FLIGHT CREW TRAINING MANUAL

TECNAM – P2006T

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Inhalt

Vorwort

Das Training Manual *TECNAM P2006T* dient als verbindliche Arbeitsgrundlage zur Harmonisierung der praktischen IFR-, CPL- bzw. ATPL-Ausbildung und des Zwei-Mot.-Ratings. Die beschriebenen Verfahren basieren auf den Richtlinien des BMVBS für die Ausbildung und Prüfung des Luftpersonals.

Fluglehrer und Flugschüler sollten sich daran orientieren, um das Ausbildungsziel in optimaler Weise zu erreichen.

Ändern sich Gesetze, Verordnungen oder Richtlinien, so gelten diese Änderungen mit ihrem Inkrafttreten. Diese Unterlage wird dann entsprechend berichtigt.

1. Geschwindigkeiten

Die folgenden Geschwindigkeiten (IAS) sind wichtig für den sicheren Betrieb des Flugzeugs.
Die Angaben beziehen sich auf Standardbedingungen in MSL bei maximalem Fluggewicht.

V_{NE}	171 kts
v_R (Rotation Speed)	65 kts
v_X (Best Angle of Climb Speed)	72 kts
v_Y (Best Rate of Climb Speed)	84 kts
Cruise Climb Speed (best economic)	83 kts
v_{MCA} (Minimum Control Speed Air) = red line	62 kts
V_{SSE} (Recommended safe simulated min. OEI speed	70 kts
v_{YSE} (Best Rate of Climb Speed Single Engine) = blue line	84 kts
V_{XSE} (Best gradient speed OEI	83 kts
Stall speed gear + flaps down	54 kts
Stall speed gear + flaps up	66 kts
v_A (Design Maneuvering Speed)	122 kts
v_{FE} (Max. Speed Flaps Extended)	122 kts
Max. Gear Operating + Max. Gear Extended Speed	122 kts

v_{REF}	flaps up	=	86 kts
	flaps T/O	=	77 kts
	flaps FULL	=	70 kts

v_{TGT}	= v_{REF}	+	$^1/_2$ Windspeed + Gusts	
	= v_{REF}	+	max.	15 kts
	= v_{REF}	+	min.	5 kts

2. Power Settings

CONDITIONS	Power	KIAS	Pitch °
Initial Climb (5 Min.)	**26'' / 2388 (5800 RPM)**	**73**	**+8**
Cruise Climb	**22'' / 2265 (5500RPM)**	**80**	**+5**
Cruise (set to 1900-2250 RPM)	**26,4'' / 2250**	**140**	**0**
Approach clean	**17'' / 2000**	**100**	**0**
High Speed Final clean	**16'' / 2000**	**120**	**-2**
Approach Flaps T/O	**18'' / 2200**	**90**	**0**
Final Flaps + Gear down	**13'' / 2200**	**71**	**-2**
Airwork	**18'' / 2300**	**122**	**0**
Slow flight clean	**16'' / 2000**	**100**	**0**
Slow flight Flaps 10°	**16'' / 2000**	**90**	**+1**
Slow flight Flaps 10° + Gear down	**17'' / 2000**	**90**	**+1**
Slow flight Flaps 25° + Gear down	**17'' / 2000**	**80**	**+3**
Slow flight Flaps 40° + Gear down	**17'' / 2000**	**70**	**+5**

3. Tecnam P2006T

The Aircraft Flight Manual was approved by European Aviation Safety Agency.

4. Zulässige Windbedingungen

Maximale Querwindkomponente:	nach Handbuch 17 kts bei der Schulung 15 kts

5. Wettermindestbedingungen

Platzrundenflüge VFR:	Hauptwolkenuntergrenze min. 1000 ft Sicht min. 1,5 km
Überlandflüge VFR:	Hauptwolkenuntergrenze min. 1000 ft Sicht mit Lehrer min. 3 km
Take Off:	Hauptwolkenuntergrenze min. OCA (CAT1) + 200 ft Landebahnsicht (RVR) 1000 m keine bekannten Vereisungsbedingungen
Approach IFR:	Entscheidungshöhe OCA (CAT1) + 200 ft Landebahnsicht (RVR) 1000 m keine bekannten Vereisungsbedingungen
Enroute IFR:	keine bekannten Vereisungsbedingungen

6. Betriebsgrenzen für den Schulbetrieb

Start- und Landebahnlänge gem. Flughandbuch.
Schul- und Einweisungsflüge dürfen nur mit Fluglehrer durchgeführt werden.

Ansonsten sind die Betriebsgrenzen laut Flughandbuch einzuhalten.

7. Engine Failure Training

Die Erfahrung hat gezeigt, dass es nicht sinnvoll ist, Engine Failure durch Abstellen der Benzinzufuhr zu simulieren. Das damit verbundene Risiko ist zu groß. Deshalb simuliert der Lehrer den Engine Failure durch langsames Zurücknehmen des Throttles.

Der Schüler führt die **"memory items"** durch (siehe emergency briefing) und fordert die **Emergency Checklist** an. Die Emergency Checklist wird dann als **"do-it list"** durchgeführt.

- Detecting a dead engine:
  - loss of thrust
  - a/c nose will point to dead engine
  - dead foot = dead engine
- Recommended safe simulated min. OEI speed (V_{SSE}) 70 kt
- Keep speed above V_{SSE} for simulated OEI Training operations.

  A simulated feather condition is obtained with propeller lever full forward and throttle lever set at 13.5 hg MAP at 70-90 kt and 2000-4000 ft (density altitude)
- 5° bank into running engine erleichtern das Geradeausfliegen.
- das Flugzeug immer austrimmen.
- **BLUE LINE SPEED = 84 kts**
- Das kritische Triebwerk ist dasjenige, das bei **Ausfall** die Flugeigenschaften am Negativsten beeinflusst.
- Im Endanflug dürfen Landeklappen und Fahrwerk erst ausgefahren werden, wenn die Landung sichergestellt ist. Maximale Landeklappenstellung T/O Position.

8. Single Engine Power Settings

CONDITIONS	Power	KIAS	Pitch °
Climb	**26,8'' / 2388**	**82**	**+8**
Cruise	**22'' / 2200**	**110**	**0**
Approach clean	**20'' / 2100**	**90**	**0**
Final Flaps T/O + Gear down	**22'' / 2200**	**90**	**-2**

Maintain 5° bank into running engine.

Simulated Engine Failure Power: 13,5'' / 2000 RPM

9. Crew Briefing

CREW BRIEFING

The CM1 determines the job distribution during crew briefing. This applies to the Multi Crew Concept or the Single Pilot Concept.

Notes

. The examples of the Normal and Non Normal Operation P2006T reflect the Multi Crew Concept. The Trainings crew consist of:

CM1.....Student Pilot (SP)
CM2.....Flight Instructor (FI)

COCKPIT PREPARATION

The CM1 announces "Cockpit Preparation". CM1 and CM2 will check and process the following items:

Door	LATCH	2
Seats	ADJUST	B
Seat Belts	FASTEN	B
Gear Lever	CHECK DOWN	1
Battery / Alternators	ON	1
Gear Indication	CHECK 3 GREEN	1
Fuel Quantity / Selectors	CHECK / ON	1
Alternate Air Controls	OFF	1
Fire Detectors	TEST	1
Circuit Breakers	ALL IN	2
Parking Brake	SET	1

The CM2/A requests the CM2 (FI) to select the appropriate frequency. The CM2/A receives the ATIS and completes the flight log. After that the CM1 requests the cockpit crew checklist, which the CM2/A will read out loud.
The item Circuit Breakers is to be answered by the CM2 (FI), since this cannot be checked by the CM2/A.

COCKPIT CHECKLIST		
Preflight Inspection	COMPLETED	B
Seat Belts	FASTEND	ALL
Circuit Breakers	CKD	
Avionics	OFF	1
Alternate Static Source	CLOSED	1
Parking Brake	SET	1
Flight Controls	CKD	1
Trim	SET FOR T/O	1
Carburetor heat	OFF	1
Flaps	CKD	B
Gear Lever	DOWN	B
Fire Detectors	TEST	1
Cockpit Checklist Completed		

10. Before Start

The CM1 orders the CM2/A: "Call for start-up".
The CM2 (FI) turns on the radios (master switch) and selects the appropriate frequency following instructions. The CM2/A calls i.e.: " Bremen Ground, D-GGUT, position GAT, information ...received, request start up".

Note

1. *A start up clearance is only then required, if the flight will be initiated following IFR or if other orders have been given. If clearance for start-up and enroute clearance are given at the same time, clearance shall be read back.*

2. *If at this time enroute clearance is given, the CM1 carries out the radio set up and also the departure briefing. If this enroute clearance has not been given, radio set up and departure briefing will be carried out after start up in the after start procedure.*

RADIO SET UP FOR DEPARTURE AND DEPARTURE BRIEFING

Recommended Set Up for IFR-Departure		
NAV #1	first VOR ILS/LOC (active RWY) HSI #1 first radial	active preselected
NAV #2	DME (VOR/DME) Next VOR on departure	active preselected
DME	on field VOR/DME	active
ADF	first fix Locator (active RWY)	active preselected
COMM #1	Ground Tower	active preselected
COMM #2	Departure ATIS	active preselected

DEPARTURE BRIEFING

The CM1 (PF) carries out the departure briefing. During the briefing all settings will be pointed out (finger pointing). This briefing has to contain:

Departure Briefing**:** - departure route with altitudes to first fix
and decision in case of abnormals
according present weather conditions

After receiving clearance the CM1 announces: "Before start set up" and carries out the following items:

Radio/Avionics	OFF	1
Master switch	ON	1
Anticollision/Strobe lights	ON	1
Gear indication	3 GREEN	1
Fuel Quantity	CHK	1
Fuel Selectors L/R	ON	1
Prop Levers	FULL FORWARD	1

CM1 requests "Before Start Checklist". CM2/ reads the Checklist.

BEFORE START CHECKLIST		
Master switch	ON	1
Gear Indication	3 GREEN	B
Fuel Quantity	CKD	1
Fuel Selectors	ON L/R	1
Anti Coll./Strobe light	ON	1
Props	FULL FWD	1
Before Start Checklist Completed		

11. Engine Start

The CM1 announces: "Starting Engines" and starts the engines himself. Normal engine start procedure:

Prop Area ..... CHECK CLEAR 1

Ignition switches R/L ..... ON 1

FUEL Pumps ..... ON 1

Cold engine:
Throttles idle (fully closed), chokes fully opened.
Soon after starting advance the throttle to 800 RPM and slowly close the choke. Keep engine at 1200 RPM for warm up period.

Hot engine:
Park the aircraft with the nose pointing into wind in order to aid cooling.
Keep chokes closed and slowly open the throttles one inch while cranking.

Flooded Engine (after engine start failure):
Keep chokes closed, open throttle fully and start the engine, then quickly reduce throttles to idle.

Starter ..... ENGAGE 1

Starter ..... RELEASE 1

Throttle ..... ADVANCE SLOWLY TO OBTAIN 1200 RPM 1

Oil pressure ..... CHECK 1

Field RH/LH ..... ON 1

Cross bus RH/LH ..... ON 1

Set lever position only to obtain engine oil temperature of 50°C

(5 minutes will be required when temperature is below +20°F/-7°C)

Avionics RH/LH..... ON 1

Volt/Ammeter RH/LH ..... CKD 1

Suction..... IN LIMITS 1

Note

When starting at ambient temperatures +20°F/-7°C and below, operate first right engine started with alternator ON (at max. charging rate not to exceed 1500 RPM) for 5 minutes minimum before initiating start on second engine.

STARTING ENGINE LIST 1+2			
Throttle	R/L	IDLE	1
Props	R/L	FWD	1
Chokes	R/L	ON/-/-	1
Fuel Pump	R/L	ON	1
Prop Area	R/L	CLEAR	B
Ignition Switches	R/L	BOTH ON	1
Starter	R/L	ON	1
Field	R/L	ON	1
Oil Pressure	R/L	CKD	1
Throttle	R/L	1200RPM	1
Choke	R/L	OFF	1
Avionics	R/L	ON	1
Cross bus	R/L	ON	1
Ammeter/Voltm.	R/L	CKD	1
Suctions		IN LIMITS	1
Repeat for opposite engine			
Starting Engine List Completed			

12. After Starting Engines

The CM1 announces: "After Start Set Up". The following items need to be processed:

Radios/Avionics	ON AND SET	1
Annunciator panel	CLEAR	1
PFD	ALLIGNED	1
Compasses	CHECK AGAINST MAG COMPASS	1
Altimeters	SET LOCAL QNH / X-CKECK	1
Trim	SET FOR T/O	1
Flaps	CHECK AND SET FOR T/O	1
Circuit Breakers	ALL IN	2

Note

1. *The altimeters have to be set according to QNH and the indicated altitude has to be compared with the elevation. To carry out the flight, the deviance has to stay within the tolerance of +/- 60ft.*

2. *Zero trim shall be set. With the announcement "Flaps check" the landing flaps need to be set to 10, 25, 40 and UP. Proper function is to be checked and both CM's have to acknowledge proper function with the report: "My side checked".*

3. *The auto pilot check-up is described in Section 9; Supplement 1 (POH PA-34).*

4. *Under normal conditions the engine run up will be carried out in the taxi holding position. After finally receiving taxi clearance, the aircraft should taxi to the taxi holding position.*

Then the CM1 requests the after start checklist. The CM2/A reads the checklist.

AFTER START CHECKLIST		
Radio & Nav setting	SET	1
Annunciatorpanel	CLEAR	1
PFD	ALLIGNED	1
Altimeters	SET … + X-CKD	1
Gyro	PRE-SELECTED	1
After Start Checklist Completed		

13. Taxiing

TAXIING

If prior to taxiing a taxi clearance is required, the CM1 orders: "Call for taxi". After receiving clearance the CM1 announces: "Taxi" and starts taxiing to the taxi holding point. Immediately after moving off the CM1 checks his wheel brakes. Then he requests: "Check your side". The CM2 (FI) tests the brakes on his side.
During turns the flight instruments have to be checked. The correct function of the magnetic compass, HSI, RMI and the T/B indicator shall be checked and also the steady reading of the artificial horizon.
During taxiing all flight controls will be checked for full and free movement. The CM1 informs the CM2 of his intentions: "Ready for flight controls". After the CM2's "Ready" the CM1 checks the rudder movements.
The CM1 requests the taxiing checklist. The CM2/A reads the checklist.

TAXI CHECKLIST		
Brakes	CKD	B
Flight Instruments	CKD	1
Flight controls	CKD	1
X-Feed	CKD	1
Taxi Checklist Completed		

Note

1. *In general 1000 RPM are sufficient for taxiing. Under normal conditions IDLE POWER is sufficient to maintain the taxi speed on even surfaces.*
2. *It is not allowed to control the taxi speed by continuously using the wheel brakes.*
3. *While taxiing to the taxi holding position the PF carries out the T/O briefing.*

TAKE OFF BRIEFING

The T/O briefing has to contain:

Take-off configuration (flap setting, speeds); aborted take-off procedure
1-engine inoperative climb out procedure, critical terrain

Note

During the briefing the term "Standard take-off" shall be used, as long a take-off with the following configuration is planned: T/O Power, Flaps 0, v_R 64 KIAS, v_{Climb} 90KIAS.

Example: "Standard T/O Bremen RWY 27,
engine failure on runway: I call "STOP", brakes, throttles close,
engine failure after lift-off: max. power, maintain blue line speed 92kts,
clean the aircraft, identify dead engine, feather dead prop,
contact ATC, climb 2000 ft straight ahead and read
ENGINE FAILURE and AFTER TAKE OFF CHECKLIST."

14. Run Up

Under normal conditions the engine run up will be carried out in the taxi holding position or a designated area is to be used for the engine run up. After finally receiving taxi clearance the aircraft should taxi to the taxi holding position.

Parking Brake	APPLY	1
Engine Instruments	GREEN	1

Check the following in normal operating range:
oil pressure, oil temperature 75°F or above, fuel pressure

Fuel Selectors RH/LH	ON	1

Check fuel pressure within green band, normal operation of engines

Props	FORWARD	1
Throttles	1650 RPM	1
Ignitions RH/LH	OFF	1

The normal drop with single ignition is 50 RPM; the maximum drop should not exceed 150 RPM. The maximum differential drop should not exceed 50

Move the prop levers afterwards and then full forward.
Do not allow more than a 300 RPM drop during the check (NO FEATHER).

Carburetor heat	CHECK	1

Check no drop of RPM

Throttles	1200 RPM	1
Suction	CHECK	1
Throttles	1200 RPM	1
Fuel Selectors RH/LH	ON	1

ENGINE RUN UP LIST				
Brakes			APPLY	1
Engine Instruments	OIL 50°	IN LIMITS		1
Throttles			1650 RPM	1
Ignition switches R/L			CKD	1
Prop. Lever		No feather	CKD	1
Carb. Heat			CHK	
Throttles			IDLE	1
RPM & Oil Pressure			IN LIMITS	1
Throttles			1200 RPM	1
Engine Run Up List Completed				

15. Before T/O

At the taxi holding point the CM1 requests: "Call: Ready for departure". The CM2/A asks the CM2 (FI) to select the appropriate frequency and announces:
"… Tower, D-GGUT, ready for departure". After receiving and acknowledging take-off clearance the CM1 announces: "Before Take-off Set Up" and taxis to the take-off position.
Then he will carry out the following items:

BEFORE T/O CHECKLIST		
Autopilot (not eng.)		
Doors / Windows	CLOSED / LATCHED	1
T/O & Emer. Briefing	COMPLETED	B
Ignition switches	BOTH ON	1
Flaps	T/O -/-	1
Trims	SET FOR T/O	1
Fuel Pumps & Press.	ON / CKD	1
Fuel selectors	RH/LH ON	1
Before T/O Checklist Completed		

Note

1. *The setting of the PITOT HEAT depends on the weather conditions, for IFR flights it has to be switched on.*
2. *Transponder ON always means Mode "C" On.*

CM1 requests the before take-off checklist. The CM2/A reads the checklist up to item Compasses/RWY. The CM1 interrupts with "Standby" until he positions the aircraft on the runway centre line and compares the compass with the QFU of the runway.

CLEARED FOR T/O CHECKLIST		
Transponder	ON & ALT	1
Landing Light	ON	1
Pitot Heat	AS REQ	1
Gyro	CKD	1
Cleared For T/O Checklist Completed		

The CM1 replies "Compasses checked" and the CM2/A finishes the checklist announcing: "Before take-off checklist completed".

16. Take Off

The CM1 (PF) announces "Take-off" and carries out the take-off. He sets T/O power and keeps his right hand on the throttles till reaching v_R. The CM2/A works as PNF/A. He gives the standard call-out: "T/O-Power set" and "Sixty". With the standard call out "V_R", given by the PNF/A, the PF achieves the required take-off attitude with both hands on the controls and lifts off. With "Positive climb" the landing gear will be retracted. The PNF (FI) controls the gear lever. The report "Gear up, no lights" will be given by the PNF/A.

Note

1. *The above-mentioned procedure up to "Gear up" is used in the Multi Crew Concept only. In the Single Pilot Concept the hand will be taken off the throttles only to retract the landing gear.*

2. *During VFR-circuits the landing light remains on.*

No sooner than 400ft AGL the PF reduces to climb power (22 inch/2265 RPM).
After achieving cruise climb set cowl flaps appropriately to keep cylinder head and oil temperatures in normal range.
No sooner than passing 400ft AGL the PNF/A asks the PNF (FI) to set the ATC-frequency, then the PNF/A contacts the ATC. After passing the transition altitude the PF requests the after take-off checklist, the PNF/A reads the checklist.

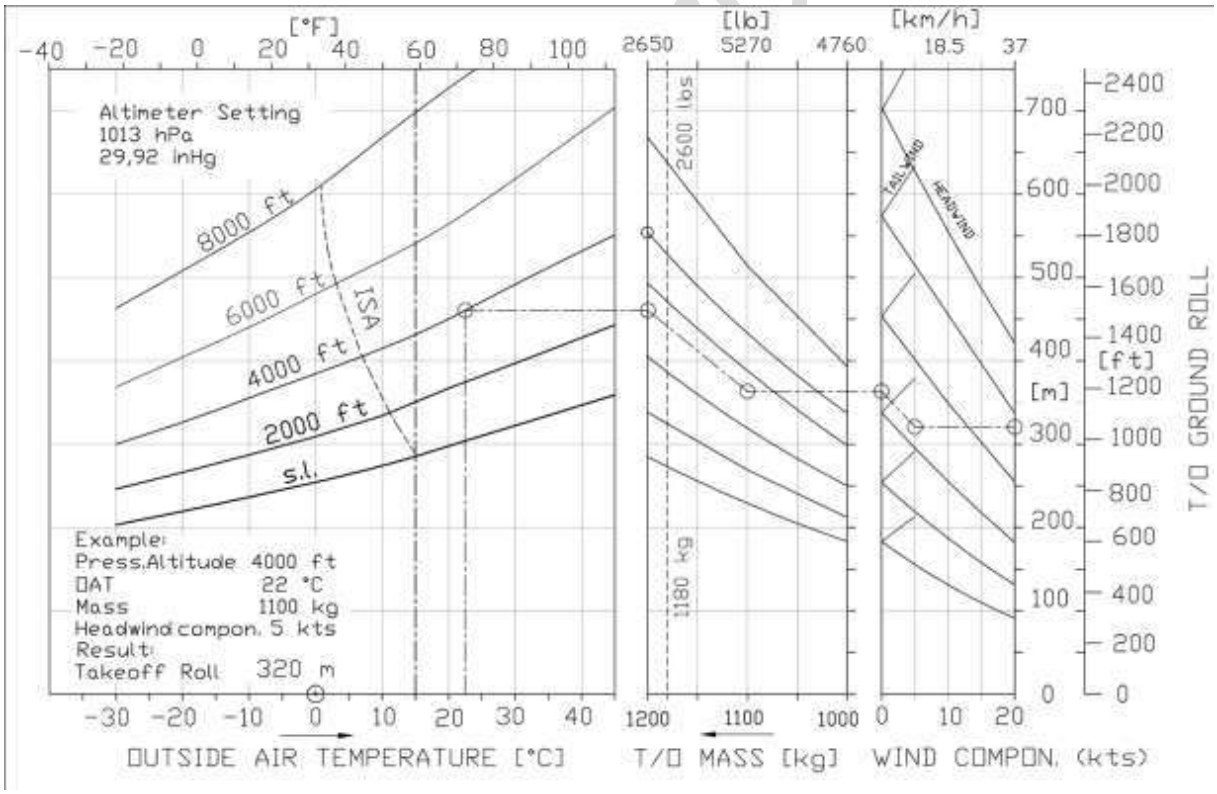
AFTER T/O CHECKLIST			
Gear		UP	PF
Flaps		UP	PF
Landing Light		OFF	PF
Fuel Pumps	R/L	OFF	PF
Landing light		OFF	PF
Altimeters		____ / ____	B
After T/O Checklist Completed			

1. *After passing the transition altitude both altimeters will be set on Standard. General procedure by the MCC:*
   (PF) Call out: "Altimeter Standard" and sets his altimeter
   (PNF) sets his altimeter
   (PF) Request: "After take-off checklist"
   While reading the after T/O checklist, the altimeter readings will be compared.

2. *If remaining in a QNH-altitude, the checklist will be read after the level off.*

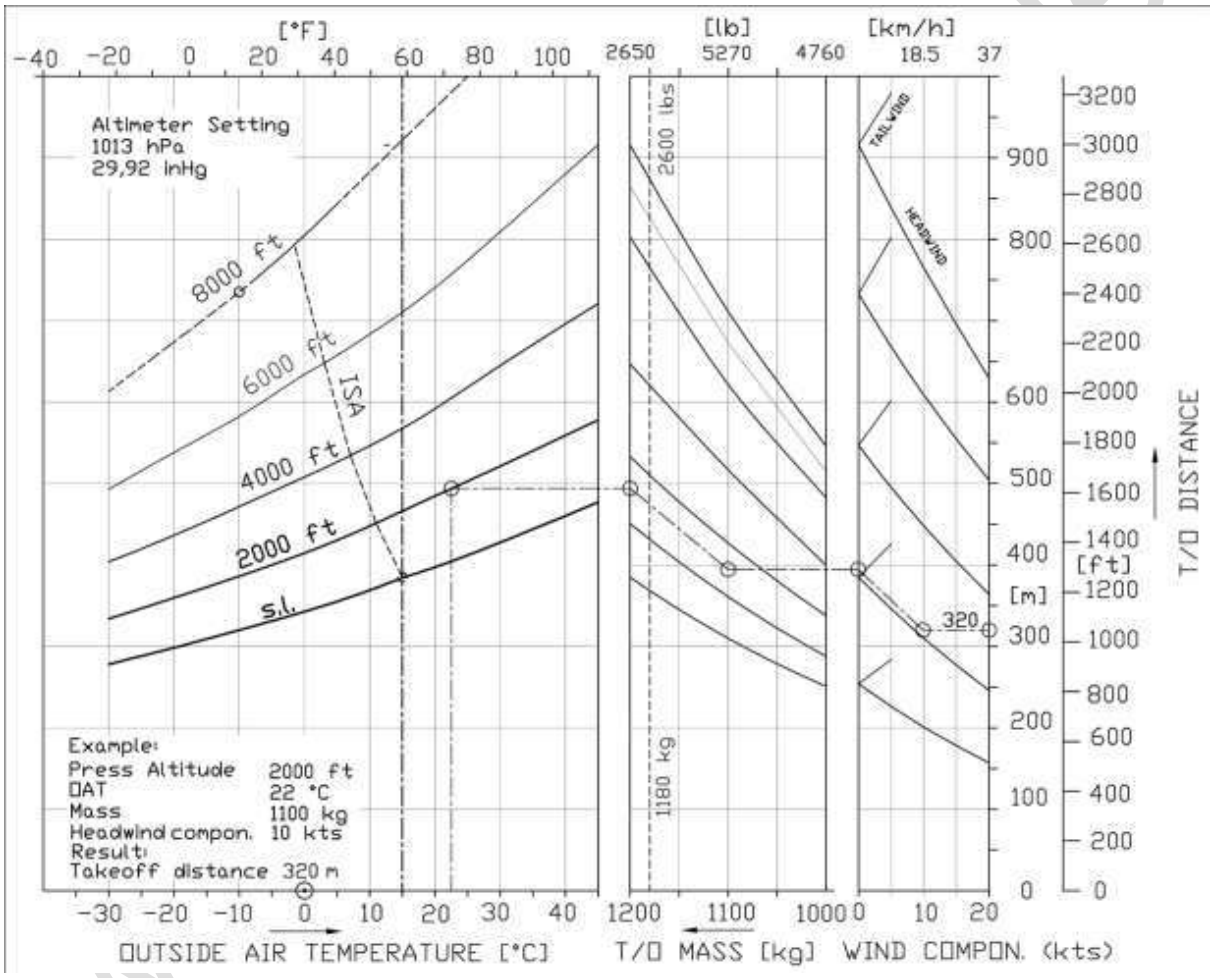
17. Take-off Ground ROLL

Takeoff ground roll
CONDITIONS:
- Flaps: T/O
- Throttle levers: FULL FORWARD
- Runway: paved



18. Take Off Distance over 50 ft

CONDITIONS:
- Flaps: T/O
- Throttle levers: FULL FORWARD
- Runway: paved



TAKE-OFF PERFORMANCE			1230 kg	Paved RWY=-6% to GND ROLL				
P2006T								
PA in ft		0°	*10°*	*20°*	25°	*30°*	*40°*	50°
SL	Roll	248	272	296	308	322	349	377
	Dist. 50ft	345	379	412	429	448	487	525
1000	Roll	278	304	331	344	359	390	420
	Dist. 50ft	385	423	460	479	500	543	586
2000	Roll	308	338	369	384	401	436	470
	Dist. 50ft	430	472	514	535	559	606	654
3000	Roll	345	379	413	430	449	487	525
	Dist. 50ft	537	590	643	669	699	758	818
4000	Roll	386	424	461	480	502	545	588
	Dist. 50ft	537	590	643	669	699	758	818
5000	Roll	432	474	517	538	562	610	658
	Dist. 50ft	602	661	720	749	782	849	916

TAKE-OFF PERFORMANCES			1080 kg	Paved RWY=-6% to GND ROLL				
P2006T								
PA in ft		0°	*10°*	*20°*	25°	*30°*	*40°*	50°
SL	Roll	177	194	211	220	230	249	269
	Dist. 50ft	246	270	294	306	320	347	374
1000	Roll	197	216	235	245	256	278	300
	Dist. 50ft	274	301	328	341	356	387	418
2000	Roll	220	242	263	274	286	311	335
	Dist. 50ft	306	336	366	381	398	432	466
3000	Roll	246	270	294	306	320	347	374
	Dist. 50ft	383	421	458	477	498	541	583
4000	Roll	275	302	329	342	357	388	419
	Dist. 50ft	383	421	458	477	498	541	583
5000	Roll	308	338	369	384	401	435	469
	Dist. 50ft	429	471	513	534	558	605	653

19. Enroute Rate of Climb at V_y – Both engines

Power Setting: Maximum Continuous Power – GARMIN G950 IFDS Flaps: UP Landing Gear: UP							
MASS	Pressure Altitude	Climb Speed V_Y	Rate of Climb [ft/min.]				
			Temperature [°C]				ISA
[kg]	[ft]	[KIAS]	-25	0	25	50	
1230	S.L.	**84**	1317	1135	973	827	**1036**
	2000	**83**	1179	1000	841	697	**928**
	4000	**81**	1041	865	709	568	**819**
	6000	**80**	904	731	577	439	**711**
	8000	**78**	767	598	446	310	**603**
	10000	**77**	631	464	316	182	**495**
	12000	**75**	495	332	186	54	**387**
	14000	**73**	360	199	56	-73	**279**
1080	S.L.	**83**	1560	1360	1182	1022	**1251**
	2000	**82**	1408	1212	1037	879	**1132**
	4000	**80**	1257	1064	892	737	**1014**
	6000	**78**	1106	917	748	595	**895**
	8000	**76**	956	770	604	454	**776**
	10000	**74**	807	624	461	314	**658**
	12000	**72**	657	478	318	173	**539**
	14000	**70**	509	333	175	34	**420**

20. Enroute Rate of Climb at V_X – Both engines

Power Setting: Maximum Continuous Power – GARMIN G950 IFDS Flaps: UP Landing Gear: UP							
MASS	Pressure Altitude	Climb Speed V_x	Rate of Climb at Vx [ft/min.]				
			Temperature [°C]				ISA
[kg]	[ft]	[KIAS]	-25	0	25	50	
1230	S.L.	**72**	1241	1073	924	789	**982**
	1000	**72**	1177	1011	863	729	**932**
	2000	**72**	1114	949	802	669	**882**
	3000	**72**	1050	887	741	609	**832**
	4000	**72**	986	825	680	550	**782**
	5000	**72**	923	763	619	490	**732**
	6000	**71**	860	701	559	431	**682**
	7000	**71**	797	639	498	371	**632**
1080	S.L.	**72**	1480	1295	1130	981	**1194**
	1000	**72**	1410	1226	1062	915	**1139**
	2000	**72**	1340	1158	995	848	**1084**
	3000	**72**	1269	1089	928	782	**1029**
	4000	**71**	1199	1020	861	717	**973**
	5000	**71**	1129	952	794	651	**918**
	6000	**71**	1059	884	727	585	**863**
	7000	**71**	990	815	660	520	**808**

21. One-Engine Rate of Climb at V_{YSE}

Power Setting: Maximum Continuous Power – GARMIN G950 IFDS Flaps: UP Landing Gear: UP							
MASS	Pressure Altitude	Climb Speed V_{YSE}	Rate of Climb at V_{YSE} [ft/min.]				
			Temperature [°C]				ISA
[kg]	[ft]	[KIAS]	-25	0	25	50	
1230	S.L.	**84**	330	230	142	62	**176**
	1000	**83**	292	193	106	26	**147**
	2000	**82**	254	157	69	-9	**117**
	3000	**81**	216	120	33	-44	**87**
	4000	**80**	179	83	-3	-80	**58**
	5000	**79**	141	46	-38	-115	**28**
	6000	**79**	104	10	-74	-150	**-1**
	7000	**78**	67	-27	-110	-185	**-31**
1080	S.L.	**80**	436	330	235	149	**271**
	1000	**80**	396	290	196	111	**240**
	2000	**79**	355	251	157	73	**208**
	3000	**79**	315	211	118	35	**176**
	4000	**79**	275	172	80	-3	**145**
	5000	**79**	234	132	41	-41	**113**
	6000	**78**	194	93	3	-78	**81**
	7000	**78**	154	54	-35	-116	**50**

22. One-Engine Rate of Climb at V_{XSE}

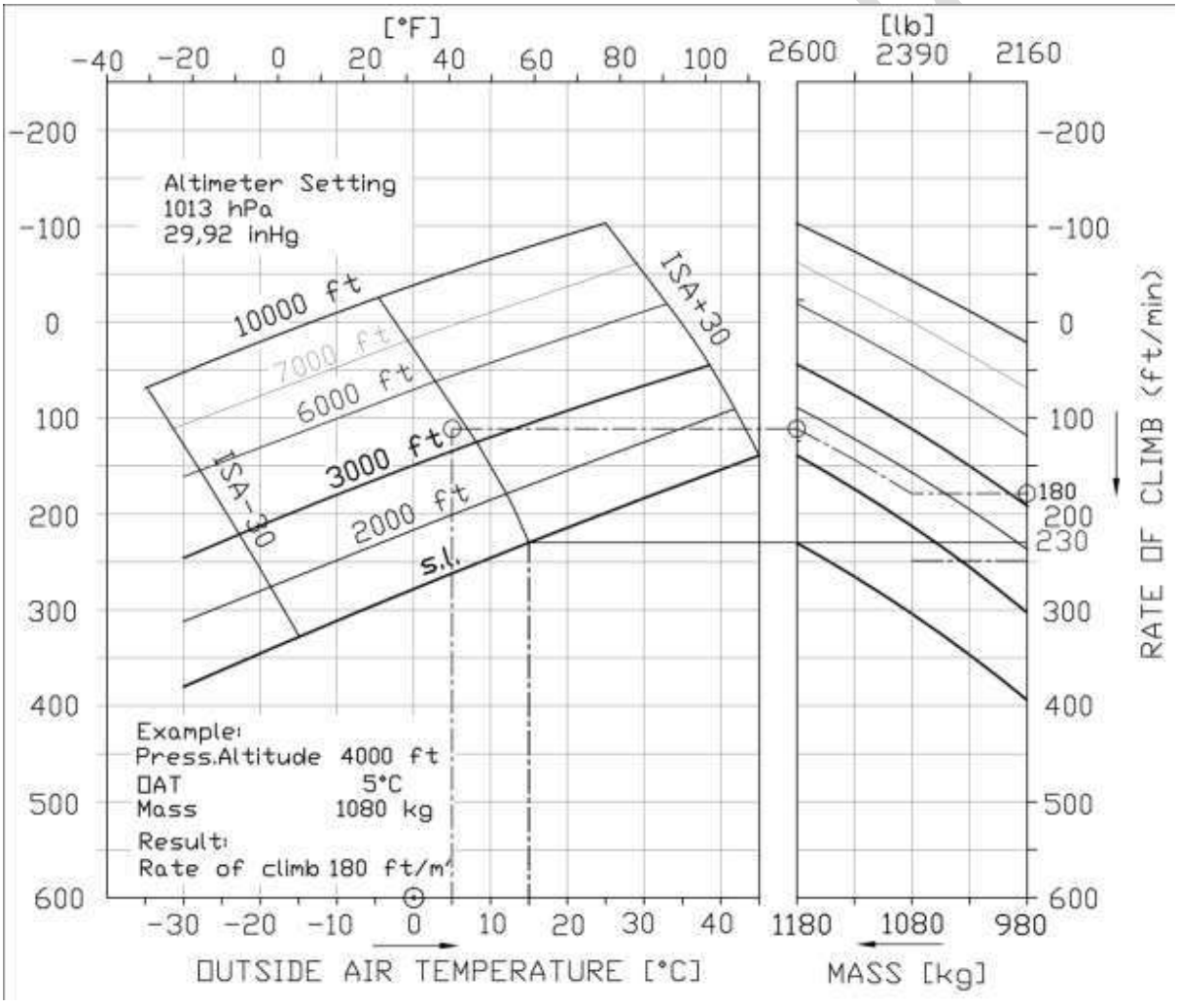
Power Setting: Maximum Continuous Power - GARMIN G950 IFDS Flaps: UP Landing Gear: UP							
MASS	Pressure Altitude	Climb Speed V_{XSE}	Rate of Climb at V_{XSE} [ft/min.]				
			Temperature [°C]				ISA
[kg]	[ft]	[KIAS]	-25	0	25	50	
1230	S.L.	**83**	325	227	140	61	**174**
	1000	**82**	288	191	104	26	**145**
	2000	**81**	251	155	69	-9	**116**
	3000	**81**	214	118	33	-44	**86**
	4000	**80**	177	82	-2	-78	**57**
	5000	**79**	140	46	-38	-113	**28**
	6000	**78**	103	10	-73	-148	**-1**
	7000	**77**	66	-26	-108	-183	**-30**
1080	S.L.	**79**	424	321	229	147	**265**
	1000	**79**	385	283	192	110	**234**
	2000	**79**	346	245	155	73	**204**
	3000	**79**	307	207	117	37	**173**
	4000	**79**	268	169	80	0	**143**
	5000	**78**	229	131	43	-36	**112**
	6000	**78**	190	93	6	-73	**81**
	7000	**78**	152	55	-31	-109	**51**

23. Climb Performance – One engine inoperating

CONDITIONS:
- AC Clean configuration
- One engine inoperative
- Max Cont. Power – Airspeed:

MASS

[kg]
VSSE
[KIAS]
1180 80
1080 78
980 75



24. Cruise

1000ft prior to reaching the level off altitude the PNF/A will use the standard call out "1000". When reaching the planned altitude the PN will accelerate to cruise speed, using climb power, and then he will set cruise power (inclusive leaning).

Note

While leaning the following temperatures shall not be exceeded:
High performance CRZ - < 435°F
ECON CRZ - < 400°F

The aircraft has to be trimmed. The PNF (FI) carries out all changes of frequencies necessary during the flight, following the PF's instructions. The COMM-frequency changes given by the ATC have to be carried out by the PNF alone.

Example: "Set Nienburg NAV #2 "

The PNF (FI) sets the frequency given by the PNF/A and carries out the identification. After that the PNF/A reports:

Example: "Nienburg NAV #2 Set and Identified"

The PF has the opportunity to use the autopilot, as long as he does not have to focus his attention primarily on handling the airplane. The operation of the autopilot has to follow regulations set in the supplements, Section 9 POH PA-34. If necessary, the function of the autopilot can be carried out by the PNF (FI). While control will be handed over with: "You have control", the PF determines Roll Mode and Pitch Mode.

Example: "You have Control, HDG 350 and Altitude Hold"

With the report: "I have control" the PNF (FI) takes control of the aircraft. His activity remains restricted to the function of an autopilot. This shall be supervised by the PNF/A. The PNF/A remains in control of the radio and gives appropriate instructions to the autopilot (i.e. HDG-, ALT-, A/P mode-changes).

To operate the fuel system (cross feed operation) see page 7-13 POH PA-34. For flights in icing conditions see supplement 6; section 9 POH.

25. Landing Performances over 50 ft

LDG PERFORMANCE			1230 kg	Paved RWY=-2% to GND ROLL			Flaps: LAND	
P2006T								
PA in ft		0°	*10°*	*20°*	25°	*30°*	*40°*	50°
SL	Roll	215	223	230	234	238	246	254
	Dist. 50ft	330	340	349	354	359	369	379
1000	Roll	222	230	239	243	247	256	264
	Dist. 50ft	339	349	360	365	370	381	391
2000	Roll	231	239	248	252	256	265	273
	Dist. 50ft	350	361	372	377	382	392	402
3000	Roll	239	248	257	262	266	275	283
	Dist. 50ft	375	385	396	401	406	417	428
4000	Roll	249	258	267	271	276	285	294
	Dist. 50ft	372	383	394	400	406	417	428
5000	Roll	258	267	276	281	286	295	305
	Dist. 50ft	384	396	407	413	419	430	442

LDG PERFORMANCE			1080 kg	Paved RWY=-2% to GND ROLL			Flaps: LAND	
P2006T								
PA in ft		0°	*10°*	*20°*	25°	*30°*	*40°*	50°
SL	Roll	188	195	202	206	209	216	222
	Dist. 50ft	289	298	307	311	315	324	332
1000	Roll	195	203	210	214	217	224	231
	Dist. 50ft	298	307	316	321	325	334	343
2000	Roll	203	210	217	221	225	232	240
	Dist. 50ft	307	316	325	330	335	344	353
3000	Roll	211	218	225	229	233	241	249
	Dist. 50ft	327	337	346	351	356	366	376
4000	Roll	219	227	234	238	242	250	258
	Dist. 50ft	327	337	346	351	356	366	376
5000	Roll	226	234	243	247	251	260	268
	Dist. 50ft	327	341	356	363	368	379	389

26. Stall Speed – Angle of bank

Mass: 1180 kg Throttle levers: IDLE Landing gear: DOWN CG: Most forward (16,5%) No ground effect				
MASS [kg]	Bank Angle [deg]	Flaps 0° [KIAS]	Flaps T/O [KIAS]	Flaps FULL [KIAS]
1230	0	66	56	53
	15	67	57	54
	30	70	60	58
	45	77	67	64
	60	93	81	78

27. Mass & Balance example

Station	Arm (inches)	Mass (kg)	Moment (mkg)	Example Mass	Example Moment
Basic D-GGUT	87,4	853	393	853	393
Pilot + Copilot		170		160	
Seat 3+4		60		140	
Baggage (max. 200)		7		8	
Fuel (max. 108 Gal useable)		140		72	
TOTAL		1230		1180	

EXAMPLE:

$$\text{C.G. FOR T/O} = \frac{\text{TOTAL MOMENT}}{\text{TOTAL MASS}} = \_\_\_\_\_$$

CHECK MASS AND C.G. WITH POH

Fuel Tanks		
Gal.	**ltr.**	**MASS**
50	189,3	136 kg
40	151	109 kg
30	114	82 kg
20	76	55 kg

Max. Ramp Mass:	1230 kg	2712 lb
Max. T/O Mass:	1230 kg	2712 lb
Max. Landing Mass:	1230 kg	2712 lb
Max. zero wing fuel Mass:	1195 kg	2635 lb

28. Fuel Calculation with Example

Für alle Trainingsflüge ist eine Fuel-Calculation anhand der im Flight-Log errechneten Zeiten durchzuführen.

Prinzipiell wird das Schulflugzeug bei Standardtrainingsflügen auf allen 2 Tanks voll betankt. Daraus ergibt sich ein Kraftstoffvorrat von:

52,8 Gal = 200 ltr.

Davon sind

10 ltr. für Start und Taxi abzuziehen = 180 ltr.

Hieraus errechnet sich eine sichere Flugzeit von ca. 4,5 Stunden, wenn man einen Verbrauch von 40 ltr./h zu Grunde legt.

Bei einem angenommen Verbrauch von 40 ltr./h sind bereits Zuschläge für eventuelle Steigflüge eingerechnet.

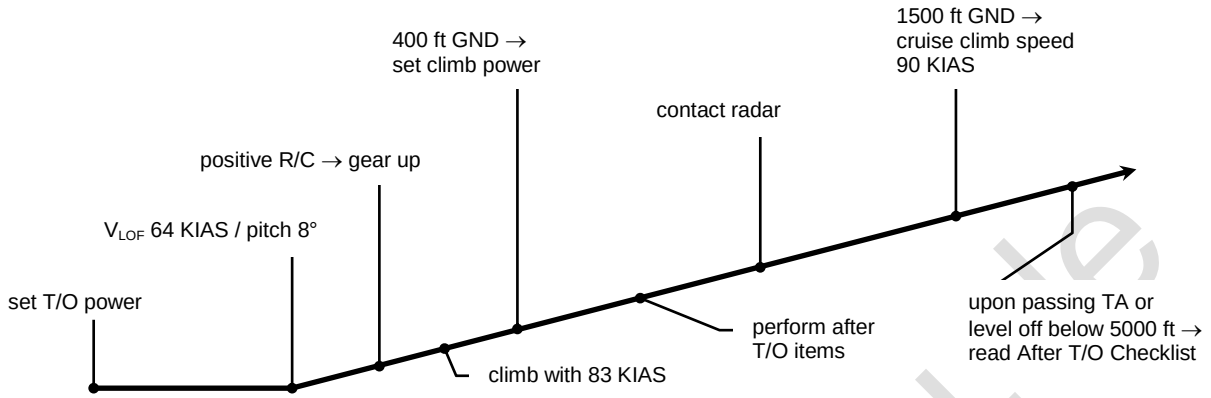
Musterberechnung

	Time	**Fuel**	**Time**	**Fuel**
Trip Fuel	2:30	100		
Contingency 10 %	0:15	10		
Alternate	0:30	20		
FINRES	0:45	30		
Min. T/O Fuel	4:00	160		
Extra Fuel	0:30	20		
T/O Fuel	4:30	180		
Start-up + Taxi	0:15	10		
Block Fuel	4:45	190		

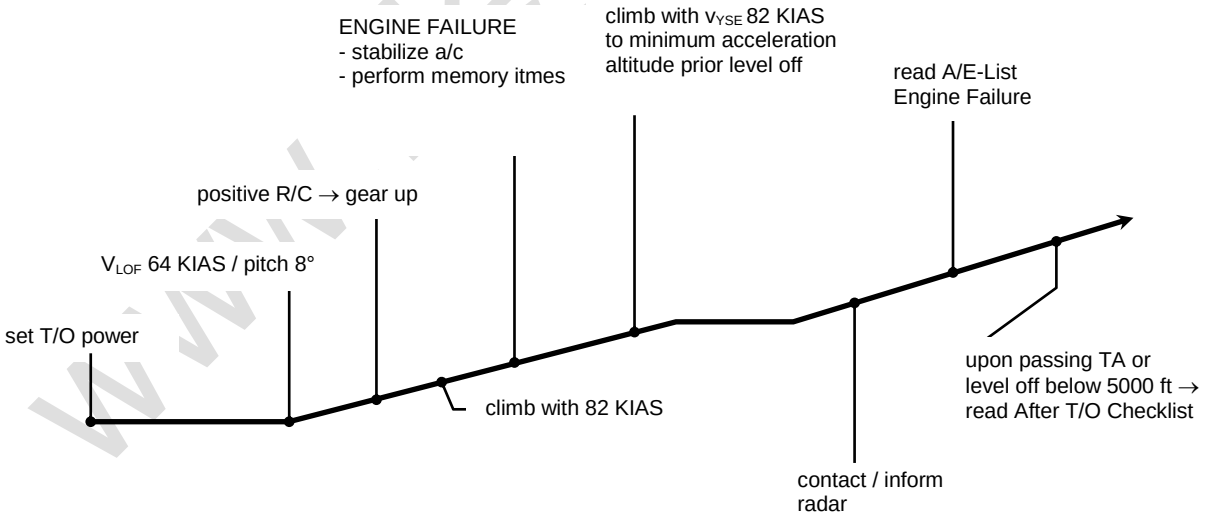
Tankinhalt ausfliegbar: 194 ltr. Beide Tanks 52,8 Gal. = 200 ltr.

Start + Taxi: pauschal 10 ltr.
Holding (FINRES): pauschal 30 ltr.

29. NORMAL TAKE OFF



30. ENGINE FAILURE after T/O



31. TOUCH AND GO LANDING

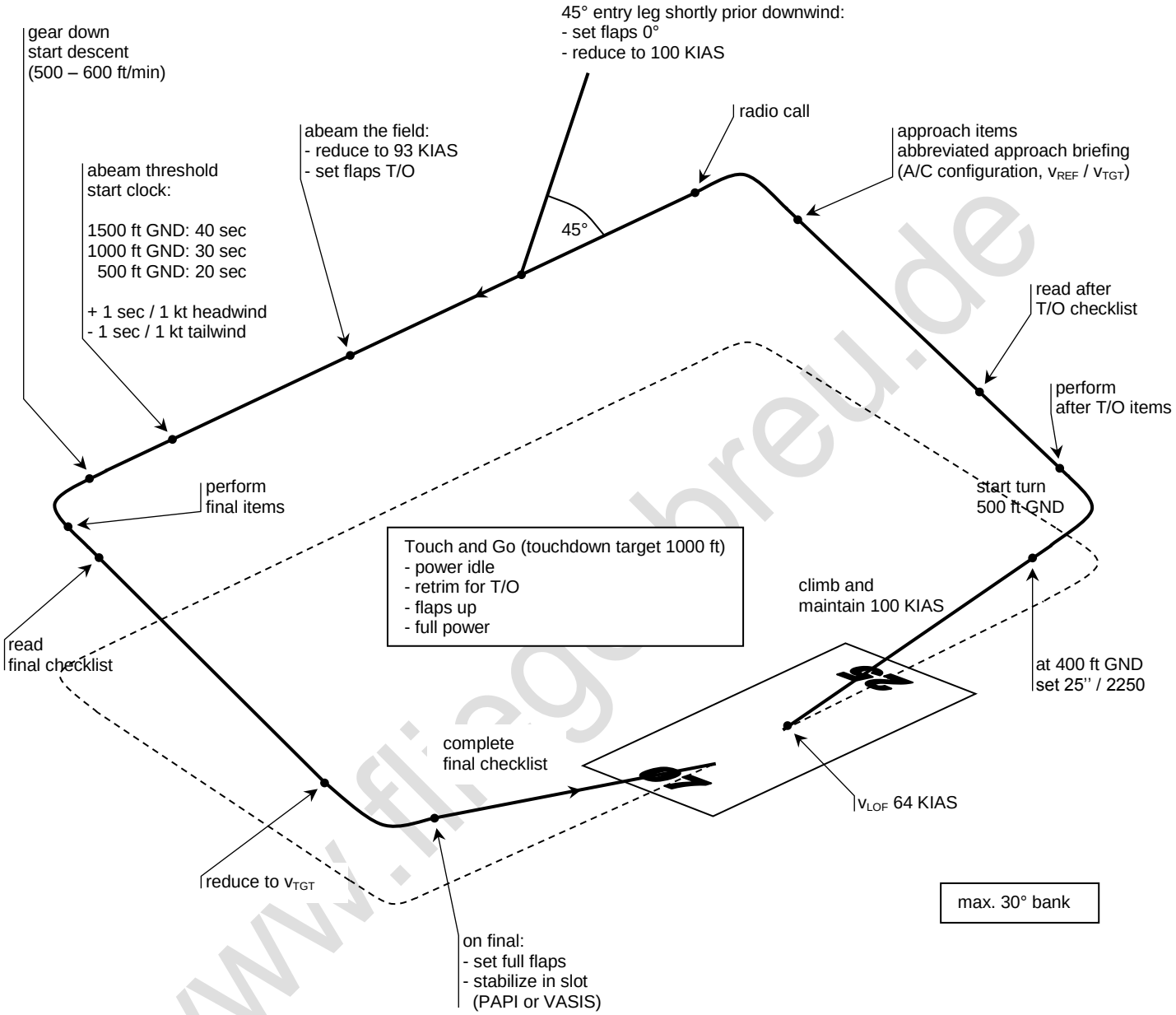
PATTERN FOR TRAINING PURPOSES

- Perform cleared for T/O items
- Read cleared for T/O checklist
- Align aircraft on runway centerline
- Apply take-off power (throttle full forward, RPM 2388 – Time max. 5 Min.)
- Accelerate aircraft and check airspeed rising and engine instruments normal
- Rotate at 64 KIAS, attitude approx. 8° up
- When positive rate of climb, smoothly apply brakes and retract the gear
  - Climb with 70 to 80 KIAS
  - At 400 ft/GND set climb power - 22" MP and 2265 RPM
  - At 500 ft/GND turn 90° left / right
  - Read after T/0 checklist

- At 1000/1500 ft/Gnd turn on downwind and level off
  - power 22" MP, RPM 2000
  - (HDG for downwind includes 2 * WCA)
  - conduct abbreviated approach briefing (A/C configuration (10° flaps), V_{REF}, V_{TGT})
  - CALL ATC
  - Abeam midfield set T/O flaps and reduce to 100 KIAS
  - Abeam threshold - start timing: 3 sec. / 100 ft AGL – 1 sec/kt tailwind

- when time elapsed:
  - gear down
  - turn to base
  - start descent 500 – 600 ft/min
  - maintain 70-80 KIAS
  - read final checklist

  - after final turn select flaps FULL (full if necessary), reduce to V_{TGT} and stabilize in slot
    (PAPI, VASIS)
  - complete final checklist



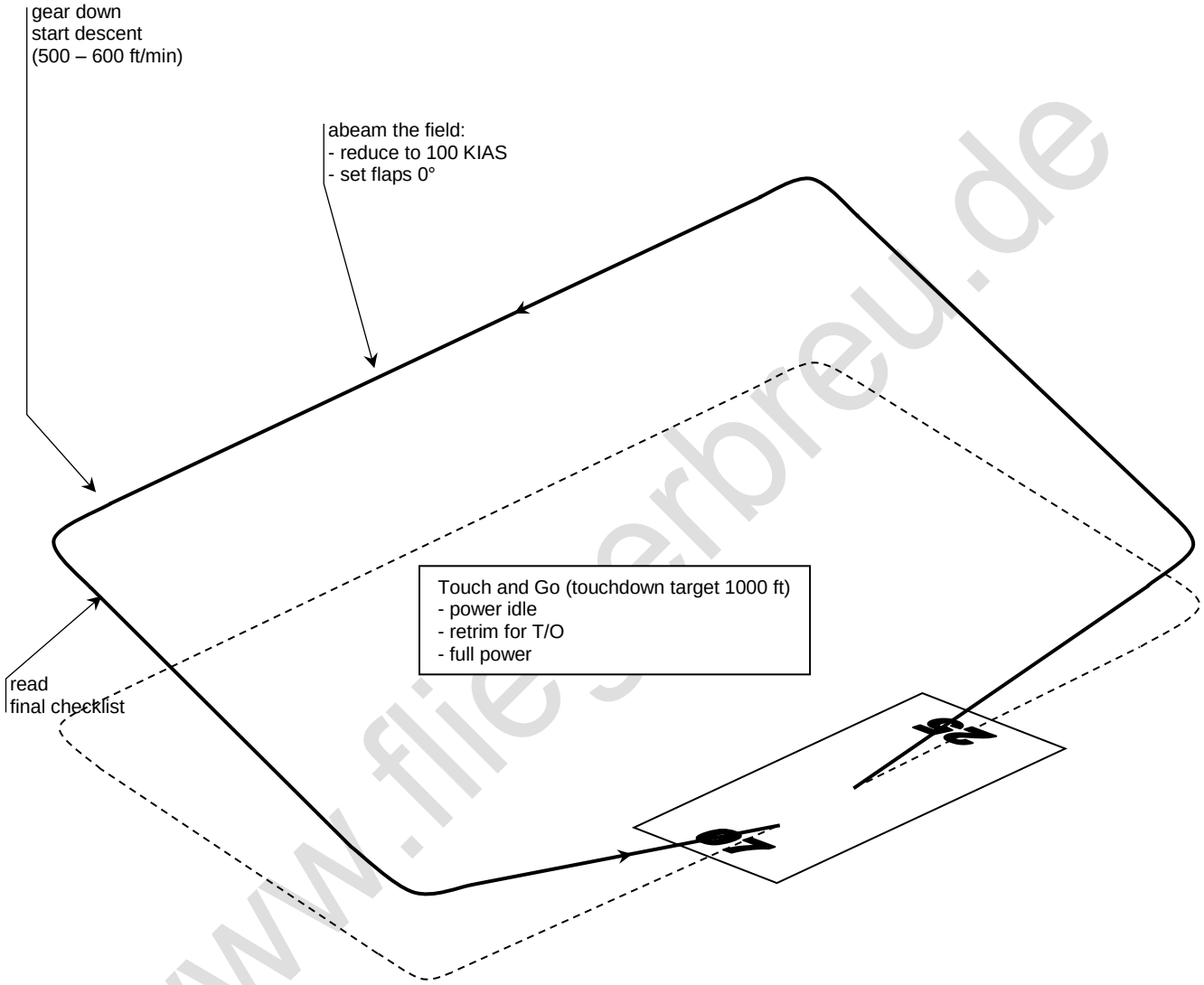
v_{REF}	=	1,3 x v_S	
v_{REF}	=	Flaps 0° :	86 KIAS
		Flaps T/O	70 KIAS
		Flaps FULL	70 KIAS

v_{TGT} = $^1/_2$ Wind Speed + Gustfaktor

min. v_{TGT} = v_{TGT} + 5 kts
max. v_{TGT} = v_{TGT} + 15 kts

32. ZERO-FLAP LANDING

PATTERN FOR TRAINING PURPOSES

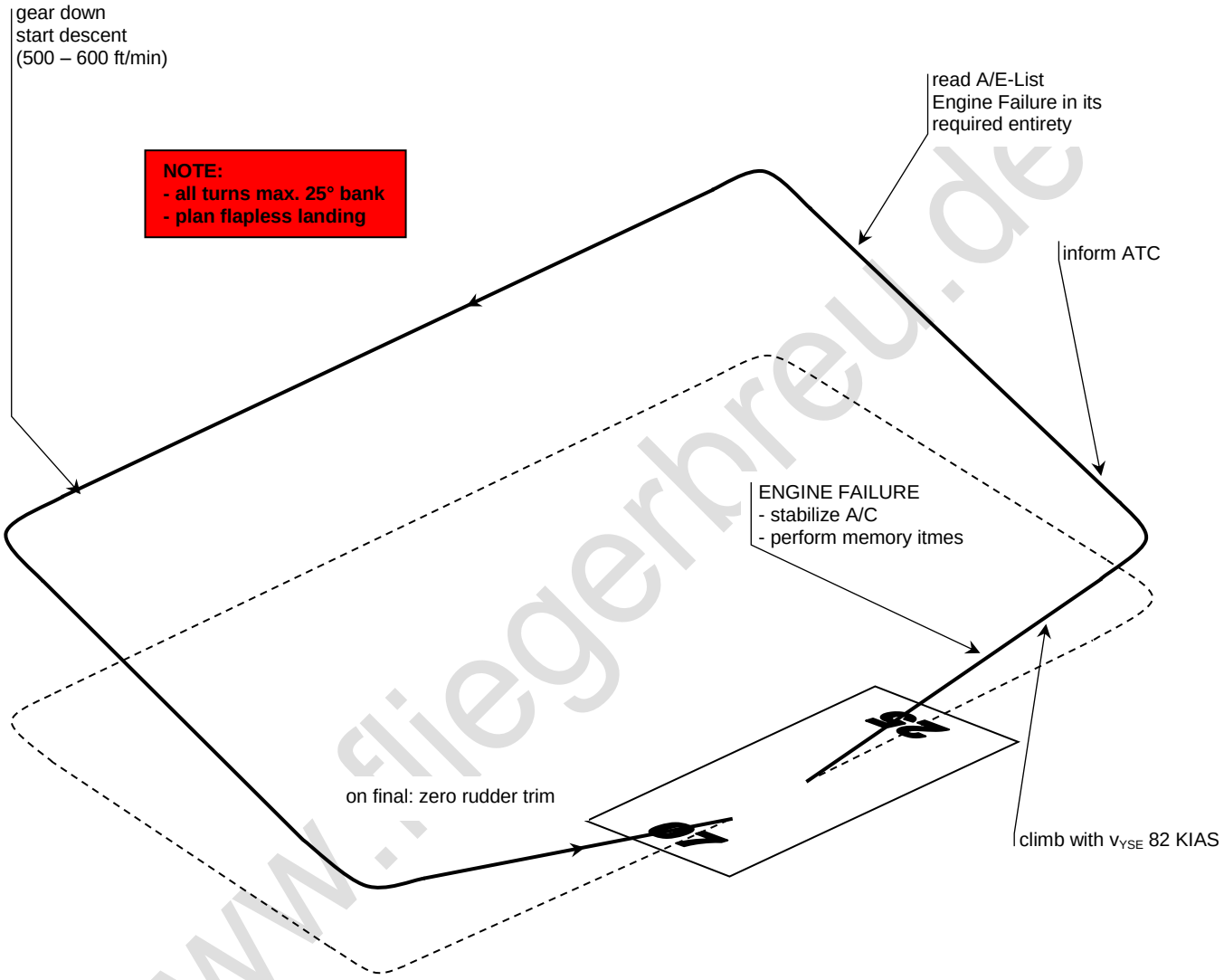


NOTE :
Only deviations from NORMAL PATTERN are shown

33. SINGLE ENGINE PATTERN

PATTERN FOR TRAINING PURPOSES

One engine inoperative **AFTER** take off



NOTE :
Only deviations from NORMAL PATTERN are shown

34. STEEP TURN (45° Bank)

Caution:

If the a/c has more than 45° bank with a low attitude resulting in a high rate of sink, start …

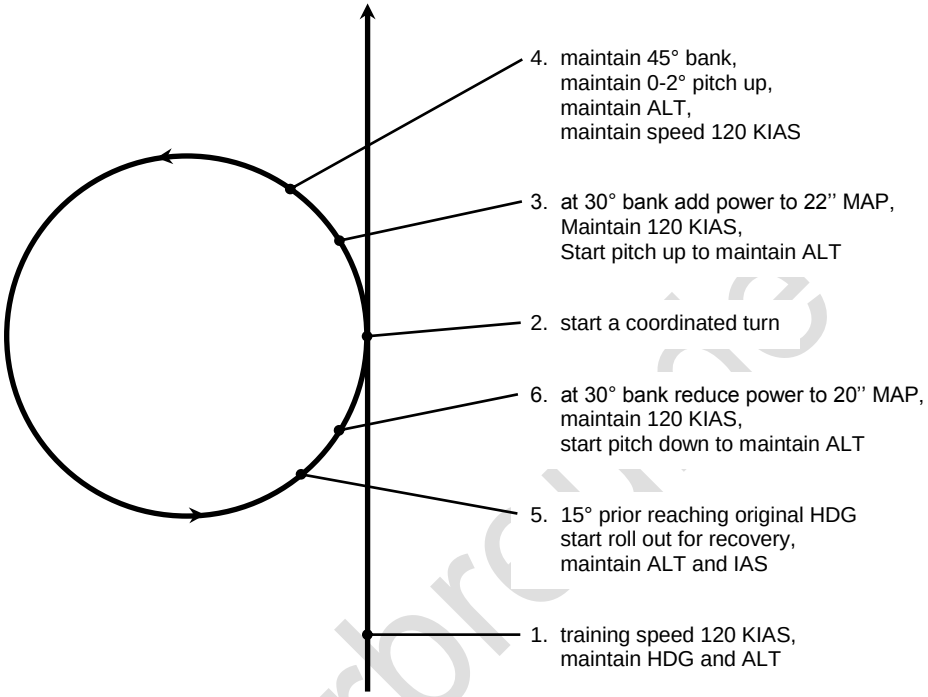
Recovery:

power → reduce

bank → wings level

pitch → nose up for level flight

(applying back pressure only may result in a spiral dive)

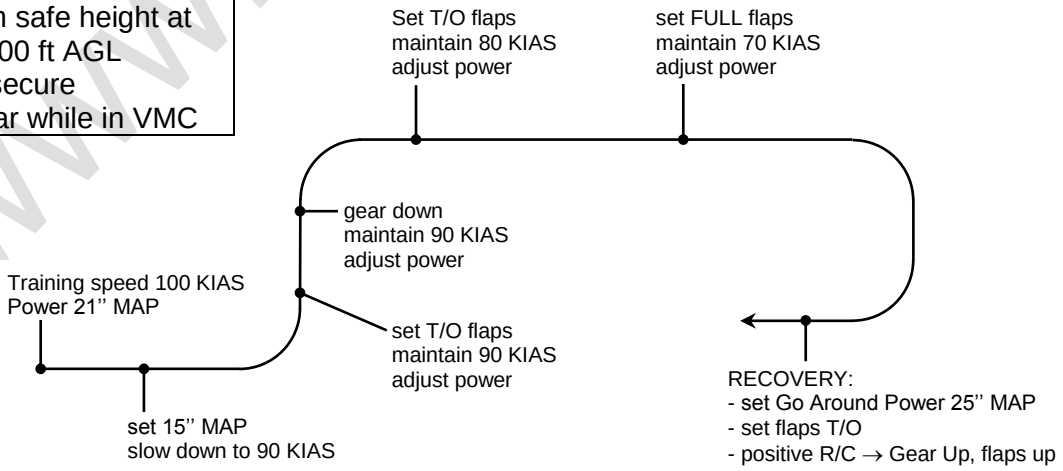


NOTE: Entry and recovery should be made in a smooth and coordinated manner.

35. SLOW FLIGHT

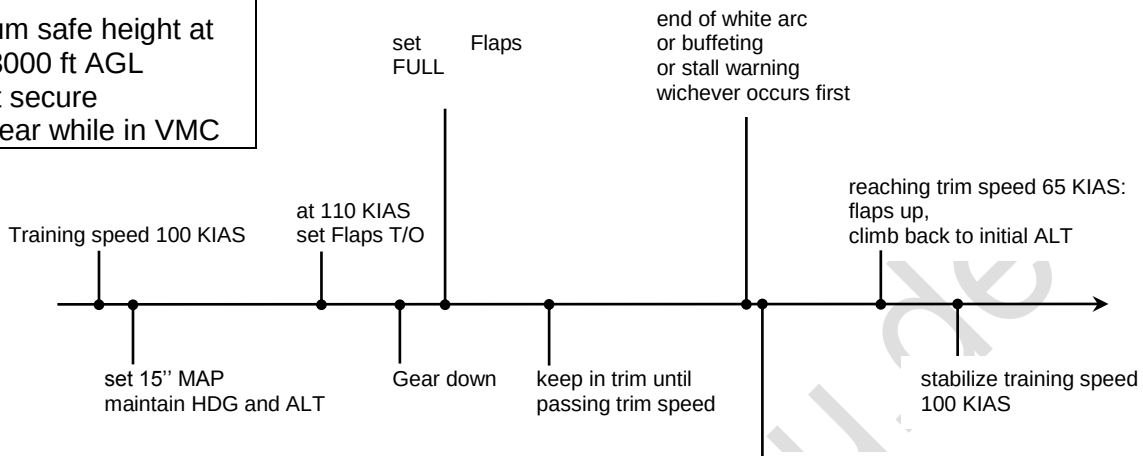
ATTITUDE FLYING

Check:
- Minimum safe height at least 3000 ft AGL
- cockpit secure
- area clear while in VMC



36. LANDING CONFIGURATION STALL

Check:
- Minimum safe height at least 3000 ft AGL
- cockpit secure
- area clear while in VMC



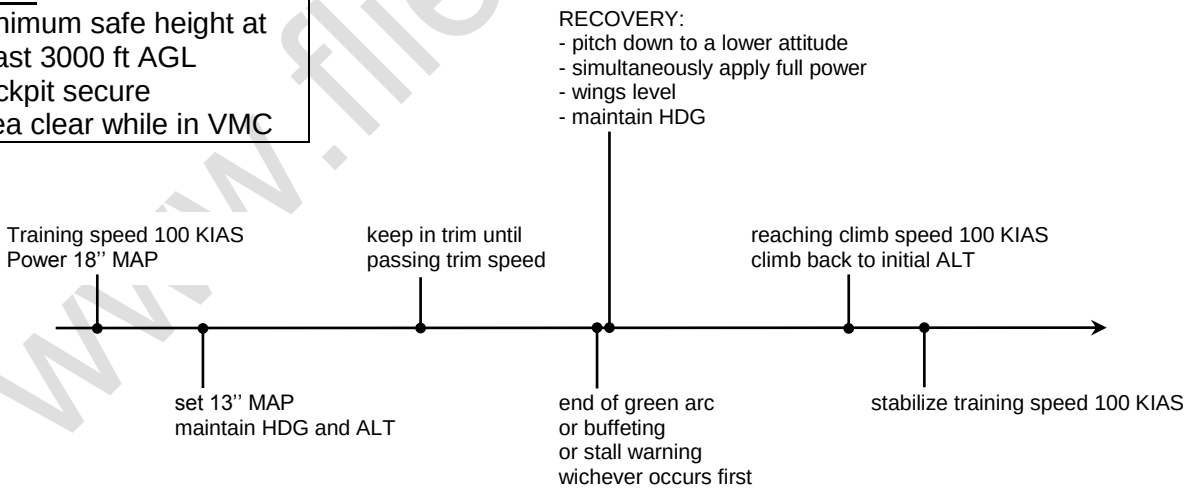
RECOVERY:
- pitch down to a lower attitude
- simultaneously apply full power
- wings level
- flaps set to T/O
- positive R/C → Gear Up
- maintain HDG

NOTE: max. allowed Altitude loss is -50 ft

Trim Speed 75 KIAS (v_{S0} + 20 kts)

37. CLEAN STALL

Check:
- Minimum safe height at least 3000 ft AGL
- cockpit secure
- area clear while in VMC



NOTE: max. allowed Altitude loss is -200 ft

Trim Speed 86 KIAS (v_S + 20 kts)

38. Normal 2 - ENGINES ILS – APPROACH

Normal - ILS – APPROACH (After cruise flight)

Before starting descent:

(A-B-C check: ATIS-BRIEFING-CHECKLIST):

- check weather (ATIS or ATC)
- calculate point of descent (normally ROD 500 -1000 ft/min)
- check landing data ($V_{REF,}$ $V_{TGT,}$ RWY length)
- complete NAV setting and approach briefing
- inform ATC and request descent
- perform approach items
- passing transition level read approach checklist

APPROACH CHECKLIST			
ATIS		RECEIVED	B
Approach Briefing		COMPLETED	B
Gyro		CKD	PF
Landing Light		ON	PF
Fuel Pumps	R/L	ON	PF
Fuel Selectors		RH/LH ON	PF
Carb. Heat		AS REQ	PF
Altimeters		____ / ____	B
Approach Checklist Completed			

APPROACH

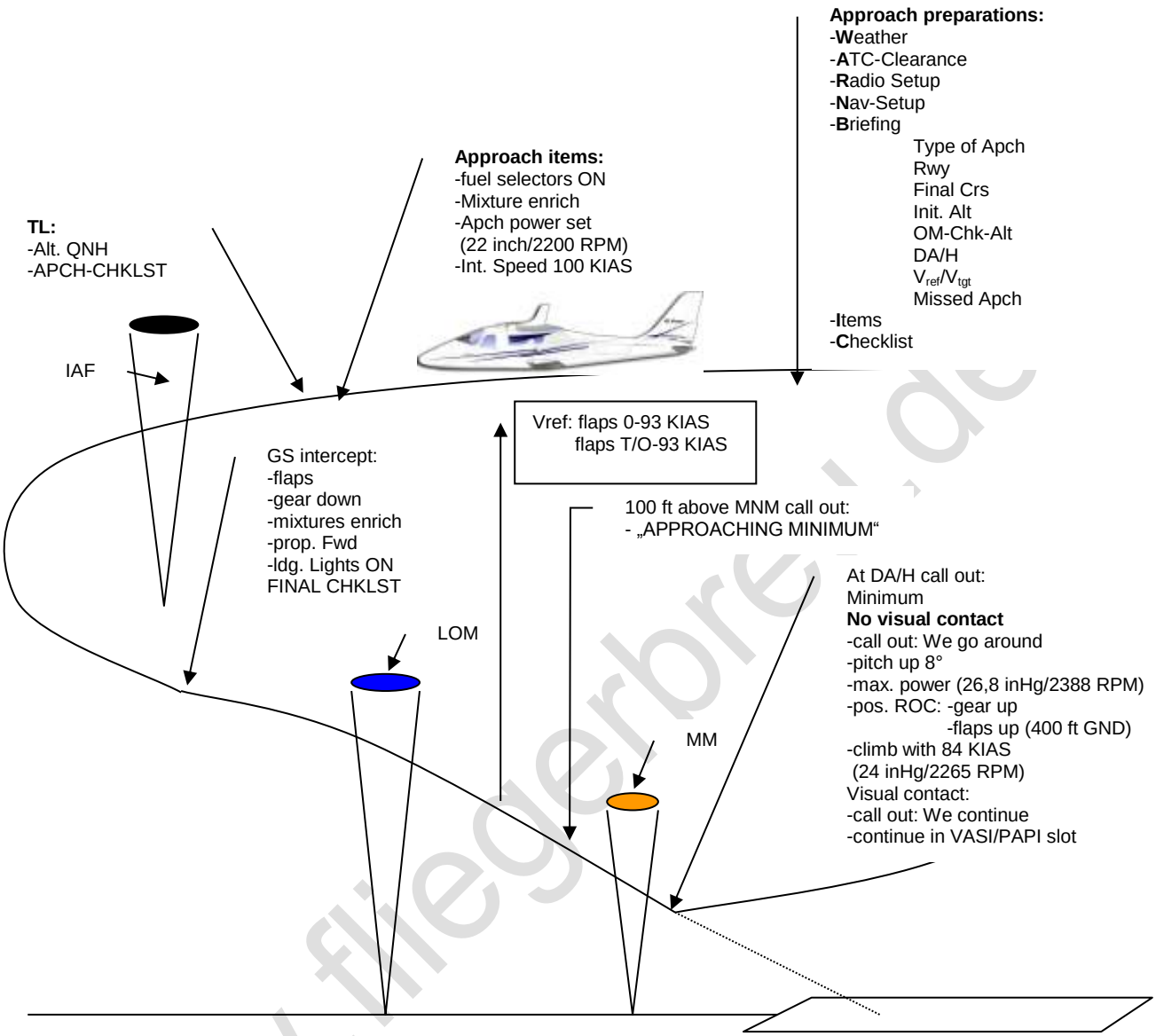
- reduce speed 100 kts / 2200 RPM
- when approaching half deflection of GS :
  - carburetor heat ON
  - reduce to 22” /2200 RPM
  - flaps T/O
  - gear down
  - maintain 90 kts to the descent point
- at GS intercept:
  - power 18” / 2000 RPM
  - prop. forward
  - landing light ON upon reception of clearance for landing, low approach or touch and go
- check OM /4 Miles final-altitude
- latest passing OM or 1000 above GND:
- gear down
- reduce to V_{TGT} = V_{REF}+ ½ Wind + full gusts (min 5 kts – max. 15 kts)
- final checklist (complete before 1000 ft AGL)

FINAL CHECKLIST		
Gear	DOWN, 3 GREEN	B
Props	FWD	PF
Flaps	FULL	PF
Landing light	ON	PF
Final Checklist Completed		

- incapacitation check: 500 ft AGL SP callout: “500”
- 100 ft to DA call out: "approaching minimum"
- at DA call "minimum", reduce speed to V_{REF} + gusts and check again gear down and properly locked (green light)
- in case of no visual contact or no landing clearance at DA:

GO-AROUND

- adjust pitch to ca. 6°-8° nose-up attitude
- apply full power simultaneously (carb. heat OFF)
- flaps T/O
- positive ROC: gear up
- at acceleration altitude 400 ft AGL:
  - pitch 5°
  - flaps retract
  - set climb power – 26" MAP / 2388 RPM (Time max. 5 min)
  - landing light OFF
  - after that he increases speed to 90 KIAS and
  - call ATC



39. ENGINE FAILURE DURING T/O RUN

If an engine should fail during the take-off roll before becoming airborne, it is advisable to close both throttles immediately and bring the aircraft to a stop. The same procedure is recommended if after becoming airborne an engine should fail prior to having reached the single-engine best rate-of-climb speed (V_{YSE}). An immediate landing is usually inevitable because of the altitude loss required to increase the speed to V_{YSE}.

The pilot must have determined before take-off what altitude; airspeed and aircraft configuration must exist to permit the flight to continue in event of an engine failure. He also should be ready to accept the fact that if engine failure occurs before these required factors are established, both throttles must be closed and the situation treated the same as engine failure on a single-engine airplane.

If it has been predetermined that the engine-out rate of climb under existing circumstances will be at least 50 fpm at 1000ft AGL, and that at least the engine-out best angle-of-climb speed (V_{XSE}) has been attained, the pilot may decide to continue the take-off.
If the airspeed is below V_{XSE} and the gear has not been retracted, the take-off should be abandoned immediately.
If the V_{XSE} has been obtained and the gear is in the retract cycle, the pilot should climb with V_{XSE} to clear any obstructions, and thereafter stabilize the airspeed at the engine-out best rate- of-climb (V_{YSE}) while retracting gear and flaps and resetting all appropriate systems.

When the decision is made to continue flight, the single-engine best rate-of-climb speed should be attained and maintained. Even if altitude cannot be maintained, it is best to continue to hold that speed because it would result in the slowest rate of descent and provide the most time for executing the emergency landing. After the decision is made to continue flight and a positive rate of climb is attained, the landing gear should be retracted as soon as practical.
If the airplane is just barely able to maintain altitude and airspeed, a turn requiring a bank greater than approximately 15° should not be attempted. When such a turn is made under these conditions, both lift and airspeed will decrease. Consequently, it is advisable to continue straight ahead whenever possible, until reaching a safe manoeuvring altitude. At that time a steeper bank may be made safely - and in either direction. There is nothing wrong with banking toward a "dead" engine if a safe speed and zero sideslip are maintained.

When an engine fails after becoming airborne, the pilot should hold heading with rudder and simultaneously roll into a bank of about 5° toward the operating engine. In this attitude the airplane will tend to turn toward the operating engine, but at the same time, the asymmetrical power resulting from the engine failure will tend to turn the airplane toward the "dead" engine. The result is a partial balance of those tendencies and provides for an increase in airplane performance as well as easier directional control.

The best way to identify the inoperative engine is to note the direction of yaw and the rudder pressure required to maintain heading. To counteract the asymmetrical thrust, extra rudder pressure will have to be exerted on the operating engine side. To aid in identifying the failed engine, some pilots use the expression "dead foot - dead engine". Never rely on tachometer or manifold pressure readings to determine which engine has failed. After power has been lost on an engine, the tachometer will often indicate the correct r.p.m. and the manifold pressure gauge will indicate the approximate atmospheric pressure or above.
(according AC 61-21A of the FAA)

ENGINE FAILURE ON GROUND

If the engine failure occurs on ground the take-off has to be aborted. The SP's actions have to be carried out according to the take-off and emergency briefing:

1. (PF calls) "STOP"
2. Brakes
3. Throttles close

It is to be considered, that all three actions need to be carried out at the same time when the engine failure is noticed.

40. ONE – ENGINE ILS – APPROACH

The general procedure listed below is not intended to replace or conflict with any procedure established by the manufacturer of the airplane. It can be used effectively for general training purposes and to emphasize the importance of v_{YSE}. It should be noted that this procedure is concerned with an engine failure on a take-off where obstacle clearance is not critical.

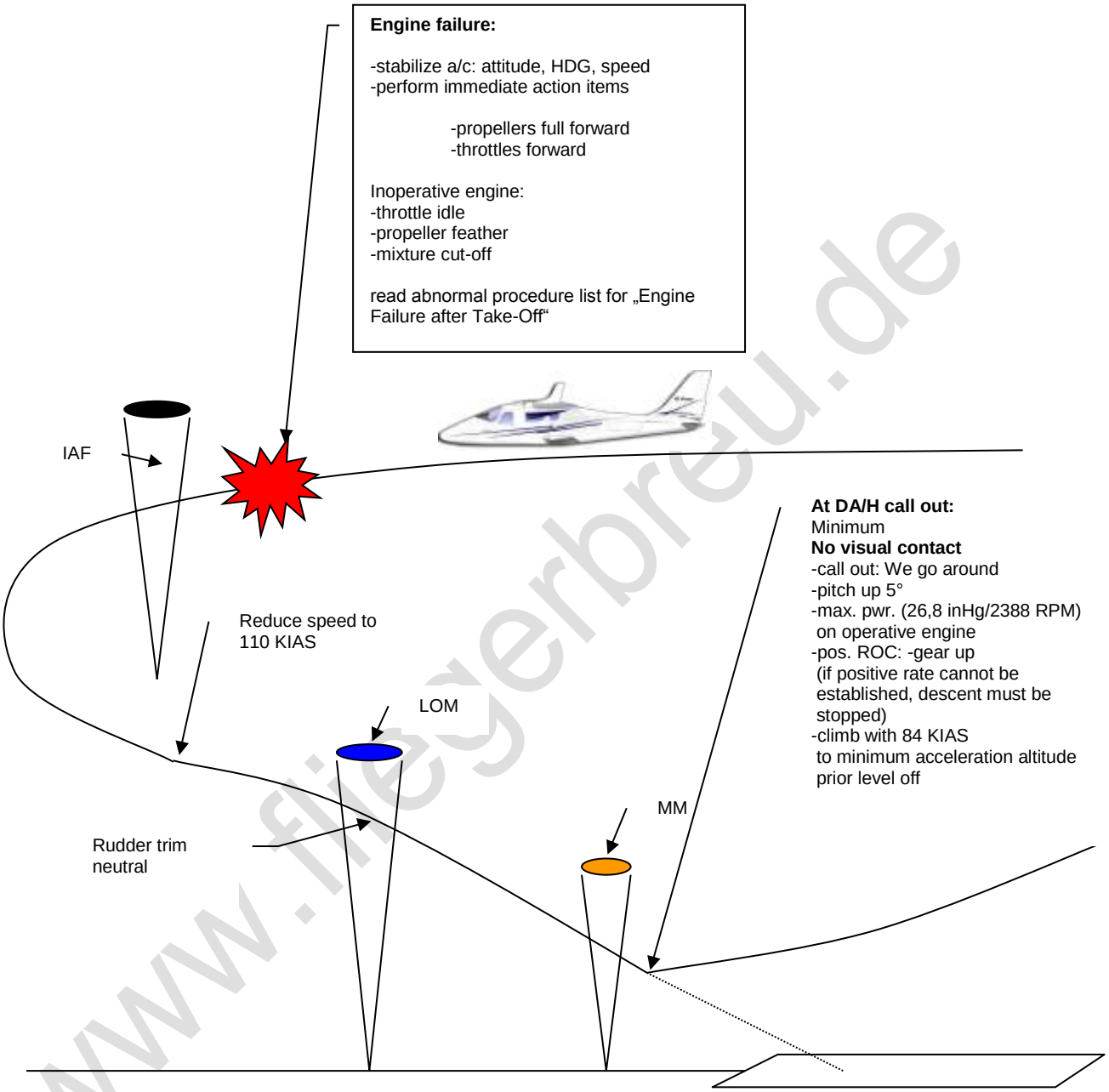
If the engine failure occurs after take-off (in training >500ft AGL), the SP's actions have to be carried out according to the take-off and emergency briefing:

1. Max. power (mixtures, prop levers and throttles forward)
2. Check gear and flaps up
3. Adjust pitch to maintain v_{YSE} (blue line)
4. Identify dead engine

In the *Multi Crew Concept:*

The PF will pay fullest attention to controlling the a/c and orders the PNF:	"Identify the failure"
The PNF analyses the failure (on instruments) and reports his findings to the PF (i.e.):	"Engine failure No. 1"
The PF checks the failure and gives the command (i.e.):	"Engine failure - start procedure."

The PNF (FI) carries out the memory items. The irreversible memory items have to be acknowledged by the PF first.



41. NON – PRECISION APPROACH

Before starting descent:

(A-B-C check: ATIS-BRIEFING-CHECKLIST):

- check weather (ATIS or ATC)
- calculate point of descent (normally ROD 500 -1000 ft/min)
- check landing data ($V_{REF,}$ $V_{TGT,}$ RWY length)
- complete NAV setting and approach briefing
- inform ATC and request descent
- perform approach items
- passing transition level read approach checklist

APPROACH CHECKLIST			
ATIS		RECEIVED	B
Approach Briefing		COMPLETED	B
Gyro		CKD	PF
Landing Light		ON	PF
Fuel Pumps	R/L	ON	PF
Fuel Selectors		RH/LH ON	PF
Carb. Heat		AS REQ	PF
Altimeters		____ / ____	B
Approach Checklist Completed			

APPROACH

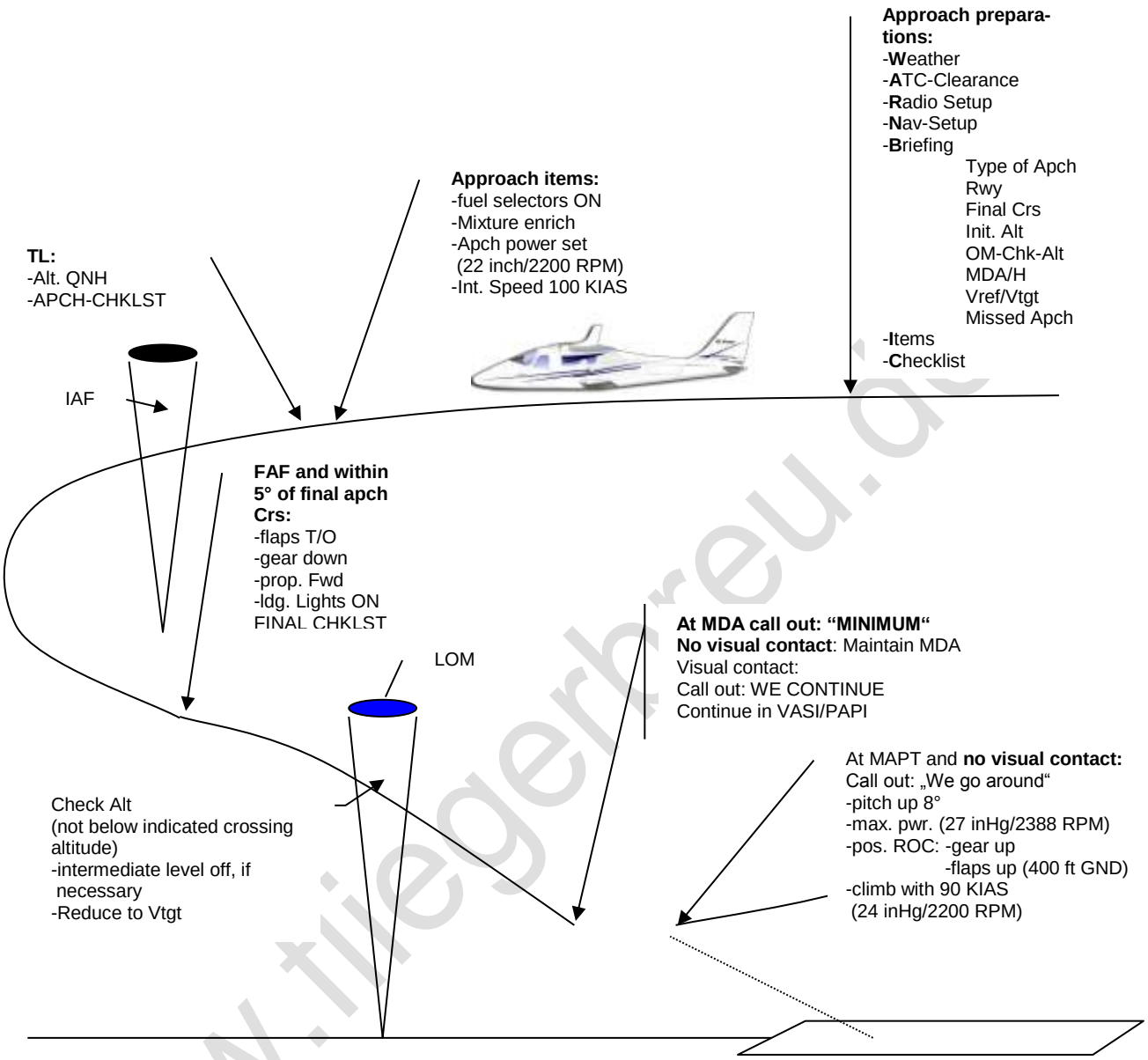
- reduce speed 100 kts / ca.22" MAP
- check gyro slaved respectively set to aircraft heading
- when approaching one mile prior FAF:
  - carburetor heat ON
  - reduce to 20” /2200 RPM
  - flaps T/O
  - gear down
  - maintain 90 kts to the descent point
- at FAF:
  - power 18”
  - prop. forward
  - flaps LDG
  - landing light ON upon reception of clearance for landing, low approach or touch and go
- final checklist (complete before 1000 ft AGL)

- check OM (beacon or final)-altitude
- latest passing OM or 1000 above GND:

- reduce to V_{TGT} = V_{REF}+ ½ Wind + full gusts (min 5 kts – max. 15 kts)
- 100 ft to MDA call out: "approaching minimum"
- at MDA call "minimum", reduce speed to V_{REF} + gusts and check again gear down and properly locked (green light)
- in case of no visual contact or no landing clearance at MDA:

GO-AROUND

- adjust pitch to ca. 6°-8° nose-up attitude
- apply full power simultaneously (carb. heat OFF)
- flaps T/O
- positive ROC: gear up
- at acceleration altitude 400 ft AGL:
    - pitch 5°
    - flaps retract
    - set climb power – 26" MAP / 2388 RPM (Time max. 5 Min.)
    - landing light OFF
    - after that he increases speed to 90 KIAS and
    - call ATC



42. Briefings

T/O + Departure Briefing

Rwy, Rwy length
Type of T/O, Flap setting
v_{LOF} 64 kts, v_{CLIMB} 90 kts
Initial Altitude, First heading change
NAV-Setting

Holding Briefing

MHA ……
Type of Entry ……..
Outbound heading ……
Outbound time ……..

Emergency Briefing

1. In case of any malfunction before v_{LOF}, 75 kts, close throttle, apply brakes, maintain centerline.

2. In case of engine failure after v_{LOF} and sufficient runway, lower the nose to maintain blue line speed 88 kts, close throttle, check gear down and locked and land straight ahead.

3. In case of engine failure after v_{LOF} and no sufficient runway, lower the nose to maintain blue line speed 88 kts, maintain heading.
   Power, Prop and Mixture forward.
   Detect dead engine. Dead engine
   Power off, Prop. feather and Mixture cut-off.
   Request emergency checklist.
   Inform ATC.

Approach Briefings

Approach Briefing ILS
1) _____ Appr. RWY _____
2) NAV Aids set
3) MSA
4) Initial-, Interm.-Appr.-Altitude
5) Final Track
6) Descent Point
7) OM Check Altitude
8) DA
9) Missed Approach Procedure

Approach Briefing NDB
1) _____ Appr. RWY _____
2) NAV Aids set
3) MSA
4) Initial-, Interm.-Appr.-Altitude
5) Final Track
6) Descent Point
7) Beacon Check Altitude
8) MDA/MAP
9) Missed Approach Procedure

Take-Off Call-Outs

Required power	O.K.
Engine Instruments	normal
Air Speed	rising

43. Aircraft Briefing - Summary

Speeds and Configuration on Final

	Prec. And Non Prec. Normal Approach	**Prec. And Non Prec. High Speed / Low Noise**
Descent Point → OM, 4 DME, NDB, …	Flaps T/O Gear down 93 kts	Clean 120 kts
Stabilized Final last 1000 ft GPD	Flaps FULL Gear down V_{TGT}	Flaps FULL Gear down V_{TGT}

Overhead OM/Beacon

OM/Beacon Check Altitude ……

100 ft before DA / MDA

Approaching Minimum!

Faustformeln:

$$WCA = \frac{WS \times (Faktor\ 1\text{-}6)}{TAS/10}$$

ROD [ft/min] = GS [kts] x 5

Faustformeln für Holding:

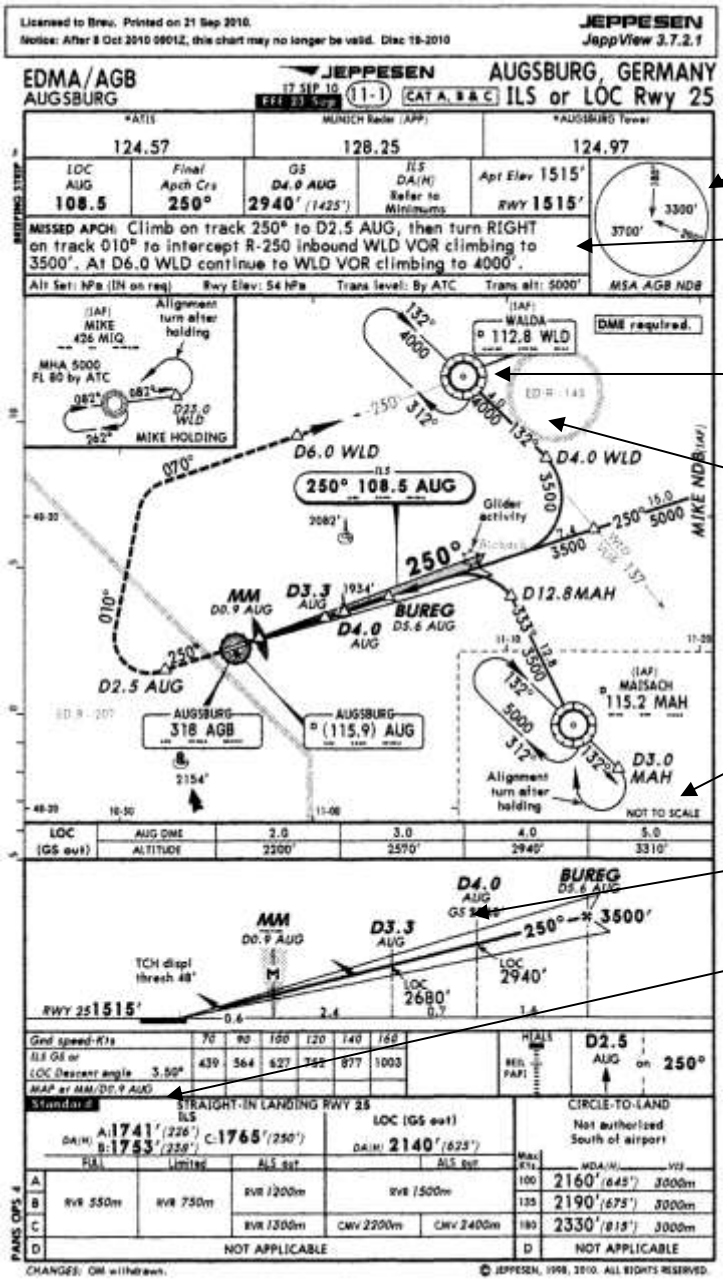
Bodenwind: Richtung / Geschwindigkeit
Höhenwind: +30° / x 2

Inbound-Leg = 1 x WCA vorhalten
Diagonal-Leg = 2 x WCA vorhalten
Outbound-Leg = 3 x WCA vorhalten

0° - 30° = v in kts → t in sec.

30° - 60° = v/2 in kts → t in sec.

60° - 90° = nach Bedarf



"Standard ILS 25 at EDMA Effective 17 Sept 2010

MSA for Approach and Missed Approach 3700'

Missed Approach: Turn Right as soon as Practicable to CEL NDB (set on ADF), climb 3000'

Initial Fix Celle NDB (set on ADF) at 3000' depart CEL on QDR 206

At 4 DME (set NAV #2 and DME) right turn to ILS (set NAV #1)

Final Course 250

Final Approach Point 5.6 DME AUG (presel. NAV #2) at 3500'

Check altitude 2940' (4.0 DME)

DA 1741 ft

Approach speed 90 kts, Target speed 86 kts"

44. Normal Checklist

COCKPIT CHECKLIST		
Preflight Inspection	COMPLETED	B
Seat Belts	FASTEND	ALL
Circuit Breakers	CKD	
Avionics	OFF	1
Alternate Static Source	CLOSED	1
Parking Brake	SET	1
Flight Controls	CKD	1
Trim	SET FOR T/O	1
Carburetor heat	OFF	1
Flaps	CKD	B
Gear Lever	DOWN	B
Fire Detectors	TEST	1
Cockpit Checklist Completed		

BEFORE START CHECKLIST		
Master switch	ON	1
Gear Indication	3 GREEN	B
Fuel Quantity	CKD	1
Fuel Selectors	ON L/R	1
Anti Coll./Strobe light	ON	1
Props	FULL FWD	1
Before Start Checklist Completed		

STARTING ENGINE LIST 1+2			
Throttle	R/L	IDLE	1
Props	R/L	FWD	1
Chokes	R/L	ON/-/-	1
Fuel Pump	R/L	ON	1
Prop Area	R/L	CLEAR	B
Ignition Switches	R/L	BOTH ON	1
Starter	R/L	ON	1
Field	R/L	ON	1
Oil Pressure	R/L	CKD	1
Throttle	R/L	1200RPM	1
Choke	R/L	OFF	1
Avionics	R/L	ON	1
Cross bus	R/L	ON	1
Ammeter/Voltm.	R/L	CKD	1
Suctions		IN LIMITS	1
Repeat for opposite engine			
Starting Engine List Completed			

AFTER START CHECKLIST		
Radio & Nav setting	SET	1
Annunciatorpanel	CLEAR	1
PFD	ALLIGNED	1
Altimeters	SET … + X-CKD	1
Gyro	PRE-SELECTED	1
After Start Checklist Completed		

TAXI CHECKLIST		
Brakes	CKD	B
Flight Instruments	CKD	1
Flight controls	CKD	1
X-Feed	CKD	1
Taxi Checklist Completed		

ENGINE RUN UP LIST			
Brakes		APPLY	1
Engine Instruments	OIL 50°	IN LIMITS	1
Throttles		1650 RPM	1
Prop. Lever	No feather	CKD	1
Carb. Heat		CHK	1
Ignition switches	R/L	CKD	1
Carb. Heat		CKD	1
Throttles		IDLE	1
RPM & Oil Pressure		IN LIMITS	1
Throttles		1200 RPM	1
Engine Run Up List Completed			

T/O Briefing:	Runway, RWY-Length
	Type of T/O
	Flap Setting
	$v_{LOF\ 65Kt}$, $v_{CLIMB\ 80\ kt}$
	1. ALT, 1. HDG change

BEFORE T/O CHECKLIST		
Autopilot (not eng.)		
Doors / Windows	CLOSED / LATCHED	1
T/O & Emer. Briefing	COMPLETED	B
Ignition switches	BOTH ON	1
Flaps	T/O -/-	1
Trims	SET FOR T/O	1
Fuel Pumps & Press.	ON / CKD	1
Fuel selectors	RH/LH ON	1
Before T/O Checklist Completed		

CLEARED FOR T/O CHECKLIST		
Transponder	ON & ALT	1
Landing Light	ON	1
Pitot Heat	AS REQ	1
Gyro	CKD	1
Cleared For T/O Checklist Completed		

AFTER T/O CHECKLIST			
Gear		UP	PF
Flaps		UP	PF
Landing Light		OFF	PF
Fuel Pumps	R/L	OFF	PF
Landing light		OFF	PF
Altimeters		____ / ____	B
After T/O Checklist Completed			

AFTER LANDING CHECKLIST		
Transponder	STAND BY	1
Pitot Heat	OFF	1
Landing Light	AS REQ	1
Fuel Pumps	OFF	1
Carburetor heat	OFF	1
Flaps	UP	1
Engine cooling	1 MIN	1
After Landing Checklist Completed		

APPROACH CHECKLIST			
ATIS		RECEIVED	B
Approach Briefing		COMPLETED	B
Gyro		CKD	PF
Landing Light		ON	PF
Fuel Pumps	R/L	ON	PF
Fuel Selectors		RH/LH ON	PF
Carb. Heat		AS REQ	PF
Altimeters		____ / ____	B
Approach Checklist Completed			

PARKING LIST			
Throttle		1200 RPM	1
Avionic bus	RH/LH	OFF	1
Mixture		CUT OFF	1
Cross buss	RH/LH	OFF	1
Trim		Neutral	1
All Light Switches		OFF	1
Ignition (btn pwr idle)		One at time OFF	1
Field	RH/LH	OFF	1
Master switch		OFF	1
Fuel selector		OFF	1
Parking List Completed			

FINAL CHECKLIST		
Gear	DOWN, 3 GREEN	B
Props	FWD	PF
Flaps	FULL	PF
Landing light	ON	PF
Final Checklist Completed		

Speeds:

v_Y		84 KIAS
v_X		82 KIAS
v_{YSE} (Blue Line Speed)		84 KIAS
v_{REF}	Flaps 0°	86 KIAS
	Flaps T/O	86 KIAS
	Flaps FULL	70 KIAS

Abbreviations:

1	=	CM1
2	=	CM2
B	=	BOTH
PF	=	PILOT FLYING

45. Call outs

CREW COORDINATION AND STANDARD CALL OUTS DURING TAKE OFF		
Condition	**PF**	**PNF**
Line Up Position	announces: **"Take Off"** and advances Throttles to Take Off power	
		checks engine instruments and calls: **"Take off Power Set"**
60 KIAS		calls: **"60"**
	acknowledges: **"Checked"**	
at v_R (64 KIAS)		calls: **"v_R"**
	rotates to proper Attitude (pitch ca. 8°) with both hands on Controls	
at positive rate of climb (on altimeter **and** VSI)	commands: **"Gear Up"**	
		acknowledges: **"Gear Up"** positions gear lever up and reports: **"Gear Up No Lights"**
400 ft AGL	sets climb power	
		Contacts ATC
passing transition altitude or first level off, whatever is earlier	announces: **"Altimeters Standard"** sets 1013 and requests: **"After Take Off Checklist"**	
		sets 1013 and reads After Take Off Checklist

CREW COORDINATION DURING PRECISION APPROACHES		
Condition	**PF**	**PNF**
Localizer motion		calls: **"Localizer alive"**
	acknowledges: **"Checked"**	
Glide slope motion		calls: **"Glide slope alive"**
	acknowledges: **"Checked"**	
Localizer capture		calls: **"Localizer capture"**
	acknowledges: **"Final RWY-HDG set"**	
Glide slope capture		calls: **"Gide slope capture"**
	acknowledges: **"Checked"**	
passing OM (or any Check-Altitude on final)		calls: **"OM Alt. checked"**
passing OM (or any Check-Altitude on final) with deviations more than 100 ft		calls: **"passing OM, … ft high/low"**
	acknowledges: **"Checked"** Corrects rate of descent	
at 500 ft AGL (Elev. + 500 ft)		calls: **"Five Hundred"**
	acknowledges: **"Checked"**	
at 100 ft BARO above Minimum		calls: **"Approaching Minimum"**
	acknowledges: **"Checked"** positions Prop Full forward	
at Minimum		calls: **"Minimum, RWY …"** (i.e. straight ahead)
	calls: **"Continue"** continues visually according VASIS / PAPI	
		or **"Minimum No Contact"**
	calls: **"Go Around"** and starts Go Around Procedure	

CREW COORDINATION DURING NON-PRECISION APPROACHES		
Condition	**PF**	**PNF**
All recommended Altitudes at DME-readings		announces: **“Approaching … DME, Altitude should be … ft”**
	acknowledges: **“ … ft at … DME”**	
any deviation more than 100 ft		announces: **“ … DME now, … ft high/low”**
	acknowledges: **“Checked”** corrects rate of descent	
all Check Altitudes at DME-readings		announces: **“Check altitude, at … DME … ft”**
	acknowledges: **“ … ft at … DME”**	
passing Locator (or any Check-Altitude on final)		calls: **“Passing Locator, altitude checked”**
passing Locator (or any Check-Altitude on final) with deviations more than 100 ft		calls: **“Passing Locator, … ft high/low”**
	acknowledges: **“Checked”** corrects rate of descent	
at 100 ft BARO above Minimum		calls: **“Approaching Minimum”**
	acknowledges: **“Checked”** positions Prop Full forward	
at Minimum (MDA at DTL)		calls: **“Minimum, RWY …”** (i.e. straight ahead)
	calls: **“Continue”** continues visually according VASIS / PAPI	
		or **“Minimum No Contact”**
	calls: **“Go Around”** and starts Go Around Procedure	

CREW COORDINATION DURING TOUCH AND GO		
Condition	**PF**	**PNF**
on ground	commands: **"Flaps up, Retrim, Carburetor Heat Off"**	
		positions Flaps to Up-Position, retrim, switches Carburetor Heat to Off-Position and reports: **"Flaps are Up, Trim set, Carburetor Heat Off"**
	announces: **"Take Off"** and advances throttles to Take Off power	
		checks engine instruments and calls: **"Take off Power Set"**
at v_R (64 KIAS)		calls: **"v_R"**
	rotates to proper attitude (pitch ca. 8°) with both hands on controls	
at positive rate of climb (on altimeter **and** VSI)	commands: **"Gear Up"**	
		acknowledges: **"Gear Up"** positions gear lever up and reports: **"Gear Up No Lights"**
400 ft AGL	sets climb power	
		contacts ATC

CREW COORDINATION DURING GO AROUND		
Condition	**PF**	**PNF**
Go Around	announces: **"Go Around, Max. Power"** simultaneously advances Throttles, switches Carburetor Heat Off and rotates to Go Around Attitude (pitch ca. 8°)	
		checks engine instruments (Man. Press., RPM)
	commands: **"Flaps 10"**	
		positions Flaps into position 10° and reports: **"Flaps 10 Set"**
at positive rate of climb (on altimeter **and** VSI)	commands: **"Gear Up"**	
		acknowledges: **"Gear Up"** positions gear lever up and reports: **"Gear Up No Lights"**
IAS > 88 KIAS	commands: **"Flaps Up"**	
		positions Flaps into Up-Position and reports: **"Flaps are Up"**
400 ft AGL	sets climb power	
		contacts ATC

CREW COORDINATION DURING ENGINE FAILURE		
Condition	**PF**	**PNF**
Engine Failure		calls: **“Engine Failure No. 1”**
	checks the failure and commands: **“Engine Failure – start procedure”**	
		touches Throttle No. 1 and announces: **“Throttle No. 1”**
	acknowledges: **“Confirmed”**	
		closes Throttle and reports: **“Closed”**
		touches Prop Lever No. 1 and announces: **“Prop Lever No. 1”**
	acknowledges: **“Confirmed”**	
		feathers Prop No. 1 and reports: **“Feather”**
		touches Mixture No. 1 and announces: **“Mixture No. 1”**
	acknowledges: **“Confirmed”**	
		closes Mixture No. 1 and reports: **“Idle Cut Off”**
		reports after completion: **“Memory items completed”**

Engine Failure bei Multi Crew Concept

Der PNF führt die Memory Items aus dem Gedächtnis aus. Jedes einzelne Item muss vom PF visuell überprüft und verbal genehmigt (“confirmed”) werden.
Der PNF muss hierzu eindeutig auf den entsprechenden Hebel oder Schalter zeigen.
Nachdem der PF die Handlung “confirmed” hat, führt sie der PNF durch.
Danach fordert der PF die Emergency Checklist “Engine Failure Checklist”. Memory Items werden überprüft und Non-Memory Items nach dem Read-and-do Verfahren durchgeführt.

Engine Failure bei Single Pilot Concept

Der SP stellt den Engine Failure fest und führt die Memory Items durch. Der FI überprüft und “confirmed” hier jeden einzelnen Item.
Auch die Non-Memory Items des Multi Crew Concepts werden beim Single Pilot Concept aus dem Gedächtnis abgearbeitet. Danach liest der SP die Engine Failure Checklist laut vor.