
Milviz Presents
the
Boeing 737-200

Milviz Tubeliners Presents The 737-200

Reference Sources & Acknowledgements:
[1] Boeing 737-200 Flight Crew Operations Manual: Document Number D6-27370-200A-TBC September 15, 1999, Copyright © 1995-2010
Revision Number: 22, Revision Date: October 8, 2010
[2] Boeing 737-200 Flight Crew Training Manual: Document Number FCT 737-200 (TM) April 30, 2005, Copyright © 1999
[3] Boeing 737 Quick Reference Handbook: Document Number D6-27370-200A-TBC Copyright © October 9, 2008
// The Boeing Company, P.O. Box 3707, Seattle, Washington 98124

Colin Pearson,
Creative Director
©Military Visualizations
77 Mont Royal West,
Suite 402
Montréal, QC
Canada • H2T2S5

Diego Menendez
Project Lead

The Boeing 737-200 Milviz Team

Bryant "Storm" Hardee	Beta Tester
Michael Morgan	Beta Tester
Rick Brown	Beta Tester
Ryan Butterworth	Beta Tester
Timothy Swindle	Beta Tester
Vassilios "Dimus" Dimoulas	Beta Tester
Ville Keränen	Beta Tester
Developers	
Bill Leaming	Lead Code
Dmitriy Usatiy/3DReach Team	Model, Textures, Animation,
Gunnar Van Meeren	Liveries
Jonathan Bleeker	Code
Mike Maarse	Sound Engineer
Tom Falley	FDE

Special Thanks & Consideration:

⇒ Collin Biedenkapp
⇒ Chuck Jodry

Milviz would also like to express their gratitude and thanks to those named above whose incredible talents, tips/tricks, and contributions not only made the Milviz Boeing 737-200 possible, but made it the most superior rendition available to flight simmers everywhere today.

Required specs:

This product requires FSX Acceleration and/or P3D. It is also designed for newer systems. Minimum requirements are a 2.6 Core 2 Duo, 4 gigs of RAM, 512 MB Video Card and 1.2GB of free disk space. Optimal requirements are a i7 960 CPU, 8 GB RAM, 1 GB video card, or greater.

TABLE OF CONTENTS

About this manual

The intended goal of this user guide is to help the reader become more familiar with the MilViz 737–200 as it relates to FSX and Prepar 3D Flight Sims. In addition, it is with deliberate intention that the user guide consists of as few pages as possible so you're not reading for hours and can get right to flying in minutes. This user guide is not intended for real-life applications and will omit certain procedures, (external preflight inspection, FAA regulations regarding taxiing and ATC procedures, etc.), that would be typically carried out by pilots in real world applications.

MilViz has included a PDF manual, (Boeing 737–200 FCOM), written and issued by Boeing specifically for this aircraft when it was first released. It contains valuable, detailed explanations covering everything that this user guide does not. Throughout the included Boeing PDF, you'll find detailed information on the many instruments, gauges and their applications that could only be summarized here. Milviz also included an easy to follow PDF guide on the "SP 77 Autopilot" as titled.

BOEING 737-200 MODELS

Military Visualizations focused on three configurations of two basic variations of the Boeing 737-200. These two variations were Boeing's response to airline companies interested in a 'flexible' airliner; an airplane that could take Cargo to a destination and then convert to a passenger plane, (PAX), if the airline carrier needed to fulfill that role in the following flight.
It had a movable bulkhead and seat tracks to handle various accommodations. Referred to as the Convertible, Boeing's Advanced 737-200 was a hit.

And then someone in Boeing had a brainstorm and decided to combine the two and that's when the 737-200 Combi was born. In the Combi's configuration, the airline companies could carry the freight in the forward sections of the fuselage and the passengers in the back. The bulkhead, pallets and seats would be repositioned as needed.

You'll find that Milviz has included a highly versatile MVAMS allowing you the ability to configure the Cargo, PAX, and Combi to your preferences and 'fine tune' the details such as weight distribution, fuel and much more. All of this is covered in the MVAMS section starting on page 10.

The two aircraft, (Convertible and the Combi), were essentially the same in that they both included a side cargo door on the forward port side for loading seats/pallets and a reinforced deck. They also added additional seat tracks and both could reconfigure the seats and pallets. But the Convertible, (later upgraded to the Quick Change), could only take Cargo or Passengers at any one time.

In the Combi's case, the cargo would be loaded forward of the movable bulkhead and then an 'X' number of seats could be loaded behind the bulkhead separating the passengers from the freight as needed. They could handle large 88" x 125" pallets.

In addition to the ability to select a Cargo, PAX, and Combi, the Milviz team also included the ability to configure any livery of your choice with a Gravel Kit, (page 7). The next page in this guide will touch on a few of the primary alterations that made up the Gravel Kit version.

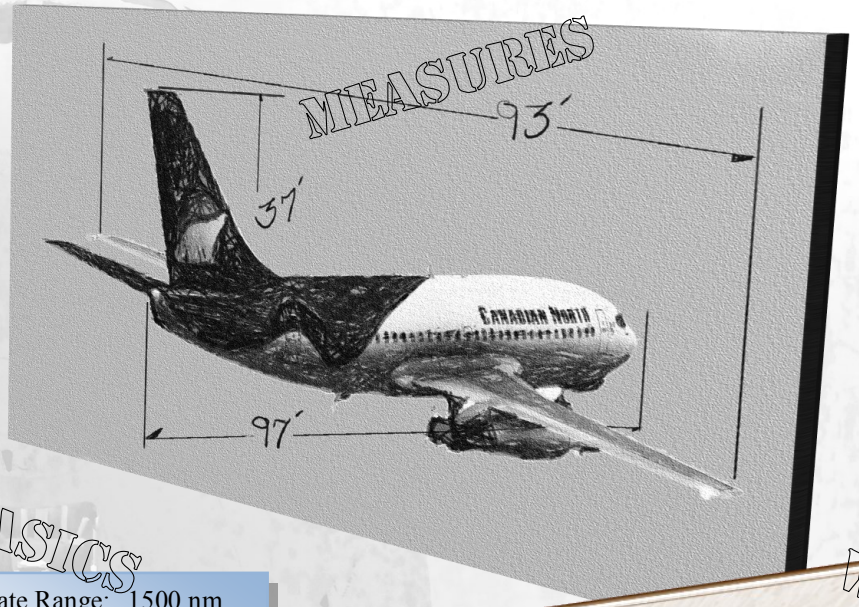
Milviz applied the JT8D–17A Pratt & Whitney engine on all of the models in this package. The T/O static thrust of the -17A at sea -level generated 16,000lbs. Eventually, the –17A was improved to the –17R with a max T/O static thrust of 17,400lbs.

The development team worked meticulously to make almost every switch and button in the cockpit operative. However, the PDCS, (Performance Data Computer System), is NOT included in our model. That said, the aircraft's SP-77 is Fully Operable!

*** Please Note: The MilViz Boeing 737–200 has a working Sperry SP-77 autopilot system. A PDF manual included for the Sperry Autopilot. Military Visualizations Inc. offers full support to all their customers. Please go to http://www.milviz.com/support and register for help by sending a request to: info@milviz.com including your proof of purchase and requested or existing foum username.**

BASIC SPECS

Because the Boeing 737-200 had quite a few variations, we'll stick to the 'general specifications' and to the engine that the Milviz developers worked with in our models which, as previously mentioned, is the P&W JT8D-17A.



FLAPS

Takeoff Flap Retraction Speed Schedule

Takeoff Flaps	At and Below 117,000 LB	Above 117,000 LB	Select Flaps
25	V2 + 15 150 170 190	V2 + 15 160 180 200	15 5 1 UP
15 or 10	V2 + 15 170 190	V2 + 15 180 200	5 1 UP
5 or 2	V2 + 15 190	V2 + 15 200	1 UP
1	190	200	UP

Limit bank angle to 15° until reaching V2 + 15.

BASICS

- Approximate Range: 1500 nm
- Fuel Capacity: 25,250lbs
- Max Start EGT: 760°C
- Max Operating Alt: 37,000'
- Max TO/Landing Alt: 8,300'

WEIGHTS

737-200 Airplanes	
Maximum Taxi Weight	117,500 lbs
Maximum Takeoff Weight	117,000 lbs (1)
Maximum Inflight Weight	
Flaps 0	116,500 lbs
Flaps 30/40	106,000 lbs
Maximum Landing Weight	105,000 lbs (2)
Maximum Zero Fuel Weight	95,000 lbs

1) Subject to additional restrictions based on takeoff, enroute, and landing performance.
2) Subject to additional restrictions based on field length or climb limit.

ENGINE INFO

JT8D-17A

Maximum N1 RPM	102.4%
Maximum N2 RPM	100%
Maximum Acceleration EGT (2 minutes)	660° C
Maximum Takeoff EGT (5 minutes)	650° C
Maximum Continuous EGT	610° C
Maximum Start EGT	
Ground (momentary)	575° C
Flight	650° C
Maximum Oil Temperature (continuous)	130° C
(15 minutes)	131° C – 165° C

BASIC SPECS

Gravel Kit Operation Limits and Procedures

THE GRAVEL KIT

For all you 'bush pilots' out there!

One of the more interesting, if not obvious, variations of the 737 200 designs was the addition of the “Gravel Kit” allowing the aircraft an ability to land on unprepared, ungroomed, runways. The "Gravel Kit" format had some significant differences from the initial, “formal design" that was first released without it.

In 1969, with the Gravel Kit installed, the Boeing 737-200 obtained its "gravel runway certification". Some of the main differences in the 737-200 equipped with a Gravel Kit are as follows:

- A nose gear ski to deflect gravel from the underbelly of the fuselage, (hard to miss!)
- Some slightly smaller deflectors, (as compared to the nose gear ski), mounted to the oversized main gear to protect the flaps
- Main gear strut hydraulic tubing and brake cable shields
- Inboard flaps reinforced on the underside with fiberglass
- The entire underside of the aircraft including fuselage and wings were painted with a tough, Teflon based paint
- The under-fuselage aerials were more robust
- The anti-collision light was made retractable
- The engine nacelles were fitted with special "anti-vortex jets". These were small, forward projecting tubes, which blew compressed air forward and down disrupting the intake currents. This helped keep gravel from being sucked in at touchdown and/or taxi.
- As the nose gear retracts, the unit was made to fold forward and then seat into the nose wheel-wells faring

GRAVEL KIT OPERATIONAL LIMITS

Okay, so the bad news is you likely won’t be flying this plane in and out of your favorite fishing hole location if you planned to put it down on a stretch of dirt and pot holes. The runway also had to be able to drain sufficiently so as not to leave any pools of water. The substrate had to be firm for at least 6 inches and void of deep sand or loose rock.

Boeing offered access to their inspection teams who would visit the intended runway and assess it for those minimum qualifications. Now I can almost hear some of the pilots who flew/fly the Cargo runs, (particularly in South America and many of the South Pacific islands), laughing from here!

I have no doubt that one or two of them had to land on a surface that was a little bumpier, a bit wetter, and perhaps slightly softer than the minimum requirements would care to permit. But hey, I'm just the messenger.

BASIC SPECS

Gravel Kit Operation Limits and Procedures

The "Gravel Protect" switch is located just to the right of the start valve arming switch on the overhead panel's light section.

Overhead Panel

Of course, Boeing does have some Operational Procedures in place for those who are piloting an aircraft with a Gravel Kit installed. These are just a few of them, additional procedures were dependent on runways that were atypical of the majority this kit was meant to handle:

- Be sure to have the Antiskid switch on during takeoff and landing, (Boeing recommends the use of the Auto-break during landings).
- The additional landing gear components require a considerably slower speed for operating the gear with a maximum of 180 kts. and a maximum airspeed while gear is extended of 200 kts.
- Gravel Protect switch in the "Anti-Ice" position.
- Vortex dissipater's always on during takeoff and landings. *It is important to note that Boeing requires that all of the engine bleed air be turned off when taking off or landing. This is to ensure that there is sufficient air pressure going to the vortex dissipaters.*
- EPR, (engine pressure ratio), maximum 1.4 while taxiing on gravel and/or before brake release.
- Make wide radius turns, (preferably using the rudder pedals as opposed to the tiller), to prevent digging the nose wheel into the ground.
- Avoid unnecessary and excessive thrust beyond the minimum to sustain proper taxi speeds.
- Permit dust to settle back down before beginning a take off.
- Approximate idle reverse to a maximum of 1.8 EPR when landing on gravel. Turn off reversers when the aircraft has slowed to approximately 60kts.

BASIC SPECS

Gravel Kit Operation Limits and Procedures

To prevent vortices from occurring at the intakes of both engines and reduce the possibility of dust and debris from being pulled into the turbines, the Gravel Kit included a Vortex Dissipater system which can be seen mounted to the nacelles of both engines, (vortex tubes and nose gear ski circled in above screenshots),

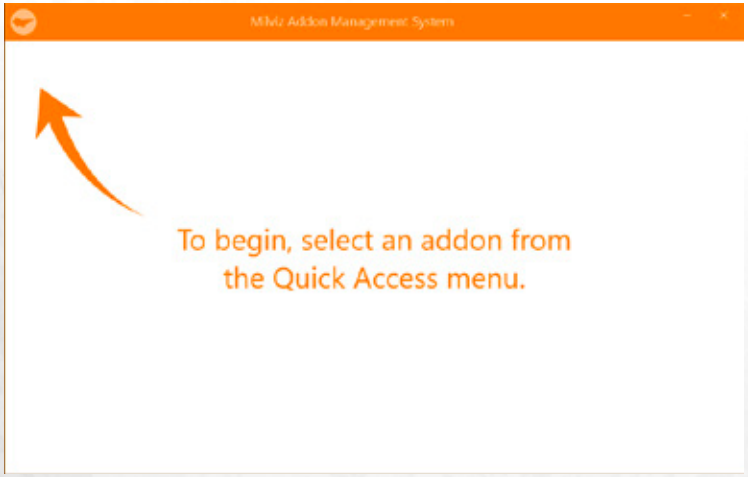
These small tubes projected forward just in front of the intakes. The air pressure got its source from the engine bleed air system and maintained 55 PSI which was sufficient in breaking up the air currents. If you look closely at several of the pictures on this page, you'll see a large rectangular plate that works around all three sides of the nose gear.

The nose gear "ski" is kind of like a fender in that it helps to keep gravel and rocks from being thrown up against the fuselage during landing and takeoff operations. As mentioned earlier, this plate is the main reason why the landing gear should not be operated at over 180 kts. and the gear should not be in its extended position beyond 200 kts.

MVAMS

MORE CONTROL FOR MORE REALISM & IMMERSION

- *Control default state of each individual aircraft, On the Fly!*
- *Change load distribution for a more challenging scenario*
- *Select the NAV systems you want to add or remove*
- *Startup by the book from a complete C&D state or hot-n-quick*
- *And more!*

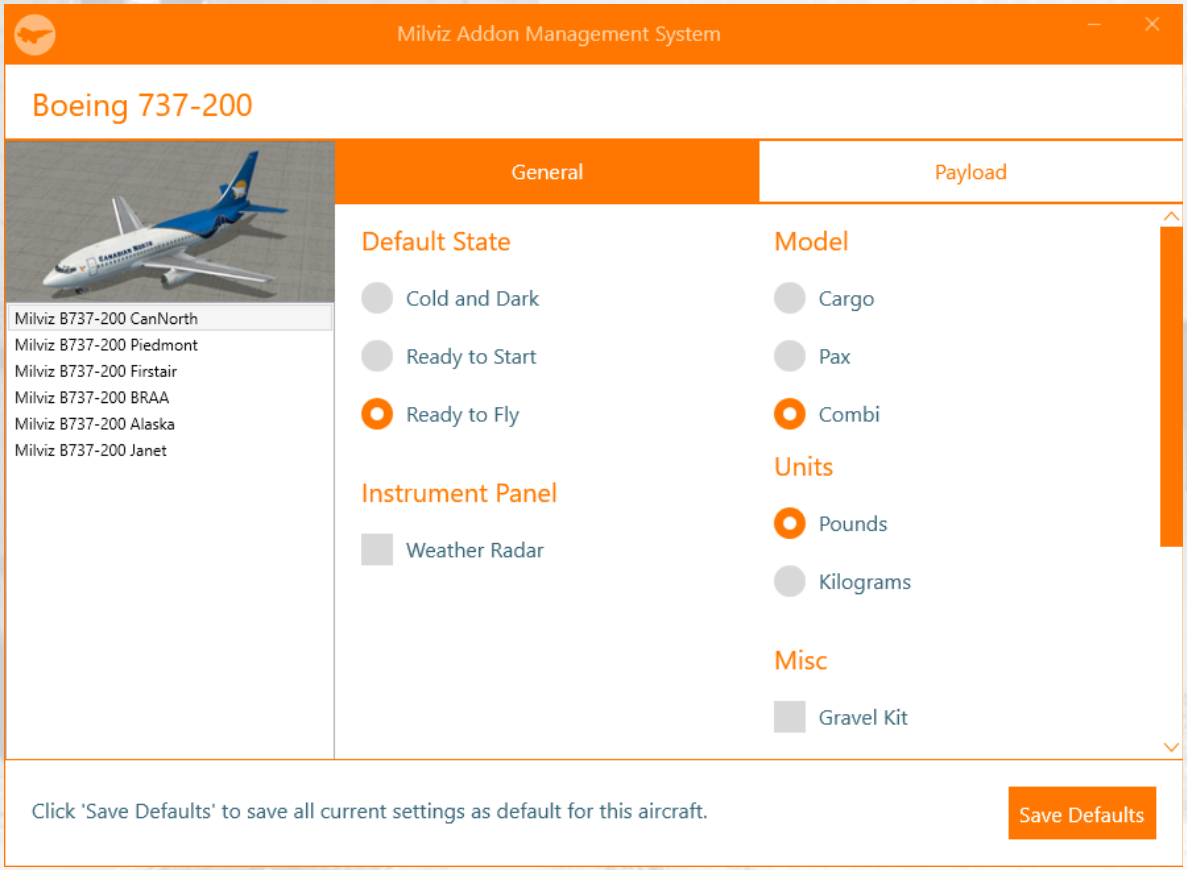


The Milviz Aircraft Management System pre-flight utility is included in the package and can be found on your desktop.

It comprises two pages: The first page gives you the ability to set up the default state, the livery of your choice (with or without the Gravel Kit), the units used and the configuration (Cargo, Pax or Combi).
In addition, if you selected MilvizWX in the installer dialogue, you may now choose which liveries it can be applied to. The second page permits you to make a number of adjustments in the load-out and disbursement of the weight and much more!

You'll first see the panel open as it appears in the top-right picture. Click on the aircraft thumbnail and the first page of the MVAMS panel to open will be for your choice of livery and the model variation you prefer for the flight you have in mind.

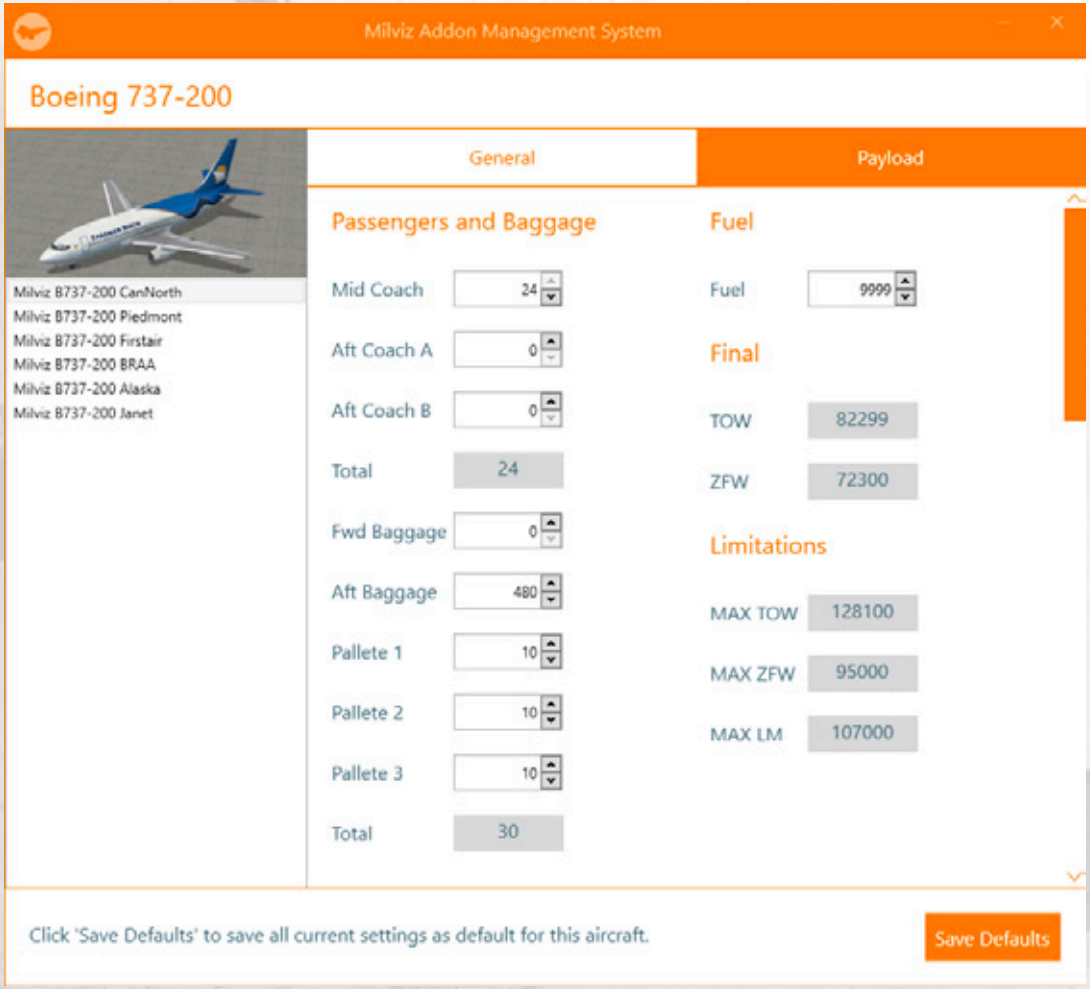
In the example directly to the right, the CanNorth livery has been chosen in Ready to Fly mode. The Combi checkbox has been selected but the Gravel Kit has not; neither has the Milviz WX weather radar. Weight units have been set to Pounds and Default State has been set to 'Ready to Fly'. Once your preferences have been set, click 'Save Defaults'.



MVAMS

MILVIZ AIRCRAFT MANAGEMENT SYSTEM

PANEL PAGE 2



So at this point, every time the Boeing 737-200 with the CanNorth livery is chosen, it'll open as a Combi aircraft supplied without the Gravel Kit and the cockpit will not contain the Milviz WX weather radar.

The 'Payload' tab of the MVAMS will offer numerous options afforded to you based on your previous selections made in Page 1. It's here that you'll be able to adjust the distribution of cargo and passengers, (this example involves both because it's a Combi). You'll also have the ability to adjust the fuel quantity. The MVAMS will keep a running total of weights and capacities as you change them.

Finally, you may want to go through the detailed starting procedure from a "Cold and Dark" state, (everything is off), and can refer to the start-up procedure which begins on Page 12. Or you may not have time for that and want the aircraft "Ready for Takeoff", (engines running, lights and instruments on, etc.), where you only need to throttle up. Some of you may want the aircraft in the state of preparation that many real-world pilots experience. If so, then select "Ready for Start" and when the aircraft opens you'll be in the cockpit with APU & electrical systems on. If the "GEN Off Bus" lights 1&2 are still on, then pickup at "Step 2a" shown on Page 13.

Otherwise, you should see the "APU Gen Off Bus" light go dim at which point you would start with "Step 3" on Page 13. Once your selections are complete, just click "Save Defaults" and all these settings will be maintained until you change them again. You can open and select any configuration for any aircraft you want while the sim is running. However, the aircraft will not pick up the changes until the next time it's opened via the default aircraft alection panel. Also, until you close the MVAMS, you can jump back and forth between the two pages and undo or change any selections you've made. The MVAMS selections are saved & applied only after you close the panel by clicking on the Save Defaults in the top-right corner.

Each time you reload the aircraft it can open with a different configuration if you choose, however there will be disruptions that can occur to your aircraft settings as a result. Why a person would want to do a configuration change at that moment, is anyone's guess. But it's the point of the example and not the example itself that I'm trying to make.

QUICK START

Depending on the selection you've made in the second page of the ACM, you'll either open your aircraft in the **C&D** state to do a complete startup procedure (which begins here), or you chose the "**Ready To Start**" selection and therefore need to go to **Page 13** and begin with "**Step 3**" assuming you want to follow this guide at all.

Please note that if you chose the **C&D** selection and then changed your mind and wanted to start the aircraft using the FSX default startup command, (Ctrl+E), it may not work from this point. You'll have to return to the ACM and select the "Ready to Start" button on the second page.

QUICK-START GUIDE

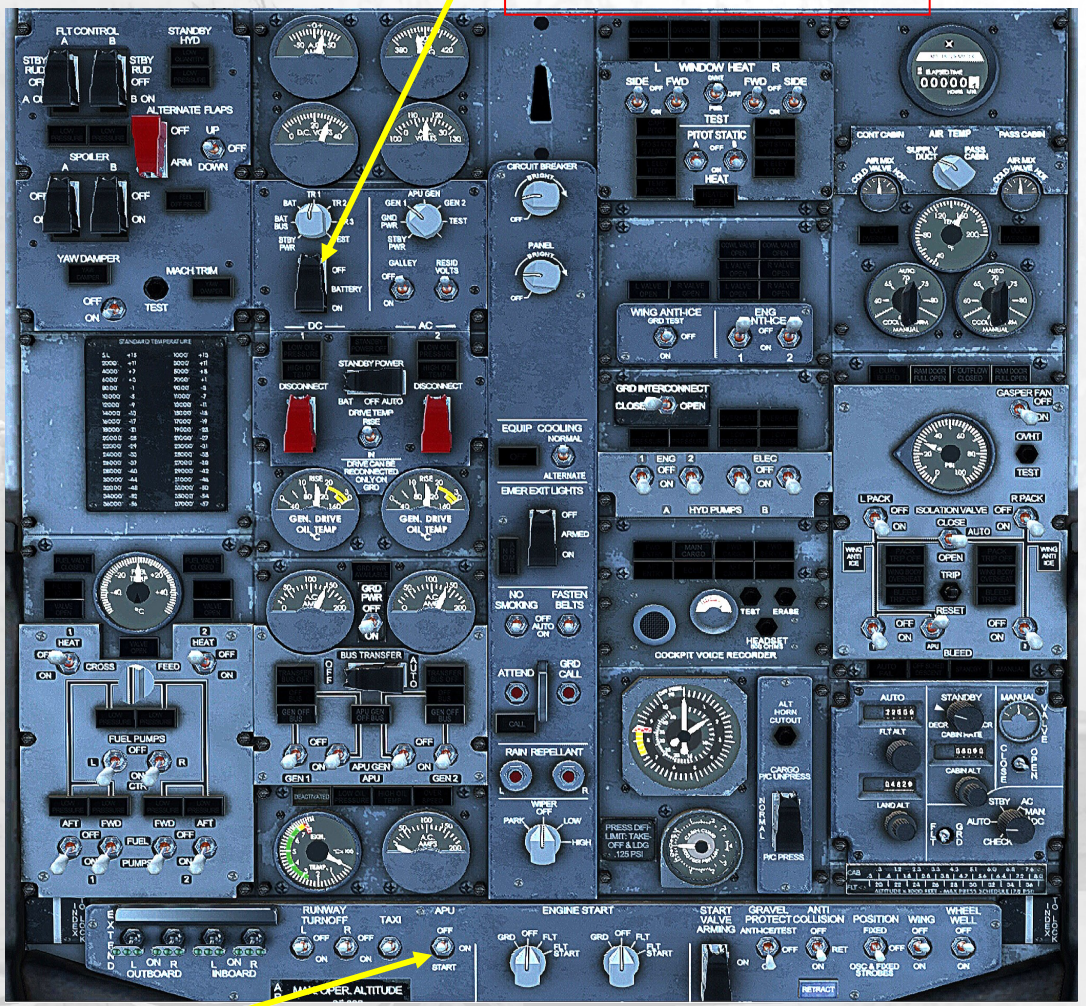
This procedure will cover how to start up the Milviz Boeing 737-200 in FSX or P3D after it's been opened to the airport of your choice.

A very detailed, official, step-by-step procedure, is covered in the Boeing PDF manual. The procedure here takes in the assumption that the **Milviz Boeing 737-200** has been opened in its **C&D** state.

NOTE: To avoid a possible conflict with the engine cutoff levers moving unintentionally, (particularly at high altitude airports), which could cause startup issues, it may be prudent to uncheck the "Auto-mix" option in the FSX "Realism" settings. Even if you're not at a high -altitude airport, uncheck the Auto-mix if you experience any difficulties in the startup.

Overhead Panel

1] Battery On: note that closing the switch cover will trip the switch to the On position.



2] APU Switch, (Three position switch): Left click the switch once to move it to the "ON" position and then once more to "START". The "START" position is a momentary position and the switch will snap back to the "ON" position immediately afterward.

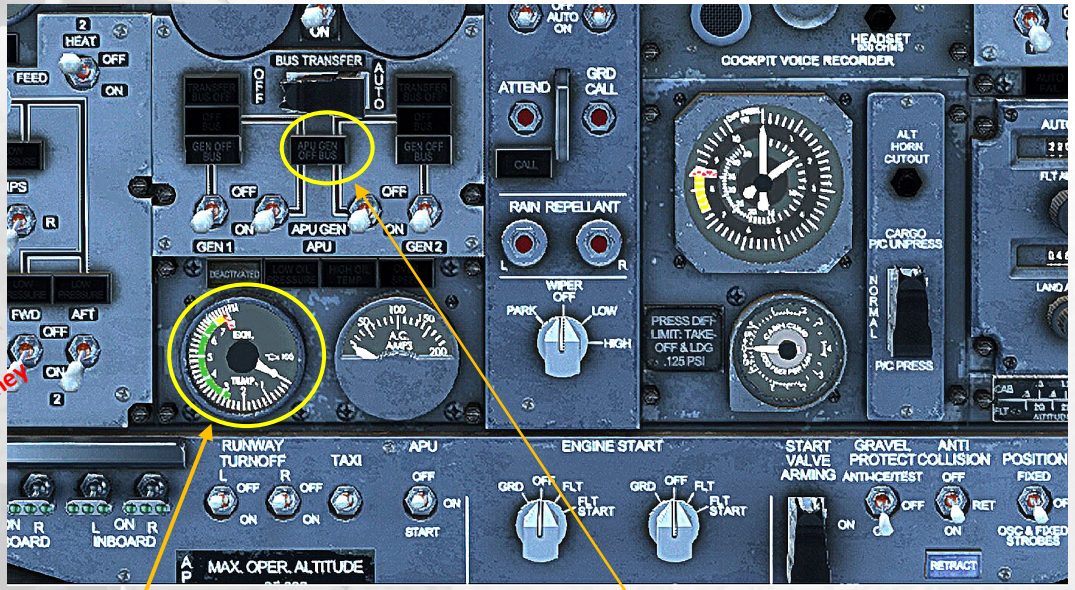
QUICK START

After you execute step two, you'll hear the APU begin the spool up and you'll note that the temperature gauge needle, (EGT) will begin racing clockwise to about 420°.

Shortly afterward, you'll notice the "APU GEN OFF BUS" light turn on and then a few moments later, it will dim.

At that point, you'll flip on the "APU Bleed Air" switch. Then close the "Isolation Valve" switch and switch the "Start Valve Armed" switch to the 'On' position.

Overhead Panel

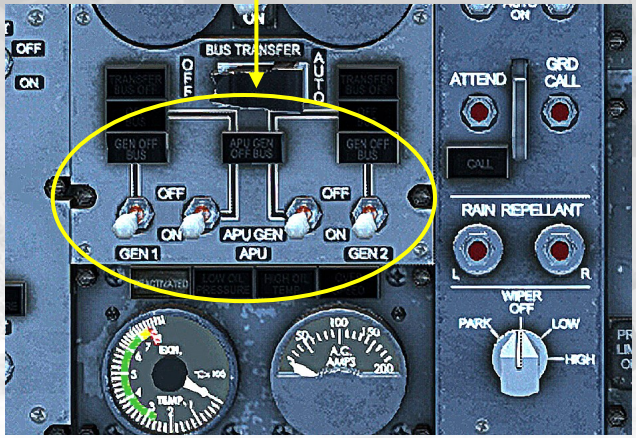


NOTE: "Ready to Start" selection can begin here. Start with Step 3 unless the Gen Off Bus lights are on. If they are, then start with Step 2a.

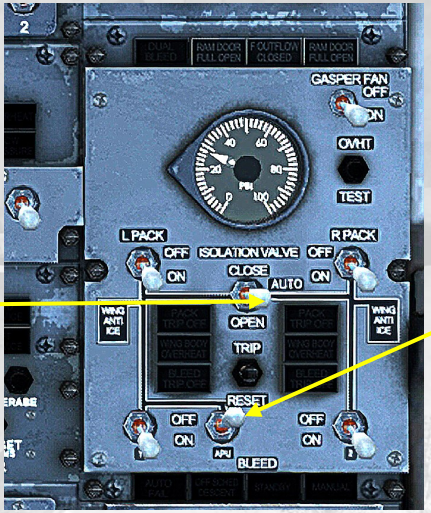
After executing step two you will note that the EGT gauge comes to life as the APU spools up.

Shortly after the indicator on the EGT reaches its settling point, (roughly 420° give or take), the "APU GEN OFF BUS" light will come on and a few moments later, will dim. When that occurs, move on to step 2a.

2a] If the "Gen 1 & 2" lights stay on after "Step 2", 'cycle' them by left clicking on their successive switches. Do the same for the left & right APU switches, (next to each Gen switch), if those lights are still on as well.



Overhead Panel

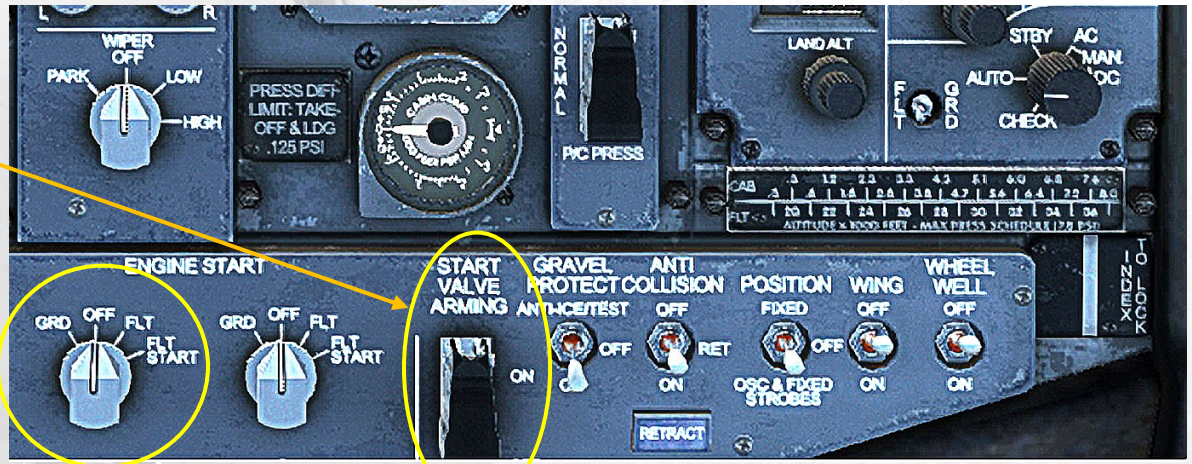


4] "Isolation Valve" switch to the closed position, (up).

3] "APU Bleed Air" switch to "On" position, (down), after the "APU GEN OFF BUS" light goes dim.

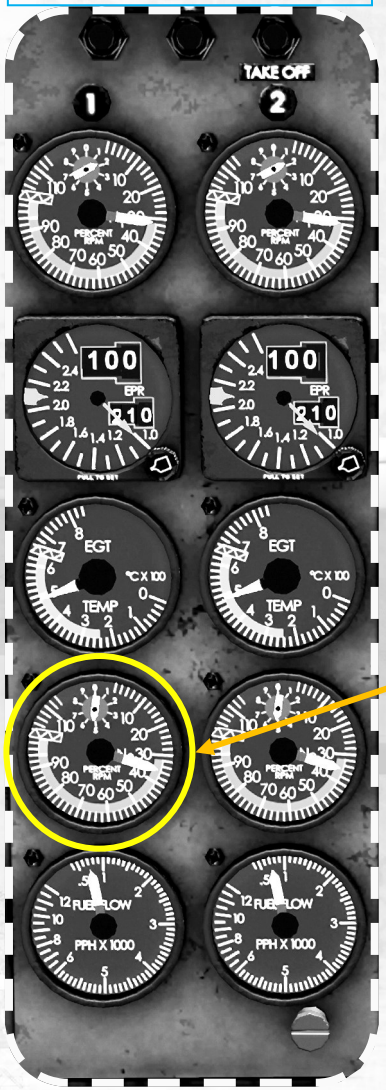
QUICK START

Overhead Panel



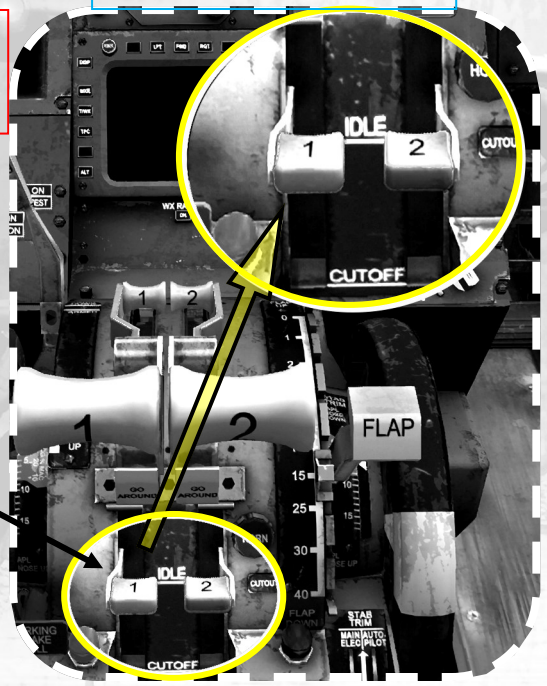
5] Open the "Start Valve Arming" switch cover and flip the toggle switch to "ON".

Cockpit Instrument Panel



6] Turn the left "Engine Start" switch to the "GRD" position.

Throttle Quadrant

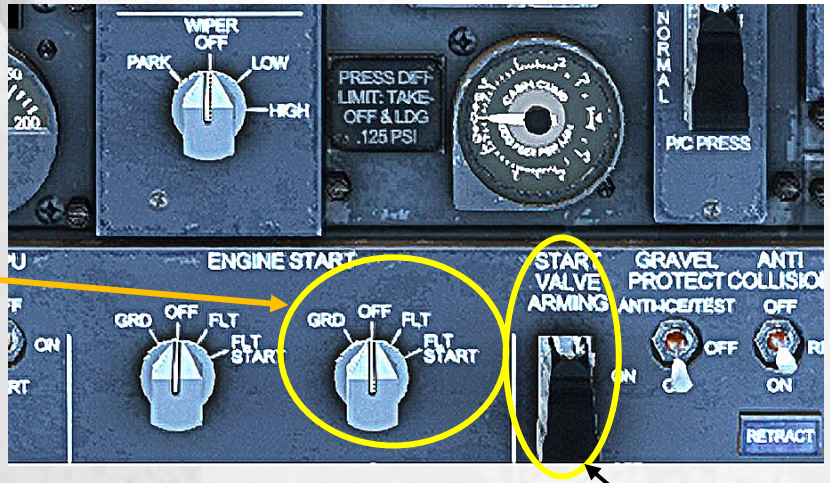


Turn your attention to the cockpit instrument panel and watch the left engine, (N2 RPM), gauge after executing step 6. When the gauge gets to about 22% execute step 7, (click on the left engine "Cut off Lever").

7] Click the left, (#1), "Cut Off" lever when left engine reaches 22%. Then confirm that the left “Engine Start” switch has returned to the “Off” position.

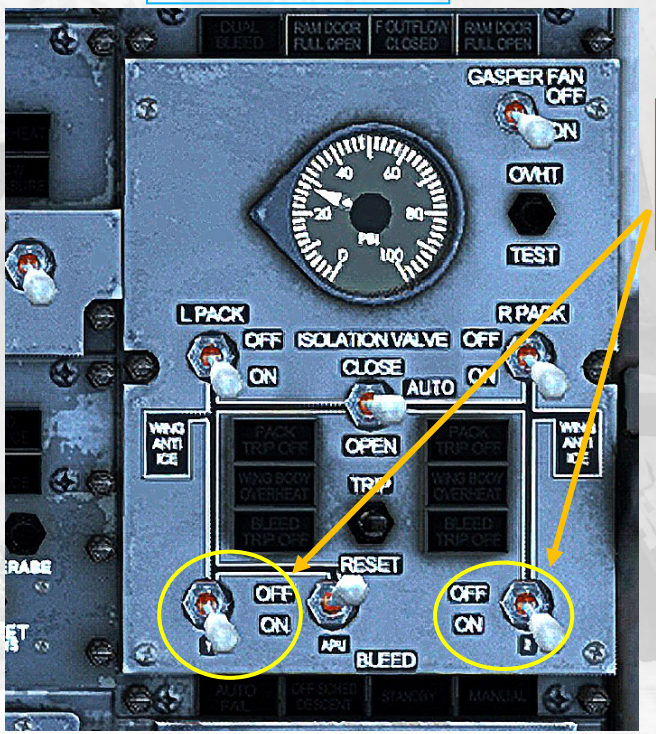
8] Repeat steps 6 & 7 applying them to the Right Engine. Remember to watch for the right engine RPM gauge on the instrument panel to reach 22% before clicking on the right engine "Cut off" lever. Then confirm that the right “Engine Start” switch has returned to the “Off” position.

Overhead Panel



9] Close the "Start Valve Arming" switch cover.

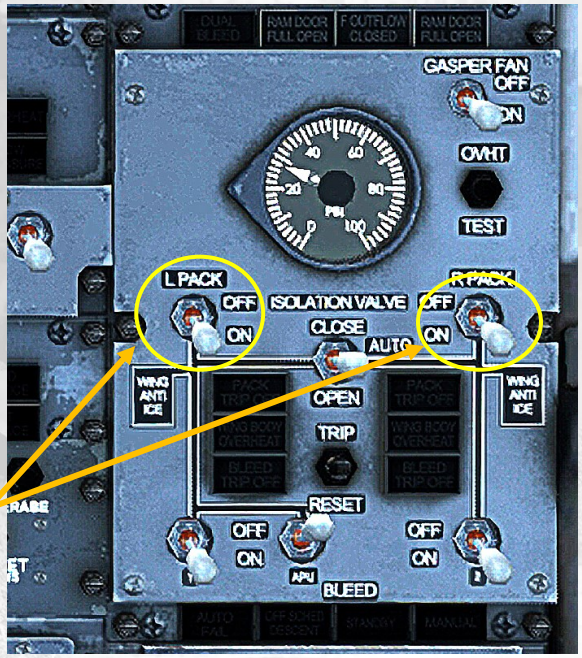
Overhead Panel



10] Turn on both left and right "Engine Bleed Air" switches.

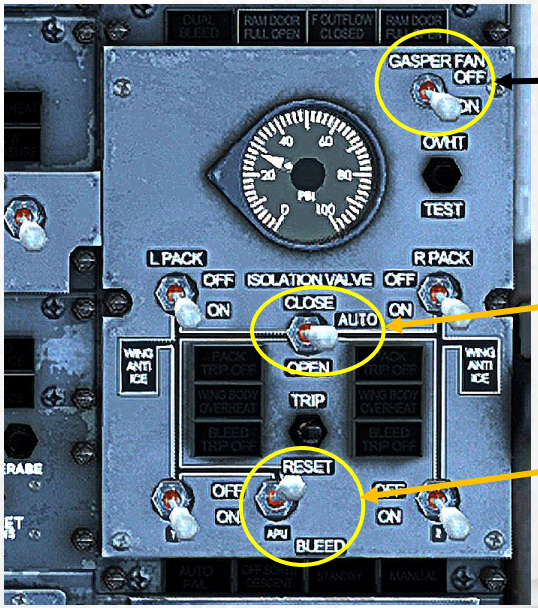
11] Turn on both left and right "L Pack" switches.

Overhead Panel



QUICK START

Overhead Panel



12] "Gasper Fan" switch to "On".

13] "Isolation Valve" switch to the "Auto", (center), position.

14] Switch the "APU Bleed Air" to the "Off", (Up), position.

15] "A" and "B" "Pitot Static Heat" switches "On".

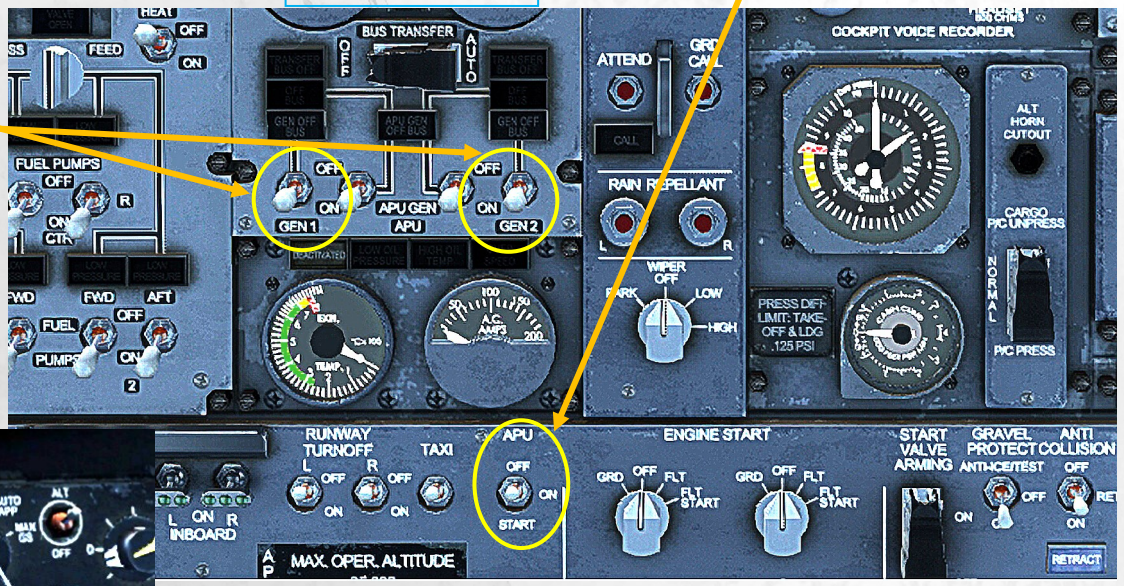
Overhead Panel

16] "Yaw Damper" switch to "On" position.

QUICK START

17] Right-click the "APU" switch to the "Off" position. †

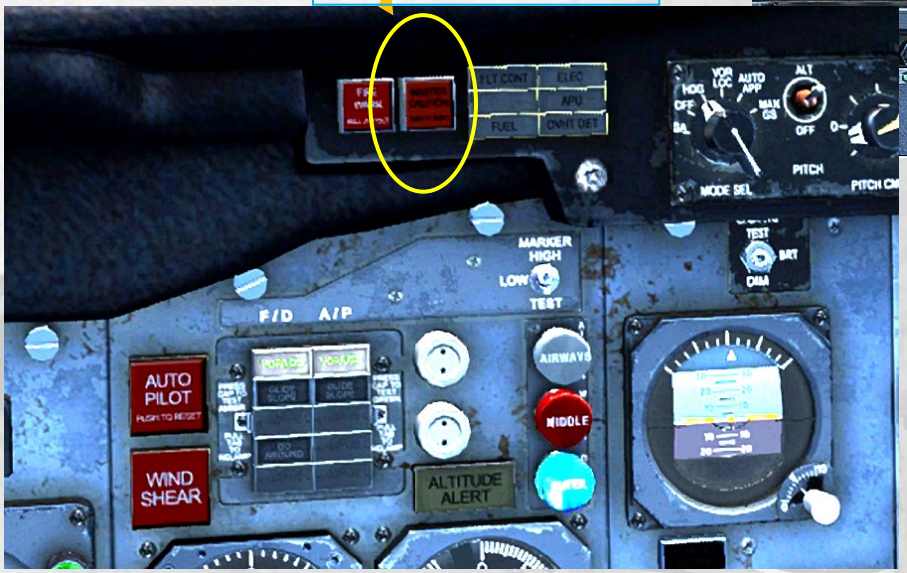
Overhead Panel



18] Finally, cycle "GEN1" & "GEN2" switches by left clicking each one at least once.

19] Press the Master Caution button to reset all the caution lights.

Left Cockpit Glare shield



Once you've executed step 18, the overhead panel should have no lit switches with the exception of those that are optional and up to the flight crew as to whether they're to be applied or not. Both engines should be running normally and the APU should be off.

† It isn't unusual to leave the APU on and running up to about 10,000 feet. However, this startup sequence addresses how to start the Milviz Boeing 737-200 in FSX or P3D. There are most certainly other possible scenarios which could inspire an alternate process which would be followed in real-life applications/situations including the personal preferences of pilot and crew.

SCAN PATTERN

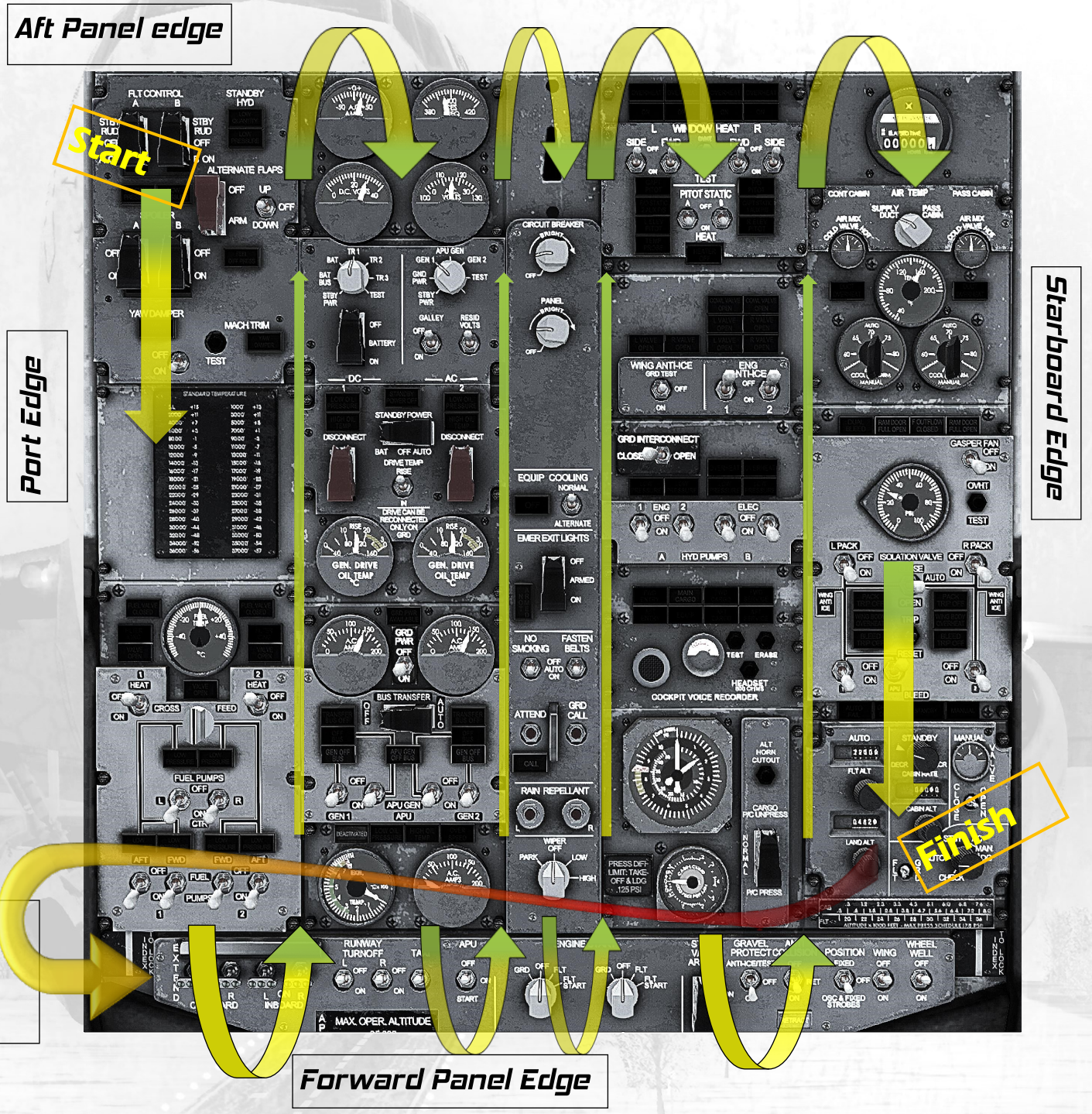
A Tip for what it's worth

You'll find the full and detailed Start Up procedure as listed by Boeing follows a pattern as depicted by the diagram to the right.

Essentially, the Startup process begins in the upper left corner, (Flight Control section), of the Overhead panel, (aft edge of the panel). Then, as indicated by the arrows, the procedure continues to the Fuel Control section stopping just before the Landing light toggle switches.

At that point, the procedure 'runs back up' the panel and resumes with the Electrical Power panel and so on. The 'call-outs', (also covered in the Boeing procedure), skip various sections within the Overhead panel's systems that have already been activated through the supplementary processes.

It finishes in the lower right corner and then sweeps over to the left where they turn their attention to Aircraft Light panel, (forward edge of the panel), beginning with the Landing Lights and working on over to the to the switches at the far right.



Many of us who are not real-world pilots, (including myself), have to rely on the developer of add-on flight simulator aircraft to be true to its flight model in order for us to be sure that we are truly accomplishing something when we successfully landed one of these versions smoothly and by the book.

For me, it's about the sense of accomplishment. When I first started in flight simulators I purchased add -on aircraft that were relatively inexpensive. It wasn't long before I realized these aircraft were just too easy to take off and land. I've been behind the yoke of a few general aviation aircraft in my life. No, I wasn't a pilot, but my father was and I did do a few takeoffs a nd landings with a small Cessna 172 many years ago.

So I did have some idea of what the plane should behave like, (at least small ones like the Cessna 172 or Beechcraft Baron 58). It wasn't long before I realized that the developers who were putting a new model out once every few weeks or so, were perhaps not so critical about their reproduction's characteristics and flight model.

Personally, I noted that companies who aren't pumping out new add-on aircraft for FSX every few weeks or even every month, were the ones who were putting in a lot of effort and selling a product that did take practice to fly correctly.

Military Visualizations Incorporated is one of the few developers who painstakingly capture the flight model details and aircraft's characteristics so closely that each of their aircraft reproductions are among the best in the industry.

These days, it's companies like Milviz that will give you the challenge that you're looking for when you have time to crank up your flight simulator and forget about everything else but what you're doing right then and there.

The Milviz Boeing 737-200 is the most accurate reproduction of this model that you'll find anywhere. Give it a try, slide you realism settings to full and challenge yourself with any one of the Milviz aircraft available today. You won't be disappointed.

Rich Petocz 2013