

## Majestic Software Dash 8-Q400



## Simulated Delivery and Advanced Tutorial Flight CYZD – KEWR

Revision 2  
24 APRIL 2013

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## CONTENTS

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1. Record of Revisions
2. Change Log
3. List of Abbreviations/Definitions
4. Introduction
5. FSX Setup – Controls and Performance
6. Explanation of Flows
7. Preflight- Weather briefing and route
8. Preflight- Aircraft Loading
9. Preflight – Aircraft Setup, Before Start
10. Startup and Taxi Out
11. Takeoff and Initial Climb
12. Cruise
13. Descent and Approach
14. Landing, After Landing Procedures
15. Shut-down and post flight.
16. Contact Information – Support Forum - Credits

APPENDIX A- Charts for this flight

APPENDIX B- Flows Sheet + Checklists

APPENDIX C- Profiles and Training Maneuvers (RESERVED FOR LATER DATE)



## 1. Record of Revisions

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Rev. No.	Revision Date	Rev. No.	Revision Date
1	4/20/13	8	
2	5/1/13	9	
3		10	
4		11	
5		12	
6		13	
7		14	



## 2. Change Log

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Revision 1 - 4/20/13

First draft completed with pictures/screenshots

Revision 2 – 5/1/13

Added Appendix B- Flows and Checklists adapted to tutorial

Corrected typos, spelling errors

Added Majestic Logo to header

### 3. List of Abbreviations / Definitions

AFCS	Auto Flight Control System	LSK	Line Select Key (FMS) (1R= 1 Right)
AHRS	Attitude/Heading Reference System	MFD	Multi-Function Display
ARCDU	Radio Control Display Unit	NH	High Speed Compressor Indication
CWP	Caution / Warning Panel	PF	Pilot Flying
EADI	Electronic Attitude Direction Indicator	PFCS	Primary Flight Control System
ED	Engine Display	PFD	Primary Flight Display
EPCU	Electronic Power Control Unit	PM	Pilot Monitoring
FD	Flight Director	T/O	Takeoff
FGCP	Flight Guidance Control Panel	ZFM/ZFW	Zero Fuel Weight/Mass
GPU	Ground Power Unit		

## Definitions

**V1:** The highest speed at which the initiation of a takeoff abort must be made. Alternately, the speed above which takeoff can safely be made.

**Vr:** Aircraft Rotation speed

**V2:** Single engine safety speed. Target speed to be achieved by a height of 35ft above the runway following an engine failure.

**Vfri:** “Flap retraction initiation speed” - Speed above which the retraction of the flaps is allowed. When in icing conditions, adjust this speed by increasing Vfri 20kts.

**Vcl:** Minimum climb speed- minimum safe climb speed to be obtained after acceleration altitude (adjusted for icing conditions by adding 20knots). Restrict bank to less than 15° when below this speed. Above this speed, bank angles up to 30° are permissible.

**Icing Conditions:** For ground operations, when OAT is +10°C or below and ground contamination, precipitation, of visibility below 1SM exists. For flight operations, when temperature is below +5°C and below

**Acceleration Altitude:** Specific altitude (usually 1000ft AGL when no obstacles/terrain exist) where the aircraft may safely level and accelerate through Vfri speed, and begin it's final segment climb. (FAR 25)

## 4. Introduction

Welcome to the second simulated delivery flight of Majestic Software's Q400, and congratulations on purchasing one of the most advanced turboprop simulations ever produced for FSX.

This tutorial is aimed at taking you through your "second" first flight with Q400 and familiarizing you with its capabilities, with the focus on standard operations. Using input from my personal real world experience over the last 5 years flying the Q400, this flight will take you in depth into how much this simulation can mirror real-world operations. While this is not a full "operations manual" much like you'd be handed when starting out at an airline, it is chock full of "normal procedures" that can be used on all flights using the Q400.

You should have already read through the systems document contained within the installation folder, as well as performed the first tutorial flight- these will help you locate the many switches and tests that are mentioned within this guide, and familiarize yourself with the general operation of the aircraft. This flight will take you through the first flight of the day checks, flows and checklists. They are adapted from procedures that were used at an airline that used the Q400.

The Q400 is a special type of turboprop that occupies an area of performance that's somewhere between prop and jet: Bombardier designed the aircraft to have jet like performance, but retain the efficiency that turboprops possess, especially on shorter route segments of 300-600nm. You'll find learning this aircraft a challenge, it is quite a busy aircraft despite the automation.



Contained within the Appendices in the back of this tutorial are all the necessary charts to complete the flight, as well as a summary of flows/checklist in an easy-to-print format. Appendix C is where you will find the takeoff and landing "profile" to be flown that will aid in standardizing your takeoffs/landings.

Please note that all of the information contained within this tutorial is mirrored upon only one airline's set of procedures- therefore they may seem awkward at times, particularly in the single-pilot

environment of FSX. There are many operators using the Q400 today, and probably differ in how they do things as well. Remember, there are many ways to skin a cat, and this tutorial outlines just one set of possibilities. Once you gain an understanding of this aircraft, feel free to tweak and change the procedures as you see fit. After all, you don't need FAA/Airline approval to operate as you see fit in FSX.

### Switch/Knob Operation

It is important to mention that during some of the systems tests you will be asked to "press and hold" a switch, while verifying that certain lights/cautions are illuminated. A way to perform this with a mouse is to left-click on the particular button, and drag the mouse away from the button while holding down your finger. You'll notice that the switch in the Q400 will stay depressed and you'll be free to zoom/out and look for the various lights.

Knobs in the Q400 can be rotated by using the middle mouse wheel- upper motions move a wheel clockwise, and lower motions move the mouse counter-clockwise.



## 5. FSX Setup – Controls + Performance

To get the most out of your Q400 aircraft, I recommend running through the control panel included with the Q400 installation, as it includes an interface with which to calibrate your hardware flight controls. It also will set up the basic options such as weight units, performance tuning, and an aircraft loading utility that will become useful later in the tutorial. You'll notice upon first inspection that the Q400 is not a conventional turboprop- the power quadrant only includes four levers- 2 power levers and 2 prop levers, which also function as a "fuel on/off" switch.

Let's open up the Control Panel. You'll find it in your aircraft folder (Microsoft Flight Simulator X/SimObjects/Airplanes/Mjc8Q400/cpan) as cpan.exe.



### 1. Units

On the EFIS tab you'll see a variety of options concerning metric/imperial units based upon where the aircraft is used. Since we're simulating the delivery of a Q400 to a US-based carrier, we'll check of Lbs for the weight, In (inches) for the pressure unit. Graphics can be up to you based on the strength of your system. I'm using a pretty standard quad core 2600k overclocked to 4.6Ghz, and experience very good performance even at high quality and refresh rate.





## 2. System Performance Tuning

This might be a little less obvious to users as to its function. The Q400 simulation on installation on your computer right now actually doesn't use the FSX engine for most of the aerodynamic and simulation computation. It uses an external flight dynamics engine called Jsbsim, which is based on NASA's LARCSIM flight dynamics engine. This engine was famously used for the testing of their X-series test planes.

Because of this new and revolutionary way of designing for FSX, the Q400 is able to accurately reproduce the flight dynamics that occur on the real aircraft. You will notice that this sim does not have the "problems" that are inherent with most FSX turboprop simulation (for example, runaway taxi).

According to the documentation, the timing source deals with how the Jsbsim simulator engine processes these information "events" from FSX. The Queue timer is thought to be more precise, while the multimedia is less- however I personally have not noticed a difference between the two on my system.

The FDE is the "flight dynamics engine" sync process. If you have your simulator locked to a particular frame rate, set this to "ENABLE" – if you have unlimited frame rates set, select "DISABLE" as the framerates can fluctuate causing pauses to occur in the sim engine.



Another final tip suggested by one of the beta testers if you experience timing-pauses- as if someone has stopped your aircraft midflight and let it continue- was to set your affinity mask to either 5 or 6, freeing up a process thread for the external Jsbsim simulator engine. I'm not quite clear on this whole thing, as I'm just a pilot. But in a manual update I'll provide more information!

### 3. Flight Controls Setup

The Flight Controls page easily allows us to calibrate the Q400s flight controls with our hardware setup. Provided you've used either the FSX control axis assignments or FSUIPC, the control panel will recognize those basic assignments. You can even set a "center" where the controls will have 0 deflection. Use this page to test full deflection as well.



**MJC8 Q400 CONTROL PANEL**

MANUAL PRODUCT PAGE ACCOUNT INFO

HOME EFIS SYSTEM **FLIGHT CONTROLS** ENGINE CONTROLS SOUND WEIGHT & BALANCE

ELEVATORS:  POSITION:  SENSITIVITY:  CENTER:   
OUTPUT INPUT

AILERONS:  POSITION:  SENSITIVITY:  CENTER:   
OUTPUT INPUT

RUDDER:  POSITION:  SENSITIVITY:  CENTER:   
OUTPUT INPUT

TILLER:  POSITION:  SENSITIVITY:  CENTER:   
OUTPUT INPUT

BRAKE LEFT:  POSITION:  ON:  OFF:   
OUTPUT INPUT

BRAKE RIGHT:  POSITION:  ON:  OFF:   
OUTPUT INPUT

STEERING CONTROL MODE: ☐ MOUSE ONLY  
☒ AILERONS+MOUSE  
☐ SPOILER AXIS

APPLY \*RELOAD THE AIRCRAFT TO ACTIVATE THE CHANGES

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The steering control mode allows us to choose how we will control the steering tiller. Like the real aircraft, the rudder pedals only give us up to 8° of nosewheel movement for taxi, which is useful for straightaway segments, but to make large turns we need to make use of the tiller located by the captain's lower left knee.

You can select how to control the tiller- or have the control mapped to either the AILERON or SPOILER axis of your hardware.

#### 4. Engine Controls Setup



This page is much like the flight controls, however you have to make some important settings here. Most home-use FS hardware do not contain multiple gates/detents, however the Q400 has 3. You'll notice as you move your levers back and fourth, the "position" value changes- this is what the sim is reading from your hardware. To set positions, set your hardware levers to where you want the indicated detents to be, and copy the value from the "position window" into the "output" window adjacent the setting. For example, I would put my power levers to where I wanted the takeoff "DETENT" to be, read the value shown in "POSITION" and insert that value into the "output" window.

##### Power Levers

REVERSE: Point at which max reverse power is produced  
 DISC: Point at which propellers are nearly "flat" against the direction of travel/airstream. Consider this the "ground idle" where no thrust is being produced.

-the range between DISC and IDLE is roughly your "beta" taxi thrust regime, so decide how large you want this to be-

**IDLE:** Minimum thrust in-flight. While flying, do not go below this point. The real Q400 has a gate where levers must be lifted for travel below this range. Most Flightsim hardware do not have a detent/gate here, so set it where you like. In the sim you'll here a clicking/gate sound as you pass over it. Bringing power levers below this point in-flight will cause a "bird sound" alarm to warn you of the misconfiguration.

**DETENT:** Takeoff power detent. This is a point where the power matches the current engine rating set on the engine control panel. The power will be set for whatever the carat shows on the engine display.

**MAX:** Over travel area- produces up to 125% torque in case of emergency. I found this difficult to set as I was always forgetting it's location on my hardware levers and overshooting. Therefore, I set this to a number my hardware can't achieve, thus taking it out of play.

##### Condition Levers

**OFF:** Set this Bottom of your hardware range

**START:** Set this to where you want the point where fuel is introduced.

**MIN:** 850 RPM cruise setting; I have this at the lower detent of my hardware to prevent inadvertent fuel shutoff/shutdown.

**900:** 900 RPM setting for climb

**MAX:** 1020 RPM setting for takeoff.

## 6. Explanation of Flows

You may have heard the term “flow” thrown around before- it’s fairly commonplace in the airline environment. Procedures aren’t completed using only a checklist in a read-and-do fashion- this would cause much heads-down time reading and checking. Because we’re normally a two-person crew, procedures have been designed to be accomplished at first without reference to a checklist, in a logical order. This is a “flow.” Then, the checklist is used to check that the items have been accomplished, and because they WERE already accomplished, the checklist is accomplished faster. Imagine without flows, one would constantly interrupt their checklist in order to flip a switch, turn a knob, etc, and then have to visually come back to their place on the checklist.

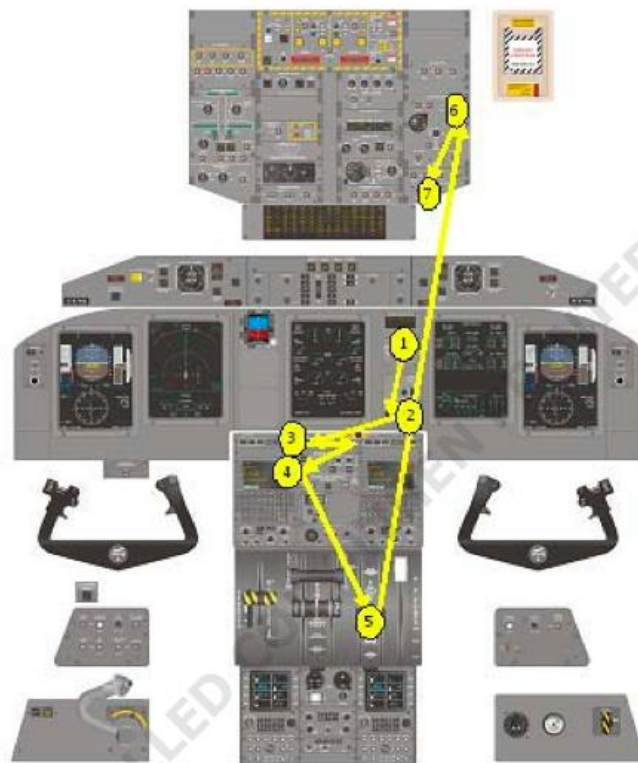
Periodically, I’ll refer to a flow within this tutorial. When I flew the Q400, I had to commit these to memory. Try them out- they’ll decrease your “heads-down” time looking at a checklist, and redirect your attention to flying the airplane. Of course, with some of the flows I’ll give you, you’ll need to combine both the captain + first officer duties since you’re flying single pilot.

Feel free to create your own flows if they work better with your type of flying. The ones listed here are just a “suggestion.”

Here’s an example of a before landing flow- the pilot monitoring would perform this on the “gear down” command given by the pilot flying. After the gear handle is lowered, you’d turn on the AUX pumps, select Reduced RPM landing, bring the condition levers to MAX, bleeds to min, and ding the flight attendants. Then, the checklist would be referenced to “check” that the items were done.

Flows can be drawn out visually on a cockpit depiction, for our visual learners. For auditory learners, feel free to hear me read the flows to you in a sultry voice by calling 1-800-992-7433\*.

An example flow “chart” from a mystery airline operator of a Q400:





## 7. Preflight- Weather Briefing and Route

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For today's delivery flight we're using the real world weather conditions that existed when I performed the flight for this tutorial- The zulu date was March 20<sup>th</sup> 2013, at around 0400z. Of course, your author lives in Hawaii and this works out to be 6pm local time- during waking hours for me. Inside FSX I had the time set to 7am local. Not exactly realistic, however doing a morning delivery flight "at the correct time" would have me awake at some ungodly hours.

Feel free to use whatever external weather generation software you like- it may change the departure/arrival runways at Downsview and Newark, and whether or not you get icing. The Majestic website should have a zip file containing the FSX saved WX files when I performed the flight.

The weather for the flight is mixed IFR/VFR. Currently in Canada at Downsview, we have light snow showers (interpolated from the weather stations CYYZ and CYTZ (Pearson Intl and City Centre) with fair visibility, and as the flight progresses the weather improves as well. VFR is expected in Newark, however the winds are gusting from the southwest. Enroute icing is expected.

```
CYYZ 200400Z 27012G17KT 15SM BKN023 OVC050 M04/M08 A2980 RMK SF7ST0 SLP100
```

```
TAF CYYZ 200238Z 2003/2106 25012KT P6SM SCT020 BKN040 BKN100  
TEMPO 2003/2006 P6SM -SHSN OVC020  
BECMG 2010/2012 25010KT  
FM201500 26012G22KT P6SM BKN030  
TEMPO 2015/2021 3SM -SHSN  
BECMG 2022/2024 25012KT RMK NXT FCST BY 200600Z
```

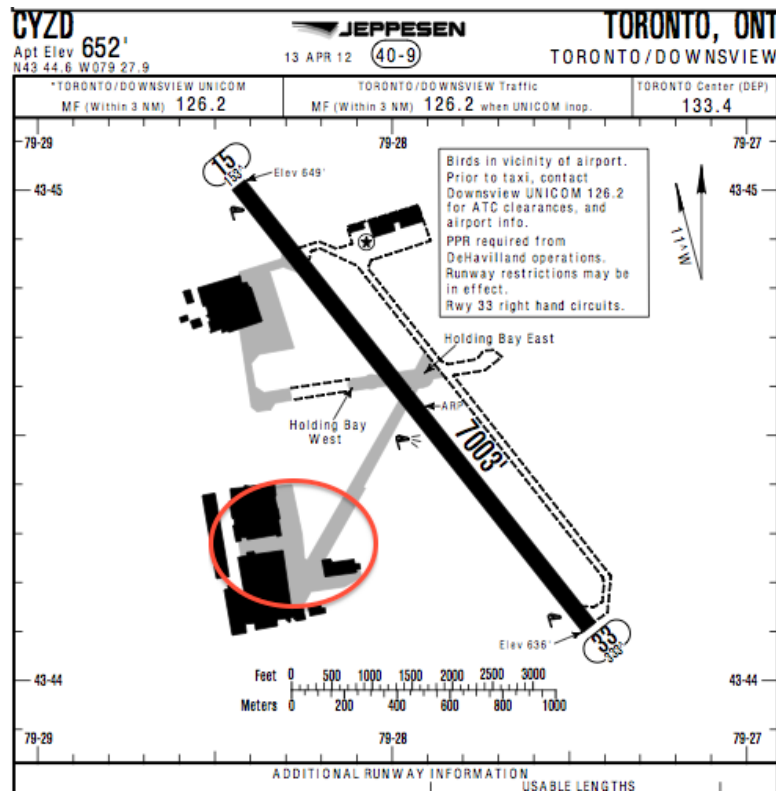
```
CYTZ 200455Z AUTO 27015G20KT 6SM -SN OVC041 M03/M07 A2982 RMK MAX WND 26023KT AT 0444Z  
SLP101
```

```
TAF CYTZ 200138Z 2002/2102 26015KT P6SM FEW015 BKN060 BKN100  
TEMPO 2002/2005 5SM -SHSN BKN015 OVC050
```

```
KEWR 200451Z 27015G21KT 10SM FEW090 03/M09 A2983 RMK AO2 SLP101 T00281094 400830017
```

```
KEWR 200215Z 2002/2106 32014G24KT P6SM FEW040 SCT100  
FM200400 29014G24KT P6SM FEW040 SCT100  
FM201600 28018G29KT P6SM SCT050  
FM202300 28010KT P6SM BKN060
```

We're starting out on the ramp where the Bombardier Q400 finishing facility is located, and will be departing on runway 33.



This corresponds to "Gate 2- GA Small" in my the FSX airport selection menu (If you select gate 1, you'll have no room to use the pushback utility). Set time to about 8am- you don't want to be in the dark the first time flying any new airplane!



The routing we dispatch has planned for us and expect from ATC:

YYZ..V252.GEE.SHAFF7

Fairly simple- although after departure due to the busy airspace at Pearson we can probably expect to be vectored to the first fix, BULGE.



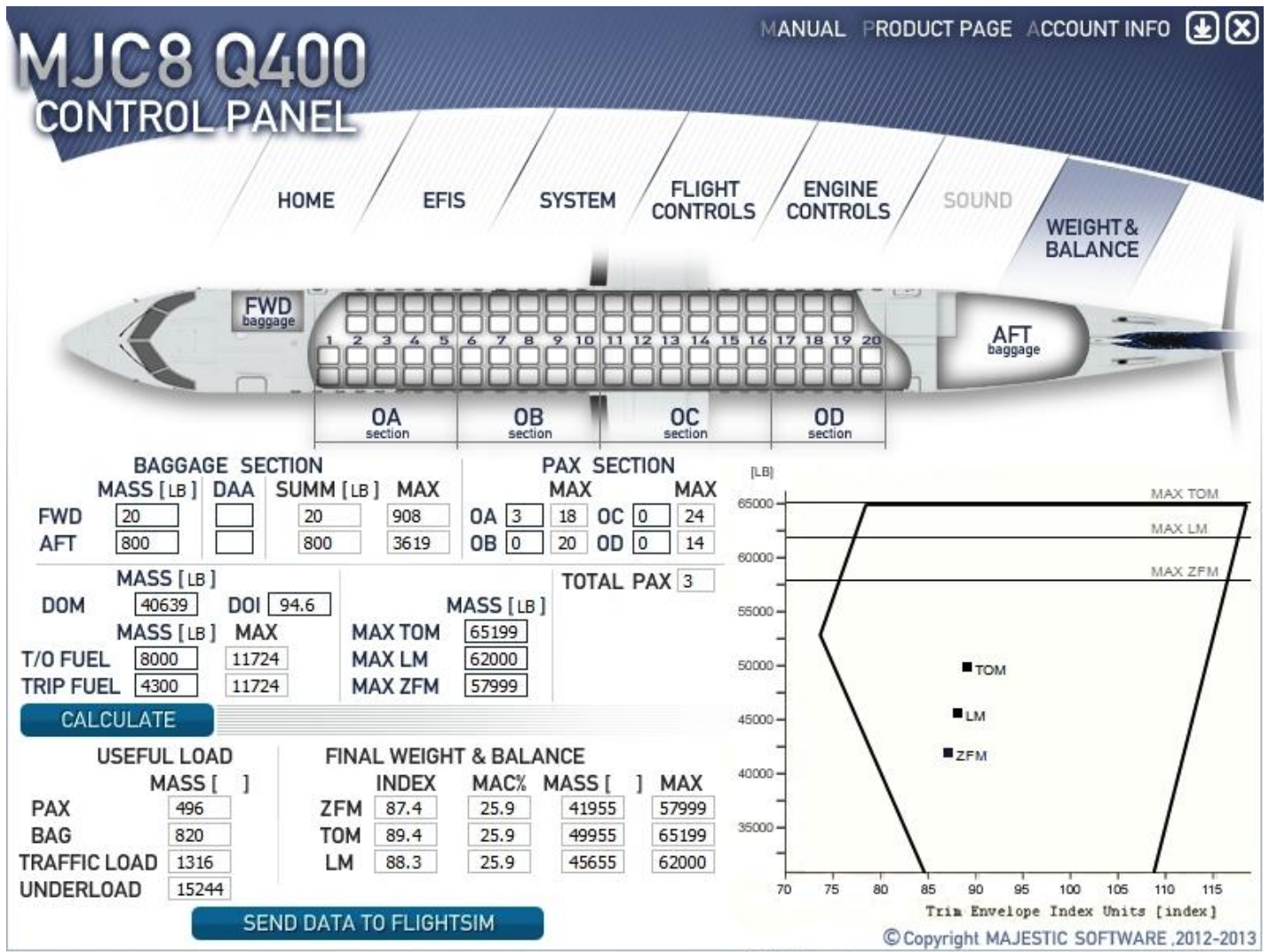
Let's head outside to the aircraft, load up with our equipment and personnel, and bring this aircraft home.

## 8. Preflight- Aircraft Loading

Since this is a delivery flight, we won't have much on board, however we will be taking a few maintenance people as well as a bombardier rep, to make sure the delivery goes well.

With flight simulator started, minimize the FS window and go back to the control panel. The panel is designed so that you can change the weight and balance from this dialogue in real-time. Once you press "SEND DATA TO FLIGHTSIM" FSX will pause and actualize with the new flight data.

We're using pounds (Lbs) as the unit, and you can see that we've accounted for 20lbs in the forward cargo, 800lbs in the aft, as well as our 3 ride-alongs in section A.



**MJC8 Q400 CONTROL PANEL**

MANUAL PRODUCT PAGE ACCOUNT INFO

HOME EFIS SYSTEM FLIGHT CONTROLS ENGINE CONTROLS SOUND **WEIGHT & BALANCE**

FWD baggage AFT baggage

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

OA section OB section OC section OD section

BAGGAGE SECTION				PAX SECTION			
	MASS [LB]	DAA	SUMM [LB]	MAX		MAX	MAX
FWD	20		20	908	OA 3	18	OC 0 24
AFT	800		800	3619	OB 0	20	OD 0 14

DOM MASS [LB] 40639 DOI 94.6

T/O FUEL MASS [LB] 8000 MAX 11724

TRIP FUEL MASS [LB] 4300 MAX 11724

MASS [LB] MAX TOM 65199

MAX LM 62000

MAX ZFM 57999

TOTAL PAX 3

**CALCULATE**

USEFUL LOAD		FINAL WEIGHT & BALANCE			
	MASS [ ]	INDEX	MAC%	MASS [ ]	MAX
PAX	496	ZFM 87.4	25.9	41955	57999
BAG	820	TOM 89.4	25.9	49955	65199
TRAFFIC LOAD	1316	LM 88.3	25.9	45655	62000
UNDERLOAD	15244				

**SEND DATA TO FLIGHTSIM**

Trim Envelope Index Units [index]

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**NOTE:** It is important to note the ZFM (Zero Fuel Mass) here- we're going to use it at a later stage in the tutorial



**ALSO NOTE:** Q400 engineers designed the aircraft so that a properly balanced aircraft (within the envelope above) will only need to be trimmed to within the white arc of the trim control.

## 9. Preflight- Aircraft Setup / Before Start




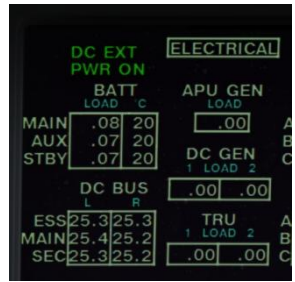

Our new Q400 sits out on the ramp, “cold and dark.” Before we do our external walk around, we’ll start inside with a simple power up flow to make sure the aircraft’s computers are working properly. This is a very electrically sensitive airplane, and whenever electricity is added to the aircraft, many systems go through a power up check to verify integrity for flight.



**NOTE:** You can make the yoke disappear (to aid in viewing the PFD/MFD displays) by clicking on its base

<b>Aircraft Power up</b> 1. Circuit Breakers.....CHECKED Check behind the Captain/FOs seat for any popped breakers	
2. Gear Lever.....DOWN	
3. Radar.....OFF The radar is located at the base of the middle pedestal- for the safety of the ground crew, check that it is “off” before powering up the batteries.	
4. Battery Master / Main / Aux Standby Switches.....ON It is important to turn the batteries on in the following sequence: 1) Battery Master 2) Main Battery 3) Aux Battery 4) Standby Battery When turning them off, use the opposite order.  If you are using external power, these may all be switched off AFTER switching to the external battery source. This helps protect the batteries from depleting while the ground power unit is in use.	



5. Main Bus Tie.....TIE	
6. Position Lights.....ON	
7. Flight Deck Displays.....ON The knobs may be tricky to find , the engine display	
8. STBY/PTU Pumps.....CHECK OFF Ensure that the Standby and PTU pump buttons are not depressed (OUT)- with no AC power on the aircraft, they will not illuminate even when depressed.	
9. Emergency Brake.....PARK	
10. EXT PWR/APU .....ON Using GPU: The Q400's ground power unit can be called up by pressing "DATA" on the FMS, and then selecting "SERVICES." The GPU should be available on the menu with the engines shut down and parking brakes parked. After selecting the EXT PWR switch to ON, you should see DC EXT PWR ON displayed on the electrical systems page. CHECK that the bus voltage is at least 24.5v for satisfactory GPU power.  Once GPU power is established, turn the batteries OFF to protect them from GPU surges, or in the case of a weak GPU, the batteries "discharging" into the GPU.  APU Use: Flow from left-to-right. Upon pushing the PWR button, the APU will flash and perform a self-test. Once this is complete, perform the APU FIRE TEST to check that the APU fuel valve closes and the lights illuminate (pictured right). Depress the START button. After a few seconds the panel will go blank, and you will see "RUN" indicating the APU is ready for bleed/DC GEN use. Pressing the GEN switchlight will "arm" the APUs DC generator- it will only bring the generator online if the external power switch is off- this is due to the aircraft's EPCU logic. HOWEVER- keep the GEN switchlight depressed during APU operation in case the GPU fails somehow. If the GPU	  

power is interrupted, the APU's generator will automatically kick in.

A lot of operators in the summertime like to use the bleed air from the APU, while using an external GPU for ground power. This extends the life of the APU. Apropos service life- real life operators also recommend waiting 1 minute after APU start before selecting APU GEN to on, or using APU bleed air on. The same thing applies when powering down- allow a 1 minute cool down with no load on the APU- that is, GEN and BL AIR off.

NOTE: For APU bleed air to function, engine bleed switches MUST be off.



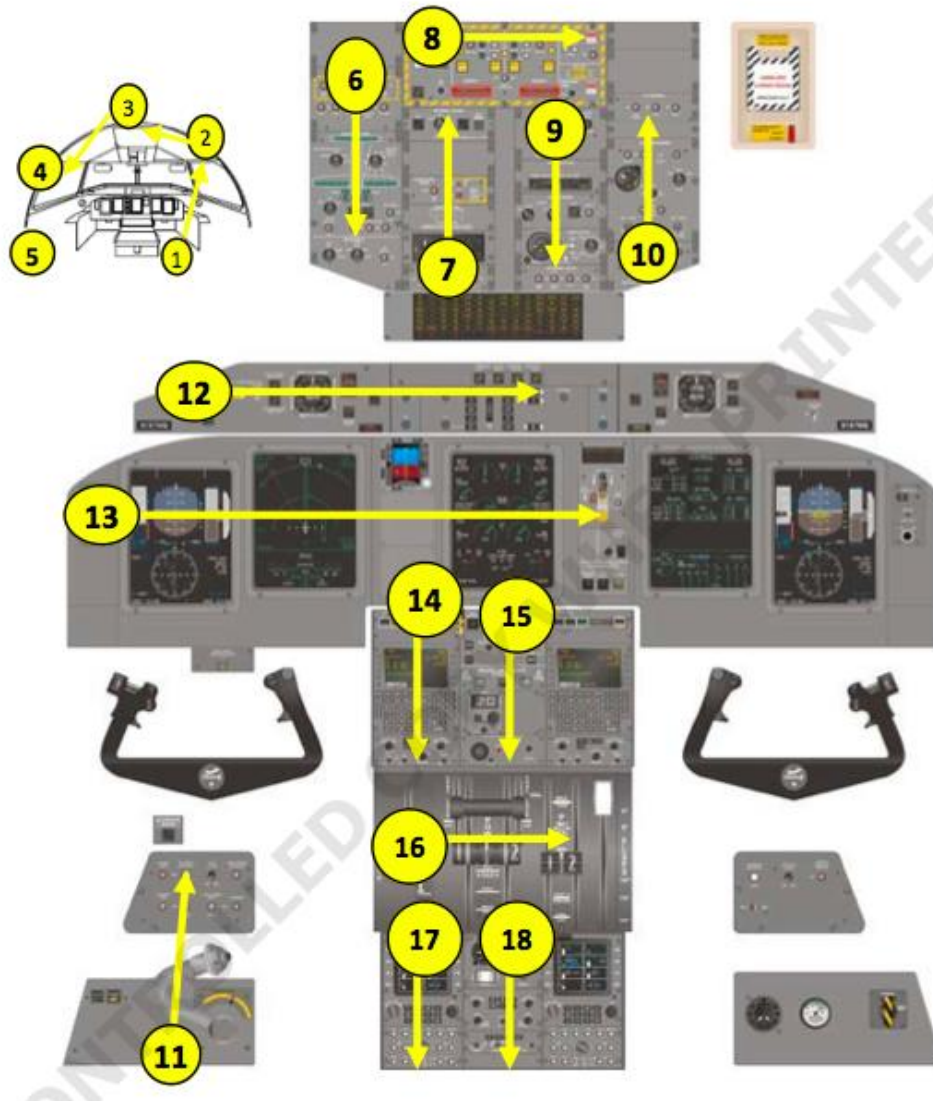
#### 11. FMS..... Initialize

The FMS will run through its startup tests. Ensure that PASSED is displayed in all fields. Confirm the currency date of the NAV database, as well as the current GPS position with current reference materials. For our parking position in Downsvew, it should be very close to what's pictured at right. You'll notice I'm using an out-of-date nav database. You can update yours using the Q400 user's guide and downloading the FeelThere/Wilco 737 NavData update from commercial sites. From what I've heard, the NavData site will soon be providing a Q400 tailored installer.








Now that the aircraft is powered, we'll perform a simple panel scan called the "originating flow." This will ensure that all switches are in their correct positions prior to startup. It also allows us to run through some systems tests to ensure everything is running within parameters. You'll notice that this is divided into a Captain's Originating check, as well as an FO's Originating check. If you are alone, I suggest just performing the captain's first, then proceeding to the FO's.

#### Captain's Originating Check:



This flow is organized to be easily remembered- the first few times you set up the cockpit and use this guide, it will take a very long time to get through it, however you'll notice that with practice you'll be able to soon walk into the cockpit and perform this flow quickly and efficiently.



<p>1. Landing Gear Alternate Extension Door.....OPEN/CHECK/CLOSE This door is located on the floor. Open to check the illumination of the 3 LED gear position indication lights (you'll notice the switch for the LEDs is right next to the green lights). Make sure all 3 illuminate green- this is a backup indicator in case of gear problems. Don't forget to close the release door when finished.</p> <p>NOTE: Green LEDs are NOT simulated in the PILOT version of this software.</p>	
<p>2. Landing Gear Alternate Release Door.....CLOSED/NORMAL This is located on the top of the cockpit- Ensure that this door is closed, and that the inhibit switch is in the normal position, and guarded as shown. During a normal "first flight of the day" preflight, the FO would normally open this to pull the gear release doors for inspection- if you forget to close this, the gear won't retract after takeoff! This has never happened to me...</p>	
<p>3. Escape Hatch..... CHECK CLOSED Ensure that the handle is fully right. The real-world hatch door was difficult to replace once removed. I experienced the same with the sim version. ☺ Don't mess with it. Is it closed? Yes. Leave it alone.</p>	
<p>4. Oxygen Masks.....CHECK Check the connection hoses to the O2 masks- you should see a green band indicating normal pressure.</p>	
<p>5. Demisters / Side Vent..... CHECK OPEN Although you won't notice this in the sim, these need to be open for proper temperature control within the cabin/flight deck. It's a peculiarity of the aircraft.</p>	

## 6. Overhead Panel 1

DC Control Panel

Battery Switches.....AS REQUIRED

-GPU Operations: all off

-APU Operations: all on

DC GEN 1 + 2 Switches....ON

Main Bus tie.....TIE

Ice Protection Panel

Airframe Mode Select.....OFF

Engine Intake Doors.....CLOSED

REF Speed Switch.....OFF

Pitot Static Switches.... ALL OFF

Propeller Ice Protection..... OFF

BOOT AIR switch..... NORM

NOTE: Never turn on the REF Speed Switch on during ground operations. If you forget and takeoff with it on, you'll most likely get an inadvertent stall warning after takeoff.

Windshield Panel

Windshield heat ..... OFF

Wiper..... OFF

Plt side wdo/ht.....OFF



## 7. Overhead Panel 2

Exterior Lights Panel

Approach/Flare/Taxi Lights.....OFF

PFD Altimeter units..... AS REQUIRED  
-set for the particular operation.

NOTE: some countries reference altitude in meters.

Flight Data RCDR Panel

ELT.....ARMED

FLT DATA RCDR switch.....NORM

Place switch momentarily in GND Test and observe that the FDR caution light extinguishes.



## 8. Fire Protection Panel

Pull Fuel/HYD off handles.....CHECK IN

Ensure that the handles are in, the green FUEL and HYD lights are illuminated indicating the respective shutoff valves are open, and any extinguisher armed and bottle-low lights are extinguished.

Engine/Cargo Fire Tests

Engine 1/2 Detection switch.....HOLD

Observe the respective handle illuminate, in addition to:

- Master Warning
- Fire Bell Sound
- Fault A/B illumination

Baggage AFT Test Switch 1/2 ..... HOLD

There are two smoke detectors in the AFT baggage compartment, which is why we have two positions for this switch. Observe the illumination of the VENT VALVE closed lights, the fire bottle LOW light, as well as the extinguisher light. Master Warning tone sounds and lightswitch illuminate.

Baggage FWD Test Switch.....HOLD



## 9. Overhead Panel 3

Panel Lighting

As required. Note that you need secondary bus power for the dome lights to function (APU Gen, External power, or two engine DC generators)

APU Panel

Check APU Switchlights are set for desired operation. TIP: When using external power alongside the APU for bleed air, keep the GEN switch depressed. Even though the APU generator is not being used, it will “back you up” with power in case the GPU fails. You can probably guess this has happened to me a few times.

Engine Start Panel

Check ignition switches are in NORM, and the SELECT switch is centered.

Pressurization Panel

Check the MAN/DUMP switch is in AUTO (down), the FWD OUTFLOW knob is fully counter-clockwise, FAULT is not illuminated, and the landing altitude of our destination airport is set. (If we needed to return to Downsvew immediately, we wouldn’t need to worry about resetting this, as the aircraft has a “takeoff memory function” that preserves the field elevation for 10 minutes).

Exterior Lights

As required. Position lights should always be left on. This will indicated to the ground crew if the aircraft is powered- and has saved many a captain when they forgot to turn off the aircraft batteries at the end of the day!





## 10. Overhead Panel 4

Emergency Lights.....ARM  
 Fasten Belts Switch.....ON  
 No Smoking Switch.....ON  
 (in some aircraft, the “turn electronic devices off” light)

TEST Caution/Advsy.....TEST  
 The “Christmas Tree” test, will illuminate all the lights in the cockpit, as well as the caution/warning panel. You’ll also hear the master warning.

Caution Test:



Advisory Test:



#### Air Conditioning Panel

Pack Switches.....AUTO  
 RECIRC Switch.....ON  
 Bleed 1 + 2.....OFF  
 Bleed Flow Controller.....MIN

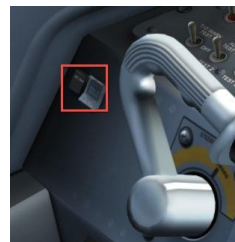
#### AC Control Panel

AC Gen Switches.....ON  
 AC External Power.....OFF



## 11. Captain’s Side Panel

EGPWS Flaps Override.....NORMAL  
 (This switch is “hidden” right below the steering tiller)



**ADC 1 + 2 TEST.....PERFORM**

Push and hold the ADC test switch in either 1 or 2.  
Check the respective indications:

- Altimeter reads 14,360
- Baro setting reads 29.23
- Airspeed reads 285, with the Vmo tape reading 284
- SAT Temp indicates -15°C and WTG2/1 FAIL appears on ED
- IAS / IAS MISMATCH and ALT appear on PFDs
- PITCH TRIM, ELEVATOR FEEL, and AVIONICS caution illuminate
- Overspeed warning horn activates

**STALL WARNING TEST.....Perform**

Press and release stall test 1 or 2.

Stick Shaker will activate and:

- #1 STALL SYST FAIL and PUSHER SYST FAIL caution lights will illuminate.
- #2 STALL SYST FAIL and and PUSHER SYST FAIL illuminates with a test 2.

**NOSEWHEEL STEERING SWITCH.....OFF**

make sure this is off until the airplane is ready for taxi, and all ground crew is clear. Leaving on during start can cause injury to ground crew operating the push tug.

**12. Glareshield**

Flight/Taxi Switch.....TAXI

Stick Pusher/Elev Trim Shutoffs.....CHECK  
(These should not be illuminated)

Clock..... CHECK

Powered Flight Control Shutoffs

Check none illuminated, and the switchlights are in the "out" position.

Flight Guidance Control Panel.....CHECK

-HSI SEL.....Set to pilot flying side

-Yaw Damper.....ON

-Nav Source Selection Knob.....AS REQUIRED

FMS departures will be performed "purple needles"  
and raw-data departures performed "blue needles."





## 13. Instrument Panels

Here we can set our V-speeds. Using the Speed card document in the DOC folder, we find that are V-speeds are (our weight currently is 49955lbs):

Set Index Control Panel (V-speeds)

- Set V1, Vr, V2, = 119, 119, 122
- Set Solid Bug is Vfr- the speed above which it is safe to begin flap retraction
  - Outline Bug is Vclimb, which is our minimum clean climb speed. It also serves as our single-engine best rate of climb speed should we loose an engine after V1.
- ICING: If departing into icing conditions, bump Vfr/Vclimb up by 20kts
- MDA: use this to set the acceleration altitude. In our case at Downsview it is 1652. Set 1660.

Pitot-Static Isolation Switch.....NORMAL  
(hides below the PFD)

Integrated Standby Instrument.....CHECK  
Set Altimeter, verify no flags

Landing Gear Lever.....CHECK  
Check in the down position, test the gear warning horn.

GPWS LANDING SELECTOR.....CHECK  
Switch to the “emergency return” flap setting to be expected

Hydraulic Control Panel.....CHECK  
Check switches aren’t depressed. Also cross check the systems panel to ensure adequate hydraulic quantity.



## 14. Center Pedestal

AHRS Panel.....CHECK  
Check that nothing is illuminated in this panel

Pitch/Roll Disconnect Handles.....IN



## 15. Center Pedestal

Fuel Control Panel.....CHECK  
Ensure that both TANK AUX pump switches are off,  
Ensure the transfer switch is centered

Propeller Control .....CHECK  
Check Autofeather switch is off, ALT FTHR switches off..



**AUTOFEATHER TEST.... Perform**

This tests the logic of the autofeather system. Use the following procedure:

- Power Levers.....DISC
- Condition Levers.... FUEL OFF
- Autofeather Switch.....SELECT

Observe the following on the ED:

- A/F TEST IN PROG displayed
- UPTRIM appears
- ITT and NH red radials increase
- A/F TEST PASS appears at the conclusion of the test
- Autofeather Switch.....OFF

**16. Power Quadrant**

Emergency Brake.....AS REQ'D

Check to make sure you have adequate parking brake pressure. 500psi was the minimum for starting engines at the parking spot.

Control Lock.....ENGAGE

(prevents wind gust damage and inadvertent T/O power selection)

Power Levers.....DISC

Condition Levers.....FUEL OFF

**17. ARCDU .....CHECK**

Set radios for departure, volumes.

EFIS Display setup- DOORS + Electrical Page

**18. Trims .....TEST**

Test elevator trim operation through the entire range. You'll hear a chirping sound after 3 seconds of trim operations, as well as an illuminated "pitch off" light. This is normal. Some pilots like to push this switch to test the pitch-trim cutout function to ensure its operation.

**WARNING:**

For testing the aileron trim, ensure the control lock is OFF to prevent damage to the control bell-housing.'

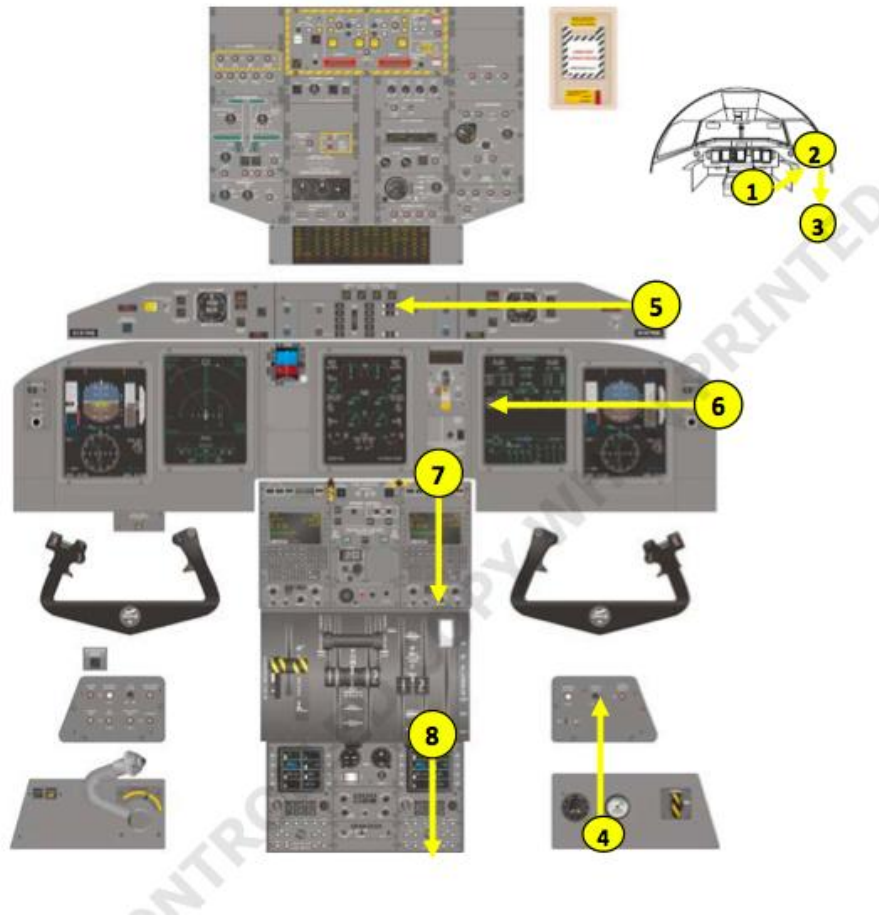
EFIS CONTROL PANEL..... AS REQUIRED

At my company, we set the Captain's screen to the doors, and the FOs to the electrical page, to monitor cargo loading and if the GPU died on us. Note that the default page when SYS is selected is electrical.

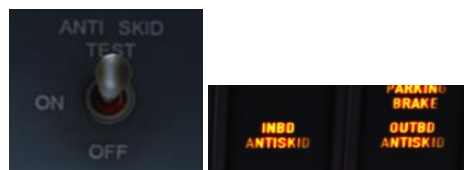





### First Officer's Originating Check Flow

You'll notice that this is shorter, but covers the FOs side of things



1. ATIS.....COPY
2. Oxygen Masks.....CHECK
3. Circuit Breakers.....CHECK
4. FO Side Panel.....CHECK  
Ensure that the FWD outflow valve is guarded and closed.  
  
Check the Oxygen pressure is adequate for flight.
5. FO Glareshield  
Anti Skid switch.....TESTED / ON  
Test the anti-skid system. You should see the INBD/OBD Antiskid cautions illuminate and then extinguish, signifying a normal test.



<p>EGPWS.....TESTED</p> <p>Press the GPWS button to have the ground proximity warning system go through its self test. Pushing the button for more than a second will cause it to go through the long self-test. If you do this, go out for lunch and it will be finished by the time you return, I promise.</p>	
<p>6. Flight Instruments.....SET</p> <p>Set the V speeds, barometer setting, acceleration height as discussed in the captain's originating flow.</p>	
<p>7. Center Pedestal.....CHECK</p> <p>AHRS.....CHECK</p> <p>Check no lights on this panel</p> <p>Terrain/WX Mode.....AS DESIRED</p>	
<p>8. ARCDU/RADIOS/RADAR.....ON/SET/TEST</p> <p>Set Radios for departure</p> <p>Radar Test: Turn the radar knob to "TEST" - after a brief delay a multi-colored test pattern will be displayed on the MFD. Make sure your WX/TERR button on the EFIS display panel is selected to WX.</p> <p>TCAS Test: On the ARCDU, click first on the select button adjacent the transponder code, and then on EXP (expanded). You'll see the option to "test" in the upper right hand corner.</p> 	<p>Radar Test Picture</p>  

Now that we're powered up, and the cockpit is set up, let's talk about the details of our flight to Newark.

Downsview doesn't have control tower. In order to get our clearance to Newark, we have to call up Toronto terminal control on 133.4 for our IFR clearance. We've advised them we'll be departing from runway 33 within the next 20 minutes.

"Bombardier 3200, cleared to the Newark airport, depart via heading 360, vectors on course, then as filed. Climb and maintain 3000ft. Departure frequency is 133.4, squawk 2315. Hold for release."

That "hold for release" means we're not allowed to takeoff yet, however based upon coordination with arriving traffic at Pearson.

With that in mind, let's set up the FMS with our route...

To refresh our memory, the routing given to us by dispatch was:

YYZ..V252.GEE.SHAFF7

We'll start by going to the Flight Plan page by pressing FPL. Start the route by entering the departure and destination airports. You'll notice that there's a confirmation screen with LAT/LONG- this can be useful to avoid confusion between navaids that have the same identifiers. Simply press ENTER to accept, and it will be inserted into the flightplan.



Confirmation Screen:



Once we have our departure/destination airports, we can start building our route. Since there is no Standard Instrument Departure (SID) out of Downsview, putting in the departure runway has no effect on the route depiction on the MFD.

If there was a SID, you'd simply press the MENU key while on the flight plan page. Select the runway for departure by entering its line number in the white field. For airports with SIDs, the departures would then be displayed as a list on the left hand side.





Our route will start at the YYZ VOR. Of course, we know in reality that we won't fly over Toronto Airport- However ATC gives us this waypoint as an anchor point for V252.

Highlight KEWR by pressing LSK 2L and enter YYZ . After the normal confirmation page, you'll see it entered right above KEWR.



To get V252, make sure the next waypoint is highlighted (in this case, KEWR) and press the LIST key.

LIST gives you options for inserting different waypoints, airports, as well as airways. LSK 2R gives us the airways option. You'll see a whole list of airways leading from YYZ. Sometimes this will be spread over a few pages. Enter the number for V252 (in my AIRAC cycle 1304, it's #15 on page 3) and press enter.

The next screen will have you define where you want to end V252. In our flight plan, GEE will end it. Pressing enter brings us back to the flightplan, and you'll notice that we're now on page 3 of the flightplan- all the waypoints on V252 from YYZ to GEE have been added.



Since we can expect a standard arrival into Newark, let's input the STAR SHAFF7. After pressing the MENU key again, select ARRIVE at LSK 4R.

Checking the weather at Newark, it looks like they are in a "south flow" today- that is, landing on 22L and departing on 22R. Select 22L by plugging 5 into the runway field. Then, select SHAFF 7 by plugging in #7 to the white open field. You will be then asked if you'd like to attach a transition, and in fact we would- we're joining the SHAFF7 at Geneseo (GEE) VOR. Select #3 into this field. Finally, select the ILS 22L, with the PATRN transition (although selecting a transition is not necessary, we're sometimes given "direct TEB" before joining the ILS, and adding in PATRN includes TEB.

Insert a GAP after SAX, to account for some vectors to the final approach course. Once again we do this from the LIST page using LSK 3R. Select "GAP" using LSK 3R



Now that our flight plan is finished, we're not done yet! The universal FMS includes a basic performance computer that keeps us updated on our current weight/fuel status. Press the FUEL key.

There are many different ways to use this- you'll see places to input passengers (as well as adjust standard weights), cargo, and fuel. Pressing the MENU page will allow you to convert liters/gallons/pounds conveniently when flying internationally. Anyway, I'll use the method we used at my company:





Plug in our ZFW which we noted in page 3 into LSK 4L. Then, plug in our total fuel in the tanks- 8000lbs for this flight. The gross weight will automatically be displayed at LSK 6L.

Now that this information is entered, pressing the PERF key will give you an up-to-date readout of current gross weight, as well as predicted weight/fuel/endurance at our destination accounting for current winds. (there is a way to

Let's Double Check that the FMS matches our clearance:

YYZ V252 GEE SHAFF7  
PATRN-ILS 22L

Go to FPL, MENU, CLEARANCE to see an easy-to-read view of our current route.



Now finally we must clean up the flight plan. Press the NAV key to bring up the main NAV page. Select LSK1L to highlight the "FROM" waypoint. You'll have to reselect CYZD from the list that appears at the right. Of course, it is #1, so we'll enter that here. Now press LSK 2L and highlight the "TO" field- select YYZ, our #2 waypoint. This will bring the FMS's navigation to the front of the flightplan.

Also, scroll through the FPL pages searching for any "NO LINK." We want to eliminate disconnects where they do not belong, and preserve them where they provide a logical gap in the flight plan- such as after SAX when we'll be on vectors for the approach. If you find any "no links" click on their adjacent LSK to stop them from blinking.

You can insert a NO LINK/GAP by going to FPL/LIST and pressing LSK 3R.



**BONUS FMS INFO:** If you're doing a "turn" or "out-and-back" and need to reload the FMS for the next flight, you can delete the whole flight plan by either inserting the number 99 anywhere as a waypoint (this will delete the entire plan), or 98 (this will delete the flight plan from the 98 entry and below).

## Takeoff Performance, Briefing



WHEW! We're about ready to start the engines and pull out of dodge! The cockpit, FMS, and aircraft are all set up. With one final wave from our friendly ground crew, we'll shut the doors. The Q400 sim accepts the standard door controls as set up in FSX. SHIFT-E and SHIFT-E2 will close the main/cargo doors.

Let's brief the departure:

"This will be your departure off of runway 33 full length. Our taxi route takes us across the runway initially, so let's keep an eye out for any landing traffic we haven't heard on the CTAF.

Takeoff will be straight out to 400ft\* using purple-needles (FMS), then a right turn to 360 as in our clearance up to 3000ft. Note that Canadian law restricts our speed below 3000ft to 200kts, so we'll keep an eye on that since we're empty.

Emergencies: anything prior to 80 knots, pilot noticing the problem will state it, you'll call the abort, and we'll stop on the runway. Anything after V1, we're going flying- the engine out procedure off of RWY 33 is simply straight out to 1660ft- which is our acceleration height, and clean up. We'll plan for a landing at Pearson if it comes down to it."

\*NOTE: 400ft above field elevation is normally when FAA allows operators to commence the initial turn as referenced in the AIM 5-2-8, provided no obstacle departure procedure exists, or a SID prescribing another procedures. My company's performance calculator took this into account.

In real life, we'd be handed a loadsheet and passenger count from a flight attendant- and would only be able to set in our Vs speeds and get our power/flap settings at this point (rather than when it was referenced during the originating check flow). However we know from when we initially loaded the aircraft that our ZFW was 41955, and our fuel 8000lbs. This gives us a ramp weight of 49955.

To be conservative, we'll take the next highest values- since our field elevation is 636ft MSL, we'll use the values from the 2000ft column, and the next highest weight of 53,000lbs. This gives us Vs speeds of V1=119, Vr=119, V2=122.

WEIGHT/ ALTITUDE	AT OR BELOW 20° C OAT						
	0	2000	4000	6000	8000	10000	0
39.500 LB	102/116	102/115	102/114	102/113	102/112	103/111	102/110
44.000 LB	105/115	106/114	107/113	107/112	108/112	110/111	107/110
48.500 LB	112/117	113/117	113/117	114/117	115/117	116/117	113/116
53.000 LB	118/122	119/122	120/122	120/122	121/122	122/122	120/121
57.000 LB	124/127	125/127	126/127	126/127	127/127	128/127	126/125
62.000 LB	130/132	131/132	131/132	132/132	133/132	134/132	131/130

We also need to know V<sub>fri</sub>/V<sub>cl</sub>, so that we can calculate the other two "triangle speeds." Since weather reports indicate snow/possible icing above 1000ft, we'll increase these speeds by 20kts each. Why? When in icing conditions, Bombardier requires us to have the INCR REF SPEEDS switch in the ON position, which increases our stall warning speed by 20kts (you'll notice the red tape increase quickly

when you turn the switch on.) This allows us to have a safe margin above stall warning before we flip the REF SPEEDS switch on. In our case, V<sub>fri</sub>=152 and V<sub>cl</sub>=163.

### Flap Retraction Initiation Speed (VFRI) Final Takeoff Speed (V CLMB)

WEIGHT	V FRI Flap 5°	V FRI Flap 10°	V FRI Flap 15°	V CLMB
39.500 LB	116	110	107	130
44.000 LB	120	112	109	131
48.500 LB	126	118	115	137
53.000 LB	132	123	120	143

When you're all set, this is what the PFD should look like for departure with everything set up correctly:



Activate the flight director by using the “hidden” click area that is on the side of the power lever handles- this button puts the FD into “go around mode.” Set the initial heading in as well. Yes, you’ll notice that on certain departures in the FMS coded from the departure end, the purple needle pointer will match runway heading. Since we’re just on a heading, first fix YYY, the FMS bearing is to the left.

Most importantly, hit ALT SEL. This will arm the altitude capture function once we get to 3000ft.

**WARNING!** The FD will not capture an altitude unless it is preselected on the AFCS with an ALT SEL displayed on the PFD. This is a peculiarity of the aircraft- ALT SEL does not come on automatically. It is a Bombardier design flaw that was never fixed (I heard that it was because it kept operational commonality with the -300 and -200 models).

In fact, our company added the callout “ALT SEL” to any time we selected a new altitude, as well as 1000ft before reaching the desired altitude, due to the risk of forgetting this and busting an altitude with the autopilot on. Pilots were walking around the terminal ordering lunch and saying “I’ll have the burger, ALT SEL.” I kid you not!

#### Before Start Checklist-

1. EXT PWR/APU Voltage.....ON/CHECKED\_\_ VOLTS  
Double check that APU/Ext power is producing sufficient voltage (>24.5 volts)
2. Circuit Breakers.....CHECKED
3. Escape Hatch.....CLOSED
4. Nose Steering.....OFF
5. Flight Guidance Control Panel.....SET
6. Fuel Quantity.....\_\_LBS, Onboard/\_\_LBS Required
7. HYD #3 Pressure.....CHECKED \_\_ PSI  
(- Depress the Hydraulic #3 switch to test adequate pressure)
8. Emergency Brake/Pressure .....PARK/CHECKED
9. Power Levers.....DISC
10. Condition Levers.....FUEL OFF
11. Emergency Lights.....ARMED
12. Fasten Belts Switch.....ON
13. Departure Briefing.....COMPLETE

Since we can’t move the aircraft with the GPU attached (many a ground crew has tried!), we need to either start an engine to get a DC Generator running, or start the APU. Your call- if you anticipate a long wait time, you can start the APU (if not already), or in our case, we’ll just start an engine.

## 10. Startup and Taxi Out

The normal sequence for starting the engines is RIGHT, then LEFT after or during pushback. This allows us to get an engine-driven DC Generator online as well as a bleed source for some conditioned air (although, on one bleed source in July in Newark, it's not enough to beat the heat). It also keeps the left side of the aircraft safe for last minute baggage loading, pulling away a jetbridge, etc.

### Engine Start

Here's a suggested flow for the captain after you get start clearance from the ground crew:

1. Doors.....CHECK CLOSED
2. Battery Master  
/Main/Aux/Standby.....ON  
The batteries might have been off if you were using external power, to preserve battery life.
3. Not simulated
4. Beacon.....ON
5. APU Bleed Air.....OFF
6. Engine #2.....CHECK CLEAR

### Engine Start Checklist

Bat Master / Main / Aux / Standby.....ON

Doors / Fueling Lights.....Noted/Off  
(when a jetbridge is attached to the aircraft, this door may still be open. Also, the cargo door may be still open for last minute bags)

Beacon Light.....ON

APU Bleed.....OFF

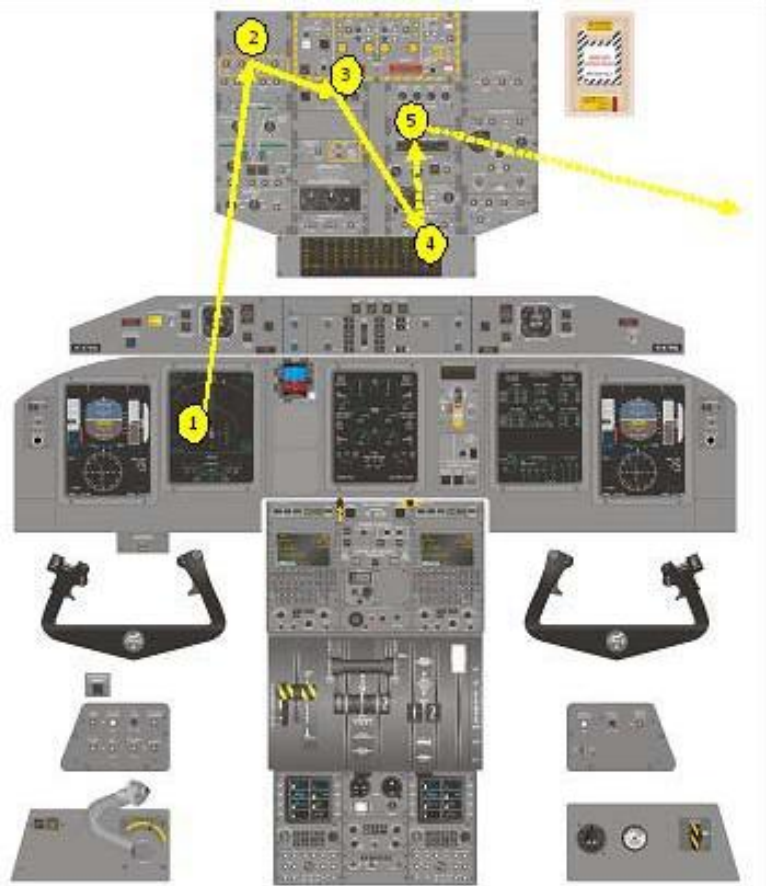
Engine.....CLEAR

Starting engines on the Q400 is quite easy thanks to FADEC. In conventional turboprops, we'd have to wait until sufficient NH speed was developed before introducing fuel. In the Q400, it's all automated.

Here are the steps:

1. Engine Start Selector.....1 or 2
2. Start Selector.....PUSH  
-at first indication of N1-
3. Condition Lever.....START/FEATHER
4. Monitor NH/EGT, check starter disconnect at 50% NH

Upon a stable start (Selector pops back to center, START switchlight goes out), select the external power switch OFF and deselect the GPU from the DATA/SERVICES page in the FMS. You'll notice that this cause the system logic to bring the right DC generator online.





## Pushback

The Q400 sim includes a quite nifty pushback utility that is what I would describe as “self service”- you control the turn/stopping, so that it’s compatible with anywhere you’ll fly this bird.

To access the utility, we’ll again use the DATA page on the FMS. Select SERVICES. Under the pushback heading, select which direction your “initial” push will be- that is, if you select “left” the aircraft will be pushed immediately to the left with only a brief straightback segment. For larger ramp areas I suggest heading straight until you’re ready to turn into position on a taxiway. Once you hit “end” the pushback will stop, and you’ll be asked to set your brakes, and be given clearance on the number 1 engine. Use the same procedure to start the above.



## After Start Flow/Checklist

We used two different flows for the FO and Captain, and they were done concurrently. We’ll perform each separately and meet back at the checklist! However- select FLAPS 5 now. I’ll tell you why later...

### Captain’s After Start Flow

After both engines are stabilized, bring the condition levers to MAX. You’ll see the AC Generators come online at about 600 Np, and stabilize at 660.

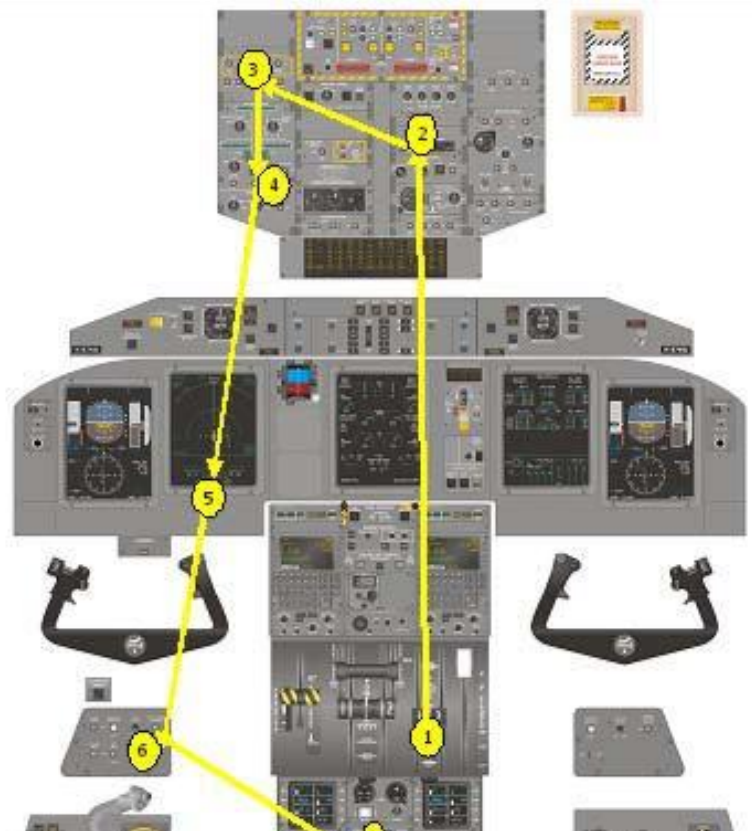
1. Condition Levers.....MAX/1020
2. APU .....OFF  
It is good practice to allow 1 minute cool-off after terminating the GEN/BL AIR function before turning off the APU.
3. Main Bus Tie.....OFF
4. Ice Protection..... AS REQUIRED  
At my last company, we used ice protection “levels” based upon the current and expected conditions. In our Q400 sim, you’ll have to have the windshield heat and PLT SIDE heat in WARMUP/ON to prevent it from fogging up, all the time.

#### Level 1, used in all conditions:

PITOT HEAT switches..... ON  
WINDSHIELD HEAT..... as necessary

#### Level 2, used on the ground when icing conditions exist, temperature +10°C or below, in flight +5°C or below

Level 1 Items.....ON  
Prop Heat.....ON  
Engine Intake Doors.....OPEN  
REF SPEEDS INCR.....SWITCH ON (inflight above 1000ft AGL ONLY!)





**Level 3**, In flight during visual accretion, or ICE DETECTED displayed on ED

Level 2 + 1 Items.....ON

Airframe Mode Select.....FAST (takeoff when above 1000ft AGL, Holds, approaches, landings) or SLOW (in cruise flight when sufficient to remove ice)

5. Rudder Travel.....CHECK TRAVEL

**Perform the Rudder Actuator Test**

Since this is the first flight of the day, we'll first check full travel with the rudder powered by both hydraulic systems. On the center glareshield, select either RUD 1 or RUD 2 off to test each PCU's functionality when it works alone.

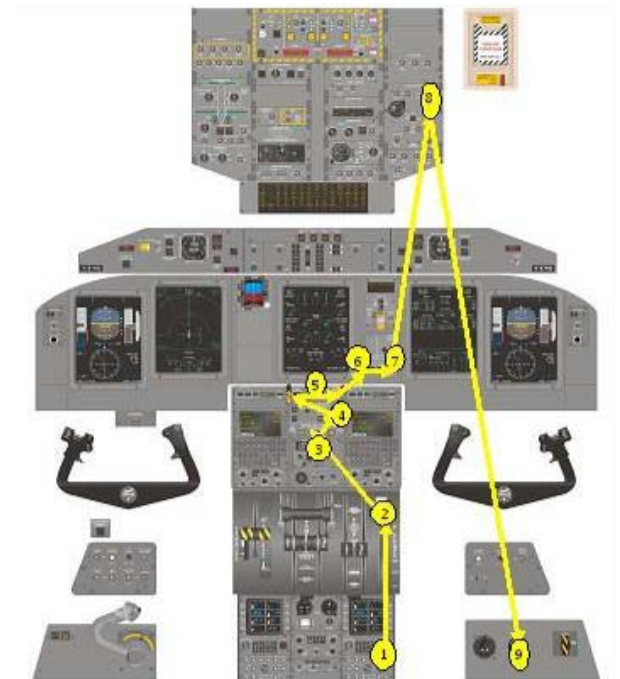
As a note, this is why we selected FLAPS 5 before our flow- when Flaps 0 is selected, rudder travel is restricted to ½ (rudder limiter function).



6. Nose Steering.....ON  
Again, this is why we had it off initially- if ground crew was around the aircraft unhooking a tug, and we performed the rudder test with Nose Steering on, they'd be injured.
7. Radar..... STBY  
This allows the radar to be ready for use when needed, since it takes approximately 90 seconds to warm up...
8. MFD..... Set to NAV  
Set the captain's MFD to it's NAV moving-map display

**First Officer's After Start Flow**

1. Transponder/TCAS.....AS REQUIRED  
Bring the TCAS/Transponder online by going to the ARCDU and pressing/holding the soft button adjacent the transponder code. You'll see ON-ALT displayed after 1 second. Note that we do this before taxi-out with the advent of ASDX equipment installed at many towers around the world. To turn on the TCAS function (helpful to display AI approaching the runway), click on the ATC1-XPDR soft button and hit EXP. This will bring up an expanded window and allow you to select the TCAS to ON. You'll note that it automatically has come on using the "push and hold" shortcut.



2. Flaps.....SELECT FOR T/O  
Confirm appropriate flap setting with both the lever/indication
3. Autofeather.....SELECT ON

## 4. Engine Rating..... RTOP / NTOP / MTOP

For the first flight of the day, use NTOP/90%. You may reduce takeoff power (much as other aircraft use “assumed temperature” if you wish on subsequent flights to preserve engine life. How much and when is usually prescribed by the performance calculation package that an airline purchases and the SOPs of the airline. In FSX, use your judgement- is there terrain ahead, is there an obstacle departure procedure, is the runway contaminated? Use NTOP. Remember, engines are free in FSX, so there’s no reason to ever reduce. At my company, “full power” takeoffs were required:

- First Flight of the day
- Tailwind operations
- When deicing fluids were added to the wings
- Contaminated Runway
- Windshear Reported

MTOP (Max Takeoff Power) was rarely used- only in situations where we needed to achieve certain performance during mountainous area departures.

## 5. Tank Aux Pumps.....BOTH ON

## 6. STBY / PTU Pumps.....ON

## 7. HYD #3 and Elevator.....CHECK

Activate the #3 isolation valve pump and test the elevators back and fourth. Yes, you’ll get an ELEVATOR PRESS caution since all three hydraulic PCUs are powering the elevators.

## 8. Bleed Air .....AS REQUIRED

Both bleeds on and flow selector to NORM, unless another configuration is required.

## 9. Deice Pressure.....CHECK

Around 18 +/-3 is normal

**After Start Checklist**

EXT PWR/ APU.....OFF

Main Bus Tie.....OFF

Ice Protection.....CHECKED / LEVEL \_\_\_\_

- (boot pressure is checked, and ice protection “level” is set)

Rudder Travel.....FULL TRAVEL

Rudder Actuator Test.....COMPLETE

Nose Steering.....ON

Autofeather.....SELECTED

Engine Rating.....% SET/CHECKED

Batteries.....CHECKED

Check the battery loads on the FO’s electrical page, and confirm that all are below .1.

This is an aircraft limitation. If not, takeoff is not authorized (since batteries will not be properly charged and will not provide required output in the case of a complete electrical failure).

Flaps..... DEGREES SET/INDICATING

AUX STBY/PTU Pumps.....ON

Hydraulic Pressure/Qty.....CHECKED

- Check minimum of 40% quantity displaying on FO’s MFD

HYD #3 and Elevator.....CHECKED

Caution/Warning Lights.....CHECKED

- The Q400 is a “dark cockpit” concept airplane, regarding cautions + warnings. Check the CW panel is dark save for the parking brake and perhaps ELEVATOR PRESS in case you haven’t bled down the STBY hydraulic pressure after the HYD #3 item

Flight Instr/Radios.....SET

Altimeters..... SET/CROSSCHECKED

MJCQ400

Revision 2

Ice Protection Test

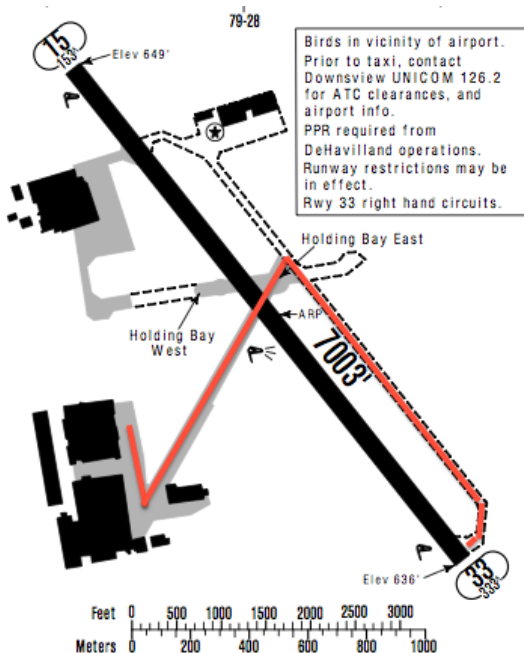


Ice Protection Test.....COMPLETE

- **Perform the Ice Protection Test**
- The ice protection test is another systems test completed on the first flight of the day, and simply involves turning all of the ice protection items on- including the boots, to test them out. It also tests the manual boot inflation sequence. Remember to turn switches back to their required positions after the completion of this test. And by all means, TURN THE REF SPEEDS INCR switch back to off.
- During this test you're looking for an appropriate inflation time on each boot sequence (6 seconds), followed by an appropriate dwell time (If I recall it's 60 seconds on FAST). Your FO will be checking that appropriate DEICE PRESSURE is indicated through the cycles. Also not the

## Taxi Out

**"Downsview Traffic, Bombardier 3200 is taxiing from the Bombardier Ramp to 33, Downsview Traffic"**



The Q400 taxis very easily under minimal power. You'll be in the "BETA" range here- as noted by the BETA range lights on the captain's glareshield panel. Therefore, you'll be controlling propeller pitch with the power levers, while the propeller RPM is held around 660. This makes it very easy to slow down without the need for brakes- as the propellers at "DISC" are almost flat against the direction of travel. Much like sticking your hand out the window of a fast moving car, the drag will slow you down.

Fanda designed taxiing to be very realistic in that your rudder pedals will only accomplish about 8° of nosewheel deflection while taxiing, just as the real aircraft does. In the control panel, you may map the nosewheel-tiller axis to your control yoke when below 40kts. This will allow you the full 70° of turn authority during taxiing. Or alternately, you can use your mouse to control the tiller. See "Chapter 5: FSX Setup" for more details.

When crossing runways, active or inactive, it's prudent to turn all exterior lights on to make yourself visible in case of an aircraft on final.

Let's give a pre-takeoff briefing :

"Once again, we're performing a flaps 5° NTOP departure off of runway. Our initial turn is right to heading 360, initially to 3000ft. Engine failure at V1 will be straight out to 3000ft. "

As we come to the hold short line of runway 33, let's run through the before takeoff flows, and then the checklist.

### Captain's Before Takeoff Flow:

1. Trims.....CHECK  
Check Rudder/Aileron/Elevator trims to ensure they are centered, elevator within center of white band.
2. T/O Warning Test.....TESTED  
As long as you hear no alarm, you're good to go!

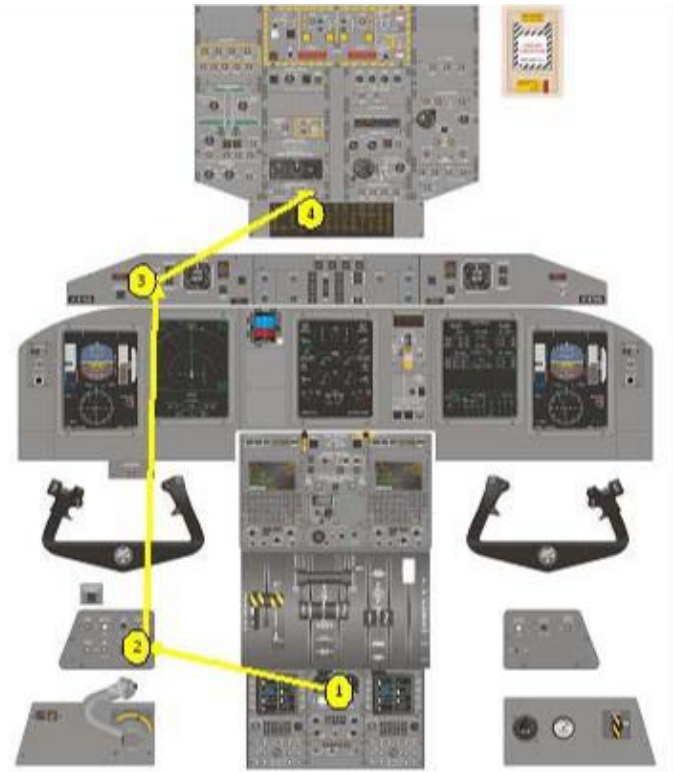
-release the control lock and test the flight controls along their full range of motion-

3. Flight / Taxi switch.....FLIGHT  
NOTE: The FO should have completed his flight controls check by now- since we are flying alone, let's check them now along their full range of travel. Look on the PFCS section of the MFD for appropriate movement.

NOTE: It will pop to flight if you forget- in fact some operators will let it switch automatically. But why not test out the ground spoilers before we need them, right? (Porter pilots, I'm talking to YOU. )

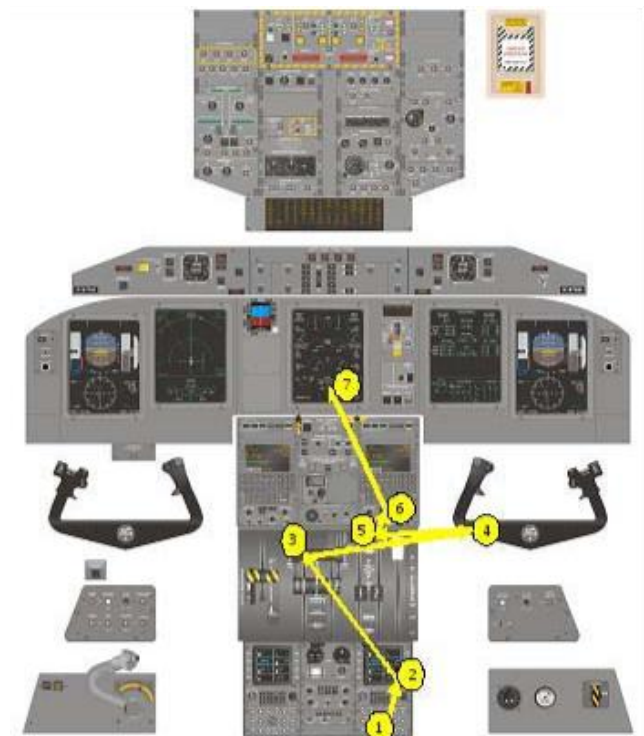
You'll notice why we check the flight controls before moving the FLIGHT/TAXI switch- we'd be unable to see spoiler deployment in conjunction with the ailerons if we move it up early!

4. ANTI-COLLISION Light switch.....WHT/ON STROBES



### First Officer's Before Takeoff Flow

1. FA Notification.....MADE  
In the SERVICES / CABIN DISPLAY there is an FO announcement available to notify flight attendants that T/O is imminent.
2. Transponder / TCAS.....ON/ALT  
The Q400 has a shortcut in the ARCDU. Pressing and HOLDING the key adjacent the transponder code for 1 second will turn the transponder ON/ALT as put the TCAS into TA/RA mode. This will save you some button pushing.
3. Control Lock.....RELEASE
4. Flight controls.....CHECK
5. Condition Levers.....CHECK MAX
6. Terrain/Radar Display.....AS REQUIRED  
Are there storms? Put the radar and display on! Are there mountains? Put the terrain display up! Are there both? I just wanted to wish you good luck, we're all counting on you.
7. Fuel.....CONFIRM REQ'D ON BOARD





### Before Takeoff Checklist

I've included a separation line for some items that can be accomplished when lined up on the runway awaiting takeoff clearance. Bleeds must be min for takeoff, but we'll leave them ON/NORM until clearance is received to keep conditioned air for the passengers. Remember- Newark in July. Enough said.

F/A Notification.....COMPLETE

Takeoff Briefing.....COMPLETE

Condition Levers.....MAX

Trims.....3 SET

T/O Warn Test.....TESTED

- Located on the captain's side panel- if you don't hear an alarm, you're all good to go

Flight Controls.....CHECKED / FREE

Flight Taxi Switch.....FLIGHT

Radar / Terrain.....AS REQ'D

Transponder/TCAS.....ON ALT

----- **when lined up** -----

Bleeds.....MIN / AS REQUIRED

- for a bleeds off takeoff, turn off the bleeds here. Normally takeoffs are performed with BLEEDS ON, flow controller MIN. However certain departures (such as in mountainous terrain where performance is necessary) requires bleeds off until acceleration altitude. Remember that the aircraft will be UNPRESSURIZED until

External Lights.....ON

- This generally goes by the following rule: White anti-collision (strobes), wing lights, go on after crossing the runway threshold into position, and the landing lights come on when cleared for takeoff. But FSX is Burger King, baby. Have it your way.

Runway / Heading.....RUNWAY \_\_\_, HEADING CHECKED

- Confirm your departure runway with the heading on the EHSI/MFD. They should match direction ☺

In the next chapter, we'll discuss the takeoff procedure and initial climb.



HINT: Reasons for a "T/O Configuration warning" include:

1. Parking brakes set
2. Flaps still 0°
3. Spoilers up with power levers more than Flight Idle + 12° angle
4. Trim not in the white arc
5. Condition levers not MAX



## 11. Takeoff and Initial Climb

We're lined up and ready to go on runway 33 at Downsview, having just received our release from Toronto. The takeoff profile included at the end of this tutorial will help you standardize your takeoffs in this aircraft.

### Crosswind Takeoffs

Since we'll have a slight crosswind, we do want slight aileron into the wind, but keep an eye on the PFCS display to prevent excessive spoiler deployment, as this creates drag and can sometimes influence performance.

We'll advance the power to the detent (you did set your detent to your hardware controls in the beginning of this tutorial, didn't you?) smoothly but quickly, making sure the torque settles at our 90% desired. The rudder provides sufficient directional control (8° either side of center).

At Vr, apply back pressure to start rotation—you'll notice that while it might take some initial back pressure to liftoff, you might need slight forward pressure to avoid over pitching above 15° nose up. The GA setting for the flight director is an initial guideline-pitch for V2 to V2 +10, not to exceed 15° of pitch. Maintain this until 1000ft AGL, and use trim to help with the control forces.

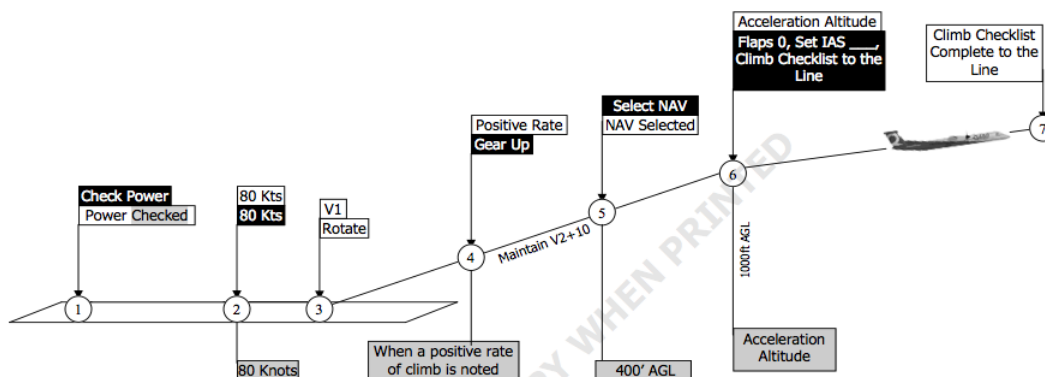


At 400ft above the airport (2060ft for math lovers, or cheat and use the Radar Altimeter), we can begin our first turn- to heading 360°. Since we've already had the HDG mode activated on our flight director, we simply turn the heading knob to 360° on the AFCS panel.

At 1000ft above airport elevation (2660ft), we hit our acceleration altitude (denoted by the MDA line on our altimeter) and can lower the nose and accelerate for climb. Our company used the initial profile speed of 185kts. Why 185kts on a plane capable of doing much more? It provided the best speed/climb rate balance in the terminal area, while protecting that flaps 5° limit-speed of 200kts until the PM could verify flaps 0 on the climb checklist.

### The Simple Steps:

- Confirm Above V<sub>fri</sub> (solid triangle bug), retract the flaps to 0° - almost always will you be above this speed during dual-engine flight, as the airplane is way overpowered.
- Hit IAS and rotate the Pitch Knob upwards to display 185kts.
- Accelerate past V<sub>cl</sub> (open triangle), and continue to 185kts.
- Perform the climb flow and the checklist... (time permitting.)



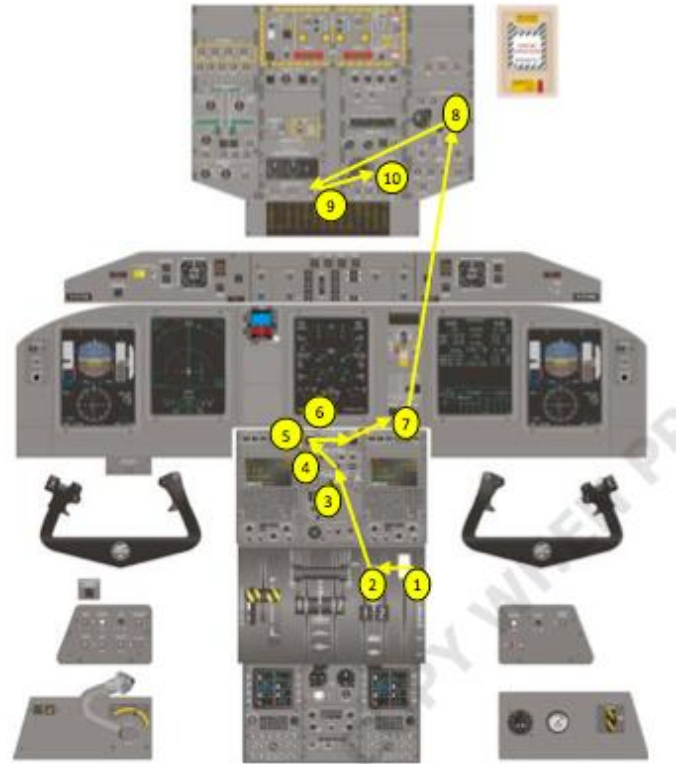


### Pilot Monitoring Climb Flow

1. Flaps.....CONFIRM 0°
2. Condition Levers.....900  
Some departure procedures required 1020 RPM (Max) until reaching a specific altitude, such as in mountainous conditions. Normal ops, confirm climb is indicated on the Engine Display
3. Push MCL on Engine Control Panel
4. Autofeather.....OFF
5. MTOP Switch.....PUSH OFF IF REQ'D
6. Aux Pump Switches.....OFF
7. STBY Hyd Press and PTU Switches.....OFF
8. Bleeds .....ON/NORM
9. Taxi Light.....OFF
10. Pressurization Panel.....CHECK
11. Ice protection.....SET

### Climb Checklist

- Landing Gear.....UP
- Flaps.....0°
- Check that both the flap lever AND the indicator display 0
- Power.....SET
- confirm the appropriate mode is set on the engine display, such as CLIMB
- Autofeather.....OFF
- AUX/Stby/PTU Pumps.....OFF
- both the Auxiliary Fuel pumps off, and the STBY/PTU Pumps off
- Engine Temps/Press.....CHECKED
- all indications within limits (no yellow/red)
- Bleeds.....ON/NORM
- If taking off with bleeds off, turn bleeds on 1 at a time to prevent a pressure bump. Flow control to NORM
- Cabin Temps/Pressure.....CHECKED
- Check to make sure you see a differential indicated on the pressurization controller
- Ice Protection.....AS REQ'D
- Set the ice protection panel switches as required for the conditions. Since we're departing into icing conditions, confirm that the prop heat knob is ON, the intake heater doors are open, and the INCR REF SPEEDS switch is in the on position.



## Enroute Climb

**TECHNIQUE NOTE:** This turboprop does not have counter-rotating props. What this means is that it is sensitive to the aerodynamic forces present in conventional twin aircraft- you'll notice that a bit of right rudder is necessary when at high power settings/angles of attack- during climb. In the real aircraft, we used rudder trim quite frequently to give our feet a rest. Do note that when you level off and accelerate, you'll have to remove the trim you added. Also in descent, sometimes a bit of left rudder is necessary during power reductions. What's that you say? We have a yaw damper? Right....biggest joke ever. The YD light on the AFCS serves only as mood-lighting in the evening.

Soon after leveling off at 8000, we're given clearance direct to the BULGE intersection with a further climb clearance to FL230. Press DTO on the FMS to view the list of waypoints, and enter the number for BULGE (#4). After pressing enter, you'll see the courseline in the MFD direct from your position to BULGE. Make sure to press the NAV button to couple the autopilot to follow the course. Set 23000 in the altitude preselect and don't forget to press ALT SEL!



## INTERCEPTING AN AIRWAY

If ATC had given us "fly heading 160° Intercept V252 east of YYZ" we could easily accomplish that with our FMS. Let's perform a "manual leg change" first. Click on LS 1L to highlight FR, and select YYZ. At LSK 2L, select PUTOL. This will activate that specific leg. Then, back on the NAV page, LSK 1R, click HDG. This will open up a field that lets us input an assigned heading- 160. You'll see "INTERCEPT" appear below the HDG. Click on this and then select NAV on the AFCS. You're PFD will go into "LNAV HDG SELECT" mode, and will fly the assigned heading until intercepting V252.

## Power and Speed Management

You'll notice that we'll keep the power levers in the detent until we level off in cruise. However, when level below 10,000 a level-off will quickly cause the airspeed to progress towards the upper Vmo speed cue. This is a very powerful aircraft, so keep an eye on your speed!

As we climb through 10,000ft, roll the pitch wheel down to increase the IAS for a faster cruise climb (and a lower deck angle for the flight attendants). Climb speed recommendations are in a Bombardier Table below

At my company, we brought the condition levers back to 850 through 10,000ft to provide a quieter cabin. Honestly I don't know why, since the propeller sound drowned out screaming babies quite nicely.

## Perform this Flow through 10,000ft

1. Exterior Lights.....AS REQUIRED  
Landing lights can be turned off, along with wing inspection and logo lights if they were on, white anti/coll lights remain on.
2. FA Notification.....COMPLETE  
Cycle either the belts/no smoking sign to notify the FA's that we're passing 10,000ft. This ends "sterile" cockpit and signals them to begin their service.
3. Condition Levers.....AS REQUIRED  
850 RPM for a slightly quieter climb, or 900 RPM for best performance. If you select 850 RPM/MIN, make sure you re-select MCL on the engine control panel to give yourself full torque availability.

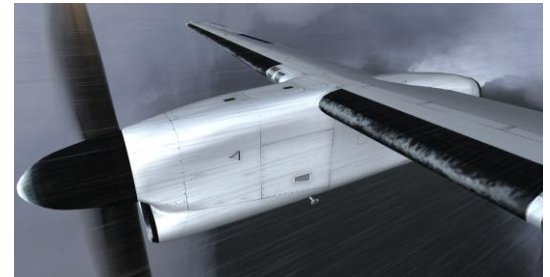
### Bombardier Climb Speed Profiles

Minimum	Vclimb + 20kts	Absolute minimum speed for use in all conditions
<b>Type I</b>	210 Kts	Normal Climb above 10,000ft
<b>Type II</b>	185 kts	Efficient Climb above 10,000ft
<b>Type III</b>	160 kts	Optimum speed for obstacles/mountainous terrain
<b>Type IV</b>	240 kts*	Best Enroute Speed Climb
<b>Type V</b>	4-6° Pitch*	Use for lower deck angles (FA + passenger comfort)
*Use only when clear of terrain/obstacles, and only if resultant rate of climb is >1000fpm		

### Icing during Climb/Cruise



You may have noticed during climb that “ICE DETECTED” starts blinking on the ED. The Q400 is equipped with dual AC-powered ice detectors that vibrate at a certain frequency. When ice starts collecting on the airframe (about .5mm of clear ice), the vibrational frequency changes and ICE DETECTED is displayed. The probe then begins a heating cycle so that it will display the message continuously during building ice, but not after ice accretion has stopped. You’ll notice that when ICE DETECTED appears, you won’t get an aural caution or an indication on the CWP. Another Bombardier design flaw I guess!



The Q400 simulates the visual accretion of ice as well. Take a look at “representative surfaces.” The windshield wipers, the prop spinner, the wings, and the windshield all simulate visual ice buildup.



To address the “ICE DETECTED” caution, place the INCR REF speeds switch to “INCR.” The ICE DETECTED will change from yellow to white, and stop blinking. What the switch does is raises the low speed cue (red-tape) about 20 kts, as well as the stall warning threshold to compensate for the detrimental effect ice has on an airframe. This is why we always increase our Vfri and Vcl speeds by 20kts, as well as Vref/Vga speeds on landing to account for this change.



## 12. Cruise

Passing 18,000ft remember to change your altimeter to 29.92 (1013 in other countries). Upon reaching cruise altitude you may bring the propellers to 850/MIN for added noise reduction and optimum performance. If you had them in 850/MIN climbing above 10,000ft

Depending on the temperature and weight of the aircraft, sometimes you can leave the power levers in the rating detent, however in my experience during winter time (read: denser air, better performance) taking them just slightly below the detent gave a comfortable, high speed cruise at Vmo-10kts.

Here is a snippet from Bombardier's Performance Manual for some suggested TQ settings for our current weight, rounded up.

		50000 LBS																	
		ISA -10									ISA								
		Long Range			Intermediate			High Speed			Long Range			Intermediate			High Speed		
FL		KIAS	TRQ %	FF lb/hr	KIAS	TRQ %	FF lb/hr	KIAS	TRQ %	FF lb/hr	KIAS	TRQ %	FF lb/hr	KIAS	TRQ %	FF lb/hr	KIAS	TRQ %	FF lb/hr
60		228	39.0	2039	235	43.5	2174	245	46.1	2251	226	38.9	2054	234	43.5	2195	245	46.8	2292
100		216	36.6	1840	248	51.7	2260	282	70.1	2218	214	36.5	1857	246	51.9	2291	282	71.4	2833
140		211	37.0	1734	246	53.2	2163	284	75.9	2834	210	37.3	1764	246	54.0	2211	284	77.6	2918
180		211	39.0	1667	246	56.3	2162	285	82.5	3011	209	39.2	1693	240	54.1	2120	274	75.3	2789
220		199	37.0	1517	231	51.0	1923	264	71.3	2598	200	37.9	1559	227	50.4	1929	257	67.3	2484
250		191	36.1	1437	219	47.5	1766	248	63.5	2309	191	36.9	1476	216	47.1	1778	241	60.4	2225

During cruise there's only a few things to do while enjoying the beautiful scenery of upstate New York.

### Fuel + Time Prediction

To get an idea of what our weight and fuel will look like upon landing in Newark, there is a rather useful prediction page if you press PERF on the FMC. It will show you your current weight, as well as the predicted range/weight/endurance upon landing in Newark, provided the winds aloft remain constant.



You can also see predicted times to each waypoint on the flight plan by clicking FPL/MENU/PPOS TO WPT- this will give you current time-enroute forecasts for those cruise PAs.

The NAV page is our main page for flight progress monitoring- the lower segment of the FMS screen gives current winds aloft readout, headwind/tailwind information, track error, and ANP/RNP for enroute and arrival navigation accuracy.

### Lazy Radio Tuning

If you get tired of scrolling the ARCDU tuning knobs when changing frequencies, switching the on/off knob of the ARCDU to "FMS" allows for remote tuning via the FMS. Press TUNE on the FMS to select what you'd like to tune. You can also store up to several frequencies for later use.

### Holding

Often when operating in busy airspace or when weather closes in on your destination, it may be necessary to hold at a specific waypoint. This is very easy in the Q400- on the NAV page, click LSK 2R adjacent "MNVR." This will bring up a variety of navigation functions. We want "HOLDING DEFN." You'll be presented with a screen that allows you to define the fix, inbound course, whether standard or left-hand turns, and leg length. To ACTIVATE the hold, press DTO-HOLD when ready. The aircraft will proceed directly to the holding fix defined, and hold. There is another function "ARM HOLD" that allows the aircraft to continue on it's planned route until a specifically defined waypoint, and then enter the hold.

## 13. Descent and Approach

### Crossing Restriction

Somewhere past EXTOL intersection, we're told to descend via "pilot's discretion" to FL190 by Hancock VOR (HNK). Of course, we're up at FL230 enjoying the smooth air and hefty tailwind. The FMS will calculate our descent point for us if we like:

Go to the FPL page. On the right side, press the LSK adjacent HNK. This will open up the white field and allow us to input 18000.



After this is done go to the VNAV page- select the LSK adjacent "TO" and select HNK from the list. The 18000 should populate the crossing restriction field and open up the TGT VS field. Enter in the desired V/S to descend at and press enter. You'll see a circular TOD point appear on the MFD- you'll also notice the distance countdown (and time) to the top of descent point. Set in 19000 in the altitude preselect, and HIT ALT SEL.



Unfortunately, because of a design flaw in the way the system works, we can't engage VNAV until we receive the Top of Descent Alert MSG- you'll get an FD MODE INHIBIT message. The TOD Alert occurs about 2 minutes prior to the top of descent point, keep an eye out for it. Engage VNAV on the AFCS. There is a workaround for this to "trick the system", but I haven't been successful using it in our sim.



Once beginning our descent, it's time to think about the SHAFF7 and approach into Newark.

You'll notice that at the CRANK intersection on the SHAFF7 arrival, it says to "expect 7000." Let's enter that into the flight plan much like we did with the descent into HNK.

### Approach Setup

For our approach, the ILS 22L into Newark has already been loaded. Set the ILS frequency of 108.7 into the NAV 1/2 radios. To set the final approach course while navigating via the FMS, we'll bring up the "Blue Needles" raw data information by pushing and holding the FORMAT button for a second on the EFIS control panel. When the blue needle CDI appears, dial in 219°, the final approach course for Newark. Hit FORMAT again to return to the Map display.

Now setup the minimums. Since this is a normal CAT I approach, procedure at my company was not to use DH (which is based upon radar altitude) but MDA. Set the MDA to 210ft- which will be read off of the barometer, and provides a visual line where we must make the "decision" to land or go around, were we faced with such weather conditions. But, set what you'd like: if you want to hear the GPWS call out "minimums," set 200 DH.





## Speed and Flap Selection

The latest weather in Newark shows winds out of the southwest and VFR conditions. 22L is of course in use for arrivals.

Landings in the Q400 may be performed normally at Flaps 10, 15, or 35. At my company we only performed 15 and 35 landings, due to the risk of tail-strike that was present with flaps 10. I always found flaps 35 to make it very easy on the brakes after touchdown in order to make the first high-speed turnoff at Newark without passenger discomfort. Some would argue that the airplane shakes and rattles too much with flaps 35 (due to the disturbed airflow and drag caused by the wing shape). In any case, a flaps 35 landing has a different technique than the flaps 15 landing.

A general Rule of thumb:

### Use Flaps 15°

- Runways greater than 7000ft
- Dry conditions with no tailwind
- Gusty conditions,
- Windshear conditions are forecast, Flaps 15 gives best recovery performance.

### Use Flaps 35°

- Runways less than 7000ft
- Tailwind operations
- When the runway is contaminated
- Icing conditions during landing (with the REF SPEEDS INCR switch on)

22L is plenty long for either. Even a Porter pilot could land on it. I kid, I kid! Today, I'll use Flaps 15.

Lets get our landing speeds: Open up the PERF page and get the predicted weight at KEWR. Since we're above 44,000lbs, but below 48,500lbs, let's use the values for 48,500lbs since we're being conservative with performance. This gives us a Vref of 112 and a Vga of 105. You'll notice that the speeds aren't much different for Flaps 35- 5 knots difference.

## Descent Checklist

We're finally given the clearance to cross CRANK at 7000ft. Go to the VNAV page once again and Assign to TO fix to CRANK. The altitude restriction should pop in. Enter a target V/S of -2000fpm.

The descent checklist is called for when we leave 18,000ft, which is the transition altitude in the USA. Set 29.83 (or local altimeter from your weather program) into the altimeter SLOWLY- remember that VNAV is controlling your airplane, and adjusting our indicated altitude will alter the VNAV path to keep up- you don't want to bring on a sudden descent to the passengers.

### Descent Checklist

Altimeters..... SET/CROSSCHECKED

-set altimeters to the landing field's QNH/Meter setting.

Fuel Balance.....CHECKED

-make sure fuel balance is within limits. If not, fix this now.

Pressurization.....SET

-check that the landing field elevation is set in the pressurization control panel.

Cabin PA.....COMPLETE

- make the descent PA at this time if not already done. The Q400 sim provides one under DATA/CABIN DISP

Fasten Belts Switch.....ON

Approach Briefing.....COMPLETE

Once we descend below 10,000ft, or are in the terminal area we can begin the In-Range checklist. Remember to slow to 250kts when below 10,000ft- this aircraft loves to fly fast. Also, take note of the Vmo at 8000ft: 245kts. The Vmo speed cue will move downwards quickly at 8000ft, so target your airspeed around 240kts to deal with this.

### **In-Range Checklist (10,000ft or terminal area)**

GPWS Landing Flap.....SELECTED \_\_\_\_°

-select the appropriate setting you've planned your landing for. This knob is located below the gear handle.

Fuel Transfer.....OFF

-terminate any fuel balancing operations, as landing is prohibited during fuel transfer

Hyd Pressure/Qty.....CHECK

Caution Warning Lights.....CHECK

- did the parking brake mysteriously set itself in FSX?

External Lights.....ON

- landings lights, logo, wing inspection are normally ON in the terminal area.

Ice Protection.....SET

-Make sure speeds are set correctly for the ice-protection setting. For landing with "level 2" icing conditions with the INCR

-REF SPEEDS switch on, add 20kts to Vref and Vga. It is better to have everything set up now than fumble with it on final.

FA Notification.....COMPLETE

-Chime/Ding the flight attendants to denote final approach and the beginning of sterile cockpit.

### **Minimum speeds for different flap settings**

The question will arise, "with Vcl no longer bugged, how slow can I go" at flaps 0? Flaps 5? Here are some speeds derived from Vcl adjusted for max gross weight, icing conditions, and bank angles up to 30°. They will provide ample stall protection in all circumstances.

Flaps 0 (clean) = 175kts

Flaps 5 = 160 kts

Flaps 10 = 150 kts\*

Flaps 15 = 145\*

\*The gear must be down in this situation, or else you'll get a configuration/gear warning.



## 14. Landing / After Landing Procedures

-----Press PAUSE- the next discussion is important to understanding Q400 landings-----

### Approach and Landing Technique

The approach speed ( $V_{app}$ ) is what you'll aim to be stabilized at on the final approach segment, and fly until just crossing the runway threshold/fence. It is dependent on the weather (and sometimes mechanical deferrals on the aircraft/malfunctions). This speed is not bugged, it is simply flown.

We'll take half the steady state wind reported by the ATIS, all of the gust and add it to  $V_{ref}$ . This allows us a margin of control in gusty conditions so that we do not dip below  $V_{ref}$  (or worse, activate a stall warning). In calm conditions, I suggest a simple 10kt additive for Flaps 15 landings, and a 5 knot additive for Flaps 35 as a minimum starting point. Do not ever exceed a  $V_{app}$  of  $V_{ref}+20$ kts, as this would not be defined as a "stable approach"

For example, winds of 300 at 12 gusting to 17 would mean we'd take 6 knots (half the steady state), and add it to 5 knots (the amount of gust), to get a minimum  $V_{app}$  of  $V_{ref}+11$ kts.

The Landing technique is different between Flaps 15 and Flaps 35 landings.

A normal target final approach power setting is 12-18% TQ, whereas for flaps 35 you'll find it takes 24-30% to remain stabilized. Also, the sight picture on final is much different. Notice the difference in pitch of the aircraft- this will be more drastic as airplane landing weight increases.

Flaps 15 Deck Angle



Flaps 35 Deck Angle





### For a Flaps 15 Landing

Maintain your approach power setting through the flare- DO NOT chop the power. Power should be reduced only slightly (2-3%) just prior to touchdown. The pitch limit for tailstrike prevention is 5°- tailstrike happens approximately at 7° nose-up pitch, so make 5° a limit since it is visible on the EADI as a line. Once touchdown occurs, smoothly lower the nose to the runway and THEN bring power levers to DISC/REV as necessary. Use steady braking if needed to aid deceleration. Pressing DATA/PREV will bring up a page that displays your current pitch attitude readout.

### For a Flaps 35 Landing

Approach power setting will be slightly higher, and the pitch will be nose low. In the flare power should be reduced to touchdown at a speed of Vref or slightly below Vref. You'll notice that being way above speed on flaps 35 landings will cause considerable float. You'll also need more back pressure to effect a proper flare attitude, about 4-5° nose up. Pressing DATA/PREV will bring up a page that displays your current pitch attitude readout.

### The "Secret" to Smooth Landings in the Q400



You'll hear many a Q400 pilot describe how difficult it is to get a "smooth landing" due to the fact that the gear struts are very strong and longer than on a low-wing aircraft. Primarily it's Porter Pilots making excuses. In all honesty, the Q400 does not have the advantage of a trailing edge gear that many of the barbie jets possess, and passengers describe landings on the Q400 as "firm."

However, do not lose hope! The secret is: being in trim. While important in any aircraft, I found that it really helps Q400 landings- both real and in the sim. On final approach, try to get your speed stabilized at the target Vref/Vapp- you'll notice that your trim should fall into within the white arc if you're flying stabilized. It will lead to a very decent touchdown.

### Low Noise Profile Landings



The Q400 offers the option for landing with Reduced Propellor RPM to mitigate noise on approach and improve passenger comfort. The RDC Np LDG button accomplishes this. By pushing RDC Np -BEFORE- you bring the condition levers to MAX, you'll keep the props at 850 RPM regardless of condition levers in MAX. The performance penalty is about a 3% increase in landing distance, and requires a reduction in power setting for the approach to

achieve the same airspeed.

In the event of a go around, bringing the power levers to the rating DETENT will cancel this mode and avail full power. Also, pushing the RDC Np button again cancels the function, and props will return to 1020. While this mode is active you'll see REDUCED NP LANDING displayed on the ED.

### Finally- Our Landing

-----Unpause your FSX-----

Back to the game: Let's proceed direct TEB (Teterboro) and descend to maintain 3000ft 10 miles prior to TEB. How do we do this in the sim? The VNAV page, select the TO to TEB, and in the middle field that opens up (highlighted white in the pic to the right) type "-10." Since 3000ft is already coded into the approach we don't need to edit the altitude.

You can follow the VNAV path down either with the VNAV function of the autopilot or in vertical speed mode.



Once we're within a 5 miles of TEB, descend to 2500ft. Set 2500ft and press ALT SEL. Vertical Speed of about 1000ft is sufficient. Reduce power to about 15% and slow to 180kts. Deploy flaps 5 when below our limit speed of 200kts.

On the AFCS panel, push HDG and switch our NAV SOURCE to blue needles, to bring up the ILS display. Arm the APPR mode. Since we set the final approach course early on during the briefing, the blue needles conveniently display aligned with the extended centerline.

You should be set up as in this picture:

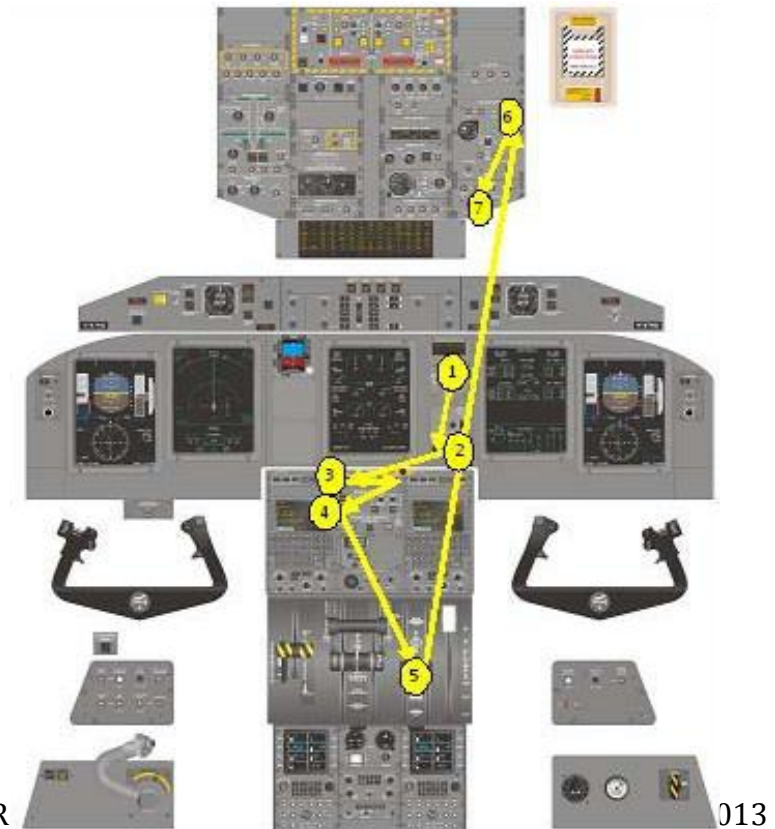


The autopilot should couple with the ILS and turn towards runway 22L. As the glideslope comes alive, lower the gear and perform the landing flow and checklist.

#### Before Landing Flow

1. Landing Gear.....SELECT DOWN
2. STBY/PTU Pumps.....SELECT ON
3. Tank Aux Pumps.....ON
4. Reduced Np.....AS REQUIRED
5. Condition Levers.....MAX
6. Bleed Flow Knob.....MIN
7. FA Notification.....CYCLE/CHIME

As we get stabilized in our final descent towards the runway, allow the speed to bleed towards the approach speed of 122 (Vref+10kts), and set flaps 15 once we get below 172kts (our limit speed for flaps 15).



Since we've already accomplished our landing flow, the checklist can be used to quickly verify everything has been done:

### Before Landing Checklist

Landing Gear.....DOWN/3 GREEN

Condition Levers.....MAX

AUX/STBY/PTU Pumps.....ON

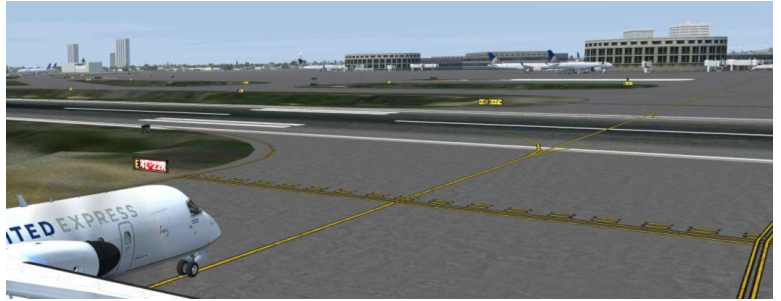
Bleeds.....AS REQD/MIN

- (as required- in case of a high performance bleeds-off landing. Flow control knob is always MIN for landing)

FA Notification.....COMPLETE

Flaps..... SET/INDICATING

Remember to bring in about 18% TQ (at least) to stabilize the speed on final. Touchdown using the technique discussed above. Remember how you linked the Q400's tiller to either your mouse or your hardware- you'll need to use it to exit the runway- plan the right high-speed turnoff at Echo. Hold Short of 22R- remember, 22R is actively used for departures.



Normally it is good procedure to wait until you're clear of ALL active runways before accomplishing the after landing checklist- or any checklist for that matter. Pilots should be heads-out when crossing runways. However, we'll use this time waiting short of 22R to accomplish ours.

### After Landing Flow

#### Captain's Responsibility:

1. Lights.....AS REQUIRED

2. Flight/Taxi Switch.....TAXI

#### FO's Responsibility

3. Radar.....OFF

4. MFDs.....SYSTEM SCREEN

- normally the captain's MFD is on "DOORS" and the FO's is on "ELEC"

5. Transponder.....STBY/AS REQD

For vatsim, turn it to standby, for reality at ASDXE airports we leave this on

6. Flaps.....0

7. Control Lock.....ENGAGE

8. Tank Aux Pumps.....OFF

- only required if you experience abnormally high fuel temps, such as in Newark in July

9. Yaw Damper.....OFF

10. Bleeds.....AS REQUIRED

- flow controller can be put back to NORM/MAX for passenger comfort

11. Main Bus Tie.....TIE

12. Ice Protection.....ALL OFF/WINDSHIELD ON

- all switches/Boots/Prop DEICE off, however Windshield can be kept on for defogging

13. APU.....AS REQUIRED

### After Landing Checklist

Radar.....OFF

Transponder.....AS REQ'D

Flaps.....0°

Control Lock.....ON

Aux Pumps.....OFF

Yaw Damper.....OFF

Flight/Taxi.....TAXI

Lights.....AS REQ'D

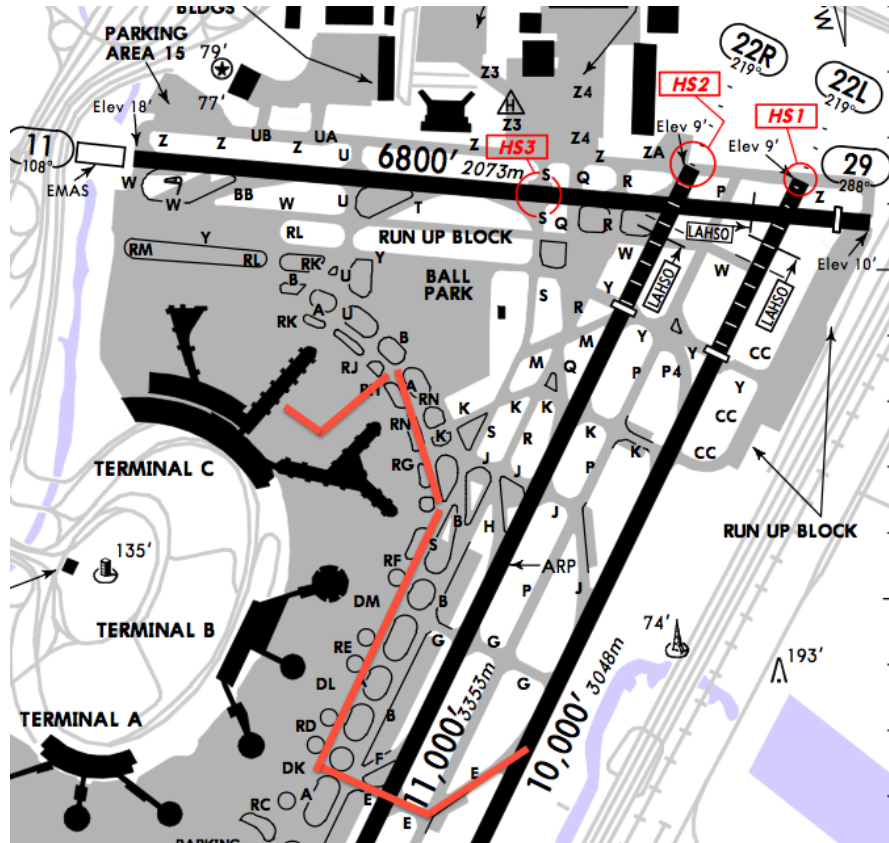
Main Bus Tie.....TIE

Ice Protection.....AS REQ'D

APU.....AS REQ'D

We're parking at Gate 105 today, which is in the C-terminal-2.

As we get clearance to cross 22R, we proceed straight across Bravo and remain short of Alpha taxiway. Ground control will clear us Bravo to the Ramp/Gate. We'll make sure that we make the slight left as Bravo curves around the terminals and enter in to the ramp.





## 15. Shut-down and Postflight

Turning into the gate, make sure that you have your taxi light off so that you don't blind the ramp crew. Since Bombardier recommends 30 seconds of "cool off time" for each engine at START/FEATHER before shutdown, we may feather the left engine (#1) and proceed in. This will allow us to shut the engine down almost immediately as we set the parking brake on blocks.

As the brake is set, shut the Engine #1 down. Bring engine #2 into Start/feather and turn off the nose steering- we'll keep the right engine running until we have either APU/External power established.



### Accomplish the Parking Flow:

1. Parking Brake.....SET
2. Power Levers.....DISC
3. Condition Levers.....START/FTHR
4. Nose Steering.....OFF

### Extra Items....

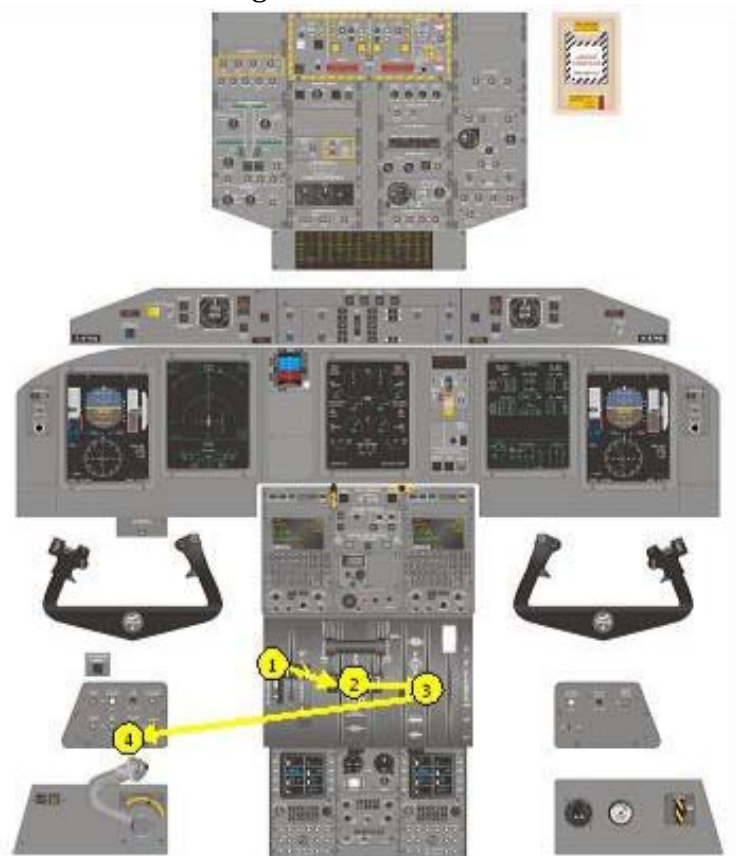
5. Transponder.....STBY
6. STBY/PTU Pumps.....OFF
7. Seatbelt Sign.....OFF
8. Bleeds.....MIN/OFF

Call up the GPU/External Power using the FMS as we did at the beginning of the tutorial. Once you confirm that power is available (this is why we turned the FO's MFD to the ELEC SYS page), you may shut down the right engine.

### Parking Checklist

- External Lights.....OFF  
 - leave the position lights + logo on, of course
- Parking Brake.....PARK
- Seatbelt Sign.....OFF
- Nose Steering.....OFF
- STBY/PTU Pumps.....OFF  
 - if you've forgotten to turn them off at the gate, push the now-unlit switchlights into the out position. They won't be powered without AC power.
- Power Levers.....DISC
- Ext Pwr/APU.....ON
- Condition Levers.....FUEL OFF
- Transponder.....STBY
- Bleeds.....MIN/OFF
- Emergency Lights.....OFF
- Ice Protection.....ALL OFF  
 - if windshield heat was used, turn it off
- STBY/AUX/MAIN/Batt Master.....AS REQ'D  
 - With external power, we shut these off to protect the batteries.

### Parking Flow at Gate Arrival



**Leaving Aircraft Checklist – Securing**

Once we're ready to call it a day, accomplish this checklist to secure the aircraft....

Parking Brake.....PARK  
Emergency Lights.....OFF  
RECIRC Switch.....OFF  
Ice Protection.....OFF  
Anti-Skid.....OFF  
FMS/ARCDU/Displays.....OFF  
Interior/Exterior Lights.....OFF  
External Power/APU.....OFF  
STBY/AUX/MAIN/Batt Master.....OFF  
Dome Light.....OFF

That last item is a real doosie! Many a Q400 pilot around the world has come in to work to find the batteries depleted from the dome light being left on from the previous night's crew. DOH!





## 16. Credits and Support Information

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### CREDITS

I'd like to offer thanks to the following people that aided me through beta testing and developing this wonderful product: Oleksiy Frolov – Mastermind of this add-on / Programmer. And he dealt with all my gripes/bugs during beta testing! Simeon Richardson – Beta Tester / Dash 8 Dispatcher, who got me interested in this project several years ago.

### ABOUT THE AUTHOR

Brendan Ratchford, now 28, has been involved in flying training for the last 12 years. He holds CFI/II/MEI certificates as well as type ratings in the Saab 340, Boeing 757/767, and Q400- of which he served as captain, check pilot, and instructor, and specialized in Crew Resource and Human Factors training for Q400 crews. Brendan brings 4 years and about 2500 hours of Q400 flying experience to the Majestic Q400 project, as well as experience from flying for a regional and major US airline for the last 8 years.

### SUPPORT

Any questions about this tutorial should be directed to the Majestic Software Support Forums located at:

<http://majesticsoftware.com/mjc8q400/support.html>

Or tweet the author at: @violinvelocity <http://twitter.com/violinvelocity>

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Some graphics contained in this manual were taken directly from the simulator and discarded manuals found in a garbage can in Tucson Arizona, and altered in order to suit duplication on a printed page. All images contained in this manual were used with permission. Sort of.

So, by reading this tutorial, you've agreed already NOT TO SUE THE AUTHOR. Or above all else, don't think you can use this tutorial for real world flying- it is for "enthusiast" simulator use only.

Porter pilots, sorry for all the jokes! I had to pick on someone ☺. And the Horizon pilots paid me off, and have given me so many jumpseat rides in the past years. Plus, at their age...

**NOTE:** 1-800 Phone number in Chapter 6: I was thinking of giving out the phone number of an old Q400 buddy I used to fly with this as a prank, but seeing as how popular a product this will become, I determined it to be a little much. It's 1-800-WX-BRIEF for those that recognized it!





## APPENDIX A: Charts for this Flight

---

### CONTENTS

1. CYZD Downsviiew Taxi Chart
2. SHAFF 7 ARRIVAL KEWR
3. ILS 22L KEWR
4. ILS 4R KEWR
5. KEWR Newark Taxi Chart

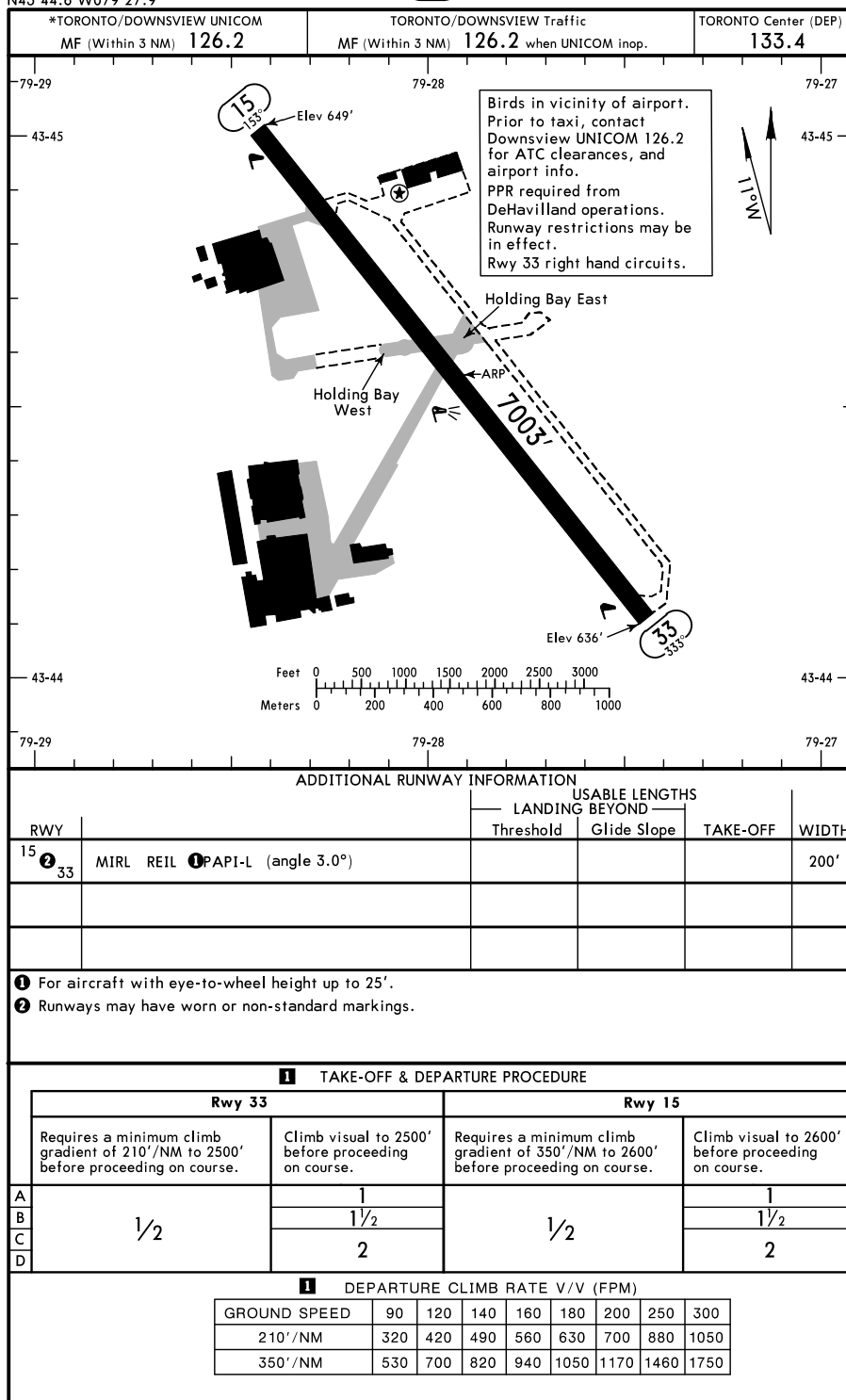


CYZD

Apt Elev 652'  
N43 44.6 W079 27.9

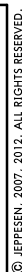
JEPPesen

13 APR 12 (40-9)

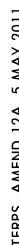
TORONTO, ONT  
TORONTO/DOWNSVIEW

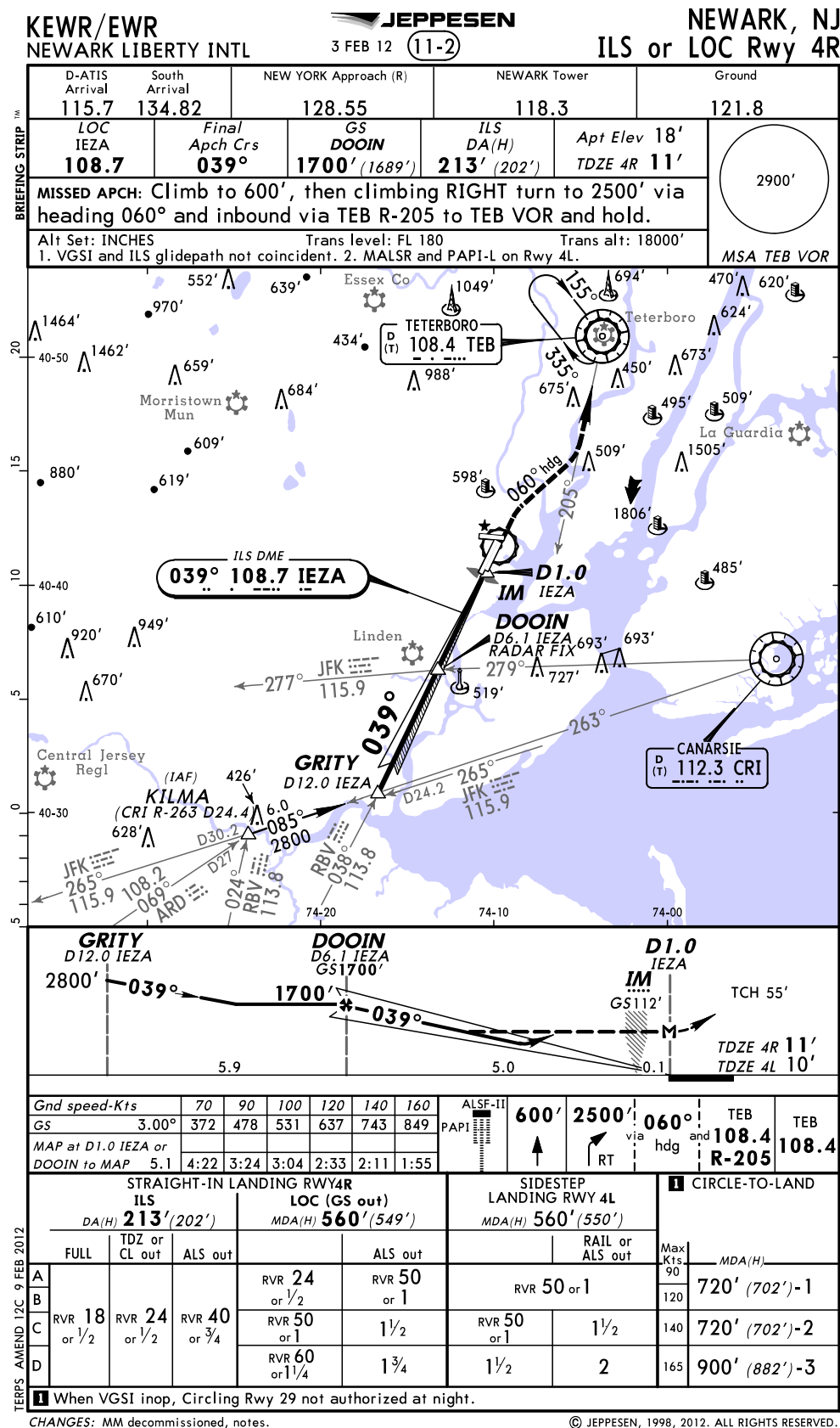
CHANGES: Lighting.

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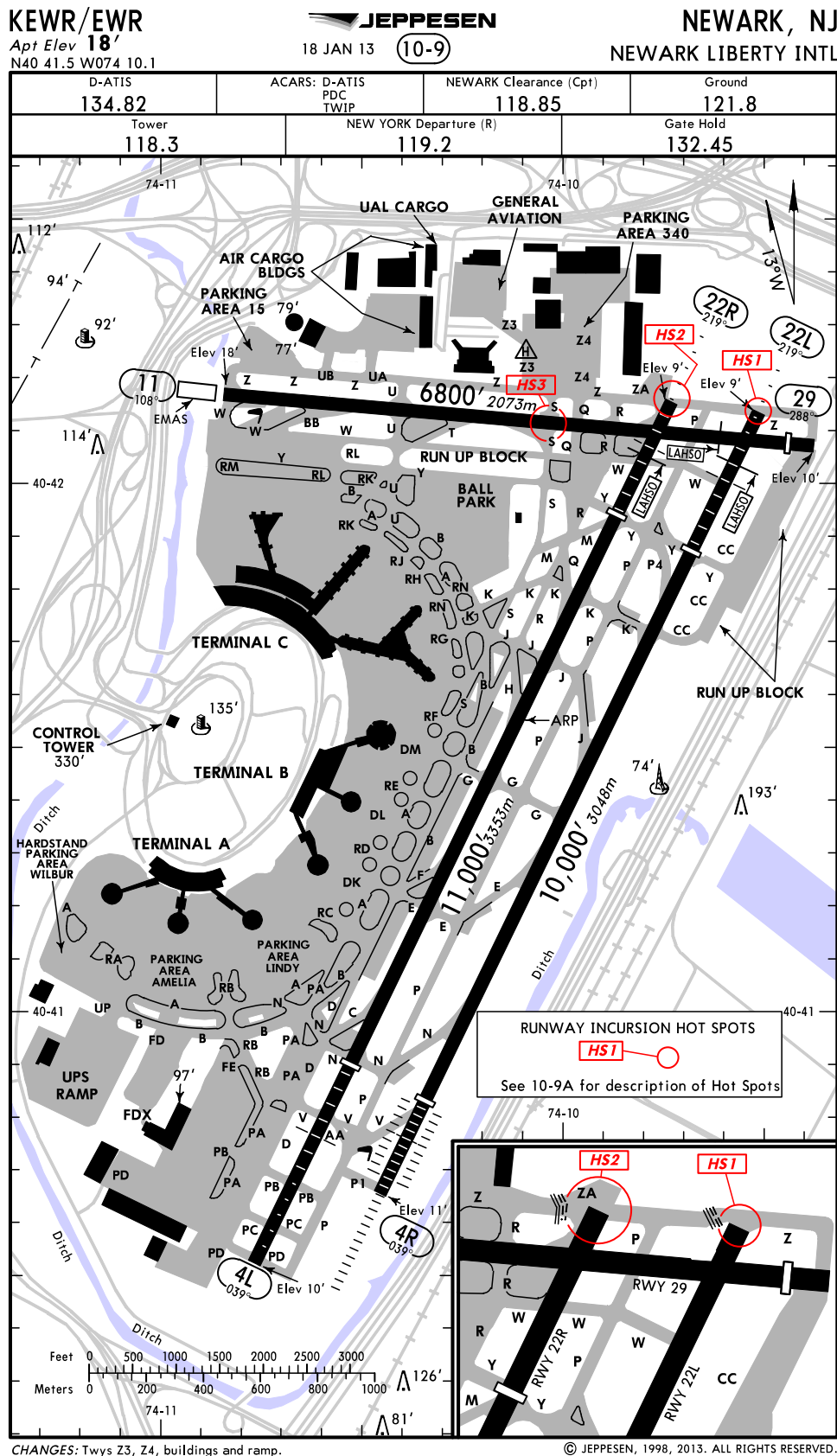


NEWARK, NJ  
ILS or LOC Rwy 22L











## APPENDIX B: Flows and Checklists

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The following pages are some suggested flows and checklists that help you operate the Q400 in detail. They are two pages each- and are meant to be printed on both sides of a page each, so that you only need one piece of paper, folded down the middle. Feel free to tweak as necessary!

Remember, flows are meant to be memorized- not from the page verbatim though! You'll find that after performing them a few times with the simulated aircraft, you'll be able to put away that sheet and perform them when necessary.



## 67 | Majestic Software Q400 Delivery Tutorial

### **POWERUP FLOW**

Circuit Breakers.....CHECKED  
Gear Lever.....DOWN  
Radar.....OFF  
Battery Master / Main / Aux Standby Switches.....ON  
Main Bus Tie.....TIE  
Position Lights.....ON  
Flight Deck Displays.....ON  
STBY/PTU Pumps.....CHECK OFF  
Emergency Brake.....PARK  
EXT PWR/APU.....ON  
FMS..... Initialize

### **CAPTAINS ORIGINATING CHECK**

Landing Gear Alt Extension Door.....OPEN/CHECK/CLOSE  
Landing Gear Alternate Release Door.....CLOSED/NORMAL  
Escape Hatch..... CHECK CLOSED  
Oxygen Masks.....CHECK  
Demisters / Side Vent..... CHECK OPEN

#### DC Control Panel

Battery Switches.....AS REQUIRED  
DC GEN 1 + 2 Switches....ON  
Main Bus tie.....TIE

#### Ice Protection Panel

Airframe Mode Select.....OFF  
Engine Intake Doors.....CLOSED  
REF Speed Switch.....OFF  
Pitot Static Switches.... ALL OFF  
Propeller Ice Protection..... OFF  
BOOT AIR switch..... NORM

#### Windshield Panel

Windshield heat ..... OFF  
Wiper..... OFF  
Plt side wdo/ht.....OFF

#### Exterior Lights Panel

Approach/Flare/Taxi Lights.....OFF  
PFD Altimeter units..... AS REQUIRED

#### Flight Data RCDR Panel

ELT.....ARMED  
FLT DATA RCDR switch.....NORM

#### Fire Protection Panel

Pull Fuel/HYD off handles.....CHECK IN  
Baggage AFT Test Switch 1/2 ..... TEST  
Baggage FWD Test Switch.....TEST

Emergency Lights.....ARM  
Fasten Belts Switch.....ON  
No Smoking Switch.....ON  
TEST Caution/Advsy.....TEST  
Bleed Flow Controller.....MIN

#### Air Conditioning Panel

Pack Switches.....AUTO  
RECIRC Switch.....ON  
Bleed 1 + 2.....OFF

#### AC Control Panel

AC Gen Switches.....ON  
AC External Power.....OFF

#### Captain's Side Panel

EGPWS Flaps Override.....NORMAL  
ADC 1 + 2 TEST.....PERFORM  
STALL WARNING TEST.....Perform  
NOSEWHEEL STEERING SWITCH.....OFF

#### Glareshield

Flight/Taxi Switch.....TAXI  
Stick Pusher/Elev Trim Shutoffs.....CHECK  
Flight Guidance Control Panel.....CHECK

Pitot-Static Isolation Switch.....NORMAL  
Integrated Standby Instrument.....CHECK  
Landing Gear Lever.....CHECK  
GPWS LANDING SELECTOR.....CHECK  
Hydraulic Control Panel .....CHECK  
AHRS Panel.....CHECK  
Pitch/Roll Disconnect Handles.....IN  
Fuel Control Panel.....CHECK  
Propeller Control .....CHECK  
AUTOFEATHER TEST.... Perform  
Emergency Brake.....AS REQ'D  
Control Lock.....ENGAGE  
Power Levers.....DISC  
Condition Levers.....FUEL OFF  
ARCDU.....CHECK  
Trims.....TEST  
EFIS CONTROL PANEL..... AS REQUIRED

### FO ORIGINATING FLOW

ATIS.....COPY  
 Oxygen Masks.....CHECK  
 Circuit Breakers.....CHECK  
 FO Side Panel.....CHECK  
 Anti Skid switch.....TESTED / ON  
 EGPWS.....TESTED  
 Flight Instruments.....SET  
 Center Pedestal.....CHECK  
 AHRS.....CHECK  
 ARCDU/RADIOS/RADAR.....ON/SET/TEST

### ENGINE START FLOW

Doors.....CHECK CLOSED  
 Battery Master /Main/Aux/Standby.....ON  
 Beacon.....ON  
 APU Bleed Air.....OFF  
 Engine #2.....CHECK CLEAR

### AFTER START FLOW – CAPTAIN

Condition Levers.....MAX/1020  
 APU .....OFF  
 Main Bus Tie.....OFF  
 Ice Protection.....AS REQUIRED  
 Rudder Travel.....CHECK TRAVEL  
 Nose Steering.....ON  
 Radar.....STBY  
 MFD.....Set to NAV

### AFTER START FLOW – FO

Transponder/TCAS.....AS REQUIRED  
 Flaps.....SELECT FOR T/O  
 Autofeather.....SELECT ON  
 Engine Rating.....RTOP / NTOP / MTOP  
 Tank Aux Pumps.....BOTH ON  
 STBY / PTU Pumps.....ON  
 HYD #3 and Elevator.....CHECK  
 Bleed Air.....AS REQUIRED  
 Deice Pressure.....CHECK

### BEFORE TAKEOFF FLOW – CAPTAIN

Trims.....CHECK  
 T/O Warning Test.....TESTED  
 Flight / Taxi switch.....FLIGHT  
 ANTI-COLLISION Light switch.....WHT/ON STROBES

### BEFORE TAKEOFF FLOW – FO

FA Notification.....MADE  
 Transponder / TCAS.....ON/ALT  
 Control Lock.....RELEASE  
 Flight controls.....CHECK  
 Condition Levers.....CHECK MAX  
 Terrain/Radar Display.....AS REQUIRED  
 Fuel.....CONFIRM REQ'D ON BOARD

### CLIMB FLOW

Flaps.....CONFIRM 0°  
 Condition Levers.....900  
 Autofeather.....OFF  
 MTOP Switch.....PUSH OFF IF REQ'D  
 Aux Pump Switches.....OFF  
 STBY Hyd Press and PTU Switches.....OFF  
 Bleeds .....ON/NORM  
 Taxi Light.....OFF  
 Pressurization Panel.....CHECK  
 Ice protection.....SET

### THROUGH 10,000FT

Exterior Lights.....AS REQUIRED  
 FA Notification.....COMPLETE  
 Condition Levers.....AS REQUIRED

### LANDING FLOW

Landing Gear.....SELECT DOWN  
 STBY/PTU Pumps.....SELECT ON  
 Tank Aux Pumps.....ON  
 Reduced Np.....AS REQUIRED  
 Condition Levers.....MAX  
 Bleed Flow Knob.....MIN  
 FA Notification.....CYCLE/CHIME

### AFTER LANDING FLOW

#### Captain

Lights.....AS REQUIRED  
 Flight/Taxi Switch.....TAXI

#### First Officer

Radar .....OFF  
 MFDs.....SYSTEM SCREEN  
 Transponder.....STBY/AS REQD  
 Flaps.....0  
 Control Lock.....ENGAGE  
 Tank Aux Pumps.....OFF  
 Yaw Damper.....OFF  
 Bleeds.....AS REQUIRED  
 Main Bus Tie.....TIE  
 Ice Protection.....ALL OFF/WINDSHIELD ON  
 APU.....AS REQUIRED

### PARKING FLOW

Parking Brake.....SET  
 Power Levers.....DISC  
 Condition Levers.....START/FTHR  
 Nose Steering.....OFF  
 Transponder.....STBY  
 STBY/PTU Pumps.....OFF  
 Seatbelt Sign.....OFF  
 Bleeds.....MIN/OFF





## Q400 NORMAL CHECKLIST

AIRCRAFT POWER UP	
Circuit Breakers	CHECKED
Landing Gear	DOWN
Radar	OFF
Batter Master/Main/Aux/Stby	AS REQ'D
Main Bus Tie	TIE
Exterior Lights	AS REQ'D
Flight Deck Displays	ON
STBY/PTU Pumps	OFF
Parking Brake	AS REQ'D
EXT PWR/APU	ON
FMS	INITIALIZED
FIRST FLIGHT OF THE DAY TESTS	
Engine Fire Detection	
APU Fire Detection	
Baggage Smoke Warning AFT + FWD	
Stall Warning Test 1+2	
ADC 1+2	
Autofeather Test	
GPWS/TCAS	
Trim Test – ELEV/RUD/AILERON	
Rudder Actuator Test*	
Ice Protection Test*	
*after engine start	

BEFORE START	
EXT PWR/APU Voltage	ON/CHECKED __ VOLTS
Circuit Breakers	CHECKED
Escape Hatch	CLOSED
Nose Steering	OFF
Flight Guidance Control Panel	SET
Fuel Quantity	__ LBS, ONBD __ REQ'D
HYD #3 Pressure	CHECKED __ PSI
Emergency Brake/Press	PARK/CHECKED
Condition Levers	FUEL OFF
Emergency Lights	ARMED
Fasten Belts Switch	ON
Departure Briefing	COMPLETE

ENGINE START	
Bat Master/Main/Aux/Stby	ON
Doors / Fueling Lights	NOTED/OFF
Beacon Light	ON
APU Bleed	OFF
Engine	CLEAR

AFTER START	
EXT Pwr/APU	OFF
Main Bus Tie	OFF
Ice Protection	LEVEL 1 or 2
Rudder Travel	FULL TRAVEL
Rudder Actuator Test	COMPLETE
Nose Steering	ON
Autofeather	SELECTED
Engine Rating	__% SET/CHECKED
Batteries	CHECKED
Flaps	__° SET/CHECKED
AUX/STBY/PTU Pumps	ON
HYD Pressure/Qty.	CHECKED
HYD #3 + Elevator	CHECKED
Caution/Warning Lights	CHECKED
Flight Instruments / Radios	SET
Altimeters	__ SET/CROSSCHECKED
Ice Protection Test	COMPLETE

BEFORE TAKEOFF	
F/A Notification	COMPLETE
Takeoff Briefing	COMPLETE
Condition Levers	MAX
Trims	3 SET
T/O Warning Test	TESTED
Flight Controls	CHECKED FREE
Flight/Taxi Switch	FLIGHT
Radar / Terrain	AS REQ'D
Transponder/TCAS	ON ALT/TA-RA
-----WHEN LINED UP-----	
Bleeds	MIN/AS REQ'D
External Lights	ON
Runway / Heading	RUNWAY __, HEADING CHECKED



CLIMB	
Landing Gear	UP
Flaps	0°
Power	SET
Autofeather	OFF
AUX/STBY/PTU Pumps	OFF
Engine Temps/Pressures	CHECKED
Bleeds	ON/NORM
Cabin Temps/Pressures	CHECKED
Ice Protection	AS REQ'D

DESCENT CHECKLIST	
Altimeters	____, SET/CROSSCHECKED
Fuel Balance	CHECKED
Pressurization	SET
Cabin PA	COMPLETE
Fasten Belts Switch	ON
Approach Briefing	COMPLETE

IN RANGE (TERMINAL/10,000FT)	
GPWS Landing Flap	SELECTED ____°
Fuel Transfer	OFF
Hyd. Pressure/Qty.	CHECKED
Caution Warning Lights	CHECKED
External Lights	ON
Ice Protection	SET
F/A Notification	Complete

BEFORE LANDING	
Landing Gear	DOWN/3 GREEN
Condition Levers	MAX
AUX/STBY/PTU Pumps	ON
Bleeds	MIN/AS REQ'D
F/A Notification	COMPLETE
Flaps	____° SET/INDICATING

AFTER LANDING	
Radar	OFF
Transponder	AS REQ'D
Flaps	0°
Control Lock	ON
Tank Aux Pumps	OFF
Yaw Damper	OFF
Flight/Taxi Switch	TAXI
Exterior Lights	AS REQ'D
Main Bus Tie	TIE
Ice Protection	AS REQ'D
APU	AS REQ'D

PARKING	
External Lights	OFF
Parking Brake	PARK
Seatbelt Sign	OFF
Nose Steering	OFF
STBY/PTU Pumps	OFF
Power Levers	DISC
EXT PWR/APU	ON
Condition Levers	FUEL OFF
Transponder	STANDBY
Bleeds	MIN/OFF
Emergency Lights	OFF
Ice Protection	OFF
STBY/AUX/MAIN/BAT Master	AS REQ'D

SECURING	
Parking Brake	PARK
Emergency Lights	OFF
RECIRC Fan	OFF
Ice Protection	OFF
Anti-Skid	OFF
FMS/ARCDU/Displays	OFF
Interior/Exterior Lights	OFF
Ext Power/APU	OFF
STBY/AUX/MAIN/Bat Master	OFF
Dome Light	OFF



## APPENDIX C: Profiles and Training Maneuvers

---

RESERVED FOR A LATER DATE

- Abnormal checklists for pro edition go here
- Steep Turns
- Stalls
- Two engine landing with vertical guidance (ILS/VNAV/RNAV-GPS)
- Two engine landing without vertical guidance (LOC/VOR/NDB)
- Normal Takeoff
- Takeoff with engine failure at V1
- Visual approach profile
- Go around profile
- Go around profile with one engine inoperative