FlightFX

P180 User Manual

For Microsoft Flight Simulator 2020

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Preface

FOR SIMULATION USE ONLY - DESIGNED FOR SINGLE-PILOT OPERATIONS

Please note that this manual is intended solely for use within Microsoft Flight Simulator and is not applicable to real-world operations. This document may evolve and be updated as the aircraft continues to develop. Not all procedures and steps in this manual may reflect those expected in real-life operations. To ensure smooth single-pilot operation within the simulator, certain adjustments have been made.

PHOTOSENSITIVE SEIZURE WARNING

A small percentage of individuals may experience seizures when exposed to certain visual stimuli such as flashing lights or patterns commonly found in video games. This can occur even in individuals with no prior history of epilepsy or seizures. If you experience any symptoms such as dizziness, vision changes, twitching, or loss of consciousness, stop playing immediately and consult a physician.

To minimize the risk of photosensitive seizures:

- Play in a well-lit room.
- Take regular breaks, especially if you feel tired or fatigued.
- If you or a family member has a history of seizures or epilepsy, consult a doctor before using this simulation.

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About The P180

FlightFX proudly presents the P180, an innovative executive turboprop aircraft that stands out for its forward aerodynamic surfaces, rear-mounted engines, and refined interior design. This twin-engine pusher brings an impressive blend of speed, efficiency, and comfort—setting a new standard for turboprop operations in Microsoft Flight Simulator.

Cutting-Edge Design and Performance

Thanks to its unique aerodynamic configuration of forward canards and rear-mounted pusher propellers, the P180 is capable of cruise speeds approaching mach .7, placing its performance on par with many light jets. With a service ceiling 41,000 feet and a range of approximately 1,500 nautical miles, it's remarkably versatile for short- to mid-range missions. The combination of laminar-flow wing designs, optimized thrust lines, and a pressurized cabin results in a stable, comfortable ride that business flyers and private pilots alike can appreciate.

Spacious, Comfortable Cabin

While compact from the outside, the P180's pressurized cabin offers a sophisticated space that caters to both business and leisure travel. It features executive-style seating and the option to select from two distinct interior themes, each enhanced by interactive items and premium finishings such as in-flight service

visuals. By placing the propellers behind the main fuselage, cabin noise is significantly reduced, and FlightFX's custom noise-canceling solution refines the environment further to provide a tranquil, enjoyable passenger experience.

Developed and Verified by Experts

The authenticity of the P180 is the result of meticulous research and collaboration with real-world pilots and a dedicated beta community. Their collective feedback shaped every aspect of the flight model, avionics, and cockpit ergonomics. This approach ensures the final product replicates the unique handling characteristics of a high-performance turboprop—from its nimble ground handling to the signature feel of its takeoff and cruise phases.

Signature Features & Systems

ProLine 21 Avionics

An advanced cockpit suite with specialized system pages, a custom CAS panel, and dedicated softkey menus.

Advanced Flight & Engine Modeling

Custom prop simulation, pressurization and engine damage logic capture the nuances of turboprop performance. True to book performance in takeoff, climb and cruise with feedback from real pilots.

Custom Prop & Steering Control

Enjoy specialized taxi and takeoff steering modes, plus beta range controls for precise power management—ensuring excellent ground maneuverability and smooth handling in every phase of flight. Additionally, users can expect functional autofeather in emergency situations.

For Beginners & Pros Alike

Choose between simplified workflows for an easier experience, or opt for advanced realism complete with specialized steering modes and engine damage potential—catering to both casual flyers and seasoned pilots.

Updated V.A.M.S. (Virtual Aircraft Management System)

Includes a multi-directional mount for flexible tablet positioning or hiding. Built-in support for Navigraph and OpenStreetMap enhances your flight planning.

Immersive Audio & Noise Management

Onsite recordings capture every engine, mechanical, and alert sound and our built in, noise-canceling system reduces fatigue on long flights without the loss of important radio communications.

Realistic Start-Up & Alerts

True-to-life procedures plus a suite of custom alarms and messages for maximum immersion.

Selectable Cabin Enhancements

We've integrated a series of optional items—such as decorative pillows, meals, work accessories, and other 'clutter' elements—that can be toggled on or off to tailor the cabin's appearance and functionality. This approach allows users to personalize their in-flight experience and keeps the interior environment sleek or fully equipped, depending on preference.

Selectable Cargo Enhancements

Just like with cabin items, users can introduce a suite of optional cargo elements—such as suitcases, ski equipment, and golf bags—that can be turned on or off in the cargo area. This feature allows for customizable cargo configurations that cater to different types of flights, further immersing the user in the operational realism and versatility of the aircraft.

A Pilot-Centric Experience

At its core, the P180 is designed to put pilots in full command of a refined, high-performance aircraft—one that balances approachability with technical depth. Whether handling an IFR flight plan in challenging weather or executing precise short-field landings, the P180's avionics and flight model are tuned to respond faithfully to pilot inputs. The separate steering modes and finely calibrated beta range controls offer superior control during ground operations, while the selectable Simplified or Advanced Modes let you tailor the experience to your personal skill level or operational preferences. From pre-flight checks to final shutdown, every step has been crafted to give pilots a sense of realism and mastery.

Ongoing Support and Future Updates

FlightFX is committed to sustaining a high-quality experience through ongoing updates and continuous community engagement. Regular patches will address user feedback and refine existing features, ensuring the P180 continues to meet and exceed expectations. For direct developer interaction and real-time support, sim pilots are encouraged to join the official FlightFX Discord community. A detailed flight manual, covering everything from basic procedures to advanced avionics usage, is also available on the FlightFX website.

Preferred Methods of Contact

Discord

Email

Specifications

Engines

- Number of Engines: 2
- Engine Manufacturer: Pratt & Whitney Canada
- Engine Model Number: PT6A-66 or PT6A-66B (depending on variant)
- Rated Horsepower: 850 HP
- Propeller Speed (rpm):
    - Takeoff and climb: 2000 rpm
    - Cruise: 1800/2000 rpm
- Engine Type: Free Turbine, Reverse Flow, 2-Shaft
    - Compressor stages/type: 4 axial + 1 centrifugal
    - Turbine stages/type: 1 stage compressor, 2 stages power
    - Combustion chamber type: Annular
- Number of Propellers: 2
- Propeller Manufacturer: Hartzell
- Number of Blades: 5 each

Limitations

Power Setting	SHP	Torque 2000 RPM	Torque 1900 RPM	Torque 1800 RPM	Max Observed ITT°C	Ng %	Np RPM	Oil Pressure PSIG	Oil Temperature °C
TAKEOFF	850	2230	-	-	830	104.1	2000	90 to 135	0 to 104
MAX. CONTINUOUS / MAX. CLIMB / MAX CRUISE	850	2230	-	-	830	104.1	2000	90 to 135	0 to 104
	806	-	2230	-					
	762	-	-	2230					
NORMAL CLIMB / NORMAL CRUISE	850	2230	-	-	820	104.1	2000	90 to 135	Climb 0 to 104 / Cruise 20 to 104
	806	-	2230	-					
	762	-	-	2230					
MIN. IDLE	-	-	-	-	750	51	-	60 (MIN)	-40 to 110
STARTING	-	-	-	-	1000	-	-	200 (MAX)	-40 (MIN)
TRANSIENT	-	2750	2750	2750	870	104.1	2205	40 to 200	0 to 110
MAX. REVERSE	-	-	-	-	760	-	1900	90 to 135	0 to 104

Maximum Weights

Depending on specific aircraft configuration/modifications, typical max weights are:

- Maximum Ramp Weight: 11,600 lbs (5262 kg) or up to 12,150 lbs (5511 kg)
- Maximum Takeoff Weight: 11,550 lbs (5239 kg) or up to 12,100 lbs (5489 kg)
- Maximum Landing Weight: 10,945 lbs (4965 kg) or up to 11,500 lbs (5216 kg)
- Maximum Zero Fuel Weight: 9800 lbs (4445 kg) or 10,200 lbs (4627 kg)

Aircraft Weights

- Empty Weight: ~7500 lbs (3266 kg)
- Maximum Useful Load: ~4230 lbs (1919 kg)

Note: Actual values depend on how the aircraft is configured in the simulator's weight and balance settings.

Airspeeds For Normal Operations

Below are some recommended airspeeds to adhere to when using the P180. These figures are based on maximum take off weight and operation under normal conditions.

Speed Description	KIAS
Recommended climb speed up to 30,000 ft. Reduce speed 1 kias for each 1000 ft. above 30000 ft.	160
VX (Best angle of climb speed)	133
VY (Best rate of climb speed)	154
Approach speed at maximum landing weight (flap mid)	129
Approach speed at maximum landing weight (flap dn)	121
Aborted landing climb speed (flap mid)	130
Aborted landing climb speed (flap dn)	115
Approximate rotation speed	108-115
Max. crosswind velocity	25
Max. mach number	0.7
Max. operating speed	260
Maneuvering speed at 11550 lb	177
Maneuvering speed at 7700 lb	152
Max. flap operating speed (up to mid)	170
Max.flap operating speed (mid to dn)	150
Max. flap extended speed (flap mid)	180
Max. flap extended speed (flap dn)	175
Max. landing gear operating speed	180
Maximum landing gear extended speed	185
Max. landing light operating speed	160
Rough air penetration speed at or below 25,000 ft. reduce speed 5 kias for each 5000 ft above 25,000 ft.	195

Performance Tables

MAXIMUM CRUISE POWER
2000 RPM
ISA -30°C

PRESS. ALT.	SAT		ENG. TORQUE	FUEL FLOW PER ENG.	TOTAL FUEL FLOW	AIRSPEED KNOTS					
						11000 LBS		10000 LBS		9000 LBS	
						(4990 KG)		(4536 KG)		(4082 KG)	
FEET	°C	°F	%	LBS/HR	LBS/HR	TAS	IAS	TAS	IAS	TAS	IAS
0	-15	5	65.0	448	896	244	260	244	260	244	260
5000	-25	-13	69.9	418	836	262	260	262	260	262	260
10000	-35	-31	74.4	393	786	281	260	281	260	281	260
15000	-45	-48	78.9	374	748	302	260	302	260	302	260
20000	-55	-66	82.9	362	724	325	260	325	260	325	260
23000	-61	-77	85.9	361	722	340	260	340	260	340	260
25000	-65	-84	88.5	362	724	350	260	350	260	350	260
27000	-68	-91	91.4	368	736	361	260	361	260	361	260
28000	-70	-95	93.1	373	746	366	260	366	260	366	260
29000	-72	-98	91.2	366	732	367	256	367	256	367	256
31000	-76	-106	84.7	342	684	363	245	363	245	363	245
33000	-80	-113	78.6	321	642	360	234	360	234	360	234
35000	-84	-120	73.0	301	602	356	223	356	223	356	223
37000	-86	-123	68.3	284	568	354	213	354	213	354	213
39000	-86	-123	64.3	271	542	354	203	354	203	354	203
41000	-86	-123	60.7	259	518	354	194	354	194	354	194

MAXIMUM CRUISE POWER
2000 RPM
ISA -20°C

PRESS. ALT.	SAT		ENG. TORQUE	FUEL FLOW PER ENG.	TOTAL FUEL FLOW	AIRSPEED KNOTS					
						11000 LBS		10000 LBS		9000 LBS	
						(4990 KG)		(4536 KG)		(4082 KG)	
FEET	°C	°F	%	LBS/HR	LBS/HR	TAS	IAS	TAS	IAS	TAS	IAS
0	-5	23	66.3	454	908	249	260	249	260	249	260
5000	-15	5	71.3	425	850	267	260	267	260	267	260
10000	-25	-13	76.0	401	802	286	260	286	260	286	260
15000	-35	-30	80.6	382	764	308	260	308	260	308	260
20000	-45	-48	84.8	370	740	332	260	332	260	332	260
23000	-51	-59	87.9	370	740	348	260	348	260	348	260
25000	-55	-66	90.6	372	744	358	260	358	260	358	260
27000	-58	-73	93.6	379	758	370	260	370	260	370	260
28000	-60	-77	95.3	384	768	375	260	375	260	375	260
29000	-62	-80	93.5	377	754	376	256	376	256	376	256
31000	-66	-88	86.8	353	706	373	245	373	245	373	245
33000	-70	-95	80.6	331	662	369	234	369	234	369	234
35000	-74	-102	75.0	311	622	365	223	365	223	365	223
37000	-76	-105	70.1	293	586	363	213	363	213	363	213
39000	-76	-105	66.0	279	558	363	203	363	203	363	203
41000	-76	-105	56.8	246	492	351	187	357	190	363	194

MAXIMUM CRUISE POWER
2000 RPM
ISA -10°C

PRESS. ALT.	SAT		ENG. TORQUE	FUEL FLOW PER ENG.	TOTAL FUEL FLOW	AIRSPEED KNOTS					
						11000 LBS		10000 LBS		9000 LBS	
						(4990 KG)		(4536 KG)		(4082 KG)	
FEET	°C	°F	%	LBS/HR	LBS/HR	TAS	IAS	TAS	IAS	TAS	IAS
0	5	41	67.5	460	920	253	260	253	260	253	260
5000	-5	23	72.6	432	864	272	260	272	260	272	260
10000	-15	5	77.5	410	820	292	260	292	260	292	260
15000	-25	-12	82.2	392	784	315	260	315	260	315	260
20000	-35	-30	86.6	381	762	339	260	339	260	339	260
23000	-41	-41	89.9	381	762	355	260	355	260	355	260
25000	-45	-48	92.6	383	766	366	260	366	260	366	260
27000	-48	-55	95.8	391	782	378	260	378	260	378	260
28000	-50	-59	97.6	396	792	384	260	384	260	384	260
29000	-52	-62	95.7	389	778	385	256	385	256	385	256
31000	-56	-70	88.9	364	728	381	245	381	245	381	245
33000	-60	-77	82.6	341	682	378	234	378	234	378	234
35000	-64	-84	75.8	317	634	373	222	374	223	374	223
37000	-66	-87	67.1	285	570	363	207	369	211	373	213
39000	-66	-87	57.0	249	498	349	189	355	193	361	197
41000	-66	-87	48.6	218	436	–	–	341	176	348	180

MAXIMUM CRUISE POWER
2000 RPM
ISA

PRESS. ALT.	SAT		ENG. TORQUE	FUEL FLOW PER ENG.	TOTAL FUEL FLOW	AIRSPEED KNOTS					
						11000 LBS (4990 KG)		10000 LBS (4536 KG)		9000 LBS (4082 KG)	
FEET	°C	°F	%	LBS/HR	LBS/HR	TAS	IAS	TAS	IAS	TAS	IAS
0	15	59	68.7	468	936	258	260	258	260	258	260
5000	5	41	73.9	442	884	277	260	277	260	277	260
10000	-5	23	79.0	419	838	298	260	298	260	298	260
15000	-15	6	83.9	401	802	321	260	321	260	321	260
20000	-25	-12	88.4	391	782	346	260	346	260	346	260
23000	-31	-23	91.8	391	782	363	260	363	260	363	260
25000	-35	-30	94.6	394	788	374	260	374	260	374	260
27000	-38	-37	97.9	401	802	386	260	386	260	386	260
28000	-40	-41	94.7	390	780	386	255	389	257	392	259
29000	-42	-44	90.5	374	748	383	249	386	251	390	253
31000	-46	-52	82.6	345	690	377	236	382	239	385	241
33000	-50	-59	74.9	318	636	370	223	375	226	380	230
35000	-54	-66	67.7	291	582	363	211	368	214	374	217
37000	-56	-69	59.2	260	520	351	195	357	199	363	202
39000	-56	-69	50.5	228	456	335	177	343	181	350	186
41000	-56	-69	42.5	199	398	–	–	–	–	335	168

MAXIMUM CRUISE POWER
2000 RPM
ISA +10°C

PRESS. ALT.	SAT		ENG. TORQUE	FUEL FLOW PER ENG.	TOTAL FUEL FLOW	AIRSPEED KNOTS					
						11000 LBS (4990 KG)		10000 LBS (4536 KG)		9000 LBS (4082 KG)	
FEET	°C	°F	%	LBS/HR	LBS/HR	TAS	IAS	TAS	IAS	TAS	IAS
0	25	77	69.9	477	954	262	260	262	260	262	260
5000	15	59	75.2	452	904	282	260	282	260	282	260
10000	5	41	80.4	430	860	303	260	303	260	303	260
15000	-5	24	85.5	413	826	327	260	327	260	327	260
20000	-15	6	90.1	401	802	353	260	353	260	353	260
23000	-21	-5	93.7	401	802	370	260	370	260	370	260
25000	-25	-12	96.6	403	806	382	260	382	260	382	260
27000	-28	-19	90.4	379	758	381	250	384	252	387	254
28000	-30	-23	86.5	364	728	379	244	382	246	385	248
29000	-32	-26	82.6	350	700	376	238	379	240	383	243
31000	-36	-34	74.9	322	644	369	225	374	229	378	231
33000	-40	-41	67.5	295	590	361	212	367	216	372	219
35000	-44	-48	60.3	268	536	351	198	358	202	364	206
37000	-46	-51	52.8	240	480	338	183	346	187	353	191
39000	-46	-51	44.8	210	420	–	–	329	169	338	174
41000	–	–	–	–	–	–	–	–	–	–	–

MAXIMUM CRUISE POWER
2000 RPM
ISA +20°C

PRESS. ALT.	SAT		ENG. TORQUE	FUEL FLOW PER ENG.	TOTAL FUEL FLOW	AIRSPEED KNOTS					
						11000 LBS		10000 LBS		9000 LBS	
						(4990 KG)		(4536 KG)		(4082 KG)	
FEET	°C	°F	%	LBS/HR	LBS/HR	TAS	IAS	TAS	IAS	TAS	IAS
0	35	95	71.0	489	978	267	260	267	260	267	260
5000	25	77	76.5	464	928	287	260	287	260	287	260
10000	15	59	81.8	441	882	309	260	309	260	309	260
15000	5	42	87.0	423	846	333	260	333	260	333	260
20000	-5	24	91.8	411	822	360	260	360	260	360	260
23000	-11	13	95.0	408	816	377	259	377	260	377	260
25000	-15	6	87.9	378	756	374	248	377	250	379	252
27000	-18	-1	80.5	350	700	370	237	373	239	376	241
28000	-20	-5	76.9	336	672	367	231	370	233	374	236
29000	-22	-8	73.3	323	646	365	225	368	228	371	230
31000	-26	-16	66.3	296	592	357	212	362	216	366	218
33000	-30	-23	59.3	270	540	347	199	353	203	359	206
35000	-34	-30	53.2	247	494	336	185	344	190	351	194
37000	-36	-33	46.7	221	442	319	168	331	174	340	180
39000	-36	-33	38.8	192	384	–	–	–	–	317	159
41000	–	–	–	–	–	–	–	–	–	–	–

MAXIMUM CRUISE POWER
2000 RPM
ISA +30°C

PRESS. ALT.	SAT		ENG. TORQUE	FUEL FLOW PER ENG.	TOTAL FUEL FLOW	AIRSPEED KNOTS					
						11000 LBS		10000 LBS		9000 LBS	
						(4990 KG)		(4536 KG)		(4082 KG)	
FEET	°C	°F	%	LBS/HR	LBS/HR	TAS	IAS	TAS	IAS	TAS	IAS
0	45	113	72.2	500	1000	271	260	271	260	271	260
5000	35	95	77.8	475	950	291	260	291	260	291	260
10000	25	77	83.3	452	904	314	260	314	260	314	260
15000	15	60	88.6	432	864	339	260	339	260	339	260
20000	5	42	88.4	402	804	359	254	360	255	361	256
23000	-1	31	80.0	363	726	357	240	360	242	361	243
25000	-5	24	73.9	337	674	354	230	357	232	360	234
27000	-8	17	67.2	311	622	349	218	352	221	356	223
28000	-10	13	63.9	298	596	345	212	349	215	353	217
29000	-12	10	60.6	285	570	341	206	346	209	350	211
31000	-16	2	53.9	259	518	329	191	338	196	342	199
33000	-20	-5	48.4	237	474	315	176	327	183	336	188
35000	-24	-12	43.2	216	432	291	156	314	169	326	176
37000	-26	-15	38.3	195	390	–	–	–	–	306	157
39000	–	–	–	–	–	–	–	–	–	–	–
41000	–	–	–	–	–	–	–	–	–	–	–

MAXIMUM RANGE POWER
2000 RPM
ISA -30°C

			11000 LBS (4990 KG)				10000 LBS (4536 KG)				9000 LBS (4082 KG)			
PRESS. ALT.	SAT		ENG. TOR QUE	FUEL FLOW PER ENG.	AIR-SPEED		ENG. TOR QUE	FUEL FLOW PER ENG.	AIR-SPEED		ENG. TOR QUE	FUEL FLOW PER ENG.	AIR-SPEED	
					TAS	IAS			TAS	IAS			TAS	IAS
FEET	°C	°F	%	LBS/HR	KTS	KTS	%	LBS/HR	KTS	KTS	%	LBS/HR	KTS	KTS
0	-15	5	59.6	433	237	251	56.2	424	233	248	52.8	414	230	245
5000	-25	-13	57.0	383	242	240	53.8	374	239	237	50.5	365	236	233
10000	-35	-31	54.2	338	248	229	50.9	329	245	226	47.9	321	241	222
15000	-45	-48	51.4	298	254	218	48.3	290	250	214	45.2	282	247	211
20000	-55	-66	48.1	263	260	206	45.2	255	256	203	42.4	248	252	200
23000	-61	-77	46.6	246	264	200	43.2	237	260	196	40.5	230	256	193
25000	-65	-84	45.7	235	267	195	42.4	226	262	192	39.2	217	258	189
27000	-68	-91	44.7	225	269	191	41.5	216	265	187	38.3	207	260	184
28000	-70	-95	44.1	221	271	189	41.0	212	266	185	37.9	203	262	182
29000	-72	-98	43.6	216	272	186	40.5	207	267	183	37.4	198	263	180
31000	-76	-106	43.4	210	275	182	39.5	198	270	179	36.5	189	265	175
33000	-80	-113	42.9	204	277	177	39.1	192	272	174	35.4	181	267	171
35000	-84	-120	42.2	198	280	173	38.7	186	275	170	35.1	175	270	166
37000	-86	-123	41.7	193	284	168	38.3	181	279	165	34.8	170	273	162
39000	-86	-123	41.3	189	290	164	37.9	178	284	161	34.5	166	278	157
41000	-86	-123	40.8	186	295	160	37.4	174	289	156	34.1	163	283	153

MAXIMUM RANGE POWER
2000 RPM
ISA -20°C

			11000 LBS (4990 KG)				10000 LBS (4536 KG)				9000 LBS (4082 KG)			
PRESS. ALT.	SAT		ENG. TOR QUE	FUEL FLOW PER ENG.	AIR-SPEED		ENG. TOR QUE	FUEL FLOW PER ENG.	AIR-SPEED		ENG. TOR QUE	FUEL FLOW PER ENG.	AIR-SPEED	
					TAS	IAS			TAS	IAS			TAS	IAS
FEET	°C	°F	%	LBS/HR	KTS	KTS	%	LBS/HR	KTS	KTS	%	LBS/HR	KTS	KTS
0	-5	23	58.1	431	237	247	54.7	421	234	244	51.2	411	231	240
5000	-15	5	56.0	382	243	237	52.7	372	240	233	49.4	363	237	230
10000	-25	-13	53.6	338	250	226	50.3	329	246	223	47.2	321	243	219
15000	-35	-30	51.2	300	257	215	48.0	291	253	212	44.8	282	249	209
20000	-45	-48	48.3	266	264	205	45.3	258	260	201	42.4	250	256	198
23000	-51	-59	47.0	250	269	198	43.5	240	264	195	40.8	232	260	192
25000	-55	-66	46.3	239	272	194	42.9	230	267	191	39.6	220	262	187
27000	-58	-73	45.3	230	275	190	42.1	221	270	186	38.8	211	265	183
28000	-60	-77	44.8	225	276	188	41.7	216	271	184	38.4	207	267	181
29000	-62	-80	44.4	221	278	186	41.2	212	273	182	38.1	202	268	179
31000	-66	-88	44.3	216	281	181	40.2	203	276	178	37.2	194	271	175
33000	-70	-95	43.9	210	284	177	40.0	198	279	174	36.2	186	274	170
35000	-74	-102	43.3	204	287	173	39.7	192	282	170	35.9	180	277	166
37000	-76	-105	42.9	199	292	169	39.3	187	286	165	35.7	176	281	162
39000	-76	-105	42.5	196	298	164	39.0	184	292	161	35.5	172	286	158
41000	-76	-105	42.1	192	304	160	38.6	180	298	157	35.2	168	292	153

MAXIMUM RANGE POWER
2000 RPM
ISA -10°C

			11000 LBS (4990 KG)				10000 LBS (4536 KG)				9000 LBS (4082 KG)			
PRESS. ALT.	SAT		ENG. TOR QUE	FUEL FLOW PER ENG.	AIR-SPEED		ENG. TOR QUE	FUEL FLOW PER ENG.	AIR-SPEED		ENG. TOR QUE	FUEL FLOW PER ENG.	AIR-SPEED	
					TAS	IAS			TAS	IAS			TAS	IAS
FEET	°C	°F	%	LBS/HR	KTS	KTS	%	LBS/HR	KTS	KTS	%	LBS/HR	KTS	KTS
0	5	41	55.4	422	236	241	51.8	411	232	237	48.2	400	228	234
5000	-5	23	53.9	378	243	231	50.5	368	239	228	47.1	358	235	224
10000	-15	5	52.2	337	250	222	48.7	327	246	218	45.5	318	242	214
15000	-25	-12	50.4	300	258	212	47.1	291	254	208	43.8	281	250	205
20000	-35	-30	48.0	268	267	202	45.0	259	262	199	41.9	251	257	195
23000	-41	-41	47.2	253	272	196	43.5	242	267	193	40.5	234	262	189
25000	-45	-48	46.6	242	275	192	43.0	232	271	189	39.6	222	266	185
27000	-48	-55	45.9	234	279	189	42.5	224	274	185	39.0	213	269	181
28000	-50	-59	45.4	230	281	187	42.1	220	276	183	38.7	210	271	179
29000	-52	-62	45.1	226	283	185	41.7	215	278	181	38.4	206	272	178
31000	-56	-70	45.1	221	287	181	40.9	208	281	177	37.7	198	276	174
33000	-60	-77	44.9	216	291	177	40.9	203	285	173	36.9	190	279	170
35000	-64	-84	44.5	210	295	173	40.7	198	289	170	36.8	185	283	166
37000	-66	-87	44.2	206	300	169	40.4	193	294	166	36.7	181	288	162
39000	-66	-87	43.9	203	307	165	40.3	190	301	162	36.6	177	295	158
41000	-66	-87	–	–	–	–	40.0	187	308	158	36.4	174	301	154

MAXIMUM RANGE POWER
2000 RPM
ISA

PRESS. ALT.	SAT		11000 LBS (4990 KG)				10000 LBS (4536 KG)				9000 LBS (4082 KG)			
			ENG. TOR QUE	FUEL FLOW PER ENG.	AIR-SPEED		ENG. TOR QUE	FUEL FLOW PER ENG.	AIR-SPEED		ENG. TOR QUE	FUEL FLOW PER ENG.	AIR-SPEED	
					TAS	IAS			TAS	IAS			TAS	IAS
FEET	°C	°F	%	LBS/HR	KTS	KTS	%	LBS/HR	KTS	KTS	%	LBS/HR	KTS	KTS
0	15	59	53.0	416	234	235	49.2	404	230	231	45.5	391	226	228
5000	5	41	52.0	374	242	226	48.4	363	238	222	44.9	352	234	219
10000	-5	23	50.9	335	250	217	47.2	324	246	213	43.8	315	241	210
15000	-15	6	49.6	301	259	208	46.1	291	254	204	42.6	280	250	201
20000	-25	-12	47.7	270	268	199	44.4	260	263	195	41.2	251	258	192
23000	-31	-23	47.1	256	274	194	43.2	244	269	190	40.1	235	264	186
25000	-35	-30	46.7	246	279	190	42.9	235	273	187	39.3	224	268	183
27000	-38	-37	46.1	238	283	187	42.6	227	277	183	38.8	216	272	179
28000	-40	-41	45.8	234	285	185	42.3	223	279	181	38.7	212	274	177
29000	-42	-44	45.5	230	287	183	42.0	219	281	179	38.5	208	276	176
31000	-46	-52	45.7	225	292	180	41.3	211	286	176	37.9	201	280	172
33000	-50	-59	45.6	220	296	176	41.4	207	290	172	37.2	193	284	168
35000	-54	-66	45.3	215	301	173	41.3	202	294	169	37.2	189	288	165
37000	-56	-69	45.1	211	307	169	41.2	198	300	165	37.3	185	294	161
39000	-56	-69	45.0	209	315	165	41.2	195	308	162	37.3	182	301	158
41000	-56	-69	–	–	–	–	–	–	–	–	37.2	180	308	154

MAXIMUM RANGE POWER
2000 RPM
ISA +10°C

PRESS. ALT.	SAT		11000 LBS (4990 KG)				10000 LBS (4536 KG)				9000 LBS (4082 KG)			
			ENG. TOR QUE	FUEL FLOW PER ENG.	AIR-SPEED		ENG. TOR QUE	FUEL FLOW PER ENG.	AIR-SPEED		ENG. TOR QUE	FUEL FLOW PER ENG.	AIR-SPEED	
					TAS	IAS			TAS	IAS			TAS	IAS
FEET	°C	°F	%	LBS/HR	KTS	KTS	%	LBS/HR	KTS	KTS	%	LBS/HR	KTS	KTS
0	25	77	50.3	409	232	229	46.4	396	227	225	42.6	382	223	221
5000	15	59	49.9	370	240	221	46.2	357	236	217	42.5	345	231	212
10000	5	41	49.4	334	249	213	45.5	322	245	209	42.0	310	240	204
15000	-5	24	48.7	301	259	205	45.0	290	254	200	41.3	279	249	196
20000	-15	6	47.3	272	270	197	43.9	261	265	192	40.4	251	259	188
23000	-21	-5	47.0	258	277	192	42.9	246	271	188	39.6	236	265	183
25000	-25	-12	46.9	250	282	189	42.9	237	276	184	39.0	226	270	180
27000	-28	-19	46.5	242	286	185	42.7	230	280	181	38.7	218	274	177
28000	-30	-23	46.2	238	289	184	42.5	227	283	180	38.7	215	276	175
29000	-32	-26	46.0	235	291	182	42.2	223	285	178	38.6	211	279	174
31000	-36	-34	46.4	230	297	179	41.7	216	290	175	38.2	204	283	171
33000	-40	-41	46.5	226	302	176	42.1	212	295	172	37.6	197	288	167
35000	-44	-48	46.3	221	307	172	42.1	207	300	168	37.8	193	293	164
37000	-46	-51	46.2	218	314	169	42.1	204	307	165	38.0	190	300	161
39000	-46	-51	–	–	–	–	42.2	201	315	162	38.2	187	308	158
41000	–	–	–	–	–	–	–	–	–	–	–	–	–	–

MAXIMUM RANGE POWER
2000 RPM
ISA +20°C

PRESS. ALT.	SAT		11000 LBS (4990 KG)				10000 LBS (4536 KG)				9000 LBS (4082 KG)			
			ENG. TOR QUE	FUEL FLOW PER ENG.	AIR-SPEED		ENG. TOR QUE	FUEL FLOW PER ENG.	AIR-SPEED		ENG. TOR QUE	FUEL FLOW PER ENG.	AIR-SPEED	
					TAS	IAS			TAS	IAS			TAS	IAS
FEET	°C	°F	%	LBS/HR	KTS	KTS	%	LBS/HR	KTS	KTS	%	LBS/HR	KTS	KTS
0	35	95	47.2	402	228	222	43.3	387	224	217	39.4	372	219	213
5000	25	77	47.5	365	238	215	43.7	352	233	210	40.0	338	228	206
10000	15	59	47.6	332	248	208	43.6	319	243	203	40.0	307	238	199
15000	5	42	47.7	302	259	201	43.8	290	254	196	40.0	278	248	192
20000	-5	24	46.8	274	271	194	43.3	263	265	189	39.7	252	259	185
23000	-11	13	47.0	262	279	190	42.6	248	273	185	39.2	238	267	181
25000	-15	6	47.1	254	285	187	42.9	241	278	182	38.8	228	272	178
27000	-18	-1	46.9	247	290	184	42.9	234	284	180	38.8	221	277	175
28000	-20	-5	46.7	243	293	183	42.8	231	286	178	38.9	218	280	174
29000	-22	-8	46.6	240	296	181	42.7	227	289	177	38.8	215	282	173
31000	-26	-16	47.2	236	302	179	42.4	220	295	174	38.7	208	288	170
33000	-30	-23	47.4	232	308	176	42.9	217	301	171	38.3	202	294	167
35000	-34	-30	47.5	228	315	173	43.1	213	307	169	38.7	198	300	164
37000	-36	-33	46.3	220	317	167	43.3	210	315	166	39.0	195	307	161
39000	-36	-33	–	–	–	–	–	–	–	–	39.3	193	316	159
41000	–	–	–	–	–	–	–	–	–	–	–	–	–	–

MAXIMUM RANGE POWER
2000 RPM
ISA +30°C

PRESS. ALT.	SAT		11000 LBS (4990 KG)				10000 LBS (4536 KG)				9000 LBS (4082 KG)			
			ENG. TOR QUE	FUEL FLOW PER ENG.	AIR-SPEED		ENG. TOR QUE	FUEL FLOW PER ENG.	AIR-SPEED		ENG. TOR QUE	FUEL FLOW PER ENG.	AIR-SPEED	
					TAS	IAS			TAS	IAS			TAS	IAS
FEET	°C	°F	%	LBS/HR	KTS	KTS	%	LBS/HR	KTS	KTS	%	LBS/HR	KTS	KTS
0	45	113	45.7	402	227	217	41.6	386	222	212	37.7	369	217	208
5000	35	95	46.3	366	237	211	42.4	351	232	206	38.6	337	227	201
10000	25	77	46.8	334	248	204	42.6	319	243	200	39.0	306	237	195
15000	15	60	47.2	305	260	198	43.2	292	254	193	39.2	279	248	189
20000	5	42	46.7	279	273	192	43.0	267	267	187	39.3	255	261	182
23000	-1	31	47.1	267	282	188	42.5	252	275	183	39.0	241	269	179
25000	-5	24	47.3	259	288	185	42.9	245	281	181	38.7	232	274	176
27000	-8	17	47.2	252	294	183	43.1	239	287	178	38.8	226	280	174
28000	-10	13	47.1	248	297	181	43.1	236	290	177	39.0	223	283	172
29000	-12	10	47.1	245	300	180	43.0	232	293	176	39.0	220	286	171
31000	-16	2	47.8	241	307	178	42.8	225	299	173	38.9	213	292	169
33000	-20	-5	48.2	236	314	175	43.5	221	306	171	38.7	206	298	166
35000	-24	-12	43.0	215	289	155	43.8	217	313	168	39.1	202	305	163
37000	-26	-15	–	–	–	–	–	–	–	–	38.0	194	304	156
39000	–	–	–	–	–	–	–	–	–	–	–	–	–	–
41000	–	–	–	–	–	–	–	–	–	–	–	–	–	–

LIST OF ACRONYMS AND ABBREVIATIONS

Below are common acronyms/abbreviations used throughout this manual:

- ACAS – Airborne Collision Avoidance System
- ADC – Air Data Computer
- ADF – Automatic Direction Finder
- AHC – Attitude Heading Computer
- AHRS – Attitude Heading Reference System
- AOA – Angle of Attack
- AP – Autopilot
- BAT – Battery
- CAUT – Caution
- C/B – Circuit Breaker
- CDU – Control Display Unit
- COM/COMM – Communications
- CPCS – Cabin Pressure Control System
- DCP – Display Control Panel
- DCU – Data Concentrator Unit
- DME – Distance Measuring Equipment
- EFIS – Electronic Flight Instrument System
- EIS – Engine Indicating System
- ELT – Emergency Locator Transmitter
- EMER / EMG – Emergency
- EPU – Emergency Power Unit
- FAF – Final Approach Fix
- FD – Flight Director
- FGC – Flight Guidance Computer
- FGP – Flight Guidance Panel
- FMS – Flight Management System
- GA – Go Around
- GPS – Global Positioning System
- HDG – Heading
- HSI – Horizontal Situation Indicator
- ILS – Instrument Landing System
- MFD – Multifunction Display
- NAV – Navigation
- PFD – Primary Flight Display
- RA – Radio Altimeter
- RTU – Radio Tuning Unit
- TAT – Total Air Temperature
- TAWS – Terrain Awareness & Warning System
- TCAS – Traffic Alert & Collision Avoidance System
- VHF – Very High Frequency
- VOR – VHF Omnidirectional Range
- WOW – Weight on Wheels

AIRFRAME

The P180 is a twin-engine, three-lifting-surface turboprop aircraft. It features:

- A forward wing near the nose,
- A main mid-wing section with twin pusher propellers,
- A rear T-tail for pitch and directional control.

The fuselage is primarily of aluminum-alloy construction with advanced composite sections. It is split into three major assemblies:

1. Forward Fuselage – includes the cockpit, pressurized cabin, and the forward wing.
2. Aft Fuselage – attaches to the rear pressure bulkhead, integrates the main wing, engine nacelles, landing gear wells, and an optional baggage compartment.
3. Tail Cone – houses the T-empennage components.

Note: For Microsoft Flight Simulator, some airframe elements are simplified. Access doors, extra compartments, and other structural features may be purely visual or partially interactive.

Nose Section and Cabin

- The nose houses avionics and the nose landing gear.
- The cabin can be arranged in multiple ways. A two-piece cabin door on the left side provides entry, with built-in steps when opened.

Main Wing and Forward Wing

- The forward wing carries full-span flaps.
- The main wing includes outboard and inboard flaps, plus ailerons outboard for roll control.
- Static wicks are mounted at various trailing edges to minimize static interference with radio systems.

System Details and Aircraft Overview

The FlightFX P-180 incorporates a suite of sophisticated onboard systems designed to replicate real-world functionality and handling characteristics. In this manual's Systems section, pilots and operators will find a comprehensive breakdown of each major system—ranging from the hydraulic and electrical architectures to the advanced ProLine 21 avionics, custom FlightFX Tablet features, and integrated engine health management. By examining the layout, operation, and interdependencies of these systems, readers will gain

a deeper understanding of how the P-180's unique design elements come together to deliver efficient, reliable, and immersive flight performance.

Cockpit Overview

This manual will broadly cover the following areas.

VAMS

Primary Controls

Secondary Controls

Flaps System

Instrument Panel

Anunciator System

Aural Warning System

Multi Function Display

Systems Tests

Engine Systems

Ice Protection

Power Plant

Fuel System

Hydraulic System

Electrical System

Lighting System

Pressurization System

Static System

Anti Ice System

Flight Instruments

Navigation

Autopilot

Flight Management System

Virtual Aircraft Management System (V.A.M.S.)

Next-Generation Control for the FlightFX P180

The Virtual Aircraft Management System (V.A.M.S.) is an innovative, tablet-based interface designed to enhance the user experience and functionality of the FlightFX P180. Accessible via a simulated tablet within the aircraft, V.A.M.S. allows pilots to manage various aircraft systems, settings, and features with ease, streamlining operations while maintaining an immersive flying experience.

The tablet can be stowed by clicking on the “STOW TABLET” decal on the side of the tablet. To retrieve the tablet it can be found in the storage compartment below the glare shield. See photo below.

Key Features and Functionality

Aircraft Customization & Configuration

- Manage external options such as chocks, pitot covers, and protectors.
- Toggle interior elements like clutter, food service, and other visual items.
- Control aircraft doors, including the main entry door and baggage compartment.

Quick Start & Cold & Dark States

- Choose from predefined aircraft states, such as:
    - Cold & Dark - Full systems shutdown for immersive startup procedures.

- Ready For Taxi - Engines running and avionics set for taxi.
- Ready for Takeoff - Engines running and avionics set for immediate departure.

Systems

- Monitor engine damage with a virtual maintenance tracking system.
- Automate steering for easier use in ground handling and take off situations.

PRIMARY CONTROLS

The P180's flight controls include conventional primary controls—ailerons, elevator, rudder—and secondary trim and flap systems.

Primary Controls

- Ailerons: Operated via cables and bellcranks from both pilot and copilot control wheels.
- Elevators: Controlled through a dual-pilot column arrangement, with push-pull rods and cables.
- Rudder: Actuated by adjustable rudder pedals.

SECONDARY CONTROLS

Trims: Aileron, rudder, and pitch trim.

- Roll Trim: A small servo tab on the right aileron, electrically driven.
- Yaw Trim: A servo tab on the rudder.
- Pitch Trim: Entirely moves the horizontal stabilizer. Activated via either primary or secondary (backup) electric systems.

ROLL TRIM SYSTEM

The roll trim system adjusts the aileron trim tab located on the inboard trailing edge of the right aileron via the roll trim actuator.

The pilot and copilot can control roll trim using the Control Wheel Trim Switches (CWTS) located on the outboard horn of each control wheel. These dual-function switches handle both roll trim and primary pitch trim. Each switch has four positions: LWD (Left Wing Down), RWD (Right Wing Down), NOSE UP, and NOSE DN (Down). Activating either switch to LWD or RWD moves the aileron trim tab accordingly to adjust the aircraft's roll attitude.

The current aileron trim tab position is displayed on the ROLL indicator within the TRIM indicator panel on the center pedestal. The indicator consists of two semi-circular scales and a pointer, showing the trim tab position in increments of LWD and RWD.

YAW TRIM SYSTEM

Yaw trim is adjusted by repositioning the rudder trim tab, located on the lower trailing edge of the rudder, via the yaw trim actuator.

The pilot controls yaw trim through the RUDDER TRIM switch on the pedestal trim control panel. The switch has three positions: NOSE LEFT, OFF, and NOSE RIGHT. When released, the switch automatically returns to the center OFF position. Moving the switch to NOSE LEFT or NOSE RIGHT signals the yaw trim actuator to adjust the rudder trim tab accordingly.

The YAW indicator in the TRIM indicator panel on the center pedestal displays the rudder trim tab position. A semi-circular scale with a pointer indicates trim direction (L for left, R for right), with scale markings representing increments of rudder trim tab travel.

FLAP SYSTEM

The flap system is electrically controlled and allows for precise adjustment of both the forward wing and main wing flap surfaces. The system consists of four mechanically independent subsystems:

- Main Wing Outboard Flaps
- Main Wing Inboard Flaps
- Forward Wing Left Flap
- Forward Wing Right Flap

Flap Control

Flap deployment is managed using a gated FLAP control lever, located on the control pedestal to the right of the condition levers. This lever operates a flap selector switch and has three selectable positions:

- UP – Clean configuration (retracted)
- MID – Takeoff setting
- DN – Landing setting

The control lever can be moved incrementally (single-step command) between UP to MID or MID to DN, and vice versa. Alternatively, it can be moved directly from UP to DN or DN to UP in a single motion (direct command).

Flap Deployment Sequence

When the FLAP control lever is moved from UP to MID, the flap surfaces deploy in a sequence that completes in approximately 8 seconds under normal conditions:

1. Initial movement: The main wing outboard flaps begin to extend, while the inboard flaps and forward wing flaps remain in their clean position.
2. After 4.5 seconds: The forward wing flaps begin moving and stop after .5 second, while the inboard flaps remain in the clean setting. The main wing outboard flaps continue moving.
3. After an additional 1.5 seconds: The inboard flaps begin to deploy, and the forward wing flaps resume movement. The main wing outboard flaps continue to extend.
4. Final step (1 second later): All flaps reach the takeoff setting.

Flap Position Indication

Flap position is continuously displayed on the Primary Flight Displays (PFDs) in the upper left corner. Additionally, a flap position indicator is available on the Multifunction Display (MFD) System Page, providing the flight crew with real-time visual feedback on flap deployment status.

INSTRUMENTATION AND AVIONICS

The aircraft is equipped with a complete set of instruments and avionics for both VFR (Visual Flight Rules) and IFR (Instrument Flight Rules) operations, with components located on the instrument panel and center pedestal.

Primary Displays and Warnings

- The left and right instrument panels house two Primary Flight Displays (PFDs) for the pilot and copilot.
- Each panel includes master warning and master caution lights/reset buttons, as well as ICE caution and STALL warning lights for enhanced situational awareness.

Central Instrument Panel

The central section of the instrument panel contains:

- Two Display Control Panels (DCPs)
- Multifunction Display (MFD)
- Miscellaneous/Reversionary Panel
- Integrated Standby Instrument (ISI)
- Radio Tuning Unit (RTU)
- Annunciator Panel
- The Flight Guidance Panel (FGP) is positioned at the top of the central section for flight automation and autopilot control.

Additional Instrumentation and Controls

- The left and right sections of the panel include two digital clocks and the ELT (Emergency Locator Transmitter) Control Panel on the left side.
- Lower instrument panel section contains various system controls, panels, and gauges, including:
    - Environmental and bleed air control panels
    - Landing gear and hydraulic system control panel
    - Anti-ice systems control panel
    - Systems test selector
    - Master switches panel
    - Fuel, engine, and propeller control panels
    - Cabin pressurization control panel
    - Cabin audio panels

Center Pedestal Equipment

The central control pedestal houses:

- External lights switches panel
- Control Display Unit (CDU)
- Cursor Control Panel (CCP)

- Pitch and rudder trim control panel
- Trim position indicators

Additional Features

- A magnetic compass is mounted on the windshield divider for backup navigation.
- The internal lights control and dimming panel is located on the left cockpit sidewall for cockpit illumination adjustments.

ANNUNCIATOR SYSTEM

The annunciator system in the P180 alerts the flight crew to critical and cautionary conditions through a combination of colored lights. In a typical setup, red lights denote warnings (emergency or highly urgent), while amber lights represent cautions (abnormal but not immediately hazardous).

A dedicated Annunciator Panel is often located on the central section of the instrument panel, near or above the Multifunction Display (MFD). There are also two Master Warning light/reset buttons (usually red) and two Master Caution light/reset buttons (amber) on the pilot's and copilot's glare shield or top of the panel.

When a system triggers a new red warning, the Master Warning lights flash. Similarly, if a caution message appears, the Master Caution lights illuminate. The pilot or copilot can press the corresponding master button to cancel (reset) the flashing, although the underlying issue will keep its respective annunciator lit until resolved.

Note: These master lights can be acknowledged with a mouse click.

Annunciator Panel Layout

The P180's annunciator system includes an overhead or central panel that groups red "Warning" and amber "Caution" lights, plus associated Master Warning/Caution lights.

- Red Lights signify urgent problems (e.g., engine fire).
- Amber Lights signify cautionary conditions (e.g., low fuel pressure).

Pressing the Master Warning or Master Caution light typically silences or resets the alert. It will stop the flashing of the master light but will not extinguish the individual system light unless the condition is corrected.

WARNING - RED LIGHTS

Annunciation	Description
L FIRE	Fire in left engine compartment
R FIRE	Fire in right engine compartment
L OIL TEMP	Left engine oil overtemperature
R OL TEMP	Right engine oil overtemperature
L OIL PRESS	Low oil pressure in left engine
R OIL PRESS	Low oil pressure in right engine
L BLEED TEMP	Left bleed air line overtemperature
R BLEED TEMP	Right bleed air line overtemperature
L MN WG OVHT	Left main wing anti-ice overheat
R MN WG OVHT	Right main wing anti-ice overheat
L FD WG OVHT	Left forward wing anti-ice overheat
R FD WG OVHT	Right forward wing anti-ice overheat
L WSHLD ZONE	Left windshield zone overheat
R WSHLD ZONE	Right windshield zone overheat
CAB PRESS	Cabin pressurization outside limits
STEER FAIL	Steering system failure
BAG DOOR	Baggage door open or not secure
CAB DOOR	Cabin door open or not secure
DUCT TEMP	Cabin air supply duct overtemperature
BAT OVHT/BATTERY	Battery overheat above 150°F (*)

CAUTION - AMBER LIGHTS

Annunciation	Meaning
L F/W V INTRAN	Left fuel firewall shut off valve in transit
R F/W V INTRAN	Right fuel firewall shut off valve in transit
L F/W V CLSD	Left fuel firewall shut off valve closed
R F/W V CLSD	Right fuel firewall shut off valve closed
L FUEL PUMP	Left main fuel boost pump inoperative
R FUEL PUMP	Right main fuel boost pump inoperative
L FUEL PRESS	Left fuel pressure below minimum
R FUEL PRESS	Right fuel pressure below minimum
L FUEL FILTER	Left fuel filter obstructed
R FUEL FILTER	Right fuel filter obstructed
L LOW FUEL	Minimum fuel level in the left tank
R LOW FUEL	Minimum fuel level in the right tank
L GEN	Left DC generator inoperative
R GEN	Right DC generator inoperative
L PROP PITCH	Left propeller beyond low pitch stop
R PROP PITCH	Right propeller beyond low pitch stop
FUEL XFEED	Fuel crossfeed valve open
XFEED INTRAN	Fuel crossfeed valve in transit
BAT TEMP/BATTERY	Battery temperature above 120°F
BUS DISC	Electrical busses not interconnected
AVCS FAN FAIL	Failure of main avionics bay cooling fan
HYD PRESS	Hyd. pressure outside range or Hyd. System inoperative

EPU DRAIN	Emergency Power Unit OFF or EPU battery draining
FLAP SYNC	Flap synchronization failed
STALL FAIL	Stall warning system failure or angle of attack transducer heater inoperative
OIL COOLING	Forced engine oil cooling operating
AUTOFEATHER	Autofeather not armed
DOOR SEAL	Failure of cabin door sealing
L PITOT HTR	Left Pitot heating system OFF or inoperative
R PITOT HTR	Right Pitot heating system OFF or inoperative

Aural Warnings

The aural warning system provides distinct, prioritized audio alerts to inform the pilot of critical aircraft conditions. Each warning corresponds to a specific situation—such as stalls, overspeed, incorrect landing gear configuration, and engine exceedances—and typically cannot be silenced unless the issue is corrected. In most cases, if multiple alerts are triggered simultaneously, only the highest-priority warning is heard. This system helps ensure that any urgent or potentially hazardous situation is promptly communicated to the flight crew.

STALL

- Alert: Repetitive tone.
- Meaning: You're close to a stall.

OVERSPEED

- Alert: Repetitive tone.
- Meaning: Your airspeed is too high (above 260 KIAS below 30,500 ft or above Mach 0.7 above 30,500 ft).

GEAR WARNING

- Alert: Continuous tone.
- Meaning: Landing gear is not down when it needs to be. It can trigger if:

1. Power is reduced below safe flight settings and gear isn't down (may be silenced with the GEAR MUTE switch).
2. Flaps are fully lowered and gear isn't down.
3. Flaps are in mid-position, gear isn't down, and the left power lever is pulled back about halfway.

TRIM-IN-MOTION

- Alert: A ticking sound (brief bursts).
- Meaning: The primary pitch trim is currently moving.

ENGINE EXCEEDANCE

- Alert: Brief tone that repeats.
- Meaning: Engine limits (torque or ITT) have been exceeded.

AUTOPILOT DISCONNECT

- Alert: A tone that quickly fades to silence.
- Meaning: The autopilot has disengaged (either by pilot action or a system fault).

ALTITUDE ALERT

- Alert: Short beep.
- Meaning:
    - You are 1000 ft away from the selected altitude (approach to target).
    - You have deviated by ±200 ft from your selected altitude (deviation).

Multifunction Display (MFD)

The Multifunction Display, centrally located on the instrument panel, provides key flight and system information in an easily configurable format. Along the top, a dedicated Engine Indicating System (EIS) region continuously displays engine data. Below, two adjustable windows (Upper and Lower Format) let the pilot choose which additional information is shown. System details—such as electrical loads, battery temperature, and anti-ice status—can be viewed on the dedicated System Page, or selected to remain visible even when the System Page is not active.

System Tests

A central System Test knob and pushbutton on the instrument panel lets you verify that key systems are working properly. To run a test:

1. Turn the selector knob to the desired position (e.g., ENG EXCEED, LAMP, FLAPS, etc.).
2. Press and hold the knob (it's spring-loaded) to activate that test.

If the system is operating correctly, you'll see or hear the expected indications (lights, alerts, tones). This ensures everything is functioning before or during flight.

Tests and Their Indications

1. ENG EXCEED (Engine Exceedance)

- What It Does: Simulates an over-limit condition on engine torque or ITT.
- Expected Result: You should hear the "Engine Exceedance" aural warning tone, confirming that system warnings work properly.

2. ANN (Annunciation)

- What It Does: Checks battery and engine oil temperature indicators on the annunciator panel.
- Expected Result:
    - BAT TEMP/BATTERY (amber)
    - BAT OVHT/BATTERY (red)
    - L OIL TEMP and R OIL TEMP (red)
      All these lights should illuminate briefly.

3. LAMP (Annunciator Lights)

- What It Does: Verifies that all warning and caution lights illuminate.
- Expected Result:
    - MASTER WARNING and MASTER CAUTION lights come on.
    - All annunciator panel lights illuminate.

4. FIRE DET (Engine Fire Detection)

- What It Does: Checks the engine fire warning circuits.
- Expected Result:
    - L ENG FIRE and R ENG FIRE red lights flash.
    - If a fire extinguishing system is installed, the L ENG FIRE EXT and R ENG FIRE EXT pushbuttons (on each side of the Flight Guidance Panel) also flash.

5. FUEL QTY (Fuel Quantity)

- What It Does: Tests the fuel quantity monitoring system.
- Expected Result:
    - L LOW FUEL and R LOW FUEL (amber) caution lights illuminate.

6. LDG GR (Landing Gear)

- What It Does: Tests the landing gear indication system.
- Expected Result:
    - UNSAFE red lights illuminate (indicating gear not fully locked).
    - The landing gear warning tone sounds.

7. AVCS FAN (Avionics Fan)

- What It Does: Checks the avionics cooling fan operation.
- Expected Result:
    - AVCS FAN FAIL (amber) on the annunciator panel appears after holding the button for about 7 seconds.

8. RAD ALT (Radio Altimeter)

- What It Does: Ensures the radio altimeter is displaying correctly.
- Expected Result:
    - 50 feet readout appears on both PFDs.

9. OVSP WRN (Overspeed Warning)

- What It Does: Checks the overspeed alert from each Air Data Computer (ADC).
- Expected Result:
    - The overspeed aural tone sounds.

10. HYD (Hydraulics)

- What It Does: Tests the hydraulic power system.
- Expected Result:
    - The hydraulic pressure gauge goes to 1300 PSI.
    - The HYD PRESS (amber) caution light on the annunciator panel illuminates.

11. STEER (Nose Wheel Steering)

- What It Does: Ensures nose wheel steering system and alerts function correctly.
- Expected Result:

- STEER FAIL red warning light appears if steering is engaged in takeoff or taxi mode.
- Pushing the Master Switch (MSW) on the control wheel turns off the STEER FAIL warning and removes the steering mode indication (STEER T-O or STEER TAXI) from the PFDs.

12. STALL (Stall Warning)

- What It Does: Simulates an angle of attack sensor failure to trigger the stall warning.
- Expected Result:
  - STALL FAIL (amber) light illuminates.
  - STALL (red) light appears, and the stall warning horn activates.
  - This test is automatically disabled in flight.

13. FLAPS

- What It Does: Verifies the flap system's electrical circuits and monitoring.
- Expected Result:
  - FLAP SYNC (amber) illuminates.
  - Confirms correct flap operation and fault indication.

14. ICE DET (Ice Detector)

- What It Does: Checks the sensor that detects ice on the airframe.
- Expected Result:
  - ICE (amber) light illuminates, then blinks after a few seconds.
  - Pressing either ICE pushbutton stops the blinking and the light goes out.

15. MN WG A/I (Main Wing Anti-Ice)

- What It Does: Tests the main wing anti-icing system when the ANTI-ICE MAIN WING switches are set to AUTO.
- Expected Result:
  - After about 20 seconds, both sides of the "MW" label on the MFD System Page show ON (green).
  - When testing is finished, turn ANTI-ICE MAIN WING switches OFF.

16. FWD WG A/I (Forward Wing Anti-Ice)

- What It Does: Tests the forward wing anti-icing system with the ANTI-ICE FWD WING switches set to ON.
- Expected Result:
  - A noticeable increase of about 30–40 Amps on each generator (seen on MFD System Page).
  - When testing is complete, turn ANTI-ICE FWD WING switches OFF.

Engine Systems

Ignition System

Each engine has a simple spark ignition system made up of one exciter and two spark igniters. When the cockpit ignition switch (labeled L or R IGN-NORM) is set to NORM, the igniters automatically fire during engine start. If needed, the pilot can also manually turn on the igniters by selecting IGN instead of NORM.

Engine Indicating System

The Engine Indicating System (EIS) normally appears on the top portion of the Multifunction Display (MFD) and shows key engine data for both the left and right engines. These readings include:

- ITT (Interstage Turbine Temperature) and Torque (shown on a shared analog gauge)
- NG (gas generator speed) and Propeller speed (each on a smaller analog gauge)
- Digital displays for Fuel Flow, Fuel Quantity, Oil Pressure, and Oil Temperature

If engine operation goes outside normal limits, the system provides warning and caution alerts.

Engine Fire Warning

Each engine compartment has a continuous-type thermal detector that triggers a fire warning when it senses extreme heat—either a localized 545 °C or a more general average of 250 °C. A sealed tube in the detector releases gas under high temperature, activating a switch that illuminates the red L FIRE or R FIRE warnings (and, if installed, the L ENG FIRE EXT or R ENG FIRE EXT pushbuttons next to the Flight Guidance Panel). Once the temperature drops, the switch opens and the warnings turn off. You can test the system by turning the SYS TEST selector to FIRE DET and pressing the selector's pushbutton, which checks both the warning lights and detector wiring.

Engine Ice Protection

Air Intake Lip (Boots De-Ice System)

Each engine's intake lip has a pneumatic deicing boot. Bleed air from the engine inflates the boot, and an internal vacuum line deflates it. Both the left and right boots operate together using the BOOTS DE ICE switch, which has three positions:

- OFF – System is inactive.
- TIMER – The boots inflate for 5 seconds, then deflate for 175 seconds, repeating this 3-minute cycle automatically.
- AUTO – An electronic control monitors an ice detector probe; once a set amount of ice accumulates, the system inflates the boots for 6 seconds after receiving 10 pulses from the probe.

When the boots inflate, a green ON indicator appears on the MFD System Page for each intake lip. The deicing system is powered through a 5-amp circuit breaker (labeled BOOTS DEICE) on the copilot's breaker panel.

Inertial Separator System

This system helps prevent dangerous ice buildup or ice ingestion at the engine inlet. Each engine's deflector vane and matching bypass door are extended by an electric actuator. When you flip the L ENG ICE VANE or R ENG ICE VANE switch to "L" or "R," it takes about 20 seconds for the vane and door to move into place.

- Indicators: On the MFD System Page, you'll see green "ON" next to "ENG" for the left or right engine once the vane is fully extended.
- Malfunctions: A problem is signaled by the "ENG" label turning yellow, along with flashing amber ICE lights.
- Power Supply: The left actuator is powered through the L ENG ICE VANE circuit breaker on the pilot's panel, and the right actuator through the R ENG ICE VANE circuit breaker on the copilot's panel.

Oil Cooler Anti-Ice System

Each engine uses a small amount of compressor bleed air to keep its oil cooler intake clear of ice. Electrically controlled valves open or close to let this air flow to the intake area.

- Switches: The L OIL COOLER INTK and R OIL COOLER INTK switches operate the valves for the left and right engines. Switching to L or R opens the corresponding valve.
- Indicators: Once the oil cooler lip is receiving bleed air, you'll see a green "ON" by the "OIL" label (left or right) on the MFD System Page.
- Malfunctions: If there's an issue, the "OIL" label turns yellow and the amber ICE lights begin flashing.

- Power: The shutoff valves get electricity from the L OIL COOLER and R OIL COOLER circuit breakers on the copilot's panel.

Power Plant

Propellers Overview

The P180 is equipped with two five-blade "pusher" propellers (one spinning clockwise, the other counterclockwise). They operate at a constant speed, can be fully feathered to reduce drag, and have the ability to go into reverse thrust. Oil pressure from the engine's governor adjusts blade pitch, while springs and weights return the blades toward high pitch or feather when oil pressure is reduced. An overspeed governor provides backup protection if the main governor fails.

Focusing on Beta Mode

- What is Beta?
  "Beta" is the range where the propeller blades move beyond the normal low-pitch angle, allowing finer pitch and even reverse thrust. It's primarily used on the ground for taxi, short-field maneuvering, or reverse thrust after landing.
- How to Engage Beta
  You move the power levers past the normal low-pitch stop, into the "beta and reverse" area. When you do this, the L and R PROP PITCH amber lights illuminate, letting you know that the props are now in the beta (or reverse) range.
- When to Use Beta
  - Ground Maneuvering: Beta helps control taxi speed without excessive braking, as it provides a way to reduce forward thrust or even generate slight reverse thrust.
  - Short Landing Rolls: After touchdown, moving the levers into beta (and potentially further into reverse) can shorten landing distances by adding extra braking force from the propellers.
- Key Points About Beta
  - The governor is still controlling the prop's overall speed, but oil pressure now drives the blades into angles below the normal flight range.
  - Watch for the PROP PITCH caution lights and be ready to return the power levers to forward pitch for normal flight operations.
  - Always follow approved procedures and speed limitations when using beta, because excessive reverse thrust at high speeds can be unsafe.

Autofeather

The autofeather system automatically feathers a propeller if one engine loses torque (e.g., during takeoff or landing). By quickly reducing drag on the failed engine, it helps maintain directional control and climb performance.

How to Arm and Use Autofeather

1. Arm the System: Move the AUTOFEATHER switch to ARM on the pedestal.
2. Advance Power Levers: Once both levers exceed about 90% NG, the system takes about two seconds to fully arm. You'll see AFX (green) on the MFD for each engine, indicating it's active.
3. Takeoff and Landing Only: Autofeather is designed for critical phases of flight (e.g., takeoff or approach). It's recommended to turn it OFF once a safe climb or cruise is established.
4. Engine Failure Detection: If torque on one engine drops below a set threshold, that engine's propeller automatically feathers. At the same time, autofeather disarms on the operating engine (you'll see its AFX indication go out).
5. Gear-Down Caution: If autofeather isn't armed or loses power when the landing gear is extended, an amber AUTOFEATHER caution light appears.

Special Considerations

- System Test: You can check autofeather on the ground by briefly switching the selector to TEST (need to be above 30% torque).
- Power Source: The system is fed from the right dual feed bus via a 5-amp breaker on the copilot's panel.

By arming autofeather during takeoff or landing, you're ensuring that a sudden engine failure triggers an immediate feather, reducing drag on the failed side and helping maintain control and climb performance. Once you've safely cleared the initial climb, you can switch it off in preparation for normal flight operations.

Propeller Synchrophaser

The Propeller Synchrophaser helps keep the propellers spinning in sync to reduce cabin noise. It automatically makes small adjustments to blade pitch so both propellers match a preset phase relationship.

How It Works

- System Components: A control box, magnetic pick-ups on each propeller, and rotating "targets" on the prop hubs.
- Power Source: Powered by the right dual feed bus through a 3-amp circuit breaker labeled PROP SYNCPH.

- Automatic Adjustments: The system compares signals from each propeller. If one prop is running faster, it slightly increases blade pitch on that prop (slowing it down) and/or decreases pitch on the slower prop (speeding it up).

When to Turn It Off

- Engine Shutdown: If one engine fails or is feathered, the synchrophaser detects the large RPM difference and disables itself automatically.
- Approach & Landing: For safety, you should switch it off during landing or if you anticipate a single-engine approach.

Condition Levers and Power

The engine and propeller controls on the FlightFX P180 are managed by two sets of levers on the control pedestal. Here's how to use them:

Power Levers (Left Side):

- These levers control engine power and, when moved back, also adjust propeller pitch (beta control).
- You have full control from maximum takeoff power down to full reverse. Movement from idle to maximum forward is unrestricted. However, to move from idle to reverse, you must first pull the lever handle up.
- The power levers work with the engine's NG speed governor, so moving the lever forward increases engine power.
- Use these levers during normal power adjustments, and to set beta (for ground maneuvers like taxiing or using reverse thrust) by moving them back from the detent.

Condition Levers (Right Side):

- These levers control the propeller's speed in flight, typically between 1800 and 2000 RPM. They also handle fuel cutoff and propeller feathering functions.
- You can set the condition levers for two idle settings:
    - Ground Idle (Low, about 54%): This is the normal setting for ground operations.
    - Flight Idle (High, about 70%): This setting is used on the ground when you need to maintain lower engine temperatures during heavy generator loads or when you need increased bleed air.
- Pushing the condition lever aft (beyond the ground idle position) and further towards the fuel cutoff (CUT OFF) will cause the propeller to feather. Moving the lever to cut off, effectively shuts the engine down.

Use the power levers to adjust engine power and beta for ground maneuvers, and the condition levers to set and maintain the correct propeller speed, idle settings, and to manage engine shutdown. This division of controls helps ensure smooth operation and proper engine management during all phases of flight.

Control Panel

The ENGINE/PROPELLER Control Panel is found just below the center of the instrument panel. It gives you easy access to key engine and propeller functions, such as starting the engines and managing the generators, monitoring and adjusting engine oil and ignition settings, and controlling safety features like the propeller overspeed governor. Additionally, it lets you switch between different modes for systems like autofeather—which automatically adjusts the propellers if an engine fails—and synchrophaser, which keeps the propellers synchronized to reduce cabin noise.

Fuel System

The aircraft's fuel system holds about 1,600 liters (around 420 U.S. gallons) in total, with nearly all of that being usable fuel.

Each engine gets fuel from its own system made up of four connected tanks:

- An integral tank built into the fuselage above the wing.
- A wet wing tank located in the wing.
- Two fuselage collector tanks positioned under the wing.

A crossfeed line connects the left and right fuel systems, so if needed, fuel from one side can feed the opposite engine. Under normal operations, the two fuel systems work independently, but during refueling, they are connected by a valve that allows you to fill the tanks from a single refuel point.

The refuel controls (a switch and indicator lights) are found on the Ground Test/Refuel panel on the right side under the wing, and there is a single filler opening on the top of the right side of the fuselage for gravity refueling.

Fuel System – How to Use the Panel

This guide explains how to operate and check the fuel system controls using the cockpit panel. Follow these steps and tips for proper fuel management and troubleshooting:

Boost Pump Control

- Starting the Boost Pumps:
  - Step 1: Move the fuel pump control switch from OFF to STBY (standby). This intermediate step lets you check that the standby pump is working during your preflight check.
  - Step 2: Continue moving the switch to MAIN. This activates the main boost pump and arms the standby pump.
- Automatic Standby Activation:
  - Once the main pump is running, the standby pump will automatically kick in if the main pump's pressure falls below 5.7 psi.
- Indicator Lights:
  - If a left or right main pump is not working (for example, if the switch is left on STBY or the pump fails), you'll see an amber fuel pump caution light on the annunciator panel.
  - Similarly, if both the main and standby pumps on one side fail, a separate fuel pressure caution light will stay lit.
- What to Do in a Failure:
  - If you're running on the standby pump after a main pump failure, it's recommended to switch the corresponding control to STBY.
  - If a fuel pressure warning appears while using the main pump, manually switch the control to STBY to activate the standby pump sooner.

Firewall Shutoff Valves and Fuel Filters

- Firewall Shutoff Valves:
    - These valves control the low-pressure fuel flow to the engine.
    - How to Operate:
        - Use the two-position toggle switches marked L or R F/W VALVE-OPEN/CLOSED on the FUEL control panel.
        - When you move the switch, an amber caution light (L or R F/W V INTRAN) will briefly light up as the valve moves, then go off when the valve reaches its open or closed position.
        - A steady amber light (L or R F/W V CLSD) means the valve is fully closed.
- Fuel Filters:
    - If fuel pressure gets too high, an amber light for the left or right fuel filter will come on, indicating that a by-pass is about to be engaged.

Fuel Crossfeed Operation

- Purpose of Crossfeed:
    - The crossfeed feature allows fuel to be transferred from one side's tank to the other. This is useful for balancing fuel between tanks or during single-engine operations.
- How to Use the Crossfeed Control:
    - Turn the rotary knob (located in the center of the FUEL control panel) from the central OFF position to either left or right to open the crossfeed valve.
    - As you move the knob, a caution light (XFEED INTRAN) will flash momentarily, then the FUEL XFEED light stays lit when the valve is fully open.
- Important Note:
    - Keep the crossfeed valve in the OFF position during normal operations. It should only be used when necessary for single-engine operations or fuel balancing—not for takeoff or landing.
    - When using crossfeed, make sure to turn off the boost pump on the side that isn't feeding fuel once the crossfeed valve is activated.

Fuel Flow and Quantity Monitoring

- Fuel Flow:
    - The fuel flow for each engine is shown digitally on the Engine Indicating System (EIS) display in pounds per hour.
- Fuel Quantity:
    - Fuel levels are displayed digitally (in pounds) for each side.
    - A low fuel warning light will come on if the quantity drops to around 120 pounds.
- System Check:

- You can verify that the fuel quantity system is working by turning the SYS TEST knob to the FUEL QTY position. This test confirms that the system's sensors and display are functioning correctly.

By following these steps and paying attention to the indicator lights on your panels, you can ensure that the fuel system is operating correctly. This helps maintain proper fuel delivery to the engines and alerts you to any potential issues that might require immediate attention.

Hydraulic System

The hydraulic system is what powers your landing gear, nose wheel steering, and brakes. It has a main pump (with several modes), an emergency hand pump, and various valves and lines that move the hydraulic fluid.

How It Works and When to Use It:

- High Duty Mode (Landing Gear Movement):
  - When you want to raise or lower the landing gear, you switch the system to HYD and move the landing gear lever. This makes the pump generate high pressure (about 1800–3100 psi) to move the gear.
  - As the gear reaches its up or down limit, switches automatically adjust the system so it stops applying high pressure. There's also a safeguard to prevent high pressure if you try to retract the gear while on the ground.
- Low Duty Mode (Steering and Braking):
  - When the plane is on the ground for steering and braking, the system works at a lower pressure (around 800–1200 psi).
  - This is the normal mode for ground operations.
- Non-Operating Mode (In Flight):
  - Once the landing gear is fully retracted or if you switch the hydraulic control off, the system goes into non-operating mode. This means the pump isn't actively working, since you don't need landing gear movement in flight.

Panel Interaction and Monitoring:

- Control Switch:
  - You control the hydraulic system with a switch labeled HYD-OFF/HYD. Turning it on and setting the gear lever appropriately will select the right mode for the current operation.
- Pressure Gauge and Warning Lights:
  - A gauge on the center instrument panel shows the hydraulic pressure in psi.
  - If the pressure isn't in the proper range for the mode you're in, an amber warning light will come on, letting you know something's not right.

- System Check:
    - You can test the hydraulic system by turning the control switch to HYD and pressing the SYS TEST knob. This verifies that the pump and associated sensors are working correctly.
- Emergency Hand Pump:
    - In case of a pump failure or major leak, an emergency hand pump is available. This pump can be used to manually extend the landing gear if necessary. This pump is located on the right side of the pedestal and has a red handle. The gear lever must be set to the down position before commencing pumping.

In simple terms, you use the hydraulic system switch and monitor the pressure gauge and warning lights to ensure that the right pressure is applied for landing gear movement, ground steering, and braking. The system automatically adjusts itself between high-pressure operations for gear movement and lower-pressure settings for normal ground handling, and it shuts off during flight once the gear is retracted.

Landing Gear

The airplane has a tricycle landing gear system that uses hydraulics to extend and retract the wheels. Here's the simple breakdown:

- Gear Configuration:
  The plane has a two-wheel nose gear that pulls forward into the nose and main gear that pulls back into the fuselage. When retracted, doors cover the wheels to keep the plane aerodynamic.
- Doors and Movement:
  Some doors (like those for the nose gear and main gear) are mechanically linked to the gear. They open when the gear is coming down and close once the gear is fully retracted.
- Steering:
  The nose gear can turn left or right. When in "Taxi Steer Mode," it can turn up to 50 degrees, but its turning angle is reduced during "T/O Mode"(20 degrees).
- Safety Features:
  Weight-on-wheel sensors prevent the gear from retracting while the plane is on the ground. The gear actuators have locks to make sure they stay in place once fully up or down.
  On the control panel, red lights show when a gear is moving, and green lights indicate that a gear is fully down and locked. No lights mean that the gear is safely up. If a red light stays on after gear movement, it might mean that a door isn't fully closed, which you can check by looking at the hydraulic pressure.

All the landing gear controls and indicators are located on the landing gear panel in the center of the instrument subpanel, making it easy for the pilot to monitor the gear's status during flight and on the ground.

A constant tone sounds to warn you when the landing gear isn't fully down and locked, under these conditions:

- Low Engine Power:
  If you reduce engine power below the level needed for flight while the gear isn't down and locked, the warning tone sounds. You can mute it using the GEAR MUTE switch on the right power lever.
- Flaps Down:
  If the flaps are set to the down position and the gear isn't extended, the tone will sound and cannot be muted until you extend the landing gear.
- Flaps in Mid Position:
  If the flaps are halfway and the gear isn't down while the left power lever is pulled back (below about half power), the tone sounds. In this case, you must either lower the gear or raise the flaps to stop the warning.

You can test the landing gear indicator system by selecting the LND GR position on the SYS TEST panel and pressing the central button. The test should cause the red "UNSAFE" and green "LOCKED DN" lights to illuminate while the warning tone is generated.

In an emergency—such as a hydraulic system failure—you can manually extend the landing gear. To do this, turn the hydraulic control switch to OFF, set the gear lever to down, and pull up the emergency selector. Then, use the hand pump approximately 20 times until all three green "LOCKED DN" lights come on, confirming the gear is fully extended.

Brake System

- Main Brakes:
  - You control the brakes by pressing the brake input on your controller or peripheral device.
- Parking Brake:
  - The parking brake is activated with a handle located below the instrument panel on the left side.
  - Normal Operation:
    - When the hydraulic system is working, pull out the parking brake handle and rotate it to the vertical position. This locks the brakes by trapping the hydraulic pressure, even if the system is turned off later.

This system ensures you have smooth braking during flight and on the ground, with backup options if the main hydraulic system fails.

Steering System

The nose gear steering system lets you control the airplane's nose direction on the ground. It's operated mainly through your rudder pedals along with a pushbutton on the left side of the pilot's control wheel. Here's how it works and when to use it:

How It Works:

- Activation and Modes:
  - Engaging the System:
    You activate the steering system by pressing the STEERING CONTROL button on the left handle of the pilot's control wheel. The system only works when the airplane is on the ground. A built-in sensor (a Weight-On-Wheel switch) ensures the system only powers up when the nose gear is down and locked.
  - Two Modes:
    - Takeoff Mode:
      In this mode, the nose gear can be turned slightly. This limited movement helps you counteract crosswinds during takeoff and landing approach while keeping the nose centered.
      When in takeoff mode, the PFD (Primary Flight Display) shows a "STEER T-O" advisory.

        - Taxi Mode:
          For taxiing on the ground, you can switch to a mode that lets you turn the nose gear up to 50° in either direction. This gives you better maneuverability while taxiing. When in taxi mode, the PFD displays a “STEER TAXI” message that flashes.
- Safety and Automatic Features:
    - You can always disengage the steering system by pressing the Master Switch on the outboard handle of the control wheel. This action also disengages the autopilot and can stop runaway trim if needed.

When and Where to Use It:

- Ground Operations:
  Use the system during taxiing, takeoff, and landing.
    - During Taxi:
      Engage the high gain (taxi) mode to allow the nose gear to turn sharply (up to 50°), making it easier to maneuver on the ground.
    - During Takeoff and Landing Approaches:
      Engage the low gain (takeoff) mode to restrict the nose gear turn to only a few degrees. This limited movement helps maintain directional stability in crosswinds.
- Location of Controls and Indicators:
    - The STEERING CONTROL pushbutton is on the left handle of the pilot control wheel.
    - The steering is primarily controlled by the rudder pedals.
    - Advisory messages such as “STEER T-O” or “STEER TAXI” appear on the PFD to tell you which mode is active.
    - The system is powered and monitored via circuit breakers and sensors on the pilot’s panel, ensuring it only works when conditions are safe (like having the nose gear locked down).

Use the nose gear steering system when you’re on the ground to help steer the airplane. Choose the low gain mode for takeoff and landing approaches (for small, precise adjustments) and the high gain mode for taxiing (for larger turns). Always check the PFD messages and warning lights to ensure the system is working properly, and disengage it using the Master Switch when it’s no longer needed.

Electrical System

The airplane’s electrical system is like its own small power plant that runs on 28 volts DC with a negative ground. Two powerful starter/generators work together to start the engines and produce electricity during flight. If these generators fail, a 25.2-volt nickel-cadmium battery in the rear baggage area kicks in as a backup for engine starting and emergency power. Additionally, an Emergency Power Unit (EPU) behind the cockpit provides extra power for essential systems if all other power is lost.

Controls

The electrical system controls are found on two panels: the MASTER SWITCHES panel on the center of the instrument panel and the ENGINE/PROPELLER panel on the control pedestal. Here's what each switch does and where it's used:

- Generator Switches:
  Two three-position switches (one for the left generator and one for the right) let you turn off or reset each generator individually.
- Battery Switch:
  A two-position switch labeled BAT-OFF controls whether the battery supplies power to the system.
- Bus Switch:
  A three-position switch labeled EMER-NORM-BUS DISC controls how the electrical buses are connected.
- Avionics Switch:
  The AVIONICS ON-COM1 ONLY-OFF switch allows you to power all the avionics or only the primary VHF communication system.
- EPU Switch:
  A three-position switch marked EPU ARM-OFF-TEST controls the connection and testing of the Emergency Power Unit.
- Start Switches:
  The L START-OFF and R START-OFF switches manage the starting mode for the generators.

You can monitor the status of the electrical system on the MFD System Page, which shows:

- The output current of each generator,
- The system voltage on the essential bus,
- The battery temperature, and
- The status of the external power connection.

This setup allows you to control and check the aircraft's electrical system, ensuring all components work properly during flight and ground operations.

Starter and Generators

The starter/generators serve two main roles: they help start the engines and then provide electrical power once the engines are running. Here's how they work and when to use them:

- Starting the Engine:
  When you want to start an engine, its starter/generator gets power from the battery through its own relay. You momentarily press the START switch (which is spring-loaded) on the corresponding control. This triggers the unit to work as a starter, sending power to the engine's ignition. As the engine speed reaches about 40% of normal (NG speed), the switch automatically resets and the engine begins driving the unit. Once the engine reaches about 54% NG speed, you can activate the generator by moving its switch from OFF to L (or R) so it can start producing electricity.
- Cross-Start Function:
  If one engine fails to start, the working engine's generator can assist. When you press the START switch on the engine that isn't running, it receives power from both the battery and the operating engine's generator.

Use the starter/generators by pressing the START switch when starting an engine, and ensure the generator switch is set properly (L or R) once the engine is running. The cross-start function can help if one engine fails to start, and if a generator trips, you can reset it using its switch. These units also automatically manage electrical output and protect against common faults.

Emergency Power Unit

The Emergency Power Unit (EPU) is a backup power source for essential systems if both generators fail. Normally, you set the EPU switch (located on the MASTER SWITCHES panel) to ARM. This keeps the EPU battery charged and ready, and it powers key emergency items like the standby instruments, landing gear lights, emergency VHF communications, and some emergency lighting.

If both generators go out, the EPU automatically takes over and provides power for about 30 minutes. An amber caution light labeled "EPU DRAIN" on the annunciator panel will light up if the EPU starts supplying power (for example, when the left bus power is lost), if you turn the EPU switch off after starting the engines, or if you test the EPU and its battery is below 50% capacity.

External Power

The external power system lets you plug in an outside power source to help run the airplane's electrical system. When an external power source is connected, a green "EXT POWER" message shows up on the MFD System Page.

In the simulator, you can also call for GPU (Ground Power Unit) power—but only when you're parked at a location that supports it. This means you need to be at a proper parking spot where an external power source is available to supply the necessary electrical power.

Lighting System

The airplane's lighting system is divided into external and internal lights.

External Lighting

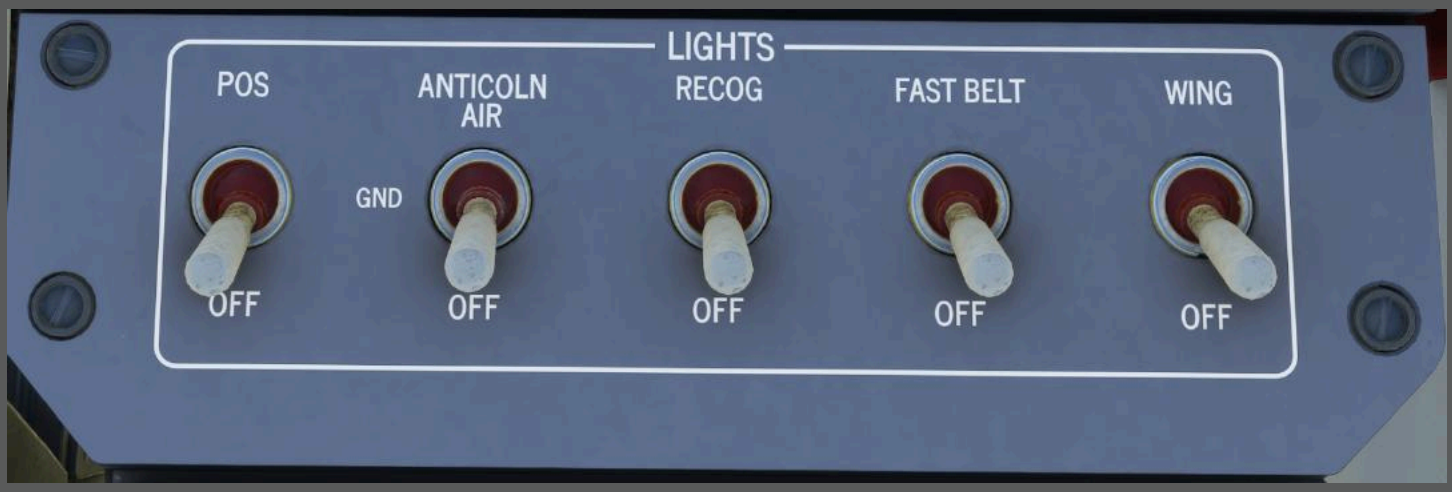
These lights help other pilots and ground crews see the airplane. They include:

- Position Lights:
    - Two forward lights (one red on the left, one green on the right) and two white lights at the back on the wing tips. Some airplanes may have a single rear white LED on the top of the vertical fin instead.
- Anticollision Lights:
    - Two strobe lights that flash—one on the top of the vertical fin and another on the bottom of the fuselage—to alert others to the airplane's presence.
- Ground Beacon Light:
    - A flashing light on the top of the fuselage that signals the airplane's location when it's on the ground.
- Other Lights:
    - Landing lights, taxi lights, recognition lights, and wing inspection lights help with visibility during different phases of operation.

Control and Power

- All external lights are controlled using switches on the LIGHTS panel located on the central control pedestal.
- For example, the position lights get their power through a specific circuit breaker and can be turned off or on with a dedicated two-position switch.

In simple terms, these external lights are essential for safe operation by ensuring that your airplane is visible to others both in the air and on the ground.



The anticollision and ground beacon lights get their power from a dedicated circuit on the copilot's panel. You control them with a three-position switch labeled "ANTI COLN AIR-GND-OFF":

- AIR Position:
  In this setting, the anticollision lights are activated. Two white LED anticollision lights—one on the top of the vertical fin and one on the bottom of the fuselage—flash in an alternating high-power mode.
- GND Position:
  In this setting, the ground beacon light is activated. With the LED setup, only the top light is used in a low-power flashing mode, while the bottom light stays off.

Additionally, there are retractable landing lights and a taxi light mounted on a movable door on the fuselage belly near the nose gear.

In simple terms, you use the three-position switch to choose between flashing anticollision lights for when you're in the air or a flashing ground beacon for when you're on the ground. The lights are automatically powered correctly by the system, ensuring you have the proper lighting for each phase of operation.

Lights Door and Landing/Taxi Lights:

- You use a three-position switch labeled OFF – TAXI – LDG.
- When you move the switch to TAXI or LDG, it sends power to the actuator that opens a door. This door reveals the landing and taxi lights.
- As the door opens, the MFD shows an "LTS DOOR OPEN" message in the bottom right corner of the screen.
- Once the door is fully open, the landing or taxi lights turn on, depending on the switch position.
- You can switch between taxi and landing light modes while the door is open.
- When you move the switch back to OFF, the door starts closing and the lights turn off.

Additional External Lights:

- Recognition Light:
  - Located at the top of the vertical fin, this light helps identify the airplane.
  - This light is bright and can illuminate the wing surface.
  - It's controlled by the "RECOG" on/off switch in the lighting control panel.
- Wing Inspection Light:
  - Mounted outside the left engine nacelle, it helps you check for ice on the wing leading edge during night operations.
  - It's also controlled by a "WING" on/off switch located in the lighting control panel.

Internal Lighting

The internal lighting control panel, located on the left side of the cockpit, lets you adjust the brightness of all the cabin lights. Here's a breakdown of how it works:

- "FLOOD" Lights:
  The instrument panel's glare shield flood lights are controlled by a three-position switch labeled BRT-DIM-OFF. This switch lets you choose between bright, dim, or off for these lights.
- "COCKPIT" Lights:
  A two position switch that controls the two overhead lights in the cockpit.
- "PANELS" Lights:
  A knob labeled PANELS adjusts the brightness of all the electroluminescent panels and display bezels in the cockpit.

- “DISPLAYS” Lights:
  Another knob, labeled DISPLAY, controls the brightness of the left and right Primary Flight Displays (PFDs), the Multifunction Display (MFD), and the Control Display Unit (CDU).
- “LAMP” Lights:
  A two-position switch called LAMP adjusts the brightness levels for the master warning, master caution, ICE indications, landing lights, and the REV/MISC panel.
- CABIN Lights:
  A two-position switch , switches ON/OFF cabin lighting

Inside the airplane, you have various lights for both the cockpit and the passenger cabin that you can control:

Cockpit Map Lights

- There are two map lights – one on the left and one on the right side of the cockpit.
- Each has its own on/off switch with a built-in dimmer (rheostat) so you can adjust the brightness.
- The can be extended out over the pilots lap by selecting and moving them laterally via a mouse or controller.

Passenger Cabin Lights

- A two-position switch labeled CABIN-OFF on the internal lights panel turns the cabin lights on or off.
- The specific cabin lighting setup depends on how the interior is configured, but it typically includes:
  - Entry Light:
    Located near the cabin door, this light automatically turns on when you open the door (controlled by a switch on the entry door panel).
  - General Cabin Lights:
    These lights are inset in rows along the sides of the cabin dome. You can control them using on/off switches on the entry door panel and on the cockpit cabin light switch.

  - Lavatory Lights:
    The lavatory has its own vanity and indirect lights controlled by a dedicated switch in that area.

- Rear Baggage Compartment Light:
  This light is controlled by a toggle switch near the compartment door and only comes on if the door is open.

Pressurization

The pressurization system keeps the cabin's air pressure at a comfortable level during flight. Here's a simple breakdown:

- How It Works:
  Air is taken from the engine's bleed air and used to pressurize the cabin. Two valves control how much air escapes from the cabin, which in turn controls the pressure. An electronic controller normally manages this automatically.
- Control Panel:
  The cabin pressurization controls are on the CABIN PRESS panel at the lower right of the instrument panel. Here you can set:
  - The rate of climb for the cabin pressure (how quickly the pressure changes during ascent).
  - The cabin altitude (the target pressure level).
  - A barometric correction (to adjust for local air pressure changes).
- Automatic and Manual Modes:
  - In automatic mode, the system continuously adjusts the cabin pressure using sensors that compare the cabin pressure to the outside pressure.
  - In manual mode, you have direct control over the outflow valves to set the cabin pressure yourself. This is useful if the automatic system isn't working properly.
- Emergency Functions:
  If needed, an emergency circuit can quickly lower the cabin pressure (using a pressure dump device) to a safe level, such as during an emergency descent.

When you set the pressurization system to AUTO, you have two sub-modes you can choose from:

- AUTO SCHED Mode:
  The system automatically manages the cabin pressure based on a pre-set relationship between the aircraft's altitude and the desired cabin pressure. To use it, you simply:
  - Set the destination's pressure altitude with knob A.
  - Adjust the barometric correction with knob B before landing.
  - Check the cabin altitude gauge to confirm that the cabin is depressurized before landing.
- CAB SEL Mode:
  This mode lets you choose the settings based on your preferences. To operate in this mode, you:
  - Set your desired cruise altitude using knob A.
  - Set the barometric correction to 29.92 in Hg with knob B.
  - Use knob R to adjust the cabin's rate of climb.
  - If your flight plan changes, you can re-select the cruise altitude.
  - Finally, check the cabin altitude gauge to make sure the cabin is properly depressurized before landing.

All these controls are powered from the right dual feed bus through a 3-amp circuit breaker on the copilot's panel. This setup gives you flexibility to let the system handle the pressurization automatically or take control manually if needed.

Static and Pitot System

The pitot/static system gathers air pressure data that your instruments use to show airspeed, altitude, and vertical speed. Here's how it works in simple terms:

- Pitot Tubes:
  These are heated tubes located on the front of the airplane, under the forward wing. They measure the pressure from the air flowing against the airplane as it moves.

- Static Ports:
  These openings are on both lower sides of the fuselage, below the second cabin window. They measure the ambient, or still, air pressure around the airplane.
- Dual Sources for Each Pilot:
  Each static port has two openings—one for the pilot and one for the copilot. This setup, along with dual pickups, helps reduce errors caused by the airplane's sideways movement, ensuring that your airspeed, altitude, and vertical speed readings are accurate.

The pitot/static system provides the essential air pressure information that feeds into your air data computers and standby instruments, keeping your flight data reliable.

- Left Side:
  Use the "L & STALL" switch to control the left pitot/static heater, which is powered through a dedicated circuit on the pilot panel.
- Right Side:
  Use the "R & TAT" switch for the right pitot/static heater, powered through a circuit on the copilot panel.

There are amber caution lights on the display (labeled L PITOT HTR and R PITOT HTR) that show the status of each heater. The system also has sensors (current-sensitive relays) that check how much current each heater draws. This helps you know if a heater is off or not working properly—even if a circuit breaker trips, these sensors still provide a warning.

Before takeoff, you can test the system by turning the pitot heaters on and then off to ensure everything is working as expected.

Stalls and AOA

The stall warning and angle of attack (AOA) system is your early alert for a potential stall. Here's what it does in simple terms and how you use it:

- What It Does:
  A sensor mounted on the right side of the fuselage (between the third and fourth windows) measures the angle at which the airflow hits the wing. This information is sent to the stall warning computer, which then shows low-speed cues on your primary flight displays. These cues give you an idea of how close you are to stalling. If the sensor fails or doesn't work properly, a red AOA flag appears on the display.
- How It Helps:
  The system adjusts the stall warning threshold based on the flap setting—so if your flaps are down, the stall warning threshold changes accordingly. If a pre-stall condition is detected, the system will:
    - Light up a red STALL warning on the instrument panel,

    - Sound an audible warning, and
    - Automatically disengage the autopilot if it's on.
- Failure Indicators:
  An amber "STALL FAIL" light will come on if there's a problem with either the stall warning system or the sensor's heating element.
  Additionally, two ground switches (one on the nose and one on the left landing gear) automatically disable the stall warning system when the airplane is on the ground.
- Anti-Ice Function:
  To prevent the sensor from freezing, its internal heater is activated using a control on the central anti-ice panel in the cockpit.
- When to Use It:
  This system works automatically during flight. You check its proper function during preflight using the SYS TEST selector. It's always active in flight to give you early warnings if the airplane is approaching a stall, so you can take corrective action immediately.

The stall warning and AOA system continuously monitors your flight conditions, adjusts for different flap settings, and warns you both visually and audibly if a stall is imminent—all while protecting the sensor from icing with built-in heating.

Ice Detection

The ice detection system helps alert you to ice buildup on the airplane. Here's a simple breakdown:

- Ice Detector:
    - Located on the right side of the nose, it senses when ice reaches about 0.5 mm on its probe.
    - When ice is detected, the sensor sends out a 5-second signal, and its heater activates to melt the ice so it can check again.
- Warning Lights:
    - Two amber pushbuttons on the pilot's and copilot's panels light up when ice is detected.
    - If you see these lights flashing periodically (for about 5 seconds each time), it means ice is being detected.
    - If the lights stay on continuously, it might indicate a problem with the sensor, so you should check the backup visual ice accretion probe on the windshield.
- Deicing Boot Control:
    - In automatic mode, the ice detector's signal is used to control the deicing boots on the engine nacelles, helping to remove ice from the engine air intakes.
- Wing Inspection Light:
    - There's also a light on the outboard side of the left engine nacelle.
    - This allows you to visually check for ice on the wing during night flights.
    - It's controlled via a switch on the LIGHTS control panel.

The system automatically detects and helps manage ice buildup, alerting you with flashing lights and supporting deicing functions, with backup visual checks available if needed.

Windshield Deice

The windshield defog/anti-ice system uses electric heaters to keep your windshield clear of ice and fog. It works with six heating elements divided into two separate groups—a primary system and a secondary system. Each group is controlled by its own switch (labeled "WSHLD HTR PRI" for the primary and "WSHLD HTR SEC" for the secondary) on the anti-ice control panel, which is located on the lower center of the instruments panel. Each switch can be set to HI, LO, or OFF, allowing you to choose the level of heating you need. When set to either LO or HI, the corresponding heating elements activate to clear ice or fog as required.

Wing/Structure Deice

The main wing anti-ice system protects the wing's leading edge from ice by blowing hot air over it. Here's how it works in simple terms:

- How It Works:
  Hot air from the engine's compressor is directed through ducts and out through diffusers along the wing's edge—one diffuser on the inner part of the wing and two on the outer part. If one engine fails, the air lines are interconnected so both wings still get hot air. (Note: The forward wing is heated electrically, and there's no anti-ice for the tail.)

- How to Control It:
  You control the system using two three-position switches (one for each wing) on the anti-ice panel, which is located in the lower center of the instrument panel. These switches let you choose:
    - AUTO mode: The system automatically adjusts the hot air flow based on temperature. When working correctly, the MFD shows a green “ON” light for each wing. If the air temperature is too low or the system fails, the green light goes off.
    - OFF or MAN mode: You can manually control the system if needed.
- Feedback and Safety:
  Temperature sensors near the wing’s leading edge provide feedback to the control unit. If the wing skin gets too hot, a red warning light appears on the annunciator panel, alerting you to potential overtemperature.
- Power Supply:
  The control circuits are powered by dedicated circuit breakers, ensuring that the system works reliably.

In AUTO mode, two temperature sensors continuously measure the hot air temperature and send their readings to the control unit. The control unit then calculates an average value and gradually adjusts the air valve to ensure the air reaching the wing’s diffusers is at the proper temperature. If everything is working normally, you'll see green "ON" indications.

If the green lights are not coming on in AUTO mode—indicating a problem—the system should be switched to MANUAL mode. In MANUAL mode, you control the valve directly. You should only use MANUAL mode if the automatic system fails, and the green lights aren’t on to confirm proper operation. A third temperature sensor monitors the wing skin temperature and will trigger a red warning light if the wing gets too hot.

When you set the switch to OFF, the air valve closes. In MANUAL mode, it's a good idea to periodically switch the system to OFF and then back to MANUAL to prevent overheating, unless the conditions allow you to keep it on MANUAL until an overtemperature warning appears.

The main wing anti-ice system uses hot engine bleed air to keep ice off the wing. You monitor its performance via the MFD and control it with switches on the anti-ice panel, choosing between automatic and manual modes as needed.

Wing Delce

The forward wing anti-ice system prevents ice from forming on the wing's leading edge by using eight heating elements. You control this system with two simple on/off switches labeled FWD WING L and FWD WING R on the anti-ice control panel. The system automatically keeps the wing's leading edge below a set temperature using two thermostats on each wing. If these thermostats fail, additional thermal switches will kick in to stop the wing from overheating, and a red warning light (L/R FWD WG OVHT) will appear on the annunciator panel. Meanwhile, the MFD System Page will show green "ON" indicators next to the "FW"

legend for each wing once the preset temperature is reached, letting you know the system is working properly.

Flight Instruments

AHRS

The Attitude and Heading Reference System (AHRS) tells you the airplane's orientation—its pitch, roll, and which direction it's pointing. Think of it as the plane's "sense of direction." Here's how it works in everyday language:

- Two Independent Systems:
  There are separate systems for the pilot and copilot. Each one works on its own so that if one fails, the other still gives you accurate information.
- Key Components:
  - Attitude/Heading Computer (AHC): This computer calculates the airplane's orientation and magnetic heading using data from various sensors.
  - Flux Detector Unit (FDU): This sensor measures the Earth's magnetic field, helping to determine which direction the plane is heading.
  - External Compensation Unit (ECU): This unit stores specific calibration data for the aircraft (collected during a special "compass swing" procedure) to correct any errors in the magnetic readings.
- Data Input:
  In addition to the sensors, the system also uses information from the airplane's air data system (like true airspeed and altitude rate) to make its calculations even more accurate.
- Where the Information Goes:
  The AHRS sends the attitude and heading data to important displays (like your primary flight displays), the flight guidance system, navigation systems, weather radar, and other parts of the cockpit. This helps keep everyone on the same page about the plane's position and direction during flight.

In simple terms, the AHRS acts like the airplane's built-in compass and attitude indicator, using sensor data and stored calibration info to provide reliable and stable information about how the plane is flying.

EFIS

The Electronic Flight Instruments System (EFIS) is what displays all your flight information on screens in the cockpit. Here's a plain-language explanation:

- Components:

    - Three Screens (Adaptive Flight Displays): Two of these serve as Primary Flight Displays (PFDs) for the pilot and copilot, showing essential flight instruments like attitude, airspeed, and heading. The third screen is a Multifunction Display (MFD) that shows engine data on the top half and navigational or system information (such as a map or system page) on the bottom half.
    - Control Panels: Two Display Control Panels (DCPs) and one Cursor Control Panel (CCP) let you adjust what's shown on the screens.
- Data Sources:
    - Air data (like speed and altitude) comes from the Air Data System.
    - Attitude and heading information is provided by the Attitude and Heading Reference System (AHRS).
    - Engine details are gathered by two Engine Data Concentrator Units (EDC) and two Data Concentrator Units (DCU).
- Redundancy:
    - The EFIS is divided into separate systems for the pilot and copilot, so if one side fails, the other can still provide all the necessary information.
    - There's a switch on the Reversionary/Miscellaneous Panel that allows you to shut down a failed display and merge the remaining information onto the other display.

The EFIS combines data from various sensors and systems to provide a complete, easy-to-read picture of the aircraft's status, ensuring both pilots have all the information they need to fly safely.

Flight Displays

The Adaptive Flight Displays combine all the essential flight information into a couple of easy-to-read screens:

- Primary Flight Displays (PFDs):
  Both the pilot and copilot have their own PFD, which show vital data like the airplane's attitude (its orientation), heading, airspeed, altitude, vertical speed, flight guidance alerts, and navigation information.
- Multifunction Display (MFD):
  The central screen is divided into three parts:
    - Top Section: Shows engine data (Engine Indicating System).
    - Middle Section: Can display checklists or text from the flight management system.
    - Bottom Section: Offers a navigation display (either a full compass rose, a partial compass arc, a system page, or a map).
- Power and Backup:
  Each display is powered by its own dedicated circuit. If the MFD fails, a reversion switch lets you shut it down and have both pilots see a combined, or "composite," display on their PFDs, which will include

engine data and system information. Likewise, if the pilot's PFD fails, you can switch to have the MFD display the composite information while the copilot's PFD continues to operate normally.

- Data Comparators:
  The system constantly compares data from different sources (like attitude, heading, altitude, airspeed, and engine performance) to ensure the information is accurate. If the data from the two independent sources don't match, a warning flag appears on the displays, signaling that you should be extra vigilant.

In simple terms, these displays work together to provide you with all the critical flight information in one integrated view, with built-in redundancy and data checking to help keep your flight safe.

Control Panel

The Display Control Panel (DCP) is like the cockpit's settings board for the flight displays. It lets you adjust and select various options to tailor what you see on your screens. Here's what you can do with it in simple terms:

- Barometric Pressure:
  Use the BARO knob (which also has a push button) to set the barometric correction value. This helps ensure your altitude readings are accurate, and you can quickly switch back to a standard setting.
- Menu Navigation and Data Entry:
  The DATA and MENU ADV knobs (with a push-button select) let you scroll through and choose items on the displays. You can change values or advance to the next menu item on your Primary or Multifunction Displays.
- Radar Tilt Control:
  The TILT knob, paired with an AUTO TILT button, adjusts the angle of your weather radar. You can set it manually or let it automatically adjust based on conditions.
- Map Display Range:
  The RANGE knob lets you change how much of the map or navigation information is shown on your displays.
- Reference and Navigation Settings:
  - The REFS button toggles a menu that shows important reference data like V-speeds and minimum barometric values.
  - The NAV/BRG button lets you choose which navigation source and bearing information to display.
- Weather Radar Options:
  - The RADAR button opens or closes the weather radar menu, letting you select different modes for your radar.
  - The GCS (Ground Clutter Suppression) button turns on or off a feature that reduces unwanted ground echoes on the radar, helping you better see rainfall and weather details.

The DCP gives you control over many aspects of your flight displays—from weather and navigation settings to map range and pressure corrections—ensuring you have all the right information at your fingertips during flight.

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Radio Panel

The Radio Tuning Unit (RTU) is the cockpit's central tool for setting radio frequencies and managing communication, navigation, and transponder functions. Here's a plain language explanation of its key features and how to use it:

- What It Does:

The RTU lets you adjust and tune the radios used for VHF communication, navigation (like VOR/ILS/DME and ADF), and the Mode-S transponder. You can tune radios directly, recall previously used frequencies, or choose from preset pages.

- Controls on the RTU:
    - Line Select Keys:

There are seven keys next to the display. The function of each key depends on what's currently shown on the screen. When you press one, it activates that specific function without affecting the rest of the unit.

    - IDENT Key:

This key makes the active transponder send out the aircraft's identifier, which helps other controllers and aircraft identify you.

    - DME-H Key:

Use this to toggle the DME hold function on the current DME channel, locking the distance reading.

    - 1/2 Key:

This button switches the display between a "cross-side" top-level page and the normal on-side page. Press it once to change views and again to switch back—unless you're in an error or menu page where this function is disabled.

    - Concentric Tune Knob:

This two-layer knob is used for selecting and adjusting radio frequencies or channels. It lets you tune to active frequencies, recall preset channels, scroll through pages, and even input configuration codes.

    - BRT Control:

Located in the upper right corner, this control adjusts the brightness of the RTU's LCD display. It can also act as a fine-tuning control if the display is already dimmed by an external source.

- Switching Between RTU and CDU Functions:

There's a rocker switch labeled "CDU/RTU" on the reversionary panel. When

this switch is in its neutral position (with no LED lit), both the RTU and the CDU (Control Display Unit) work together for radio tuning. If the RTU ever fails or loses its tuning capability, you can switch this rocker to the CDU position. In that case, only the CDU will handle radio tuning, and an LED near the switch will light up to confirm the change.

The RTU is your central interface for controlling radio communications and navigation systems, with dedicated keys and knobs to adjust frequencies, manage settings, and ensure everything is working correctly. Its design allows for flexibility and redundancy, so you always have a reliable way to tune your radios during flight.

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Flight Management Computer (FMC)

The Flight Management Computer (FMC) is a central interface on the control pedestal that lets you manage both flight planning and radio functions, such as communication, navigation, and transponder settings. Here's a simple breakdown of its features:

- Display and Layout:
  The FMC has a color screen that shows all your flight management data and modes. The top line

displays the current mode and page number. Below that, there are six lines for data along with corresponding label lines, and at the bottom, two lines serve as a scratchpad and for messages.

- Radio Tuning:
  A dedicated tuning section on the FMC lets you select frequencies or channels for radios (COM, NAV, ADF) and set transponder codes. You can adjust these settings directly or choose from presets.
- Input Controls:
  - Line Select Keys: These are buttons around the display used to choose modes, and to copy or transfer data between the display and the scratchpad.
  - Function Keys: These keys let you quickly access many radio tuning and flight management functions.
  - Alphanumeric Keypad: This full keyboard allows you to enter data directly, which is first stored in a scratchpad. Then, by pressing the corresponding line select key, you transfer the data to where it's needed.
- Mode Selection:
  You can switch between different operating modes (like flight plan editing, performance data entry, or tuning radio frequencies) by using either the function keys or the line select keys next to menu items. Some functions toggle on and off with repeated presses.

The FMC is your all-in-one cockpit computer for entering flight plans, tuning radios, and managing various systems, with an easy-to-use display and control keys that let you quickly access and adjust information as needed.

Navigation Systems

Radio Altimiter

The Radio Altimeter System measures how high the airplane is above the ground from about 2500 feet down to touchdown. Here's a simple explanation:

- How It Works:
  A transmitter/receiver unit in the nose sends and receives signals via two antennas on the bottom of the airplane. This information is used by the Flight Guidance System and is shown on your Primary Flight Displays (PFDs).
- What You See:
  The digital altitude (AGL), along with the Decision Height (the altitude at which you must decide to continue or abort a landing), is displayed on the PFDs. You can set the Decision Height using the controls on the Display Control Panel (DCP) and the PFD line select keys.
- Testing the System:
  You can check the radio altimeter by turning the SYS TEST switch on the Central Control Panel to the

RAD ALT position. In test mode, the PFD shows a yellow “RA TEST” halo next to the altitude readout. If everything is working properly, the display will show an altitude of 50 feet.

The Radio Altimeter gives you accurate altitude readings near the ground, which are critical for landing, and you can easily test its functionality using the onboard test switch.

Weather Radar

The Weather Radar System (RTA-800) helps you see weather conditions and avoid storms while flying. Here’s a simple explanation:

- What It Is:
  It’s a two-channel, solid-state, color weather radar that uses X-band frequencies. The radar is located in the nose of the airplane and uses different colors to show how strong or intense weather is.
- What It Does:
  It detects and displays precipitation and weather hazards within about 60 degrees on each side of your flight path, helping you navigate around dangerous weather. It can also show ground terrain information.
- How You Control It:
  You control the radar using the Display Control Panel (DCP). Through the radar menu, you can adjust the range (how far out you see), the tilt (the angle of the radar beam), and a feature called Ground Clutter Suppression (GCS) that makes it easier to interpret weather returns. Pressing the “RDR” key on your Primary or Multifunction Displays brings up the radar menu.

The weather radar system gives you a clear, color-coded view of weather conditions ahead so you can steer clear of hazards and, if needed, view some terrain details as well.

Radio Navigation

The VHF Radio Navigation System helps you navigate by receiving signals from various ground-based stations. It’s located in the nose of the airplane and consists of two receivers:

- NAV 1 Receiver:
  This unit picks up signals from VOR stations (for en-route navigation), ILS systems (for landing guidance), marker beacons (which tell you how far you are from the runway), and even ADF signals.
- NAV 2 Receiver:
  Similar to NAV 1 but without the ADF, it also handles VOR, ILS, and marker beacon signals.

These signals let you fly along your planned route and guide you safely during landing. All the necessary antennas are mounted on the tail (vertical stabilizer).

You control the system using the Display Control Panels and the Primary/Multifunction Displays, along with the Radio Tuning Unit (RTU) and the Control Display Unit (CDU). These tools allow you to set radio frequencies, enter beacon codes, and choose the right modes. Both the pilot and copilot can operate these controls, and if one tuning unit fails, you can switch to the other so you always have navigation guidance.

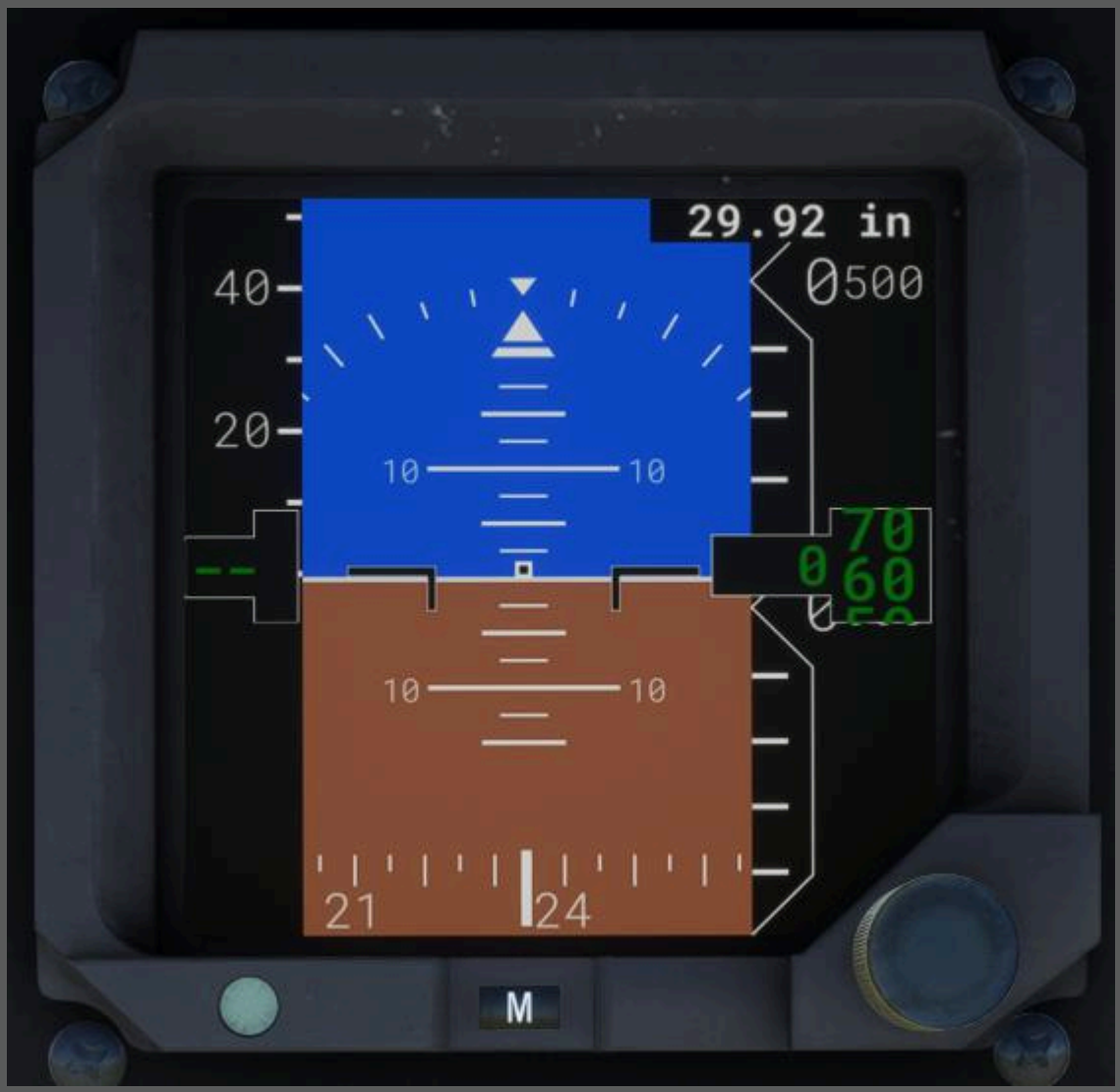
DME

The Distance Measuring Equipment (DME) is a navigation tool that tells you how far you are from a ground station. Here's a plain language explanation:

- What It Does:
  The DME measures the straight-line (line-of-sight) distance between your airplane and selected ground stations. It also calculates how quickly you're closing in on that station and estimates the time until you reach it. Additionally, it decodes an identifier from the station so you know which one you're tracking.
- How It Works:
  The DME unit, located in the nose of the airplane, works with an antenna mounted on the lower front of the fuselage. It operates on specific radio frequencies and is often paired with VOR or ILS navigation systems. When you select a VOR or ILS frequency, the DME automatically tunes to the matching distance-measuring channel.
- Display and Control:
  The distance, time-to-station, ground speed, and station ID are shown on your Primary Flight Displays (PFDs) or Multifunction Display (MFD). You control and tune the DME using the Radio Tuning Unit (RTU) or the Control Display Unit (CDU), often in conjunction with other navigation systems. The DME also sends audio signals to the airplane's audio system.
- Additional Features:
  The system can track up to three different stations at once. Normally, channels 1 and 2 are tuned through the RTU or CDU, while channel 3 is reserved for auto-tuning by the Flight Management System (FMS). The FMS can even manage auto-tuning of channels 1 and 2 when you're not using the DME HOLD function.

In simple terms, the DME gives you accurate, real-time distance information from ground stations, helping you determine your position and manage your approach to the runway.

Stand By Horizon Indicator



The Integrated Standby Instrument (ISI) is your backup display for key flight data—attitude, altitude, and airspeed—when the primary instruments fail. Here's a simple breakdown of how it works and what it does:

- What It Does:
  The ISI shows you the airplane's orientation (how it's pitched, rolled, and its angle relative to the horizon), how high you are, and your speed. It's like a safety net in case your main instruments stop working.
- How It Works:
  - It uses an inertial sensor that measures the airplane's movements (roll, pitch, and how quickly it changes direction) to figure out its attitude.
  - Two pressure sensors calculate your altitude and airspeed.
  - The information is displayed on a color LCD screen in both digital readouts and a scrolling tape format.

    - There’s an automatic brightness control that adjusts the display based on ambient light, so you can always see the data clearly.
- Power and Backup:
  The ISI is powered by an emergency power source. If you lose the main DC generators and battery power, the ISI will still run for at least 30 minutes, giving you time to react to the situation.

The ISI is a crucial backup instrument that keeps you informed of your basic flight parameters even if your main systems fail.

Autopilot

The Flight Management Computer (FMC) Flight Guidance System (FGS) is essentially your autopilot and flight director combined, which helps you fly the plane automatically or provides guidance cues. Here’s a plain-language rundown of its key functions and how you use them:

Core Components:

- Two Flight Guidance Computers (one for each side) that calculate flight commands.
- A Flight Guidance Panel (FGP) where you input commands.
- Three servos that move the airplane’s control surfaces (for roll, pitch, and yaw).

Autopilot and Yaw Damper Functions:

- Autopilot Engage:
    - Use the AP Engage button on the FGP to turn on the autopilot. When engaged, the system follows the flight director’s commands to keep the airplane on the desired flight path.
    - The autopilot automatically turns on the pitch trim and, if you choose, the yaw damper.
- Yaw Damper (YD) Engage:
    - There’s a separate YD button to activate or deactivate the yaw damper, which helps keep the plane stable in the yaw (side-to-side) direction. You can use it independently or together with the autopilot.
- Disengagement:
    - Lower the AP/YD disconnect switch (or press the autopilot disconnect button) to turn off the autopilot. The system will also disengage automatically if a fault is detected.

Mode Selection:

- Lateral (Side-to-Side) Modes:
  - *Roll Hold:* Keeps the plane level.
  - *Heading Select (HDG):* Follows a specific heading that you set with the HDG knob.
  - *Back Course (B/C):* Tracks a reverse course signal.
  - *Approach (APPR):* Provides guidance for the final approach to land.
  - *NAV Mode:* Follows a navigation course based on radio signals.
  - *Half Bank Mode:* Limits the maximum bank angle for gentle turns.
- Vertical (Up-and-Down) Modes:
  - *Pitch Hold:* Maintains the current pitch angle.
  - *Altitude Hold:* Keeps the airplane at a set altitude.
  - *Vertical Speed (VS):* Maintains a set rate of climb or descent.
  - *Altitude Preselect:* You can pre-set an altitude target that the system will try to capture as you approach.
  - *Flight Level Change (FLC):* Adjusts altitude while maintaining a specific airspeed.
  - *VNAV (Vertical Navigation):* Uses the flight plan to manage vertical guidance.

Additional Controls:

- Control Knobs and Wheels:
  - The VS/Pitch wheel lets you adjust the pitch or vertical speed reference.
  - The HDG knob sets your desired heading, which is shown by a heading bug on the displays.
- Synchronization (SYNC) Buttons:
  - These help update your reference values (pitch or heading) to match the current aircraft state.
- Altitude and Speed Adjustments:
  - Use the ALT knob to set your preselected altitude in large or fine increments.
  - The SPEED knob and IAS/MACH button let you choose and adjust your airspeed reference, whether in IAS or Mach mode.
- Flight Director (FD) Buttons:
  - These turn on or off the flight director guidance lines on your displays, which provide visual cues for maintaining the desired flight path.

Display Feedback:

- Your Primary Flight Displays (PFDs) show mode messages (like “AP” for autopilot, “HDG” for heading mode, etc.) above the attitude indicator.
- The flight director commands are shown as magenta bars over the aircraft symbol on the PFD.
- The system continuously monitors the flight parameters and will only allow mode engagement if conditions (such as airspeed, attitudes, and rates) are within safe limits.

Operational Notes:

- Some functions operate automatically: for example, if you change the preselected altitude while in altitude preselect mode, the system will arm itself to capture that altitude.
- In case of any anomalies (like excessive rates or system failures), the FGS will automatically disengage the autopilot.
- The system works in a dual-redundant manner (one for the pilot and one for the copilot), so if one side fails, the other can take over.
- You can switch between automatic and manual control modes if needed.

In everyday terms, the FGS takes much of the work out of flying by keeping the airplane on its intended path, managing speed, altitude, and direction, and providing clear guidance on your displays. All these controls and feedback let you easily select the desired flight mode, make adjustments on the fly, and ensure safe, stable flight whether you're climbing, cruising, or approaching to land.

Flight Management System

The Flight Management System (FMS) is your airplane's smart navigation and flight planning tool. It not only helps you set up and follow a flight plan but also takes in data from multiple sensors to calculate your exact position and guide the airplane along your chosen route. Here's what it does and how you use it, explained simply:

What It Consists Of:

- CDU-3000 (Control Display Unit):
  This is the screen and keypad on the central control pedestal that you use to enter data, view flight plans, and adjust radio frequencies.
- FMC-3000 (Flight Management Computer):
  This computer, housed inside the avionics system, processes all the navigation data to calculate your "best computed position" and generate steering commands.
- Database Units (DBU-4100, and DBU-5000 if installed):
  These are like onboard data libraries that store your navigation charts, waypoints, and other flight plan information. They can be updated on the ground using a USB drive or a connected laptop.

Operational Abilities and Functions:

- Position Initialization:
  When you power up the FMS, you start by telling it your current position—like your airport, gate, runway threshold, or a nearby navaid—using the "POS INIT" pages on the CDU. The FMS then uses data from all available sensors (GPS, VOR/DME, inertial sensors, etc.) to refine your exact location.
- Flight Planning and Navigation:

    - You can create a flight plan by selecting waypoints (fixed geographical points stored in the database or ones you define yourself) to build a route from one point to another.
    - The FMS holds two flight plans: an active one that it uses for navigation and a secondary one for backup or later use.
    - As you fly, the system continuously calculates your position relative to your flight plan and sends steering commands to help the autopilot fly you from waypoint to waypoint.
- En Route, Terminal, and Approach Navigation:
    - En Route: The FMS guides you along your planned route between airports.
    - Terminal: When you are within about 30 nautical miles of your departure or arrival airport, the FMS enters terminal mode and shows relevant information.
    - Approach: When you are about 2 nautical miles from the Final Approach Fix (FAF), the FMS switches to approach mode and helps manage the final descent. Before landing, it shows alerts like “LAST WAY-POINT” to warn you as you pass the final waypoint. It then stops steering based on the flight plan and holds your current heading until a new flight plan is entered.
- Sensor Integration and Auto-Tuning:
    - The FMS uses data from GPS, VOR/DME systems, and other sensors to ensure the navigation data is accurate.
    - It automatically tunes the VOR/DME frequencies to pick the best available signals, which helps maintain a precise position.
- Display and Messaging:
    - On the PFD (Primary Flight Display): You see navigation information such as the active navigation source, course deviation, vertical navigation (VNAV) data, and various system messages.
    - On the MFD (Multifunction Display): You can view detailed maps, charts, and text pages that show flight plan progress, sensor status, fuel management, and more.
    - The CDU also shows messages on a scratchpad and a message line. Important alerts and system information are shown on both the PFD and MFD.
- Ground Operations:
    - There is an “FMS ON GND” switch that lets you power up only the essential avionics for flight planning and database updates when the airplane is on the ground.
- RNAV and VNAV Capabilities:
    - The system supports both horizontal (RNAV) and vertical (VNAV) navigation, meeting the requirements for both European (B-RNAV/P-RNAV) and U.S. airspace.
    - For Standard Instrument Departures (SID), it is recommended that you set the Flight Director to basic heading and pitch modes, with the navigation (NAV) function armed and the heading preset to the runway, to reduce workload during takeoff.

How to Use It:

1. Before Flight (On Ground):
    - Position Initialization: Use the CDU's "POS INIT" pages to enter your starting position.
    - Flight Planning: Enter or select your waypoints and build your active flight plan.
    - Database Updates: If needed, update your navigation database using the onboard DBU via a USB drive or a laptop connection.
    - Set Auto-Tuning: Make sure the VOR/DME sensors are set to auto-tuning so the FMS always receives the best signals.
2. During Flight:
    - The FMS continuously calculates your position using data from all available sensors.
    - It displays navigation information on your PFD and MFD, including your route, waypoints, and any alerts.
    - The FMS computes steering commands that the flight control system (or autopilot) uses to keep you on course.
    - As you approach your destination, the system transitions through terminal and approach modes, alerting you with messages such as "LAST WAY-POINT."
3. In Case of Changes:
    - If you need to update your flight plan mid-flight or if you receive new weather or navigation information, you can enter new waypoints or change existing ones via the CDU.
    - The system automatically adjusts and recalculates your route based on the most reliable sensor data available.

The FMS makes flight planning, navigation, and position tracking a seamless process. It gathers and processes data from multiple sources, helps create and manage flight plans, and provides all the necessary navigation information on your cockpit displays, all while offering both automatic and manual control options to adapt to different flight phases and conditions.

Checklists

Before Start

1. Entrance door - SECURE
2. Crew/passenger briefing - COMPLETE
3. Seats - ADJUST
4. Switches - CHECK OFF
5. Battery switch - BAT
6. Fuel quantity - CHECK
7. Parking brake - CHECK LOCKED
8. Avionics master switch - COM1 ONLY

Engine Starting - Normal Start

1. First engine start - Battery or GPU
2. Anti Col. light - GND
3. Power lever - IDLE
4. Condition lever - CUT OFF
5. Firewall shut off valve - CHECK OPEN
6. Fuel pump - TEST AND CHECK MAIN
7. Fuel pressure light - CHECK OFF
8. Bleed air switches - CHECK OFF
9. Ignition switch - CHECK NORM
10. Propeller - CLEAR
11. Engine start switch - START
12. Condition lever (at 13% NG) - GROUND IDLE
13. ITT - MONITOR (1000C Max. 5 sec.)
14. Oil pressure (EICAS) - CHECK INCREASING
15. NG RPM (EICAS) - CHECK INCREASING
16. Engine start switch (at about 40% NG) - CHECK OFF

With Engine at Ground Idle Setting, Check the Following Conditions:

1. ITT (EICAS) - 750C Max
2. Oil pressure (EICAS) - 60 psi Min
3. Oil temperature (EICAS) - 110C Max
4. NG RPM (EICAS) - 54% MIN
5. NP RPM (EICAS) - 900 RPM MIN

Post-Start Checks

1. Condition lever - ADVANCE TO FLIGHT IDLE
2. GPU (unless needed for second engine start) - DISCONNECT
3. Generator - ON
4. Ammeter - CHECK
5. Hydraulic pump switch - HYD (Pressure - CHECK; light OFF)

Cross-Start Procedure (One Engine Operating)

1. Condition lever (operative engine) - FLIGHT IDLE
2. Generator (operative engine) - CHECK ON
3. Ammeter (Sys Page) - CHECK below 160 Amp
4. Firewall shut off valve - CHECK OPEN
5. Power lever (inoperative engine) - IDLE
6. Condition lever (inoperative engine) - CUT OFF
7. Fuel pump - MAIN
8. Fuel pressure light - CHECK OFF
9. Bleed air switch - OFF
10. Ignition switch - CHECK NORM
11. Propeller - CLEAR
12. Engine start switch - START
13. Condition lever (inoperative engine) (at 13% NG) - GROUND IDLE
14. ITT - MONITOR (1000°C Max. 5 sec.)
15. Oil pressure (EICAS) - CHECK INCREASING
16. NG RPM (EICAS) - CHECK INCREASING
17. Engine start switch (at about 40% NG) - CHECK OFF

With Engine at Ground Idle Setting, Check the Following Conditions:

1. ITT (EICAS) - 750°C Max
2. Oil pressure (EICAS) - 60 psi Min
3. Oil temperature (EICAS) - 110°C Max
4. NG RPM (EICAS) - 54% MIN
5. NP RPM (EICAS) - 900 RPM MIN

Post-Cross Start Checks

1. Condition lever - BOTH GROUND IDLE
2. Generator - ON

Before Taxi

1. EPU - TEST
2. EPU switch - ARM
3. Avionics switch - ON
4. Environmental temperature - AUTO AND TEMP SELECT AS NECESSARY
5. Bleed air switches - SET to L and R positions
6. Pressurization Auto/Man switch - AUTO
7. Auto Sched/Cab sel switch - AUTO SCHED
8. Landing altitude - SET
9. Barometric correction - SET
10. Rate selection - SET (PIP mark)
11. Engine oil coolers - AS REQUIRED
12. Gyros - CHECK
13. Radios - SET and CHECK
14. Air Data Computer - TEST (if installed)
15. Overspeed warning - TEST
16. Hydraulic system - TEST
17. Steering system - TEST
18. Steering - TAXI
19. Pitot/stall/static heat - CHECK
20. Stall warning - TEST
21. Flap system - TEST
22. Flaps - MID
23. Trim systems - Set for take-off
24. Ice detector - TEST
25. WSHLD heat - CHECK
26. Engine ice vane/oil cooler intake - CHECK
27. Engine inlet de-ice boots - CHECK
28. Anti ice Main wing - TEST
29. Anti ice Fwd wing - TEST
30. EFIS - TEST (if installed)
31. Autopilot - TEST (if installed)
32. Radio altimeter - TEST (if installed)
33. Annunciator panel - TEST and CHECK CAB DOOR warning light flashing
34. BAG DOOR AND CAB DOOR warning lights - CHECK OFF
35. Parking brake - RELEASE

Taxi

1. Brakes - CHECK (avoid excessive use)
2. Steering system - OFF on a level runway
3. Airplane - CHECK no tendency to yaw left or right
4. Steering system - TAXI
5. Prop reverse - CHECK
6. Prop feathering - CHECK
7. Flight instruments - CHECK

Engine Run-Up

1. Parking brake - SET LOCKED
2. Condition levers - MAX RPM
3. Power levers - Advance to 2000 RPM
4. Propeller overspeed - TEST
5. Propeller governing - CHECK to minimum RPM
6. Autofeather system - TEST
7. Autofeather switch - ARM
8. Parking brake - RELEASE

Before Takeoff

1. Circuit breakers - CHECK IN
2. Anti coln lights - AIR
3. Windshield heat - AS REQUIRED
4. Pitot/Stall/Static heat - ON
5. Seat belts and no smoking signs - ON
6. Flight instruments - SET and CHECK
7. Engine gauges - CHECK
8. Warning and caution lights - CHECK OFF
9. Transponder - SET
10. Bleed air switches - CHECK to L and R positions
11. Fuel pumps - CHECK MAIN
12. Condition levers - CHECK MAX RPM
13. Flaps - CHECK MID
14. Longitudinal trim - CHECK TAKEOFF SET
15. Aileron trim - CHECK NEUTRAL
16. Rudder trim - CHECK NEUTRAL

17. Flight controls - CHECK FREE
18. Steering - TAKEOFF
19. Oil cool - OFF
20. Taxi/landing lights - AS REQUIRED
21. Navigation lights - AS REQUIRED
22. Ice protection systems - AS REQUIRED

Takeoff

1. Engine gauges - WITHIN LIMITS
2. Steering - OFF (not over 60 KIAS)
3. Rotation - Around 110Kts (Use Perf Page)
4. Airspeed - Accelerate to 120 KIAS until above 50 ft.
5. Taxi/landing lights - OFF (below 160 KIAS)
6. Gear - UP (below 180 KIAS)
7. Autofeather - OFF (above 150 KIAS)
8. Flaps - UP (below 170 KIAS)

Climb

1. Climb power - SET
2. Airspeed - 165Kts
3. Seat belts and no smoking signs - AS REQUIRED
4. Pressurization - CHECK
5. Windshield heat - LO or HI as necessary

Cruise

1. Cruise power - SET
2. Airspeed - Refer to Manual
3. Engine instruments - CHECK
4. Pressurization - CHECK
5. Environmental control system - CHECK

Descent

1. Windshield heat - AS REQUIRED
2. Pressurization - CHECK
3. Environmental control system - CHECK

Before Landing

1. Seat belts and no smoking signs - ON
2. Condition levers - MAX RPM
3. Gear (below 180 KIAS) - DN; CHECK 3 GREEN
4. Flaps (below 170 KIAS) - MID
5. Autofeather (below 150 KIAS) - ARM, CHECK LIGHT
6. Landing lights (below 160 KIAS) - AS REQUIRED
7. Flaps on final (below 150 KIAS) - DN
8. Autopilot/Steering - OFF
9. Cabin pressure barometric condition - CHECK

Landing

1. Landing gear - CHECK DN (3 green lights)
2. Flaps - CHECK DN
3. Approach speed - Around 115Kts (Use Perf Page)
4. Power - AS REQUIRED
5. Condition levers - CHECK MAX RPM
6. Brakes - AS REQUIRED
7. Reverse - AS REQUIRED, engage reverse below 1900 prop RPM or 5% drop from the set value
8. Reverse - AVOID USE below 40 KIAS, approximately
9. Condition levers - GROUND IDLE
10. Steering - ENGAGE TAKE OFF (if necessary)

After Landing

1. Power levers - IDLE
2. Steering - TAXI (if necessary)
3. Flaps - UP
4. Radar - OFF
5. Transponder - OFF
6. Anticollision lights - GROUND
7. Taxi/landing lights - AS REQUIRED
8. Ice protection equipment heat - OFF (if applicable)
9. Autofeather - OFF
10. Cabin altitude/p - CHECK Landing Field / Zero

Shutdown

1. Parking brake - SET
2. Avionics switch - OFF
3. Bleed air - OFF
4. Power lever - CHECK IDLE
5. Condition lever - CHECK GROUND IDLE
6. Hydraulic pump - OFF
7. Condition lever - CUT OFF
8. Fuel pump switches - OFF
9. All electrical switches - OFF
10. Battery switch - OFF
11. Passenger door - OPEN