manoeuvring to attain separation from each other to effect individual control, and during join-up and breakaway.

12.13.2 Formation Flight Planning Procedures

IFR and VFR flight planning procedures for formation flights are essentially the same as for a single aircraft with the following exceptions:

(a) a single flight plan may be filed for all aircraft within the formation;

(b) the flight lead will file an arrival report and close the flight plan for the formation;

(c) the Canadian flight plan/itinerary form is to be completed as follows:

(i) Item 7, AIRCRAFT IDENTIFICATION: indicate the formation call sign,

(ii) Item 9, NUMBER AND TYPE OF AIRCRAFT AND WAKE TURBULENCE CATEGORY: indicate the number of aircraft, followed by the type of aircraft designator or, in the case of formation flights comprising more than one type of aircraft, insert ZZZZ,

(iii) Item 10, the letter "W" is not to be used for formation flights, regardless of the RVSM status of aircraft within the flight, and

(iv) Item 18, OTHER INFORMATION: if ZZZZ is included in Item 9, insert TYP/ followed by the number and type(s) of aircraft in the formation;

(d) if the formation is to be non-standard, i.e. not in accordance with the parameters listed in RAC 12.13.3, the formation leader should insert the words "non standard" and should indicate the parameters to be used in the *OTHER INFORMATION* section of the Canadian flight plan/itinerary form.

12.13.3 IFR and CVFR Formation Flight

ATC will clear a formation flight as if it is a single aircraft. Additional airspace will not be protected unless the requirement to do so is included on the flight plan and has been previously co-ordinated. It is the formation leader's responsibility to flight plan for extra airspace and to co-ordinate with ATC if the formation will not operate in accordance with the following IFR and CVFR formation flight criteria:

(a) the formation leader will operate at the assigned altitude, and the other formation aircraft will be within 100 ft vertically of the altitude of the formation leader;

(b) the formation will occupy a maximum frontal width of 1 NM; and

(c) the formation will have a maximum longitudinal spacing of 1 NM between the first and the last aircraft.

The formation leader is responsible for separation between aircraft within the formation and for ensuring that all the formation aircraft remain within these parameters unless additional airspace has been allocated. Although IFR formation flights are expected to take off and land in formation, unforeseen conditions may preclude the formation from completing an IFR approach and landing. If it becomes necessary for a formation to break into individual elements or single aircraft, the formation leader should advise the controlling agency of the destination as soon as possible to allow ATC sufficient time to assign flight levels or altitudes that will provide vertical separation for each element or aircraft. In such instances, the formation leader will retain responsibility for separation between elements or aircraft until all have reached the assigned flight levels or altitudes.

All formation flights will be considered as non-certified RVSM flights, regardless of the RVSM certification status of the individual aircraft within the formation.

12.14 Photographic Survey Flights

CAR 602.34 – *Cruising Altitudes and Cruising Flight Levels*, exempts aircraft operated for the purpose of aerial survey or mapping from the cruising altitude for direction of flight requirement if certain conditions are met.

Subject to RAC 12.16.6 (d), photographic survey flights are exempt from the requirement to be RVSM certified to operate in RVSM airspace to conduct aerial survey or mapping operations. This exemption is not applicable for that portion of flight transiting to/from the area of operation.

Pilots intending to conduct aerial survey or mapping operations should refer to CAR 602.34 and obtain the publication, *Pilot Procedures Photographic Survey Flights* from:

NAV CANADA
Manager, ATS Standards and Procedures
77 Metcalfe Street
Ottawa ON K1P 5L6

Tel.: 613-563-5659

This publication describes flight requirements for pilots and operators conducting survey operations in Canadian airspace. It is published so that the ATC system can better accommodate the special demands and the unique operational requirements of aircraft on photographic survey missions.

12.15 Safety Alert Procedure and Phraseology

12.15.1 General

A Safety Alert is a notification by an air traffic controller to an aircraft that it is in a position which, in the controller's judgment, is in unsafe proximity to terrain, obstructions or other aircraft. Low altitude alerts are issued for unsafe proximity to terrain or obstructions, while traffic alerts are issued for unsafe proximity to other aircraft.

Once the aircraft is informed of the Safety Alert, it is the pilot's responsibility to determine what course of action, if any, will be taken.

12.15.2 Controller Phraseology

SCENARIO	SAMPLE PHRASEOLOGY
Controller becomes aware that an aircraft is at an altitude that is in unsafe proximity to terrain or an obstruction.	FBAC, LOW ALTITUDE ALERT. VERIFY YOUR ALTITUDE IMMEDIATELY. CYEG ALTIMETER IS 2992. THE MINIMUM IFR ALTITUDE IS FOUR THOUSAND.
Controller becomes aware that an aircraft is in unsafe proximity to another aircraft.	FBAC, TRAFFIC ALERT UNIDENTIFIED TRAFFIC TWO O'CLOCK SIX MILES, WESTBOUND, ALTITUDE EIGHT THOUSAND UNVERIFIED.

12.15.3 ATC Conflict Alert Software

ATC Conflict Alert Software is intended to alert controllers of situations where separation could be compromised. The display of this alert would normally occur approximately one min prior to a loss of separation and one min prior to the display of a TCAS RA. Warning time can be shorter depending on factors such as flight path configuration; however, in most instances, sufficient time should exist for conflict resolution prior to the display of a TCAS RA.

Once the ATC alert is validated and it is determined that the situation requires corrective action, the controller must use imperative phraseology as specified in RAC 12.15.4.

12.15.4 Use of the Terms Traffic Alert and Airspace Alert as Part of an Avoidance Instruction

The terms "traffic alert" and "airspace alert" used in conjunction with an avoidance instruction require pilot compliance and acknowledgement. However, Safety Alert instructions do not supersede existing pilot requirements to follow TCAS/ACAS RAs.

12.15.5 Controller Phraseology

SCENARIO	SAMPLE PHRASEOLOGY
Controller responds to an ATC conflict alert advisory or to an observed loss or imminent loss of separation between identified aircraft in controlled airspace.	FABC, TRAFFIC ALERT TURN LEFT 30 DEGREES IMMEDIATELY. -or- FABC, TRAFFIC ALERT CLIMB TO 4 THOUSAND IMMEDIATELY.
Controller issues corrective action in response to a loss or an imminent loss of separation within Class F airspace.	FABC, AIRSPACE ALERT CLIMB TO FL330 IMMEDIATELY TO AVOID RESTRICTED AIRSPACE. -or- FABC, AIRSPACE ALERT TURN RIGHT 60 DEGREES IMMEDIATELY TO AVOID RESTRICTED AIRSPACE.

12.16 Traffic Alert and Collision Avoidance Systems and Airborne Collision Avoidance Systems

12.16.1 General

ACAS is International Civil Aviation Organization (ICAO) terminology. TCAS is the acronym for the traffic alert and collision avoidance system developed in the United States by the FAA. The acronyms TCAS and ACAS are generally interchangeable. Care needs to be taken when comparing ICAO definitions of ACAS II with North American definition of TCAS II. Specifically, the ICAO definition of a fully compliant ACAS II (ICAO Annex 10, Volume 4, Chapter 4) is equivalent to TCAS II software version 7.1.

NOTE: For the purposes of the AIM, TCAS terminology will be used and, where necessary for clarity, a specific software version will be identified.

TCAS equipment alerts flight crews when the path of the aircraft is predicted to potentially collide with that of another aircraft. TCAS-equipped aircraft interrogates other aircraft in order to determine their position. TCAS is designed to operate independently of ATC and, depending on the type of TCAS, will display proximate traffic and provide TAs and RAs.

(a) TAs provide information on proximate traffic and indicate the relative positions of intruding aircraft. TAs are intended to assist the flight crew in visual acquisition of conflicting traffic and to prepare the pilots for the possibility of an RA.

(b) RAs are divided into two categories: preventative advisories, which instruct the pilot to maintain or avoid certain vertical speeds, and corrective advisories, which instruct the pilot to deviate from the current flight path (e.g., "CLIMB" when the aircraft is in level flight).

There are two types of TCAS:

(a) TCAS I is a system including a computer and pilot display(s), which provides a warning of proximate traffic (TA) to assist the pilot in the visual acquisition of intruder aircraft and assist in avoiding potential collisions (i.e: does not provide RAs); and

(b) TCAS II is a system including a computer, pilot display(s), and a Mode S transponder, which provides both TAs and vertical plane RAs. RAs include recommended escape manoeuvres, only in the vertical dimension to either increase or maintain existing vertical separation between aircraft.

NOTE: There is currently no TCAS equipment capable of providing RAs in the lateral direction.

The following paragraphs and table describe the TCAS levels of protection versus aircraft equipage.

(a) Intruder aircraft without transponders are invisible to TCAS-equipped aircraft and thus TAs or RAs are not provided.

(b) Intruder aircraft equipped with only a Mode A transponder are not tracked or detected by TCAS II, because TCAS II does not use Mode A interrogations. Mode A transponder aircraft are invisible to TCAS-equipped aircraft.

(c) Intruder aircraft equipped with a Mode C transponder without altitude input will be tracked as a non-altitude replying target. Neither a data tag nor a trend arrow will be shown with the traffic symbol. These aircraft are deemed to be at the same altitude as own aircraft.

(d) In an encounter between two TCAS II-equipped aircraft, their computers will communicate using the Mode S transponder data link, which has the capability to provide complementary RAs (e.g., one climbing and one descending).

		Own Aircraft Equipment	
		TCAS I	TCAS II
Intruder Aircraft Equipment	Non-XPDR-equipped or Mode A XPDR ONLY	Not tracked & not displayed	Not tracked & not displayed
	Mode C or Mode S XPDR	TA	TA and vertical RA
	TCAS I	TA	TA and vertical RA
	TCAS II	TA	TA and coordinated vertical RA

12.16.2 Transport Canada TCAS/ACAS Regulations

The Technical Standard Order (TSO) for TCAS I is TSO-C118 or CAN-TSO-C118.

The TSO for TCAS II/ACAS II is TSO-C119 or CAN-TSO-C119. The original release of TSO-C119 was associated with software version 6.0. Since then the following updates to TSO-C119 have been released:

(a) TSO-C119a: associated with software version 6.04a. Version 6.04a was released to address nuisance alerts which were occurring at low altitudes and during low-level manoeuvres, and to address a problem with the altitude crossing logic.

NOTE: This version is the minimum requirement for operations in Canada when outside of RVSM airspace;

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(b) TSO-C119b: associated with software version 7.0. Version 7.0 was released to address numerous enhancements to the collision avoidance algorithms, aural annunciation and RA displays, and changes to reduce repetitive nuisance TAs on RVSM routes in slow closure situations.

NOTE: Software version 7.0 is the minimum required for all CAR 702, 703, 704 and 705 aeroplanes when operating inside of RVSM airspace;

(c) TSO-C119c: associated with software version 7.1. Version 7.1 was released to address reversal logic issues and address flight crew misinterpretation of Adjust Vertical Speed Adjust aural annunciation. In ICAO terminology this is also referred to as ACAS II.

NOTES:

1: In Amendment 85 to ICAO Annex 10, Volume IV, Chapter 4, published in October 2010, ICAO has mandated that all new ACAS installations after 1 January 2014 be compliant with version 7.1 and all ACAS units shall be compliant with version 7.1 after January 2017. Transport Canada has not initiated any rulemaking based on these ICAO requirements.

2: Be advised that if you operate in ICAO member countries after the above-mentioned dates you will have to equip with software version 7.1.

In some member states such as the European Community and within European Civil Aviation Conference (ECAC) airspace, equipage with TCAS II software version 7.1 will be required earlier than the ICAO mandated dates.

The TSO for Mode S transponders is TSO-C112 or CAN-TSO-C112.

The following table and associated notes summarizes the TCAS/ACAS requirements for CAR Part VII air operators.

Canadian Aviation Regulation	TCAS I Equivalent to CAN-TSO-C118	TCAS II CAN-TSO-C119a (SW 6.04a) outside of RVSM airspace or CAN-TSO-C119b (SW 7.0) inside of RVSM airspace and Mode S transponder CAN-TSO-C112
Subpart 702.46	Not required	Required for turbine-powered aeroplanes of maximum certified takeoff weight (MCTOW) exceeding 15 000 kg (33 069 lb).(Notes 1 and 2)
Subpart 703.70	Minimum required for aeroplanes of MCTOW exceeding 5 700 kg (12 566 lb) outside of RVSM airspace. (Note 1)	Not required but acceptable outside of RVSM airspace Required when operating in RVSM airspace. (Note 1).
Subpart 704.70	Minimum required for aeroplanes of MCTOW exceeding 5 700 kg (12 500 lb) outside of RVSM airspace. (Note 1)	Required for turbine-powered aeroplanes of MCTOW exceeding 15 000 kg (33 069 lb). (Note 1)
Subpart 705.83	Minimum required for non-turbine-powered aeroplanes outside of RVSM airspace. (Note 1)	Required for turbine-powered aeroplanes. (Note 1)

NOTES:
1. TCAS II, CAN-TSO C119b (software version 7.0) or more recent and Mode S transponder CAN-TSO-C112 or more recent, are required for operations in RVSM airspace.
2. Not required when engaged in or configured for firefighting, aerial spray services, or aerial survey and operates only in low-level airspace.

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It is strongly recommended that foreign operators comply with TCAS equipage requirements as outlined above when operating within Canadian airspace.

There are currently no CARs requiring private operators (CAR 604) to equip with TCAS equipment. However, private operators are advised that ICAO Annex 6, Part II, Chapter 3.6.10.2 requires that: "All turbine-engined aeroplanes of a maximum certificated take-off mass in excess of 15 000 kg or authorized to carry more than 30 passengers, for which the individual airworthiness certificate is first issued after 1 January 2007, shall be equipped with an airborne collision avoidance system (ACAS II)". This means that affected private operators, flying into ICAO member countries must be equipped with ACAS II.

12.16.3 Use of TCAS outside of Canada

Numerous countries world wide have operational regulations which require certain aircraft to be equipped with TCAS. If you are planning on operating your aircraft in a foreign country consult that country's regulations to determine TCAS equipage requirements.

The following TCAS requirements must be complied with for Canadian air operators to operate in U.S. airspace (see FAA FAR 129.18):

(a) TCAS I: Turbine-powered airplane with a passenger-seat configuration, excluding any pilot seat, of 10-30 seats.

(b) TCAS II: Turbine-powered airplane of more than 33 000 lb maximum certificated takeoff weight.

Canadian air operators planning operations into U.S. airspace are advised to be compliant with FAA FAR 129.18 and review FAA Advisory Circular 120-55C – *Air Carrier Operational Approval and Use of TCAS* (as amended).

For Canadian air operators planning operations in Europe, details of European requirements are available at: www.eurocontrol.int/acas/.

12.16.4 Operational Approval

For Canadian air operators, TCAS operational approval is accomplished through Transport Canada approval of: pertinent training; checking and currency programs; checklists; SOP operations or training manuals; maintenance programs; minimum equipment lists or other pertinent documents.

When planning to equip with TCAS, Canadian air operators should consult their Transport Canada principle operations inspector (POI) early in their program to permit a timely response.

Canadian air operators may address the training, checking and currency individually or as part of an integrated program. For example, TCAS/ACAS qualification may be keyed to qualification of specific aircraft (e.g., during A320 transition), may be addressed in conjunction with general flight crew qualification (e.g., during initial new hire indoctrination), or may be completed as dedicated TCAS/ACAS training and checking (e.g., by completion of a standardized TCAS/ACAS curriculum in conjunction with a recurrent IFT/PPC event).

FAA Advisory Circular 120-55C – *Air Carrier Operational Approval and Use of TCAS* (as amended) provides information with respect to training, checking and currency in the use of TCAS. The material therein can be used by operators to assist in defining their implementation of TCAS.

EUROCONTROL has produced and published TCAS training material and information available at: www.eurocontrol.int/acas/.

12.16.5 Aircraft Certification Approval

An acceptable means of demonstrating compliance with the appropriate requirements of the *Airworthiness Manual*, Chapter 525, to obtain airworthiness approval, is to follow the method specified in FAA Advisory Circular AC20-131A – *Airworthiness Approval of Traffic Alert and Collision Avoidance Systems (TCAS II) and Mode S Transponders* (as amended) for installation of TSO-C119a TCAS/ACAS. FAA Advisory Circular AC20-151A – *Airworthiness Approval of Traffic Alert and Collision Avoidance Systems (TCAS II), Versions 7.0 & 7.1 and Associated Mode S Transponders*, should be followed for installations using TSO-C119b or TSO-C119c equipment.

12.16.6 Operational Considerations

(a) Where required by regulations to be equipped with TCAS, flight crews must operate with their TCAS equipment on at all times, in so far as is consistent with the AFM (Aircraft Flight Manual) and SOPs. This is true even when operating away from major, high traffic density airports. Although TCAS will never be a complete substitute for a good lookout, good situational awareness and proper radio procedures, it has been proven to be a valuable tool in providing information on potential collision hazards. Hence flight crews should not deprive themselves of this important asset, especially in areas of mixed IFR and VFR traffic.

(b) For a TCAS-equipped aircraft to provide a flight crew with collision avoidance information the TCAS unit and the transponder must be turned on, the transponder cannot be selected to the STANDBY mode (that is, powered but not transmitting data). If the transponder is not turned on and responding to interrogations, the aircraft's TCAS cannot display information about potentially conflicting aircraft nearby nor can it provide instructions to the crew to resolve impending collision threats. Failures of the TCAS computer unit itself can also occur; however, these failures only affect the TCAS-equipped aircraft's ability to detect nearby aircraft. The aircraft containing the inoperative TCAS unit remains visible to other aircraft as long as its transponder remains operative. The consequences of a TCAS unit failure are magnified, however, when the transponder is inoperative because, not only is TCAS information lost on the affected aircraft, but that aircraft will not be visible to other airborne collision avoidance systems. Regardless of whether the transponder has failed or the TCAS has become inoperative, a flight crew's ability to mitigate the risk of collision is significantly degraded if the collision avoidance system becomes inoperative and the failure is not quickly and reliably brought to the crew's attention. Air operators are encouraged to inform their pilots who use transponders or transponder/TCAS units about the potential lack of a conspicuous warning to indicate the loss of collision protection resulting from a compromise in functionality of either the transponder or TCAS unit. Air operators should require all pilots who use transponders or transponder/TCAS units to become familiar with the annunciations currently used to indicate failure or lack of active functionality of these components.

(c) Flight crews are reminded to follow the RAs promptly and accurately, even though the RAs may change in strength and/or reverse. RA commands do not require large load factors when being followed. Any delay in responding to an RA could swiftly erode the ability to maintain or achieve adequate separation without resorting to strengthening RAs. For TCAS to provide safe vertical separation, initial vertical speed response is required within 5 seconds of the RA. Deviation from commands or second-guessing the commands should not occur. An RA prevails over any ATC instruction or clearance.

(d) Flight crews may have to inhibit the RA function under certain circumstances per the AFM (e.g., during an engine failure).

(e) The TCAS system may inhibit RAs during certain flight phases, such as at low altitudes. Flight crews need to be aware of when TCAS will not provide a full range of RA commands.

(f) Flight crews should not attempt to manoeuvre solely on the basis of TA information. The TA should trigger a visual search for traffic, supplemented with a request for ATC assistance to help in determining whether a flight path change is required. In the case of a TCAS II TA, the flight crew should prepare for a possible RA, following the TA.

(g) TAs and RAs should be treated as genuine unless the intruder has been positively identified and assessed as constituting neither a threat nor a hazard.

(h) Flight crews should be aware that in accordance with the Canadian Transportation Accident Investigation and Safety Board Act an incident where a risk of collision or a loss of separation occurs is considered a reportable aviation incident. Responding to an RA is considered a reportable aviation incident.

(i) If a TCAS RA manoeuvre is contrary to other critical cockpit warnings, then those other critical warnings are respected as defined by TCAS certification and training (that is, responses to stall warning, wind shear and terrain awareness and warning systems (TAWS) take precedence over a TCAS RA, especially when the aircraft is less than 2 500 ft AGL.)

(j) Due to interference limiting algorithms, ACAS II may not display all proximate transponder-equipped aircraft in areas of high density traffic. Flight crew vigilance must be maintained and flight crews should not become complacent in their efforts to search the sky for other aircraft.

12.16.7 Pilot Action when Deviating from Clearances: Regulations and Information

Safety studies have confirmed that the significant safety benefit afforded by TCAS could be seriously degraded by a deficient response to RAs. It has also been shown that the safety benefit of TCAS is eroded when pilots do not follow the flight path guidance provided during an RA.

In view of this safety hazard and to optimize the safety benefits of TCAS, the following regulatory provisions have been established:

Subsection 602.31(3) of the CARs states that:

The pilot-in-command of an aircraft may deviate from an air traffic control clearance or an air traffic control instruction to the extent necessary to carry out a collision avoidance manoeuvre, where the manoeuvre is carried out

(a) in accordance with a resolution advisory generated by an Airborne Collision Avoidance System (ACAS) or a Traffic Alert and Collision Avoidance System (TCAS); or

(b) in response to a warning from a Ground Proximity Warning System (GPWS) on board the aircraft.

Subsection 602.31(4) of the CARs states that:

The pilot-in-command of an aircraft shall

(a) as soon as possible after initiating the collision avoidance manoeuvre referred to in subsection (3), inform the appropriate air traffic control unit of the deviation; and

(b) immediately after completing the collision avoidance manoeuvre referred to in subsection (3), comply with the last air traffic control clearance received and accepted by, or the last air traffic control instruction received and acknowledged by, the pilot-in-command.

NOTE: By following the RA guidance precisely, the magnitude of the altitude deviation can be minimized. Pilots must ensure that the manoeuvre necessary to comply with the RA (climb or descent) is not maintained after the RA has terminated.

There is information available which highlights the importance of following RAs. EUROCONTROL has issued numerous ACAS II bulletins (www.eurocontrol.int/acas/). ACAS II Bulletin Number 2 *Follow the RA*, dated July 2002, describes several RA events and the consequences of the flight crew actions taken. The bulletin is informative in describing the advantages of TCAS/ACAS for collision avoidance, when followed correctly. The bulletin also describes the limitations associated with the visual acquisition of traffic and those of ATC radar displays.

Transport Canada recommends that operators disseminate this information to pilots for awareness, and where appropriate, establish suitable pilot training programs to ensure that flight crews follow RAs promptly and accurately, even when presented with conflicting avoidance instructions from ATC.

12.16.8 Mode S Transponder Approval and Unique Codes

Along with performing all the functions of Mode A and C transponders, Mode S transponders also have a data link capability. Mode S transponders are an integral component of all TCAS II/ACAS II installations.

For aircraft that are not required to be equipped with TCAS/ACAS, there is no requirement to replace existing Mode A or C transponders with Mode S transponders until it becomes impossible to maintain presently installed Mode A and C transponders.

Airworthiness approval must be obtained by Canadian aircraft operators who install Mode S transponders. FAA Advisory Circular AC20-131A – *Airworthiness Approval of Traffic Alert and Collision Avoidance Systems (TCAS II) and Mode S Transponders* (as amended) should be used for guidance to obtain airworthiness approval. Canadian operators should contact their Regional Transport Canada office for approval details.

At the time of registration, each Canadian aircraft with a Mode S transponder will receive a unique 24-bit Mode S code assignment, which must be uploaded in the transponder, usually by the installer.

12.16.9 Pilot/Controller Actions

In order to use TCAS in the most effective and safest manner, the following pilot and controller actions are necessary:

(a) Pilots should not manoeuvre their aircraft in response to TAs only;

(b) In the event of an RA to alter the flight path, the alteration of the flight path should be limited to the minimum extent necessary to comply with the RA (aggressive manoeuvring should not be required since TCAS RAs are predicted on ¼ G manoeuvre load factors);

(c) Pilots should notify the appropriate ATC unit of the deviation and when the deviation has ended, as soon as possible;

(d) When a pilot reports a manoeuvre induced by an RA, the controller should not attempt to modify the aircraft flight path until the pilot reports returning to the terms of the existing ATC instruction or clearance, but should provide traffic information as appropriate;

(e) Pilots who deviate from an ATC instruction or clearance in response to an RA shall promptly return to the terms of that instruction or clearance when the conflict is resolved and advise ATC.

12.16.10 Pilot and Controller Phraseology

The current ICAO pilot/controller phraseology is detailed below (ICAO Doc 4444 PANS Air Traffic Management, Chapter 12, Paragraph 12.3.1.2). It should be noted that, for the purpose of phonetic clarity, the term TCAS is used.

Circumstances	Pilot	Controller
After a flight starts to deviate from the ATC clearance or instructions to comply with a TCAS RA.	TCAS RA	ROGER
After the response to a TCAS RA is completed and a return to the ATC clearance or instruction is initiated.	CLEAR OF CONFLICT. RETURNING TO (assigned clearance)	ROGER (or alternative instruction)
After the response to a TCAS RA is completed and the assigned ATC clearance or instruction has been resumed.	CLEAR OF CONFLICT. (assigned clearance) RESUMED	ROGER (or alternative instruction)
After an ATC clearance or instruction contradictory to the TCAS RA is received, the flight crew will follow the RA and inform ATC directly.	UNABLE, TCAS RA	ROGER

12.17 Reduced Vertical Seperation Minimum (RVSM)

12.17.1 Definitions

RVSM: The application of 1000-ft vertical separation at and above FL290 between aircraft approved to operate in reduced vertical separation minimum airspace.

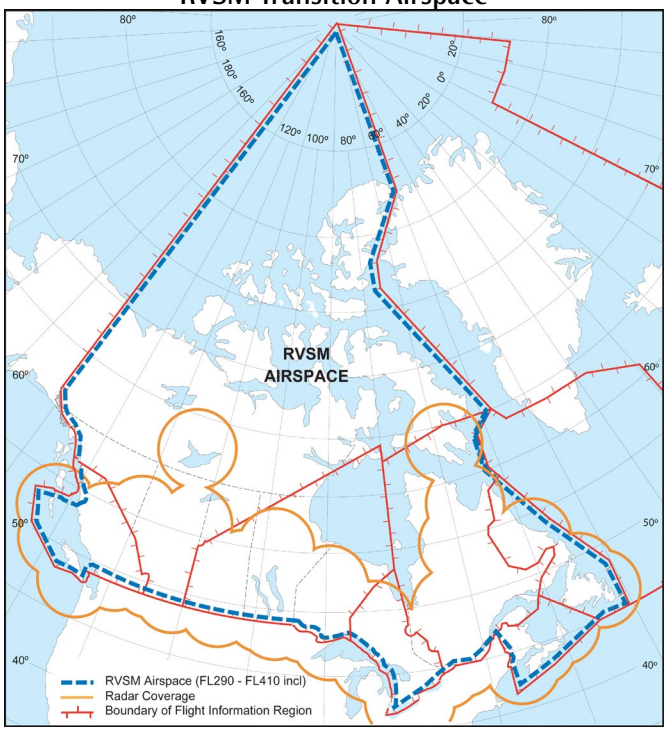
Non-RVSM Aircraft: An aircraft that does not meet reduced vertical separation minimum (RVSM) requirements for certification and/or for operator approval.

RVSM Aircraft: An aircraft that meets reduced vertical separation minimum (RVSM) requirements for certification and for operator approval.

12.17.2 RVSM Airspace

(a) RVSM airspace is all airspace within CDA from FL290 to FL410 inclusive as defined in the DAH (TP 1820) and depicted in Figure 12.3.

Figure 12.3 – RVSM Airspace and RVSM Transition Airspace



12.17.3 ATC Procedures

(a) Within RVSM airspace ATC:

(i) will, within non-radar airspace, endeavour to establish 2 000 ft separation or applicable lateral or longitudinal separation minimum if an aircraft reports greater-than-moderate turbulence, and/or mountain wave activity that is of sufficient magnitude to significantly affect altitude-keeping, and is within 5 min of another aircraft at 1 000 ft separation;

(ii) will, within radar airspace, vector aircraft to establish radar separation or establish 2 000 ft separation if an aircraft reports greater-than-moderate turbulence, or encountering mountain wave activity that is of sufficient magnitude to significantly affect altitude-keeping, if 1 000 ft vertical separation exists between two aircraft, and targets appear likely to merge;

(iii) may structure portions of the airspace for specific periods of time for one-way traffic in which inappropriate flight levels to the direction of flight may be assigned; and

(iv) may, within non-radar airspace, temporarily suspend RVSM within selected areas and/or altitudes due to adverse weather conditions, e.g. pilot reports greater-than-moderate turbulence. When RVSM is suspended, the vertical separation minimum between all aircraft will be 2 000 ft.

(b) Pilots may be requested by ATC to confirm that they are approved for RVSM operations. Pilots/operators unable to provide such confirmation will be issued a clearance to operate outside RVSM airspace:

Phraseology: *"Affirm RVSM" or "Negative RVSM (supplementary information, e.g. monitoring flight)."* See phraseology depicted in Figure 12.4

12.17.4 In-Flight Procedures

(a) Before entering RVSM airspace, the status of required equipment should be reviewed. The following equipment should be operating normally:

(i) two independent altitude measurement systems;
(ii) one automatic altitude control system; and
(iii) one altitude alert system.

(b) The pilot must notify ATC whenever the aircraft:

(i) is no longer RVSM-compliant due to equipment failure;
(ii) experiences loss of redundancy of altimetry systems; or
(iii) encounters turbulence or mountain wave activity that affects the capability to maintain the cleared flight level.

(c) In the event that any of the required equipment fails prior to entering RVSM airspace, a new clearance should be requested in order to avoid RVSM airspace.

(d) In level cruise, it is essential that the aircraft maintains the cleared flight level. Except in contingency situations, aircraft should not deviate from the cleared flight level without an ATC clearance. If the pilot is notified by ATC of an assigned altitude deviation (AAD) error of 300 ft or greater, the pilot should return to the cleared flight level as soon as possible.

(e) TRANSITION BETWEEN FLs: During cleared transition between flight levels, the aircraft should not overshoot or undershoot the assigned level by more than 150 ft.

12.17.5 Flight Planning Requirements

(a) Unless an aircraft can be accommodated in RVSM airspace as detailed in paragraph 12.17.6, RVSM approval is required for the aircraft to operate within RVSM airspace. The operator must determine that the aircraft has been approved by the appropriate State authority and will meet the RVSM requirements for the filed route of flight and any planned alternate routes. The letter "W" shall be inserted in Item 10 (Equipment) of the flight plan to indicate that the aircraft is RVSM-compliant and the operator is RVSM-approved. The "W" designator is not to be used unless both conditions are met. If the aircraft registration is not used in Item 7, the registration is to be entered in Item 18 (RAC 3.16.8 "REG/").

(b) ATC will use the equipment block information to either issue or deny clearance into RVSM airspace and to apply either 1 000 ft or 2 000 ft vertical separation minimum.

(c) Non-RVSM aircraft requesting permission to operate in RVSM airspace shall include "STS/NONRVSM" in item 18 of the flight plan to indicate the reason for special handling by ATS.

12.17.6 Operation of Non-RVSM Aircraft in RVSM Airspace

(a) FLIGHT PRIORITY:

RVSM aircraft will be given priority for level allocation over non-RVSM aircraft. Non-RVSM aircraft may be accommodated on a traffic- and workload-permitting basis.

(b) VERTICAL SEPARATION:

The vertical separation minimum between non-RVSM aircraft operating in RVSM airspace and all other aircraft is 2 000 ft.

(c) CONTINUOUS CLIMB OR DESCENT THROUGH RVSM AIRSPACE:

Non-RVSM aircraft may be cleared to climb to and operate above FL410 or descend to and operate below FL290, provided the aircraft is capable of:

(i) a continuous climb or descent and does not need to level off at an intermediate altitude for any operational considerations; and
(ii) climb or descent at the normal rate for the aircraft.

(d) STATE AIRCRAFT:

For the purposes of RVSM operations, State aircraft are those aircraft used in military, customs and police services.

State aircraft are exempt from the requirement to be RVSM-approved to operate in RVSM airspace.

(e) NON-RVSM AIRCRAFT IN RVSM AIRSPACE:

Non-RVSM aircraft may flight plan to operate within RVSM airspace, provided the aircraft:

(i) is being delivered to the State of Registry or Operator;
(ii) was formerly RVSM-approved, but has experienced an equipment failure and is being flown to a maintenance facility for repair in order to meet RVSM requirements and/or obtain approval;
(iii) is being utilized for mercy or humanitarian purposes;
(iv) is a photographic survey flight (CDA only). This approval is not applicable for that portion of flight transiting to and from the area(s) of surveying or mapping operations;

(v) is conducting flight checks of a NAVAID. This approval is not applicable for that portion of flight transiting to and from the area(s) of flight check operations; or
(vi) is conducting a monitoring, certification or developmental flight.

(f) PHRASEOLOGY:

Pilots of non-RVSM flights should include the phraseology "negative RVSM" in all initial calls on ATC frequencies, requests for flight level changes, readbacks of flight level clearances within RVSM airspace and readbacks of climb or descent clearances through RVSM airspace. See Figure 12.4.

12.17.7 Delivery Flights for Aircraft that are RVSM-Compliant on Delivery

(a) An aircraft that is RVSM-compliant on delivery may operate in Canadian Domestic RVSM airspace provided that the crew is trained on RVSM policies and procedures applicable in the airspace and the responsible State issues the operator a letter of authorization approving the operation.

(b) State notification to the NAARMO (see RAC 12.16.10) should be in the form of a letter, e-mail or fax documenting the one-time flight indicating:

(i) planned date of the flight;
(ii) flight identification;
(iii) registration number; and
(iv) aircraft type/series.

12.17.8 Airworthiness and Operational Approval and Monitoring

(a) Operators must obtain airworthiness and operational approval from the State of Registry or State of the Operator, as appropriate, to conduct RVSM operations. For the purposes of RVSM, the following terminology has been adopted:
(i) RVSM Airworthiness Approval: The approval that is issued by the appropriate State authority to indicate that an aircraft has been modified in accordance with the relevant approval documentation, e.g. service bulletin, supplemental type certificate, and is therefore eligible for monitoring. The date of issue of such an approval should coincide with the date when the modification was certified by the operator as being complete.
(ii) RVSM (Operational) Approval: The approval that is issued by the appropriate State authority once an operator has achieved the following:
(A) RVSM airworthiness approval; and
(B) State approval of Operations Manual (where applicable) and on-going maintenance procedures.

(b) Operators of Canadian-registered aircraft intending to operate in RVSM airspace will be required to show that they meet all the applicable standards in accordance with CARs Parts VI and VII. Information on RVSM approval may be obtained from:

Airworthiness Approvals:

Transport Canada
Safety and Security Director,
Aircraft Certification (AARD)
Ottawa ON K1A 0N8

Fax: 613-996-9178

Operating Standards Commercial Air Carriers and Private Operators:

Transport Canada
Safety and Security Director,
Commercial and Business Aviation (AARX)
Ottawa ON K1A 0N8

Fax: 613-954-1602

RVSM Maintenance Programs:

Transport Canada
Safety and Security Director,
Aircraft Maintenance and Manufacturing (AARP)
Ottawa ON K1A 0N8

Fax: 613-996-9178

12.17.9 Monitoring

(a) All operators that operate or intend to operate in airspace where RVSM is applied are required to participate in the RVSM monitoring program. Monitoring prior to the issuance of RVSM operational approval is not a requirement. However, operators should submit monitoring plans to the responsible civil aviation authority to show that they intend to meet the North American RVSM Minimum Monitoring Requirements.

(b) Ground-based and GPS-based monitoring systems are available to support RVSM operations. Monitoring is a quality control program that enables Transport Canada and other civil aviation authorities to assess the in-service altitude-keeping performance of aircraft and operators.

(c) Ground-based height monitoring systems are located in the vicinity of Ottawa, Ont., and Lethbridge, Alta. Over-flight of ground-based height monitoring systems is transparent to the pilot. Aircraft height-keeping performance monitoring flights using ground-based monitoring systems should be flight planned to route within a 30 NM radius of the Ottawa VORTAC, or a 30 NM radius of the Lethbridge VOR/DME.

(d) GPS monitoring unit (GMU) services to conduct a height-keeping performance monitoring flight may be obtained from the following agencies:

CSSI, Inc.
Washington, DC
Tel: 202-863-2175
E-mail: .....*monitor@cssiinc.com*
Web site: .....*<www.rvsm-monitoring.com>*

ARINC
Annapolis, MD
RVSM Operations Coordinator
Tel: 410-266-4707
E-mail: .....*rvsmops@arinc.com*
Web site: .....*<www.arinc.com/products/rvsm/>*

12.17.10 NAARMO

(a) The Regional Monitoring Agency for CDA is the NAARMO, located in Atlantic City, NJ, and may be contacted as follows:

William J. Hughes Technical Center NAS & International Airspace Analysis Branch (ACT-520) Atlantic City International Airport Atlantic City, NJ 08405 USA

Fax: 609-485-5117
AFTN: ..... N/A

(b) Information on the responsibilities and procedures applicable to the NAARMO may be found on the Web site: *<www.tc.faa.gov/act-500/niaab/rvsm/naarmo_intro.asp>*.

12.17.11 TCAS II/ACAS II RVSM Requirements

Aeroplanes operating in accordance with CAR 702, 703, 704 and 705 in RVSM airspace must be equipped with TCAS II/ACAS II. The TCAS II/ACAS II must be TSO to TSO-C-119b or later revision (TCAS II software version 7.0). All other TCAS/ACAS-equipped aircraft operating in RVSM airspace should be equipped with software version 7.

12.17.12 Mountain Wave Activity (MWA)

(a) Significant MWA occurs both below and above FL290, which is the floor of RVSM airspace. It often occurs in western Canada and western USA in the vicinity of mountain ranges. It may occur when strong winds blow perpendicular to mountain ranges, resulting in up and down or wave motions in the atmosphere. Wave action can produce altitude excursions and airspeed fluctuations accompanied by only light turbulence. With sufficient amplitude, however, wave action can induce altitude and airspeed fluctuations accompanied by severe turbulence. MWA is difficult to forecast and can be highly localized and short-lived

(b) Wave activity is not necessarily limited to the vicinity of mountain ranges. Pilots experiencing wave activity anywhere that significantly affects altitude-keeping can follow the guidance provided below.

(c) In-flight indications that the aircraft is being subjected to MWA are:

(i) altitude excursions and airspeed fluctuations with or without associated turbulence;
(ii) pitch and trim changes required to maintain altitude with accompanying airspeed fluctuations; and
(iii) light to severe turbulence depending on the magnitude of the MWA.

(d) *TCAS Sensitivity*—For both MWA and greater-than-moderate turbulence encounters in RVSM airspace, an additional concern is the sensitivity of collision avoidance systems when one or both aircraft operating in close proximity receive TCAS advisories in response to disruptions in altitude hold capability.

(e) *Pre-flight tools*—Sources of observed and forecast information that can help the pilot ascertain the possibility of MWA or severe turbulence are: Forecast Winds and Temperatures Aloft (FD), Area Forecast (FA), SIGMETS and PIREPS.

12.17.13 Wake Turbulence

(a) Pilots should be aware of the potential for wake turbulence encounters following Southern Domestic RVSM (SDRVSM) implementation. Experience gained since 1997, however, has shown that such encounters in RVSM airspace are generally moderate or less in magnitude.

(b) It is anticipated that, in SDRVSM airspace, wake turbulence experience will mirror European RVSM experience gained since January 2002. European authorities have found that reports of wake turbulence encounters had not increased significantly since RVSM implementation (eight versus seven reports in a ten-month period). In addition, they found that reported wake turbulence was generally similar to moderate clear air turbulence.

(c) Pilots should be alert for wake turbulence when operating:

(i) in the vicinity of aircraft climbing or descending through their altitude;
(ii) approximately 12–15 mi. after passing 1 000 ft below opposite direction traffic; and
(iii) approximately 12–15 mi. behind and 1 000 ft below same direction traffic.

Figure 12.4 – Pilot/Controller Phraseology—RVSM Operations Standard Phraseology for RVSM Operations

Message	Phraseology
For a controller to ascertain the RVSM approval status of an aircraft	(call sign) confirm RVSM approved
Pilot indication that flight is RVSM-approved	Affirm RVSM
Pilot will report lack of RVSM approval (Non-RVSM status): a. On the initial call on any frequency in the RVSM airspace; and b. In all requests for flight level changes pertaining to flight levels within the RVSM airspace; and c. In all read-backs to flight level clearances pertaining to flight levels within the RVSM airspace; and d. In read-back of flight level clearances involving climb and descent through RVSM airspace (FL290-410)	Negative RVSM (supplementary information, e.g. "monitoring flight")
Pilot report of one of the following after entry into RVSM airspace: all primary altimeters, automatic altitude control systems or altitude alerters have failed (This phrase is to be used to convey both the initial indication of RVSM aircraft system failure and on initial contact on all frequencies in RVSM airspace until the problem ceases to exist or the aircraft has exited RVSM airspace)	Unable RVSM Due Equipment
ATC denial of clearance into RVSM airspace	Unable issue clearance into RVSM airspace, maintain FL__.
Pilot reporting inability to maintain cleared flight level due to weather encounters. See RAC 12.16.12(c)	Unable RVSM due (state reason) (e.g. turbulence, mountain wave)
ATC requesting pilot to confirm that an aircraft has regained RVSM-approved status or a pilot is ready to resume RVSM	Confirm able to resume RVSM
Pilot ready to resume RVSM after aircraft system or weather contingency	Ready to resume RVSM

12.17.14 In-Flight Contingencies

(a) The following general procedures are intended as guidance only. Although all possible contingencies cannot be covered, they provide for cases of inability to maintain assigned level due to:
(i) weather;
(ii) aircraft performance; and
(iii) pressurization failure.

The pilot's judgment should determine the sequence of actions to be taken, taking into account specific circumstances, and ATC shall render all possible assistance.

(b) If an aircraft is unable to continue flight in accordance with its ATC clearance, a revised clearance shall, whenever possible, be obtained prior to initiating any action, using a distress or urgency signal if appropriate. If prior clearance cannot be obtained, an ATC clearance shall be obtained at the earliest possible time. The pilot should take the following actions until a revised ATC clearance is received:
(i) establish communications with and alert nearby aircraft by broadcasting, at suitable intervals: flight identification, flight level, aircraft position, (including the ATS route designator or the track code) and intentions on the frequency in use, as well as on frequency 121.5 MHz (or, as a back-up, the inter-pilot air-to-air frequency 123.45 MHz);
(ii) initiate such action as necessary to ensure safety. If the pilot determines that there is another aircraft at or near the same flight level, which might conflict, the pilot is expected to adjust the path of the aircraft, as necessary, to avoid conflict.

Figure 12.5 provides pilot guidance on actions to take under certain conditions of aircraft system failure and weather encounters. It also describes the ATC controller actions in these situations. It is recognized that the pilot and controller will use judgement to determine the action most appropriate to any given situation.

Figure 12.5 – Contingency Actions: Weather Encounters and Aircraft System Failures

Initial Pilot Actions in Contingency Situations

Initial pilot actions when unable to maintain flight level or unsure of aircraft altitude–keeping capability

- Notify ATC and request assistance as detailed below;
- Maintain cleared flight level, if possible, while evaluating the situation;
- Watch for conflicting traffic, both visually and with reference to ACAS/TCAS, if equipped; and
- Alert nearby aircraft by illuminating exterior lights, broadcasting position, flight level and intentions on 121.5 MHz (or as back-up, the inter-pilot air-to-air frequency, 123.45 MHz).

Inability to Maintain Cleared Flight Level Due to Weather Encounter

Pilot should:	ATC may be expected to:
• Contact ATC and advise • Unable RVSM Due (state reason)" (e.g. turbulence, mountain wave)	• In radar airspace, where 1 000 ft vertical separation exists between two aircraft, and targets appear likely to merge, vector one or both aircraft to establish radar separation until the pilot reports clear of the turbulence
• If not initiated by the controller, and if in radar airspace, request vector clear of traffic at adjacent flight levels	• Provide lateral or longitudinal separation from traffic at adjacent flight levels, traffic-permitting
• Request flight level change or re-route, if desired	• Advise pilot of conflicting traffic
	• Issue flight level change or re-route, traffic-permitting

Pilot Report of Mountain Wave Activity (MWA)

Pilot should:	ATC may be expected to:
• Contact ATC and report experiencing MWA	• Advise pilot of conflicting traffic
• If advised of conflicting traffic at adjacent flight levels and the aircraft is experiencing MWA that significantly affects altitude-keeping, request vector to acquire horizontal separation • If so desired, request a flight level change or re-route	• If pilot requests, vector aircraft to achieve horizontal separation, traffic-permitting • In radar airspace, where 1 000 ft vertical separation exists between two aircraft, and targets appear likely to merge, vector one or both aircraft to establish radar separation until the pilot reports clear of MWA • Issue flight level change or re-route, traffic-permitting
• Report location and magnitude of MWA to ATC	• Issue PIREP to other aircraft concerned

Wake Turbulence Encounters

Pilot should:	ATC may be expected to:
• Contact ATC and request vector lateral offset or flight level change	• Issue vector, lateral offset or flight level change, traffic-permitting

Failure of Automatic Altitude Control System, Altitude Alerter or All Primary Altimeters

Pilot wil:	ATC will:
• Contact ATC and advise "Unable RVSM Due Equipment" • Request Clearance out of RVSM unless operational situation dictates otherwise	• Provide 2 000 ft vertical separation or appropriate horizontal separation • Clear aircraft out of RVSM airspace

One Primary Altimeter Remains Operational

Pilot will:	ATC will:
• Cross-check stand-by altimeter • Notify ATC of loss of redundancy, operation with single primary altimeter • If unable to confirm primary altimeter accuracy, follow action for failure of all primary altimeters	• Acknowledge operation with single primary altimeter and monitor progress

12.18 MINIMUM SAFE ALTITUDE WARNING (MSAW)

12.18.1 GENERAL

Minimum safe altitude warning (MSAW) is a radar display feature designed to alert controllers to the existence of aircraft operating or predicted to operate at altitudes where separation from terrain cannot be assured. It is used to assist controllers in detecting altitude deviations that could result in controlled flight into terrain (CFIT).

MSAW service is only available in the Vancouver FIR to IFR and CVFR aircraft operating in en route controlled airspace that receive radar service and are in direct communication with the controller. There is a service exclusion zone within a 100-NM radius of CYVR. In addition, MSAW service is not available in control zones and approach/departure corridors.

RAC

12.18.2 PROCEDURES

In the event an MSAW is generated, the controller will provide the following information:

1. TERRAIN WARNING
2. IMMEDIATE SAFE ALTITUDE [VALUE]
3. ALTIMETER [VALUE]

12.18.3 Pilot-Initiated Terrain Avoidance Procedure

If the aircraft is equipped with GPWS or TAWS, the flight crew is expected to carry out the appropriate terrain avoidance procedures in response to an on-board alarm. The pilot of a GPWS/TAWS-equipped aircraft should acknowledge receipt of the altimeter and immediate safe altitude information from the controller. The pilot should also advise the controller of the terrain avoidance action being taken when beginning the manoeuvre or as soon as workload permits.

Example:

Pilot: *ROGER, INITIATING GPWS/TAWS CLIMB or*
ROGER, GPWS/TAWS EQUIPPED

The controller at this point will provide the aircraft with additional terrain-related information, as appropriate.

Example:

ATC: *[higher/lower] TERRAIN AHEAD, TO YOUR [left/right]*
IMMEDIATE SAFE ALTITUDE NOW [altitude]

12.18.4 ATC-Initiated Terrain Avoidance Procedure

After issuing the altimeter and immediate safe altitude information the controller will, if appropriate, provide direction based on the MSAW information received.

Example:

ATC: *EXPEDITE CLIMB TO SEVEN THOUSAND*

In the event that the aircraft is not GPWS/TAWS-equipped or the pilot has not yet received a warning from his/her on-board system, the pilot should request vectors for terrain avoidance assistance as required.

Example:

Pilot: *REQUEST VECTORS FOR TERRAIN AVOIDANCE or*
REQUEST TERRAIN AVOIDANCE INSTRUCTION

Although the prime responsibility to initiate terrain avoidance rests with the pilot, if, in the judgment of the controller, it becomes apparent that the aircraft is in danger of colliding with terrain, the controller may initiate terrain avoidance intervention.

Example:

ATC: *TURN [left/right] [number of] DEGREES IMMEDIATELY*
or
CLIMB [altitude] IMMEDIATELY

Once terrain avoidance has been initiated, the pilot will be provided with all additional terrain-related information available.

Example:

ATC: *[higher/lower] TERRAIN AHEAD, TO YOUR [left/right]*
IMMEDIATE SAFE ALTITUDE NOW [value]

If, at any time during the procedure, the pilot regains sight of the terrain, visual terrain avoidance should resume and the controller should be advised as soon as practicable.

12.18.5 Assistance to Aircraft in Distress

The digitized terrain contour map component of the MSAW system can be used by the controller independently of the warning function to provide navigational assistance to any aircraft in need. Such aircraft could include radar-identified aircraft that are lost or have encountered icing in mountainous terrain.

Vectoring for terrain avoidance can be provided to aircraft in distress or experiencing an emergency, provided the pilot requests it or the controller suggests it and the pilot concurs.

RAC ANNEX

1.0 General

This annex contains those *Canadian Aviation Regulations* (CARs) that relate to the subject matter of this chapter, but may not have been incorporated, in full or in part, in the chapter text.

2.0 Canadian Aviation Regulations

Reckless or Negligent Operation of Aircraft

602.01

No person shall operate an aircraft in such a reckless or negligent manner as to endanger or be likely to endanger the life or property of any person. Fitness of Flight Crew Members

602.02

No operator of an aircraft shall require any person to act as a flight crew member and no person shall act as a flight crew member, if either the person or the operator has any reason to believe, having regard to the circumstances of the particular flight to be undertaken, that the person

(a) is suffering or is likely to suffer from fatigue; or

(b) is otherwise unfit to perform properly the person's duties as a flight crew member.

Alcohol or Drugs – Crew Members

602.03

No person shall act as a crew member of an aircraft

(a) within eight hours after consuming an alcoholic beverage;

(b) while under the influence of alcohol; or

(c) while using any drug that impairs the person's faculties to the extent that the safety of the aircraft or of persons on board the aircraft is endangered in any way.

Alcohol or Drugs – Passengers

602.04

(1) In this Section, "intoxicating liquor" means a beverage that contains more than 2.5 percent proof spirits.

(2) No person shall consume on board an aircraft an intoxicating liquor unless the intoxicating liquor
   (a) has been served to that person by the operator of the aircraft; or
   (b) where no flight attendant is on board, has been provided by the operator of the aircraft.

(3) No operator of an aircraft shall provide or serve any intoxicating liquor to a person on board the aircraft, where there are reasonable grounds to believe that the person's faculties are impaired by alcohol or a drug to an extent that may present a hazard to the aircraft or to persons on board the aircraft.

(4) Subject to subsection (5), no operator of an aircraft shall allow a person to board the aircraft, where there are reasonable grounds to believe that the person's faculties are impaired by alcohol or a drug to an extent that may present a hazard to the aircraft or to persons on board the aircraft.

(5) The operator of an aircraft may allow a person whose faculties are impaired by a drug to board an aircraft, where the drug was administered in accordance with a medical authorization and the person is under the supervision of an attendant.

Compliance with Instructions

602.05

(1) Every passenger on board an aircraft shall comply with instructions given by any crew member respecting the safety of the aircraft or of persons on board the aircraft.

(2) Every crew member on board an aircraft shall, during flight time, comply with the instructions of the pilot-in-command or of any person whom the pilot-in-command has authorized to act on behalf of the pilot-in-command.

Smoking

602.06

(1) No person shall smoke on board an aircraft during takeoff or landing or when directed not to smoke by the pilot-in-command.

(2) No person shall smoke in an aircraft lavatory.

(3) No person shall tamper with or disable a smoke detector installed in an aircraft lavatory without permission from a crew member or the operator of the aircraft. Aircraft Operating Limitations

602.07

No person shall operate an aircraft unless it is operated in accordance with the operating limitations
   (a) set out in the aircraft flight manual, where an aircraft flight manual is required by the applicable standards of airworthiness;
   (b) set out in a document other than the aircraft flight manual, where use of that document is authorized pursuant to Part VII;

(c) indicated by markings or placards required pursuant to Section 605.05; or
(d) prescribed by the competent authority of the state of registry of the aircraft.

Portable Electronic Devices

602.08

(1) No operator of an aircraft shall permit the use of a portable electronic device on board an aircraft, where the device may impair the functioning of the aircraft's systems or equipment.

(2) No person shall use a portable electronic device on board an aircraft except with the permission of the operator of the aircraft.

Carry-on Baggage, Equipment and Cargo

602.86

(1) No person shall operate an aircraft with carry-on baggage, equipment or cargo on board, unless the carry-on baggage, equipment and cargo are
(a) stowed in a bin, compartment, rack or other location that is certified in accordance with the aircraft type certificate in respect of the stowage of carry-on baggage, equipment or cargo; or
(b) restrained so as to prevent them from shifting during movement of the aircraft on the surface and during takeoff, landing and inflight turbulence.

(2) No person shall operate an aircraft with carry-on baggage, equipment or cargo on board unless
(a) the safety equipment, the normal and emergency exits that are accessible to passengers and the aisles between the flight deck and a passenger compartment are not wholly or partially blocked by carry-on baggage, equipment or cargo;
(b) all of the equipment and cargo that are stowed in a passenger compartment are packaged or covered to avoid possible injury to persons on board;
(c) where the aircraft is type-certificated to carry 10 or more passengers and passengers are carried on board,
(i) no passenger's view of any "seat belt" sign, "no smoking" sign or exit sign is obscured by carry-on baggage, equipment or cargo except if an auxiliary sign is visible to the passenger or another means of notification of the passenger is available,
(ii) all of the passenger service carts and trolleys are securely restrained during movement of the aircraft on the surface, takeoff and landing, and during inflight turbulence where the pilot-in-command or in-charge flight attendant has directed that the cabin be secured pursuant to subsection 605.25(3) or (4), and
(iii) all of the video monitors that are suspended from the ceiling of the aircraft and extend into an aisle are stowed and securely restrained during takeoff and landing; and
(d) all of the cargo that is stowed in a compartment to which crew members have access is stowed in such a manner as to allow a crew member to effectively reach all parts of the compartment with a hand-held fire extinguisher.

Crew Member Instructions

602.87

The pilot-in-command of an aircraft shall ensure that each crew member, before acting as a crew member on board the aircraft, has been instructed with respect to
(a) the duties that the crew member is to perform; and
(b) the location and use of all of the normal and emergency exits and of all of the emergency equipment that is carried on board the aircraft.

Passenger Briefings

602.89

(1) The pilot-in-command of an aircraft shall ensure that all of the passengers on board the aircraft are briefed before takeoff with respect to the following, where applicable:
(a) the location and means of operation of emergency and normal exits;
(b) the location and means of operation of safety belts, shoulder harnesses and restraint devices;
(c) the positioning of seats and the securing of seat backs and chair tables;
(d) the stowage of carry-on baggage;
(e) where the aircraft is unpressurized and it is possible that the flight will require the use of oxygen by the passengers, the location and means of operation of oxygen equipment; and
(f) any prohibition against smoking.

(2) The pilot-in-command of an aircraft shall ensure that all of the passengers on board the aircraft are briefed
(a) in the case of an over-water flight where the carriage of life preservers, individual flotation devices or personal flotation devices is required pursuant to Section 602.62, before commencement of the over-water portion of the flight, with respect to the location and use of those items; and
(b) in the case of a pressurized aircraft that is to be operated at an altitude above FL250, before the aircraft reaches FL250, with respect to the location and means of operation of oxygen equipment.

(3) The pilot-in-command of an aircraft shall, before takeoff, ensure that all of the passengers on board the aircraft are provided with information respecting the location and use of
(a) first aid kits and survival equipment;
(b) where the aircraft is a helicopter or a small aircraft that is an aeroplane, any ELT that is required to be carried on board pursuant to Section 605.38; (c) and any life raft that is required to be carried on board pursuant to Section 602.63.

Noise Operating Criteria

602.105

No person shall operate an aircraft at or in the vicinity of an aerodrome except in accordance with the applicable noise abatement procedures and noise control requirements specified by the Minister in the *Canada Air Pilot* or *Canada Flight Supplement*, including the procedures and requirements relating to

(a) preferential runways;
(b) minimum noise routes;
(c) hours when aircraft operations are prohibited or restricted;
(d) arrival procedures;
(e) departure procedures;
(f) duration of flights;
(g) the prohibition or restriction of training flights;
(h) VFR or visual approaches;
(i) simulated approach procedures; and
(j) the minimum altitude for the operation of aircraft in the vicinity of the aerodrome.

Noise-Restricted Runways

602.106

(1) Subject to subsection (2), no person shall operate a subsonic turbojet aeroplane that has a maximum certificated takeoff weight of more than 34 000 kg (74,956 pounds) on takeoff at a noise restricted runway set out in Column II of an item of the schedule at an aerodrome set out in Column I of that item, unless there is on board

(a) a certificate of airworthiness indicating that the aeroplane meets the applicable noise emission standards;
(b) a certificate of noise compliance issued in respect of the aeroplane; or
(c) where the aeroplane is not a Canadian aircraft, a document issued by the state of registry that specifies that the aeroplane meets the applicable noise emission requirements of that state.

(2) Subsection (1) does not apply

(a) to the extent that it is inconsistent with any obligation assumed by Canada in respect of a foreign state in a treaty, convention or agreement;
(b) where the pilot-in-command of an aircraft has declared an emergency; or
(c) where an aircraft is operated on
  (i) an air evacuation operation,
  (ii) any other emergency air operation, or
  (iii) a departure from an aerodrome at which it was required to land because of an emergency.

SCHEDULE (Section 602.106)

Item	Column I	Column II
	Aerodrome*	Noise Restricted Runways for Takeoff*
1.	Vancouver International Airport	08, 12
2.	Calgary International Airport	07, 10, 16, 25, 28
3.	Edmonton City Centre (Blatchford Field) Airport	All runways
4.	Edmonton International Airport	12
5.	Winnipeg International Airport	13, 18
6.	Hamilton Airport	06
7.	Toronto/Lester B. Pearson International Airport	06L, 06R, 15
8.	Ottawa/Macdonald-Cartier International Airport	32
9.	Montréal International Airport (Dorval)	All runways

* Information taken from the aeronautical information publication of the Department of Transport entitled Canada Flight Supplement. ≥

Power-driven Aircraft – day VFR

605.14

No person shall conduct a takeoff in a power-driven aircraft for the purpose of day VFR flight unless it is equipped with

(a) where the aircraft is operated in uncontrolled airspace, an altimeter;
(b) where the aircraft is operated in controlled airspace, a sensitive altimeter adjustable for barometric pressure;
(c) an airspeed indicator;
(d) a magnetic compass or a magnetic direction indicator that operates independently of the aircraft electrical generating system;
(e) a tachometer for each engine and for each propeller or rotor that has limiting speeds established by the manufacturer;
(f) an oil pressure indicator for each engine employing an oil pressure system;
(g) a coolant temperature indicator for each liquid-cooled engine;
(h) an oil temperature indicator for each air-cooled engine having a separate oil system;
(i) a manifold pressure gauge for each
  (i) reciprocating engine equipped with a variable-pitch propeller,
  (ii) reciprocating engine used to power a helicopter,
  (iii) supercharged engine, and
  (iv) turbocharged engine;

(j) a means for the flight crew, when seated at the flight controls to determine
  (i) the fuel quantity in each main fuel tank, and
  (ii) if the aircraft employs retractable landing gear, the position of the landing gear;
(k) subject to subsections 601.08(2) and 601.09(2), a radiocommunication system adequate to permit two-way communication on the appropriate frequency when the aircraft is operated within
  (i) Class B, Class C or Class D airspace,
  (ii) an MF area, unless the aircraft is operated pursuant to subsection 602.97(3), or
  (iii) the ADIZ;
(l) where the aircraft is operated under Subpart 4 of this Part, or under Subpart 3, 4 or 5 of Part VII, radiocommunication equipment adequate to permit two-way communication on the appropriate frequency;
(m) where the aircraft is operated in Class B airspace, radio navigation equipment that will enable it to be operated in accordance with a flight plan; and
(n) where the aircraft is operated under Subpart 4 of this Part or under Subpart 5 of Part VII, radio navigation equipment that is adequate to receive radio signals from a transmitting facility.

Power-driven Aircraft – VFR OTT

605.15

(1) No person shall conduct a takeoff in a power-driven aircraft for the purpose of VFR OTT flight unless it is equipped with
  (a) the equipment referred to in paragraphs 605.14(c) to (j);
  (b) a sensitive altimeter adjustable for barometric pressure;
  (c) a means of preventing malfunction caused by icing for each airspeed indicating system;
  (d) a gyroscopic direction indicator or a stabilized magnetic direction indicator;
  (e) an attitude indicator;
  (f) subject to subsection (2), a turn and slip indicator or turn coordinator;
  (g) where the aircraft is to be operated within the Northern Domestic Airspace, a means of establishing direction that is not dependent on a magnetic source;
  (h) radiocommunication equipment adequate to permit two-way communication on the appropriate frequency; and
  (i) radio navigation equipment adequate to permit the aircraft to be navigated safely.

(2) Where the aircraft is equipped with a standby attitude indicator that is usable through flight attitudes of 360 degrees of pitch and roll for an aeroplane, or ±80 degrees of pitch and ±120 degrees of roll for a helicopter, the aircraft may be equipped with a slip-skid indicator in lieu of a turn and slip indicator or turn coordinator.

Power-driven Aircraft – Night VFR

605.16

(1) No person shall conduct a takeoff in a power-driven aircraft for the purpose of night VFR flight, unless it is equipped with
  (a) the equipment referred to in paragraphs 605.14(c) to (n);
  (b) a sensitive altimeter adjustable for barometric pressure;
  (c) subject to subsection (2), a turn and slip indicator or turn coordinator;
  (d) an adequate source of electrical energy for all of the electrical and radio equipment;
  (e) in respect of every set of fuses of a particular rating that is installed on the aircraft and accessible to the pilot-in-command during flight, a number of spare fuses that is equal to at least 50 percent of the total number of installed fuses of that rating;
  (f) where the aircraft is operated so that an aerodrome is not visible from the aircraft, a stabilized magnetic direction indicator or a gyroscopic direction indicator;
  (g) where the aircraft is to be operated within the Northern Domestic Airspace, a means of establishing direction that is not dependent on a magnetic source;
  (h) where the aircraft is an airship operated within controlled airspace, radar reflectors attached in such a manner as to be capable of a 360-degree reflection;
  (i) a means of illumination for all of the instruments used to operate the aircraft;
  (j) when carrying passengers, a landing light; and
  (k) position and anti-collision lights that conform to the Aircraft Equipment and Maintenance Standards.

(2) Where the aircraft is equipped with a standby attitude indicator that is usable through flight attitudes of 360 degrees of pitch and roll for an aeroplane, or ±80 degrees of pitch and ±120 degrees of roll for a helicopter, the aircraft may be equipped with a slip-skid indicator in lieu of a turn and slip indicator or turn coordinator.

(3) No person shall operate an aircraft that is equipped with any light that may be mistaken for, or downgrade the conspicuity of, a light in the navigation light system, unless the aircraft is being operated for the purpose of aerial advertising.

(4) In addition to the equipment requirements specified in subsection (1), no person shall operate an aircraft in night VFR flight under Subpart 4 of this Part or Subparts 2 to 5 of Part VII, unless the aircraft is equipped with
  (a) an attitude indicator;
  (b) a vertical speed indicator;
  (c) a means of preventing malfunction caused by icing for each airspeed indicating system; and
  (d) an outside air temperature gauge.

Use of Position and Anti-collision Lights

605.17

(1) Subject to subsection (2), no person shall operate an aircraft in the air or on the ground at night, or on water between sunset and sunrise, unless the aircraft position lights and anti-collision lights are turned on.

(2) Anti-collision lights may be turned off where the pilot-in-command determines that, because of operating conditions, doing so would be in the interests of aviation safety.

Power-driven Aircraft – IFR

605.18

No person shall conduct a takeoff in a power-driven aircraft for the purpose of IFR flight unless it is equipped with

(a) when it is operated by day, the equipment required pursuant to paragraphs 605.16(1)(a) to (h);
(b) when it is operated by night, the equipment required pursuant to paragraphs 605.16(1)(a) to (k);
(c) an attitude indicator;
(d) a vertical speed indicator;
(e) an outside air temperature gauge;
(f) a means of preventing malfunction caused by icing for each airspeed indicating system;
(g) a power failure warning device or vacuum indicator that shows the power available to gyroscopic instruments from each power source;
(h) an alternative source of static pressure for the altimeter, airspeed indicator and vertical speed indicator;
(i) sufficient radiocommunication equipment to permit the pilot to conduct two-way communications on the appropriate frequency; and
(j) sufficient radio navigation equipment to permit the pilot, in the event of the failure at any stage of the flight of any Item of that equipment, including any associated flight instrument display,
  (i) to proceed to the destination aerodrome or proceed to another aerodrome that is suitable for landing, and
  (ii) where the aircraft is operated in IMC, to complete an instrument approach and, if necessary, conduct a missed approach procedure.

Balloons – Day VFR

605.19

No person shall conduct a takeoff in a balloon for the purpose of day VFR flight unless it is equipped with

(a) an altimeter;
(b) a vertical speed indicator;
(c) in the case of a hot air balloon,
  (i) a fuel quantity gauge, and
  (ii) an envelope temperature indicator;
(d) in the case of a captive gas balloon, a magnetic direction indicator; and
(e) subject to subsections 601.08(2) and 601.09(2), a radio communication system adequate to permit two-way communication on the appropriate frequency when the balloon is operated within
  (i) Class C or Class D airspace,
  (ii) an MF area, unless the aircraft is operated pursuant to subsection 602.97(3), or
  (iii) the ADIZ.

Balloons – Night VFR

605.20

No person shall conduct a takeoff in a balloon for the purpose of night VFR flight unless it is equipped with

(a) equipment required pursuant to Section 605.19;
(b) position lights;
(c) a means of illuminating all of the instruments used by the flight crew, including a flashlight; and
(d) in the case of a hot air balloon, two independent fuel systems.

Gliders – Day VFR

605.21

No person shall operate a glider in day VFR flight unless it is equipped with

(a) an altimeter;
(b) an airspeed indicator;
(c) a magnetic compass or a magnetic direction indicator; and
(d) subject to subsections 601.08(2) and 601.09(2), a radiocommunication system adequate to permit two-way communication on the appropriate frequency when the glider is operated within
  (i) Class C or Class D airspace,
  (ii) an MF area, unless the aircraft is operated pursuant to subsection 602.97(3), or
  (iii) the ADIZ.

Seat and Safety Belt Requirements

605.22

(1) Subject to subsection 605.23, no person shall operate an aircraft other than a balloon unless it is equipped with a seat and safety belt for each person on board the aircraft other than an infant.

(2) Subsection (1) does not apply to a person operating an aircraft that was type-certificated with a safety belt designed for two persons.

(3) A safety belt referred to in subsection (1) shall include a latching device of the metal-to-metal type.

Restraint System Requirements

605.23

An aircraft may be operated without being equipped in accordance with Section 605.22 in respect of the following persons if a restraint system that is secured to the primary structure of the aircraft is provided for each person who is

(a) carried on a stretcher or in an incubator or other similar device;
(b) carried for the purpose of parachuting from the aircraft; or
(c) required to work in the vicinity of an opening in the aircraft structure.

Shoulder Harness Requirements

605.24

(1) No person shall operate an aeroplane, other than a small aeroplane manufactured before July 18, 1978, unless each front seat or, if the aeroplane has a flight deck, each seat on the flight deck is equipped with a safety belt that includes a shoulder harness.

(2) Except as provided in Section 705.75, no person shall operate a transport category aeroplane unless each flight attendant seat is equipped with a safety belt that includes a shoulder harness.

(3) No person shall operate a small aeroplane manufactured after December 12, 1986, the initial type certificate of which provides for not more than nine passenger seats, excluding any pilot seats, unless each forward- or aft-facing seat is equipped with a safety belt that includes a shoulder harness.

(4) No person shall operate a helicopter manufactured after September 16, 1992, the initial type certificate of which specifies that the helicopter is certified as belonging to the normal or transport category, unless each seat is equipped with a safety belt that includes a shoulder harness.

(5) No person operating an aircraft shall conduct any of the following flight operations unless the aircraft is equipped with a seat and a safety belt that includes a shoulder harness for each person on board the aircraft:

(a) aerobatic manoeuvres;
(b) Class B, C or D external load operations conducted by a helicopter; and
(c) aerial application, or aerial inspection other than flight inspection for the purpose of calibrating electronic navigation aids, conducted at altitudes below 500 feet AGL.

General Use of Safety Belts and Restraint Systems

605.25

(1) The pilot-in-command of an aircraft shall direct all of the persons on board the aircraft to fasten safety belts

(a) during movement of the aircraft on the surface;
(b) during takeoff and landing; and
(c) at any time during flight that the pilot-in-command considers it necessary that safety belts be fastened.

(2) The directions referred to in subsection (1) also apply to the use of the following restraint systems:

(a) a child restraint system;
(b) a restraint system used by a person who is engaged in parachute descents; and
(c) a restraint system used by a person when working in the vicinity of an opening in the aircraft structure.

(3) Where an aircraft crew includes flight attendants and the pilot-in-command anticipates that the level of turbulence will exceed light turbulence, the pilot-in-command shall immediately direct each flight attendant to

(a) discontinue duties relating to service;
(b) secure the cabin; and
(c) occupy a seat and fasten the safety belt provided.

(4) Where an aircraft is experiencing turbulence and the in-charge flight attendant considers it necessary, the in-charge flight attendant shall

(a) direct all of the passengers to fasten their safety belts; and
(b) direct all of the other flight attendants to discontinue duties relating to service, to secure the cabin and to occupy their seats and fasten the safety belts provided.

(5) Where the in-charge flight attendant has given directions in accordance with subsection (4), the in-charge flight attendant shall so inform the pilot-in-command.

Use of Passenger Safety Belts and Restraint Systems

605.26

(1) Where the pilot-in-command or the in-charge flight attendant directs that safety belts be fastened, every passenger who is not an infant shall
- (a) ensure that the passenger's safety belt or restraint system is properly adjusted and securely fastened;
- (b) if responsible for an infant for which no child restraint system is provided, hold the infant securely in the passenger's arms; and
- (c) if responsible for a person who is using a child restraint system, ensure that the person is properly secured.

(2) No passenger shall be responsible for more than one infant.

Use of Crew Member Safety Belts

605.27

(1) Subject to subsection (2), the crew members on an aircraft shall be seated at their stations with their safety belts fastened
- (a) during takeoff and landing;
- (b) at any time that the pilot-in-command directs; and
- (c) in the case of crew members who are flight attendants, at any time that the in-charge flight attendant so directs pursuant to paragraph 605.25(4)(b).

(2) Where the pilot-in-command directs that safety belts be fastened by illuminating the safety belt sign, a crew member is not required to comply with paragraph (1)(b)
- (a) during movement of the aircraft on the surface or during flight, if the crew member is performing duties relating to the safety of the aircraft or of the passengers on board;
- (b) where the aircraft is experiencing light turbulence, if the crew member is a flight attendant and is performing duties relating to the passengers on board; or
- (c) if the crew member is occupying a crew rest facility during cruise flight and the restraint system for that facility is properly adjusted and securely fastened.

(3) The pilot-in-command shall ensure that at least one pilot is seated at the flight controls with safety belt fastened during flight time.

Child Restraint System

605.28

(1) No operator of an aircraft shall permit the use of a child restraint system on board the aircraft unless
- (a) the person using the child restraint system is accompanied by a parent or guardian who will attend to the safety of the person during the flight;
- (b) the weight and height of the person using the child restraint system are within the range specified by the manufacturer;
- (c) the child restraint system bears a legible label indicating the applicable design standards and date of manufacture;
- (d) the child restraint system is properly secured by the safety belt of a forward-facing seat that is not located in an emergency exit row and does not block access to an aisle; and
- (e) the tether strap is used according to the manufacturer's instructions or, where subsection (2) applies, secured so as not to pose a hazard to the person using the child restraint system or to any other person.

(2) Where a seat incorporates design features to reduce occupant loads, such as the crushing or separation of certain components, and the seat is in compliance with the applicable design standards, no person shall use the tether strap on the child restraint system to secure the system.

(3) Every passenger who is responsible for a person who is using a child restraint system on board an aircraft shall be
- (a) seated in a seat adjacent to the seat to which the child restraint system is secured;
- (b) familiar with the manufacturer's installation instructions for the child restraint system; and
- (c) familiar with the method of securing the person in the child restraint system and of releasing the person from it.

Flight Control Locks

605.29

No operator of an aircraft shall permit the use of a flight control lock in respect of the aircraft unless
- (a) the flight control lock is incapable of becoming engaged when the aircraft is being operated; and
- (b) an unmistakable warning is provided to the person operating the aircraft whenever the flight control lock is engaged.

De-icing or Anti-icing Equipment

605.30

No person shall conduct a takeoff or continue a flight in an aircraft where icing conditions are reported to exist or are forecast to be encountered along the route of flight unless

(a) the pilot-in-command determines that the aircraft is adequately equipped to operate in icing conditions in accordance with the standards of airworthiness under which the type certificate for that aircraft was issued; or

(b) current weather reports or pilot reports indicate that icing conditions no longer exist.

Oxygen Equipment and Supply

605.31

(1) No person shall operate an unpressurized aircraft unless it is equipped with sufficient oxygen dispensing units and oxygen supply to comply with the requirements set out in the table to this subsection.

OXYGEN REQUIREMENTS FOR UNPRESSURIZED AIRCRAFT		
Item	Column I Persons For Whom Oxygen Supply Must Be Available	Column II Period Of Flight And Cabin-Pressure-Altitude
1.	All crew members and 10 percent of passengers and, in any case, no less than one passenger	Entire period of flight exceeding 30 minutes at cabin-pressure-altitudes above 10 000 feet ASL but not exceeding 13 000 feet ASL
2.	All persons on board the aircraft	(a) Entire period of flight at cabin-pressure-altitudes above 13 000 feet ASL (b) For aircraft operated in an air transport service under the conditions referred to in paragraph (a), a period of flight of not less than one hour.

(2) No person shall operate a pressurized aircraft unless it is equipped with sufficient oxygen dispensing units and oxygen supply to provide, in the event of cabin pressurization failure at the most critical point during the flight, sufficient oxygen to continue the flight to an aerodrome suitable for landing while complying with the requirements of the table to this subsection.

MINIMUM OXYGEN REQUIREMENTS FOR PRESSURIZED AIRCRAFT FOLLOWING EMERGENCY DESCENT (NOTE 1)		
Item	Column I Persons For Whom Oxygen Supply Must Be Available	Column II Period Of Flight And Cabin-Pressure-Altitude
1.	All crew members and 10 percent of passengers and, in any case, no less than one passenger	(a) Entire period of flight exceeding 30 minutes at cabin-pressure-altitudes above 10 000 feet ASL but not exceeding 13 000 feet ASL (b) Entire period of flight at cabin-pressure-altitudes above 13 000 feet ASL (c) For aircraft operated in an air transport service under the conditions referred to in paragraph (a) or (b), a period of flight of not less than (i) 30 minutes (Note 2), and (ii) for flight crew members, two hours for aircraft the type certificate of which authorizes flight at altitudes exceeding FL250 (Note 3)
2.	All passengers	(a) Entire period of flight at cabin-pressure-altitudes exceeding 13 000 feet ASL (b) For aircraft operated in an air transport service under the conditions referred to in paragraph (a), a period of flight of not less than 10 minutes

NOTES

1: In determining the available supply, the cabin pressure altitude descent profile for the routes concerned must be taken into account.

2: The minimum supply is that quantity of oxygen necessary for a constant rate of descent from the aircraft's maximum operating altitude authorized in the type certificate to 10 000 feet ASL in 10 minutes, followed by 20 minutes at 10 000 feet ASL.

3: The minimum supply is that quantity of oxygen necessary for a constant rate of descent from the aircraft's maximum operating altitude authorized in the type certificate to 10 000 feet ASL in 10 minutes, followed by 110 minutes at 10 000 feet ASL.

Use of Oxygen

605.32

(1) Where an aircraft is operated at cabin-pressure-altitudes above 10 000 ft ASL, but not exceeding 13 000 ft ASL, each crew member shall wear an oxygen mask and use supplemental oxygen for any part of the flight at those altitudes that is more than 30 min in duration.

(2) Where an aircraft is operated at cabin-pressure-altitudes above 13 000 ft ASL, each person on board the aircraft shall wear an oxygen mask and use supplemental oxygen for the duration of the flight at those altitudes.

(3) The pilot at the flight controls of an aircraft shall use an oxygen mask if
   (a) the aircraft is not equipped with quick-donning oxygen masks and is operated at or above FL250; or
   (b) the aircraft is equipped with quick-donning oxygen masks and is operated above FL410.

3.0 Transportation of Dangerous Goods (TDG) by Air

Dangerous goods refers to a product, substance or organism included by its nature or by the regulations in any of the classes listed in the schedule to the *Transportation of Dangerous Goods Act, 1992*. There are nine classes of dangerous goods:

Class 1: Explosives;
Class 2: Gases;
Class 3: Flammable liquids;
Class 4: Flammable solids; substances liable to spontaneous combustion; substances that on contact with water emit flammable gases;
Class 5: Oxidizing substances and organic peroxides;
Class 6: Toxic and infectious substances;
Class 7: Radioactive materials;
Class 8: Corrosives; and
Class 9: Miscellaneous products, substances or organisms.

Dangerous goods shall not be carried on board any Canadian aircraft, or in any foreign aircraft when operated in Canada, unless in compliance with the *Transportation of Dangerous Goods Act, 1992*, (TDG Act, 1992) and the *Transportation of Dangerous Goods Regulations* (TDG Regulations).

Sections 12.1 to 12.3 of the TDG Regulations regulate the domestic and international transport of dangerous goods by air, and adopt by reference the *ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air* (ICAO TIs).

Sections 12.4 to 12.17 of the TDG Regulations provide alternative domestic provisions for dangerous goods in air transport, which address the unique characteristics of the Canadian aviation industry and geographical environment. **NOTE**: Activities related to the handling, offering for transport or transporting of dangerous goods by air, which are not consistent with the TDG Act, 1992 or the TDG Regulations, require an equivalency certificate issued under section 31 of the TDG Act, 1992, and section 14.1 of the TDG Regulations.

Canadian Air Operators are required to submit procedures for the carriage of dangerous goods and corresponding TDG Training Program to TC for review and approval. TC published *Advisory Circular (AC) 700-001- Procedures for the Carriage of Dangerous Goods to the Company Operations Manual* and *AC 700-008 – Development of a Dangerous Goods Training Program* to assist air operators in the development of dangerous goods procedures and training program. The ACs are found on the Transport Canada Civil Aviation (TCCA) documentation website: <*www.tc.gc.ca/eng/civilaviation/opssvs/managementservices-referencecentre-acs-700-menu-511.htm*>.

NOTE: Consultants may provide assistance in developing dangerous goods procedures and training programs; however, generic procedures and training programs may need to be amended to reflect air operators' activities.

Anyone handling, offering for transport, transporting or importing dangerous goods in Canada must be trained and hold a valid training certificate in compliance with Part 6, Training, of the TDG Regulations. An air operator can delegate some of its responsibilities to third parties; however, the air operator remains accountable. Therefore, an air operator is responsible for training employees (and third party staff) who handle, offer for transport, or transport dangerous goods based on the approved dangerous goods procedures and TDG training program. Employees (and third party staff) can also perform TDG duties if in the presence and under the direct supervision of a person who is trained and who holds a TDG training certificate. A TDG training certificate expires 24 months after its date of issuance.

Guidance material and additional information can be obtained from one of the following TCCA TDG regional offices:

Headquarters—National Capital Region AARXE
Place de Ville, Tower C
330 Sparks St, 4th Floor
Ottawa ON K1A 0N8
Tel: 613-990-1060
Fax: 613-954-1602

Quebec Region—NAXD
Commercial and Business Aviation
700 Leigh Capreol
Pierre Elliott Trudeau International Airport
Dorval QC H4Y 1G7
Tel.: 514-633-2838
Fax: 514-633-3697

Atlantic Region—MAXD
Commercial and Business Aviation
P.O. Box 42,
Heritage Court
Moncton NB E1C 8K6
Tel.: 506-851-7247
Fax: 506-851-7190

Pacific Region—TAXD
Commercial and Business Aviation
800 Burrard Street, Suite 620
Vancouver BC V6Z 2J8
Tel.: 604-666-5655
Fax: 604-666-0682

Ontario Region—PAXD—PIA
Commercial and Business Aviation
5431 Flightline Drive
Pearson International Airport
Mississauga ON L5P 1B2
General Information: 416-952-0000
Fax: 905-405-3305

Prairie and Northern Region—RAEX
Commercial and Business Aviation
1100 Jasper Place
9700 Jasper Avenue
Edmonton AB T5J 4E6
Tel.: 780-495-5278
Fax: 780-495-4622

Winnipeg Office
Tel.: 204-495-1424
Fax: 204-495-1734

National Operations—NAROA
700 Leigh Capreol Suite 2093
Pierre Elliott Trudeau International Airport
Dorval QC H4Y 1G7
Tel.: 514-633-3116
Fax: 514-633-3717