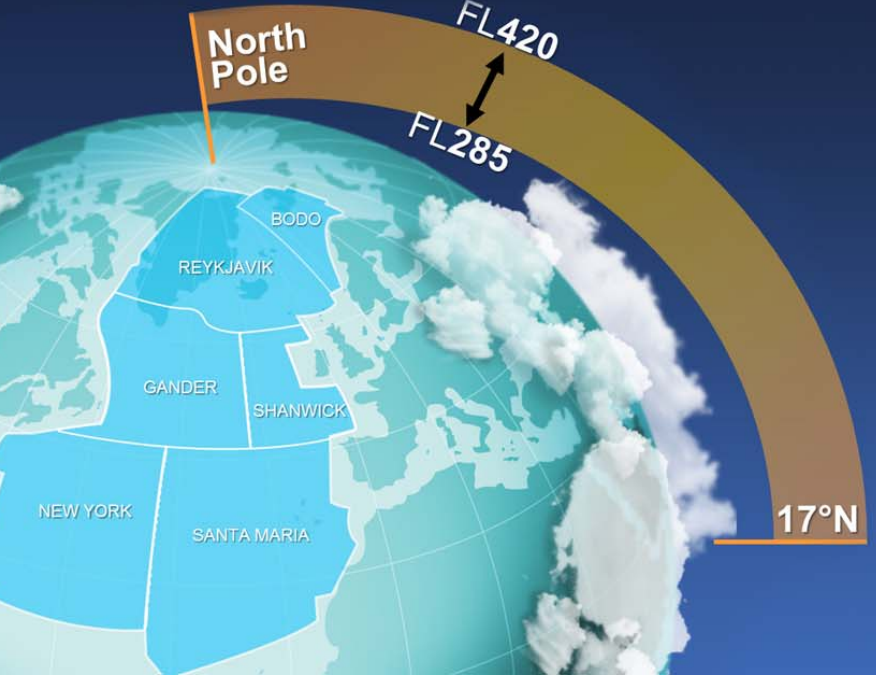


FlightSafety international

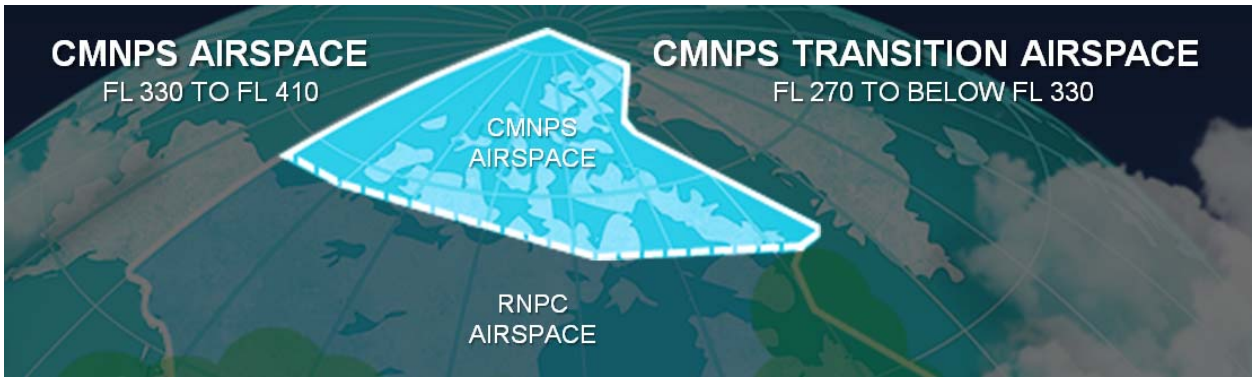
MNPS

Minimum Navigation Performance Specification and North Atlantic High Level Airspace

This is airspace where better navigational equipment is required in order to allow for closer separation minimums. There are two MNPS airspace areas in the world.

North Atlantic MNPS/NAT HLA

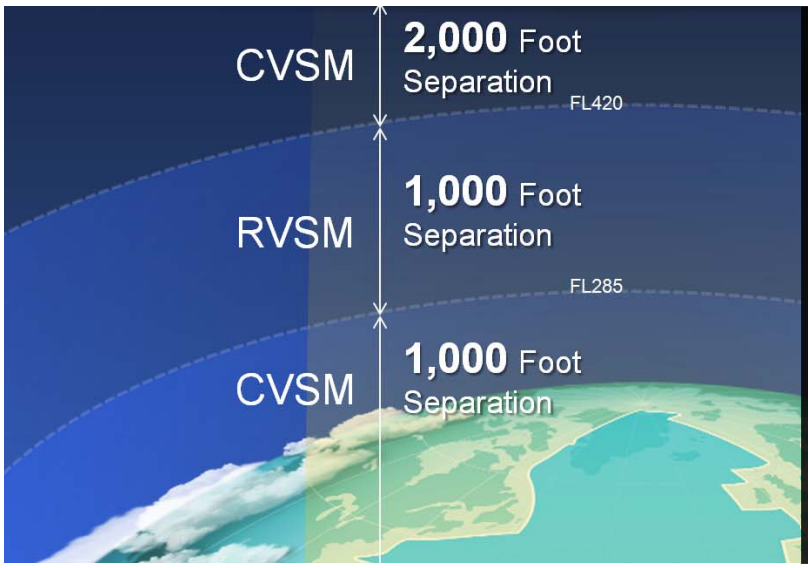
The North Atlantic is the **busiest oceanic airspace in the world** with an average of over 1200 flights crossing each day. In 1984, the North Atlantic implemented the Minimum Navigation Performance Specification (MNPS) Airspace requiring more accurate navigational capabilities in order to reduce the lateral and longitudinal separation requirements which allows for more aircraft in the airspace.
The specific MNPS airspace includes all of Reykjavik, Gander, Shanwick and Santa Maria Oceanic areas and the portion of New York Oceanic north of 27° North, but excluding the area which is west of 060° West and south of 38°30' North (Western Atlantic Route Structure [WATRS] area) and vertically from FL 285 to FL 420. In February 2016 the North Atlantic MNPS airspace was re-designated as the North Atlantic High Level Airspace (NAT HLA). This changed the name of the airspace and also added in Bodo Oceanic Control Area to the NAT HLA."



Canadian MNPS

Many people are not aware that there is MNPS airspace outside of the North Atlantic. However, northern Canada also has an area of designated MNPS airspace. Canadian MNPS Airspace includes parts of Northern Control Area (NCA) and Arctic Control Area (ACA).

- Canadian MNPS Airspace is between FL 330-FL 410.
- Canadian MNPS *Transition* Airspace is between FL 270 to below FL 330.



Vertical Separation

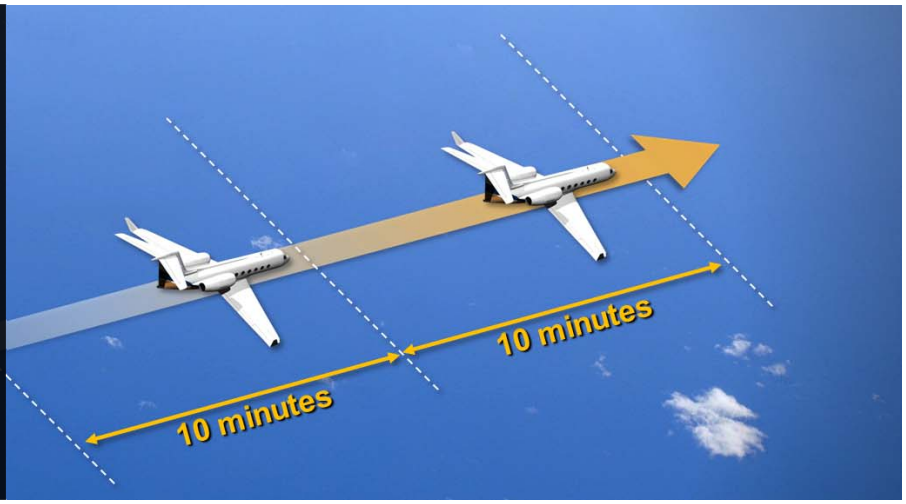
As with most airspace around the world today, there is 1,000 foot vertical separation up to FL 290, and also from FL 290 to FL 410 in RVSM airspace, which includes all MNPS/NAT HLA areas. Above FL 410 we go back to 2,000 foot vertical separations Conventional Vertical Separation Minimums (CVSM).

Lateral & Vertical Separation

With the implementation of MNPS in 1984 and the requirement for more accurate navigation capabilities, lateral separation was cut in half from 120 NM to 60NM (one degree of latitude).

Longitudinal Separation

In MNPS/NAT HLA airspace the longitudinal separation may be reduced to 10 minutes in trail using Mach Number Technique.

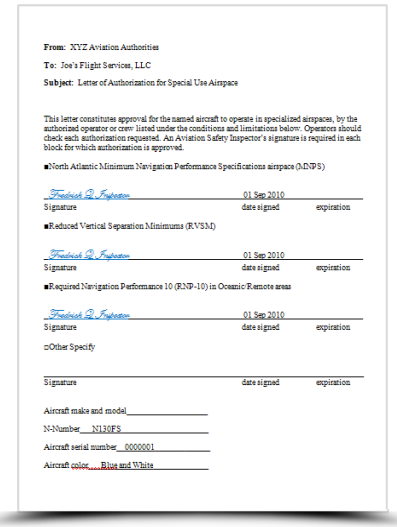


Equipment Requirements

12.6 NM	In order to operate in MNPS airspace, your navigation system must be certified to keep your lateral error within 12.6 NM of your course centerline 95% of the time. Beginning in 2015, aircraft are required to meet RNAV 10/RNP 4 Standards for a new LOA or OpSpecs. Authorizations based on the 12.6 requirement will still be valid until January 2020.
Two High Accuracy Long Range Navigation Systems	Operations in MNPS Airspace require very accurate Long Range Navigation (LRN) systems. A minimum of two LRN systems is required for unrestricted MNPS authorization.

Letter of Authorization

A Letter of Authorization (LOA) or Operations Specifications (OpSpecs) is **required to operate in all special use airspaces, including MNPS, NAT HLA and RVSM.** LOA's or OpSpecs are issued by the State of Registry or State of the Operator after ensuring proper equipment capabilities and training requirements



From: XYZ Aviation Authorities

To: Joe's Flight Services, LLC

Subject: Letter of Authorization for Special Use Airspace

This letter constitutes approval for the named aircraft to operate in specialized airspaces, by the authorized operator or crew listed under the conditions and limitations below. Operators should check each authorization requested. An Aviation Safety Inspector's signature is required in each block for which authorization is approved.

■North Atlantic Minimum Navigation Performance Specifications airspace (MNPS)

Frederick D. Fighter — 01 Sep 2010
Signature — date signed — expiration

■Reduced Vertical Separation Minimums (RVSM)

Frederick D. Fighter — 01 Sep 2010
Signature — date signed — expiration

■Required Navigation Performance 10 (RNP-10) in Oceanic/Remote areas

Frederick D. Fighter — 01 Sep 2010
Signature — date signed — expiration

□Other Specify

Signature — date signed — expiration

Aircraft make and model_____
N-Number___N130FS_____
Aircraft serial number___0000001_____
Aircraft color___Blue and White_____

Aviation Authority Verification

The Aviation Authorities of the country issuing a Letter of Authorization (LOA) or Operations Specifications (OpSpecs) to a company for any special use airspace will verify several things.

Equipment & Documents	One of the things the Authorities will verify is the proper equipment is installed on the aircraft and the documentation matches the requirements of the airspace.
Navigation Equipment	For MNPS/NAT HLA airspace authorizations, the authorities will check the navigation systems installed on the aircraft to make sure they meet the requirements for the airspace. This is also normally where they would check part numbers for the installation process of that equipment.
Crew Training	The authorities will also check training programs for the crews and maintenance people to ensure proper understanding of the procedures for this airspace.

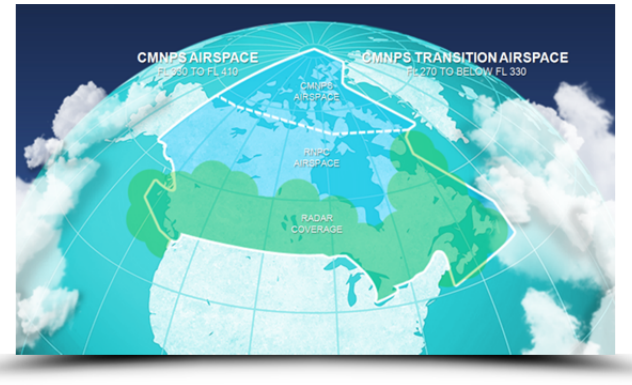
Route Options

Within the North Atlantic High Level Airspace there are three different route options for aircraft. Which route option you choose to use will depend greatly on weather, operator's approvals and aircraft capabilities in terms of equipment, range and performance.

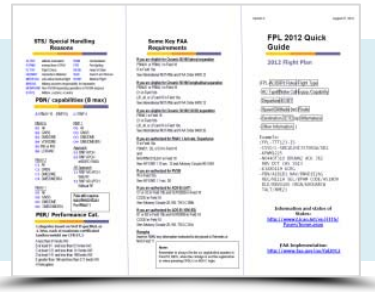
Special Routes	Special Routes, nicknamed "Blue Spruce Routes," are established for shorter range aircraft as well as aircraft equipped with only one serviceable LRNS or without HF radios. These routes are published in the *North Atlantic Operations and Airspace Manual* as well as on the *Atlantic Orientation Chart*.
Organized Track System	The Organized Track System (OTS) is set up to take care of the major commercial traffic flows. Effectively the Organized Track System (OTS) becomes a superhighway system for moving traffic across the North Atlantic as easily as possible. The tracks are one directional (eastbound at night, westbound during the day) and will change every day based on weather patterns.
Random Routes	Any flights not on an Organized Track or Special Route are called Random Routes. Random routes are normally set up using whole degrees of latitude and longitude with 10° longitude increments for position reporting.

Routing within Canadian MNPS

Routing within Canadian MNPS can either be on established routes or using random routing in both the Northern Control Area (NCA) and Arctic Control Area (ACA).



ICAO Flight Plan Codes



As part of pre-flight preparation, when filing their flight plan, crews must also **know the appropriate codes for filing an ICAO Flight Plan.**

Refer to the resources section to access:
ICAO 2012 Quick Guide.

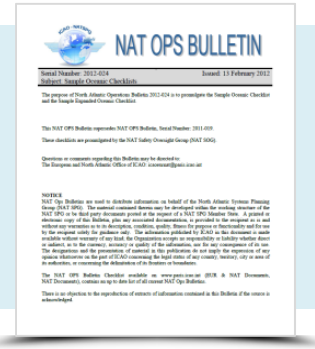
Flight Operations

Prior to any flight, we need to ensure the aircraft and the crew is **authorized for the flight operations to be conducted.** Going into MNPS, NAT HLA and RVSM Airspace requires that the crew is trained for MNPS, NAT HLA and RVSM operations. It also requires that the company has a Letter of Authorization or Operations Specifications for MNPS, NAT HLA and RVSM Airspace areas. The Letter of Authorization or Operation Specifications is required to be on board the aircraft for the flights.

During preflight, the crew should **check maintenance log to see if any potential malfunctions would interfere with MNPS or RVSM eligibility**. Ensure that maintenance action has been taken to correct defects to required equipment.

Crews should **check the database** to ensure it is current. Long Range Navigational Systems should be programmed and cross checked by both pilots.

Oceanic Checklist



Oceanic Checklists have been developed by organizations that set the rules and requirements for various oceanic areas. It is strongly encouraged that **crews review and use these checklists to help minimize the risk of errors.**

Refer to the resources section to access:
NAT OPS Bulletin 2014_001 Oceanic Checklist.

Oceanic Clearances

The three components of an Oceanic/Remote Airspace Clearance are **Route**, **Level** and **Speed.**

Aircraft departing from coastal airports will normally be required to get their oceanic clearance before takeoff due to the short amount of time available once airborne (frequently as little as 20 minutes). Requests for oceanic clearance should be done at least 30 minutes prior to departure for eastbound flights (Gander) or 40-45 minutes prior to departure for westbound flights (Shanwick).

Longer range aircraft departing from further inland should request their oceanic clearance at least 45 but no more than 90 minutes before reaching the oceanic boundary. Crews can also receive their oceanic clearance via data link if so equipped.

Standard Message Types

There are four primary message types that have specific formats to use; Position Reports, Revised Estimates, Request Clearance, and When Able Higher Reports.

Position Report	Position reports are one of the most critical reports given as it helps ATC keep track of where aircraft are so we can ensure safe separation. When giving a position report, get the information from the Long Range Navigation System that is being used to navigate the aircraft, not from the computer flight plan. That will help give another cross check of our navigation information.
Revised Estimate	If the estimated time to the next waypoint changes by three minutes or more due to shifting winds or other issues, we need to contact ATC with a revised estimate.
Request Clearance	If we wanted to request a higher Mach speed, we can use the same format abbreviated for our purpose.
When Able Higher Report	We can also advise ATC of our ability to climb to a higher altitude at a given point or time.

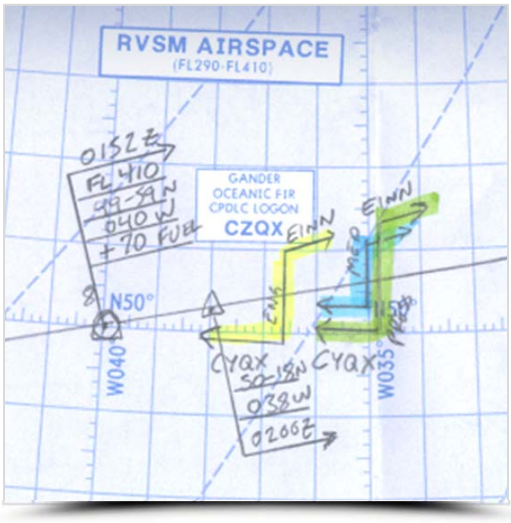
Note: *The response from ATC will normally take some time as they must coordinate to determine if your request can be done without losing separation from other aircraft.*

Plotting Requirements

The **FAA and ICAO require crews to use a plotting** chart to provide themselves with a visual presentation of the intended route. Among the things that should be plotted on the chart before departure are waypoints, Equal Time Points (ETPs), potential divert airports and nearby Organized Tracks and routes. It is required to plot the position of the aircraft any time there is more that 725 NM between ground based navigation aids for turbojet aircraft or more than 450 NM for turboprop aircraft. It is strongly recommended that plotting be done in any remote areas to prevent gross navigational errors (GNE's).

It is also recommended that you plot your position approximately ten minutes or two degrees of longitude after passing each waypoint to ensure the aircraft is on course. This is frequently referred to as a "Gross Navigational Error Check."

What is Equal Time Point?



An Equal Time Point (ETP) is the point along the route where it will take the same amount of time to either continue across the ocean to the nearest coastal airport or reverse course and return back to the nearest coastal airport. The ETP will not be the same as the physical halfway point since it varies based on winds.

Typically there are at least three ETP's calculated;

1. Medical (all engines operating),
2. Pressurization Failure, and
3. Engine Failure.

The three ETP's will normally fall relatively close to each other, but never the same because of winds.

Special In-flight Procedures

Strategic Lateral Offset Procedure (SLOP)

The Strategic Lateral Offset Procedure (SLOP) is a standardized operational procedure established in oceanic and remote airspace since 2004.

SLOP is meant to mitigate the risk of collision due to abnormal events such as:

- Operational Altitude Deviation Errors
- Turbulence Induced Altitude Deviation Errors
- Effects of wake vortex encounters

For aircraft that can set and maintain an automatic offset they should offset one or two miles right of course. Offsets to the left are NOT permitted. Some basic guidelines for SLOP are:

- Aircraft should start this offset as soon as radar service is terminated and maintain this offset until the oceanic exit point.
- No ATC permission or acknowledgement is required.
- Continue to make your standard position reports as if you are on centerline. ATC will accept a deviation of 2 NM in your actual position to account for SLOP.
- Coordination with aircraft in the vicinity on 123.45/121.5.
- Aircraft can switch offsets if needed (wake turbulence, etc.) without coordination with ATC.
- The Long Range Navigation system must have the ability to offset automatically after programming the system. Aircraft without the automatic offset capabilities must use centerline.

Areas of Compass Unreliability

In areas of both NAT HLA and Canadian MNPS where operations are in the far northern latitudes, the magnetic compasses become unreliable. Most corporate aircraft do not fly in these areas. However, care should be taken to understand the potential problems of operations in that area.

Magnetic North vs. True North Reference	In areas where magnetic compasses are not reliable, navigation orientation is frequently changed from a magnetic reference to a true north reference. Crews should exercise extreme caution when changing between magnetic and true north references as errors can be significant and dangerous. It is noted on the chart what is being used for reference. Routes using true north for reference will have a "T" next to the course bearing to indicate "True."
Long Range Navigation Systems	Most modern Long Range Navigation (LRN) systems will automatically switch from magnetic north reference to true north reference at about 72° to 73° north latitudes. Crews should become familiar with their specific equipment and procedures. It is recommended to push the system into true north navigation reference at approximately 70° north latitude.
VOR Orientation	Many of the VOR's that can be used for navigation in Canadian Northern Domestic Airspace (to include CMNPS airspace) will be oriented to true north reference instead of magnetic north. Crews should verify the orientation when using any VOR's for navigation checks or operations.
Special Training and Approval Requirements	Operators are reminded that they are responsible to ensure they meet any specific training requirements for operations in areas of magnetic compass unreliability. They are also reminded that they are responsible to ensure they are aware and meet any specific special authorizations to operate in such areas. Specific country requirements vary, so we will not attempt to give the information for any specific country.

Contingency Procedures

ICAO Document 4444 also talks about general procedures to use when things are not going as planned. These are referred to as Contingency Procedures and include:

- Severe Turbulence
- Mountain Wave Activity
- Wake Turbulence
- Equipment Failures
- Weather Deviation

There are two things that are critical to remember:

1. Traffic separation is the most critical issue.
2. Pilot in Command (PIC) ultimately holds the responsibility for the safety of their aircraft.

Standard rules of contingency procedures in any airspace in the world:

1. Light up the airplane
2. Talk on the radios
3. Notify ATC

Contingency References

There are several good resources for dealing with contingency issues in MNPS airspace.

ICAO Doc 4444	Air Traffic Management rules for worldwide contingency operations. The source document for all other contingency references.
NAT Doc 007	North Atlantic Operations and Airspace Manual is a good resource for NAT High Level Airspace..
Jeppesen Atlantic Orientation Chart	A very valuable resource for any North Atlantic operations.
Transport Canada's Aeronautical Information Manual	Good resource for Canadian MNPS operations.

Loss of Communication

ICAO Standard Lost Communications procedures are as follows:

VMC	Squawk 7600 in the transponder, remain VMC, find an airport to land, and call on the ground to let ATC know you are safe.
IMC	Squawk 7600 in the transponder, start the clock, remain with your current clearance for: ▪ **7 Minutes i**f you are in a controlled environment. ▪ **20 minutes** from the time you miss a position report that should have been given if you are in a non-controlled environment. Following that time, go to filed flight plan routing and altitudes. ***Important Note: All areas do NOT follow standard ICAO Lost Communication procedures.*** NAT HLA Lost Communication Procedures: **Before Receiving Oceanic Clearance – IMC**; Cross on Flight Planned Route, Mach Number and Altitude. Planned step climbs NOT to be done. **After Receiving Oceanic Clearance – IMC**; follow cleared route. At the Oceanic boundary fix after crossing, follow standard ICAO Loss of Communication Procedures.

Navigation Failure

ICAO Standard Lost Communications procedures are as follows:

Loss of Single Long Range Navigation System

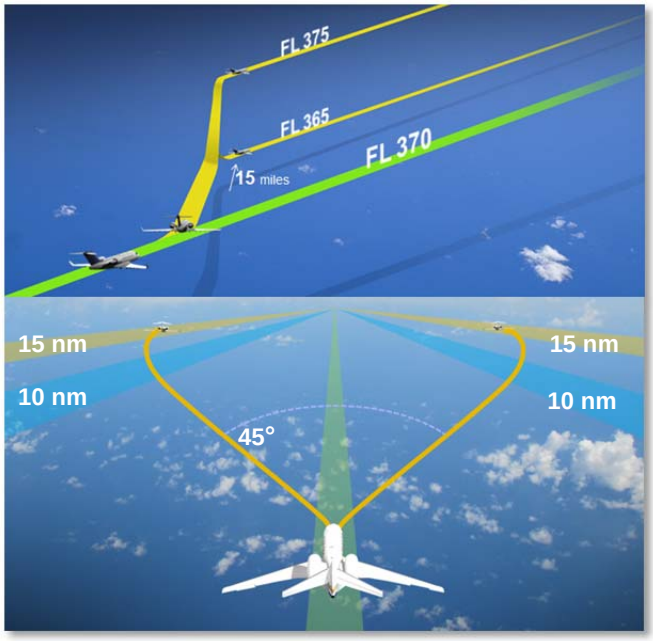
Before Entering MNPS/NAT HLA Airspace	The best option is to land and get the system repaired before departure. For the North Atlantic High Level Airspace, we would have the option of changing our route to a Special Route (Blue Spruce Route)
In MNPS Airspace	As with any contingency, turn on all exterior lighting. Let ATC know of the system failure. Tell them what your plan is. In this case, it would probably be best to remain on our flight planned or cleared routing. Talk with other aircraft around you for help also. Verify your position by any means available.

Loss of ALL Long Range Navigation System

Before Entering MNPS/NAT HLA Airspace	Contact ATC and return to land at a suitable airport to get the systems repaired before entering MNPS/NAT HLA airspace.
In MNPS Airspace	Turn on all exterior lighting. Let ATC know of the system failure. Tell them what your plan is. In this case, it would probably be best to remain on our flight planned or cleared routing. Talk with other aircraft around you for help also. Verify your position by any means available. Use flight plans, times, distances and headings.

ICAO Doc 4444 Contingency Procedure

If we experience a failure or malfunction where we cannot maintain our current clearance, **what would we do?** This would include things such as engine failures, pressurization failures, turbulence, autopilot failures, etc. ICAO has developed some standard procedures for dealing with such contingencies in ICAO Doc 4444, *Air Traffic Management*. The procedures consist of at least a 45 degree turn off course to offset 15 NM and a vertical movement half of the vertical separation requirements (500 feet off altitude below FL 410, 1000 feet off altitude above FL 410) Keep in mind sometimes reversing course may be the best option. The standard 15 NM offset would still be applicable.



Weather Deviation Procedure

While in MNPS airspace if a weather deviation is required, crews should attempt to contact ATC as soon as possible. Remember in remote areas where HF is the primary communication method, it will normally take time for coordination, so the earlier we talk with ATC the better. When contacting ATC it is recommended that you use the terminology “Weather Deviation Required” to alert the radio operator that this is a more urgent issue.

Transmit on **123.45/121.5**

- Callsign, FL, Position and Intentions
- Turn on all aircraft exterior lights
- Watch for conflicting traffic both visually and with TCAS

What if you can’t contact ATC?

- If your deviation is staying within 10 NM of center line of our cleared route, you would stay on the assigned altitude.
- If you must deviate more than 10 NM from center line, you will do an altitude change to give a better chance of avoiding conflicting traffic.

Route	Deviation	Level Change
000-179 magnetic	Left	↓300 feet
	Right	↑300 feet
180-359 magnetic	Left	↑300 feet
	Right	↓300 feet

Future of MNPS/NAT HLA

Required Communication Performance (RCP)

Beginning on 7 February 2013 specified tracks and flight levels within the North Atlantic Organized Track System began requiring both FANS 1/A Controller-Pilot Data Link Communications (CPDLC) and FANS 1/A Automatic Dependent Surveillance – Contract (ADS-C) equipment on board and functioning aircraft assigned to those specific tracks. This was the implementation of Phase 1 of the Data Link Mandate (DLM) in the North Atlantic area. In February 2015, Phase 2 of the Data Link Mandate expanded the mandate to include all Organized Tracks at altitudes between FL 350 and FL 390.

Reduced Longitudinal Separation

With better navigation equipment and better capability of monitoring aircraft location, we can afford to reduce the longitudinal separation minimums down to 5 minutes in trail. As with MNPS airspace this will require crews to fly mach speed with extreme accuracy. In 2014, Reduced Longitudinal Separation Minimums was implemented on the OTS where the Data Link Mandate was required. This has expanded with the additions to the Data Link Mandate. Eventually this will become the standard for all aircraft in the Organized Track System at a minimum.

Reduced Lateral Separation

With additional equipment of Controller Pilot Data Link Communication (CPDLC) systems and Automatic Dependent Surveillance – Contract (ADS-C) and with approval for RNP-4 operations, we can reduce the lateral separation to 30 NM between waypoints. Instead of always using whole degrees of latitude and longitude, we can now use 30 minutes of latitude for waypoints. This will allow for a separation of no less than 25 NM between routes. Phase 1 began in November 2015 between two core tracks at altitudes between FL 350 and FL 390. Phase 2 is expected to begin in late 2016 expanding to the full track system between FL 350 and FL 390.

Performance Based Navigation

ICAO Performance Based Navigation (PBN) standards for remote areas is RNAV 10. This allows for the use of 50 NM lateral separation minimums. In 2015 any new approvals for North Atlantic MNPS airspace will be based on RNAV 10 or RNP 4 navigation specification requirements. In February 2016 the North Atlantic MNPS Airspace was re-designated as North Atlantic High Level Airspace. In 2016 50 NM lateral separation will be allowed between suitably equipped aircraft throughout the North Atlantic High Level Airspace.