BOMBARDIER CUSTOMER SERVICES COMMERCIAL AIRCRAFT

Flight Deck

Dash 8/Q-Series

Issue 1, 2011

Inaugural Edition!

Bombardier Chief Pilot Brian Price's Winding Journey from Valencia back to Toronto

story, page 7

You. First.

BOMBARDIER

From the Editor

Flight Deck is a technical newsletter written for the pilot community. The document includes discrepancies that have been experienced and reported by operators, and action taken on other noteworthy maintenance tips. Additionally, Flight Deck provides routine notification of items of interest and significance that have occurred since issuance of the previous edition. It also provides updates regarding Steering Committees, Forums, Conferences, and other recent developments in the worldwide pilot community. Flight Deck is intended to be read by all pilots in the operator's organization. It will be issued semi-annually.

If you would no longer like to receive this publication, if you have other names that you would like us to add to our distribution list, or if you have any general questions regarding Flight Deck, please do not hesitate to contact me at: adam.amato@aero.bombardier.com.

Important Note:
Operators concerned with the current validity and possible implications of a specific article in Flight Deck should contact the Technical Help Desk: (telephone: 1-416-375-4080; email: thd.qseries@aero.bombardier.com).

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- enter username and password and click on Login
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A **Flight Deck Index** is included along with all published Flight Decks on the iflybombardier.com customer portal.

The Index is sorted by ATA chapter and contains every article ever published in Flight Deck.

Any questions can be addressed to the editor.

Once in an ISAR, use CTRL+F to search for key words.

For additional information on any of the in-service items covered in Flight Deck, please contact your local Bombardier Commercial Aircraft Field Service Representative, the Technical Help Desk or the appropriate staff member noted below:

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Brian Price	Chief Pilot, Turboprops	1-416-373-7399

Welcome to the Inaugural Edition of your Dash 8/Q-Series Flight Deck!

Every operator, regardless of location, shares one common characteristic; they are dedicated to keeping their customers flying, to getting them to where they need to be. Every day, people board aircraft around the world, take a seat, and are transported to a new destination. Yet this does not happen automatically. Sitting in the front of those aircraft, preparing to fly from location to location, are the people in control. This publication is for you; the pilot community. It is a place to share stories, updates, and discrepancies that you have experienced; a common meeting area for information and discussion.

In this first issue, we have provided those of you who were unable to attend the Flight Operations Steering Committee in Toronto from March 8 – 10 with a breakdown of several of the presentations that were given at the meeting. We have also attempted to locate some relevant, previously published ISAR articles to help you deal with particular issues that may arise during flight.

Finally, we have our own Chief Pilot,Turboprops, Brian Price discussing the multiple legs of his journey flying an aircraft from Valencia back to Toronto; an aircraft that he himself delivered almost a decade ago.

We are confident that you will find Brian's article an entertaining read, and encourage you to send in similar stories of your own for publication. We also hope that you will find both the presentation summaries and the ISAR articles informative and useful; much like the ISAR, if you would like to contribute technical articles of your own for inclusion, please feel free to do so.

With this in mind, we encourage your feedback. Tell us what you would like to see in future issues; more technical articles? less presentations from forums and steering committees? more personal stories from your fellow pilots? The choice is up to you. As this is our inaugural issue, we have no problem adapting future editions to fit your needs. Our goal with *Flight Deck* is to provide you with something that you will look forward to reading, and we will look into making any changes necessary in order to do so.

Flight Deck is scheduled to be released twice a year, and like our ISARs, will be separated into a CRJ Series edition and a Dash 8/Q-Series edition. We hope that you will find it both enjoyable and informative, and we look forward to working together with you to produce an improved publication with each new release.

Until next time, keep 'em flyin'.

If you have any questions regarding Flight Deck, would like to provide feedback or submit your own articles for publication, please contact the Editor, Adam Amato, at:
adam.amato@aero.bombardier.com

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Flight Operations Service Letters

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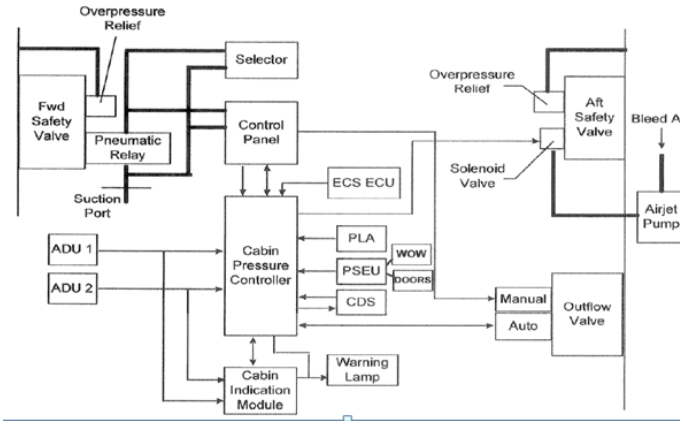
Visit our website for eServices, operator service documents, news & events, resources, discussion, forums, and much more

Cabin Pressure Control Schematic



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0001 Dash 8/Q-Series – FOSC # 19 – Toronto, Ontario – March 8 – 10, 2011

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Applicability: All Dash 8/Q-Series

Contributed by: Harlan Simpkins,Q-Series customer Liaison Pilot

The Dash 8/Q-Series Flight Operations Steering Committee meeting was held again in Toronto from March 8-10. In attendance were over 34 members representing the majority of the Dash 8/Q-Series fleet. Wideroe, Tyrolean, Swedish Coast Guard, South African Express, SkyRegional, SATA, Porter, Piedmont, Jazz Aviation LP, Luxair, Intersky, Horizon, Flybe, DAC Aviation, Croatia, Colgan, Augsburg, ANA, Air Nelson, Air Berlin, and Air Baltic were all in attendance.

FOSC presentations were made from Bombardier Programs, In-Service Engineering, and Technical Publications, as well as Reliability and Maintenance Engineering groups. The number of open items on the FOSC Action Registry continues to decrease, proving the effectiveness of the Committee.

The FOSC continues to provide an open forum for networking, sharing of ideas and best practices.

The relationship between the operators and Bombardier remains strong. Working together, we have found common ground and resolution on many different issues.

Our evening team building event was a great success, further strengthening the relationships within the FOSC. Thank you to FlightSafety for co-sponsoring the event.

Presentations and minutes from the meeting are available on the Bombardier Commercial Aircraft Customer Services website (www.iflybombardier.com).

The next FOSC will be held in Toronto during the week of September 19-23, 2011.

Please contact Harlan Simpkins for details:

harlan.simpkins@aero.bombardier.com

0002 Pilot Update

Flight Operations Service Letters

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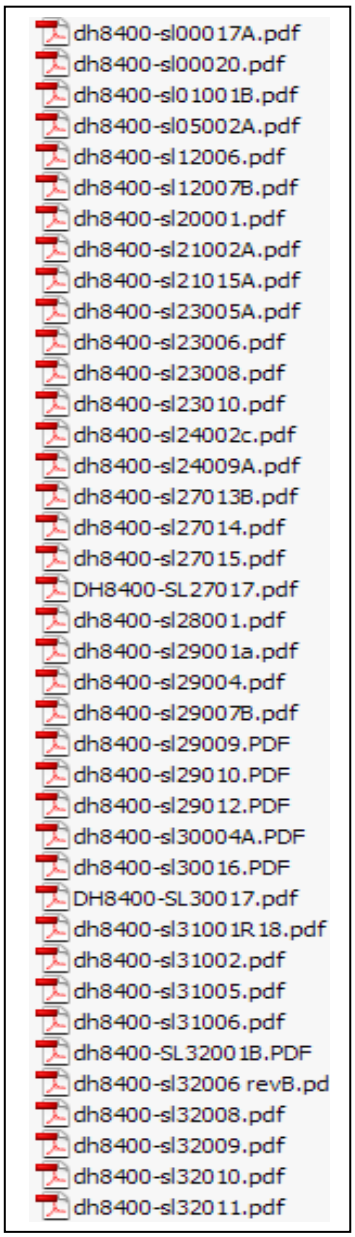
Applicability: All Dash 8/Q-Series

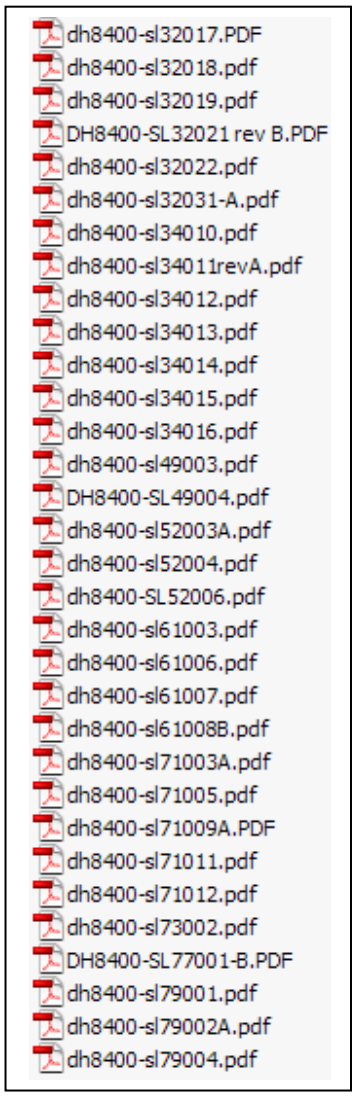
Contributed by: Harlan Simpkins, Q-Series Customer Liaison Pilot

Welcome to the inaugural edition of the Dash 8/Q-Series Flight Deck.

In each edition, we will feature a "Pilot Update" section, where we will briefly discuss relevant items to the pilot community.

In this issue, I will be listing a number of relevant Flight Operations Service Letters that should be reviewed to ensure best practices are being utilized. A detailed breakdown can be found on page 23 of Flight Deck.





If you would like access to these FOSLs in their entirety, they can be located on iflybombardier.com, under 'Resources' > 'Service Documents'> 'Service Letters.' ■

Harlan Simpkins
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0003 Coming Home with a Price - A Journey from Valencia to Toronto

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Applicability: All Dash 8/Q-Series

Contributed by: Brian Price, Chief Pilot, Turboprops

Departure from Narsarsuaq, Greenland.

Recently I received a call from our Bombardier Asset Management Group, who deal with our pre-owned aircraft. They needed two pilots to ferry a used Q-Series aircraft from Valencia to Toronto for refurbishment. In this case it was a Q300-315 built in 2002 - manufacturer serial number: 581. It just happened that I had also ferried this very aircraft from the factory to Belfast City Airport, Northern Ireland back in February 2002. I think it had roughly 25 hours on the airframe when we handed the aircraft over to the Denim Air crew, who completed the flight to Valencia. I thought it would be fitting to fly 581 back to Toronto.

With the help of our Flight Dispatcher Michelle Chartier, we planned the route and organized our required navigation charts and documents as well as the safety equipment that we would need to take with us to Spain. Airline tickets were booked to Valencia, and on Tuesday, May 17, fellow pilot Charlie Honey and I met at the Toronto Pearson airport and we were off to Spain for another Flight Operations adventure.

Our planned route back to Toronto would be via: Valencia to Jersey Island in the English Channel - Glasgow, Scotland - Reykjavik, Iceland - Narsarsuaq, Greenland - Goose Bay, Canada, and finally, Toronto. Of course, this was our planned route, and quite often in aviation the plan is changed en-route due to operational circumstances such as: weather, volcanic eruptions or other unforeseen events.

The day after our arrival in Valencia, we met up with Daniel Neve and Laura Barco (our coordinators from Air Nostrum), who provided Charlie and I with our Spanish license validations, customs paperwork and other legal documents. Daniel outlined the maintenance history of the aircraft and when it was last flown. Charlie and I thought it would be prudent to complete a few routine engine and system checks to ensure the aircraft was in a fully functional state before

Co-Captain Charlie Honey and Mr. Price in front of the aircraft that they would bring back to Toronto.

heading off over the Atlantic. The ground and systems tests were successful, with no anomalies noted, and we decided to take the aircraft on the first leg of our journey to Jersey Island just off the coast of France in the English Channel.

We departed Valencia just after lunch time in uncharacteristically bad weather for Spain: cool temperatures, moderate rain and low clouds. The aircraft performed well and we were soon cruising at FL240 and 265 knots. After a pleasant flight flying over the Pyrenees and Western France, we descended into Jersey Island and touched down on its undulating runway, two hours and thirty minutes after takeoff.

We taxied into the Aviation Beauport FBO ramp area and topped up the fuel tanks with Jet A. Charlie and I made our way to the Aviation Beauport offices where we got refuelled as well with sandwiches and a coffee. While there we checked the weather for our next leg over England and up to Scotland. ATC had our flight plan for Glasgow and all was in order.

We departed from Runway 09 at Jersey with a left turn to intercept our course. This route took us up over Guernsey Island and north over the English Channel. We continued our climb to FL 240 and set up high-speed cruise power settings for Glasgow, which again gave us a true airspeed of 265 knots.

Weather was not a concern on this leg, with a few overcast layers which turned to scattered cumulus for our arrival in Scotland. After another two hours airborne we completed our descent and approach checklist and we were radar vectored for an ILS approach to runway 23 in Glasgow. We parked the aircraft on a small paved parking area adjacent to Alpha taxiway and checked the engine oil levels, which were still within normal limits. Once the aircraft wheels were chocked and pitot static and prop ties put in place, we headed off to the Signature FBO.

The Signature duty officers confirmed our departure time for Friday and offered their services for anything else we needed. We were soon in the taxi and on our way to the Hilton Hotel where we began making our plans for a good Scottish meal of Haggis!

On Approach to Runway upon arriving in Reykjavik

The next day, refreshed after a good sleep and very large Scottish breakfast, we headed to the airport for our planned departure to Reykjavik, Iceland at 11:00 local. Just as we were getting ready to head to the aircraft, we received a call and were told to delay our departure until we heard from that same contact again - some last minute details were still being resolved.

After a four-hour delay, we got the phone call to proceed to Reykjavik as planned. Departure from runway 23 was routine and after checking in with Scottish Center we were soon flying direct to BARKU intersection. While monitoring ATC, we contacted Iceland Radio on our number two radio for our Oceanic clearance and settled in for a three-hour flight to Reykjavik. The North Atlantic winds were blowing from the South, which helped increase our ground speed and therefore reduced our fuel requirements for Reykjavik. Normally on this route we would be fighting headwinds, so it was nice to have the extra push and additional fuel on arrival in Iceland.

As I looked out the window as we cruised at FL240 from our comfortable flight deck, I could see that the winds on the surface were very strong and the Atlantic was streaked with white caps. I looked down at the water and then glanced at the engine instrument panel and like many other pilots on these long over-water flights - I put my faith in Pratt and Whitney.

Due to very strong Northerly winds, Reykjavik Centre advised that our arrival to Reykjavik would be a localizer approach for Runway 19 circling to land on Runway 01. Once we descended through the clouds, we had the familiar city of Reykjavik in sight, and due to our location in relation to the airport, we requested the visual approach to Runway 01. Charlie did a great job getting the aircraft down and stopped in very gusty and turbulent conditions, and we parked the aircraft for the night on the ramp at Flight Services. Another check of the engine oil after shutdown required us to top both engines up with one litre each, and we double checked that we had secured the oil cap! A few minutes later, another Bombardier Flight Operations crew arrived with a Q400 that was also being ferried back to Sault Ste. Marie, Canada for refurbishment. They had a small technical problem while shutting the aircraft down and were consequently grounded for maintenance. This would prove to be a problem of volcanic proportions the following day!

We met up with our fellow pilots Ron Schout and Dave Killin at the 'Tapas' restaurant in downtown Reykjavik for a few refreshments and many very tasty tapas while we caught up on each other's adventures for the last few days.

The following day the wind was much calmer and the temperature was a more comfortable +7 degrees celsius, with sunny skies.

We departed just after 10:00 local time on Runway 01 and made a left turn direct to our first fix: EMBLA. Our routing for the day would take us to EMBLA, then 63N 30W - 62N 40W - NA (Narsarsuaq beacon) and then to BGBW (Narsarsuaq airport).

Charlie Honey inspects the aircraft before moving to the next leg of the trip.

Winds were fairly light enroute, with a 20 knot component on the nose giving us a groundspeed of 245 knots. A low level broken cloud deck obscured the Atlantic, so there wasn't much to look at except the engine and fuel gauges. Meanwhile, back in Iceland, the Grimsvotn Volcano was erupting violently - which grounded our Q400 compatriots for another four days while the ash cloud dissipated.

Charlie Honey enjoying a coffee in preparation for the flight ahead.

The view over Greenland.

Narsarsuaq Airport is very historic due to the strategic role it played in World War II, when the Allies code named it 'Bluie West One'. The airport strip was built on the terminal moraine of a glacier by the US Navy in 1941 on the only clear strip of land for hundreds of miles around. It also has a formidable reputation for being a very challenging airport due to its location at the end of the fjord and the high terrain surrounding the runway, which makes maneuvering difficult.

This was our most critical leg; even though Narsarsuaq was forecast to be VFR for our arrival, we never take it for granted. Weather can change very quickly in the fjord and fuel burn is always a major consideration. Our alternate airport, Godthab, was 260 nautical miles away. We monitored our fuel situation constantly and requested weather updates for Narsarsuaq from Reykjavik ATC and Gander ATC to ensure there would be no last minute surprises with weather that would cause a diversion to Godthab or Sondrestromfjiord.

Narsarsuaq remained VFR with some low level scattered cloud in the approach area. We flew the NDB/DME approach for runway 07 and landed on the pronounced upsloping runway. Refueling was done by the Greenland Air staff while Charlie and I went into the Narsarsuaq AFIS offices to check our flight plan, enroute weather and make a very important phone call to Canada Customs with our ETA for Goose Bay.

A flap 10 departure from Runway 25 with a visual climbout down the fjord afforded beautiful views of the rugged Greenland terrain and the icebergs floating towards the Davis strait.

We had a 30 knot tailwind component on this leg to Goose Bay (which was rather unusual), but we weren't complaining! Our groundspeed was 300+ knots on average, with no cloud at our wrong way assigned cruising altitude of FL 230.

We contacted Gander Centre approaching LOACH intersection and picked up the ATIS for Goose Bay. The reported weather at Goose Bay was calm winds and cloud bases of 3,000 feet. Runway 08 was the active runway for our arrival, but since there was no wind and no traffic, we requested the localizer back-course for runway 26 and this was quickly granted by Goose Bay approach. We landed two hours and thirty minutes after our departure from Greenland with 2,400 lbs. of fuel remaining. ▶

Two cheerful Canada Customs officers were waiting for us as we shut down the engines. They were quite friendly as they checked our paperwork and wished us well for our night in Goose Bay. We did another quick oil check on the engines and refuelled for the next day before heading to the Hotel North - one of the finest hotels in the Happy Valley area.

After our long day, we decided to get some exercise and walk to the legendary Goose Bay tavern - 'Trappers' - for dinner. At 'Trappers,' you cook your own steak dinner on their in-house barbecue. No blaming the chef for your overcooked T-bone at this place.

Hotel North in Goose Bay.

Winds are always a concern flying Westbound in the Northern hemisphere and the flight to Toronto was 966 nautical miles; near the maximum range of the Q300. After discussing the winds and forecast weather for our destination as well as alternates with Universal Aviation, we decided to file Toronto Pearson as our destination. If winds were stronger than forecast we had our choice of diversion airports, unlike the day before.

Departure off of runway 26 at Goose Bay aimed us in the right direction for Toronto as we once again climbed to our cruising altitude of FL240. On this leg we adjusted the power to give us the best combination of fuel burn and speed and we ended up flying at our long range cruise speed of 235 knots true airspeed. Winds were fairly light enroute and we landed on Runway 15L at Toronto Pearson on schedule after four hours and 20 minutes in the air. We taxied into the Skyservice ramp and shut down at exactly 13:00 local time as planned, after another excellent adventure. ■

0004 FOSC Presentations

Technical Publications – Aeroplane Operating Manual Update

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Applicability: All Dash 8/Q-Series

- **AOM Revision 27**
  - At the time of the FOSC, revision was currently in production. It has now been released to all customers.

- **AOM New Format**
  - As discussed at the last FOSC, Bombardier will be changing the format of the AOM through the following:
    - Eliminate customization by operator.
    - Prepare a set of Masters documents which include material for all customers.
    - Masters will be customized by regulating authority and metric/imperial.
  - We will end up with 6 AOM variants:
    - DOT Metric
    - DOT Imperial
    - FAA Metric
    - FAA Imperial
    - EASA Metric
    - EASA Imperial
    - Bombardier is currently in work preparing the new version AOMs, starting with DOT Metric & DOT Imperial.
    - Now finalizing the bookplan (complete list of chapters and sections).
    - Started work to consolidate current customized material into master manual format.
    - Started work to remove material currently in other publications.
    - As progression continues, it looks as if there will end up being two volumes. Page and binder size are the same as AFM.
    - Scheduled completion target is the Fall of 2011.

FOSC Action Items

- **Action Item**
  - Advance copies of pertinent AFM Revisions.
- ***Response***
  - Working with Flight Operations, Liaison Pilot and Airworthiness; Bombardier to provide information when appropriate.
- **Action Item**
  - Can documentation such as master MEL be issued in a format (e.g. Microsoft Word) that can be edited (not simply.pdf)?
- **Action Item**
  - Difficulty with editing the MMEL.
- ***Response***
  - Bombardier is currently working to create Word version copies of documents requested at last FOSC.
- **Action Item**
  - See what can be done to get AFM and QRH release/effectivity in line.
- ***Response***
  - We are currently aligned across all AFMs/QRHs.
  - As discussed previously, we cannot hold back AFM revisions.
  - We work with Flight Operations and the Liaison Pilot for QRH updates.
  - Working to get QRH revisions related to AFM content turned around quickly to be in line with the AFM.
  - Other editorial changes to go out as required, but not to hold up AFM-related content changes.
- **Action Item**
  - AFM/QRH/AOM + MEL and MELP.
- **Response**
  - AFM, QRH, MEL in digital format.
  - ODMs, AOMS, QRHs and MMEL/MELPs are available.
  - Q400 AFM (Model 402) is available.
  - We are working on a plan to provide the Q123 AFMs starting with the Q300s.
    - Q300s targeted for the Fall of 2011.
    - Q200s and Q100 will be scheduled after completion of Q300s. ■

0005 FOSC Presentations — Master Minimum Equipment List

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Applicability: All Dash 8/Q-Series

- Request for Relief for Q100/200/300/400 Missing Brake Wear (Indicator) Pins.
  - Currently in review internally; then will be sent to TCCS for approval.

Operator Perception - The MEL is not the Result of Collaboration Between Manufacturer and Operators

- The Dash 8 Series 400 MMEL began development in 1997, two years before the Q400 design was certified and three years before first revenue flight.
- A Joint MMEL Development Team was created for the Q400 MMEL. Team members were potential Q400 customers (Air Ontario, Horizon, Rheintalflug, SAS, Tyrolean and Wideroe), TCCA, FAA and JAA specialists, and Bombardier System Design Specialists. This was the first time a joint MMEL development process was performed by any OEM.
- Post-certification changes to the MMEL and MELP are initiated by changes in regulatory authorities' regulations and documents (TCCA MMEL Policy and Procedures Manual TP9155E, TCCA MMEL Guidance Book, FAA MMEL Policy Book, JAA Leaflet Number 26), new design changes, and via customer feedback through the Customer Response Centre, where an Action Database Request will be raised.
- At the last TSC meeting, an action item was taken by Bombardier management to look at the MMEL issues, processes, etc. and present the new proposed plan on how to improve the MMEL at the next TSC and FOSC meeting.

Q400 33-50-2 Interior Electrical Emergency Lighting System

- Request Explanatory Information for NextGen Interior Aeroplanes
  - Existing MMEL relief for item 33-50-2 'Interior Electrical Emergency Lighting System' is based on the "Classic" interior, and therefore refers to light bulbs.
  - Bombardier will be adding separate relief for the NextGen interiors in the MMEL document.
  - Wording of the new relief reads as follows:

33 LIGHTS				
EXISTING MMEL				
33-50-2 Interior Electrical Emergency Lighting System (Applicable to Bombardier AEROC 84.6.E.1, Sect. 5 Only)				
1) Ceiling Lights, Emerg. Markers, Emerg. Locators	C	-	-	Individual light bulbs, etc. may be inoperative provided no two adjacent overhead emergency lights are inoperative.
2) EXIT Identfiers Light Bulbs	C	-	-	Two bulbs from five may be inoperative on each identifier.

NextGen LEO Lighting (Interior)

NEW ADDITIONAL MMEL PROPOSAL				
NextGen Interior (CR825CH02598) (Applicable to Bombardier AEROC 84.6.E.1, Sect. 15 Only)				
1) Ceiling Emergency Flood Lights	C	7	-	Individual light units may be inoperative provided: a) No two adjacent ceiling emergency flood lights are inoperative, and b) Floodlight at aircraft fuselage station X=335.31 is operative.
2) EXIT Identifiers	C	4	4	Each exit identifier may have 40% of its internal lights inoperative.

- New relief for the NextGen interiors has been accepted by FAA and will be reflected in Revision 6 of the FAA MMEL.

- MMEL relief for TCCA and EASA will be updated based on wording similar to what has been granted for FAA.

Delays in approving TRs

- Legal issues with signing a contract for EASA MMEL approval was resolved in late 2010, which caused a delay earlier in the year in obtaining EASA approval of TCCA MMEL TRs. EASA MMEL TRs will be pushed forward after EASA MMEL Revision 5 is published.

- Bombardier has requested a set approval time for MMEL reviews with EASA. EASA has committed to a minimum of six weeks to review proposals (this assumes an AFM Supplement is not required for the MMEL proposal).

- Unlike the TCCA and FAA MMEL documents, which are sent to only one regulatory authority respectively, the EASA (JAA) MMEL document is sent to two different regulatory authorities.

- EASA MMEL Chairman will not approve the MMEL document until other member has given their OK for the proposal.

- If the EASA MMEL requires an AFM Supplement, this would require an additional two (2) to four (4) months after the AFM Supplement has been approved by TCCA.

- Once the AFM Supplement has been approved, the MMEL proposal can then be approved.

No Single Document for MMEL/MELP

- Bombardier and EASA must get together to publish one document which contains all approved changes from Bombardier and EASA.

  - At the time of the FOSC, new EASA implementing rules for MMEL relief are expected to be in force by April, 2012. There will be a transition period given from entry into force (by the European Commission). At this time it is not known what transition period will be granted by EASA.

  - Bombardier's plan is to have a separate, stand alone EASA MMEL and MELP document for the Dash 8/Q-Series 100/200/300 and the Q400 by late 2012. At the time of the FOSC, work was to start in the summer of 2011.

Q400 MMEL Inoperable Display Units

- There has been a request for display unit relief similar to Embraer and Dornier MMEL relief.
  - Bombardier will be submitting a proposal to TCCA to allow for a revenue flight with the co-pilots MFD inoperative.
  - With the current MMEL document revisions being produced, Bombardier estimates completion of this relief by December 2011.

Dash 8 MMEL and MELP Revision Update

- Revision 23 of FAA Dash 8 Series 100/200/300 MMEL and Revision 13 of the FAA MELP document was published in April 2011.
- Revision 4 of FAA Dash 8 Series 400 MMEL and MELP document was published in April 2011.
- Revision 21 of TC Dash 8 Series 100/200/300 MMEL and Rev. 13 of the MELP documents to be published tentatively by the end of September 2011.
- Revision 5 of TC Dash 8 Series 400 MMEL and MELP documents to be published tentatively by the end of December 2011.
- Revision 5 of EASA (JAA) Dash 8 Series 400 MMEL and MELP documents to be published tentatively by the end of December 2011. ■

2300 Past ISAR Article Crew Headset Recommendation

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Applicability: Dash 8/Q-Series 100/200/300

contributed by Brian Riley, In-Service Engineering (Systems)
Reference: Mod 8/2095

Originally Published: Q400 ISAR 2007-11

Several operators have solicited comments from Bombardier Aerospace regarding flight crew headsets that can and cannot be used on the aircraft. Prior to Mod 8/2095, the Dash 8 included three Racal ATR1517ABCVP headsets. These headsets had two 300 ohm speakers connected in series that exactly matched the aircraft system. It was found, however, that most pilots preferred to use their own headsets. Mod 8/2095 was therefore introduced to delete the Racal headsets from the aircraft build.

Headset selection is at the discretion of the operator/crew. Generally, it would be preferable to match the aircraft's 600 ohm system, however, this would limit the variety of headsets that can be used. A popular headset manufacturer typically uses headsets that use two 300 ohm speakers connected in parallel (150 ohms total), with a variable 1,000 ohm volume potentiometer in series (150 to 1,150 ohm range). This non-stereo arrangement has often been used on Dash 8/Q-Series aircraft without problems. The headset volume potentiometer is typically set in the middle; otherwise, the boom microphone is 250 mV / 150 ohms, and the connection is the standard two-plug connection to the aircraft.

It is recommended that operators/pilots consider the above details when they select a non-stereo aviation headset for use on Dash 8/Q-Series aircraft. It remains the pilot's responsibility to confirm satisfactory operation of any headset / boom microphone arrangement on the aircraft, prior to aircraft operation. ■

2321 Past ISAR Article

Radio Altimeter Anomaly - Unilink Alert Inhibit Logic

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Applicability: Q400 (with Unilink units operating with SCN21 and SCN22)

Reference: based on DH8-400-SL-23-006

Originally Published: Q400 ISAR 2009-06

This ISAR article is intended to further communicate information previously released in Service Letter DH8-400-SL-23-006, issued to inform operators of a Unilink alert inhibit situation and to provide recommendations for corrective action.

The Unilink system suppresses uplink annunciations during critical phases of flight, such as takeoff and landing, to prevent crew disruption. A radio altitude of 2,500 feet and a 5-minute post-WOW (Weight-Off-Wheels) timer is configured for this suppression. Consequently, during the takeoff phase, uplink annunciations are suppressed from when the airspeed is greater than 50 knots until the radio altimeter is greater than 2,600 feet. The timer enables uplink annunciations 5 minutes after WOW, if the aircraft continues to be in the takeoff phase. Uplink annunciations are also suppressed during the landing phase, from when the radio altimeter subsequently goes below 2,400 feet until after landing. It should be noted that a 100-foot offset from the configured altitude, in either direction, is used.

During production, it was found that if the aircraft had transitioned through the 2,600-foot radio altitude and enabled uplink annunciations, terrain or structures underlying the flightpath could cause the radio altitude to drop back below 2,400 feet. The Unilink system would interpret this as being in the landing phase, and therefore inhibit uplink annunciations until the aircraft landed.

It is possible to reconfigure the Unilink system's suppression threshold to use pressure altitude instead of radio altitude. As an interim measure, an In-Service Modsum was issued for the affected production aircraft in order to approve a new configuration using a specific pressure altitude. Given that each operator may require a different pressure altitude threshold configuration for their operation, this pressure altitude could range from 3,000 to over 9,000 feet.

Universal has advised that they intend to implement minor software change SCN22.3 to address this issue in 2010. The change intends to confirm that the landing phase is being entered using pressure altitude data, before suppressing uplink annunciations.

Operators are invited to incorporate the above information into their operations documentation.

If operators experience the uplink suppression issue described in this article, they are encouraged to contact the Technical Help Desk (thd.qseries@aero.bombardier.com; telephone: 1-416-375-4000) with aircraft S/N and selected barometric altitude to suppress uplink annunciations, and to request an IS Modsum to approve a configuration change for their fleet.

Update: Resolved with introduction of SB 84-23-33 that installs software upgrade to SCN 22.3. ■

2700 FOSC Presentations

Intermittent Stall Warning – Stick Shaker Events

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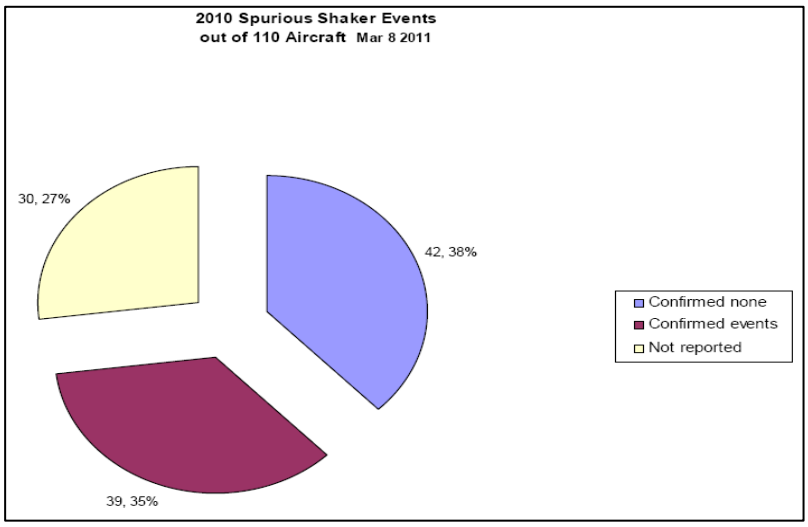
Applicability: Q300

Issue:
Intermittent Stick Shaker events are reported on various Q300 operators' aircraft. Duration is always less than 1-2 seconds. Except for one captured event, it is typically reported on one side only. At no time is a shaker event discretely posted to the FDR.

Status:
A survey of all Q300 operators was conducted a few years ago. At that time, only Qantas and Air Nelson reported events. A recent survey finds the vast majority of events are observed on late serial number aircraft (post SN 595, or those fitted with APIRS).

- Detailed review of wire diagrams/installations does not find any major differences. Between installations pre and post SN 595, there are aircraft that have the issue and others that do not, within the same build range. Of those with events, some have a higher frequency of events. The highest in 2010 was 39 events. The lowest was 1.
- IS Modsums 8Q2700009, 8Q2700011 and 8Q2700014 have been released to capture shaker event data on Qantas SN 599 to 605. Events captured indicates the shaker is being driven external to the stall warning computer, or more than likely a computer output spike faster than 0.5 seconds.
- An operator test found shaker motor will start to run with as little as 16 Vdc and 0.2 ma. Simply touching the motor to power will cause the motor to start. Motor will continue for a second after power is removed.
- Local mod to isolate existing shaker power wire from loom with AC4 standoffs/D rings did not prevent further events.



- IS Modsum IS8Q2750002 was released as a trial installation to replace existing shaker wire with a shielded shaker wire. Events were still reported on aircraft fitted with this installation.
- BA, BAE have been having weekly calls to determine possible causes. Currently investigating if root cause is a result of ASCB timing or data invalid switching internal to the computer. Each computer will use its on side ASCB data for shaker computation.

  In the event on side ASCB data is lost, it will switch to cross side ASCB data. If cross side ASCB data is lost, it will switch to on side ASCB data again. If still invalid, it will take default values stored in memory. It is unknown if the above switching will cause an output spike.

Plan:

- Additional IS modsum 8Q2700016 to be introduced to install on wing event recorder on a high-event aircraft. Recovered data will assist further actions.
- A temporary ASCB trial removal via an SB and Modsum on a trial aircraft may be issued. This will require an aft C of G limitation and post-flight maintenance action to reset the caution light. Intent is to validate ASCB relationship.
- While not a priority, replacement of existing Voi-shon ground studs with bolt, washer, nut arrangement, separate stall warning power, signal and chassis ground wires is also being considered. ■

3600 FOSC Presentations — Pneumatics Issues

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Applicability: Q400

Q400 ECS Software Changes

- The Q400 now has approximately 90% fleet penetration of the -007 S/W.
- With -007 software installed, an RTD sensor can be used in place of the current Bleed Over Temperature Switch (cause of numerous Bleed O/T nuisance Caution Lights). The RTD has been installed on approximately 53% of the Fleet.
- -007 S/W will improve the transient temperature control at cruise in the cockpit by smoother control of bypass valve operation (will prevent in-rush of hot air), and also allows the bypass valve to fully open and help with temperature control in the flight compartment (valve was inhibited at 35 milliamp command and would not fully open when required).

Pressurization Operation

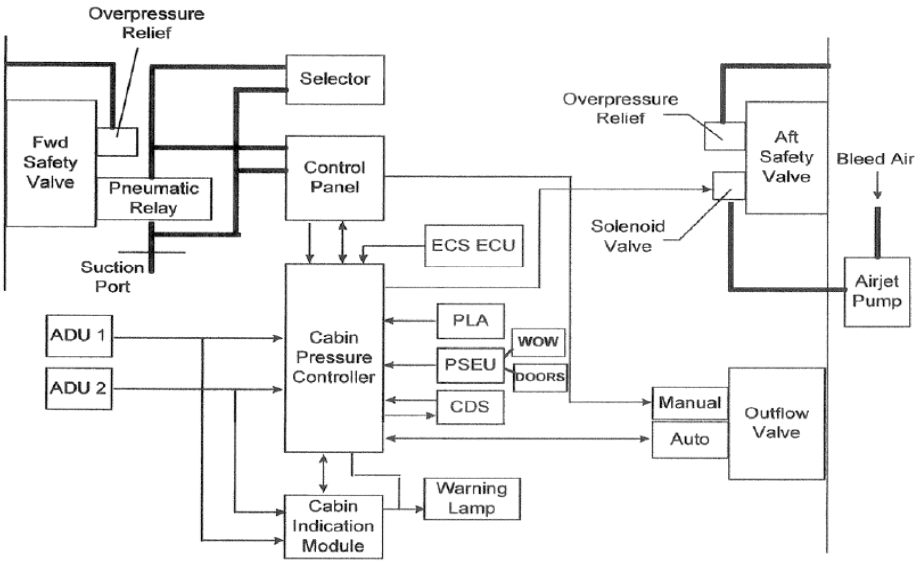
Question: *Does the Q400 depressurize in the event an "Open Door" signal is sensed during flight?*

- On Ground when in AUTO Mode on the CPCS - In the event of a door open signal the system will not initiate pressurization.
- During Flight in Auto Mode - The door signal is memorized when the aircraft leaves the ground position. If the memorized signal indicates "Doors not OPEN," normal flight sequences are initiated. However if during flight a failure occurs (loss of Door Closed signal), the CPCS will continue to operate in Normal mode.

Question: *Does the Q400 depressurize automatically if a problem occurs (e.g leaking door seal)?*

- Two doors on the Q400 have inflatable door seals; the Airstair and Rear Baggage doors. In the event that one of these seals deflates, the aircraft will start to depressurize. The gap left by a deflated seal around each door is such that the area is enough to cause slow depressurization. These doors do not have a door flap vent and the gap area is sufficient to allow pressure to decay; therefore when deflated will ensure that the cabin is depressurized prior to opening a door. The rest of the doors on the Q400 have passive seals and if they developed some leakage it would not lead to a depressurization event. ▶

Cabin Pressure Control Schematic



Cabin Pressurization System

- **System Operation –Auto Mode**
  - Automatic Operation

- The main principle is to control the cabin pressure with no load for the flight crew. The Cabin Pressure Controller controls the cabin pressure/altitude based on the following information:
  - Aircraft altitude/pressure (detected by two sensors located in the CPCP and CIM), aircraft vertical speed and barometric correction coming from both Air Data Units (i.e., ADU1 and ADU2).
  - Landing elevation, selected from the CPCP.
  - Weight on wheels, and door signals coming from Proximity Sensor Electronic Unit (PSEU).
  - Engine Throttle Lever position switch (Pilot Pedestal Switch).
  - Cabin input airflow introduction from ECS ECU.

- Automatic Depressurization Sequence
  - Weight On Wheel discrete input on "GROUND".
  - Throttle Switch is on "less than minimum take off power"– Power Lever Angle less than 60°.

- Automatic Pre-Pressurization Sequence
  - Weight on Wheel discrete input is on "GROUND".
  - Throttle Switch is on "more than minimum take off power"– Power Lever Angle greater than 60°.

- Take off Sequence
  - Weight on Wheel leaves the "GROUND" position (electrical ground).

Air Quality

As requested by the FOSC, Please see below a discussion on the Q400 Cabin Air Quality:

- With respect to cabin air quality, the Q400 has been certified to FAR/JAR Part 25; the specific regulation that deals with Ventilation is 25.831. This regulation requires a specific amount of fresh air per crew member in each compartment, and also requires a specific amount of fresh air per passenger. In addition, Carbon Monoxide and Carbon dioxide levels are to be below specified levels. All of these requirements were achieved and verified during the Q400 Flight Test Program.

The following statements are in response to questions posed by the FOSC with respect to the Q400 ECS Configuration:

- The Q400 employs a High Efficiency Particulate Air (HEPA) filter which filters all re-circulated air. The filtration efficiency is in excess of 99.97% of 0.3 µm particles (manufacturers are now supplying HEPA filters with aBiosideincorporated to attack airborne viruses).

- The refresh rate of fresh air is approximately every four minutes.

- The amount of recircair is approximately 25% of total flow at sea level.

In the event of air duct contamination, a Service Letter has been issued which discusses purging/cleaning procedures (ref DH8-400-SL-21-012A). ▶

Target Rate of Change (ROC)

- **SAE -ARP 1270 recommendations**
  - ARP 1270 recommendations of acceptable pressure change rates are for sustained rates.

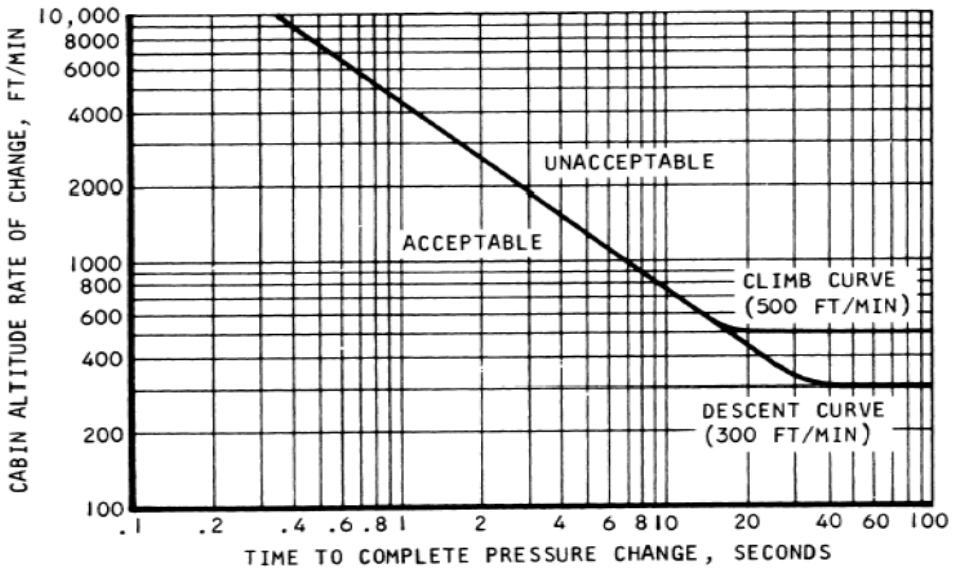


FIGURE 4 - Design Limits for Short Duration Cabin Pressure Changes, Based on Threshold of Detection by Humans

Pressure Fluctuations

- **SAE ARP 1270 Figure 3**
  - No data for time intervals less than .3 seconds.
  - Changes in pressure less than 60 ft are not noticeable for all rates (60 ft = Δ0.0312 PSID at sea level).

- **Sudden pressure changes generally longer than 1 second can be caused by:**
  - Valves opening/closing
  - Inflow turned on or off
  - Outflow valve movements ■

3600 Flight Test Engineering

Connection of Resistive Temperature Device in Place of Bleed Hot Temperature Sensor Switches

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Applicability: Q400

contributed by: Donald Band, Flight Test Engineering
reference: Q400-ISAR-2010-05-2110 and Q400-ISAR-2010-05-3610

It might have escaped your notice, but the revised ECS ECU software (-007) included a change to allow connection of an RTD (or Resistive Temperature Device) in place of the Bleed Hot temperature sensor switches. This was detailed in **Q400-ISAR-2010-05-2110 and Q400-ISAR-2010-05-3610,** both written by Shabbir Mohamed.

The switches had been noticed to have a tendency to produce Bleed Hot cautions at inappropriate moments, putting the pilots in the hot seat. Testing to confirm that the new devices worked as designed was completed early last year on the prototype Q400 s/n 4001 in Wichita, Kansas. The mod for the sensors was designed to minimize required wiring changes when changing from the bleed hot switches.

All operators have been encouraged to complete these upgrades (ref SB 84-21-13 and SB84-36-03).

Associated with the testing of the RTDs, a number of software changes were made to the ECS ECU to improve control of the bleed flow, and thus passenger comfort. System operation has definitely improved.

One other fault mode that was identified earlier on (and didn't involve 4001 testing) was associated with a bleed off case in which the HPSOV had small leakage that over-pressurized the downstream valve and triggered a bleed hot caution associated with the high pressure. In short, the downstream shutoff valve did too good of a job. A controlled leak was introduced by drilling a small hole in the downstream valve. This ensured that trapped air did not build up under high pressure.

If you're working too hard to get comfortable, you might want to confirm these service bulletins have been incorporated.

By the way, if you've got cold feet at altitude, you might want to play with those side panel black knobs a little bit. They can pretty well shut off the heat to the cockpit in the wrong position. I've talked to the production test pilots, and their preferred position is with both fully open – that brings lots of air to the cockpit. ■

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DASH 8/Q-SERIES 100/200/300 FLIGHT OPERATIONS SERVICE LETTERS

All published Flight Operations Service Letters are available through the www.iflybombardier.com customer portal.

FOSL	Rev	ATA	SUBJECT
DH8-SL-12-011	B	1230	Best Practices - Taxiing on Slush Covered Surfaces
DH8-SL-21-026	A	2100	Environmental Control System (ECS) Duct Temperature Indicator Fluctuations **(Flight Ops-Related SL)**
DH8-SL-24-0014	--	2449	APU Generator Reliability
DH8-SL-27-012	--	2722	New Rudder Trim Switch Characteristics
DH8-SL-27-013	--	2720	AFM Temporary Amendment – Rudder Actuator Test
DH8-SL-29-002	A	2900	Hydraulic Fluid Transfer **(Flight Ops-Related SL)**
DH8-SL-31-009	--	3150	Caution / Advisory Lights Test
DH8-SL-32-012	--	3260	Landing Gear and Landing Gear Door Anomalies **(Flight Ops-Related SL)**
DH8-SL-32-022	--	3200	Nosewheel Steering **(Flight Ops-Related SL)**
DH8-SL-32-024	B	3240	Approval for Temporary Operation with Worn NLG and MLG Dunlop Tires **(Flight Ops-Related SL)**
DH8-SL-32-026	--	3200	Landing Gear Malfunctions
DH8-SL-32-027	--	3230	Primary and Alternate Gear Downlock Indication
DH8-SL-32-030	A	3200	Landing Gear
DH8-SL-34-022	B	3420	APIRS Latched "Basic" Light Annunciation **(Flight Ops-Related SL)**
DH8-SL-34-025	--	3400	Universal FMS Flight Plan Crossfill Operations
DH8-SL-34-026	--	3460	Universal FMS – Erroneous FMS Operation During a Holding Pattern Course Reversal Approach Transition
DH8-SL-34-027	--	3460	FMS Shutdown Procedure
DH8-SL-49-003	--	4900	APU – Bleed Air and Generator Selection

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Q400 FLIGHT OPERATIONS SERVICE LETTERS

All published Flight Operations Service Letters are available through the www.iflybombardier.com customer portal.

FOSL	Rev	ATA	SUBJECT
DH8400-SL-00-017	A	0000	Correction to QRH Fuselage Fire or Smoke Procedure
DH8400-SL-00-020	--	0000	Q400 Pitch Awareness Training
DH8400-SL-01-001	B	0100	Carry-on Portable Electronic Device (PED)
DH8400-SL-05-002	A	0510	Maximum Operating Speed (Vmo)
DH8400-SL-12-006	--	1200	Pushback from Gate Without Gear Ground Pins Installed and Without Engines Operating
DH8400-SL-12-007	B	1230	Best Practices - Taxiing on Slush covered surfaces
DH8400-SL-20-001	--	2000	Resetting Tripped Circuit Breakers
DH8400-SL-21-002	A	2100	ECS Operational Recommendations
DH8400-SL-21-015	A	2100	Pressure Bumps
DH8400-SL-23-005	A	2311	VHF Communication Radio Bleed through
DH8400-SL-23-006	--	2321	Unilink Alert Inhibit Logic – Radio Altimeter Anomaly
DH8400-SL-23-008	--	2321	VHF Radio Bleed Through
DH8400-SL-23-010	--	2300	ARCDU (P/N CDU3933 AF05)
DH8400-SL-24-002	C	2430	AC and DC Power Generating System Best Practices and Troubleshooting Guidelines
DH8400-SL-24-009	A	2400	Honeywell DC GCU (post mod 4-126424 (Engine 1 and 2 GCU) and mod 4-901699-APU GCU)
DH8400-SL-27-013	B	2751	Flap Control Unit (FCU) Upgrades – Part Number C148674-2-004 and 005
DH8400-SL-27-014	--	2722	New Rudder Trim Switch Characteristics
DH8400-SL-27-015	--	2720	AFM Temporary Amendment #18 – Rudder Actuator Test
DH8400-SL-27-017	--	2700	Powered Flight Control System (PFCS) Indication
DH8400-SL-28-001	--	2840	Intermittent Fuel Quantity Indication
DH8400-SL-29-001	A	2900	Hydraulic Fluid Transfer
DH8400-SL-29-004	--	2910	Propeller Tethering to Prevent Air Ingress in Hydraulic Systems
DH8400-SL-29-007	B	2910	Q400 Hydraulic System Best Practices
DH8400-SL-29-009	--	2921	Hydraulic Power Transfer Unit (PTU) – Start/Stop Logic Change
DH8400-SL-29-010	--	2910	Hydraulics – Engine Driven Pump and PTU
DH8400-SL-29-012	--	2900	Low Pressure in #3 Hydraulic System During Pushback
DH8400-SL-30-004	A	3010	Operation and Maintenance of Airframe De-Icing System
DH8400-SL-30-016	--	3081	Ice Detector Probe – Power Up Self Test

Q400 FLIGHT OPERATIONS SERVICE LETTERS			
All published Flight Operations Service Letters are available through the www.iflybombardier.com customer portal.			
DH8400-SL-30-017	--	3061	Propeller De-ice Nuisance Caution Light
DH8400-SL-31-001	18	3061	Nuisance Caution Light (s) or Advisory Messages
DH8400-SL-31-002	--	3100	Static Air Temperature (SAT) and Outside Air Temp (OAT)Discrepancies
DH8400-SL-31-005	--	3151	PUSHER SYST FAIL Caution Light will Illuminate on Ground, 30 Seconds After Landing
DH8400-SL-31-006	--	3150	Aircraft Flight Manual
DH8400-SL-32-001	--	3200	Ferry Flight with Landing Gear Extended (Doors Open)
DH8400-SL-32-006	B	3240	Approval for Temporary Operation with Worn NLG and MLG Dunlop Tires
DH8400-SL-32-008	--	3251	Q400 Nose Wheel Steering System Overview
DH8400-SL-32-009	--	3200	Q400 Main Landing Gear Accidents
DH8400-SL-32-010	--	3220	Q400 Nose Gear Accident
DH8400-SL-32-011	--	3220	Q400 Airplane Flight Manual Revision 4.21.3 Landing Gear Door Malfunctions
DH8400-SL-32-017	--	3230	Landing Gear Failure to Retract
DH8400-SL-32-018	--	3240	Q400 Brake Wear
DH8400-SL-32-019	--	3230	Primary and Alternate Gear Downlock Indication
DH8400-SL-32-021	B	3260	Introduction of New Proximity Sensor Electronic Unit (PSEU) with Software Logic Upgrade
DH8400-SL-32-022	B	3260	Introduction of New Proximity Sensor Electronic Unit (PSEU) with Software Logic Upgrade
DH8400-SL-32-031	A	3200	Landing Gear
DH8400-SL-34-010	A	3441	Honeywell P660 Weather Radar(WX) – Nuisance Weather Radar – WX FAIL Message
DH8400-SL-34-011	A	3411	Navigation – Pitot Static System – Airspeed Mismatch Events
DH8400-SL-34-012	--	3461	No Entry – Hold Message
DH8400-SL-34-013	--	3400	Ghost or Mirror Image on the Integrated Standby Instrument (ISI)
DH8400-SL-34-014	--	3400	Universal FMS Flight Plan Crossfill Operations
DH8400-SL-34-015	--	3460	Universal FMS – Erroneous FMS Operation During a Holding Pattern Course Reversal Approach Transition
DH8400-SL-34-016	--	3460	FMS Shutdown Procedure
DH8400-SL-49-003	--	4930	APU Fuel Quantity Requirements
DH8400-SL-49-004	--	4900	APU – Bleed Air and Generator Selection
DH8400-SL-52-003	A	5200	Translating Door Dropping – Resetting Procedure
DH8400-SL-52-004	--	5200	Opening and Closing of Translating, Fwd Airstair & Aft Baggage Doors using Internal and External Handles
DH8400-SL-52-006	--	5200	Translating Door Dropping – Resetting Procedure
DH8400-SL-61-003	--	6120	Propeller Beta Schedule and Operational Differences
DH8400-SL-61-006	--	6120	Automatic Underspeed Protection Circuit Activation After Inappropriate CLA Selection During Flight
DH8400-SL-61-007	--	6120	Automatic Underspeed Protection Circuit Activation
DH8400-SL-61-008	B	6120	Propeller Electronic Control Software Upgrades
DH8400-SL-71-003	A	7100	Ground Operating Procedures to Minimise Risk of Engine FOD
DH8400-SL-71-005	--	7100	Propeller/Power Turbine Overspeed Due to Inadvertent CLA Selection
DH8400-SL-71-009	A	7100	Temporary Operating Procedure for Aircraft with Engines Having Compressor Inner Support (CIS) Cracking
DH8400-SL-71-011	--	7100	Powerplant Control with PLA in the Overtravel Range
DH8400-SL-71-012	A	7100	Engine Malfunctions
DH8400-SL-73-002	--	7321	Full Authority Digital Electronic Control (FADEC) Software Modification
DH8400-SL-77-001	B	7700	Fuel Temperature Indication Improvements
DH8400-SL-79-001	--	7930	PW150A Engine Oil Pressure Fluctuations
DH8400-SL-79-002	A	7910	Slow Engine Oil Temperature Warmup
DH8400-SL-79-004	--	7920	Engine Air Cooled Oil Cooler By-Pass Valve – Recommended Operator Actions to Reduce Dispatch Interruptions and Flight Cancellations