

ATC light gun sign	ATC light gun signals								
Color & type	Meaning		Meaning						
of signal	aircraft on the	ground	aircraft in the air						
Steady green	Cleared for take	off	Cleared to land						
Flashing	Cleared to taxi		Return for landing	(followed by					
green			steady green at th	e					
			appropriate time)						
Steady red	Stop		Give way to other	aircraft and					
			continue circling						
Flashing red	Taxi clear of rur	iway in	Airport unsafe, do	not land					
	use								
Flashing	Return to the st	arting	Land at this airpor	t + stop at					
white	point on airport	:	the parking (follow	ved by					
			steady green at th	е					
All	5		appropriate time)						
Alternating	Exercise extrem	ie							
red/green	caution		dicrogard parliar l	anding					
Reuliale			normission do NC	anung Tiandi					
	-1-		permission, do No						
When interception sign	ais 4.								
- Listen to dis	u. tross froquency 1	121 5 MH	17 or 2/13 MHz						
- Squawk cod	e 7700	121,5 1011							
Squawk cou		1							
Interceptor	Meaning	Interce	pted aircraft	Meaning					
rocking aircraft	You have	Rock ye	our plane and	Roger, will					
wings slightly	been	irregula	ar switch on and	comply					
in front and	intercepted	off you	r navigation lights						
above +	follow me								
Irregular									
blinking nav									
Abrupt	Vou may	Bocky	our plana	Pogor					
climbing bond	rocood	ROCK Y	our plane	Roger					
Pull out landing	Land on	Pull ou	t landing goar +	Pogor will					
run out lanung	this airfield	landing	t lights on + land	comply					
landing lights	this an neiu	on the	airfield after the	comply					
on while flying		interce	ntor had flown						
over active		over th	e active runway						
runway		Pull in	landing gear +	Negative					
		flash (la	anding) lights + fly	cannot					
		over th	e active runway	land on					
		at > 10	00 ft AGL but <	this airport					
		2000 ft	AGL + continue	the unport					
		to circl	e around the						
		runway	/ in use						
		Regula	rly switch on and	l cannot					
		off all a	available lights	comply					
		Irregula	ar switch on and	Emergency					
		off all a	available lights						
Ground-air signal	code fo <u>r survivo</u>	ors							
Require assistar	nce	V							
Require medica	lassistance	Х							
No / Negative		Ν							
Yes / Affirmative	e	Y							
Description 1 and 1		•							

http://www.b	elgocontr	ol.be					
Conversions			I				
1 ft = 0.305 m		1 US Ga	= 3.785	1 lbs = 0.454 kg			
1 m = 3.28 ft		1 = 0.2	64 US Gal	1 kg = 2.205 lbs			
1 km = 0. 54 N	М	1 Imp G	al = 4.545 l	1 AVGAS = 0.72kg			
1 NM = 1,852	km	1 = 0,2	2 Imp Gal	1 oil = 0,9 kg			
1 sm = 0,869 N	IM	1 US Ga	l = 0,83 Imp Gal	°C = (°F – 32) * (5/9)			
1 sm = 1,609 k	m	1 Imp G	al = 1,2 US Gal	1 kt ≅ 2 km/h			
Abbreviations		•					
Vs = power-off s	talling sp	eed	PPR = Prior Perm	ission Required			
flaps and gear r	etracted		H24 = airport per	manent open			
V _{s0} = power off	stalling sp	beed	HJ = airport open	from SR to SS			
in landing	configura	tion	HN = airport oper	n from SS to SR			
$V_{REF} = 1,3 \times V_{S0}$			HS = airport oper	on scheduled hours			
V_{NE} = Never Exc	eed speed	ł	HX = airport has i	no fixed opening hour			
V _A = Maneuveri	ng speed		QFU = magnetic o	direction of runway			
V _{FE} = Max flap e	xtend spe	ed	EET =Estimated Enroute Time				
V_R = rotation sp	eed		ETA = Estimated Time of Arrival				
V _x = best angle	of climb		ETD = Estimated Time of Departure				
$V_{\rm Y}$ = best rate of	t climb /gl	ide	EOBT = Estimated Off Block Time				
U/S = UnService	eable		MIOW = Max takeoff weight				
O/R = On Reque	2St		MZFW = Max zero fuel weight				
PINR = POINT OF F	NO RETURN		TODA – Takeoff distance available				
ODM = mag co	urse to st	ation: R	ODR = Mag course to airplane				
QUJ = true cour	se to stat	ion: R _w	QTE = line of position on a map				
QUJ = true course to station: R_w QTE = line of position on a map							
Time							
Time UTC in winter	time	Belgian l	ocal time – 1 hr				
Time UTC in winter UTC in summe	time r time	Belgian le Belgian le	ocal time – 1 hr ocal time – 2 hr				
Time UTC in winter UTC in summe Radio alphabet	time r time	Belgian le Belgian le	ocal time – 1 hr ocal time – 2 hr				
Time UTC in winter UTC in summe Radio alphabet A = Alfa	time r time H = Hot	Belgian k Belgian k el	ocal time – 1 hr ocal time – 2 hr O = Oscar	V = Victor			
Time UTC in winter UTC in summe Radio alphabet A = Alfa B = Bravo	time r time H = Hot I = India	Belgian le Belgian le el	ocal time – 1 hr ocal time – 2 hr O = Oscar P = Papa	V = Victor W = Whiskey			
Time UTC in winter f UTC in summe Radio alphabet A = Alfa B = Bravo C = Charlie	time r time H = Hot I = India J = Jolie	Belgian k Belgian k el a t	ocal time – 1 hr ocal time – 2 hr O = Oscar P = Papa Q = Quebec	V = Victor W = Whiskey X = X-ray			
Time UTC in winter of UTC in summe Radio alphabet A = Alfa B = Bravo C = Charlie D = Delta	time r time H = Hot I = India J = Jolie K = Kilo	Belgian le Belgian le el t	ocal time – 1 hr ocal time – 2 hr O = Oscar P = Papa Q = Quebec R = Romeo	V = Victor W = Whiskey X = X-ray Y = Yankee			
Time UTC in winter f UTC in summe Radio alphabet A = Alfa B = Bravo C = Charlie D = Delta E = Echo	time H = Hot I = India J = Jolie K = Kilo L = Lima	Belgian li Belgian li el a t	ocal time – 1 hr ocal time – 2 hr O = Oscar P = Papa Q = Quebec R = Romeo S = Sierra	V = Victor W = Whiskey X = X-ray Y = Yankee Z = Zulu			
Time UTC in winter f UTC in summe Radio alphabet A = Alfa B = Bravo C = Charlie D = Delta E = Echo F = Foxtrot	time H = Hot I = India J = Jolie K = Kilo L = Lima M = Mil	Belgian la Belgian la el a t t	Ocal time – 1 hr Docal time – 2 hr O = Oscar P = Papa Q = Quebec R = Romeo S = Sierra T = Tango	V = Victor W = Whiskey X = X-ray Y = Yankee Z = Zulu			
Time UTC in winter f UTC in summe Radio alphabet A = Alfa B = Bravo C = Charlie D = Delta E = Echo F = Foxtrot G = Golf	time H = Hot I = India J = Jolie K = Kilo L = Lima M = Mil N = Nov	Belgian la Belgian la rel a t t e ke vember	Ocal time – 1 hr Docal time – 2 hr O = Oscar P = Papa Q = Quebec R = Romeo S = Sierra T = Tango U = Uniform	V = Victor W = Whiskey X = X-ray Y = Yankee Z = Zulu			
Time UTC in winter f UTC in summe Radio alphabet A = Alfa B = Bravo C = Charlie D = Delta E = Echo F = Foxtrot G = Golf Aviation French	time H = Hot I = India J = Jolie K = Kilo L = Lima M = Mil N = Nov	Belgian li Belgian li el t t e vember	Decal time – 1 hr Decal time – 2 hr O = Oscar P = Papa Q = Quebec R = Romeo S = Sierra T = Tango U = Uniform	V = Victor W = Whiskey X = X-ray Y = Yankee Z = Zulu			
Time UTC in winter T UTC in summe Radio alphabet A = Alfa B = Bravo C = Charlie D = Delta E = Echo F = Foxtrot G = Golf Aviation French - Je roule po	time H = Hot I = India J = Jolie K = Kilo L = Lima M = Mil N = Nov	Belgian la Belgian la eel a t vember mt d'arrêt	Decal time – 1 hr Decal time – 2 hr Decal time – 2 hr Decal time – 2 hr P = Papa Q = Quebec R = Romeo S = Sierra T = Tango U = Uniform de la piste 19: taxi	V = Victor W = Whiskey X = X-ray Y = Yankee Z = Zulu			
Time UTC in winter T UTC in summe Radio alphabet A = Alfa B = Bravo C = Charlie D = Delta E = Echo F = Foxtrot G = Golf Aviation French - Je m'aligne	time H = Hot I = India J = Jolie K = Kilo L = Lima M = Mil N = Nov	Belgian la Belgian la el a t vember nt d'arrêt colle par la pur intégra	Decal time – 1 hr Decal time – 2 hr Decal time – 2 hr Decal time – 2 hr P = Papa Q = Quebec R = Romeo S = Sierra T = Tango U = Uniform de la piste 19: taxi a piste 19: lining u tion vent-arrière	V = Victor W = Whiskey X = X-ray Y = Yankee Z = Zulu to holding point p and departing runw he la piste 19: overbee			
Time UTC in winter to UTC in summe Radio alphabet A = Alfa B = Bravo C = Charlie D = Delta E = Echo F = Foxtrot G = Golf Aviation French - Je roule po - Je m'align - Verticale to - Verticale to - Verticale to	time T time H = Hoti J = Jolie K = Kilo L = Lima M = Mil N = Nov Dur le poin e et je déc errain, poer	Belgian la Belgian la el a t vember nt d'arrêt colle par la our intégra t arrièrre	Decal time – 1 hr Decal time – 2 hr Decal time – 2 hr P = Papa Q = Quebec R = Romeo S = Sierra T = Tango U = Uniform de la piste 19: taxi a piste 19: lining u tion vent-arrière C Base. Finale piste	V = Victor W = Whiskey X = X-ray Y = Yankee Z = Zulu to holding point p and departing runw le la piste 19: overhea 19: crosswind			
Time UTC in winter T UTC in summe Radio alphabet A = Alfa B = Bravo C = Charlie D = Delta E = Echo F = Foxtrot G = Golf Aviation French - Je roule po - Je m'aligne - Verticale t - Vent trave downwind	time tr time H = Hoti J = Jolie K = Kilo L = Lima M = Mil N = Nov Dur le poin e et je déc errain, poc rsier,ven ji	Belgian la Belgian la eel a t vember nt d'arrêt colle par la bur intégra t arrièrre, nal runway	Decal time – 1 hr Decal time – 2 hr Decal time – 2 hr P = Papa Q = Quebec R = Romeo S = Sierra T = Tango U = Uniform de la piste 19: taxi a piste 19: lining u tion vent-arrière of Base, Finale piste (19)	V = Victor W = Whiskey X = X-ray Y = Yankee Z = Zulu to holding point p and departing runw le la piste 19: overhea 19:crosswind,			
Time UTC in winter T UTC in summe Radio alphabet A = Alfa B = Bravo C = Charlie D = Delta E = Echo F = Foxtrot G = Golf Aviation French - Je roule po - Je m'aligne - Verticale t - Vent trave downwind - Quiter la f	time T time T time H = Hoti J = Jolie K = Kilo L = Lima M = Mil N = Nov Dur le poin e et je déd errain, po rsier,ven I, base, fil réquence	Belgian la Belgian la Rel t t vember nt d'arrêt colle par la pur intégra t arrièrre, nal runway : leaving t	Decal time – 1 hr Decal time – 2 hr Decal time – 2 hr P = Papa Q = Quebec R = Romeo S = Sierra T = Tango U = Uniform de la piste 19: taxia piste 19: lining u tion vent-arrière of Base, Finale piste (19)	V = Victor W = Whiskey X = X-ray Y = Yankee Z = Zulu to holding point p and departing runw le la piste 19: overhea 19:crosswind,			
Time UTC in winter of UTC in summe Radio alphabet A = Alfa B = Bravo C = Charlie D = Delta E = Echo F = Foxtrot G = Golf Aviation French - Je roule po - Je m'aligno - Verticale t - Verticale t - Vent trave downwind - Quiter la f - La piste es	time T time T time H = Hoti J = Jolie K = Kilo L = Lima M = Mill N = Nov our le poin e et je déé errain, po rsier,ven I, base, fir réquence t dégagée	Belgian la Belgian la Belgian la eel a t vember nt d'arrêt colle par la pur intégra t arrièrre, nal runway : leaving t e: runway	Decal time – 1 hr Decal time – 2 hr Decal time – 2 hr P = Papa Q = Quebec R = Romeo S = Sierra T = Tango U = Uniform de la piste 19: lining u tion vent-arrière of Base, Finale piste (19) he frequency vacated	V = Victor W = Whiskey X = X-ray Y = Yankee Z = Zulu to holding point p and departing runw le la piste 19: overhea 19:crosswind,			
Time UTC in winter of UTC in summe Radio alphabet A = Alfa B = Bravo C = Charlie D = Delta E = Echo F = Foxtrot G = Golf Aviation French - Je roule po - Je m'align - Verticale t - Verticale t - Vent trave downwind - Quiter la f - La piste es - Je remont	time tr time tr time H = Hoti J = Jolie K = Kilo L = Lima M = Mill N = Nov our le poin e et je dér errain, po rsier,ven l, base, fir réquence t dégagée e la piste	Belgian la Belgian la Belgian la el a t vember nt d'arrêt colle par la bur intégra t arrièrre, nal runway : leaving t e: runway 19: backtr	Decal time – 1 hr Decal time – 2 hr Decal time – 2 hr P = Papa Q = Quebec R = Romeo S = Sierra T = Tango U = Uniform de la piste 19: lining u tion vent-arrière of Base, Finale piste (19) he frequency vacated acking runway 19	V = Victor W = Whiskey X = X-ray Y = Yankee Z = Zulu to holding point p and departing runw le la piste 19: overhea 19:crosswind,			

Proceeding in this direction 1

War	ning:	Rules		Air to ground	signals			
Taki	ng passengers on a flight	- 1. Rules of country of re	gistration	During daylig	ght	rock wings		
-	You need at least 3	- 2. Rules of country that	you fly in	During darkn	ness	flash landing o	r navigation lights 2	2 times
	takeoffs and 3 landings as	If the rules of the country you	ı fly in are	-	N	othing of the abo	ove = not understor	od
	PIC during last 90 days on	more strict, use these rules		Transponder	odes	5		
	same type of airplane	General equipment & docum	ients	7700	Emo	gency (distress t	frequency: 121 500	MHz or 2/13 MHz)
Divi	ng	First Aid kit		//00	Toer	an emergency	v: radio "CANCEL DI	ISTRESS"
-	12h wait for altitudes	Fire extinguisher		7600	Sans	wk 7600 means:	"I ost Communicat	tions"
	< 8000ft	1 Seat / person + safety belt		7000	Jyua	First use squaw	k 7700 during 1 mi	nute to draw
-	24h wait for altitudes	Documents:	Flight crew	r: safety helt		attention	k //00 during 1 mil	
	> 8000ft	- Aircraft journal	always only	Descengers con		Padia: "TPANISM		
Alco	hol	- Aircraft registration	aiways one	rassengers can	_			
-	Light drinking: wait 12h	- Radio permit	only be rec	commended to		Controlled / No	n controlled area:	
-	Heavy drinking: wait 24h	- Airworthiness certificate	leave their	safety belts on.	-		h as soon as nossibl	0
Illne	ss/surgery	 noise certificate 					n flying in VMCI	C
-	Local sedation: 12h wait	 Weight & balance 	2				fy ATC after landing	a
-	Complete sedation: 24h	 Pilot information 	Handbook				o flight plan if pace	5 sconv
	wait	 Interception signal 	als				e night plan in hete.	ssal y
Imm	ediate inform 'FOD	 Safety markings 8 	k placards	7500			101 enter controlle	d airspace!
Luch	itvaart' in case of:	- Pilots medical + flying lic	7500	HIJac	ĸ			
-	> 12h in clinic	identity card + pilots jou	ırnal	7000	VFR	unless given and	other code by ATC)	
-	Surgery	- Passenger list / cargo lis	t	Marshaller ha	nd sign	als	l i	
-	Serious injury	- Actual Charts		Signs of the m	arshalle	er should be inte	rpreted independe	nt of his/her position
-	Use of pills	- Maintenance document	s: NOT ON					A
-	Use of glasses	BOARD!		Bern		8.8 /		
-	Pregnancy	Spare fuses		8089		101 /.	1 14	Xor
-	After >21 days illness	Nightflight		22			The last	1 Ale
VFR		- Navigation lights				11	∇Z	X
-	magnetic compass	- Min 1 landing light		$ \Lambda ^{\vee}$		IN \	** / *	
-	chrono	- Instrument lights		$ \rangle \rangle$				⇒ 1
-	altimeter	- Passenger light		Flagman Directo P	lot lo Sign	Iman It Signa	Iman's Position Sig	Adman Directs Towing
_	airspeed indicator	- 1 electrical torch / crew	member	Traffic Conditions 5	Regulite		8	
_	mode S transponder	- Elight FROM and TO a ni	ight flight			~ ~	m 19	
Baci	c IEB	equipped airport	ight hight	. 0 .		00	K0//	
Dusi	nitot heat	- Navigation flight		RX8			1	- 5-71-
_	inclinomotor	- in controlled area: li	icton to ATC	Y N		M M) (1.19
-	artificial borizon	clearances	ISLEIT TO ATC				[A]	144
-	directional gyro		roa: 2500 or			· // \\	1/ \\	1/ \\
-	suction motor		n ea. 5500 0f ruloc)	N N		U U	Biop U	Cut Engines
-	insido tomna OAT		u(cs)	Flagman direch	s péok	Come Annes	and -	
-	variometer	1000000000000000000000000000000000000	711. ≥ FLU3U				-	0
- Elsiis	vanometer	- VISIDIIILY ≤ 3 KIII cloud base > 1500ft		In B		0	0	
FIYI	NM of coast or subside		4	R		AN		·% ∧*
< 50	INIVI OT COAST OF OUTSIDE	- AIC permission required	L	\mathbf{Y}				61.10
giidi	ng distance of land:	- Flight plan required				TAT	- 4/4-	
-		Oxygen	400/ -5			// //	1/ 1/	
>10) NM (SE) or >200 NM	- > 10000 ft (for crew + ≥	10% of	U U		Puli Chocks	Insert Chocks	Slow Down
(ME)	passengers if > 30 min)		Gent engine				
-	life jacket	 > 13000 ft (for passenge 	ers+crew)					¥∕ ¥∕
-	inflatable raft	Fuel				0.4		Rall
-	tlares	Recommended spare fuel: 45	min!	0 0		27	Re	102/
-	ELT	Acrobatic flights (ie spins, sta	ills,)	E.		IN P	50) (
Fligh	nt in formation	- VMC required		1 [61.1	A LINK	1
-	VMC required	 Not above cities, industri 	ries, crowds,	1/16		1/1 ~	· ///	// \\
-	Agreement between PICS	dangerous areas, contro	olled airspace			1/ 1/	1/ //	U V
-	ATC-permission needed	 Always ≥ 2000 ft AGL 		A8 Closer (0.)	5)	Loft Turn	(Night Turn	Feight, Upper Band there (upper band there as day)
	when landing/takeoff in	 Visibility ≥ 5km when ≤ 3 	3000ft MSL	. 1 .				dat weits -
	formation							

Altitudes Non controlled areas 0 ≤ 3000 ft AGL Height: free • Altimeter setting: free, recommended QNH > 3000 ft AGL and \leq transition altitude (4500 ft MSL): 0 . Height: follow hemispherical cruising rules VFR: 3500 or 4500 ft MSL in class F G, IFR rules in class B C D E) Altimeter setting: regional QNH > transition altitude (4500 ft MSL): 0 Height: follow hemispherical cruising rules • (IFR in class B C D E, VFR in class F G) Altimeter setting: 1013,25 hPa **Controlled** areas ≤ 3000 ft MSL 0 Follow ATC-directions > 3000 ft MSL and \leq transition altitude (4500 ft MSL): 0 Height: follow ATC directions, use hemispherical cruising rules (IFR in class B C D E, VFR in class F G) Altimeter setting: QNH . > transition altitude and < transition level: 0 NO horizontal flights allowed ≥ transition level: 0 . Height: follow ATC directions, use hemispherical cruising rules (IFR in class B C D E, VFR in class F G) Altimeter setting: 1013,25 hPa . Transition layer 4 4 FL 60 pressure altitude (QNE) flight level FL45= 4500 ft flight level ▶ 1013,25 hPa FL 50 Isobare transition level Height (AGL via QFE 1013,2 hPa (indicated) altitude (MSL) 920 hPa isobar transition altitude via QNH Brussels FIR: 4500 ft MSL QNH height altitude elevation. MSL True altitude = 1018 hPa isobar QNH-altitude +[(OAT-temp – ISA-temp) * altitude/1000ft]* 4ft Minimum Safe altitude



PPL Aviation Aid – only valid in EBBU FIR! based on eAIS Package (publication date February 26th 2009)

-

Carburator Icing Conditions



Head and tail wind components



Lights & rules "of the road"

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Always fly at a safe distance of other aircraft: avoid coming to close Aircraft that are overtaken, should not change speed or direction



VFR Right of way priority

When two aircrafts are converging at approximately the same level, the aircraft that has the other on its right shall give way, except as follows:

- power-driven heavier-than-aircraft shall give way to airships, gliders and balloons
- airships shall give way to gliders and balloons
- gliders shall give way to balloons
- power-driven ACFT shall give way to aircraft which are seen to be towing other aircraft or objects
- An aircraft in landing (unless this aircraft is a glider or an aircraft in emergency) must give priority to a lower flying aircraft
 Aircraft in final always have priority









Remarks? tony.opsomer@scarlet.be

PPL Aviation Aid – only valid in EBBU FIR! based on eAIS Package (publication date February 26th 2009)



- Bernouilli: $p_{tot} = p_{stat} + p_{dyn} = p_{stat} + \frac{1}{2} * \rho * v^2$
- Boyle gas law: (p*V)/T = Cte
- Lift L = $1/2 * \rho * v^2 * S * C_L(\alpha)$
- Drag D = $1/2 * \rho * v^2 * S * C_D(\alpha)$
- Lift to drag ratio L/D = distance flown / height
- AVGAS fuel = 0,72 kg/l = 6 lbs/US Gal
- Oil = 0,9 kg/l
- Wing loading = total weight airplane / wing area
- Wing aspect ratio = wingspan / mean chord
- Wing area = wingspan * mean chord
- Centripetal force = m^*v^2/r
- Load factor n = resultant lift / total real weight
- Load factor & minimum speed: $v_s = v_{s1} * v_n$
- Speed radio waves = 300 000 km/s
- length of a radio wave (m) = 300 000 000 m/s / frequency (Hz)
- Distance transmission radio waves (NM) = $\{1,23 * \forall [height (ft)]\} + 10\%$
- Moment of force = force applied * distance from the axis of rotation
- Climb gradient (%) = climb rate (fpm) / IAS (kts)
- Rate one turn = $2 \min / 360^\circ = 3^\circ / \sec$
- Angle of bank in a rate one turn \approx TAS / 10 + 7



Navigation

- Abbreviations: R_w = true route (route = course = track)
 - R_m = magnetic route (route = course = track)
 - R_c = compass route (route = course = track)
 - D_c = drift correction (D_c = WCA = Wind Correction Angle)
 - drift D ≈ D_c
 - if drift has negative sign: wind is blowing from the right side 0
 - if drift has positive sign: wind is blowing from the left side 0
 - $C_w = true cap (cap = heading)$
 - $C_{w backtrack} = C_w + / -180^\circ + 2 * D$ (use the sign of D!!) $R_{w_{backtrack}} = C_{w_{backtrack}} - D$ (use the sign of D!!)
 - C_m = magnetic cap (cap = heading)
 - C_m backtrack= C_m +/- 180° + 2 * D (use the sign of D!!) $R_{m_{backtrack}} = C_{m_{backtrack}} - D$ (use the sign of D!!)
 - $C_c = compass cap (cap = heading)$
 - V = variation (when: West or Left = sign, East or Right = + sign)
 - d = deviation (when: West or Left = sign, East or Right = + sign)

Conversions

- perform the calculations in the direction of the arrows, otherwise change signs!
 - Conversion of **directions** This doesn't really exist!





Relative bearing G

- Reference: longitudinal axis of airplane 0
- $QDM = C_m + G$ 0

indicates R_w

0 $QUJ = C_w + G$

Calculations

- **EET** = Estimated Elapsed Time
- = distance (NM) / ground speed (kts) * 60
- Fuel consumption = Fuel flow * EET / 60
- Always add a safety margin of 45 min spare fuel!!
- **PNR** = Point of No Return
 - 0 depends on endurance (takes into account: TAS, wind, spare fuel and quantity of fuel

gives line of position on map

- Time to PNR = (endurance * GS_{back}) / (GS_{out} + GS_{back}) 0
- 0 Distance to PNR = time to PNR * GSout
- **PET** = Point of Equal Time = Critical point
 - Depends on distance between the 2 points (takes into 0 account: wind)
 - Distance to PET = (distance * GS_{back}) / (GS_{out} + GS_{back}) 0
 - 0 Time to PET = distance to PET / GSout
- Route error (°, valid if ≤ 15°) = error (NM)/flown distance (NM)*60 Correction for route error (°) = - route error * 2
 - OR = - sum of the 2 route error angle

Diversion planning

Sketch the track line and determine the track direction using a VORrose, protractor, etc.



- Assess the wind angle (= angle between the longitudinal axis of the aircraft and the wind direction)
- Calculate maximum drift: (wind speed*60)/TAS
- Determine the portion of maximum drift by using the table below:

Wind angle	Portion of max drift / portion of wind speed
000 °	0
010 °	1/6
015 °	1/4
020 °	1/3
030 °	1/2
040 °	2/3
045 °	3/4
050 °	5/6
060° or more	1

- Calculate (90° wind angle), look up the portion of wind speed (using the table above) and apply the result to the wind speed
- Work out the ground speed: TAS +/- wind component
- Measure the diversion distance with a pencil and meridian, a protractor, etc



Ground speed	Factor to determine the needed flying time in minutes
60 kts	1
70 kts	6/7
75 kts	4/5
80 kts	3/4
90 kts	2/3
100 kts	3/5
110 kts	6/11
120 kts	1/2

Flight plan

- Required in case of: international flight, night VFR, flight involving ATC (class B, C, D) Allowed in all other cases
- A flight plan does not gives automatic clearances! You still need to ask ATC for clearances...
- 1 flight plan for each takeoff + landing
- File a flight plan minimum 30 min, maximum 24 hours before takeoff (unless you mention the precise date of the flight) File an in-flight flight plan by radio at least 10 min before entering the controlled area
- Flight plan expires if no departure within 15 min (controlled flight) or 1 hour (uncontrolled flight) after normal departure time (EOBT) You may change EOBT before the flight plan expires
- Activate a previous filed flight plan when the flight begins
- Close a flight plan as soon as possible after landing
- Notify any change in flight plan (cancellation, passengers, route, etc)
- use TAS (not Ground Speed, nor Indicated airspeed)

Starting a C172 engine

 0	
 Towbar REMOVED Mixture RICH Carburator heat COLD Ignition key OFF Fuel tank BOTH Fuel primer? • Engine hot? • Do not prime! • Engine cold? • OAT >20°C	Engine overprimed??? • Towbar REMOVED • Mixture: IDLE • Throttle: FULL OPEN • Propeller area CLEAR • Master switch ON • Ignition switch START (RELEASE when engine starts) • Do this for several revolutions
 prime 1 til OAT ≅ 10°C: prime 2 til OAT ≅ 5°C prime 3 til 	 Before start oil quantity check It is recommended to check th oil level when engine is cold If oil stick indicates an oil leve below 6 qts -> ADD 1 of oil
■ OAT ≅ -5 °C	

- Pull the propeller several times by hand to brake lose the oil (BE CAREFUL, check master switch is OFF, ignition key is OFF, mixture is IDLE, throttle is CLOSED) • prime 5 times
- OAT < -10°C
 - Do not fly the aircraft...
- Throttle **open ½ inch** (do NOT pump the throttle if there's no acceleration pump in the carburator! Most C152-aircraft have an acceleration pump...)
- Propeller area **CLEAR**
- Master switch ON
- Ignition switch **START** (RELEASE when engine starts)
- Throttle ADJUST for 1000 RPM (when it's cold outside, first run the engine at a higher RPM - keep an eye on oil pressure!!! - for a short period before adjusting to 1000 RPM)
- Oil pressure: CHECK for pressure within 20-30s

Flight

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	FLIGHT PLAN	
DELOOTY	1000000000000	
<<≡ FF →	ADMESSEE(S)	
FILING TIME	ORIGINATOR	
	→ <<≡	
SPECIFIC IDENTIFICAT	ION OF ADDRESSEE(S) AND/OR ORIGINATOR	
3 MESSAGE TYPE	7 AIRCRAFT IDENTIFICATION 8 FLIC	GHT RULES TYPE OF FLIGHT
<<≡(FPL		_ _
D NUMBER	TYPE OF AIRCRAFT WAKE TURBULENCE CA	T 10 EQUIPMENT
-		- /
13 DEPARTURE AE	RODROME TIME	
	<<≡	
15 CRUISING SPEED	LEVEL ROUTE	
- []	→ →	
		. →
18 OTHER INFORMATION		
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18 OTHER INFORMATION		
	SUPPLEMENTARY INFORMATION (NOT TO BE TRANSMITTED IN	N FPL MESSAGES)
18 OTHER INFORMATION	SUPPLEMENTARY INFORMATION (NOT TO BE TRANSMITTED IN PERSONS ON BOARD	N FPL MESSAGES) EMERGENCY RADIO UHF VHF ELT
		N FPL MESSAGES) EMERGENCY RADIO UHF VHF ELT → R / U V E
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18 OTHER INFORMATION 19 ENDURANCE HR MIN -E / BUIRVIAL EQUIPMENT POLAF → S / P DINGHIES NUMBER + D / → AIRCRAFT COL A / REMARKS + N / PILOT IN COM	SUPPLEMENTARY INFORMATION (NOT TO BE TRANSMITTED IN PERSONS ON BOARD $\rightarrow P / \$ DESERT MARITIME JUNGLE JACKETS LIGHT D M J \rightarrow J / L CAPACITY COVER COLOUR $\downarrow \downarrow \downarrow \rightarrow C \rightarrow$ COUR AND MARKINGS	$ \rightarrow \square$ N FPL MESSAGES) EMERGENCY RADIO UHF VHF ELT → R / U V E T FLUORES UHF VHF F U V] <<=

Flying from high pressure area to lower pressure area or flying from hot to cold, always look out below

Higher altitude / temperature / humidity -> lower density -> lower pressure Lower altitude / temperature / humidity -> higher density -> higher pressure

Weather chart symbols – Wind signs

•••	Wind blowing from 27 Wind blowing from 90	'0°/5 kts)°/50 kts	ATC, the reference is magnetic North
ſ	Wind blowing from 00		Reference= true North If the wind is given by
	Drizzle	Å.	Volcanic eruption
0	Freezing precipitation	Г	Widespread smoke
\cup	Severe aircraft icing	¥	Freezing fog
V	Moderate aircraft icing		Widespread fog
V	Light aircraft icing	=	Widespread mist
0	Marked mountain waves	8	Widespread haze
	Severe turbulence	4	Widespread sandstorm or duststorm
	Moderate turbulence	5	Severe sand or dust haze
\triangle	Hall	Δ	Shower
3ª	Severe line squall	+	Widespread blowing snow
9	Tropical cyclone	*	Snow
K	Thunderstorm	**	Rain

Belgian military meteo colour codes								
Colour code	Horizontal Visibility	Height of lowest SCT, BKN or OVC cloud layer						
BLU	≥ 8 km	≥ 2500 ft						
WHT	5 - 7 km	1500 – 2400 ft	VFN					
GRN	3,7 – 4,9 km	700 – 1400 ft	Special VFR					
YLO	1,6 – 3,6 km	300 – 600 ft						
AMB	0,8 – 1,5 km	200 ft						
RED	< 0,8 km							
BLACK	Airport out of service reasons than clouds on							

If two colour codes are stated: the airport is active, if only one colour code is stated, the airport is closed...



	Warm air mass	Cold air mass
What?	Air is warmer than the	Air is colder than the
	ground (the air mass is	ground (the air mass is
	cooled from below)	warmed from below)
stable/unstable?	stable	unstable
visibility	poor	Good (except during
		showers)
flying conditions	calm	expect turbulence
		gusty winds
cloud types	stratiform	cumuliform
precipitation	Possible fog	showers possible
	If any: continuous light rain/drizzle	expect thunderstorms

Warm & Cold Fronts



ann 100	M		100 3	00 800	200
	Before Warm Front	At Warm Front	In Warm Sector	At Cold Front	After Cold Front
Pressure	ר	= / Ы	= / Ы	\uparrow	7
Wind speed	Ŷ	=	max	Strong turbulent	turbulent
Wind direction	S-SW -> S-SE	-> SW	SW	-> W-NW	W-NW
Temperature	N	= / 7	=	\checkmark	variabel
Rel humidity	7	high	high	high	variabel
Clouds	Ci-> As /Ac -> Ns -> Sc/St	Ns / St	St / Sc	Ns/St/Ac /As	Cu/TCu/ Cb
Weather	Virga -> -RA / RA / snow	RA/ +RA /snow	-RA/ -DZ/ -SN (poss BR/FG)	RA/RASH poss GR, TS, SN	Variable poss GR/TS/ SN
Visibility	good -> moderat e (-RA) -> poor/ bad (RA/SN)	Poor / bad	Poor / bad	Poor / bad but ↗ after CF	Very good (except during rain)

flying towards a cyclone, results in a drift to the right
 flying towards an anticyclone, results in a drift to the left

Compared to the wind at 0 ft AGL (ie 270/20), the wind at 2000 ft AGL generally has a direction of 270+30° and speed of 20+30 kts
when the wind blows in your back, the cyclone is at your left hand

Fog

Advection fog

- Required conditions: moist, warm air over cold surface or cold air over moist, warm surface, +/- 5-10 kts wind
- May occur any time, can be very persistent

Radiation fog

- Required conditions: moist air, few clouds, 2-6 kts wind
- Occurs mostly during night or morning, especially in Hpressure area and during winter

Weather phenomena

	QU	QUALIFIER					WE	ATH	R PHENO	MEN	A	
P	OF ROXIMITY DESCRIPTOR		RIPTOR	PRECIPITATION		OBSCURATION			OTHER			
_	-	-	_	1	-	3	_	4		-	5	
•	Light MI Shallow		oz	Orizzie		BR	Mint	PO	Dust/Sand Whats			
		BC.	Pat	chés	RA	Fak		FG	Fog	80	Squate	
	Misterate (No Qualifier)	orate DR Low Ontring		SN	Show		ŦIJ	Smiké	FC	Formali Cloud		
	_									+FC	Tarriado or Waterspout	
		BL.	Bo	giving.	50	Snow Gr	uirtú -	DU	Ousi	58	Sandatorm	
+	History	SH	Shi	wers.	1C	Ion Cryst	alté	SA	Sand	D5	Dustation	
		TS	The	inderstorms	PL	PL Ice Peliets		HZ	Histor			
VC	is the Vicinity	FZ	Fre	gring	GR	Hait		PY.	fiprwy.			
		PR	Par	tial	GS	Small Ha Sroper Pa	il tir Beita	¥A.	Volsanii: Ash			
					UP	"Unknow Precipita	n) tion					
		- la	.	.teste				1				
ou	a types &	ap	brev	lations		614.0						
0/8	s coverage	5		Sky Clea	r	SKC These notations do not			ot			
1/8	8-2/8 cove	erag	e	Few		FEW	infl	influence landing/takeoff			eoff	
3/8	8-4/8 cove	erag	e	Scattere	d	SCT	visi	bility	/ rules!			
5/8	8-7/8 cove	erag	e	Broken		BKN	Fro	m th	is point y	ou ca	an speak	

8/8 covera	ge	Overcast	OVC	of a cloud rules for l	ceiling (ie visibility anding & takeoff)
> 17000 ft	Cirrus [C Cirrostra	i] itus [Cs]	Cirrocum	nulus [Cc]	Cumulus [Cu]
> 7000 ft	Altostra Nimbost	tus [As] tratus [Ns]	Altocum	ulus [Ac]	Cumulonimbus [Cb] strong vertical develop
	Stratus [St]	Stratocu	mulus [Sc]	DANGEROUS!!



PPL Aviation Aid - only valid in EBBU FIR! based on eAIS Package (publication date February 26th 2009)

version 2016-12-22 / page 6

Airspace classificatio	on										
		1	,		controlled		1	uncon	trolled		
Class		А	В		С	D	E	F	G		
	IFR		IFR from IFRIFR from VFR	IFR from IFRIFR from VFR		IFR from IFR	IFR from IFR	IFR from IFR as far as possible	no separation		
separation	VFR		- VFR from VFR - VFR from IFR	 VFR from IFR Special VFR from oth (only in a CTR and w NO VFR from VFR!! 	VFR from IFR Special VFR from other Special VFR and from IFR (only in a CTR and when cleared by ATC!!!) NO VFR from VFR!						
VFR services		owed	Control	Control for sep Traffic info between VF	Control for separation of VFR from IFR Traffic inf Vraffic info between VFR (avoidance advice on request) (avoidance		Traffic information as far as practical	Flight information			
VFR speed limit		: All	No speed limit		Max 250 kt IAS (below)0)			
VFR ATC clearanc	e required?	R Noi			Yes No			No			
VFR 2-way radio i	required?	VFI			Yes		No				
VMC minima			Visibility: - ≥ 5km when below FL10 - ≥ 8km when at or above Distance from clouds: - ≥ 1500m horizontally - ≥ 300m vertically	0 FL100				At or below 3000 ft - Remain clear of - Visibility ≥ 5 kr - Remain in sigh	MSL or 1000 AGL: If clouds n t of ground		
Hemispherical rule	es			IFR			VFR				
Hemispherical crui Valid above 3 NOT under AT Under ATC cc when flying V V Below TA: 4500 ft MSL Above TA: even FL + 5 (ie in airspu	ising rules (in 1000 ft AGL up TC-control (clas Introl (class B · /FR) UNLESS A /FR 0 -> 179° Below TA: 3500, 5500 or 75 MSL Above TA: odd FL + 5 ace class D!) 80°	EBBU FIR to 30000 ss D E F - C): IFR he TC gives	 Continuity of the second state in the second state in	UIR UAR UIR UAR UIR UAR UTA UTA	FIR (Flight Information Region) FL460 Class FL 195 Class (mil: Belg civ: Brussel FL 195 Class (mil: Belg civ: Brussels FL 95 - during night: c (Brussels control) - during mil (Brussels control) - during mil (Belga radar) o other hou (Brussels informat - If no CTR/CTA (Brussels informat - In CTR: Class O North Sea Belgium Belgium	CTR (Belgi (Luxer (Luxer - Cont - From s C - Belor s c - Radia class C - CONt - Radia CTA - CTA - CTA - CTA - TMA - CTA - TMA - AWY /TMA: Class G on - CTA - CTA - CTA - CTA - CTA	um -> civilian: class C, military mbourg CTR's: class D) rolled Region a ground up to ngs mostly to a particular aircp o contact name: tower, groun rolled Area does not start from ground or = Terminal Area (Belgium -> (Lille TMA's o Mostly on top of a CTR o Radio contact name: ai = Airway (Belgium -> airways o Typical width: 10 NM, f o Radio contact name: Bi = Controlled Area (Belgium -> o Radio contact name: Bi to contact name: Bi to contact name: Bi to contact at least 5 min	r: class D) generally: 0 -> 250 ort id, delivery, ally: 2500 -> 4500 ft MSL wore: - civilian: class C, militar , Luxembourg TMA's: (oproach (departure or s: class C) from 4500 ft MSL up to russels control • class C) russels control before entering the) ft MSL y: class C) class D or E) arrival) > FL195		
Takeoff and landin Airport without A Visibility: ≥ 1,5 k train ≥ 5 km Cloud base: ≥ 500 Remain clear of c Stay in sight of gr	ng visibility rul ATC (circuit ing) n (nav flight) O ft AGL louds round	es Airpor Ground Cloud I Specia - C - C - V o o	t with ATC d visibility $\ge 5 \text{ km}$ base: $\ge 1500 \text{ ft AGL}$ I VFR Only in CTR during the day only for takeoff / landing in a CT 'isibility & cloud base rules dependent in ATC but are never less than: \circ 1500 m ground visibil \circ Clear of clouds \circ In sight of ground/wa in special VFR you always get ATC	- TRA = Temp - P = Prohibit - D = Dangero - R = Restrictor Remarks: - CTR's and TI - Be aware of the CTR/CTA - Military CTR ity ter - Make radio CI CTR/CTA/TM	orary Reserved Areas, Ie. TRA 23 ed Areas, ie. EBP02 bus areas, ie. EBD03 ed areas, ie. EBR26 MA's only exist during the time they i compulsory reporting points when A V's and TMA's can be activated very Generally: even when NOT active, 2 NM and lower than 2500 ft MSL contact at least 5 min before enteri MA/AWY	cTR/ - Alwa are active!! entering/leaving fast! do not come within of military airports ng a	CTA/TMA/AWY ys give: Name of ATC unit Call sign Type of aircraft IFR/VFR Point of departure Destination Routing Altitude / Flight level Position Squawking code ETA to CTR/CTA	(ie. Brussels inforr (ie. OOBET) (ie. C152) (ie. VFR) (ie. from EBKT) (ie. to EBGB) (ie. via AFI) (ie. at 1000 ft) (ie. North West of (ie. squawk 7000) (ie. estimate AFI in	nation) Brussels CTR) n 10 minutes)		

FEET-METERS-CONVERSION FUSS-METER-KONVERTIERUNG PIEDS-MÊTRES-CONVERSION

Feet / Fuß / Pieds Meters / Meter / Mètres



Condition	T/O (over 50 ft obst.)	Land (over 50 ft obst.)	
Weight + 10%	1,20	1,10	
Elevation + 1000 ft	1,10	1,05	
Outside temp + 10°C	1,10	1,05	
Dry grass	1,20	1,15	
Wet grass	1,30	>1,35	
Wet paved		1,15	
2% slope	7 1,10	1,10 لا	
Tailwind 10% of Vr	1,20	1,20	





KOCH CHART

50

40

30

20

10

C

-10

-20

-30

-40

°C

120

110

100

90

80

70

60

50

40

30

20

10

0

-10

-20

-30

-40

0_F

AIRPORT TEMPERATURE

-16

-14

0.1

0.2

0.3 CLIMB

0.6 s.L.

0.8

<u>-1.0</u>

0.4 RATE

FROM

FACTOR

3.6

3.0

2.4

2.0

1.6

1.4

1.2

1.0 -

TAKE-OFF

DISTANCE

FACTOR

DRAW A LINE FROM AIRPORT PRESSURE ALTITUDE

TO AIRPORT TEMPERATURE TO FIND T.O. DISTANCE

AND CLIMB FACTORS FROM SEA LEVEL

FROM S.L.

LTITUDE

PRESSURE

8

6

2

-0

-2

29.92 INCHES)

2

ALTIMETER

AIRPORT F