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Transport Canada
Safety & Security

Transports Canada
Sécurité et sûreté

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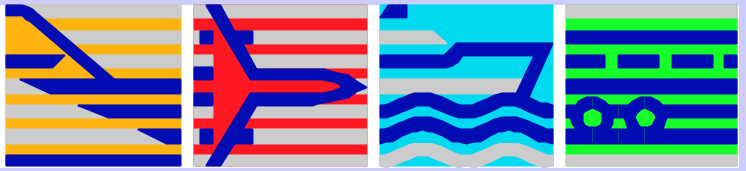
ETOPS Presentation

Ralph Webster



Extended Range Twin Engine Operations

ETOPS

Overview of:

- Definitions
- Operational Approval
- Flight Planning Preparation and in-flight considerations
- Airports (Suitable vs.Adequate)
- What's new and what's coming?

This information is based on Transport Canada Document TP6327 *Safety Criteria for Approval of Extended Range twin Engine Operations* .

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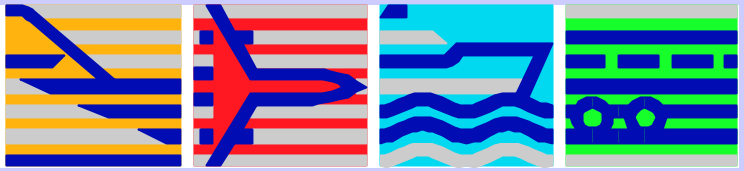
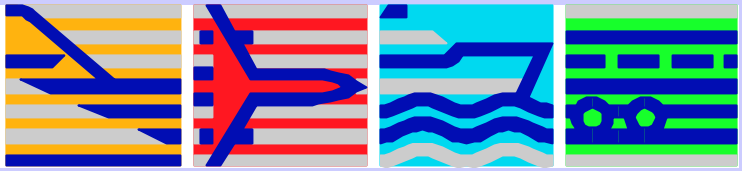


Definitions

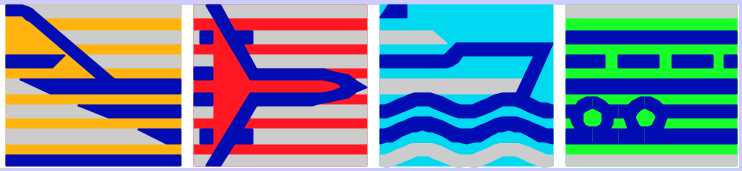
- Benign Area of Operation
- Demanding Area of Operation
- CP Critical Point & calculation
- Extended Range (ER) Operations
- ER (or ETOPS) Area of Operation
- Equal Time Point (ETP)
- ER Entry Point (EEP)
- ER Exit Point (EXP)
- ER Segment



Definitions

Benign Area of Ops

- An area that provides numerous adequate airports, a high level of reliability and availability of communications, navigation and ATC services and facilities, and where prevailing weather conditions are stable and generally do not approach extremes in temperature, wind, ceiling and visibility.



Definitions

Demanding Area of Operations

An area that has one or more of the following characteristics:

1) Prevailing weather conditions can approach extremes in winds, temperature, ceiling and visibility for prolonged periods of time;
2) few alternate airports;
3) due to remote or over-water area, a high level of reliability and availability of communications, navigation and ATC services may not exist.

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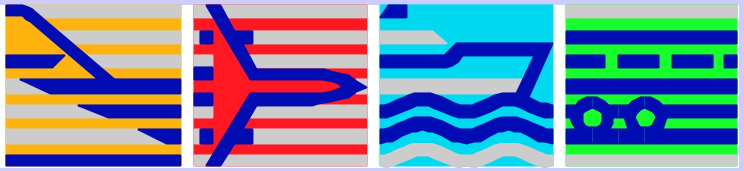

- Distance to critical point (nm) = $\frac{D \times gsA}{gsB + gsA}$

  Where:

  D = total distance from point A to point B (nm)

  gsA = ground speed from critical point ***to go back*** to point A, and

  gsB = ground speed from critical point ***to proceed*** to point B

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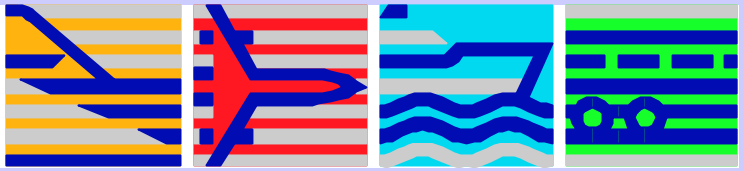

Extended Range Operations

Operations conducted over a specific route that contains a point further than 60 minutes flying time at the approved one engine inoperative cruise speed (standard conditions) from an adequate airport.

ETOPS Area of Operations

Area within which an operator is authorized to conduct a flight under ETOPS regulations. Defined by circles centered on the adequate airports the radius of which is the allowed maximum diversion distance.

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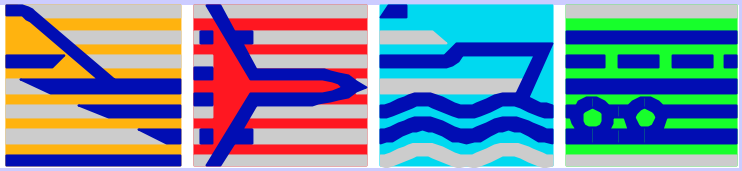

ER Entry Point (EEP)

The point on the outbound route beyond which the aircraft is no longer continuously within 60 minutes flying time at the approved one engine inoperative cruise speed (standard conditions) from an adequate airport.

ER Exit Point (EXP)

The first point on the inbound route where the aircraft is continuously within 60 minutes flying time at the approved one engine inoperative cruise speed (standard conditions) from an adequate airport.

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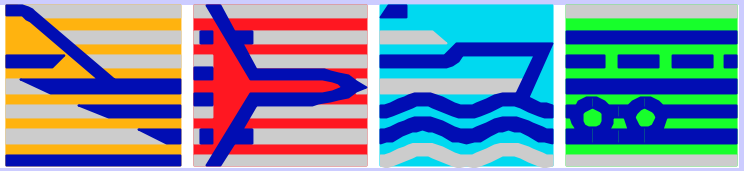
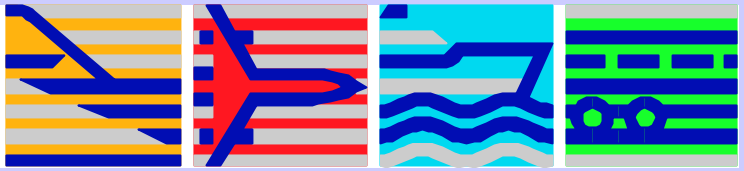


Equal Time Point

A point along the route which is located at the same flight time from two airports.

ER Segment

The extended range starts at the EEP and ends at the EXP.



Operational Approval

- Benign Area of Operations
- Demanding Area of Operations – Stages of Approval

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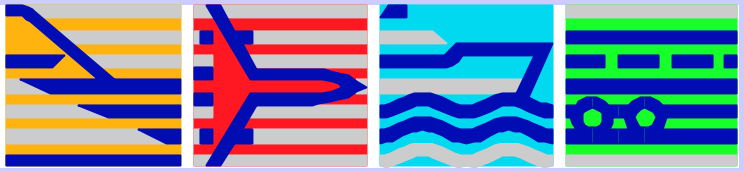

Operational Approval

Benign Area of Operations

- Limited to within 75 minutes of an adequate airport.

- ETOPS type design approval not required but airframe-engine combination and general scope of operation will be reviewed before an Ops Spec is issued.

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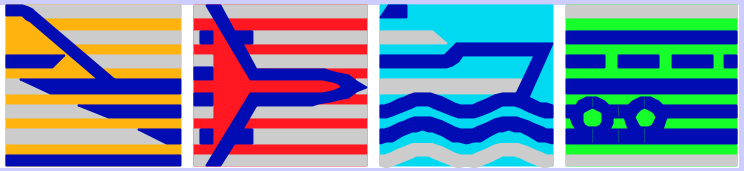
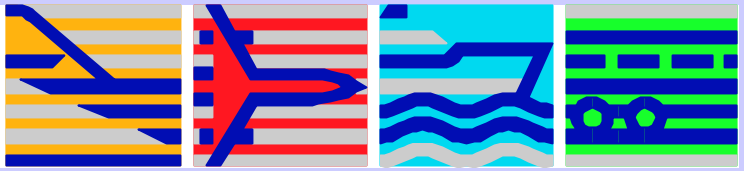


APPROVAL STAGES – Demanding Area of Ops

1. 75 minute approval
   - i) Minimal or no in-service experience required;
   - ii) Approved Configuration, Maintenance and Procedures (CMP) Manual
2. 90 minute approval
   - i) 6 months of operating experience;
   - ii) Approved CMP
3. 120 minute approval
   - i) 12 months of operating experience;
   - ii) Approved CMP



4. <u>138 minute approval</u>

   i) 3 months of 120 minute ETOPS operating experience;

   ii) ETOPS type design approval configuration may be to the 120 minute criteria, but any specific limitations may not be exceeded.

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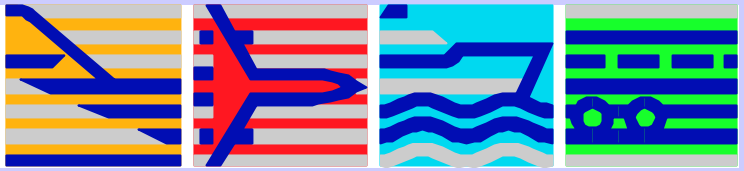
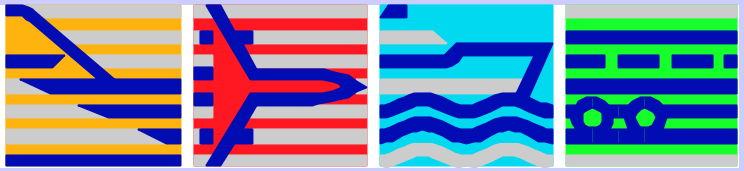


5. <u>Greater than 138 minute approval</u>

i) 12 months of 120 minute ETOPS, or above, operating experience;

ii) ETOPS type design approval for the intended operation (e.g. 180 minute CMP if only120 and 180 configurations are specified). Specific limitations to reflect operational approval (e.g. propulsion system reliability, cargo fire protection) not to be exceeded.



Flight Preparation and In-Flight Considerations

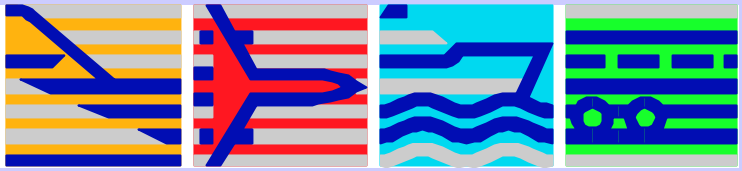
General

ETOPS criteria are in addition to or amplify requirements in applicable operational rules.

Minimum Equipment List (MEL)

The MEL must provide appropriate level of system redundancy for ETOPS. An operators MEL may be more restrictive than the MMEL due to the type of ETOPS operations.

MEL's for aircraft in service prior to ETOPS operations must be re-evaluated before being used for ETOPS.

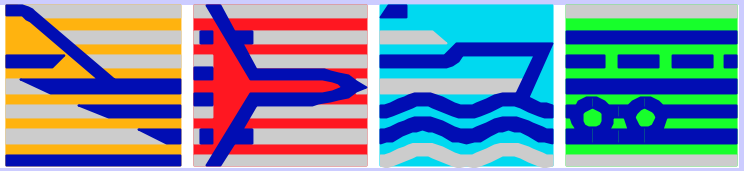


Flight Preparation and In-Flight Considerations

System Failure

A list of items considered ETOPS sensitive must be readily available to the flight crew. This list must provide specific direction for actions required for both ETOPS and non-ETOPS phases of flight.

Typically this list would be found in the QRH or similar document carried on board.



Flight Preparation and In-Flight Considerations

Communication

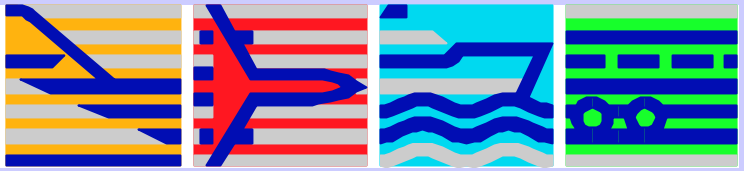
Communication available under normal propagation conditions at normal ONE engine cruise altitudes to provide reliable two way communication.

Crew must have sufficient information to make informed go/no-go decision

Navigation

Appropriate ground aids to provide guidance (subject to onboard capability) over the planned route and routes to any alternate.

Approach aids at the alternates as required for the authorized approach types.



Flight Preparation and In-Flight Considerations

Fuel and Oil Supply

ETOPS flight plans must consider the expected weather conditions along the route. Fuel and Oil reserves shall include contingency reserves sufficient to deal with the most critical failure occurring at the most critical point en route.

Most Critical Point must be within Critical Fuel Reserves

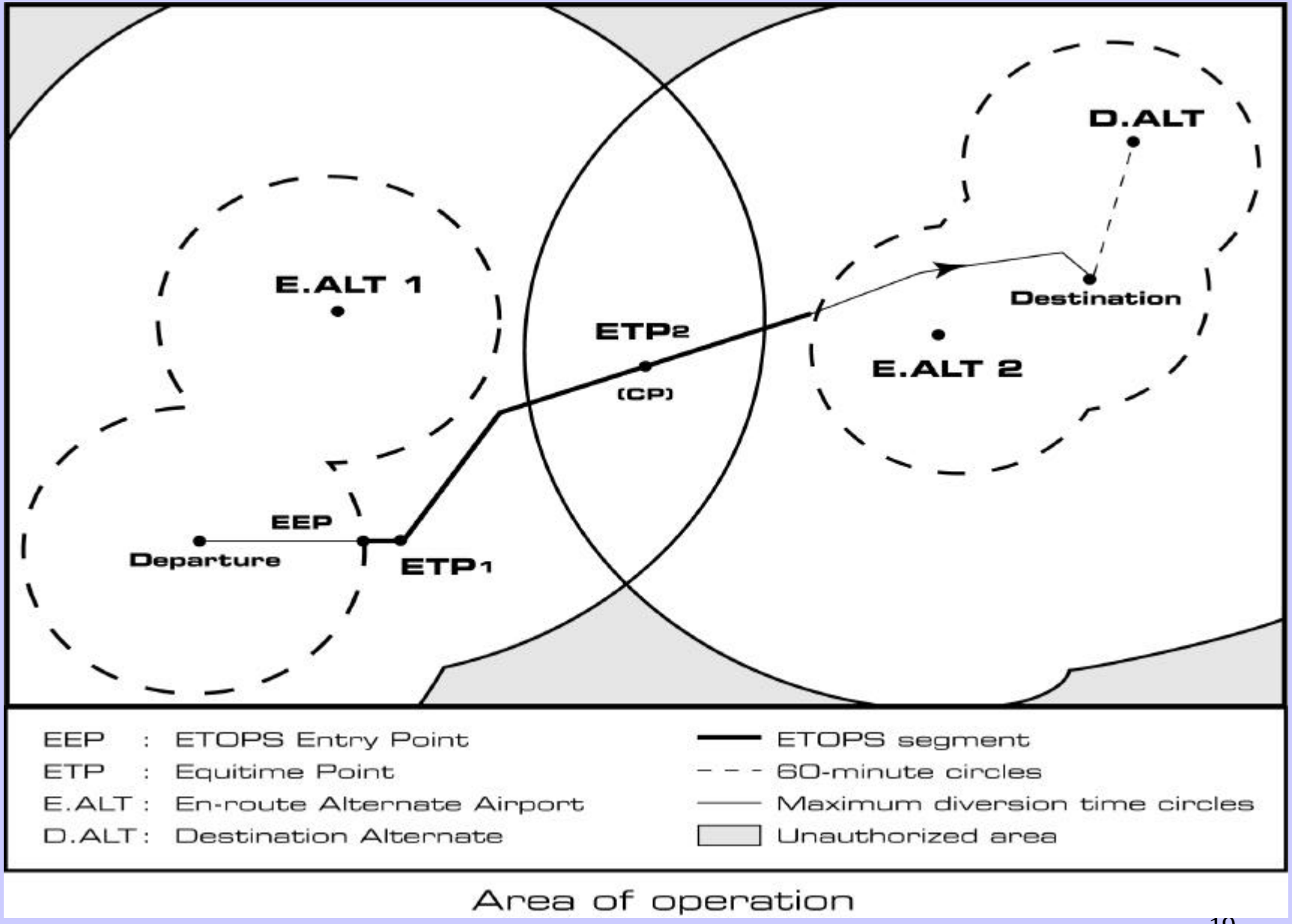
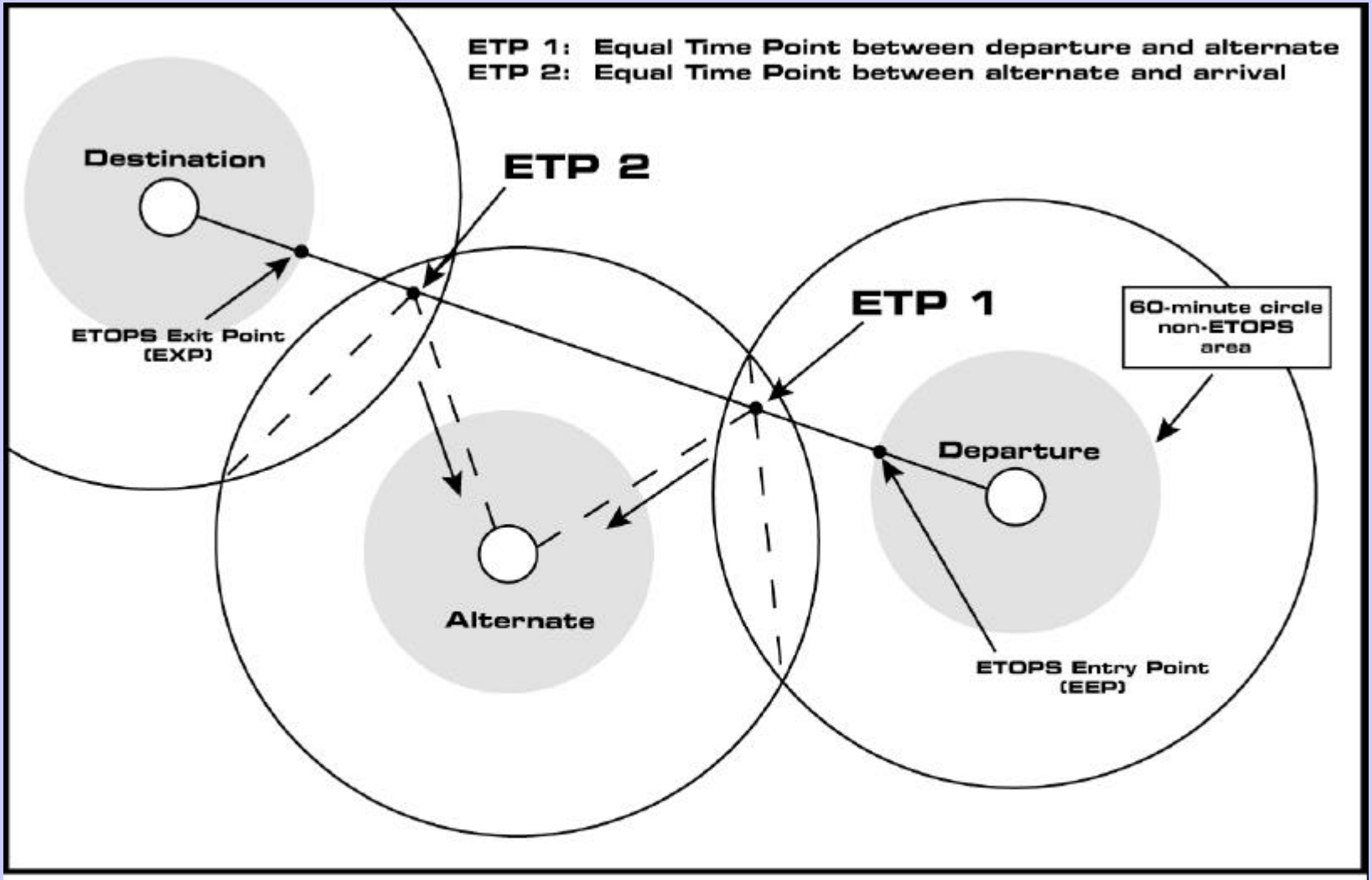


Figure 1

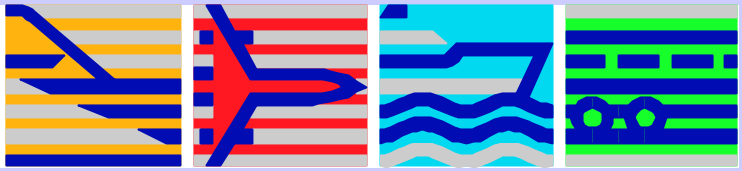
5.



Established earliest time of landing: High speed cruise (2 engine operating and high altitude) from ETP 1 to alternate.

Established latest time of landing: Low speed cruise (one engine operating and Low altitude) from ETP 2 to alternate

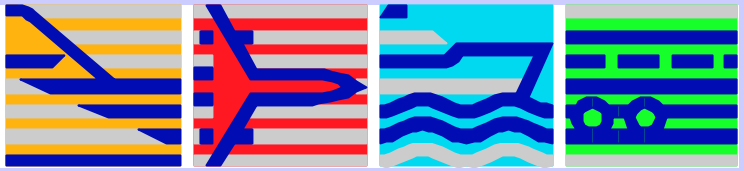
Figure 2



Flight Preparation and In-Flight Considerations

Adequate Alternate Airport

- Operator and TCCA consider the airport adequate based on performance requirements applicable at the expected landing weight
- The airport must be available and have the necessary services such as ATS, lighting, communications, weather reporting nav aids and emergency services.
- Must have at least one approach aid available for an instrument approach.

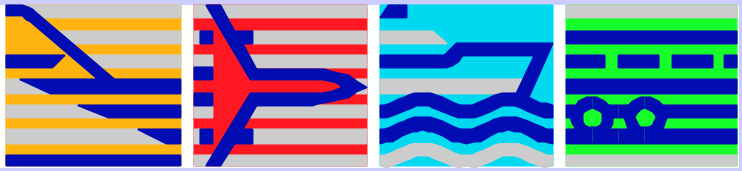


Flight Preparation and In-Flight Considerations

Suitable En route Alternate Airport

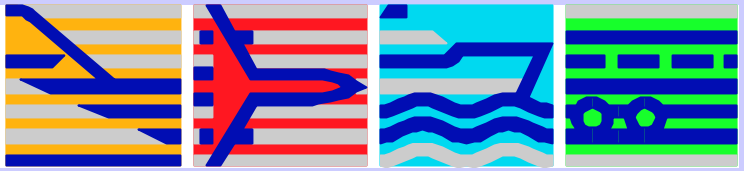
- Is an Adequate Alternate Airport with weather forecasts that indicate the weather will be at or above the specified minima and field conditions are suitable for a safe landing.

- See paragraph 3.4.6 and Appendix B of TP6327



Suitable Enroute Alternate Airport

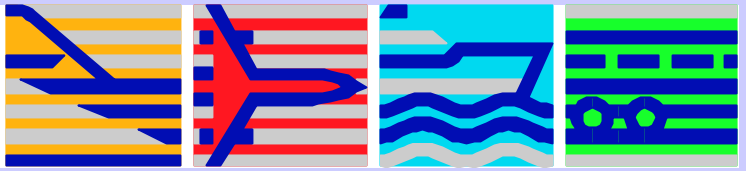
- Must be identified on the Operational Flight Plan and up to date information included as part of the dispatch release. (weather, NOTAMS, facilities, etc.) and updated throughout the flight.
- Forecast weather conditions from 1 hour prior to earliest time of landing, to 1 hour after latest possible landing time must meet or exceed the authorized weather minima for en route alternate.
- Forecast cross wind component including gusts must be less than the maximum permitted cross wind for single engine landing



Flight Preparation and In-Flight Considerations

Changes During Flight

- Crews must remain informed of any significant changes at en route alternates.
- Prior to ER Entry Point, all ETOPS conditions must be evaluated. If any changes preclude a safe approach and landing at the alternate, a revised alternate must be selected and the flight plan changed accordingly.
- Beyond ER Entry Point – Captain's discretion



Changes to ETOPS Regulations

For the Canadian regulations, most of the changes to TP 6327 have been editorial in nature.

The manual will retain its current format.

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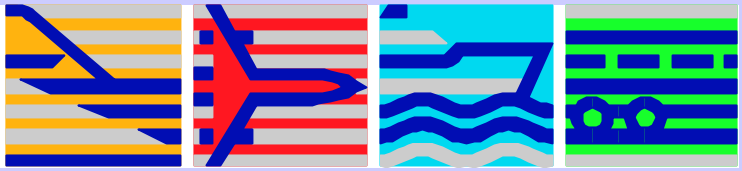
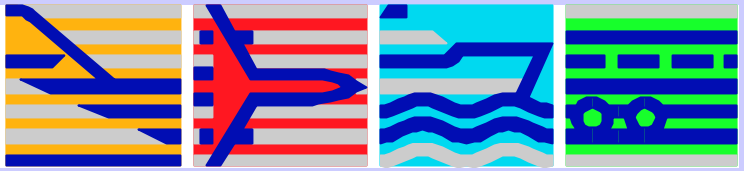


What's Coming in the ETOPS World?

- Wording change directing crew to divert promptly to the alternate in the event of a critical system malfunction.
- Unacceptable thrust loss will be redefined to mean "engine thrust is below the power required to maintain flight in the event of the failure of the other engine."
- Definition of **In Flight Shutdown** will be changing to include unacceptable thrust loss. This will be for both statistical and operational purposes.



What's Coming in the ETOPS World?

- LROPS document is coming. Will be based on present ETOPS manual, FAA 3 or 4 engine ETOPS Manual and JAA LROPS manual
- The Canadian manual will deal with Canadian requirements and conditions first and harmonization where feasible.

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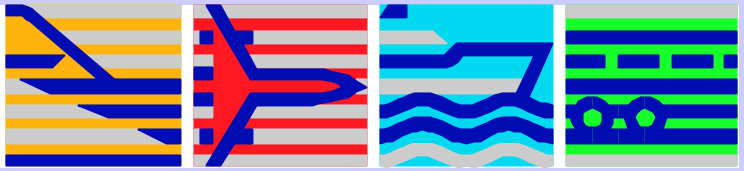

Questions??

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