

5. PERFORMANCE

**SECTION 5****5. PERFORMANCE**

5.1	Introduction.....	5-3
5.2	Performance data	5-4
5.2.1	Airspeed indicator system calibration.....	5-4
5.2.2	Stall speeds	5-5
5.2.3	Take-off distance	5-6
5.2.4	Landing distance.....	5-7
5.2.5	Climb performance.....	5-8
5.3	Additional information.....	5-10
5.3.1	Cruise	5-10
5.3.2	Horizontal speeds	5-11
5.3.3	Endurance	5-13
5.3.4	Balked landing climb	5-14
5.3.5	Effect on flight performance and characteristics.....	5-17
5.3.6	Demonstrated crosswind performance	5-17
5.3.7	Ceiling	5-18
5.3.8	Noise data	5-18



Intentionally left blank

**AIRCRAFT OPERATING INSTRUCTIONS**Doc. No. HARMAOIUS

5.1 Introduction

Section 5 provides data for airspeed calibration, stall speeds, take-off performance and additional information, provided by the airplane manufacturer.

The stated performance data has been computed from actual flight tests with the airplane and engine in good condition and using average piloting techniques.

CAUTION

THE PERFORMANCE STATED IN THIS SECTION IS VALID FOR STANDARD POWERPLANT - ROTAX 912 ULS (100 HP) TOGETHER WITH WOODCOMP KLASSIC 170/3/R PROPELLER INSTALLED IN THE AIRPLANE.

FOR ACTUAL PERFORMANCE SEE SECTION 9 - SUPPLEMENTS.



5.2 Performance data

5.2.1 Airspeed indicator system calibration

NOTE

Assumed zero instrumentation error. Valid for airplane take-off weight 1320 lbs (600 kg) and with vortex generators along the whole span of the wing.

MTOW 1320 lb VG's	Flaps Retracted	Flaps Takeoff	Flaps Landing II
KIAS	KCAS	KCAS	KCAS
33		44	40
34	45	45	42
35	46	45	43
40	50	49	48
45	54	52	52
50	58	56	57
55	62	60	61
60	66	64	64
65	70	68	68
70	74	73	71
75	78		
80	82		
85	86		
90	90		
95	95		
100	99		
105	103		
110	107		
115	112		
120	116		
125	120		
130	125		
135	129		
140	134		
145	138		
150	143		

**AIRCRAFT OPERATING INSTRUCTIONS**

Doc. No. HARMAOIUS

5.2.2 Stall speeds**Conditions:**

- wing level stall - engine at idle power
- turning flight stall - engine at 75% max. continuous power
- airplane weight: 1320 lbs (600 kg)
- Vortex generators along the whole span of the wing

NOTE

The stated stall speeds are valid for all flight altitudes. Altitude losses shown in the table present max. values determined on the basis of flight tests using average piloting technique.

600 kg 1320 lbs	Flaps position	Stall speed		Altitude loss [ft]
		IAS [km/h]	CAS [km/h]	
Wing level flight	Retracted (0°)	63	83	200
	Take-off (15°)	61	82	
	Landing (50°)	60	75	
Turn flight (coordinated turn 30° bank)	Retracted (0°)	72	91	
	Take-off (15°)	70	88	
	Landing (50°)	70	84	

1320 lbs 600 kg	Flaps position	Stall speed		Altitude loss [ft]
		KIAS	KCAS	
Wing level flight	Retracted (0°)	34	45	200
	Take-off (15°)	33	44	
	Landing (50°)	33	40	
Turn flight (coordinated turn 30° bank)	Retracted (0°)	39	49	
	Take-off (15°)	38	48	
	Landing (50°)	38	45	

1320 lbs 600 kg	Flaps position	Stall speed		Altitude loss [ft]
		IAS (mph)	CAS (mph)	
Wing level flight	Retracted (0°)	39	52	200
	Take-off (15°)	38	51	
	Landing (50°)	38	46	
Turn flight (coordinated turn 30° bank)	Retracted (0°)	45	56	
	Take-off (15°)	44	55	
	Landing (50°)	43	52	



AIRCRAFT OPERATING INSTRUCTIONS

Doc. No. HARMAOIUS

5.2.3 Take-off distance

Conditions:

- engine: max. take-off power
- flaps: Take-off (15°)
- carburetor preheating: OFF
- airplane weight: 1320 lbs
- altitude: 0 ft ISA
- ambient air temperature: ISA

ISA Conditions			CONCRETE		GRASS	
Airport altitude H [ft]	Temperature TH [°C]	Temperature TH [°F]	Takeoff Run [ft]	Distance over 50 ft obstacle [ft]	Takeoff Run [ft]	Distance over 50 ft obstacle [ft]
0 ft ISA	15.0	59	980	1590	800	1700
2000 ft ISA	11.0	52	780	1790	900	1910
4000 ft ISA	7.1	45	870	2020	1010	2160
6000 ft ISA	3.1	38	960	2280	1150	2430
8000 ft ISA	-0.8	30	1120	2570	1320	2750
10000 ft ISA	-4.8	23	1270	2920	1470	3120

ISA + 10 °C			CONCRETE		GRASS	
Airport altitude H [ft]	Temperature TH [°C]	Temperature TH [°F]	Takeoff Run [ft]	Distance over 50 ft obstacle [ft]	Takeoff Run [ft]	Distance over 50 ft obstacle [ft]
0 ft ISA	25.0	77	740	1700	800	1820
2000 ft ISA	21.0	70	830	1920	960	2050
4000 ft ISA	17.1	63	940	2180	1090	2310
6000 ft ISA	13.1	56	1060	2440	1230	2610
8000 ft ISA	9.2	48	1200	2770	1380	2960
10000 ft ISA	5.2	41	1360	3140	1580	3350

ISA + 20 °C			CONCRETE		GRASS	
Airport altitude H [ft]	Temperature TH [°C]	Temperature TH [°F]	Takeoff Run [ft]	Distance over 50 ft obstacle [ft]	Takeoff Run [ft]	Distance over 50 ft obstacle [ft]
0 ft ISA	35.0	95	790	1820	910	1940
2000 ft ISA	31.0	88	890	2050	1030	2190
4000 ft ISA	27.1	81	1000	2310	1160	2470
6000 ft ISA	23.1	74	1140	2620	1320	2800
8000 ft ISA	19.2	66	1290	2970	1490	3170
10000 ft ISA	15.2	59	1460	3370	1690	3600

ISA -10 °C			CONCRETE		GRASS	
Airport altitude H [ft]	Temperature TH [°C]	Temperature TH [°F]	Takeoff Run [ft]	Distance over 50 ft obstacle [ft]	Takeoff Run [ft]	Distance over 50 ft obstacle [ft]
0 ft ISA	5.0	41	940	1480	750	1580
2000 ft ISA	1.0	34	720	1670	840	1780
4000 ft ISA	-2.9	27	810	1870	940	2000
6000 ft ISA	-6.9	20	920	2110	1060	2260
8000 ft ISA	-10.8	12	1040	2390	1200	2550
10000 ft ISA	-14.8	5	1170	2700	1360	2890

ISA -20 °C			CONCRETE		GRASS	
Airport altitude H [ft]	Temperature TH [°C]	Temperature TH [°F]	Takeoff Run [ft]	Distance over 50 ft obstacle [ft]	Takeoff Run [ft]	Distance over 50 ft obstacle [ft]
0 ft ISA	-5.0	23	800	1380	690	1470
2000 ft ISA	-9.0	16	970	1550	780	1650
4000 ft ISA	-12.9	9	750	1740	870	1860
6000 ft ISA	-16.9	2	850	1960	990	2090
8000 ft ISA	-20.8	-6	960	2210	1110	2360
10000 ft ISA	-24.8	-13	1080	2500	1260	2670

Corrections:

- Influence of wind: Add 4% on every 1 kt (1.15 mph) of tail wind
- RWY inclination: Add 8% of the take-off run distance on 1% of runway inclination up the slope



AIRCRAFT OPERATING INSTRUCTIONS

Doc. No. HARMAOIUS

5.2.4 Landing distance

Conditions: - engine: idle
- flaps: Landing II (fully extended)
- carburetor preheating: OFF
- airplane weight: 1320 lbs
- altitude: 0 ft ISA
- ambient air temperature: ISA

ISA Conditions			CONCRETE		GRASS	
Airport altitude H [ft]	Temperature tH [°C]	Temperature tH [°F]	Landing Run [ft]	Distance over 50 ft obstacle [ft]	Landing Run [ft]	Distance over 50 ft obstacle [ft]
0 ft ISA	15.0	59	590	1290	530	1230
2000 ft ISA	11.0	52	630	1370	560	1300
4000 ft ISA	7.1	45	660	1450	600	1390
6000 ft ISA	3.1	38	710	1540	630	1470
8000 ft ISA	-0.8	30	750	1640	670	1570
10000 ft ISA	-4.8	23	800	1750	720	1670

ISA + 10 °C			CONCRETE		GRASS	
Airport altitude H [ft]	Temperature tH [°C]	Temperature tH [°F]	Landing Run [ft]	Distance over 50 ft obstacle [ft]	Landing Run [ft]	Distance over 50 ft obstacle [ft]
0 ft ISA	25.0	77	610	1330	550	1270
2000 ft ISA	21.0	70	650	1420	580	1350
4000 ft ISA	17.1	63	690	1500	620	1430
6000 ft ISA	13.1	56	730	1600	660	1520
8000 ft ISA	9.2	48	780	1700	700	1620
10000 ft ISA	5.2	41	830	1810	740	1730

ISA + 20 °C			CONCRETE		GRASS	
Airport altitude H [ft]	Temperature tH [°C]	Temperature tH [°F]	Landing Run [ft]	Distance over 50 ft obstacle [ft]	Landing Run [ft]	Distance over 50 ft obstacle [ft]
0 ft ISA	35.0	95	630	1380	570	1320
2000 ft ISA	31.0	88	670	1460	600	1400
4000 ft ISA	27.1	81	710	1560	640	1480
6000 ft ISA	23.1	74	760	1660	680	1580
8000 ft ISA	19.2	66	810	1780	720	1680
10000 ft ISA	15.2	59	860	1890	770	1790

ISA -10 °C			CONCRETE		GRASS	
Airport altitude H [ft]	Temperature tH [°C]	Temperature tH [°F]	Landing Run [ft]	Distance over 50 ft obstacle [ft]	Landing Run [ft]	Distance over 50 ft obstacle [ft]
0 ft ISA	5.0	41	570	1250	510	1190
2000 ft ISA	1.0	34	600	1320	540	1260
4000 ft ISA	-2.9	27	640	1400	580	1340
6000 ft ISA	-6.9	20	680	1490	610	1420
8000 ft ISA	-10.8	12	720	1580	650	1510
10000 ft ISA	-14.8	5	770	1680	690	1600

ISA -20 °C			CONCRETE		GRASS	
Airport altitude H [ft]	Temperature tH [°C]	Temperature tH [°F]	Landing Run [ft]	Distance over 50 ft obstacle [ft]	Landing Run [ft]	Distance over 50 ft obstacle [ft]
0 ft ISA	-5.0	23	550	1200	490	1140
2000 ft ISA	-9.0	16	580	1270	520	1210
4000 ft ISA	-12.9	9	620	1360	550	1290
6000 ft ISA	-16.9	2	650	1430	590	1370
8000 ft ISA	-20.8	-6	700	1520	620	1450
10000 ft ISA	-24.8	-13	740	1620	660	1540

Corrections: - Influence of wind: Add 4.5 % on every 1 kt
(1.15 mph) of tail wind
- RWY inclination: Add 8% of the landing run
distance on 1% of runway
inclination down the slope



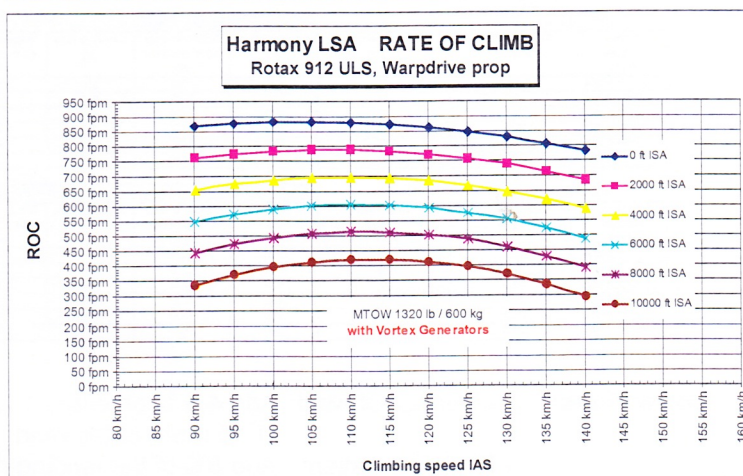
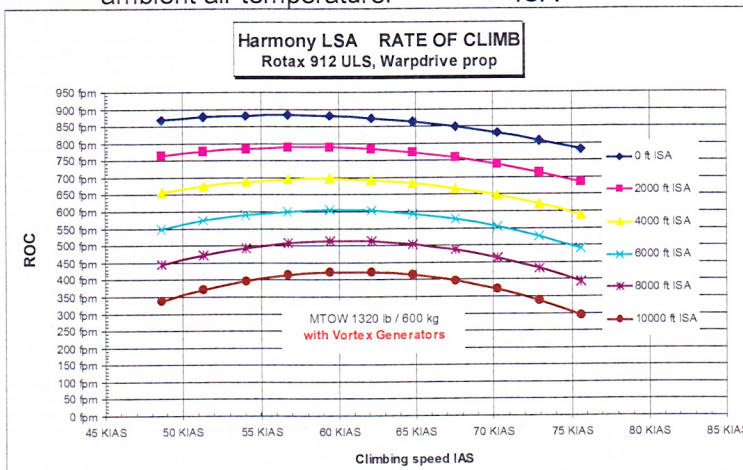
AIRCRAFT OPERATING INSTRUCTIONS

Doc. No. HARMAOIUS

5.2.5 Climb performance

Conditions:

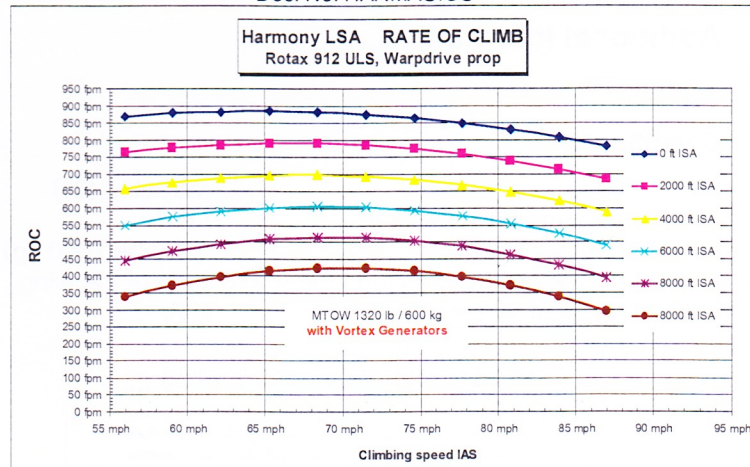
- engine: maximum take-off power
- flaps: retracted (0°)
- carburetor preheating: OFF
- airplane weight: 1320 lbs
- vortex generators along the whole span of the wing
- ambient air temperature: ISA





AIRCRAFT OPERATING INSTRUCTIONS

Doc. No. HARMAOIUS



Best rate of climb: 60 KIAS, 110 km/h, 70 mph

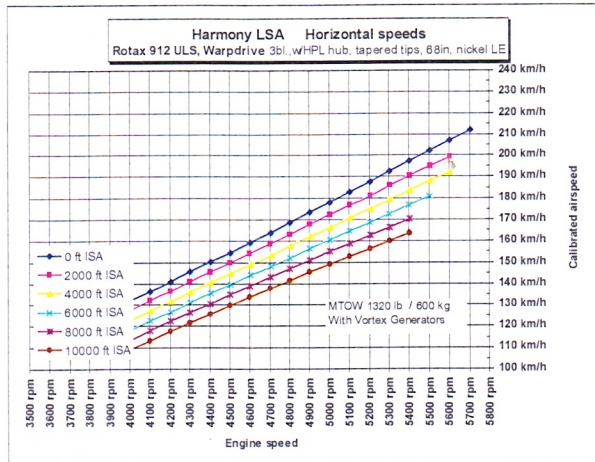
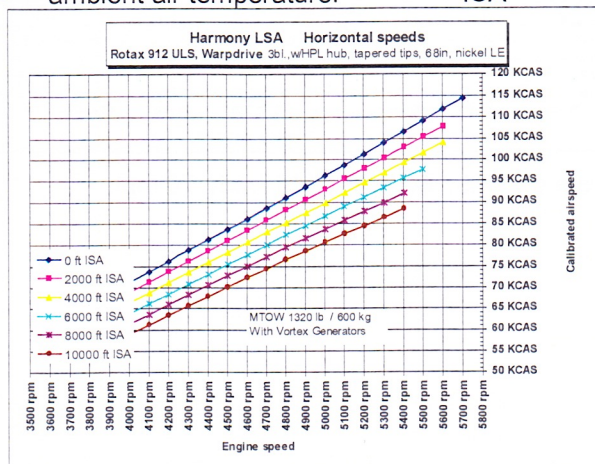


5.3 Additional information

5.3.1 Cruise

Conditions:

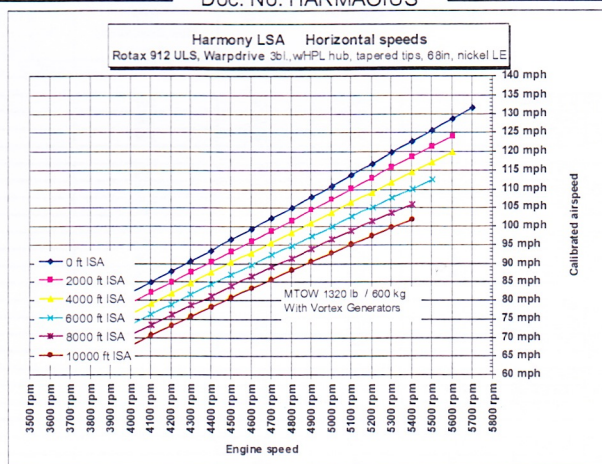
- flaps: retracted (0°)
- carburetor preheating: OFF
- airplane weight: 1320 lbs (600 kg)
- vortex generators along the whole span of the wing
- ambient air temperature: ISA





AIRCRAFT OPERATING INSTRUCTIONS

Doc. No. HARMAOIUS



5.3.2 Horizontal speeds

		55%MCP	65%MCP	78%MCP	MCP Max. Continuous Power	MT/OP Max. Takeoff Power
		4300 rpm	4800 rpm	5000 rpm	5500 rpm	5800 rpm (5 min)
0 ft ISA	KIAS	76	91	97	112	
	KCAS	79	91	96	109	
	KTAS	79	91	96	109	
2000 ft ISA	KIAS	73	87	93	108	
	KCAS	76	88	93	105	
	KTAS	78	91	96	108	
4000 ft ISA	KIAS	70	84	89	103	
	KCAS	74	85	90	102	
	KTAS	78	90	95	108	
6000 ft ISA	KIAS	66	80	86	99	
	KCAS	71	82	87	98	
	KTAS	78	90	95	107	
8000 ft ISA	KIAS	63	77	82		
	KCAS	68	79	84		
	KTAS	77	90	94		
10000 ft ISA	KIAS	60	73	78		
	KCAS	66	76	81		
	KTAS	77	89	94		



AIRCRAFT OPERATING INSTRUCTIONS

Doc. No. HARMAQIUS

		55%MCP	65%MCP	78%MCP	MCP Max. Continuous Power	MT/OP Max. Takeoff Power
		4300 rpm	4800 rpm	5000 rpm	5500 rpm	5800 rpm (5 min)
0 ft ISA	IAS km/h	141	168	179	207	
	CAS km/h	146	169	178	202	
	TAS km/h	146	169	178	202	
2000 ft ISA	IAS km/h	135	162	173	199	
	CAS km/h	141	163	172	196	
	TAS km/h	145	168	178	201	
4000 ft ISA	IAS km/h	129	155	166	191	
	CAS km/h	136	158	167	188	
	TAS km/h	144	168	177	200	
6000 ft ISA	IAS km/h	123	149	159	183	
	CAS km/h	131	152	161	181	
	TAS km/h	144	167	176	198	
8000 ft ISA	IAS km/h	117	142	152		
	CAS km/h	127	147	155		
	TAS km/h	143	166	175		
10000 ft ISA	IAS km/h	111	136	145		
	CAS km/h	122	142	149		
	TAS km/h	142	165	174		
		55%MCP	65%MCP	78%MCP	MCP Max. Continuous Power	MT/OP Max. Takeoff Power
		4300 rpm	4800 rpm	5000 rpm	5500 rpm	5800 rpm (5 min)
0 ft ISA	IAS (mph)	87	105	112	129	
	CAS (mph)	91	105	111	126	
	TAS (mph)	91	105	111	126	
2000 ft ISA	IAS (mph)	84	101	107	124	
	CAS (mph)	88	101	107	121	
	TAS (mph)	90	105	110	125	
4000 ft ISA	IAS (mph)	80	97	103	119	
	CAS (mph)	85	98	103	117	
	TAS (mph)	90	104	110	124	
6000 ft ISA	IAS (mph)	76	92	99	114	
	CAS (mph)	82	95	100	112	
	TAS (mph)	89	104	109	123	
8000 ft ISA	IAS (mph)	73	88	94		
	CAS (mph)	79	91	96		
	TAS (mph)	89	103	109		
10000 ft ISA	IAS (mph)	69	84	90		
	CAS (mph)	76	88	93		
	TAS (mph)	88	102	108		



AIRCRAFT OPERATING INSTRUCTIONS

Doc. No. HARMAOIUS

5.3.3 Endurance

Conditions:

- Altitude 2000 ft ISA
- flaps: retracted (0°)
- carburetor preheating: OFF
- airplane takeoff weight: 1320 lbs (600 kg)
- airplane empty weight: 802 lbs (364 kg)
- vortex generators along the whole span of the wing

LOAD LIMITS			
Max. take-off weight	600 kg	1320 lb	
Empty weight	364 kg	802 lb	
Crew	160 kg	353 lb	
Baggage (max. 25kg)	0 kg	0 lb	
Available fuel to not exceed MTOW	106,1 l	28,0 USGAL	

PERMITTED CREW WEIGHT									
	118 l	96 l	76 l	57 l	38 l	19 l			
	31,2 USGAL	25,0 USGAL	20,0 USGAL	15,0 USGAL	10,0 USGAL	5,0 USGAL			
	28,0 UKGAL	20,8 UKGAL	16,7 UKGAL	12,5 UKGAL	8,3 UKGAL	4,2 UKGAL			
Baggage max.	25 kg	126 kg	143 kg	157 kg	171 kg	184 kg	198 kg		
Baggage 1/2	13 kg	139 kg	156 kg	169 kg	183 kg	197 kg	210 kg		
No baggage	0 kg	151 kg	168 kg	182 kg	196 kg	209 kg	223 kg		
Baggage max.	56 lb	279 lb	316 lb	346 lb	376 lb	406 lb	436 lb		
Baggage 1/2	28 lb	306 lb	343 lb	373 lb	404 lb	434 lb	464 lb		
No baggage	0 lb	334 lb	371 lb	401 lb	431 lb	461 lb	491 lb		

ENDURANCE AND RANGE		55% MCP	65% MCP	75% MCP	MCP Max. Continuous Power
Altitude 2000 ft ISA					
Engine speed	(rpm)	4300	4800	5000	5500
	(l/h)	12,2	15,9	18,0	25,0
Fuel consumption	(US gal/h)	3,2	4,2	4,8	6,6
	(UK gal/h)	2,7	3,5	4,0	5,5
IAS	(km/h)	135	162	173	199
	(knots)	73	87	93	108
	(mph)	84	101	107	124
CAS	(km/h)	141	163	172	195
	(knots)	76	88	93	105
	(mph)	88	101	107	121
TAS	(km/h)	145	168	178	201
	(knots)	78	91	96	108
	(mph)	90	105	110	125

Endurance at	118,1 (h:m)	9:40	7:25	6:33	4:43
Range at	118,1 (km)	1380	1230	1140	930
	31,2 USGAL (NM)	750	660	620	500
	28,0 UKGAL (miles)	860	760	710	580

Endurance at	94,6 (h:m)	7:44	5:57	5:15	3:47
Range at	94,6 (km)	1100	980	910	740
	25,0 USGAL (NM)	590	530	490	400
	20,8 UKGAL (miles)	680	610	570	460

Endurance at	76,7 (h:m)	6:11	4:45	4:12	3:01
Range at	76,7 (km)	880	780	730	590
	20,0 USGAL (NM)	480	420	390	320
	16,7 UKGAL (miles)	550	480	450	370

Endurance at	56,8 (h:m)	4:38	3:34	3:09	2:16
Range at	56,8 (km)	650	580	540	440
	15,0 USGAL (NM)	350	310	290	240
	12,5 UKGAL (miles)	400	360	340	270

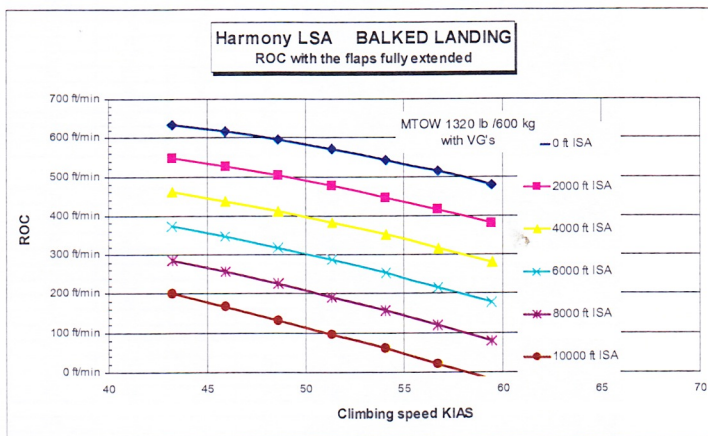
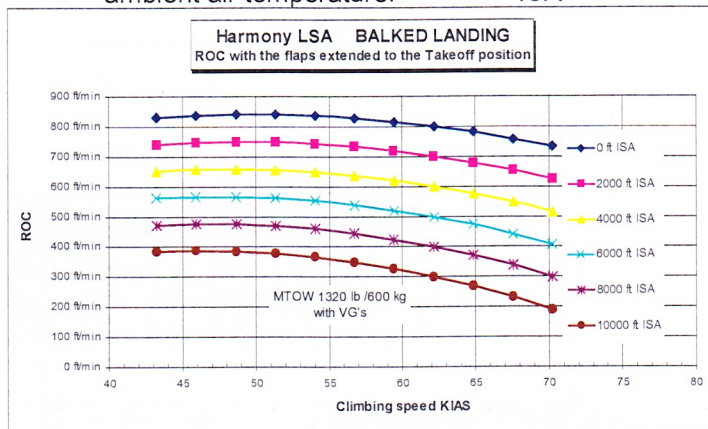
Endurance at	37,9 (h:m)	3:05	2:22	2:06	1:30
Range at	37,9 (km)	430	380	350	290
	10,0 USGAL (NM)	230	210	190	160
	8,3 UKGAL (miles)	270	240	220	180



5.3.4 Balked landing climb

Conditions:

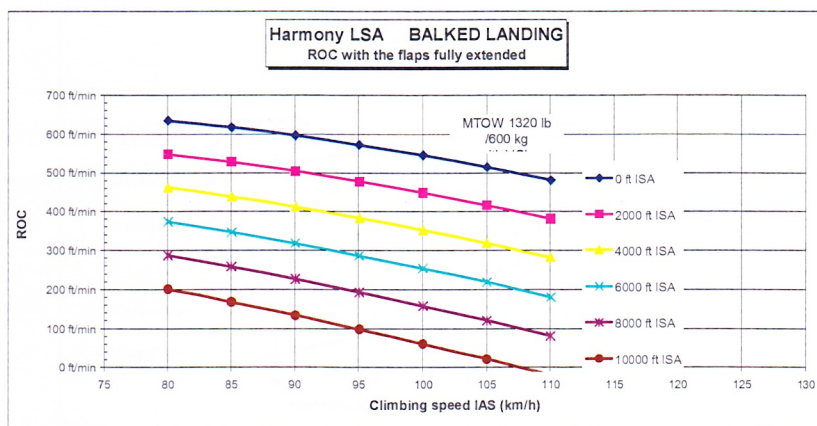
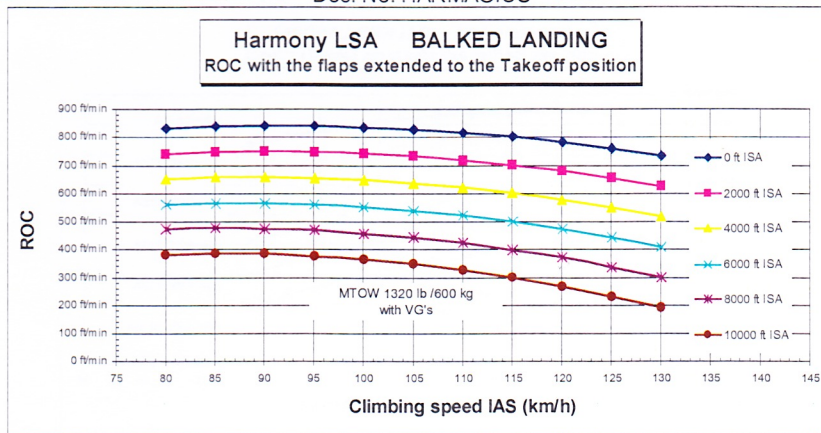
- engine: maximum take-off power
- carburetor preheating: OFF
- flaps: Take-off, Landing II
- airplane weight: 1320 lbs (600 kg)
- vortex generators along the whole span of the wing
- ambient air temperature: ISA





AIRCRAFT OPERATING INSTRUCTIONS

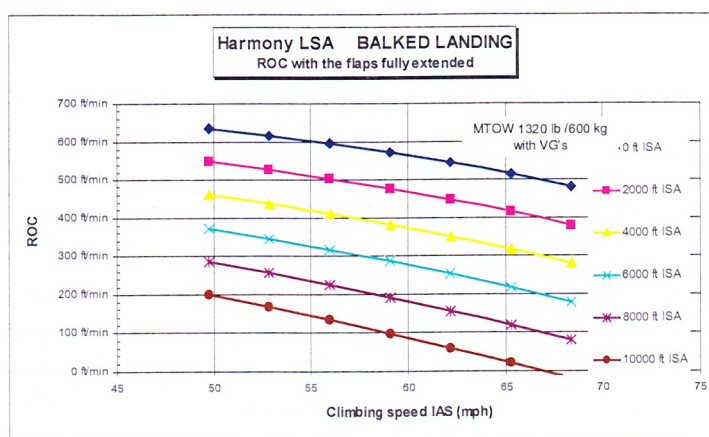
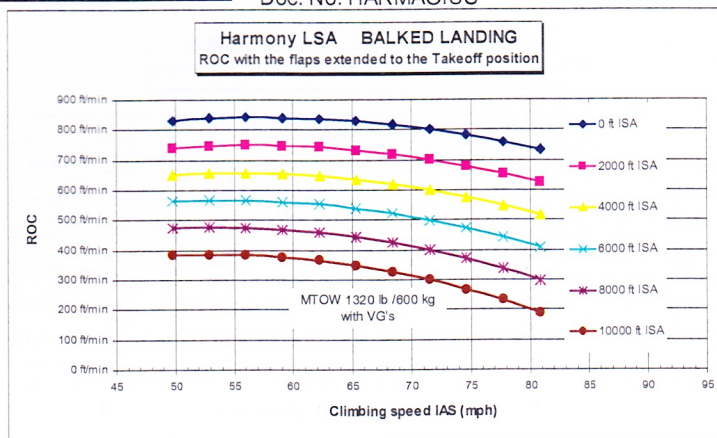
Doc. No. HARMAOIUS





AIRCRAFT OPERATING INSTRUCTIONS

Doc. No. HARMAOIUS





AIRCRAFT OPERATING INSTRUCTIONS

Doc. No. HARMAOIUS

5.3.5 Effect on flight performance and characteristics

Flight performances and characteristics are not considerably affected by rain or insect stuck on the airplane surface.

5.3.6 Demonstrated crosswind performance

Maximum demonstrated speed of wind
at airplane operation 24 kts (28 mph)

Maximum demonstrated speed of cross wind
for take-off and landing 16 kts (18.4 mph)

Maximum demonstrated speed of tail wind 6 kts (7 mph)

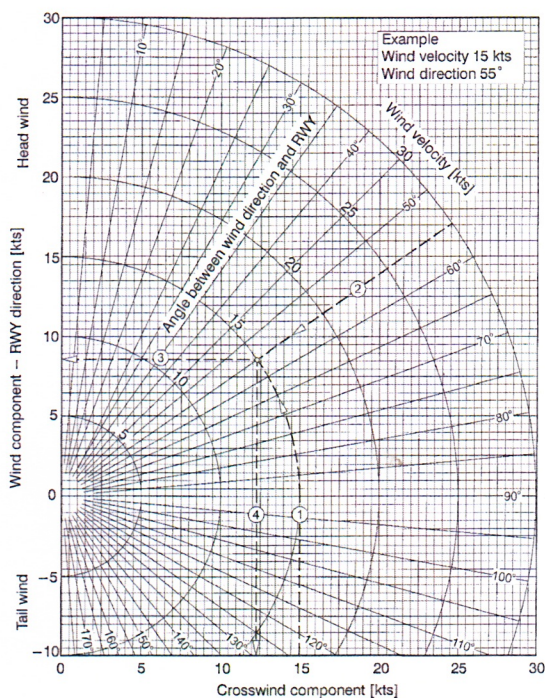


Figure 5-1 Influence of wind on take-off and landing



AIRCRAFT OPERATING INSTRUCTIONS

Doc. No. HARMAOIUS

5.3.7 Ceiling

	ROC fpm	Ceiling ft	Ceiling m
Service ceiling	100	16980	5180
Absolute ceiling	0	19150	5840

5.3.8 Noise data

Not measured.