SAMPLE OCEANIC CHECKLIST

Note: ICAO North Atlantic Working Groups composed of industry, ATC and state regulators have created this checklist. **For reference only**, it is not intended to replace an operator's oceanic checklist. Operators without an oceanic checklist are encouraged to use this sample and tailor it to their specific needs and approvals. This checklist focuses on an orderly flow and ways to reduce oceanic errors. Operators should also review the **attached expanded checklist.** The Oceanic Errors Safety Bulletin (OESB) should be used together with this checklist. The OESB can be found at www.nat-pco.org.

FLIGHT PLANNING

- Plotting Chart – plot route from coast out to coast in
- Equal Time Points (ETP) - plot
- Track message (current copy available for all crossings)
  - Note nearest tracks on plotting chart
- Review possible navigation aids for accuracy check prior to coast out

PREFLIGHT

- Master Clock for all ETAs/ATAs
- Maintenance Log – check for any navigation/ communication/surveillance or RVSM issues
- RVSM
  - Altimeter checks (tolerance)
  - Wind shear or turbulence forecast
- Computer Flight Plan (CFP) vs ICAO Flight Plan (check routing, fuel load, times, groundspeeds)
- Dual Long Range NAV System (LRNS) for remote oceanic operations
- HF check (including SELCAL)
- Confirm Present Position coordinates (best source)
- Master CFP (symbols: O, V, \, X)
- LRNS programming
  - Check currency and software version
  - Independent verification
  - Check expanded coordinates of waypoints
  - Track and distance check ($\pm$ 2° and $\pm$ 2 NM)
  - Upload winds, if applicable
- Groundspeed check

TAXI AND PRIOR TO TAKE-OFF

- Groundspeed check
- Present Position check

CLIMB OUT

- Transition altitude – set altimeters to 29.92 in (1013.2 hPa)
- Manually compute ETAs above FL180

PRIOR TO OCEANIC ENTRY

- Gross error accuracy check – record results
- HF check, if not done during pre-flight
- Log on to CPDLC or ADS 15 to 45 minutes prior, if equipped
- Obtain oceanic clearance from appropriate clearance delivery
  - Confirm and maintain correct Flight Level at oceanic boundary
  - Confirm Flight Level, Mach and Route for crossing
  - Advise ATC When Able Higher (WAH)
  - Ensure aircraft performance capabilities for maintaining assigned altitude/assigned Mach
- Reclearance – update LRNS, CFP and plotting chart
  - Check track and distance for new route
- Altimeter checks - record readings
- Compass heading check – record

AFTER OCEANIC ENTRY

- Squawk 2000 – 30 minutes after entry, if applicable
- Maintain assigned Mach, if applicable
- VHF radios-set to interplane and guard frequency
- Strategic Lateral Offset Procedure (SLOP) - SOP
- Hourly altimeter checks

APPROACHING WAYPOINTS

- Confirm next latitude/longitude

OVERHEAD WAYPOINTS

- Confirm aircraft transitions to next waypoint
  - Check track and distance against Master CFP
- Confirm time to next waypoint
  - **Note: 3-minute or more** change requires ATC notification
- Position report - fuel

10-MINUTE PLOT (APPR. 2° OF LONGITUDE AFTER WAYPOINT)

- Record time and latitude/longitude on plotting chart – non steering LRNS

MIDPOINT

- Midway between waypoints compare winds from CFP, LRNS and upper millibar wind charts
- Confirm time to next waypoint

COAST IN

- Compare ground based NAVAID to LRNS
- Remove Strategic Lateral Offset
- Confirm routing after oceanic exit

DESCENT

- Transition level - set altimeters to QNH

DESTINATION/BLOCK IN

- Navigation Accuracy Check
- RVSM write-ups

OTHER ISSUES

1. Contingencies
   (a) Published Weather Deviation Procedure
   (b) **15 NM offset** (formerly 30NM in the NAT, 25NM in the Pacific)
   (c) Lost Comm/NAV Procedures
1. ETOPS
2. Weather – Destination/Alternate(s) Airport(s)
3. Data Link Contingency Procedures
4. Dead Reckoning (DR)
5. GPS – RAIM/FDE Requirements

SAMPLE OCEANIC EXPANDED CHECKLIST

As of 24 Apr 2007

Note: ICAO North Atlantic Working Groups composed of industry, ATC and state regulators have created this checklist. **For reference only**, it is not intended to replace an operator's oceanic checklist. Operators without an oceanic checklist are encouraged to use this sample and tailor it to their specific needs and approvals. This checklist focuses on an orderly flow and ways to reduce oceanic errors. The Oceanic Errors Safety Bulletin (OESB) should be used together with this checklist. The OESB can be found at http://www.nat-pco.org.

FLIGHT PLANNING

- Plotting Chart
  A plotting chart of appropriate scale should be used for all remote oceanic operations. This includes using a plotting chart for published oceanic routes and tracks. ICAO groups who review oceanic errors have determined that the routine use of a plotting chart is an excellent aid to reduce lateral errors. A plotting chart can also serve as a critical aid in case of partial or total navigation failure. It should be noted that the pilot should read from the plotting chart back to the master CFP when verifying data. To read from the Master CFP to the plotting chart is a human factor's issue that has lead to errors based on seeing what we expect to see

- Equal Time Points (ETP)
  ETPs should be computed for contingencies such as medical divert, engine loss or rapid depressurization. A simultaneous engine loss and rapid depressurization should also be considered. It is advisable to note the ETPs on the plotting chart. Crewmembers should review with each other the appropriate diversion airport(s) when crossing ETPs. Pilot procedures should also include a manual method for computing ETPs.

- Track message
  Crews must have a current track message even if filed for a random route. Reviewing the date, effective Zulu time and Track Message Identifier (TMI) ensures having a current track message on board. The TMI is linked to the Julian Date. Operators must also ensure that their flight planning and operational control process notify crewmembers in a timely manner of any amendments to the daily track message. Plotting tracks near the assigned route can help situational awareness in case the crew needs to execute a contingency.

- Review possible navigation aids for accuracy check prior to coast out
  It is good practice to discuss in advance a primary and secondary ground based navigational aid that will be used to verify the accuracy of the Long Range Navigation System (LRNS). This planning may help to identify intended navigation aids that are limited or NOTAMed unusable and is helpful when departing airports close to oceanic airspace. Examples include Shannon (EINN), Lisbon (LRRT), Los Angeles (KLAX), etc.

PREFLIGHT

- Master Clock
  It is a requirement to have a master clock on board synchronized to UTC or GPS. This time source, which is typically the Flight Management System (FMS), must be used for all ETAs and ATAs. The use of multiple time sources on the aircraft has lead to inconsistencies in reporting times to ATC and resulted in a loss of longitudinal separation.

- Maintenance Log
  Before entering a special area of operation, crews should focus on any write-ups that affect communication, navigation, surveillance or RVSM requirements. Any discrepancies noted in the maintenance log or during the walk-around may require delays or rerouting.

- RVSM
  Required equipment includes two primary independent altimetry sources, one altitude alert system and one automatic altitude control system. In most cases a functioning transponder that can be linked to

the primary altimetry source is also required. Crews should note any issues that can affect accurate altimetry.

- Altimeter checks
  Before taxi, crews should set their altimeters to the airport QNH. Both primary altimeters must agree within ± 75 feet of field elevation. The two primary altimeters must also agree within the limits noted in the aircraft operating manual.

- Wind Shear or Turbulence Forecast
  The Master Computer Flight Plan (CFP) with projected wind shear or the turbulence forecast documents should be reviewed for flights in RVSM airspace. Forecast moderate or greater turbulence could lead to RVSM suspension. Operators are cautioned against flight planning through areas of forecast moderate or greater turbulence.

- Computer Flight Plan (CFP)
  The document designated as the Master CFP should be carefully checked for date, type aircraft, fuel load and performance requirements. Crosschecks should also be done for routing and forecast groundspeeds. The CFP should be carefully checked against the ICAO filed flight plan to ensure the routing is in agreement with both documents. The enroute time on the CFP should be compared against the distance to destination for a reasonable groundspeed. The enroute time should also be compared against the total distance for a reasonable fuel load.

- Dual Long Range NAV System (LRNS)
  Two operational LRNSs are required for remote oceanic operations. A single FMS is not authorized for remote oceanic operations.

- HF check
  An HF check should be conducted on the primary and secondary HF radios in areas where dual HF radios are required. If possible, the HF checks should be done on the ground or before entering oceanic airspace. A SELCAL check should also be accomplished.

- Confirm Present Position coordinates
  Both pilots should independently verify the present position coordinates using either published ramp coordinates or determine position from the airfield diagram. They should not rely solely on the present position when the LRNS was shut down from the previous flight. A master source such as an enroute chart should also be used to confirm accuracy of coordinates at the oceanic boundaries.

- Master CFP symbols
  Operators are encouraged to use consistent symbology on the Master CFP. For example, a circled number (O) means the second crewmember has independently verified the coordinates entered or crosschecked by the first crewmember. A checkmark (V) may indicate that the track and distances have been confirmed. A diagonal line (\ ) may indicate that the crew has confirmed the coordinates of the approaching and next way point. An X-symbol (X) may indicate having flown overhead the way point.

- LRNS programming
  - Check currency and software version
    It is important to check the effective date of the database. Crews should note if the database is projected to expire during their trip. Crews are discouraged from flying with expired databases. MELs may allow relief to fly with an expired database but require the crews to manually crosscheck all data. The software version of the database should also be confirmed in case there has been a change.
  - Independent verification
    It is critical that one crewmember enters waypoint coordinates and that these are independently checked by another crewmember. It should be noted that the pilot should read from the FMS

screen back to the master CFP when verifying data. To read from the Master CFP to the FMS is a human factor's issue that has lead to errors based on seeing what we expect to see.

- Check expanded coordinates of waypoints
  Most FMSs allow entering abbreviated oceanic coordinates. There have been cases when there was an error in the expended waypoint coordinate, but crews only checked the abbreviated coordinate. Verifying only the abbreviated coordinate could lead to a lateral error. Flight crews should conduct a magnetic course and distance check between waypoints to further verify waypoint coordinates.
- Track and distance check
  To minimize oceanic errors, it is important to conduct a magnetic course and distance check from oceanic entry to oceanic exit. Operators should establish a tolerance such as $\pm$ 2^{o} and $\pm$ 2NM. The course and distance check comparing the Master CFP against the LRNS are critical in detecting errors that may not have been noticed by simply checking coordinates. A difference of more than 2^{o} between waypoints may be due to a difference of the magnetic variation in the database versus the variation used in the Master CFP. Any difference outside the $\pm$ 2^{o} or $\pm$ 2NM should be rechecked and verified.
- Upload winds
  Some LRNS units allow the crew to upload projected winds. This procedure allows more accurate reporting of ETAs.

- Groundspeed check
  The groundspeed should be noted before taxiing the aircraft. Crews should expect the groundspeed to read zero (0) knots. This procedure is a good practice to detect an error that may be developing in the LRNS.

TAXI AND PRIOR TO TAKE-OFF

- Groundspeed check
  During taxi to the active runway, pilots should check the groundspeed to see if it is reasonable.

- Present Position check
  This Present Position check is conducted after leaving the gate. Check for gross difference between this Present Position and the gate coordinates. This check will alert the crew to possible error in the LRNS database that can be investigated/corrected prior to take-off.

CLIMB OUT

- Transition altitude
  Crews should brief the transition altitude based on information from the approach plate or from the ATIS. After climbing through the transition altitude, the altimeters should be reset to 29.92 in or 1013.2 hPa.

- Manually compute ETAs
  After climbing above the sterile altitude and time permitting crews should manually compute ETAs from departure to destination. These should be noted on the Master CFP. This is an excellent crosscheck against ETAs computed by the LRNS.

PRIOR TO OCEANIC ENTRY

- Gross error accuracy check
  Before oceanic entry, the accuracy of the LRNS should be checked against a ground-based NAV-AID. The results of the accuracy check should be recorded with the time and position. A large difference between the ground-based NAV-AID and the LRNS may require immediate corrective action. Operators should establish a gross error check tolerance based on the type LRNS. It is not advisable

for crews to attempt to correct an error by doing an air alignment or by manually updating the LRNS since this has often contributed to a Gross Navigation Error.

- HF checks
  If the crew was unable to accomplish the HF and SELCAL checks on the ground, these checks must be accomplished before oceanic entry.

- Log on to CPDLC or ADS
  Operators approved to use Controller Pilot Data Link Communications (CPDLC) or Automatic Dependent Surveillance (ADS) should log on to the appropriate FIR 15 to 45 minutes prior to the boundary.

- Obtain oceanic clearance
  Both pilots must obtain oceanic clearance from the appropriate clearance delivery. (Clearance via voice should be at least 40 minutes prior to oceanic entry and via data link should be 30 to 90 minutes prior to oceanic entry). It is important that both pilots confirm and enter the ocean at the altitude assigned in the oceanic clearance (this may be different than the domestic cleared flight level). An oceanic clearance typically includes a route, flight level and assigned MACH. Crews should include their requested flight level in their initial clearance request. Some oceanic centers require pilots to advise them at the time of their oceanic clearance "When Able Higher" (WAH). Crews should be confident that they are able to maintain requested flight levels based on aircraft performance capabilities.

- Reclearance
  A reclearance (that is different from the oceanic route requested with the filed flight plan) is the number one scenario which leads to a Gross Navigation Error. Crews must be particularly cautious when receiving a reclearance. Both pilots should receive and confirm the new routing and conduct independent crosschecks after the LRNS, Master CFP and Plotting Chart are updated. It is critical that crews check the magnetic course and distance between the new waypoints as noted in PREFLIGHT under the paragraph "LRNS Programming".

- Altimeter checks
  Crews are required to check the two primary altimeters which must be within 200 ft of each other. This check is conducted while at level flight. The stand-by altimeter should also be noted. The altimeter readings should be recorded along with the time.

- Compass heading check
  It is recommended to conduct a compass heading check and record the results. This check is particularly helpful with inertial systems. The check can also aid in determining the most accurate compass if a problem develops over water.

AFTER OCEANIC ENTRY

- Squawk 2000
  Thirty minutes after oceanic entry crews should Squawk 2000, if applicable. There may be regional differences such as Squawking 2100 in Bermuda's airspace or maintaining last assigned Squawk in the West Atlantic Route System (WATRS). Crews transiting Reykjavik's airspace must maintain last assigned Squawk.

- Maintain assigned Mach
  Some oceanic clearances include a specific Mach. There is no tolerance for this assigned Mach. The increased emphasis on longitudinal separation requires crew vigilance in a separation based on assigned Mach. The requirement is to maintain the true Mach which has been assigned by ATC. In most cases, the true Mach is the indicated Mach. Some aircraft, however, require a correction factor.

- VHF radios
  After going beyond the range of the assigned VHF frequency, crews should set their radios to interplane (123.45) and guard frequency (121.5).

- Strategic Lateral Offset Procedure (SLOP)
  The SLOP should be Standard Operating Procedure (SOP) for all oceanic crossings. This procedure was developed to reduce the risk from highly accurate navigation systems or operational errors involving the ATC clearance. SLOP also replaced the contingency procedure developed for aircraft encountering wake turbulence. Depending upon winds aloft, coordination between aircraft to avoid wake turbulence may be necessary. This procedure of flying centerline, 1NM or 2NM right of centerline, greatly reduces the risk to the airspace by the nature of the randomness. Aircraft that do not have an automatic offset capability (that can be programmed in the LRNS) should fly the centerline only. SLOP was not developed to be used only in contingency situations.

- Hourly altimeter checks
  Crews are required to observe the primary and stand-by altimeters each hour. It is recommended that these hourly checks be recorded with the readings and times. This documentation can aid crews in determining the most accurate altimeter if an altimetry problem develops.

APPROACHING WAYPOINTS

- Confirm next latitude/longitude
  Within a few minutes of crossing an oceanic waypoint crews should crosscheck the coordinates of that waypoint and the next waypoint. This check should be done by comparing the coordinates against the Master CFP based on the currently effective ATC clearance.

OVERHEAD WAYPOINTS

- Confirm aircraft transitions to next waypoint
  When overhead an oceanic waypoint, crews should ensure that the aircraft transitions to the next leg. This is confirmed by noting the magnetic heading and distance to the next waypoint compared against the Master CFP.

- Confirm time to next waypoint
  Crews must be vigilant in passing an accurate ETA to ATC for the next waypoint. A change of **three (3)** minutes or more requires that ATC be notified in a timely manner. There is substantial emphasis on reducing longitudinal separation and this timely update must be a priority for the crews.

- Position report
  After passing over the oceanic waypoint, crews that give a position report to ATC must use the standard format. Flights designated as MET reporting flights or flights on random routes should be including in the position report additional items such as winds and temperatures. Crews should also note and record their field status at each oceanic waypoint. This is especially important if the cleared route and flight level differ significantly from the filed flight plan.

10-MINUTE PLOT

- Record time and latitude/longitude on plotting chart
  Approximately 10 minutes after passing an oceanic waypoint, crews should plot the latitude, longitude and time on the plotting chart. It is advisable to plot the non-steering LRNS. A 10-minute plot can alert the crew to any lateral deviation from their ATC clearance prior to it becoming a Gross Navigation Error. A good crosscheck for the position of the 10-minute plot is that it is approximately 2^{o} of longitude past the oceanic waypoint.

SAMPLE OCEANIC EXPANDED CHECKLIST

MIDPOINT

- Midway between waypoints
  It is good practice to crosscheck winds midway between oceanic waypoints by comparing the Master CFP, LRNS and upper millibar wind chart. As noted before, this information will be included in a position report if the flight has either been designated as a MET reporting flight or is a flight on a random route. This crosscheck will also aid crews in case there is a need for a contingency such as Dead Reckoning (DR).

- Confirm time
  It is recommended that during a wind check the crews also confirm the ETA to the next waypoint noting the **two (2)** minute tolerance.

COAST IN

- Compare ground based NAVAID to LRNS
  When departing oceanic airspace and acquiring ground based NAVAIDs, crews should note the accuracy of the LRNS by comparing it to those NAVAIDs. Any discrepancy should be noted in the Maintenance Log.

- Remove Strategic Lateral Offset
  Crews using a Lateral Offset of 1NM or 2NM right of centerline at oceanic entry need a procedure to remove this Lateral Offset at coast in prior to exiting oceanic airspace. It is advisable to include this as a checklist item.

- Confirm routing after oceanic exit
  Before entering the domestic route structure, crews must confirm their routing to include aircraft speed.

DESCENT

- Transition level
  During the approach briefing, crews should note the transition level on the approach plate or verified by ATIS. Crews must be diligent when descending through the transition level to reset the altimeters to QNH. This is particularly important when encountering IFR, night or high terrain situations. Any confusion between a QNH set with inches of Mercury or hPa must be clarified.

DESTINATION/BLOCK IN

- Navigation Accuracy Check
  When arriving at the destination gate, crews should note any drift or circular error in the LRNS. A GPS Primary Means system normally should not exceed 0.27NM for the flight. Some inertial systems may drift as much as 2NM per hour. Because the present generation of LRNSs is highly accurate, operators should establish a drift tolerance which if exceeded would require a write-up in the Maintenance Log. RNP requirements demand that drift be closely monitored.

- RVSM write-ups
  Problems noted in the altimetry system, altitude alert or altitude hold must be noted in the Maintenance Log. The RVSM airspace is closely monitored for any Height Deviations. An aircraft not meeting the strict RVSM standards must not be flight-planned into RVSM airspace without corrective action.