

PILOT'S OPERATING HANDBOOK FOR



LIGHT SPORT AIRCRAFT

Model:	HARMONY LSA
Airplane Serial Number:	2023 2222
Airplane Registration Number:	
Publication Number:	HARMLSAISPOH
Date of Issue:	03. 03. 2023
Issue	1.
Validity	All

This manual must be on the airplane board during operation. This manual contains information which must be provided to the pilot and also contains supplementary information provided by the airplane manufacturer – Evektor – Aerotechnik a.s.

This aircraft must be operated in compliance with the information and limitation stated in this manual

Copyright © 2023
EVEKTOR - AEROTECHNIK, a.s.
Tel.: +420 572 537 111
Fax: +420 572 537 900
email: marketing@evektor.cz
www.evektoraircraft.com

Airplane manufacturer:
EVEKTOR-AEROTECHNIK, a.s.
686 04 Kunovice – Letecká 1394
Czech Republic



0 Technical Information

0.1 Introduction

This Manual is valid only for Harmony LSA airplane with serial number and registration number shown on the cover page.

This Manual may not be used for airplane operation if it is not keep up to date.

0.2 Warnings, Cautions, Notes

WARNING

MEANS THAT NON-OBSERVATIONS OF THE CORRESPONDING PROCEDURE LEADS TO AN IMMEDIATE OR IMPORTANT DEGRADATION OF THE FLIGHT SAFETY.

CAUTION

MEANS THAT NON-OBSERVATIONS OF THE CORRESPONDING PROCEDURE LEADS TO A MINOR OR TO A MORE OR LESS LONG TERM DEGRADATION OF THE FLIGHT SAFETY.

NOTE

Draws the attention to any special item not directly related to safety but which is important or unusual.



0.3 Log of Revisions

All revisions or supplements to this Manual, except actual weighing data, are issued in form of revisions, which will have new or changed pages as an appendix and the list of which is shown in the Log of Revisions table.

NOTE

It is airplane operator's responsibility to keep this Manual up to date.

Rev. No.	Affected Pages	Description	Appr./ Date	Inserted by / Date
1	0-2; 0-4; 0-6; 9-3	Added supplement	30.6.2023	30.6.2023
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				



Doc. No. HARMLSAISPOH

Rev. No.	Affected Pages	Description	Appr./ Date	Inserted by / Date
21				
22				
23				
24				
25				
26				



0.4 List of Effective Pages

Section	Page	Date	Section	Page	Date
			2	2-4	2023-03-03
0	0-1	2023-03-03		2-5	2023-03-03
	0-2	2023-06-30		2-6	2023-03-03
	0-3	2023-03-03		2-7	2023-03-03
	0-4	2023-06-30		2-8	2023-03-03
	0-5	2023-03-03		2-9	2023-03-03
	0-6	2023-06-30		2-10	2023-03-03
	0-7	2023-03-03		2-11	2023-03-03
	0-8	2023-03-03		2-12	2023-03-03
				2-13	2023-03-03
				2-14	2023-03-03
1	1-1	2023-03-03		2-15	2023-03-03
	1-2	2023-03-03		2-16	2023-03-03
	1-3	2023-03-03			
	1-4	2023-03-03			
	1-5	2023-03-03	3	3-1	2023-03-03
	1-6	2023-03-03		3-2	2023-03-03
	1-7	2023-03-03		3-3	2023-03-03
	1-8	2023-03-03		3-4	2023-03-03
	1-9	2023-03-03		3-5	2023-03-03
	1-10	2023-03-03		3-6	2023-03-03
				3-7	2023-03-03
				3-8	2023-03-03
				3-9	2023-03-03
				3-10	2023-03-03
2	2-1	2023-03-03		3-11	2023-03-03
	2-2	2023-03-03		3-12	2023-03-03
	2-3	2023-03-03			



Doc. No. HARMLSAISPOH

Section	Page	Date	Section	Page	Date
4	4-1	2023-03-03		5-10	2023-03-03
	4-2	2023-03-03		5-11	2023-03-03
	4-3	2023-03-03		5-12	2023-03-03
	4-4	2023-03-03		5-13	2023-03-03
	4-5	2023-03-03		5-14	2023-03-03
	4-6	2023-03-03		5-15	2023-03-03
	4-7	2023-03-03		5-16	2023-03-03
	4-8	2023-03-03		5-17	2023-03-03
	4-9	2023-03-03		5-18	2023-03-03
	4-10	2023-03-03		5-19	2023-03-03
	4-11	2023-03-03		5-20	2023-03-03
	4-12	2023-03-03		5-21	2023-03-03
	4-13	2023-03-03		5-22	2023-03-03
	4-14	2023-03-03			
	4-15	2023-03-03			
	4-16	2023-03-03	6	6-1	2023-03-03
	4-17	2023-03-03		6-2	2023-03-03
	4-18	2023-03-03		6-3	2023-03-03
				6-4	2023-03-03
				6-5	2023-03-03
5	5-1	2023-03-03		6-6	2023-03-03
	5-2	2023-03-03		6-7	2023-03-03
	5-3	2023-03-03		6-8	2023-03-03
	5-4	2023-03-03		6-9	2023-03-03
	5-5	2023-03-03		6-10	2023-03-03
	5-6	2023-03-03		6-11	2023-03-03
	5-7	2023-03-03		6-12	2023-03-03
	5-8	2023-03-03		6-13	2023-03-03
	5-9	2023-03-03		6-14	2023-03-03



Doc. No. HARMLSAISPOH

Section	Page	Date	Section	Page	Date
7	7-1	2023-03-03		7-29	2023-03-03
	7-2	2023-03-03		7-30	2023-03-03
	7-3	2023-03-03		7-31	2023-03-03
	7-4	2023-03-03		7-32	2023-03-03
	7-5	2023-03-03		7-33	2023-03-03
	7-6	2023-03-03		7-34	2023-03-03
	7-7	2023-03-03		7-35	2023-03-03
	7-8	2023-03-03		7-36	2023-03-03
	7-9	2023-03-03			
	7-10	2023-03-03	8		
	7-11	2023-03-03		8-1	2023-03-03
	7-12	2023-03-03		8-2	2023-03-03
	7-13	2023-03-03		8-3	2023-03-03
	7-14	2023-03-03		8-4	2023-03-03
	7-15	2023-03-03		8-5	2023-03-03
	7-16	2023-03-03		8-6	2023-03-03
	7-17	2023-03-03		8-7	2023-03-03
	7-18	2023-03-03		8-8	2023-03-03
	7-19	2023-03-03		8-9	2023-03-03
	7-20	2023-03-03		8-10	2023-03-03
	7-21	2023-03-03			
	7-22	2023-03-03	9		
	7-23	2023-03-03		9-1	2023-03-03
	7-24	2023-03-03		9-2	2023-03-03
	7-25	2023-03-03		9-3	2023-06-30
	7-26	2023-03-03		9-4	2023-03-03
	7-27	2023-03-03		9-5	2023-03-03
	7-28	2023-03-03		9-6	2023-03-03



0.5 Table of Contents

	Section
General Information	1
Limitations	2
Emergency Procedures	3
Normal Procedures	4
Performance	5
Weight & Balance	6
Airplane & System Description	7
Handling, Servicing & Maintenance	8
Supplements	9



Intentionally Left Blank



TABLE OF CONTENTS

1 General Information

1.1	Introduction	1-3
1.2	Certification Basis	1-3
1.2.1	List of applicable standards	1-3
1.2.2	Data location	1-4
1.3	Descriptive Data	1-5
1.3.1	Airplane Description	1-5
1.3.2	Power Plant	1-5
1.3.3	Main Technical Data	1-5
1.3.4	Three View Drawing	1-7
1.4	Airplane Performance Specifications	1-8
1.5	Weight	1-8
1.6	Airspeeds and Performance	1-8
1.7	Fuel	1-8
1.8	Engine	1-9
1.9	Definitions and Abbreviations	1-9



Intentionally Left Blank



1.1 Introduction

PARTICIPANT'S RESPONSIBILITY

There are inherent risks in participating in aviation activities, these risks are significant, up to and potentially including death. Operators and passengers of recreational aviation aircraft, by participation, accept the risks inherent in such participation of which the ordinary prudent person is or should be aware. Pilots and passengers have a duty to exercise good judgment and act in a responsible manner while using the aircraft and to obey all oral or written warnings, or both, prior to and/or during use of the aircraft.

This Aircraft Operating Instructions has been prepared to provide pilots and instructors with information for safe and efficient operation of the HARMONY LSA airplane. It also contains supplementary information considered to be important by the airplane manufacturer.

The pilot is obliged to become familiar with all content of this Manual including supplements located in Section 9.

1.2 Certification Basis

HARMONY LSA complies with the ASTM F2245

Standard Specification for Design and Performance of a Light Sport Airplane, issued by ASTM International Committee F37.

IFR version complies with FAR 91.205 requirements, as well as with F2245 Annex A3 Additional Requirements for Light Sport Airplanes Operated under Instrument Flight Rules, as known till 1.1.2009.

1.2.1 List of applicable standards

List of applicable ASTM consensus standards is in compliance with FAA accepted ASTM consensus standards as amended:

F2245	Standard Specification for Design and Performance of a Light Sport Airplane
F2972	Standard Practice for Quality Assurance in the Manufacture of Fixed Wing Light Sport Aircraft
F2745	Standard Specification for Required Product Information to be Provided with an Airplane
F2339	Standard Practice for Design and Manufacture of Reciprocating Spark Ignition Engines for Light Sport Aircraft



Doc. No. HARMLSAISPOH

- F2506 Standard Specification for Design and Testing of Fixed-Pitch or Ground Adjustable Light Sport Aircraft Propellers
- F2538 Standard Practice for Design and Manufacture of Reciprocating Compression Ignition Engines for Light Sport Aircraft
- F2746 Standard Specification for "Pilot's Operating Handbook"
- F2316 Standard Specification for Airframe Emergency Parachutes for Light Sport Aircraft
- F2839 Standard Practice for Compliance Audits to ASTM Standards on Light Sport Aircraft

1.2.2 Data location

The certification documentation is available from the US importers or airplane manufacturer on a request of competent aviation authority and/or Designated Airworthiness Representative.

Contact address:

Visit www.evektoraircraft.com for US importers.

Airplane Manufacturer

EVEKTOR-AEROTECHNIK, a.s.

Letecká 1384

686 04 Kunovice

Czech Republic

Tel.: +420 572 537 111

Fax: +420 527 537 900

e-mail: marketing@evektor.cz

www.evektoraircraft.com



1.3 Descriptive Data

1.3.1 Airplane Description

Harmony LSA airplane is a low-wing with two side by side seats and nose wheel landing gear. Airplane structure is a metal with high portion of composite materials used.

For further description see Section 7 - Airplane & System Description.

1.3.2 Power Plant

The standard power plant consists of ROTAX 912 iS engine and ground adjustable, 3 – bladed, Warpdrive CF propeller, with Nickel protection of blade leading edges.

For further description see Section 7 - Airplane & System Description.

1.3.3 Main Technical Data

Wing

Span	30.45 ft
Area	111.47 sq.ft
MAC depth	46.67 in
Wing loading with vortex generator.....	11.84 lb/sq.ft
Wing loading no vortex generator.....	11.38 lb/sq.ft
Aileron – area	3.35 sq.ft
Flap – area	5.60 sq.ft

Fuselage

Length	20.51 ft
Width	3.55 ft
Height.....	8.12 ft
Cockpit canopy max. width.....	3.9 ft

Horizontal tail units

Span	9.09 ft
HTU area.....	20.67 sq.ft
Elevator area	9.06 sq.ft

Vertical tail units

Height.....	4.21 ft
VTU area	11.2 sq.ft)



Doc. No. HARMLSAISPOH

Landing gear

Wheel track 6.4 ft

Wheel base 4.76 ft

Main and nose landing gear wheel diameter..... 15 in



Doc. No. HARMLSAISPOH

1.3.4 Three View Drawing

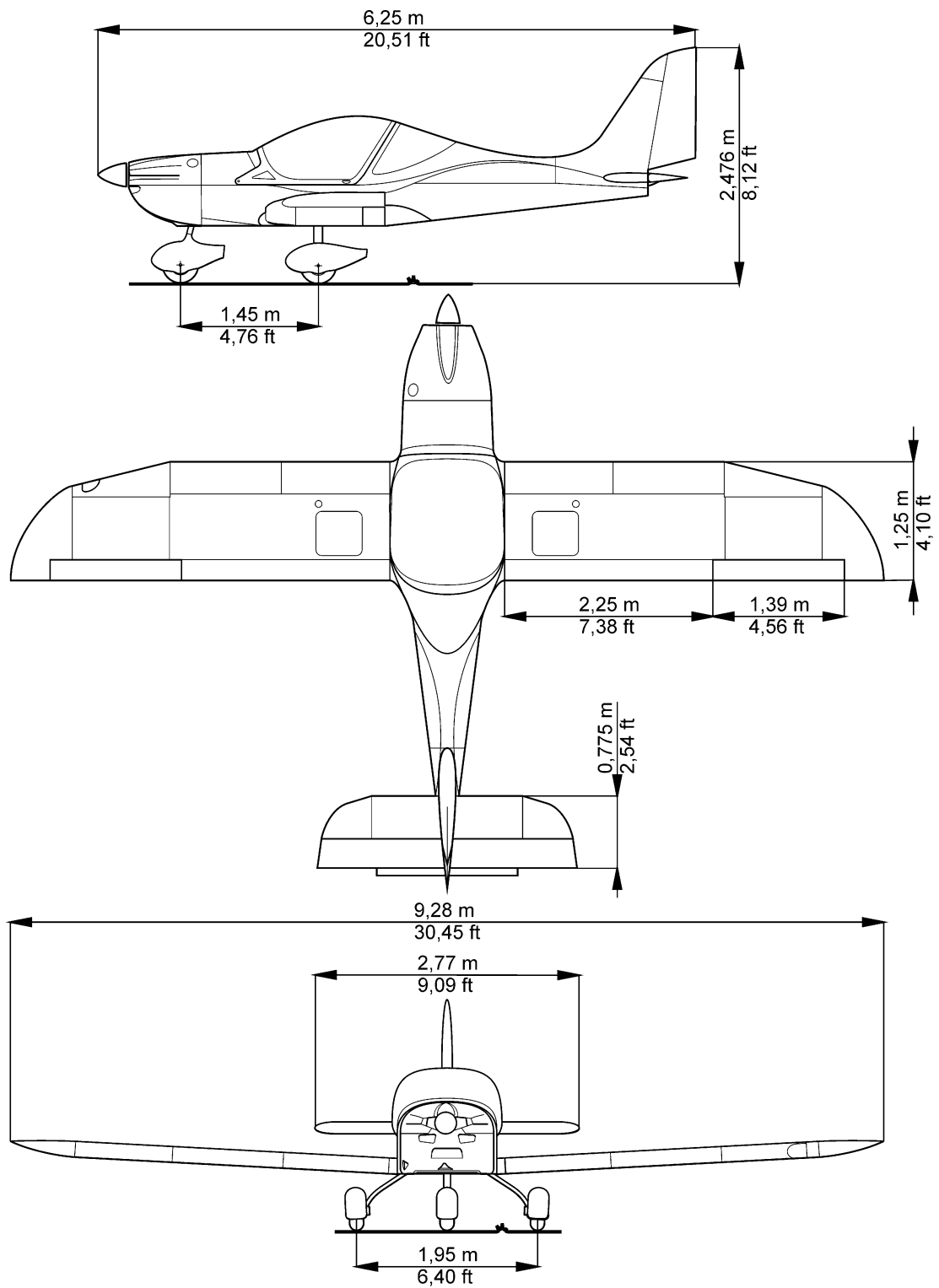


Figure 1-1



1.4 Airplane Performance Specifications

1.5 Weight

Maximum take-off weight600 kg

1.6 Airspeeds and Performance

Top speed (0 ft ISA, MTP) 112 KIAS

Cruise speed (2000 ft ISA, 75% MCP).....93 KIAS

Maximum range (2000 ft ISA, 75% MCP)620 NM

Best rate-of-climb speed V_Y :

- Flaps retracted – 0°65 KIAS (74 mph IAS)
- Flaps in take-off position – 15°57 KIAS (66 mph IAS)

Best rate-of-climb speed V_X :

- Flaps retracted – 0°56 KIAS (65 mph IAS)
- Flaps in take-off position – 15°54 KIAS (63 mph IAS)

Stall speeds in horizontal flight:

- Flaps retracted – 0°34 KIAS (39 mph IAS)
- Flaps in take-off position – 15°33 KIAS (38 mph IAS)
- Flaps in landing position II – 50°33 KIAS (38 mph IAS)

1.7 Fuel

Total fuel capacity31.7 U.S. gallons

Total usable fuel.....31.2 U.S. gallons)

Automotive gasoline with octane index min. RON 95 (or anti-knock index min. AKI 91) meets the following standards:

- Europe – EN 228 Super, EN 228 Super plus
- Canada – CAN/CGSB-3.5 Quality 3
- USA – ASTM D4814
- Russia - R51866-2002

Aviation gasoline:

- AVGAS 100 LL aviation fuel according to ASTM D910.
- AVGAS UL91 (unleaded) aviation fuel according to ASTM D7547.



1.8 Engine

Max. take-off power (5 minutes) 73.5 kW (100 HP) at 5800 RPM
Max. continuous power..... 69 kW (93 HP) at 5500 RPM

1.9 Definitions and Abbreviations

NOTE

The abbreviations on placards in the airplane cockpit are printed in **BOLD CAPITAL LETTERS** in the text of this Airplane Flight Manual.

ACCU	Accumulator
AKI	Anti knock index of fuel
ALT ENC	Encoding altimeter
AOA	Angle of attack
ATC	Air traffic control
bar	1 bar = 100 kPa
°C	Celsius degree
CAS	Calibrated airspeed
ELT	Emergency locator transmitter
fpm	Foot per minute
ft	Foot/feet (1 ft = 0.305 m)
GEN	Generator
GPS	Global positioning system
IAS	Indicated airspeed
IC	Intercom
ISA	International standard atmosphere
kg	Kilogram
KIAS	Indicated airspeed in knots
km/h	Kilometers per hour
kt, kts	Knot, knots (1 kt = 1.852 km/h)
l	Liter
lb, lbs	pound/pounds (1 lb = 0.453 kg)
m	Meter
MAC	Mean aerodynamic chord
max.	Maximum



Doc. No. HARMLSAISPOH

MCP	Maximum continuous power
min.	Minimum / minute
mm	Millimeter
m/s	Meter per second
MTP	Maximum take-off power
nm	Nautical mile (1 nm = 1.852 km)
OAT	Outside air temperature
OFF	System is switched off or control element is in off position
ON	System is switched on or control element is in on position
Pa	Pascal (1 Pa = 1 N/sq.m)
PSI	Pound per sq.in (1 PSI = 6.89 kPa)
POH	Pilot's Operating Handbook
RON	Research octane number
RPM	Revolutions per minute
RWY	Runway
sq.ft	Foot squared
sq.in	Inch squared
sq.m	Meter squared
U.S. gall	U.S. gallons (1 U.S. gall = 3.785 l)
V _A	Maneuvering speed
V _C	Design cruising speed
V _{FE}	Maxim flap extended speed
VFR	Visibility flight rules
V _{LOF}	Airplane lift - off speed
V-METER	Voltmeter
V _{NE}	Never exceed speed
V _{NO}	Maximum structural cruising speed
V _{S0}	Stall speed with flaps in 50° position
V _{S1}	Stall speed with flaps in 0° position
VTU	Vertical tail units
V _X	Best angle of climb speed
V _Y	Best rate of climb speed
XPDR	Transponder



TABLE OF CONTENTS

2 Limitations

2.1	Introduction	2-3
2.2	Airspeed Limitation	2-3
2.3	Airspeed Indicator Marking	2-4
2.4	Power Plant.....	2-5
2.5	Power Plant Instrument Marking.....	2-6
2.6	Miscellaneous Instrument Marking.....	2-6
2.7	Weight Limits.....	2-7
2.8	Centre of Gravity	2-7
2.9	Approved Maneuvers	2-7
2.10	Maneuvering Load Factors.....	2-8
2.11	Flight Crew.....	2-8
2.12	Kind of Operation	2-8
2.13	Fuel Limits	2-9
	2.13.1 Fuel Capacity	2-10
	2.13.2 Approved Fuel Grades	2-10
2.14	Oil Limits	2-11
2.15	Maximum Number of Passengers.....	2-11
2.16	Electrical System Limitations.....	2-11
2.17	Other Limitations.....	2-11
2.18	Limitation Placards	2-12



Intentionally Left Blank



2.1 Introduction

Section 2 contains operation limitation, instrument marking and basic placards necessary for safe operation of airplane and its engine, standard systems and equipment. Limitation for optional systems and equipment are stated in section 9 - Supplements.

2.2 Airspeed Limitation

Airspeed limitations and their meaning for operation are stated in the table below:

Airspeed		KIAS	mph IAS	Meaning
V _{NE}	Never exceed speed	146	168	Do not exceed this speed in any operation.
V _{NO}	Maximum structural cruising speed	115	132	Do not exceed this speed, with exception of flight in smooth air, and even then only with increased caution.
V _A	Maneuvering speed	90	104	Do not make full or abrupt control movement above this speed, because under certain conditions the airplane may be overstressed by full control movement.
V _{FE}	Maximum flap extended speed	70	81	Do not exceed this speed with the given flap setting.



2.3 Airspeed Indicator Marking

Airspeed indicator markings and their color-code significance are shown in the table below:

Marking	Range		Meaning
	KIAS	mph IAS	
Red line	33	38	V_{S0} at maximum weight (flaps in landing position 50°)
White arc	33 – 70	38 - 81	Operating range with extended flaps. Lower limit - V_{S0} at maximum (flaps in landing position 50°) Upper limit - V_{FE}
Green arc	34 - 115	39 - 132	Normal operating range Lower limit - V_{S1} at maximum weight (flaps retracted - 0°) Upper limit – V_C
Yellow arc	115 – 146	132 - 168	Maneuvers must be conducted with caution and only in smooth air
Red line	146	168	Maximum speed for all operations - V_{NE} .



2.4 Power Plant

Engine manufacturer:	BRP-Powertrain GmbH & Co KG	
Engine type:	ROTAX 912 iS	
Power:	max. take-off	73.5 kW / 100 HP
	max. continuous	69.0 kW / 95 HP
Engine speed:	max. take-off	5800 RPM max. 5 minutes
	max. continuous	5500 RPM
	idle	min. 1400 RPM
Coolant temperature:	maximum	248 °F
Oil temperature:	maximum	266 °F
	optimum operation	190 - 230°F
Oil pressure:	maximum	102 PSI (7 bar) (for short period admissible at cold start)
	minimum	12 PSI (0.8 bar)
	optimum operation	29 - 73 PSI (2 - 5 bar)
Fuel pressure:	minimum	2,2 PSI (0,15 bar)
Fuel grades:	see para 2.13.2 Approved Fuel Grades	
Oil grades:	see para 2.14 Oil Limits	
reducer gear ratio	2.43 : 1	
Propeller manufacturer:	Warpdrive	
Propeller type:	Warpdrive CF, nickel protection of blade leading edges 3-blade, composite, on-ground adjustable	
Propeller diameter:	68 in)	
Maximum prop speed:	2600 RPM	

NOTE

If installed a different propeller type – see section 9
Supplement for propeller limitations.



2.5 Power Plant Instrument Marking

The color-code of instruments is shown in the following table:

Instrument	Units	Red arc	Green arc	Yellow arc	Red arc
		Lower limit	Normal operation range	Caution range	Upper limit
RPM indicator	RPM	–	1400 – 5500	5500 – 5800	5800
Oil temperature indicator	°C	–	90 – 110	50 – 90 110 – 130	130
	°F	–	190 – 230	120 – 190 230 – 266	266
Oil pressure indicator	Bar	0.8	2 – 5	0.8 – 2 5 – 7	7
	PSI	12	29 – 73	12 – 29 73 – 102	102
Cylinder head temperature	°C	–	50 – 120	–	120
	°F	–	120 – 248	–	248
Fuel pressure indicator	PSI	2.2	–	–	5.8
Voltmeter	V	10	12.4 – 15.1	10 – 12.4	15.1

NOTE

Red arc is marked from lower (upper) limit up to scale start (end).

Sign “-” means battery charging on the ammeter, sign “+” means battery discharging.

2.6 Miscellaneous Instrument Marking

There are no other instruments with color marking.



2.7 Weight Limits

Empty weight (average equipment)	740 lbs ± 2%
Maximum take-off weight - no vortex gen.....	1268 lbs
Maximum take-off weight - with vortex gen.	1320 lbs
Maximum landing weight – no vortex gen.	1268 lbs
Maximum landing weight – with vortex gen.	1320 lbs
Maximum weight in baggage compartment.....	55 lbs

WARNING

DO NOT EXCEED MAXIMUM WEIGHTS! THEIR EXCEEDING LEADS TO AIRPLANE OVERLOADING AND TO DEGRADATION OF FLIGHT CHARACTERISTICS AND DETERIORATION OF MANOEUVRABILITY.

2.8 Centre of Gravity

Empty airplane C.G. position (standard equipment)	14 ± 5 %MAC
Operating C.G. range	20 to 31 %MAC
Reference datum origin is the 2.21 in (56.15 mm) behind wing leading edge. MAC = 46.67 in (1185.5 mm)	

2.9 Approved Maneuvers

Harmony LSA airplane is approved to perform the following maneuvers:

- Steep turns up to bank of 60°
- Climbing turns
- Lazy eights
- Stall (except for steep stalls)
- Normal flight maneuvers

WARNING

AEROBATICS AS WELL AS INTENTIONALL SPINS ARE PROHIBITED!



2.10 Maneuvering Load Factors

Maximum positive load factor.....4,0

Maximum negative load factor-2,0

2.11 Flight Crew

Minimum flight crew 1 pilot

Minimum weight of flight crew 121 lbs

Maximum weight of flight crewsee sec. 6

WARNING

DO NOT EXCEED MAXIMUM WEIGHTS AND LIMITATION OF CENTER OF GRAVITY! THEIR EXCEEDING LEADS TO AIRPLANE OVERLOADING AND TO DEGRADATION OF FLIGHT CHARACTERISTICS AND DETERIORATION OF MANOEUVRABILITY.

2.12 Kind of Operation

The airplane is standardly approved for VFR daylight flights.

WARNING

**NIGHT FLIGHTS ACCORDING TO VFR, FLIGHTS ACCORDING ARE APPROVED ONLY WHEN INSTRUMENTATION REQUIRED FOR SUCH FLIGHTS IS INSTALLED AND FLIGHT PERFORMED BY A PILOT WITH APPROPRIATE RATING!
NOT AUTHORIZED FOR FLIGHT INTO KNOWN OR FORECAST POSSIBLE ICING CONDITIONS.
NOT AUTHORIZED FOR FLIGHT WITHIN 25 MILES OF KNOWN LIGHTNING OR THUNDERSTORMS.**

Instruments and equipment for daylight flights according to VFR:

- 1 Airspeed indicator (the color marking according to para 2.3)
- 1 Sensitive barometric altimeter
- 1 Magnetic compass
- 1 Fuel gauge indicator for each fuel tank



Doc. No. HARMLSAISPOH

- 1 Oil temperature indicator
- 1 Oil pressure indicator
- 1 Cylinder head temperature indicator
- 1 Engine speed indicator
- 1 Safety harness for every used seat

Instruments and equipment for Night VFR flights:
F 2245 Annex 2 LSA to be flown at night

CAUTION

ADDITIONAL EQUIPMENT NECESSARY FOR
AIRPLANE OPERATION IS GIVEN IN
APPROPRIATE OPERATION REGULATION OF
AIRPLANE OPERATOR'S COUNTRY.

2.13 Fuel Limits

Anti knock properties

Fuels with following specification can be used

Fuel specification	
	Usage / Description
Anti knock properties	912 iSc / 912 iS
	Min. RON 95 (Min. AKI ¹)

¹ Anti Knock Index (RON + MON)/2

MOGAS

	Usage / Description
MOGAS	912 iSc / iS
European standard	EN 228 Super
	EN 228 Super plus

AVGAS

NOTE

AVGAS 100 LL places greater stress on the valve seats due to its high lead content and forms increased deposits in the combustion chamber and leads



Doc. No. HARMLSAISPOH
sediments in the oil system. Thus it should only be used when automotive gasoline is unavailable.
Risk of vapor formation if using winter fuel for summer operation.

	Usage / Description
AVGAS	912 iSc / iS
Aviation standard	AVGAS 100LL (ASTM D 910)

2.13.1 Fuel Capacity

Fuel tank capacity (each)	15.85	U.S. gallons
Total fuel capacity	31.7	U.S. gallons
Total usable fuel.....	31.2	U.S. gallons
Total unusable fuel.....	0.5	U.S. gallons
.....	(0,25 U.S.gall per tank)	

NOTE

Obey the manufacturers instructions about the lubricants. If the engine is mainly run on AVGAS more frequent oil changes will be required. See Service Information SI-912 i-001, latest edition.

NOTE

It is not recommended to fully tank the fuel tanks. Due to fuel thermal expansions keep about 2.11 U.S. gallons of free space in the each tank to prevent fuel bleed through the vents in the wing tips. This should be adhered especially when cold fuel from an underground tank is tanked.

2.13.2 Approved Fuel Grades

Automotive gasoline with octane index min. RON 95 (or anti-knock index min. AKI 91) meets the following standards:

- Europe – EN 228 Super, EN 228 Super plus
- Canada – CAN/CGSB-3.5 Quality 3
- USA – ASTM D4814



- Russia - R51866-2002

Aviation gasoline:

- AVGAS 100 LL aviation fuel according to ASTM D910.
- AVGAS UL91 (unleaded) aviation fuel according to ASTM D7547.

CAUTION

APPROVED AND UP TO DATE FUEL GRADES ARE
STATED IN THE ACTUAL ISSUE OF SERVICE
INSTRUCTION SI-912-016.

2.14 Oil Limits

Performance classification SG or higher according to API.

Oil volume:

- minimum 2,5 l (min. mark on the dip stick)
- maximum 3,0 l (max. mark on the dip stick)

CAUTION

RECOMMENDED OIL GRADES ARE STATED IN
THE ACTUAL ISSUE OF SERVICE INSTRUCTION
SI-912-016.

2.15 Maximum Number of Passengers

Maximum number of passengers including pilot.. 2

2.16 Electrical System Limitations

SOCKET and **BEACONS** switches must be in **OFF** position during taxiing.

SOCKET switch must be in **OFF** position during landing.

2.17 Other Limitations

SMOKING IS PROHIBITED on the airplane board.

PASSENGER NOTICE

This aircraft conforms to ASTM Consensus Standards of airworthiness developed and maintained by the aviation community under ASTM Technical Committee F37.

PASSENGER WARNING!

This aircraft was manufactured in accordance with Light Sport Aircraft airworthiness standards and does not conform to standard category airworthiness requirements.



2.18 Limitation Placards

The following placards are located on the instrument panel:



**BEFORE TAKE-OFF PUSH CANOPY HANDLE UP
TO CHECK CANOPY FULL CLOSING**

**FUEL QUANTITY INDICATION IS ACCURATE
ONLY IN LEVEL FLIGHT ATTITUDE**

The following placards are located on the titling canopy:

**PASSENGER NOTICE:
THIS AIRCRAFT CONFORMS TO ASTM
CONSENSUS STANDARDS OF AIRWORTHINESS
DEVELOPED AND MAINTAINED BY THE
AVIATION COMMUNITY UNDER ASTM
TECHNICAL COMMITTEE F37.**

**PASSENGER WARNING!
THIS AIRCRAFT WAS MANUFACTURED IN
ACCORDANCE WITH LIGHT SPORT AIRCRAFT
AIRWORTHINESS STANDARDS AND DOES NOT
CONFORM TO STANDARD CATEGORY
AIRWORTHINESS REQUIREMENTS.**

The following placards are located on the top of fixed rear canopy:

**CANOPY IS UNLOCKED IF A LATCH
IS VISIBLE UNDER THE GLASS**

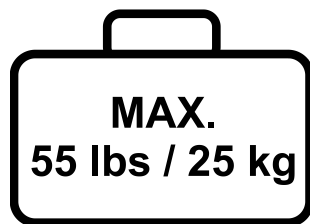
Note: for painted top of the rear glass the latch is visible when looking sideways from under the painted area.



These placard are located on the tip – up canopy close to rear guide pins:

**CAUTION !
FINGERS OFF
WHEN CLOSING
THE CANOPY!**

The following placards are located in the baggage compartment:



The following placard is located behind the baggage compartment



It prohibits use of that place for additional stowage due to airplane aft C.G. limit.

The following placards are located on sides of the tip-up canopy:

Day VFR airplane

**This Light Sport Aircraft has been approved only
for VFR day flights under no icing conditions.**

and (all versions)



Doc. No. HARMLSAISPOH

<p>Aerobatics and intentional spins are prohibited!</p> <table border="1"> <tr> <th colspan="2">AIRSPEED IAS</th></tr> <tr> <td>Never exceed V_{NE}</td><td>146 kts</td></tr> <tr> <td>Design Manoeuvring V_A</td><td>90 kts</td></tr> <tr> <td>Max. Flap Extended V_{FE}</td><td>70 kts</td></tr> <tr> <td>Stalling V_{SO}</td><td>33 kts</td></tr> </table> <table border="1"> <tr> <th colspan="2">ENGINE SPEED</th></tr> <tr> <td>Max. Take-off (max. 5 min.)</td><td>5800 rpm</td></tr> <tr> <td>Max. Continuous</td><td>5500 rpm</td></tr> <tr> <td>Min. Idling</td><td>1400 rpm</td></tr> </table> <table border="1"> <tr> <td>Unusable quantity of fuel</td><td>0.5 USgal</td></tr> </table>	AIRSPEED IAS		Never exceed V_{NE}	146 kts	Design Manoeuvring V_A	90 kts	Max. Flap Extended V_{FE}	70 kts	Stalling V_{SO}	33 kts	ENGINE SPEED		Max. Take-off (max. 5 min.)	5800 rpm	Max. Continuous	5500 rpm	Min. Idling	1400 rpm	Unusable quantity of fuel	0.5 USgal	<p>Aerobatics and intentional spins are prohibited!</p> <table border="1"> <tr> <th colspan="2">AIRSPEED IAS</th></tr> <tr> <td>Never exceed V_{NE}</td><td>168 MPH</td></tr> <tr> <td>Design Manoeuvring V_A</td><td>106 MPH</td></tr> <tr> <td>Max. Flap Extended V_{FE}</td><td>81 MPH</td></tr> <tr> <td>Stalling V_{SO}</td><td>38 MPH</td></tr> </table> <table border="1"> <tr> <th colspan="2">ENGINE SPEED</th></tr> <tr> <td>Max. Take-off (max. 5 min.)</td><td>5800 rpm</td></tr> <tr> <td>Max. Continuous</td><td>5500 rpm</td></tr> <tr> <td>Min. Idling</td><td>1400 rpm</td></tr> </table> <table border="1"> <tr> <td>Unusable quantity of fuel</td><td>0.5 USgal</td></tr> </table>	AIRSPEED IAS		Never exceed V_{NE}	168 MPH	Design Manoeuvring V_A	106 MPH	Max. Flap Extended V_{FE}	81 MPH	Stalling V_{SO}	38 MPH	ENGINE SPEED		Max. Take-off (max. 5 min.)	5800 rpm	Max. Continuous	5500 rpm	Min. Idling	1400 rpm	Unusable quantity of fuel	0.5 USgal
AIRSPEED IAS																																									
Never exceed V_{NE}	146 kts																																								
Design Manoeuvring V_A	90 kts																																								
Max. Flap Extended V_{FE}	70 kts																																								
Stalling V_{SO}	33 kts																																								
ENGINE SPEED																																									
Max. Take-off (max. 5 min.)	5800 rpm																																								
Max. Continuous	5500 rpm																																								
Min. Idling	1400 rpm																																								
Unusable quantity of fuel	0.5 USgal																																								
AIRSPEED IAS																																									
Never exceed V_{NE}	168 MPH																																								
Design Manoeuvring V_A	106 MPH																																								
Max. Flap Extended V_{FE}	81 MPH																																								
Stalling V_{SO}	38 MPH																																								
ENGINE SPEED																																									
Max. Take-off (max. 5 min.)	5800 rpm																																								
Max. Continuous	5500 rpm																																								
Min. Idling	1400 rpm																																								
Unusable quantity of fuel	0.5 USgal																																								

or

Valid with vortex generators

LOAD LIMITS							
Max.take-off weight		1320 lbs					
Empty weight		700 lbs					
Max.baggage weight		55 lbs					
PERMITTED CREW WEIGHT							[lbs]
Fuel quantity	U.S.gal.	30,0	25,0	20,0	15,0	10,0	5,0
Baggage weight	max. 55 lbs	385	415	445	475	505	535
	1/2 28 lbs	412	442	472	502	532	562
	No baggage	440	470	500	530	560	590
Fuel reserve		2 U.S. gallons					

No vortex generators

LOAD LIMITS							
Max.take-off weight		1268 lbs					
Empty weight		700 lbs					
Max.baggage weight		55 lbs					
PERMITTED CREW WEIGHT							[lbs]
Fuel quantity	U.S.gal.	30,0	25,0	20,0	15,0	10,0	5,0
Baggage weight	max. 55 lbs	333	363	393	423	453	483
	1/2 28 lbs	360	390	420	450	480	510
	No baggage	388	418	448	478	508	538
Fuel reserve		2 U.S. gallons					

NOTE

The values stated on the placard "LOAD LIMITS" are valid for the empty weight of the airplane with average equipment. The placard with values valid for the actual empty weight of the airplane will be placed in the cockpit.



Doc. No. HARMLSAISPOH

NOTE

Other placards and labels are shown in Airplane Maintenance Manual for Harmony LSA airplane.



Intentionally Left Blank



TABLE OF CONTENTS

3 Emergency Procedures

3.1	Introduction	3-3
3.2	Speeds for Performing Emergency Procedures	3-3
3.3	Engine Failure.....	3-4
3.3.1	Engine Failure at Take-off Run.....	3-4
3.3.2	Engine Failure at Take-off	3-4
3.3.3	Engine Failure in Flight.....	3-4
3.4	Engine Starting in Flight	3-5
3.5	Engine Fire.....	3-6
3.5.1	Fire on the Ground	3-6
3.5.2	Fire at Take-off	3-6
3.5.3	Fire in Flight.....	3-7
3.6	Fire in the Cockpit	3-7
3.7	Gliding Flight	3-8
3.8	Emergency Landing	3-9
3.8.1	Emergency Landing – with Non-operating Engine	3-9
3.8.2	Safety landing – with Engine Operating.....	3-9
3.8.3	Landing with Burst Tire.....	3-10
3.8.4	Landing with Damaged Landing Gear	3-10
3.9	Unintentional Spin Recovery.....	3-11
3.10	Other emergency procedure	3-11
3.10.1	Vibration	3-11
3.11	Canopy Opening in Flight.....	3-12



Intentionally Left Blank



3.1 Introduction

Section 3 describes operations and procedures for emergency situation solutions that could possibly occur during airplane operation.

3.2 Speeds for Performing Emergency Procedures

Airspeed for the best gliding ratio

(flaps retracted) 59 KIAS (68 mph IAS)

Precautionary landing (engine running,

flaps in **LANDING II** position – 50°)..... 55 KIAS (63 mph IAS)

Emergency landing (engine stopped,

flaps in **LANDING II** position – 50°)..... 55 KIAS (63 mph IAS)



3.3 Engine Failure

3.3.1 Engine Failure at Take-off Run

1. **THROTTLE** leveridle
2. Brakesas necessary
3. **FUEL PUMP A, B****OFF**
4. **LANE A, B****OFF**
5. **MASTER SWITCH****OFF**

3.3.2 Engine Failure at Take-off

1. Push the control stick to get the airplane to gliding.
2. Gliding speed:
 - Flaps in **TAKE-OFF** position (15°).....min. 55 KIAS (63 mph IAS)
 - Flaps retracted (0°).....min. 59 KIAS (68 mph IAS)
3. Altitude:
 - Land in take – off direction if below 150ft
 - Land in take – off direction or you can perform turn up to 90°if altitude is 150 – 400ft
 - You can try start engine if altitude is above 250 ft
 - You can perform turn up to 180°if altitude is above 400 ft
4. **THROTTLE** leveridle
5. Flapsas needed
6. **FUEL PUMP A, B****OFF**
7. ATCreport
8. **MASTER SWITCH****OFF**
9. After touch downbrake as needed

3.3.3 Engine Failure in Flight

1. Gliding speed59 KIAS (68 mph IAS)
2. Altitudetake a decision and carry out:
 - Engine starting in flight – see para 3.4
 - Emergency landing – see para 3.8.1



3.4 Engine Starting in Flight

NOTE

It is possible to start the engine by means of the starter within the whole range of operation speeds as well as flight altitudes. The engine is started up after switching the **STARTER SWITCH** to **START** position and push button **STARTER**.

If the engine is shut down, the altitude loss during engine starting can reach up to 1000 ft.

1. Gliding speed 59 KIAS (68 mph IAS)
2. Altitude check
3. **MASTER SWITCH** **ON**
4. **FUEL PUMP A, B**..... **ON**
5. Unnecessary electrical equipment..... **OFF**
6. **FUEL** selector..... **LEFT** or **RIGHT**
7. **CHOKE** as needed
8. **THROTTLE** lever..... idle or increased idle

The propeller is rotating:

9. **LANE B, A** **ON**

The propeller is not rotating:

10. If engine starting does not occur, increase gliding speed up to 108 KIAS (124 mph IAS), so that air-flow turns the propeller and engine will start.
11. If engine starting is unsuccessful, then continue according to para 3.8.1 Emergency Landing – with Non-operating Engine.



3.5 Engine Fire

3.5.1 Fire on the Ground

1. **FUEL PUMP A, B** **OFF**
 2. Brakes brake
 3. **LANE A, B** **OFF**
 4. **HOT AIR** knob close
 5. **MASTER SWITCH** **OFF**
- After the engine stops:
6. **FUEL SELECTOR** **OFF**
 7. Airplane leave
 8. Portable extinguisher use, if available

3.5.2 Fire at Take-off

1. **FUEL PUMP A, B** **OFF**
 2. **LANE A, B** **OFF**
 3. **MASTER SWITCH** **OFF**
 4. **FUEL SELECTOR** **OFF**
 5. Airspeed 65 KIAS (75 mph IAS)
 6. **HOT AIR** knob close
 7. **COLD AIR** knob close
- After the engine stops:
8. Gliding speed 55 KIAS (63 mph IAS)
 9. Ignition **OFF**
- Land:
10. Airplane leave
 11. Portable extinguisher use, if available



3.5.3 Fire in Flight

1. **FUEL PUMP A, B** **OFF**
2. **LANE A, B** **OFF**
3. **MASTER SWITCH** **OFF**
4. **HOT AIR** knob close
5. **COLD AIR** knob close
6. Gliding speed 59 KIAS (68 mph IAS)
7. ATC report, if possible
8. **MASTER SWITCH** **OFF**

NOTE

For extinguishing the engine fire, you can perform slip under assumption that you have sufficient altitude and time.

WARNING

AFTER EXTINGUISHING THE ENGINE FIRE START ENGINE ONLY IF IT NECESSARY TO SAFE LANDING. FUEL LEAK IN ENGINE COMPARTMENT COULD CAUSE FIRE AND FIRE COULD RESTORE AGAIN.

9. If you start engine again, switch off all switches, switch on the **MASTER SWITCH**, and then subsequently switch on only equipment necessary to safe landing.
10. Emergency landing carry out according to para 3.8.1
11. Airplane leave
12. Portable extinguisher use as needed, if available

3.6 Fire in the Cockpit

1. Fire source identify
2. **MASTER SWITCH** in case that the source of fire is electrical equipment **OFF**
3. Portable extinguisher use, if available
4. After extinguishing the fire aerate the cockpit, open eye-bals vents



5. Safety landingcarry out as soon as possible
according to para 3.8.2

WARNING

**NEVER SWITCH ON THE DEFECTIVE SYSTEM
AGAIN.**

NOTE

If a defective electrical system circuit was detected as the fire source, then switch off appropriate circuit breaker and switch over **MASTER SWITCH** to **ON** position.

3.7 Gliding Flight

NOTE

Gliding flight can be used for example in case of engine failure.

Wing flaps position	Retracted (0°)	Take-off (15°)
Airspeed	59 KIAS (68 mph IAS)	55 KIAS (63 mph IAS)



3.8 Emergency Landing

3.8.1 Emergency Landing – with Non-operating Engine

1. Airspeed 59 KIAS (68 mph IAS)
2. Landing area choose,
determine wind direction
3. Safety harness..... tighten up
4. Flaps..... landing position (50°)
5. Airspeed 60 KIAS (69 mph IAS)
6. ATC notify situation, if possible
7. **FUEL** selector..... **OFF**
8. **LANE A, B** **OFF**
9. **MASTER SWITCH** **OFF** before touch down

3.8.2 Safety landing – with Engine Operating

1. Area for landing choose, determine wind
direction, carry out
passage flight with speed of
59 KIAS (68 mph IAS)
flaps in take-off position (15°)
2. ATC notify situation, if possible
3. Safety harness..... tighten up
4. Flaps..... landing position (50°)
5. Airspeed 60 KIAS (69 mph IAS)
6. Landing..... carry out



3.8.3 Landing with Burst Tire

CAUTION

WHEN LANDING AT HOLDING, KEEP THE WHEEL WITH BURST TIRE ABOVE THE GROUND AS LONG AS POSSIBLE BY MEANS OF AILERONS. IN CASE OF NOSE WHEEL BY MEANS OF ELEVATOR.

1. At running hold airplane direction by means of foot control and elevator.

3.8.4 Landing with Damaged Landing Gear

1. In case of nose landing gear damage touch down at the lowest possible speed and try to keep the airplane on main landing gear wheels as long as possible.
2. In case of main landing gear damage touch down at his lowest possible speed and if possible keep direction at running.



3.9 Unintentional Spin Recovery

NOTE

The airplane has not, when using normal techniques of pilotage, tendency to go over to spin spontaneously.

Standard procedure of recovery from spin:

1. **THROTTLE** lever..... idle
2. Control stick..... ailerons - neutral position
3. Pedals kick the rudder pedal push
against spin rotation direction
4. Control stick push forward at least to middle
position as minimum and hold
it there until rotation stops
5. Pedals immediately after rotation
stopping, set the rudder to
neutral position
6. Control stick..... by gradual pulling recover
the diving

CAUTION

ALTITUDE LOSS PER ONE TURN AND
RECOVERING FROM THE SPIN IS 500 UP TO
1000 FT.

3.10 Other emergency procedure

3.10.1 Vibration

If abnormal vibrations occur on the airplane then:

1. **THROTTLE** lever..... Set engine RPM to the mode in
which the vibrations are
the lowest.
2. Land on the nearest possible airport, possibly perform safety landing
according to para 3.8.2



3.11 Canopy Opening in Flight

WARNING

ALWAYS MAKE SURE BEFORE A TAKEOFF, THAT COCKPIT CANOPY IS FULLY CLOSED – THE RED WARNING LIGHT ON THE DASHBOARD MUST GO OFF.

IF THE AIRPLANE IS EQUIPPED WITH DIGITAL INTEGRATED INSTRUMENTS, THE APPROPRIATE LIGHT ON THE DISPLAY MUST INDICATE CLOSED CANOPY!

If the canopy would open in flight due to improper closing, wake behind opened canopy would cause vibrations of the horizontal tail unit and consequently vibrations of the control sticks and airplane controllability would be affected.

Proceed as follows to solve such situation:

1. Grasp shaking control stick(s). This will reduce control sticks and horizontal tail unit vibrations caused by wake behind opened canopy.
2. Pull the throttle lever to reduce airspeed to approximately 65 KIAS (75 mph IAS).
3. Pull opened canopy down by holding the canopy frame on either side (solo flight) or on both sides (dual flight) and keep holding the canopy pulled down. This will reduce wake acting on the horizontal tail unit and improve airplane controllability.

WARNING

PRIORITY IS TO MAINTAIN AIRPLANE CONTROLLABILITY!

ATTEMPTS TO CLOSE THE CANOPY ARE SECONDARY!

4. Try to close the canopy; this could be possible in dual flight. If not, keep holding the canopy down by either hand.
5. Perform Safety landing according to para 3.8.2.
6. It is required after landing to check conditions of the canopy and lock system. Horizontal tail unit must be inspected, as well.
7. Found faults must be fixed before next flight.



TABLE OF CONTENTS

4 Normal Procedures

4.1	Introduction	4-3
4.2	Recommended Speeds for Normal Procedures	4-3
4.2.1	Take-off	4-3
4.2.2	Landing.....	4-3
4.3	Assembly and Disassembly	4-3
4.4	Pre-flight Check.....	4-4
4.5	Normal Procedures and Checklist	4-8
4.5.1	Before Engine Starting	4-8
4.5.2	Engine Starting.....	4-9
4.5.3	Before Taxiing	4-11
4.5.4	Taxiing.....	4-11
4.5.5	Before Take-off.....	4-11
4.5.6	Take-off	4-12
4.5.7	Climb	4-12
4.5.8	Cruise	4-12
4.5.9	Descent	4-14
4.5.10	Before Landing	4-14
4.5.11	Final.....	4-15
4.5.12	Balked Landing.....	4-15
4.5.13	Landing.....	4-15
4.5.14	After Landing	4-15
4.5.15	Engine Shut-off.....	4-16
4.5.16	Airplane Parking	4-17



Intentionally Left Blank



4.1 Introduction

Section 4 describes operations and recommended procedures for normal operation of the airplane. Normal procedures following from system installation and optional equipment, which require supplementation of these Instructions, are shown in section 9 - Supplements.

4.2 Recommended Speeds for Normal Procedures

4.2.1 Take-off

Climbing speed up to 50 ft (flaps in TAKE-OFF pos. - 15°)	57 KIAS (66 mph IAS)
Best rate-of-climb speed V_Y (flaps in TAKE-OFF pos. - 15°)	57 KIAS (66 mph IAS)
Best rate-of-climb speed V_Y (flaps retracted - 0°).....	65 KIAS (74 mph IAS)
Best angle-of-climb speed V_X (flaps in TAKE-OFF pos. - 15°)	54 KIAS (63 mph IAS)
Best angle-of-climb speed V_X (flaps retracted - 0°).....	56 KIAS (65 mph IAS)

4.2.2 Landing

Approaching speed for normal landing (flaps in LANDING II position - 50°)	60 KIAS (69 mph IAS)
---	----------------------

4.3 Assembly and Disassembly

Description of assembly and disassembly is given in the Airplane Maintenance Manual for Harmony LSA airplane.



4.4 Pre-flight Check

Carry out pre-flight check according to the following procedure:

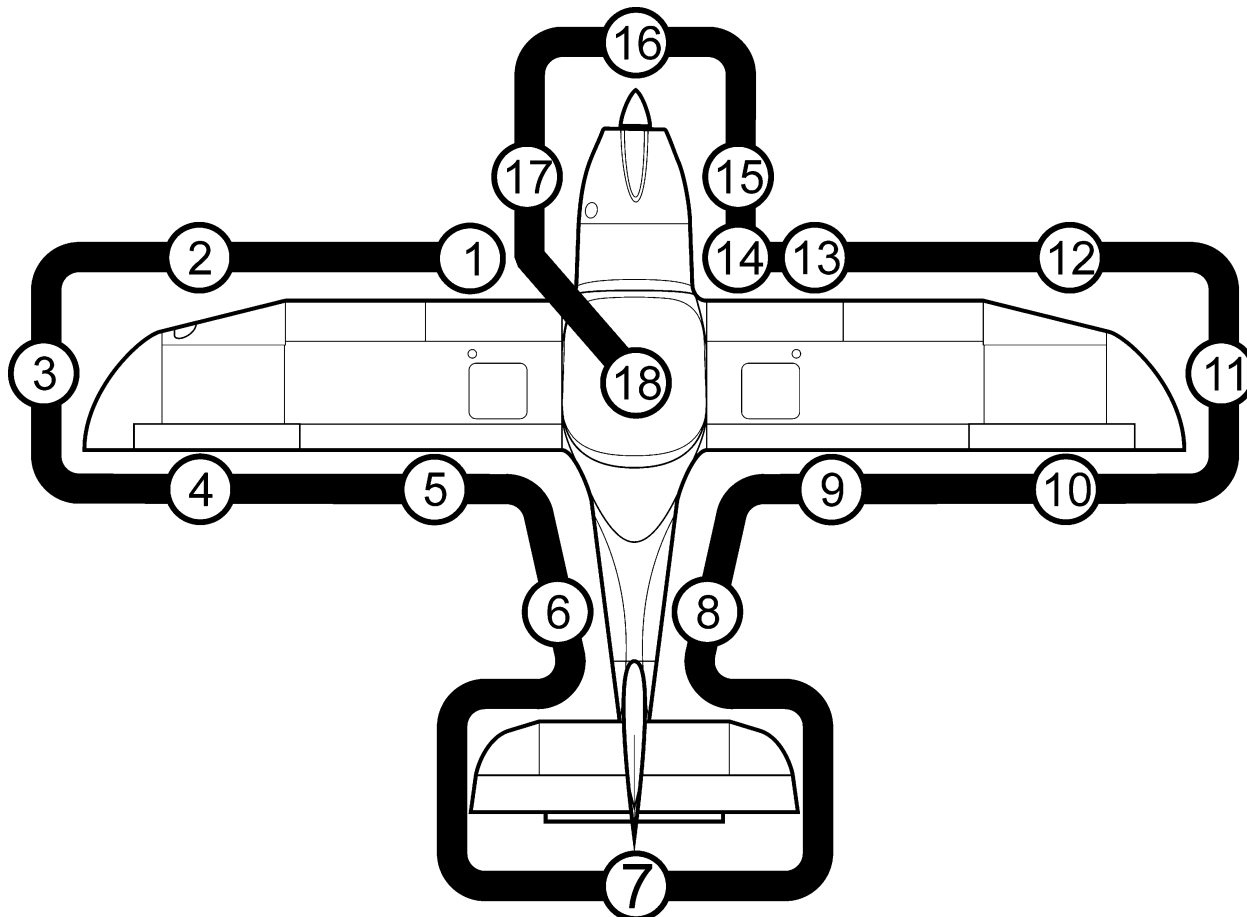


Figure 4-1

WARNING

**CHECK BEFORE PRE-FLIGHT CHECK THAT
IGNITION IS SWITCHED OFF**

NOTE

The word “condition”, used in procedures of pre-flight check, means visual check of surface, damage, deformation, scratches, attrition, corrosion, icing or other effects decreasing flight safety.



1. Left landing gear leg - check
 - landing gear leg attachment and condition
 - attachment of brake system hose
 - landing gear wheel condition
 - tire condition and inflation
 - condition and attachment of wheel covers
 - ground cable condition (if installed)
 - no contamination in the draining reservoirs of the pitot-static system
2. Left wing - check
 - wing surface condition
 - leading edge condition
 - closing of the fuel tank cap
 - wing leading edge condition
 - condition of the stalling speed sensor
 - landing light condition (if installed)
 - condition of the Pitot tube
3. Left wing tip - check
 - surface condition
 - attachment check
 - fuel tank vent - cleanness
 - condition and attachment of the position lights and the anti-collision beacon (if installed)
4. Left aileron - check
 - surface condition
 - condition of trim tab (if installed) and its control (electr. trim)
 - attachment
 - free movement
5. Left wing flap - check
 - surface condition
 - attachment
 - drain fuel tank (see Section 8, para 8.5.2)
6. Rear part of fuselage - check
 - surface condition
 - condition of antennas (top and bottom fuselage surface – if installed)



7. Tail units - check

- tail skid condition
- surface condition
- condition of rudder and elevator attachment
- freedom of rudder and elevator movement
- condition of trim tab, condition and security of elevator trim tab control rods

8. Rear part of fuselage - check

- surface condition

9. Right wing flap- see 5

10. Right aileron- see 4

11. Right wing tip - see 3

12. Right wing - see 2 - except the landing light and Pitot tube

- Alternate pitot tube (if installed)
- Landing light (if installed)
- AOA probe (if installed)

13. Right landing gear leg - see 1

14. Front part of the fuselage - right hand side - check

- tilting canopy attachment and condition
- condition and attachment of GPS antenna
- condition and cleanness of air intakes
- condition of the nose landing gear leg and nose wheel
- condition of the nose wheel control rods
- external power socket (if installed)

15. Engine

Checks before the first flight of day - it is necessary to remove upper engine cowlings:

- condition of engine bed
- condition of engine attachment
- condition of exhaust system
- condition of engine cowlings
- visual check on fuel and electrical system condition
- check on cooling liquid volume in the expansion tank on the engine body (replenish as required up to max. 2/3 of the expansion tank volume)



- check on cooling liquid level in the overflow bottle (volume should be approx. 0,42 pints (0,2 liter))
- open oil tank cap, turn the propeller slowly by hand in direction of engine rotation several times to pump oil from the engine into the oil tank, this process is finished when air is returning back to the oil tank and can be noticed by a gurgle from the open oil tank – see the Rotax Operator's manual.); install oil tank cap

Checks before every flight:

- cleanness of air intakes
- check on oil level (between marks - flattening on the dip stick)
- check on cooling liquid level in the overflow bottle (volume should be approx. 0,42 pints (0,2 liter))
- proper closing of the upper engine cowling

16. Propeller - check

- attachment
- condition of blades, hub and spinner

17. Front part of fuselage - left hand side - check

- cleanness of air intakes
- tilting canopy attachment and condition

18. Cockpit - check

NOTE

Canopy is unlocked if a latch next to lock is visible under the glass, otherwise it is locked. Unlock it first with key.

- **MASTER SWITCH ON**
- Check canopy OPEN/CLOSE red indication light function.
- All switches **OFF**
- Instrument equipment check on condition
- Check of safety belts condition and attachment
- Check pressure in the portable fire extinguisher (press gauge in the green arc) (if installed)
- Check on presence of loose object in the cockpit
- Check on adjusting and securing the rudder pedals (see Section 7, para 7.3.3)



Doc. No. HARMLSAISPOH

WARNING

**RIGHT AND LEFT PEDAL OF RUDDER CONTROL
MUST BE SET TO THE SAME POSITIONS AND
WELL SECURED**

- POH and other required documentscheck on completeness
and validity

4.5 Normal Procedures and Checklist

4.5.1 Before Engine Starting

1. Pre-flight check and check on
weight and centre of gravity positiondone
2. External power source (if installed)connect as necessary
3. Safety harnessescheck, fasten
4. Control stickfree
5. Rudder pedal adjust Setup the rudder pedals to one
of three positions (front, middle
or rear)

WARNING

**THE RUDDER MUST BE IN NEUTRAL POSITION
BEFORE PEDALS ARE ADJUSTED! CHECK THAT
THE RUDDER IS CENTERED BEFORE
ADJUSTING**

NOTE

The steps to adjust the pedals are:

- 1) Assure the rudder is in the neutral position
(centered),
- 2) Assure the space aft of the rudder pedals (where
your feet are positioned in flight is clear, and no
pressure is applied to the rudder pedals.
- 3) Pull lever, pedals will automatically move fully aft.
Then release lever.
- 4) Place feet on the pedals, apply light even pressure
on pedals while slightly engaging the lever. The
pedals will start to move forward.
- 5) Release lever and continue to push pedals forward
using light even pressure. The pedals will
automatically lock in the nearest position.



Doc. No. HARMLSAISPOH

- 6) Repeat steps 4) and 5) to move pedals to the desired position.

6. Rudder pedals..... free

WARNING

**DO NOT ADJUST RUDDER PEDAL POSITION IN
FLIGHT OR WITH ENGINE RUNNING**

7. Wing flaps function check

8. **MASTER SWITCH**..... **ON**

9. Trim tab function check

10. **PARKING BRAKE** handle (if installed) release brakes

11. Brakes function check

12. **AVIONICS SWITCH** **OFF**

13. **LANE A, B** **OFF**

14. **FUEL PUMP A,B**..... **OFF**

15. Canopy close

4.5.2 Engine Starting

CAUTION

AFTER ENGINE STARTING AND EFIS SWITCHING-
ON IT IS NECESSARY TO MATCH EFIS
ALTIMETER WITH ANALOG ALTIMETER (SEE EFIS
MANUAL - SETUP - ALT ADJ).

1. **MASTER SWITCH**..... **ON**

2. Fuel gauge indicators..... check of fuel quantity

3. **FUEL** selector **LEFT**

Pull the safety button on the fuel selector, turn the handle to the left and then release safety button. Now the handle can be freely moved between left and right position. Safety button prevents unintentionally switch the selector to **OFF** position.

4. **THROTTLE** lever idle

5. Space in the propeller area free

6. **BEACONS** **ON** (if necessary)

7. Brakes..... apply

8. **LANE A, B** **ON**

9. **FUEL PUMP A, B** **ON**



Doc. No. HARMLSAISPOH

10. **STARTER SWITCH** **START**11. **STARTER** **PUSH**
CAUTION

ACTIVATE STARTER FOR 10 SEC. AS A
 MAXIMUM, AND THEN LET IT COOL DOWN FOR 2
 MINUTES.

AFTER STARTING UP ENGINE, DO NOT CARRY
 OUT SUDDEN RPM CHANGES, AFTER POWER
 DECREASE WAIT FOR ABOUT 3 SEC. IN ORDER
 TO REACH CONSTANT RPM BEFORE
 REACCELERATION.

12. **STARTER SWITCH** **OFF**13. **THROTTLE** lever as necessary (see NOTE)

14. Oil pressure up to 10 sec. min. pressure

15. **GEN, AUX. GEN**(if install) switches **ON**
NOTE

After starting up engine, adjust throttle for smooth
 engine running at about 2500 RPM. Check oil
 pressure. Pressure must increase within 10s. Increase
 engine RPM until oil pressure is stabilized over 2 bar
 (29 PSI).

16. Engine instruments check

17. Engine warming up see NOTE

NOTE

Begin warming up with engine running at 2000 RPM.
 For about 2 minutes, continue at 2500 RPM. Warming
 time depends on outside air temperature until oil
 temperature reaches 122 °F.

18. **FUEL** selector **RIGHT**

Verify proper engine feeding from the right tank for approx.
 1 minute.

19. **FUEL** selector **LEFT**

20. External power source if use give instruction to disconnect it
 (if installed)

21. **AVIONICS SWITCH** **ON**



Doc. No. HARMLSAISPOH

- 22. Radio station / avionics..... **ON**
- 23. Other electrical equipment..... **ON** as necessary

4.5.3 Before Taxiing

- 1. Transponder **SBY**
- 2. Outside lights as necessary
- 3. **BEACONS** **OFF**
- 4. **SOCKET** **OFF**

4.5.4 Taxiing

- 1. **THROTTLE** lever as necessary
- 2. Brakes..... check by depressing
- 3. Rudder pedals..... function check
- 4. Direction of taxiing control by rudder pedals (these are mechanically connected with nose wheel control), possibly by slacking up left and right wheel of the main landing gear.

4.5.5 Before Take-off

- 1. Brakes..... apply
- 2. **BEACONS** **ON** (if necessary)
- 3. Ignition check..... carry out, see NOTE

NOTE

Carry out ignition check in the following way:
Set engine speed to 4000 RPM. Switch **LANE A** set to position **OFF**. Revolution drop max. 250 RPM. Return switch **LANE A** to position **ON**. Switch **LANE B** set to position **OFF**. Revolution drop max. 250 RPM. Return switch **LANE B** to position **ON**.

- 4. Engine instrument check
- 5. Control stick free
- 6. Wing flaps **TAKE-OFF** position (15°)
- 7. Trim tab..... **NEUTRAL**
- 8. Aileron trim **NEUTRAL** (if installed)
- 9. Fuel gauge indicator check on fuel quantity
- 10. **FUEL** selector..... check **LEFT**
- 11. Engine instrument..... check



Doc. No. HARMLSAISPOH

12. Flight instrument.....check
13. Radio station / avionicscheck, set
14. **LANE A, B**check
15. **MASTER SWITCH**.....check **ON**
16. Safety harnesstighten up
17. Canopy.....closed
18. Transponder.....**ON** or **ALT**

4.5.6 Take-off

1. **THROTTLE** lever.....max. take-off power
2. During take-off run smoothly lighten up the nose landing gear until airplane take-off occurs.
3. After take-off accelerate airplane to57 KIAS (66 mph IAS)
4. Main landing gear wheelsbrake to stop main wheel rotation
5. After reaching 150 ft, set flaps toretracted position (0°)
6. Trimas necessary

WARNING

TAKE-OFF IS PROHIBITED:

- **IF ENGINE RUNNING IS IRREGULAR**
- **IF VALUES OF ENGINE INSTRUMENTS ARE NOT WITHIN THE REQUIRED RANGE**

4.5.7 Climb

1. **THROTTLE** lever.....max. continuous power
2. Airspeed $V_Y = 65$ KIAS (74 mph IAS)
..... $V_X = 56$ KIAS (65 mph IAS)
3. Engine instrument.....check
4. Trimas necessary

4.5.8 Cruise

1. **THROTTLE** lever.....as necessary
2. Airspeedas necessary (max. 5500 RPM)
3. Engine instruments.....check
4. Fuel quantitycheck



CAUTION

FUEL GAUGES DISPLAY TRUE FUEL QUANTITY ONLY ON GROUND AND IN A LEVEL FLIGHT. TO READ TRUE FUEL QUANTITY AFTER TRANSITION FROM CLIMB/DESCENT WAIT APPROX. 2 MINUTES TO FUEL TO LEVEL.

NOTE

It is recommended to alternately switch the tanks during cruise to equally consume fuel from both tanks and minimize airplane tendency to bank with unbalanced tanks.

Do not fly with the fuel selector set to RIGHT if the left tank is full to avoid fuel bleed from left tank vent.

When the left tank fuel gauge indicates approx. 1/8 of fuel quantity (needle in the middle between 1/4 and 0) then switch to the right tank to consume remaining fuel and then switch back the left tank to complete the flight at left tank. If the engine conks out due to fuel consumption from either tank, then immediately switch the fuel selector to other tank and engine run will be recovered within 7 seconds.



4.5.9 Descent

1. **THROTTLE** lever.....as necessary
2. Airspeedas necessary
3. Trimas necessary
4. Engine instrument.....check

CAUTION

AT LONG APPROACHING AND DESCENDING FROM HIGH ALTITUDE IT IS NOT SUITABLE TO REDUCE THROTTLE TO MINIMUM FOR THE REASON OF POSSIBLE ENGINE UNDERCOOLING AND SUBSEQUENT LOSS OF POWER. PERFORM DESCENDING AT INCREASED IDLE AND CHECK OBSERVANCE OF THE ALLOWED VALUES ON ENGINE INSTRUMENTS.

4.5.10 Before Landing

1. Fuel quantitycheck

CAUTION

FUEL GAUGES DISPLAY TRUE FUEL QUANTITY ONLY ON GROUND AND IN A LEVEL FLIGHT. TO READ TRUE FUEL QUANTITY AFTER TRANSITION FROM CLIMB/DESCENT WAIT APPROX. 2 MINUTES TO FUEL TO LEVEL.

2. **FUEL** selector.....**LEFT**
3. Engine instrument.....check
4. Brakescheck by depressing pedals
5. Safety harnessestighten up
6. Free area of landing.....check
7. Approaching speed.....60 KIAS (69 mph IAS)
8. Flaps.....**TAKE-OFF** position (15°)
9. Trimas necessary
10. **PARKING BRAKE** handlecheck for lever down (if installed)



CAUTION

PARKING BRAKE MUST BE RELEASED (LEVER DOWN) TO PREVENT LANDING WITH BRAKED WHEELS.

11. **SOCKET** **OFF**

4.5.11 Final

1. Flaps landing pos. (30° or 50°)
2. Maintain airspeed 60 KIAS (69 mph IAS)
3. Trim as necessary

4.5.12 Balked Landing

1. **THROTTLE** lever max. take-off power
2. Flaps **TAKE OFF** position (15°)
3. Airspeed 56 KIAS (65 mph IAS)
4. Flaps at altitude of 150 ft **RETRACTED** position (0°)
5. Trim as necessary
6. **THROTTLE** lever max. continuous power
7. Instruments check
8. Clim at airspeed 65 KIAS (74 mph IAS)

4.5.13 Landing

1. **Flaps** landing pos. (30° or 50°)
2. **THROTTLE** lever idle
3. Touch-down on main landing gear wheels carry out
4. Brakes after nose landing gear
wheel touch-down as necessary

4.5.14 After Landing

1. Flaps **RETRACTED** position (0°)
2. Trim NEUTRAL
3. Outside light **OFF**
4. Transponder **OFF**
5. **BEACONS** **OFF**



4.5.15 Engine Shut-off

1. **THROTTLE** lever.....idle
2. Engine instruments.....check
3. Radio station / avionics.....**OFF**
4. **AVIONICS SWITCH****OFF**
5. Other electrical equipment.....**OFF**
6. **FUEL PUMP A, B**.....**OFF**
7. Ignition **Lane A,B****OFF**
8. **MASTER SWITCH****OFF**



4.5.16 Airplane Parking

1. Ignition check **OFF**
2. **MASTER SWITCH**..... check **OFF**
3. **FUEL** selector **OFF**
Pull the safety button on the fuel selector, turn the handle to the **OFF** position and then release safety button. Now the handle is blocked in the **OFF** position. Safety button prevents unintentionally switch the selector from the **OFF** position.
4. **PARKING BRAKE** handle brake as necessary
5. Fix the control stick using safety harnesses during long-time parking.
6. Canopy..... close,
lock as necessary

NOTE

It is recommended to use parking brake (if installed) for short-time parking only, between flights during a flight day. After ending the flight day or at low temperatures of ambient air, do not use parking brake, but use the wheel chocks instead.

If after releasing the parking brake wheels (or one of them) stay blocked, depress and release the brake pedals. This procedure should result to unblock wheels. If the wheel or wheels fail to unblock by the process (even after repeated depressing) it is necessary to allow vent valve (in the appropriate wheel) and reduce the pressure in the brake circuit.



Intentionally Left Blank



TABLE OF CONTENTS

5 Performance

5.1	Introduction	5-3
5.2	Approved Performance Data	5-4
5.2.1	Airspeed Indicator System Calibration	5-4
5.2.2	Stall Speed	5-5
5.2.3	Take-off Distance	5-7
5.2.4	Landing Distance.....	5-9
5.2.5	Climb Performance.....	5-11
5.3	Additional information	5-13
5.3.1	Cruise	5-13
5.3.2	Horizontal Speeds	5-14
5.3.3	Endurance	5-16
5.3.4	Balked landing climb.....	5-17
5.3.5	Effect on Flight Performance and Characteristics	5-20
5.3.6	Demonstrated Crosswind Performance.....	5-20
5.3.7	Ceiling	5-21
5.3.8	Noise data	5-21



Intentionally Left Blank



5.1 Introduction

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

CAUTION

THE PERFORMANCE STATED IN THIS SECTION IS VALID FOR ROTAX 912 IS (100 hp) TOGETHER WITH GROUND ADJUSTABLE, 3 – BLADED, WARPDRIVE CF PROPELLER, WITH NICKEL PROTECTION OF BLADE LEADING EDGES, INSTALLED IN THE AIRPLANE.

FOR ACTUAL PERFORMANCE SEE SECTION 9 – SUPPLEMENTS.



5.2 Approved Performance Data

5.2.1 Airspeed Indicator System Calibration

NOTE

Assumed zero instrument error. Valid for airplane take-off weight 1320 lbs (600 kg).

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		



5.2.2 Stall Speed

- 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.

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

1320 lbs 60 kg	Flaps position	Stall speed		Altitude loss
		KIAS	KCAS	[ft]
Wing level flight	Retracted (0°)	34	45	200
	Take-off(15°)	33	44	
	Landing II (50°)	33	40	
Turn flight (coordinated turn 30° bank)	Retracted (0°)	39	49	200
	Take-off(15°)	38	48	
	Landing II (50°)	38	45	



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



5.2.3 Take-off Distance

- Conditions:**
- engine
 - flaps
 - airplane weight
 - altitude
 - ambient air temperature
 - max. take-off power
 - Take-off position (15°)
 - 1320 lbs (600 kg)
 - 0 ft ISA
 - ISA

ISA conditions			Concrete RWY		Grass RWY	
Airport altitude H [ft]	Temperature tH		Take-off run	Distance over 50 ft obstacle	Take-off run	Distance over 50 ft obstacle
	[°C]	[°F]	[ft]	[ft]	[ft]	[ft]
0 ft	15.0	59	690	1590	800	1700
2000 ft	11.0	52	780	1790	900	1910
4000 ft	7.1	45	870	2020	1010	2160
6000 ft	3.1	38	990	2280	1150	2430
8000 ft	-0.8	30	1220	2570	1300	2750
10000 ft	-4.8	23	1270	2920	1470	3120

ISA conditions + 10°C (50°F)			Concrete RWY		Grass RWY	
Airport altitude H [ft]	Temperature tH		Take-off run	Distance over 50 ft obstacle	Take-off run	Distance over 50 ft obstacle
	[°C]	[°F]	[ft]	[ft]	[ft]	[ft]
0 ft	25.0	77	740	1700	860	1820
2000 ft	21.0	70	830	1920	960	2050
4000 ft	17.1	63	940	2160	1090	2310
6000 ft	13.1	56	1060	2440	1230	2610
8000 ft	9.2	48	1200	2770	1390	2660
10000 ft	5.2	41	1360	3140	1580	3350



ISA conditions + 20°C (68°F)			Concrete RWY		Grass RWY	
Airport altitude H [ft]	Temperature tH		Take-off run	Distance over 50 ft obstacle	Take-off run	Distance over 50 ft obstacle
	[°C]	[°F]				
0 ft	35.0	95	790	1820	910	1940
2000 ft	31.0	88	890	2050	1030	2190
4000 ft	27.1	81	1000	2310	1160	2470
6000 ft	23.1	74	1140	2620	1320	2800
8000 ft	19.2	66	1290	2970	1490	3170
10000 ft	15.2	59	1460	3370	1690	3600

ISA conditions – 10°C (14°F)			Concrete RWY		Grass RWY	
Airport altitude H [ft]	Temperature tH		Take-off run	Distance over 50 ft obstacle	Take-off run	Distance over 50 ft obstacle
	[°C]	[°F]				
0 ft	5.0	41	640	1480	750	1580
2000 ft	1.0	34	720	1670	840	1780
4000 ft	-2.9	27	810	1870	940	2000
6000 ft	-6.9	20	920	2110	1060	2260
8000 ft	-10.8	12	1040	2390	1200	2550
10000 ft	-14.8	5	1170	2700	1360	2890

ISA conditions – 20°C (- 4°F)			Concrete RWY		Grass RWY	
Airport altitude H [ft]	Temperature tH		Take-off run	Distance over 50 ft obstacle	Take-off run	Distance over 50 ft obstacle
	[°C]	[°F]				
0 ft	-5.0	23	600	1380	690	1470
2000 ft	-11.0	16	670	1550	780	1650
4000 ft	-12.9	9	750	1470	870	1860
6000 ft	-16.9	2	850	1960	990	2090
8000 ft	-20.8	-6	960	2210	1110	2360
10000 ft	-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



5.2.4 Landing Distance

- Conditions:**
- engine – idle
 - flaps – LANDING II (fully extended)
 - airplane weight – 1320 lbs (600 kg)
 - altitude – 0 ft ISA
 - ambient temperature: – ISA

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

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



ISA conditions + 20°C (68°F)			Concrete RWY		Grass RWY	
Airport altitude H[ft]	Temperature tH		Landing run tH	Distance over 50 ft obstacle.	Landing run	Distance over 50 ft obstacle.
	[°C]	[°F]				
0 ft	35.0	95	630	1380	570	1320
2000 ft	31.0	88	670	1460	600	1400
4000 ft	27.1	81	710	1560	640	1480
6000 ft	23.1	74	760	1660	680	1580
8000 ft	19.2	66	810	1760	720	1680
10000 ft	15.2	59	860	1880	770	1790

ISA conditions – 10°C (14°F)			Concrete RWY		Grass RWY	
Airport altitude H[ft]	Temperature tH		Landing run	Distance over 50 ft obstacle.	Landing run	Distance over 50 ft obstacle.
	[°C]	[°F]				
0 ft	5.0	41	570	1250	510	1190
2000 ft	1.0	34	600	1320	540	1260
4000 ft	-2.9	27	640	1400	580	1340
6000 ft	-6.9	20	680	1490	610	1420
8000 ft	-10.8	12	720	1580	650	1510
10000 ft	-14.8	5	770	1680	690	1600

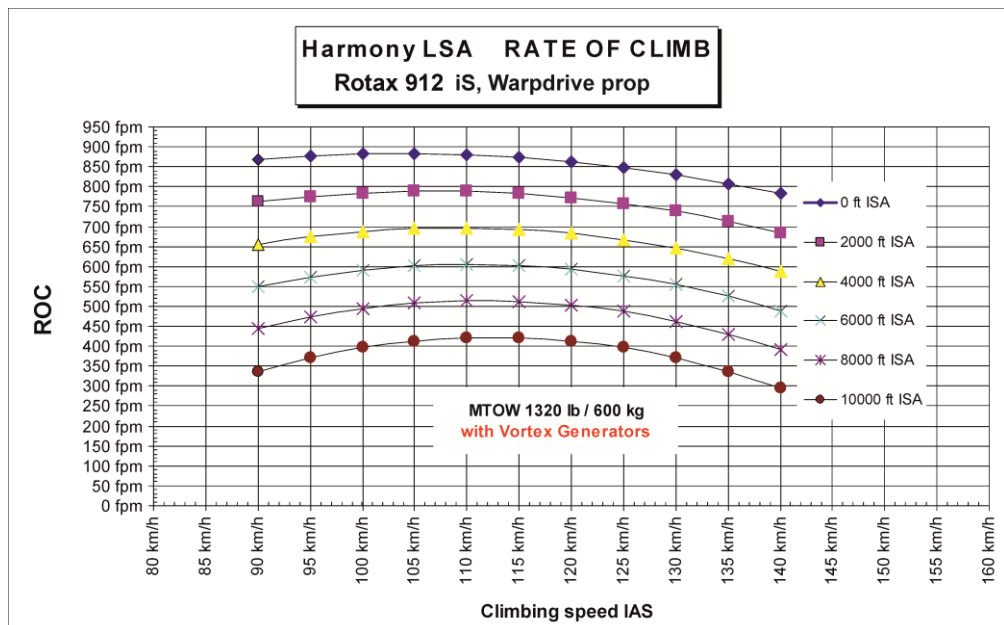
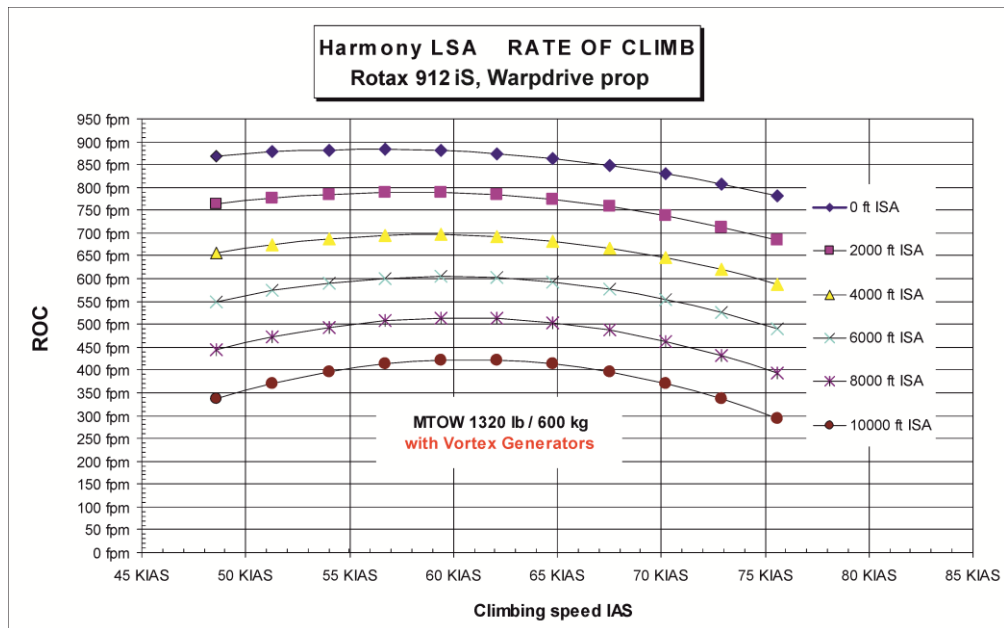
ISA conditions – 20°C (- 4°F)			Concrete RWY		Grass RWY	
Airport altitude H[ft]	Temperature tH		Landing run	Distance over 50 ft obstacle.	Landing run	Distance over 50 ft obstacle.
	[°C]	[°F]				
0 ft	-5.0	23	550	1200	490	1140
2000 ft	-9.0	16	580	1270	520	1210
4000 ft	-12.9	9	620	1350	550	1290
6000 ft	-16.9	2	650	1430	590	1370
8000 ft	-20.8	-6	700	1520	620	1450
10000 ft	-24.8	-13	740	1620	660	1540

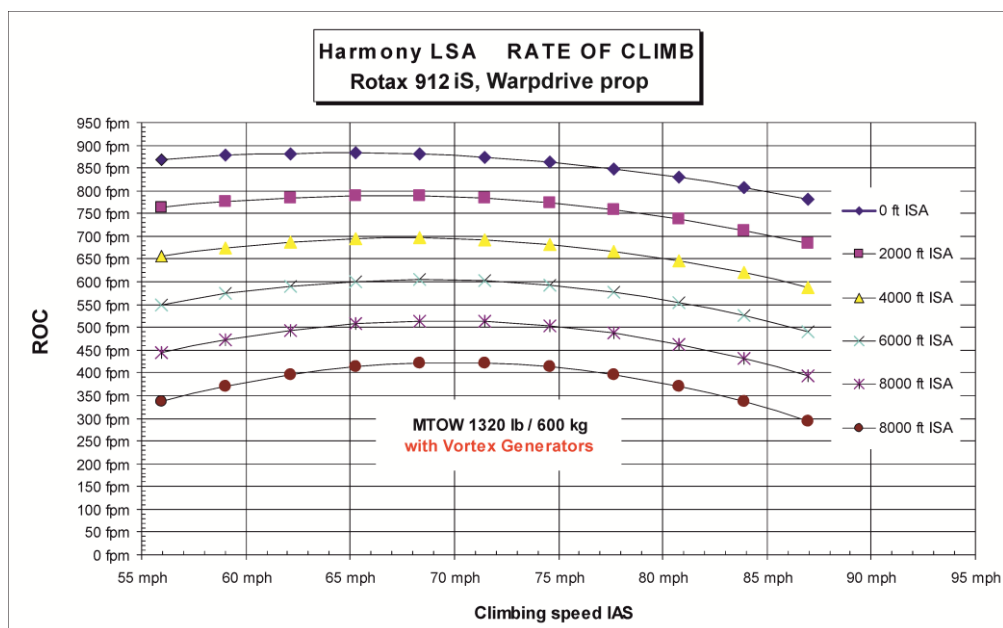
- Corrections:**
- Influence of wind: Add 4.5 % on every 1 kt (1.15 mph) of tail wind
 - RWY inclination: Add 8% of the landing run distance on 1% of runway inclination down the slope



5.2.5 Climb Performance

- Conditions:**
- engine – max. take - off power
 - flaps – retracted (0°)
 - airplane weight – 1320 lbs (600 kg)
 - ambient air temperature - ISA
 - data for R 912 iS engine and Warpdrive propeller





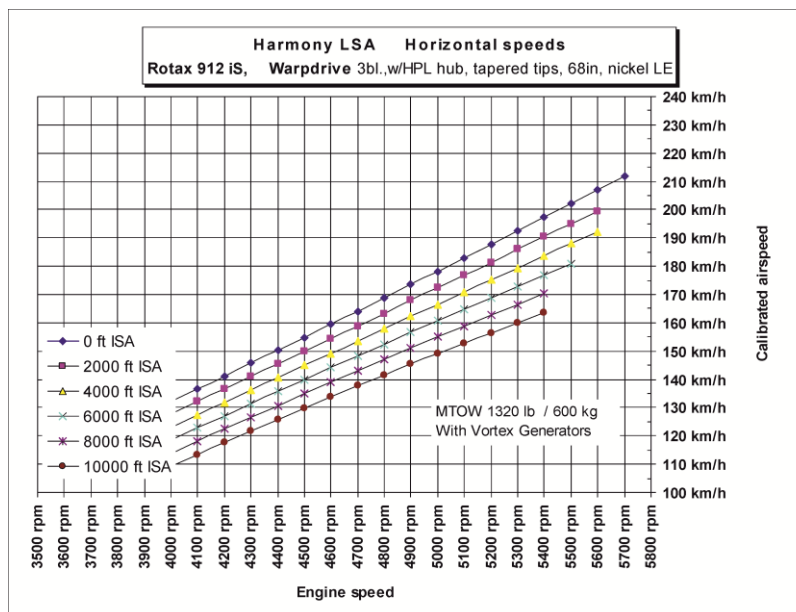
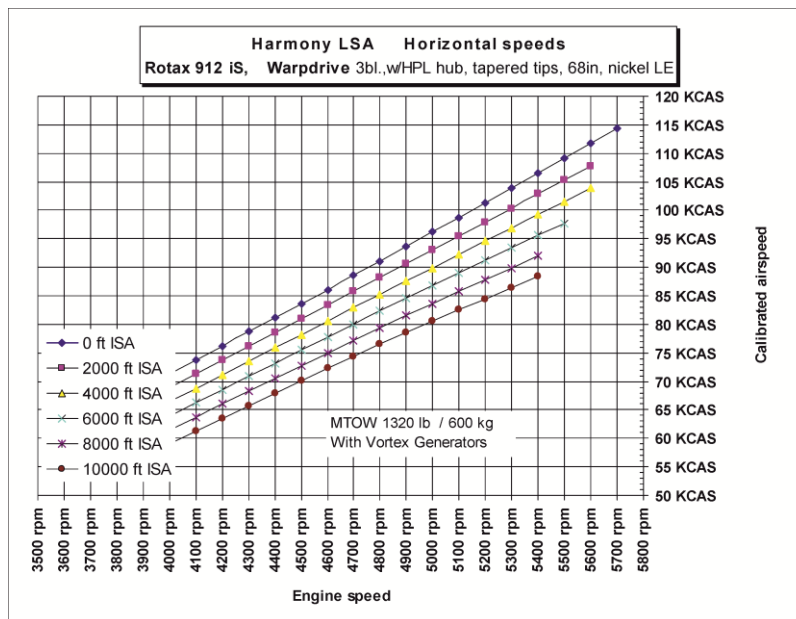
Best rate of climb: 60 KIAS, 110 km/h, 70 mph

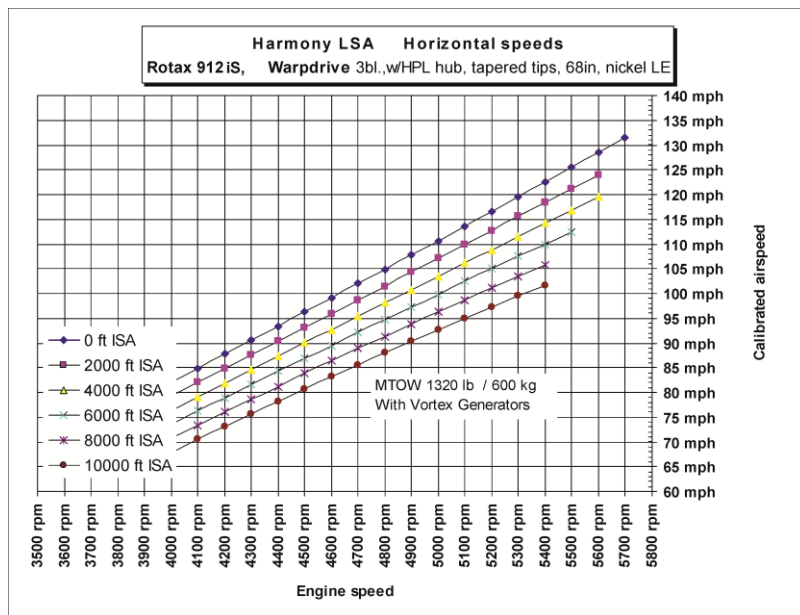


5.3 Additional information

5.3.1 Cruise

- Conditions:**
- flaps – retracted (0°)
 - airplane weight – 1320 lbs (600 kg)
 - vortex generator along the whole span of the wing
 - ambient air temperature - ISA
 - data for R 912 iS and Warpdrive prop





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		



Harmony^{LSA}

PILOT'S OPERATING HANDBOOK

Section 5

Performance

Doc. No. HARMLSAISPOH

		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	195	
	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		



5.3.3 Endurance

- Conditions:**
- altitude – 2000 ft ISA
 - flaps – retracted (0°)
 - airplane weight – 1320 lb (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	95 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
		26,0 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
	13 kg	139 kg	156 kg	169 kg	183 kg	197 kg	210 kg
	0 kg	151 kg	168 kg	182 kg	196 kg	209 kg	223 kg
Baggage max.	55 lb	279 lb	316 lb	346 lb	376 lb	406 lb	436 lb
	28 lb	306 lb	343 lb	373 lb	404 lb	434 lb	464 lb
	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
Fuel consumption	[l/h]	12,2	15,9	18,0	25,0
	[USgal/h]	3,2	4,2	4,8	6,6
	[UKgal/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 l	[h:m]	9:40	7:25	6:33	4:43
Range at	118,1 l	[km]	1380	1230	1140	930
	31,2 USGAL	[NM]	750	660	620	500
	26,0 UKGAL	[miles]	860	760	710	580

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

Endurance at	75,7 l	[h:m]	6:11	4:45	4:12	3:01
Range at	75,7 l	[km]	880	780	730	590
	20,0 USGAL	[NM]	480	420	390	320
	16,7 UKGAL	[miles]	550	480	450	370

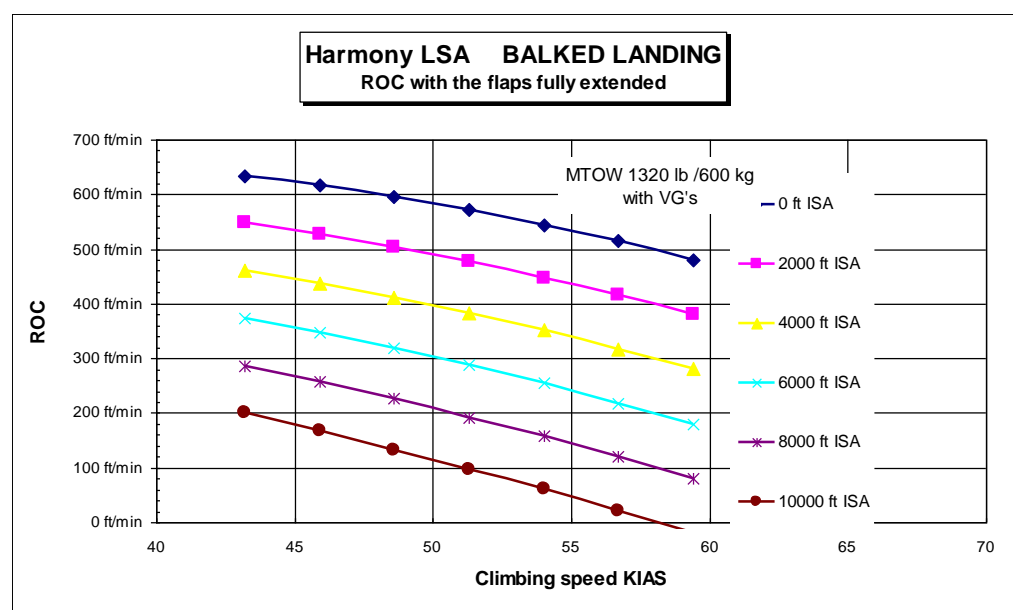
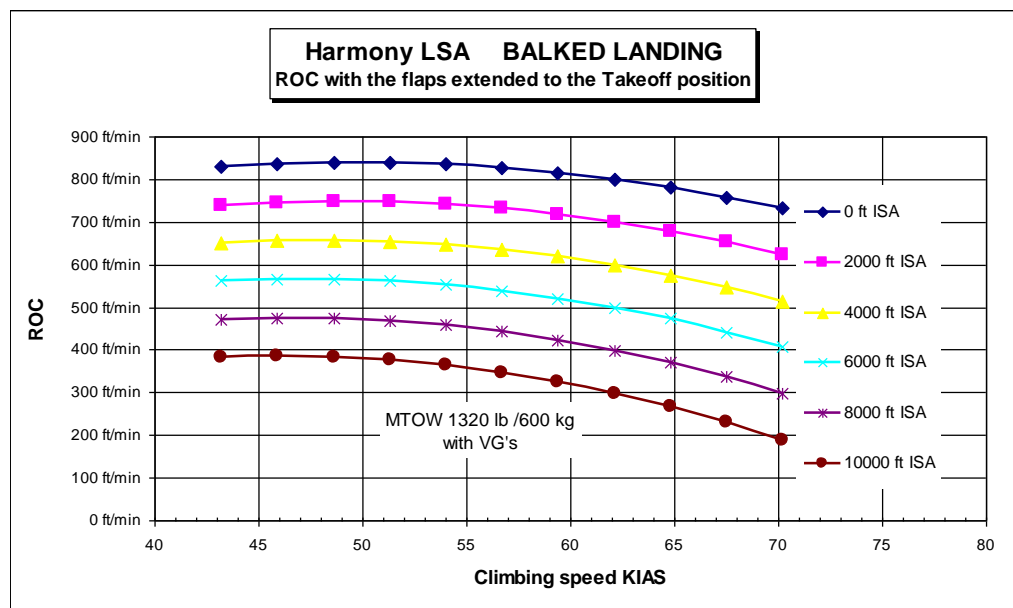
Endurance at	56,8 l	[h:m]	4:38	3:34	3:09	2:16
Range at	56,8 l	[km]	650	580	540	440
	15,0 USGAL	[NM]	350	310	290	240
	12,5 UKGAL	[miles]	400	360	340	270

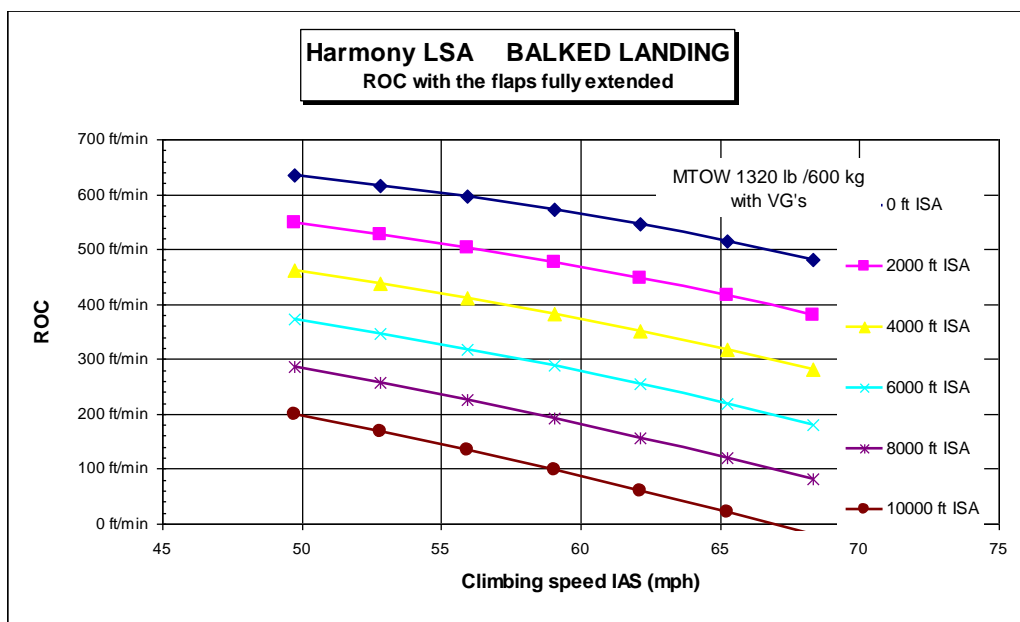
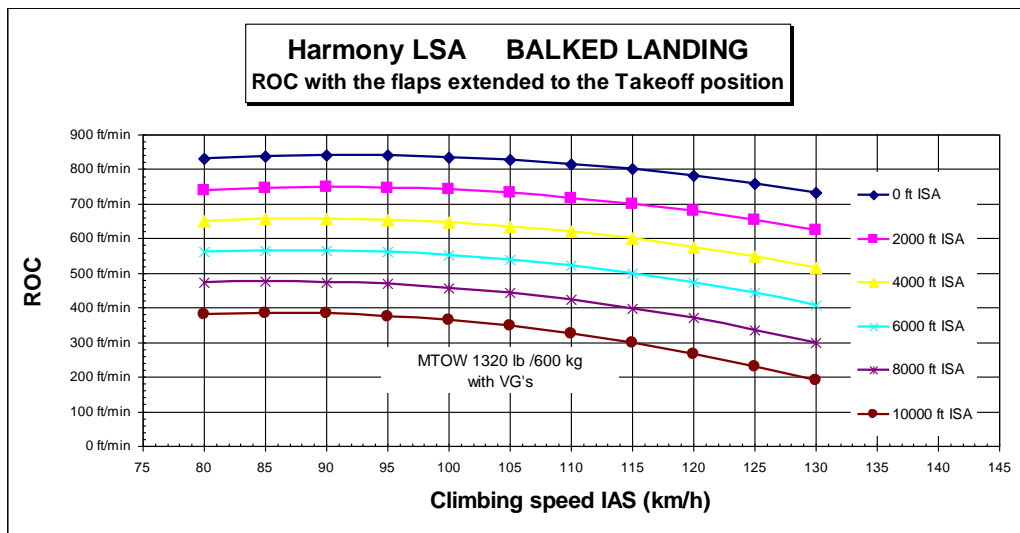
Endurance at	37,9 l	[h:m]	3:05	2:22	2:06	1:30
Range at	37,9 l	[km]	430	380	350	290
	10,0 USGAL	[NM]	230	210	190	160
	8,3 UKGAL	[miles]	270	240	220	180



5.3.4 Balked landing climb

- Conditions:**
- engine – maximum take – off power
 - flaps – take – off, landing II
 - airplane weight – 1320 lb (600 kg)
 - vortex generators along the whole span of the wing
 - ambient air temperature – ISA
 - data for R 912 iS and Warp drive propeller







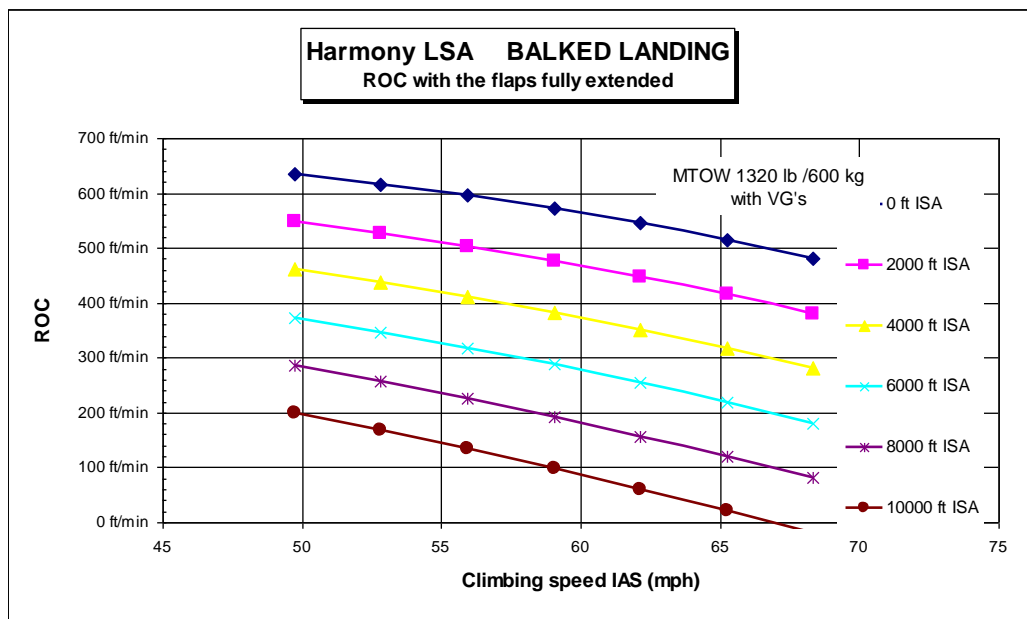
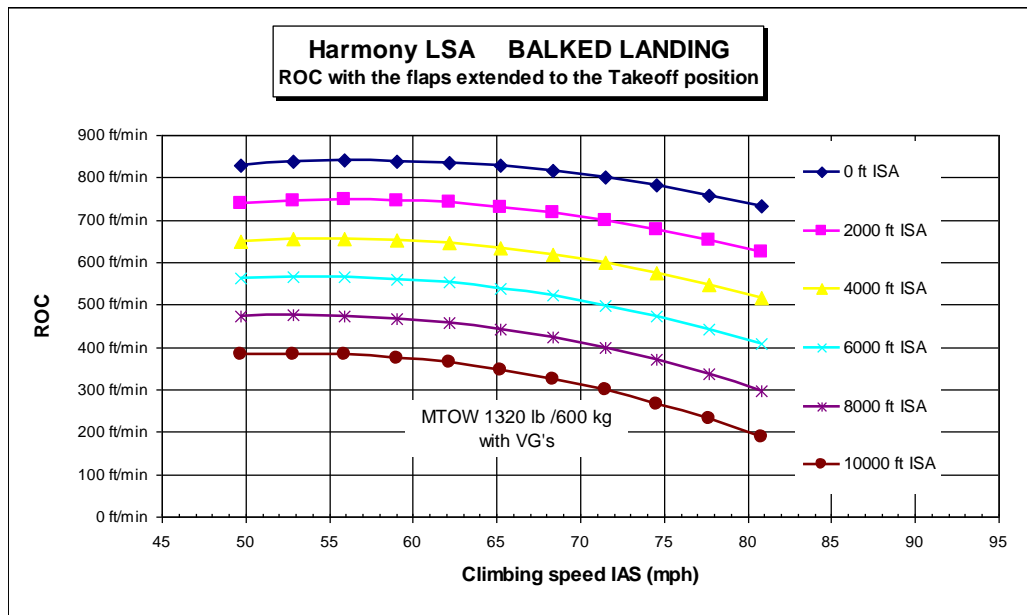
Harmony^{LSA}

PILOT'S OPERATING HANDBOOK

Section 5

Performance

Doc. No. HARMLSAISPOH





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 operation24 kt (28 mph)

Maximum demonstrated speed of cross wind

for take-off and landing 16 kt (18.4 mph)

Maximum demonstrated speed of tail wind6 kt (7 mph)

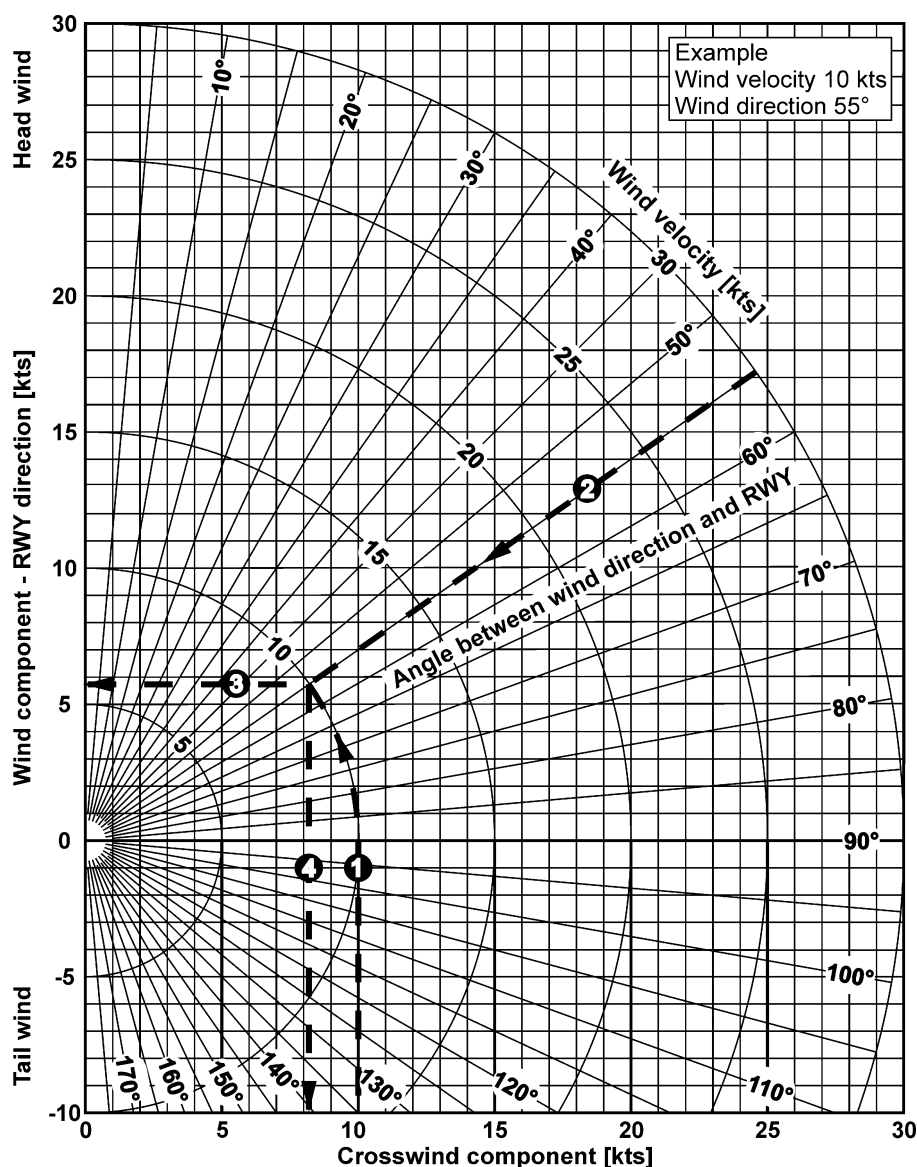


Figure 5-1 Influence of wind on take – off and landing



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



Intentionally Left Blank



TABLE OF CONTENTS

6 Weight and Balance

6.1	Introduction	6-3
6.2	Weight and Balance Record	6-4
6.3	Permitted Payload Range	6-5
6.4	Operational Weight and Balance Computation	6-6
	6.4.1 Computation Procedure.....	6-6
6.5	Airplane Loading Schedule Chart.....	6-8
6.6	Table of Static Moments	6-10
6.7	Airplane Loading Graph.....	6-11
6.8	CG Moment Envelope	6-12
6.9	Operational Weight and CG Envelope	6-13
6.10	Equipment List	6-14



Intentionally Left Blank



6.1 Introduction

This Section includes Weight and Balance Record of empty airplane, Permitted Payload Range within which the airplane may be safely operated, and a method to determine whether the operational weight and CG location will be within the permitted limits range.

Procedure for weighing the airplane and the calculation method for establishing the permitted payload range are contained in the Airplane Maintenance Manual for Harmony LSA.



6.2 Weight and Balance Record

[illegible]



6.3 Permitted Payload Range

MAXIMUM WEIGHT OF CREW [lb]			Airplane S/N:							MTOW [lb]:1320		
Date	Empty weight [lb]	C.G. [% MAC]	FUELLING							Date	Signature	
			Fuel volume	1	0.8	0.6	0.4	0.3	0.2			
			Fuel volume [US gals]	30	25	20	15	10	5			
			Fuel weight [lb]	180	150	120	90	60	30			
			55									
			28									
			0									
			55									
			28									
			0									
			55									
			28									
			0									
			55									
			28									
			0									
			55									
			28									
			0									



6.4 Operational Weight and Balance Computation

An important part of preflight planning is to determine that the aircraft is loaded so its weight and CG location are within the allowable limits.

This is possible by using hereafter explained Loading graph method, using weights, arms, and moment indexes.

6.4.1 Computation Procedure

1. Record into the **Airplane Loading Schedule Chart** current empty weight and static moment of the airplane, which you read from the table 6.2 Weight and Balance Record.
2. Record the weight of crew, fuel, and baggage into the **Airplane Loading Schedule Chart**.
3. See the **Table of Static Moments** or **Airplane Loading Graph** to read static moments for given weights of crew, fuel, and baggage
4. Record found moments into the **Airplane Loading Schedule Chart**
5. Determine Take-off weight of the airplane – add together the airplane empty weight, crew, fuel, and baggage and record the result into the **Loading Schedule Chart**.
6. Check, whether the calculated Take-off weight does not exceed Airplane Maximum Take-off Weight 1320 lb.
If yes, then it is necessary to reduce weight of some of the useful load items (fuel, baggage).

WARNING

**EXCEEDING MTOW MAY LEAD TO
DETERIORATION OF SAFETY OF FLIGHT!**

7. Determine Total Static Moment of loaded airplane – add together the static moment of empty airplane, crew, fuel, and baggage and record the result into the **Loading Schedule Chart**.
8. Plot Takeoff Weight and Total Static Moment into the **HARMONY LSA CG Moment Envelope**.
9. Check, whether the intersection of Take-off weight horizontal line and Total Static Moment vertical line is inside the envelope.
If **YES**, then the flight may be safely performed as regards weight and balance.
If **NOT**, then it is necessary to change weight of some of the useful load items (crew, fuel, baggage) so that after a repeated computation the intersection of Take-off Weight and Total Static Moment will be inside the CG Moment envelope.



Doc. No. HARMLSAISPOH

WARNING

**SAFETY OF FLIGHT PERFORMED WITH THE
AIRPLANE LOADED OUTSIDE PERMITTED LIMITS
OF WEIGHT AND STATIC MOMENTS MAY BE
DETERIORATED!**



6.5 Airplane Loading Schedule Chart

Type/Model:	Harmony LSA
Serial No.:	
Registration:	

Input data

LOADING SCHEDULE CHART		Your Aircraft			Sample Aircraft		
No.	Item	Arm (m)	Weight (kg)	Moment (kg.m)	Arm (m)	Weight (kg)	Moment (kg.m)
		(1)	(2)	(3) = (1) x (2)	(1)	(2)	(3) = (1) x (2)
1.	Empty Airplane <i>See Weight and Balance Record delivered with your airplane</i>				0,148	364	54
2.	Crew	0,489			0,489	172	84
3.	Baggage Max.: 25 kg 55 lb	1,027			1,027	25	26
4.	Fuel Max. 120 l Density 0.72 kg/ l	0,623			0,623	40	25

TOTAL WEIGHT (kg)	TOTAL MOMENT (kg.m)
(7) = SUM (1÷4)	(8) = SUM (1÷4)

TOTAL WEIGHT (kg)	TOTAL MOMENT (kg.m)
(7) = SUM (1÷4)	(8) = SUM (1÷4)
601	188

C.G. (m):	=	$\frac{\text{TOTAL MOMENT}}{\text{TOTAL WEIGHT}}$	=	
-----------	---	---	---	--

=	$\frac{\text{TOTAL MOMENT}}{\text{TOTAL WEIGHT}}$	=	0,314
---	---	---	--------------

C.G.' (% MAC):	=	$\frac{\text{C.G. (m)}}{\text{MAC}} \times 100$	=	
----------------	---	---	---	--

=	$\frac{\text{C.G. (m)}}{\text{MAC}} \times 100$	=	26,4
---	---	---	-------------

Explanation:

C.G. (m) Center of Gravity position from Datum origin (0,05615 m behind Wing leading edge)
 C.G.' (%MAC) Center of Gravity position in percent of Mean Aerodynamic Chord
 MAC (m) Mean Aerodynamic Chord (m) 1,1855

Limits:

600 kg Maximum Takeoff Weight (with Vortex Generators - valid for the USA)
 575 kg Maximum Takeoff Weight (No Vortex Generators - valid for the USA)
 14 ± 5 %MAC Empty Airplane C.G. Range
 13 - 33 %MAC Operating C.G.range



Harmony^{LSA}

PILOT'S OPERATING HANDBOOK

Section 6

Weight & Balance

Doc. No. HARMLSAISPOH

Type/Model:	Harmony LSA
Serial No.:	
Registration:	

Input data

LOADING SCHEDULE CHART		Your Aircraft			Sample Aircraft		
No.	Item	Arm (in) (1)	Weight (lb) (2)	Moment/100 (lb.in) (3) = (1) x (2) / 100	Arm (in) (1)	Weight (lb) (2)	Moment (lb.in) (3) = (1) x (2)
1.	Empty Airplane <i>See Weight and Balance Record delivered with your airplane</i>				5,83	802	46,7
2.	Crew	19,25			19,25	379	73,0
3.	Baggage Max.: 25 kg 55 lb	40,43			40,43	55	22,3
4.	Fuel Max. 32 USgal Density 6 lb / USgal	24,54			24,54	87	21,4

TOTAL WEIGHT (lb) (7) = SUM (1+4)	TOTAL MOMENT/100 (lb.in) (8) = SUM (1+4)

TOTAL WEIGHT (lb) (7) = SUM (1+4)	TOTAL MOMENT/100 (lb.in) (8) = SUM (1+4)
1324	163

C.G. (in):	=	$\frac{\text{TOTAL MOMENT}}{\text{TOTAL WEIGHT}}$	=	
------------	---	---	---	--

$\frac{\text{TOTAL MOMENT}}{\text{TOTAL WEIGHT}}$	=	12,345
---	---	--------

C.G.' (%MAC):	=	$\frac{\text{C.G. (in)}}{\text{MAC}} \times 100$	=	
---------------	---	--	---	--

$\frac{\text{C.G. (in)}}{\text{MAC}} \times 100$	=	26,4
--	---	------

Explanation:

C.G. (in) Center of Gravity position from Datum origin (2.21 in behind Wing leading edge)
C.G.' (%MAC) Center of Gravity position in percent of Mean Aerodynamic Chord
MAC (m) Mean Aerodynamic Chord (m) 46,6732

Limits:

1320 lb Maximum Takeoff Weight (with Vortex Generators - valid for the USA)
1268 lb Maximum Takeoff Weight (No Vortex Generators - valid for the USA)
14 ± 5 %MAC Empty Airplane C.G. Range
13 - 33 %MAC Operating C.G.range

*) – for your empty airplane arm see Weight and Balance Record delivered with your airplane



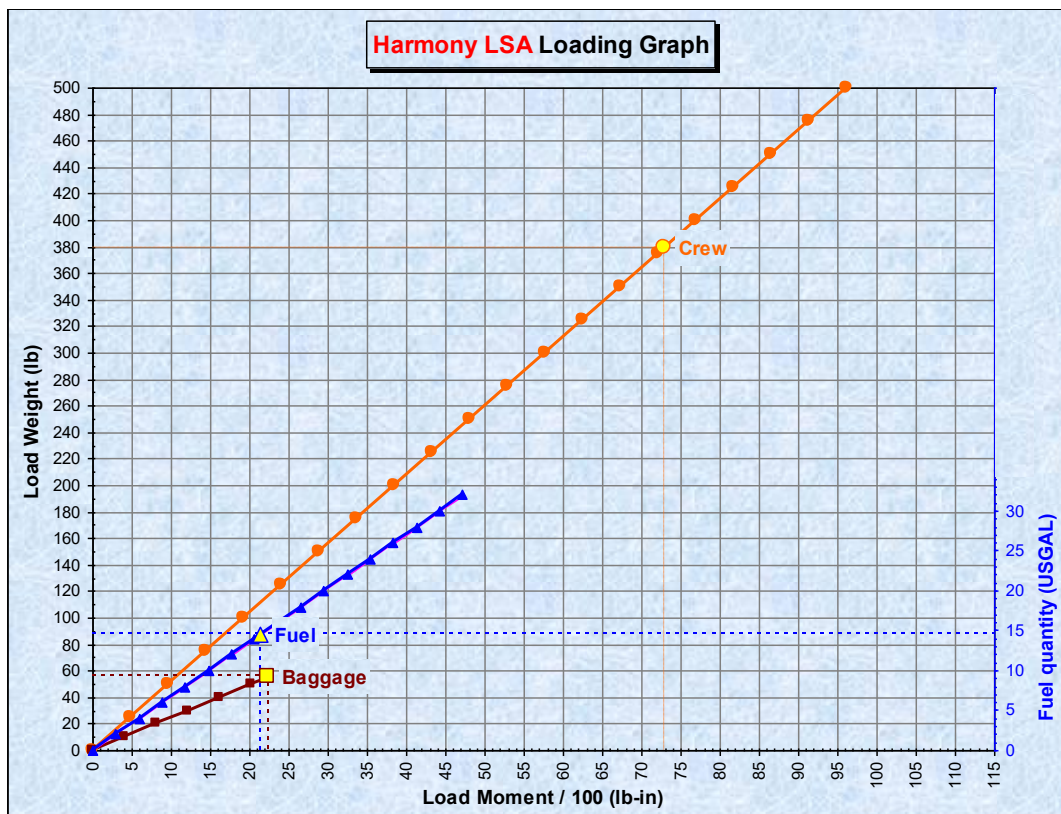
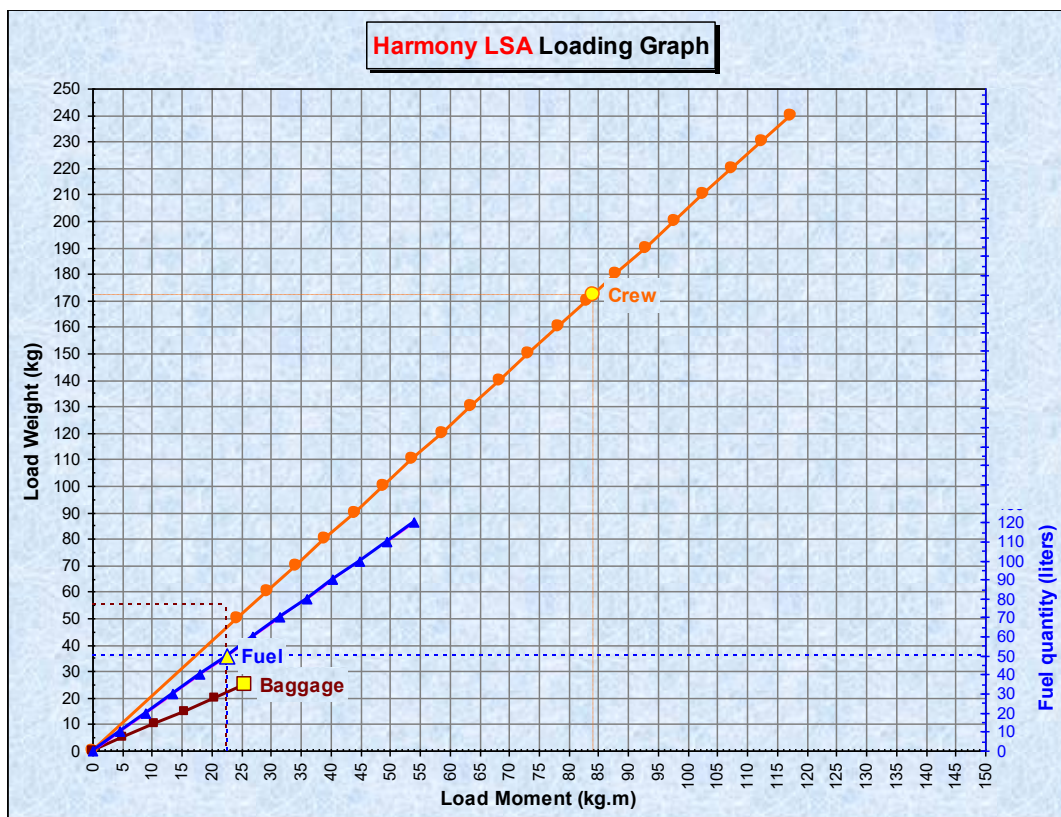
6.6 Table of Static Moments

CREW		BAGGAGE		FUEL		
Weight (kg)	Moment (kg.m)	Weight (kg)	Moment (kg.m)	Quantity (liters)	Weight (kg)	Moment (kg.m)
0	0,0	0	0,0	0,0	0,0	0,0
50	24,4	5	5,1	10,0	7,2	4,5
60	29,3	10	10,3	20,0	14,4	9,0
70	34,2	15	15,4	30,0	21,6	13,5
80	39,1	20	20,5	40,0	28,8	18,0
90	44,0	25	25,7	50,0	36,0	22,4
100	48,9			60,0	43,2	26,9
110	53,8			70,0	50,4	31,4
120	58,7			80,0	57,6	35,9
130	63,6			90,0	64,8	40,4
140	68,4			100,0	72,0	44,9
150	73,3			110,0	79,2	49,4
160	78,2			120,0	86,4	53,9
170	83,1					
180	88,0					
190	92,9					
200	97,8					
210	102,7					
220	107,5					
230	112,4					
240	117,3					

CREW		BAGGAGE		FUEL		
Weight (lb)	Moment/100 (lb-in)	Weight (lb)	Moment/100 (lb-in)	Quantity (USGal)	Weight (lb)	Moment/100 (lb-in)
0	0,0	0	0,0	0,0	0,0	0,0
25	4,8	10	4,0	2,0	12,0	2,9
50	9,6	20	8,1	4,0	24,0	5,9
75	14,4	30	12,1	6,0	36,1	8,8
100	19,2	40	16,2	8,0	48,1	11,8
125	24,1	50	20,2	10,0	60,1	14,7
150	28,9	55	22,2	12,0	72,1	17,7
175	33,7			14,0	84,1	20,6
200	38,5			16,0	96,1	23,6
225	43,3			18,0	108,2	26,5
250	48,1			20,0	120,2	29,5
275	52,9			22,0	132,2	32,4
300	57,7			24,0	144,2	35,4
325	62,5			26,0	156,2	38,3
350	67,4			28,0	168,2	41,3
375	72,2			30,0	180,3	44,2
400	77,0			32,0	192,3	47,2
425	81,8					
450	86,6					
475	91,4					
500	96,2					

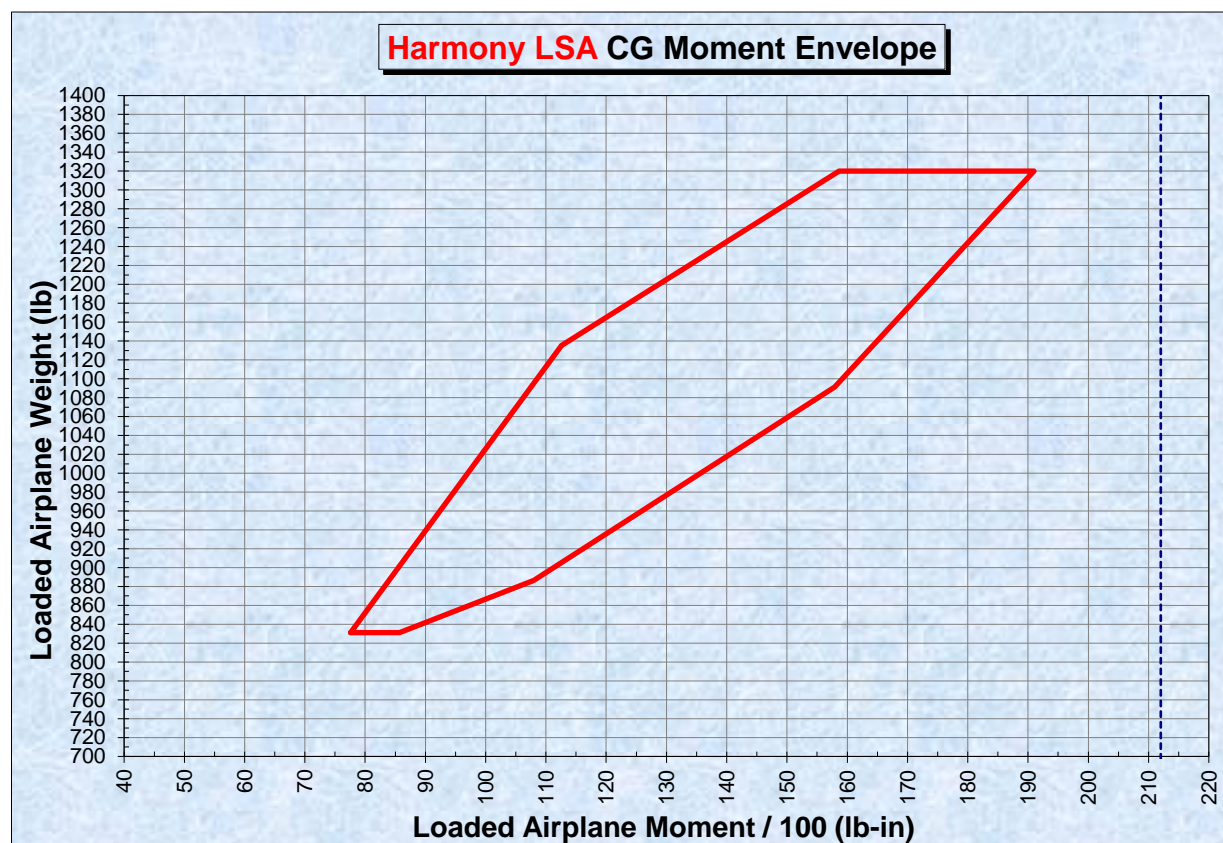
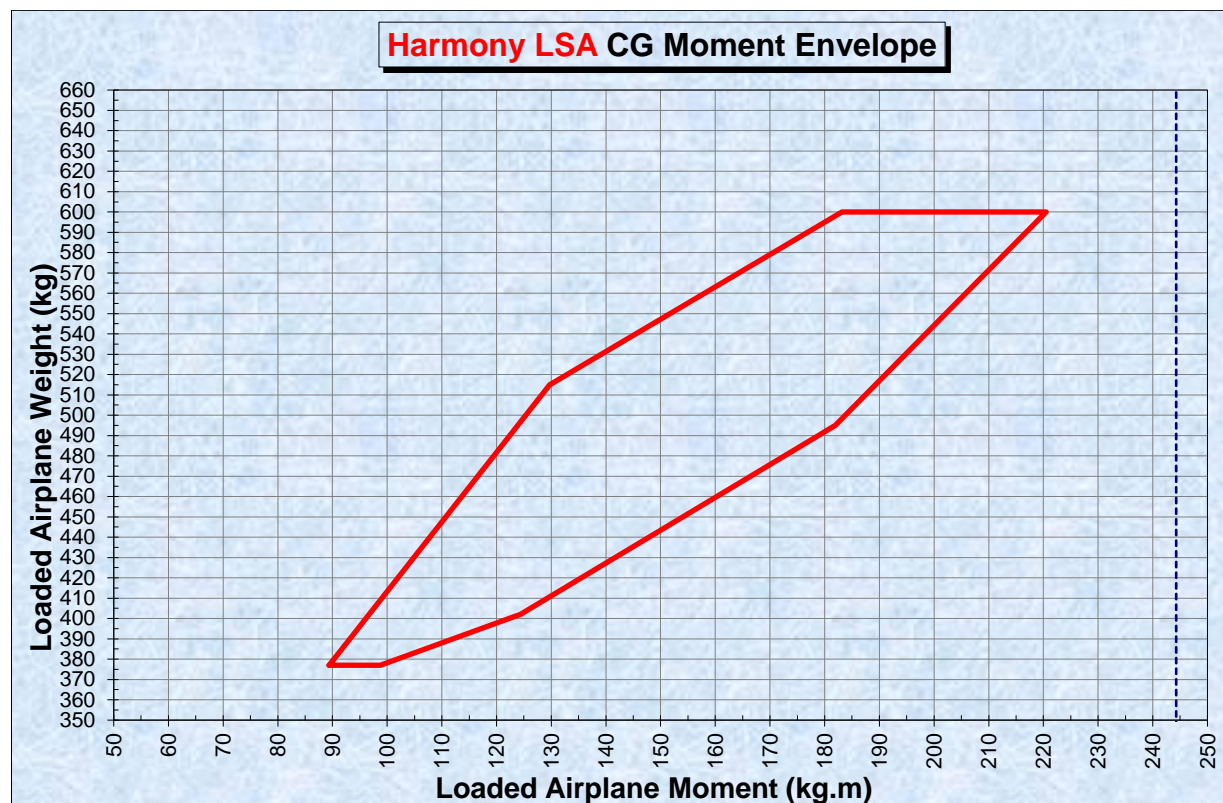


6.7 Airplane Loading Graph



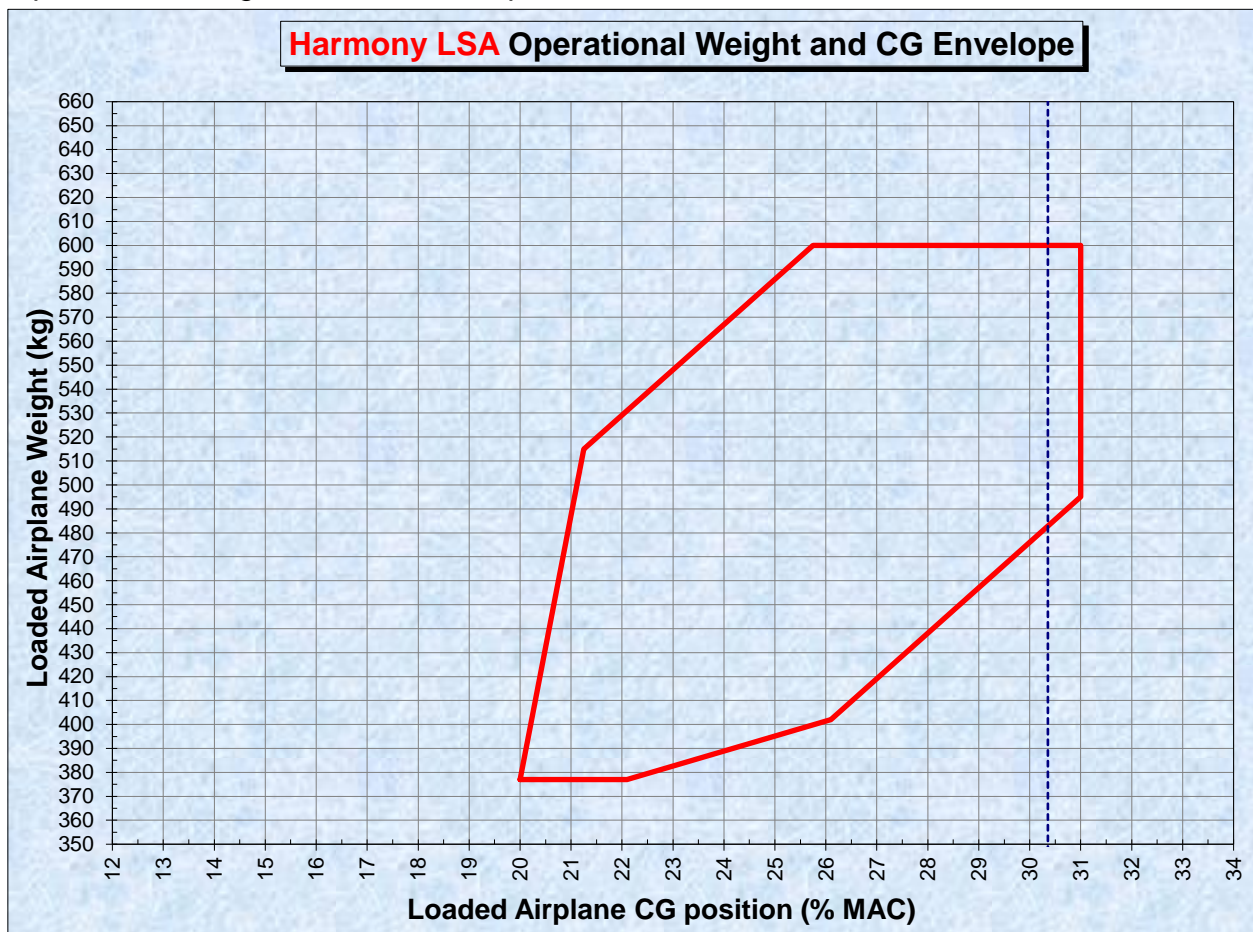


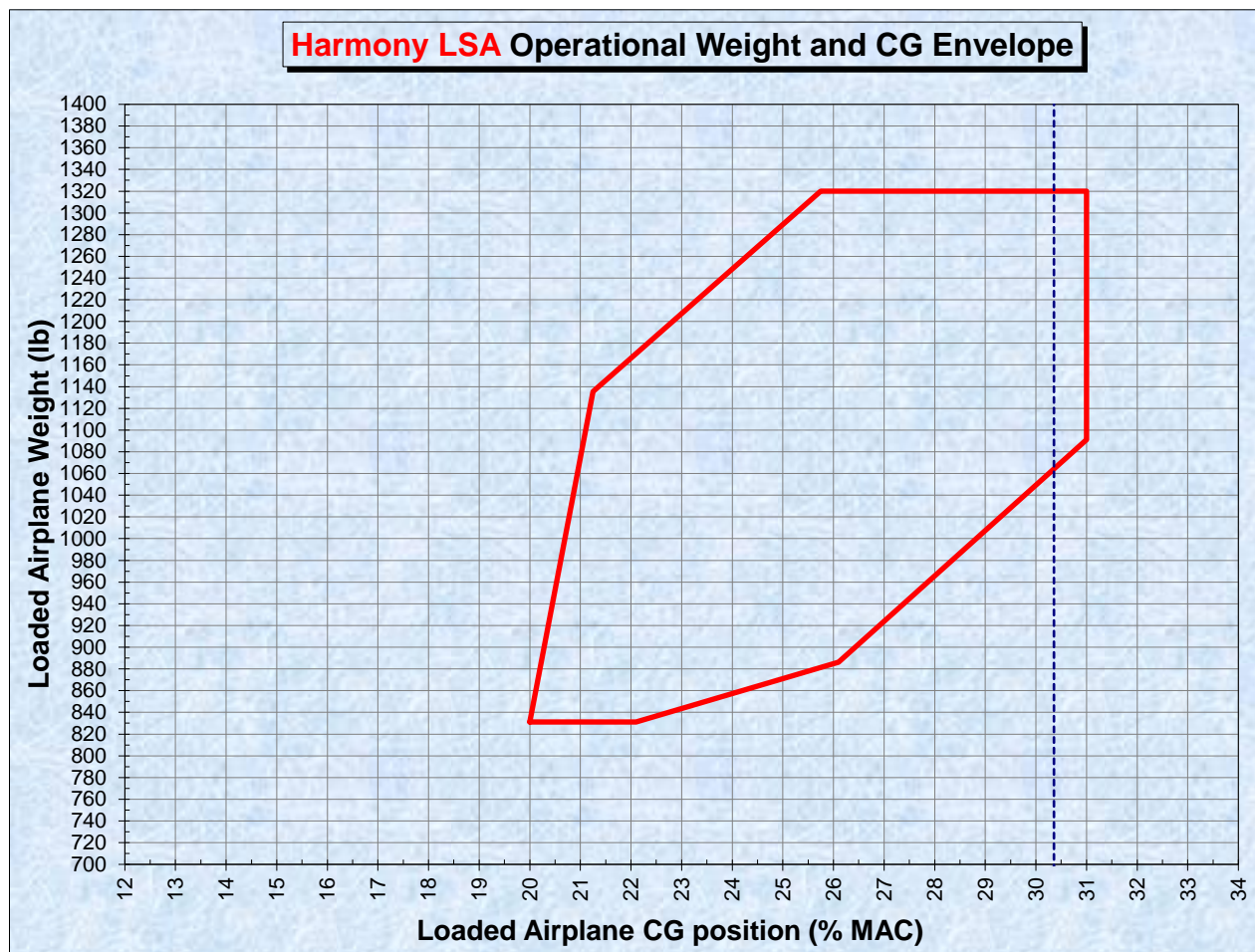
6.8 CG Moment Envelope





Operational Weight and CG Envelope





6.9 Equipment List

The equipment list is located in Supplement in Section 9 of this POH.



TABLE OF CONTENTS

7 Airplane and System Description

7.1	Introduction	7-3
7.2	Airframe.....	7-3
7.2.1	Fuselage.....	7-3
7.2.2	Wing	7-3
7.2.3	Horizontal Tail Unit (HTU)	7-3
7.2.4	Vertical Tail Unit (VTU).....	7-3
7.3	Control.....	7-5
7.3.1	Longitudinal Control	7-5
7.3.2	Elevator Trim Tab Control	7-6
7.3.3	Lateral Control.....	7-7
7.3.4	Aileron trim tab control.....	7-9
7.3.5	Rudder Control.....	7-10
7.3.6	Wing Flaps Control.....	7-12
7.4	Controls in the Cockpit and Instrument Panel.....	7-14
7.5	Inside and Outside Marking and Placards	7-15
7.6	Landing Gear and Brakes	7-15
7.6.1	Landing Gear.....	7-15
7.6.2	Brakes	7-16
7.7	Seat and Safety Harnesses.....	7-18
7.8	Baggage Compartment.....	7-18
7.9	Canopy	7-18
7.10	Power Unit.....	7-19
7.10.1	General.....	7-19
7.10.2	Engine Control.....	7-19
7.10.3	Engine Instruments	7-20
7.10.4	Engine Cooling System	7-22
7.10.5	Engine Lubrication System.....	7-23
7.10.6	Engine Intake System.....	7-24

Section 7

Airplane and System
Description

Harmony^{LSA}
PILOT'S OPERATING HANDBOOK



Doc. No. HARMLSAISPOH

7.10.7 Ignition System	7-24
7.10.8 Engine electrical system	7-25
7.10.9 Fuel System	7-25
7.10.10 Fuel Tanks.....	7-25
7.10.11 Fuel Selector	7-26
7.10.12 Fuel Filter	7-26
7.10.13 Indication of Fuel Quantity.....	7-26
7.10.14 Fuel Tank Draining	7-26
7.11 Electrical System	7-29
7.11.1 Lighting	7-29
7.12 Pitot-static System.....	7-31
7.13 Supplementary Equipment.....	7-32
7.13.1 Stall Speed Warning System	7-32
7.13.2 Ventilation and Heating System	7-33
7.14 Navigation and Communication Equipment.....	7-35



7.1 Introduction

This section describes systems of the airplane and its operation. Information on optional systems and equipment is available in section 9, Supplements.

7.2 Airframe

The airframe of Harmony LSA airplane is of semimonocoque, metal -composite structure consisting of metal reinforcement, frames and duralumin sheet skin.

7.2.1 Fuselage

The fuselage is of semimonocoque structure consisting of reinforcements and duralumin skin. Fuselage section is rectangular in the lower part and elliptic in the upper part. The fin is an integral part of fuselage. Top part of the fuselage including canopy frame is made of composite. The cockpit for two-member crew is located in the middle part of the fuselage that is accessible after uncovering the single-piece organic glass canopy. The engine compartment in the front part of the fuselage is separated from the cockpit by the steel fire wall to which the engine bed is attached.

7.2.2 Wing

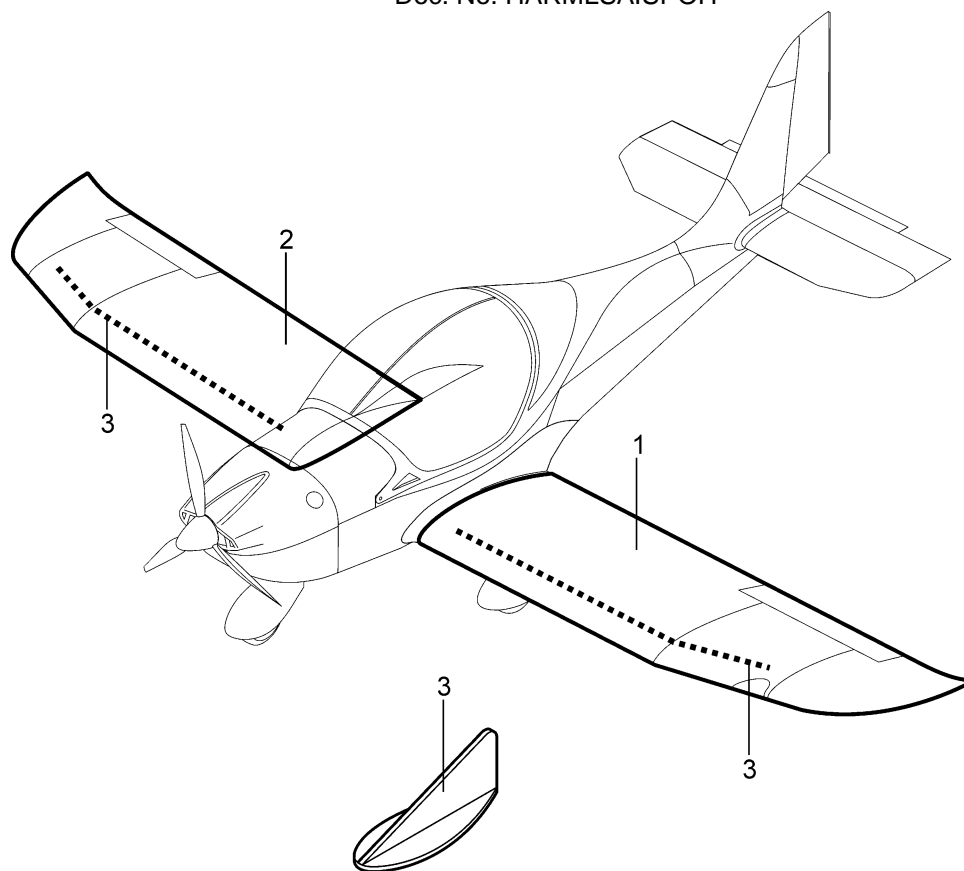
The wing is of rectangular shape with trapezoidal wing tip, single-spar structure with the auxiliary spar with suspended ailerons and split wing flaps. Riveting is used for connecting individual structural elements. Fiber-glass wing tips are riveted on the wing ends. Wings can be equipped Vortex generator (Fig. 7-1).

7.2.3 Horizontal Tail Unit (HTU)

The HTU of conventional type consists of the stabilizer and elevator with the trim tab. Single-spar structure of HTU consists of duralumin ribs, spar and skin. Top view of HTU is of rectangular shape with trapezoidal tip. Fiber-glass tips are riveted on the stabilizer and elevator ends.

7.2.4 Vertical Tail Unit (VTU)

VTU is of trapezoidal shape. Its fin is an integral part of the fuselage. The rudder is suspended on the fin by means of two hinges. The VTU structure consists of the duralumin spar and skin. Fiber-glass tips are riveted on the fin and rudder ends.



Legend to Figure 7-1:

- | | | | |
|---|------------|---|--------|
| 1 | Left wing | 3 | Vortex |
| 2 | Right wing | | |

Figure 7-1 Vortex installation



7.3 Control

Airplane control consists of ailerons, elevator and rudder. Directional control is connected by means of pull rods with nose landing gear control. Main landing gear brakes are controlled by pedals of directional control.

Airplane is equipped with dual control enabling flight with two-member crew.

7.3.1 Longitudinal Control

The longitudinal control is operated by the left control stick (1, Figure 7 - 2) or the right control (2) stick that are attached to the countershaft (3) of manual control. The movement of the control stick is transferred from the countershaft by the pull-rod (4), led via the central channel (between the seats) in the cockpit, to the deflection of the two-armed lever (5) located under the floor in the baggage compartment. An angular deflection of the two-armed lever is transferred to a longitudinal movement of two pull-rods (6, 8) connected with the rocker arm (7) in the middle of the rear part of the fuselage. The rear pull-rod (8) is attached to the elevator lever (9).

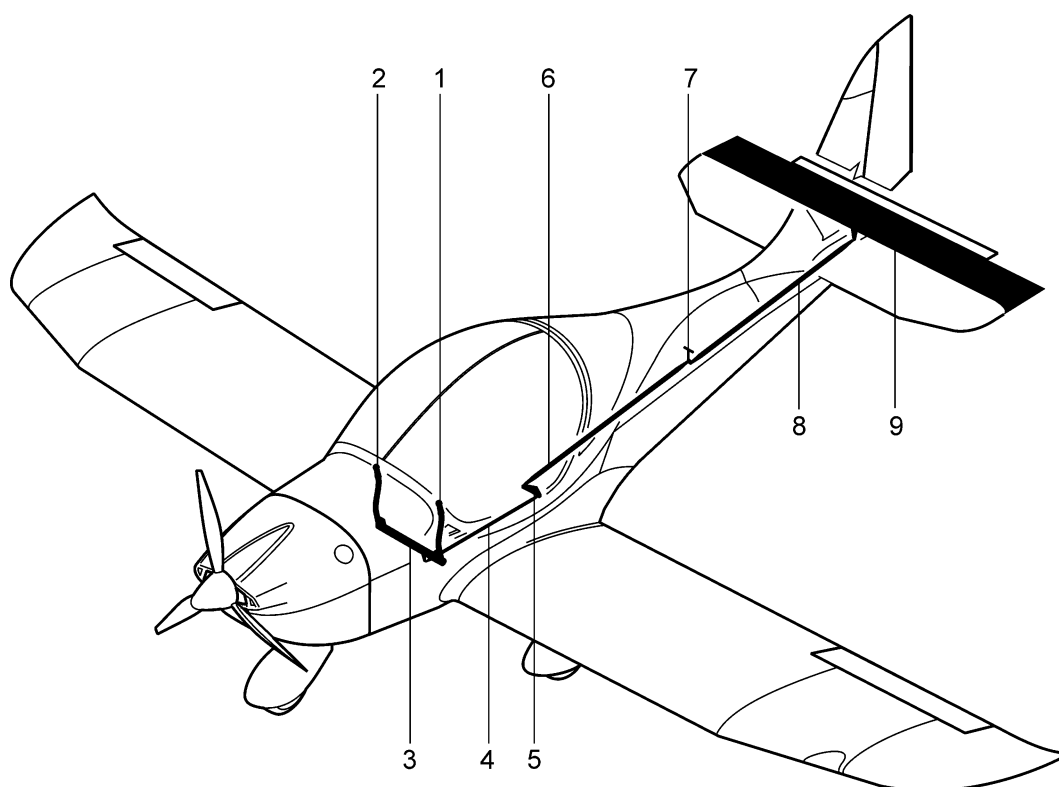


Figure 7-2 Longitudinal control (page 1 of 2)



Legend to Figure 7-2:

1	Left control stick	6	Pull-rod
2	Right control stick	7	Rocker arm
3	Countershaft of manual control	8	Pull-rod
4	Pull - rod	9	Elevator
5	Two armed lever		

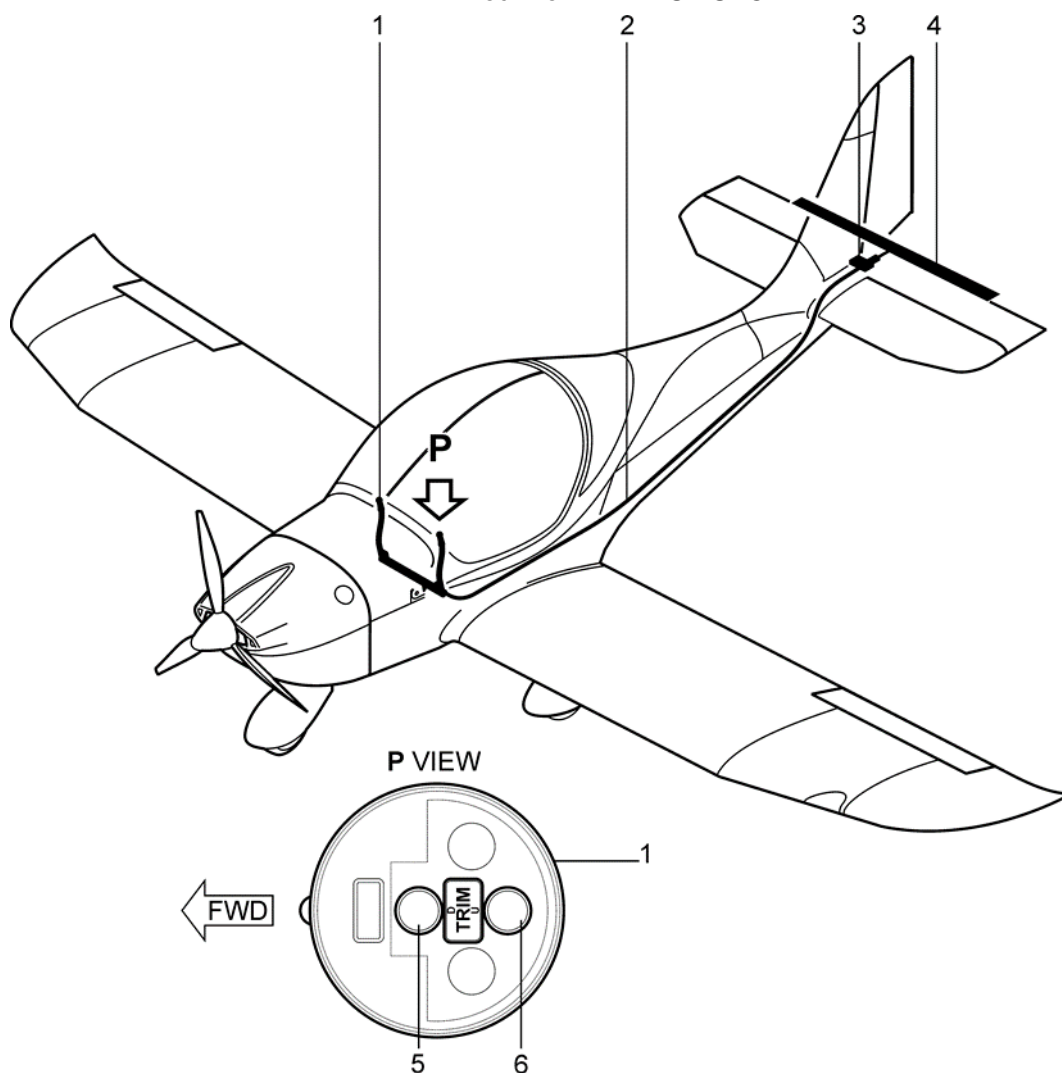
Figure 7-2 Longitudinal control (page 2 of 2)

7.3.2 Elevator Trim Tab Control

Elektromechanical control

The elevator trim tab (4, Figure 7 – 3) is located on the elevator trailing edge. It is controlled by the electromechanical strut (3) connected with the angular lever on the trim tab (4) via the pull-rod. In the upper part of both control sticks, there is a head (1) with control buttons (5, 6) that serve for setting the trim tab deflections. The sense of control is: forwards (D, heavy on nose) or backwards (U, heavy on tail).

The electromechanical strut (3) is mounted inside the elevator; the connector is attached to the bracket on the pull-rod of elevator control. The relative position of the trim tab is, in the case of the installation of analog instruments, indicated by the indicator on the instrument panel. The neutral position is located between the marks on the indicator



Legend to Figure 7-3:

- | | | | |
|---|--------------------------|---|----------------------|
| 1 | Control stick head | 4 | Trim tab |
| 2 | Harness | 5 | Button Trim D |
| 3 | Electromechanical strutt | 6 | Button Trim U |

Figure 7-3 Electromechanical elevator trim tab control

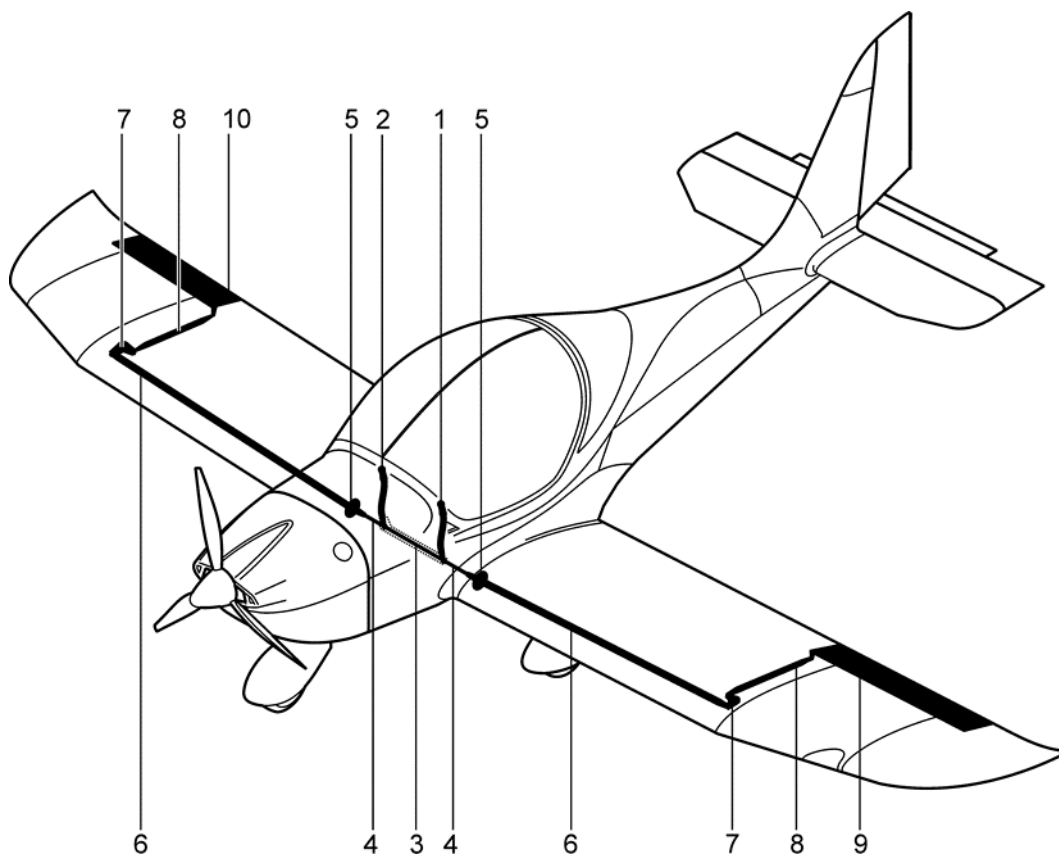
7.3.3 Lateral Control

The lateral control is controlled by the left control stick (1, Figure 7-4) or by the right control stick (2) attached to the countershaft of manual control. The size of lever swing to the left or to the right from the vertical position determines the size of the aileron (9, 10) deflection. The movement of the control stick is transferred by the system of pull-rods and by the angular lever to the pull-rod of aileron.



Doc. No. HARMLSAISPOH

The control elements are located on the main spar brackets. The control sticks (1 2) are mutually connected by the pull-rod (3). The pull-rods (3) connected with the pull-rods (4) are attached to the control sticks. The pull-rods (6) pass through the grommets (5) in ribs No. 1 and are connected with the angular levers (7). The angular levers (7) transfer the movement to the pull-rods (8) connected with the levers on the ailerons (9, 10). The bellcranks (7) are pivoted in the brackets in the wing.



Legend to Figure 7-4:

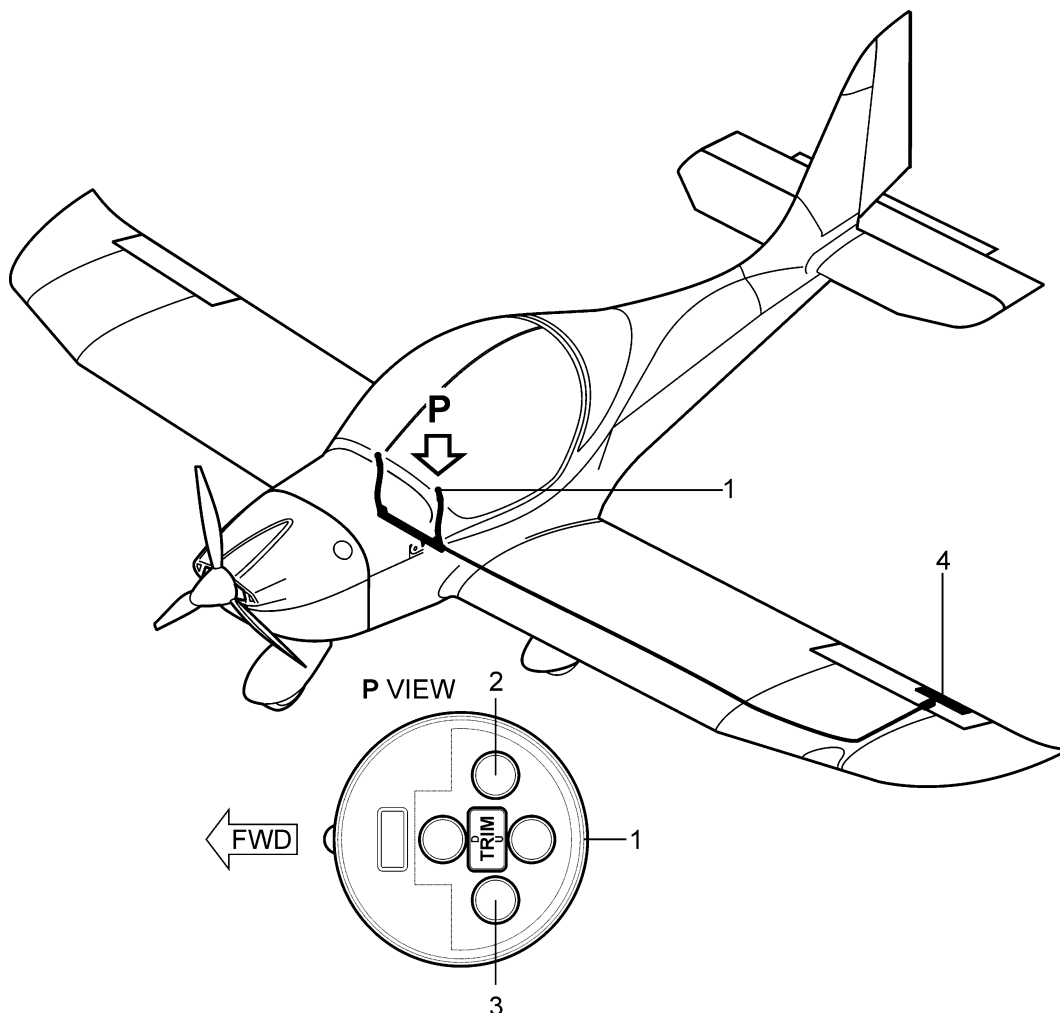
- | | | | |
|---|---------------------|----|---------------|
| 1 | Left control stick | 6 | Pull-rod |
| 2 | Right control stick | 7 | Angular lever |
| 3 | Connecting pull rod | 8 | Pull-rod |
| 4 | Pull - rod | 9 | Left aileron |
| 5 | Grommet | 10 | Right aileron |

Figure 7-4 Lateral control



7.3.4 Aileron trim tab control

Electric aileron trim tab control (figure 7-5) can be installed optionally. Control switches are located on the control stick, trim tab position indicator is located on the instrument panel.



Legend to Figure 7-5:

- | | | | |
|---|----------------------|---|--|
| 1 | Control stick head | 3 | Button Trim L |
| 2 | Button Trim R | 4 | Trim tab with electromechanical strutt |

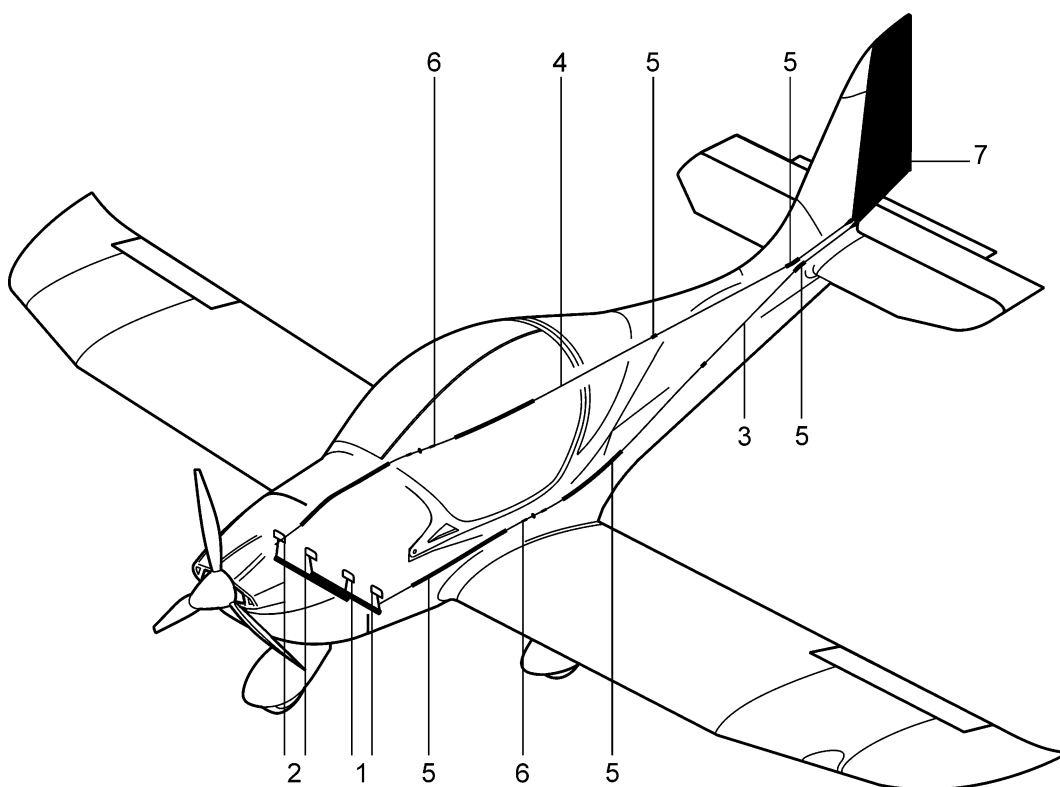
Figure 7-5 Electromechanical elevator trim tab control



7.3.5 Rudder Control

Rudder control is controlled by pedals of foot control. The movement of the pedals (1, 2, Figure 7- 6) is transferred to the rudder by the steel cables (3, 4). The cables are attached to the left pedal of left foot control, to the right pedal of right foot control and to the attachments on the rudder. The route of cables of rudder control is led along the sides of the fuselage. The cables are led in the plastic guiding tubes (5) in the exposed places. The stops of cables (6) are located in the area of fuselage frame No. 3.

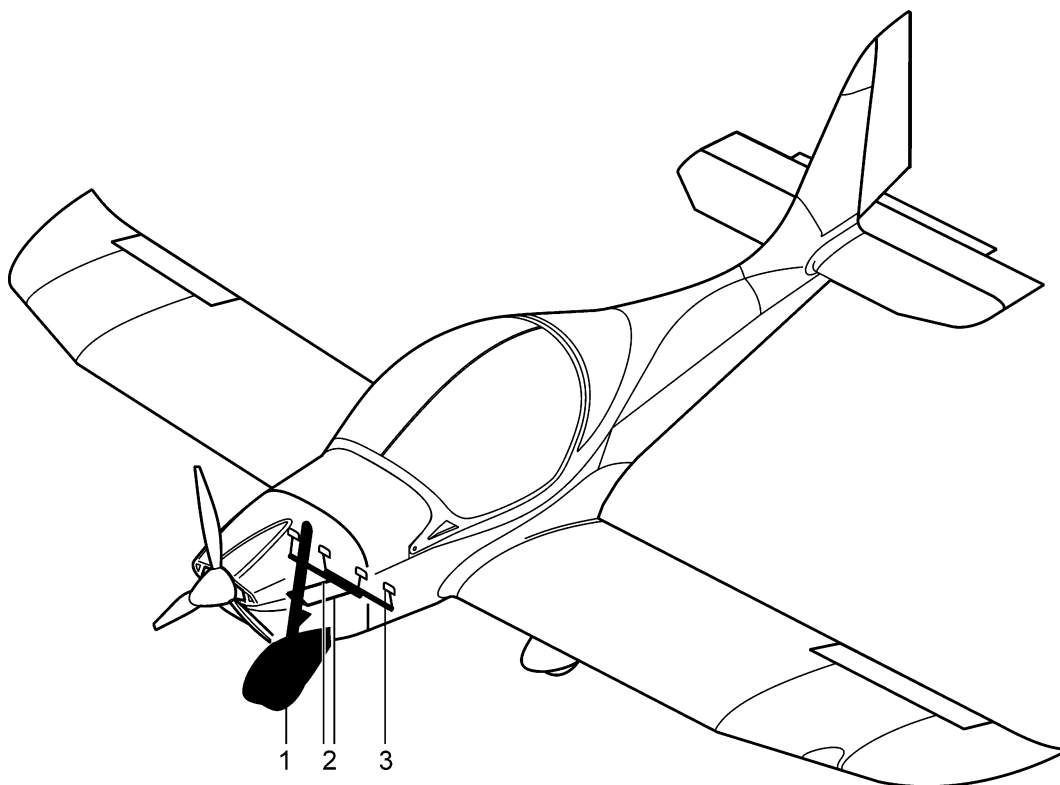
The pedals (3, Figure 7 - 7) of rudder control are connected with the nose landing gear (1) by means of the adjustable pull-rods (2). The rudder deflecting and the nose landing gear steering are controlled via the movement of foot control pedals. The hydraulic pumps of brakes are also controlled by the foot control pedals.



Legend to Figure 7-6:

1	Left pedals	5	Tube
2	Right pedals	6	Cable stop
3	Left cable	7	Rudder
4	Right cable		

Figure 7-6 Rudder control



Legend to Figure 7-7:

- | | | | |
|---|-----------|---|--------|
| 1 | Nose gear | 3 | Pedals |
| 2 | Pull rod | | |

Figure 7-7 Nose gear control

The foot control pedals can be set in three positions

Adjustable foot control pedals NOT equipped with the remote position control

The steps to adjust the rudder pedals position:

1. Release the pin from the adjusting groove by pressing lever.
2. Set pedal to one of three possible positions.
3. Check on the pin locking-on in the adjusting groove.

WARNING

**RIGHT AND LEFT PEDAL OF RUDDER CONTROL
MUST BE ADJUSTED IN THE SAME POSITIONS
AND SECURED!**

Adjustable foot control pedals equipped with the remote position control

The steps to adjust the rudder pedals position:



WARNING

THE RUDDER MUST BE IN NEUTRAL POSITION BEFORE PEDALS ARE ADJUSTED! CHECK THAT THE RUDDER IS CENTERED BEFORE ADJUSTING!

DO NOT ADJUST FOOT CONTROL PEDALS POSITION IN FLIGHT OR WITH ENGINE RUNNING!

1. Check the engine is shut down.
2. Set the rudder in the neutral position (centered).
3. Assure the space aft of the rudder pedals (where your feet are positioned in flight) is clear, and no pressure is applied to the rudder pedals.
4. Pull the lever marked **ADJUSTABLE PEDALS LEVER** (located below the instrument panel on the RH and LH cockpit side), pedals will automatically move fully aft. Then release the lever.
5. Place feet on the pedals, apply light even pressure on pedals while slightly engaging the lever. The pedals will start to move forward.
6. Release lever and continue to push pedals forward using light even pressure. The pedals will automatically lock in the nearest position.
7. Repeat steps 4 and 5 to move pedals to the desired position.

7.3.6 Wing Flaps Control

The flap control lever is located between pilot seats. When a lock button located on the upper end of the lever is pressed, the lock pin is pulled out of the groove in the changing gate. The flaps can then be extended to a position for takeoff or landing (2 positions). The flap position is locked when the lock button is released.

The wing flaps are controlled by the manual lever **FLAPS** (1, Figure 7-8) that is located in the cockpit between the seats. The left wing flap (4) and the right wing flap (5) are connected by means of the torsion shaft (3). The pins on both ends of the torsion shaft fit in the guiding grooves in the end ribs of wing flaps. The deflection of the manual lever is transferred by the pull-rod (2) to the deflection of the angular lever on the torsion shaft. By swiveling the torsion shaft, the eccentric pins on the lever perform a circular movement and by the guiding grooves of the root ribs, they carry the wing flaps. The wing flaps are opened and closed by a sliding movement of the eccentric pins inside the grooves. The eccentricity of the pins allows the adjustment of wing flap setting by swiveling the pins.

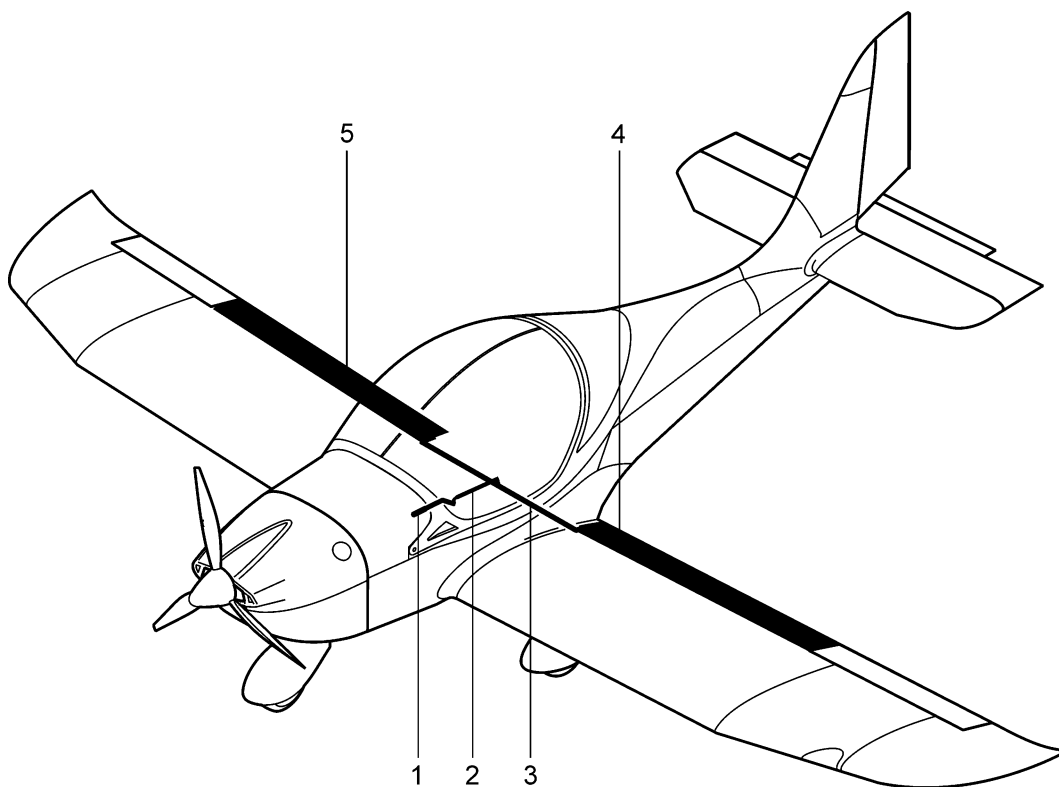


The position of the lever of wing flap control is locked by the pin in the slots of the slotted link mechanism. By pressing the button on the upper end of the lever, the locking pin slides out of the cutouts in the slotted piece. The wing flaps are locked and can be set to the required position. The position of wing flaps is locked by releasing the locking button when the pin fits in the cutout in the slotted piece.

There can be installed **FLAPS** amber warning light on the left side of the instrument panel. The **FLAPS** warning light is on when the wing flaps control lever is in position for takeoff or landing (2 positions).

The wing flaps can be set to four positions.

RETRACTED	0°
TAKEOFF	15°
LANDING (1 st position)	30°
LANDING (2 nd position)	50°



Legend to Figure 7-8:

- | | |
|-----------------|---------------|
| 1 Lever | 4 Wing flap L |
| 2 Pull-rod | 5 Wing flap R |
| 3 Torsion shaft | |

Figure 7-8 Wing flaps control



7.4 Controls in the Cockpit and Instrument Panel

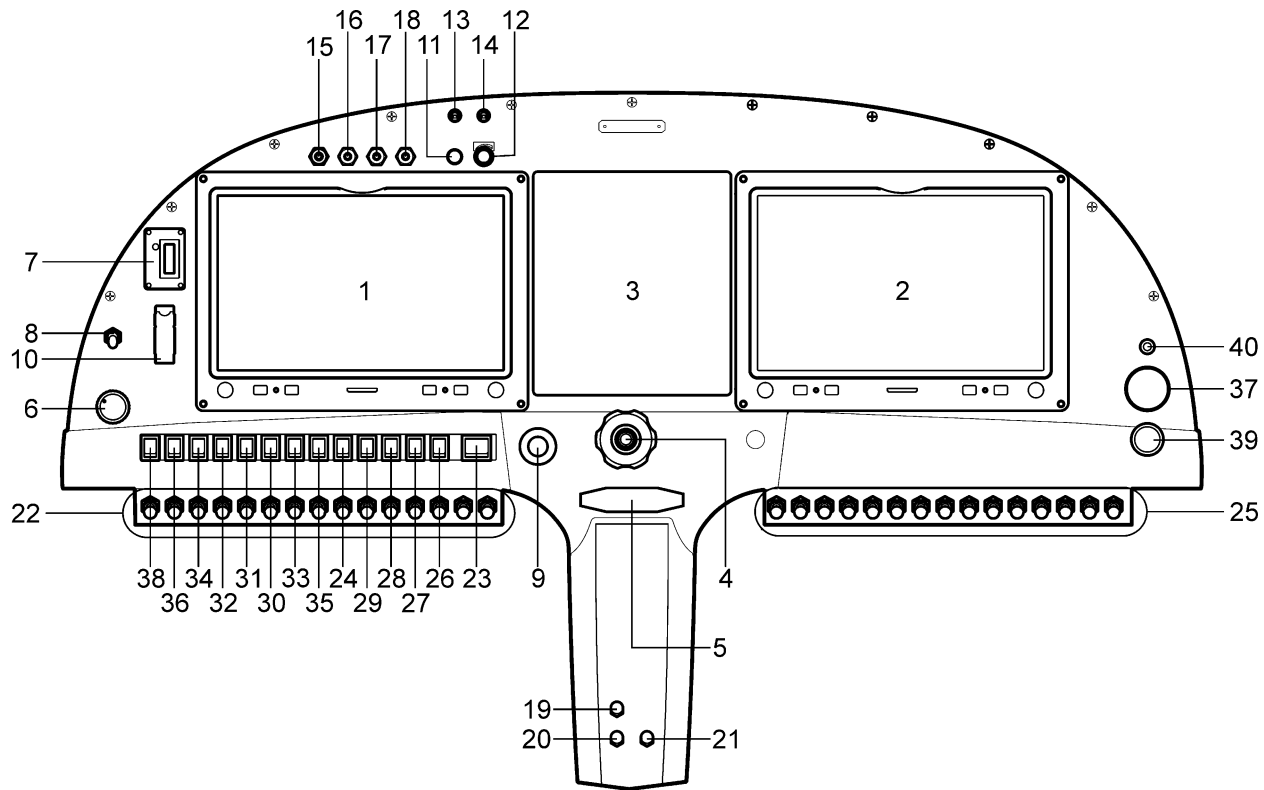


Figure 7-9 Harmony LSA with R 912 iS engine example instrument panel.

Legend to Figure 7-9:

- | | |
|-------------------------------------|---------------------------|
| 1 PFD display | 21 Air distributor lever |
| 2 MFD display | 22 Circuit breakers |
| 3 COMM / NAV / GPS bay | 23 Master switch |
| 4 Throttle | 24 Avionics |
| 5 Emergency parachute system | 25 Circuit breakers |
| 6 Selector valve static of pressure | 26 Lane A switch |
| 7 ELT remote control | 27 Lane B switch |
| 8 Starter switch | 28 Fuel pump A switch |
| 9 Starter | 29 Fuel pump B switch |
| 10 Emergency switch | 30 Beacon switch |
| 11 TOGA | 31 Position lights switch |
| 12 Instrument light DIM knob | 32 Landing light switch |
| 13 TAS Audio | 33 Taxi light switch |
| 14 Day / night change – over switch | 34 Intercom switch |



15	Pitot heating signalling	35	Batt. G3X switch
16	EMS signalling	36	Pitot tube heating switch
17	Lane B signalling	37	Engine speed indicator (1 A)
18	Lane A signalling	38	Engine instruments (1 A)
19	Cold air lever	39	Fuel press / quantity ind. (1 A)
20	Hot air lever	40	Voltmeter / OAT (1 A)

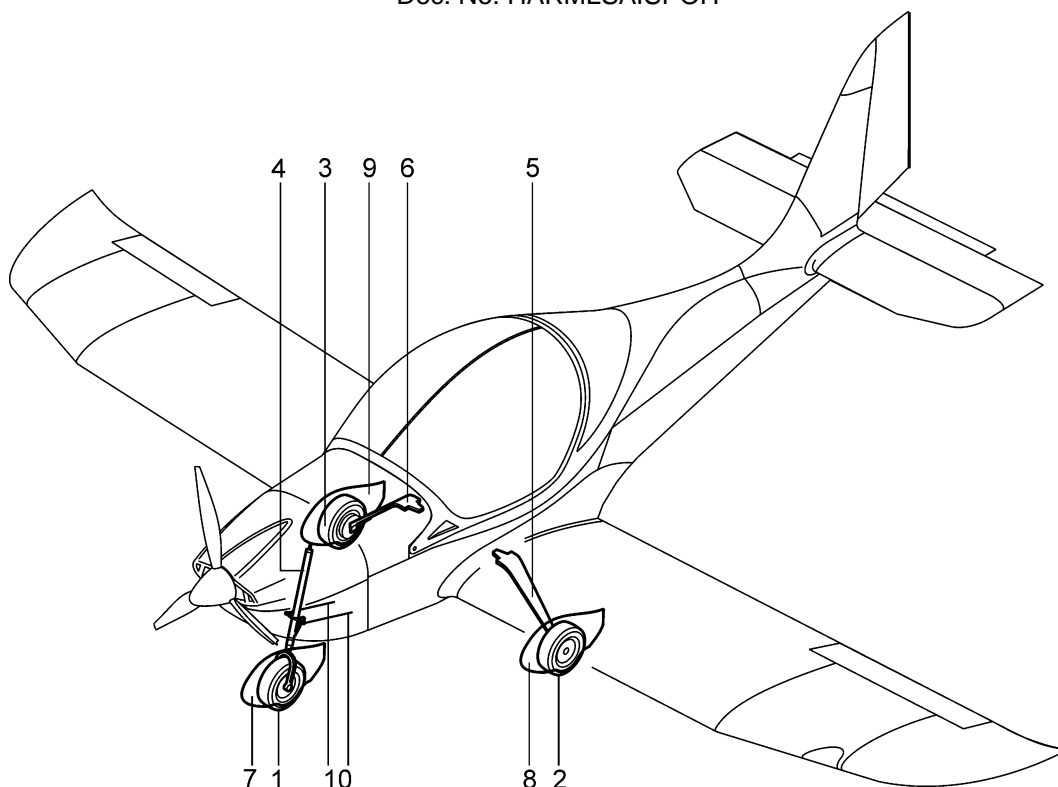
7.5 Inside and Outside Marking and Placards

Placard list and markings are mentioned in the Airplane Maintenance Manual for Harmony LSA airplane.

7.6 Landing Gear and Brakes

7.6.1 Landing Gear

The airplane is equipped with a sort of fixed nose landing gear. Main landing gear legs (5, 6, Figure 7-10) are produced from composite spring. Nose landing gear leg (4) is welded from two pieces - the tube and the yoke- in which the nose wheel is mounted. The nose landing gear is spring-loaded by rubber blocks. The nose wheel is controllable, wheel control is coupled with rudder control by means of two pull rods (10). Wheels can be fitted with fiber-glass aerodynamic pants (7, 8, 9).



Legend to Figure 7-10:

- | | | | |
|---|----------------------------|----|-----------------------------|
| 1 | Nose wheel | 6 | Right main landing gear leg |
| 2 | Left main wheel | 7 | Nose wheel pant |
| 3 | Right main wheel | 8 | Left main wheel pant |
| 4 | Nose landing gear leg | 9 | Right main wheel pant |
| 5 | Left main landing gear leg | 10 | Control pull rods |

Figure 7-10 Landing gear

7.6.2 Brakes

The Harmony LSA airplane is equipped with disk hydraulic brakes on main landing gear wheels (Figure 7-11). Brake system is composed of brake pedals (these are a part of rudder control pedals), brake pumps (1), hoses for leading brake liquid (7), brake yokes with wheel cylinders and brake pads (2, 3). By depressing the brake pedals compression of brake pumps occurs, which generates pressure in brake circuit and hydraulic cylinders press the brake pads onto the brake disks. Braking pressure can be regulated only by force of brake pedals depressing.

The mechanical manually controlled parking brake is installed in the airplane. **PARKING BRAKE** handle is located below the left pilot seat.

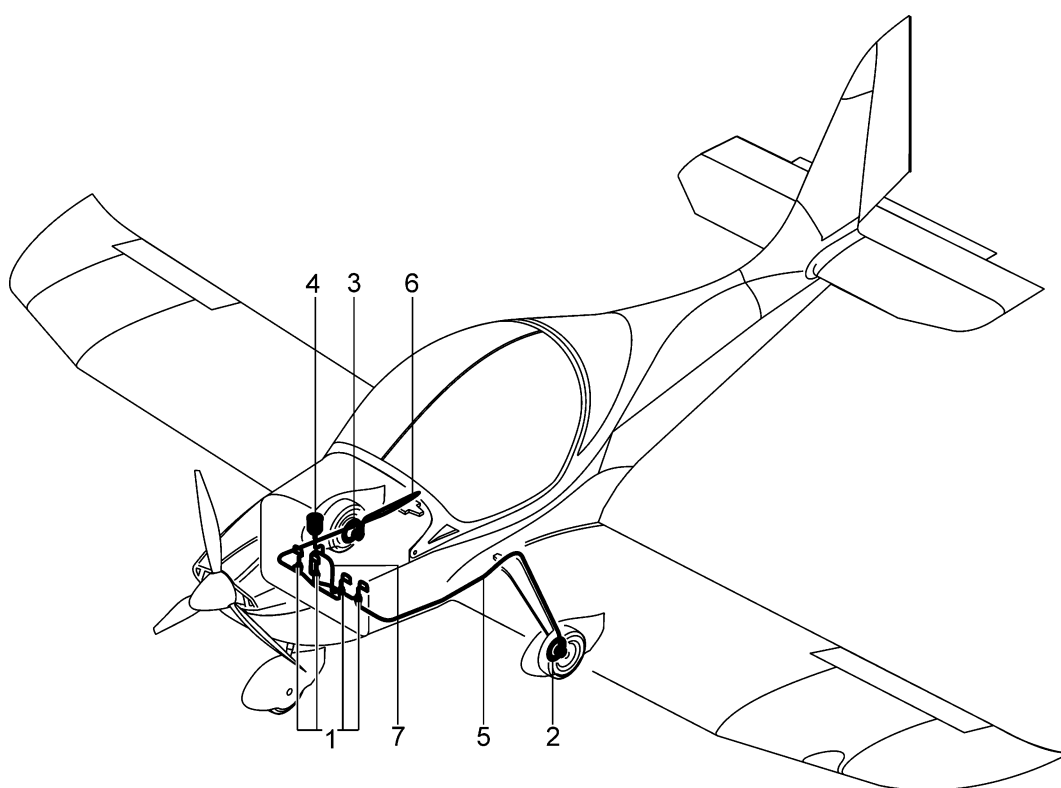


Applying parking brake

1. Brake pedals press and hold
2. **PARKING BRAKE** handle pull to brake
3. Brake pedals release

Releasing parking brake

1. Brake pedals press and hold
2. **PARKING BRAKE** handle push to release
3. Brake pedals release



Legend to Figure 7-11:

- | | | | |
|---|-----------------------|---|---------------------------|
| 1 | Brake pump | 5 | Hose to left wheel brake |
| 2 | Left wheel brake | 6 | Hose to right wheel brake |
| 3 | Right wheel brake | 7 | Brake liquid hose |
| 4 | Brake fluid reservoir | | |

Figure 7-11 Braking system



7.7 Seat and Safety Harnesses

Harmony LSA airplane is a two-seat airplane with side-by-side seats. Seats are fixed, non-adjustable and fitted with light upholstery.

Each of seats is fitted with four-point safety harness which is composed of safety belts, shoulder straps and lock. The safety harness is anchored in the fuselage sides behind the seats and on the seat sides.

7.8 Baggage Compartment

Baggage compartment is positioned behind seat rests.

Maximum weight of baggage is 55 lbs (25 kg) and is stated on the placard in the baggage compartment. The baggage compartment is fitted with rubber net for baggage fixation.

7.9 Canopy

The cockpit canopy is of a semi drop shape. The framework is made of composite. The organic glass is glued to the canopy composite frame.

The canopy is attached to the fuselage in the front part by two swivel pins by means of which it can be folded up forwards. In order to make opening easier, the actual weight of canopy is balanced by two gas struts, besides the canopy is provided with holders on the lower framework for easier handling. The canopy is provided with the lock in the rear upper part of framework for locking.



7.10 Power Unit

7.10.1 General

The engine ROTAX 912 iS (100 hp) is used to power Harmony LSA airplane. ROTAX 912 iS is a four-cylinder, four-stroke engine with opposite cylinders, central cam shaft, OHV valve mechanism and maximum take-off power of 100 hp (73.5 kW) at 5800 RPM.

The on - ground adjustable, 3 – bladed, Warpdrive CF propeller, with Nickel protection of blade leading edges.

7.10.2 Engine Control

Engine power is controlled by means of **THROTTLE** lever, which is located in the middle of the instrument panel and which controls engine power range from idle up to maximum take-off.

If the throttle lever is fully pushed in, then this position corresponds to maximum engine power. If the throttle lever is fully pulled out, then this position corresponds to idle (1400 RPM set by airplane manufacturer). Rapid changes in engine power setting can be made by pressing down the round button on the lever body and by its pulling out or pushing in. Small changes in power setting can be performed through lever turning (clockwise - power increase).

WARNING

DO NOT APPLY AN EXCESSIVE FORCE IF THE THROTTLE LEVER IS CLOSE TO FULLY PULLED POSITION, OTHERWISE IT CAN CAUSE DAMAGE TO THE THROTTLE LEVER.

In the case of a throttle control damage as a result of excessive tightening when the controller starts “skipping” due to a stripped thread, then such “skipping” can lead to an increase of the engine idle speed.

The throttle lever is fitted with the locking ring, clockwise turning of which ensures locking of the lever in requested position.

The Engine Management System has following main functionality

- Ignition control
- Fuel injection control
- Fault detection
- (Internal-) Generator management



Doc. No. HARMLSAISPOH

Parts of the Engine Management System are Sensors, Actuators, the ECU and the wiring harness. The core of the EMS is the engine control unit (ECU), which consists of two modules.

These modules will be denoted by Lane A and Lane B, each one capable of taking over control, regulation and monitoring of the engine. In error-free engine operation, both Lanes are returned ON.

During engine control by Lane A, Lane B ensures that the engine operation can be maintained even after a failure or reduced functionality of Lane A.

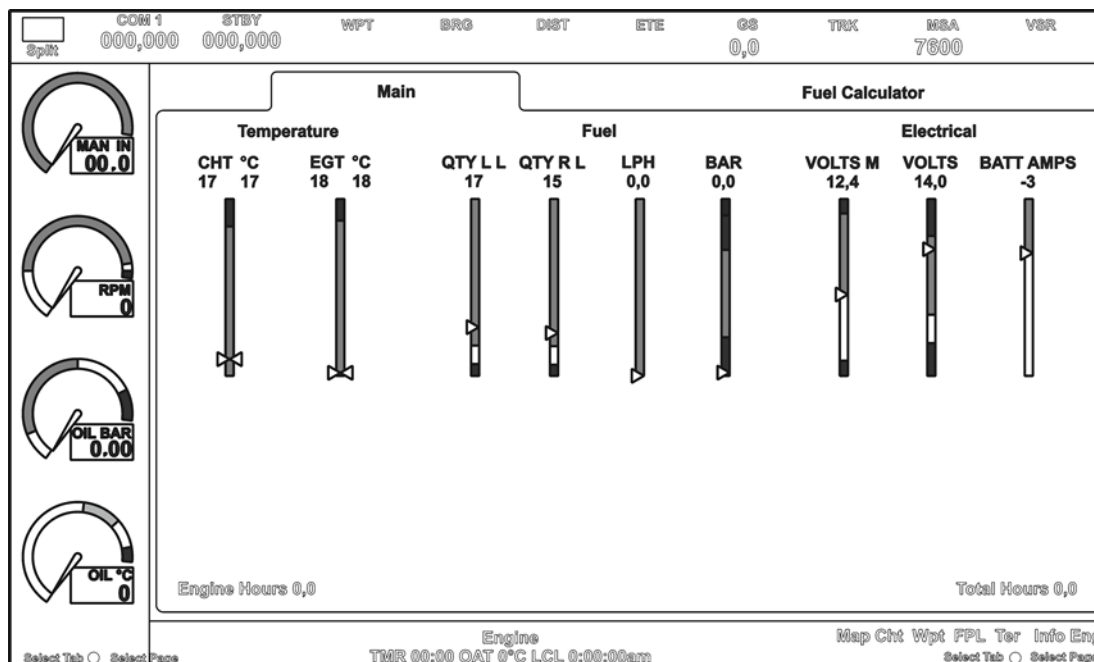
Depending on the activity and the failure status of the two Lanes, the ECU automatically selects a Lane to take over control of the engine.

A huge quantity of sensors

(e. g. sensors for measuring the pressure in the airbox) and actuators (e.g. ignition coils) of the engine are designed with redundancy. In this case, each of the sensors or actuators is connected to a Lane, so that the two Lanes have the same measurement values and send the same output signals. Nonredundant sensors (e. g. oil pressure sensors) are connected to one Lane only and serve for the expanded monitoring of the engine functionality. Due to an ECU internal communication, these sensor values will be exchanged between the two Lanes (assuming that both Lanes are active and free of errors).

7.10.3 Engine Instruments

GDU 460 display critical engine, electrical and others system parameters, for Harmony LSA airplane with R 912 iS engine.





In left side round indicators:

Engine Manifold Pressure **MAN IN**

Displays manifold pressure to indicate engine power.

Working range 0 – 44 in Hg.

Tachometer **RPM**

Displays propeller speed in revolutions per minute.

Working range of the RPM indicator is 0 - 8000 RPM.

Oil Pressure **OIL BAR**

Displays oil pressure.

Working range is 0 ÷ 10 bar.

Oil Temperature **OIL °C**

Displays oil temperature.

Working range of oil thermometer is 50 ÷ 150 °C.

Main indicators:

Temperature

Cylinder Head Temperature **CHT °C**

Displays the head temperature of the hottest cylinder.

The cylinder head or coolant thermometer transmitter senses temperature of cylinder No. 3 or coolant of cylinder No. 3.

Working range of the thermometer is 50 ÷ 150 °C.

Exhaust Gas Temperature **EGT°C**

Displays the exhaust gas temperature.

Working range 50 – 150°C.

Fuel

Fuel quantity

Displays the amount of fuel in each tank.

Left tank fuel quantity **QTY L L.**

Right tank fuel quantity **QTY R L.**

Fuel flowmeter **LPH**

Displays fuel flow.

Fuel pressure **BAR**

Displays fuel pressure.



Electrical

Voltmeter **VOLTS M**

Displays the main bus voltage.

Voltmeter **VOLTS**

Displays auxiliary circuit voltage **VOLTS**

Ammeter **BATT AMPS**

Displays the batt amps

7.10.4 Engine Cooling System

Engine cooling is combined, cylinder heads are cooled by water, and cylinders are cooled by air.

Cooling circuit of cylinder heads is designed as a closed system containing - pump, expansion tank (1. Fig. 7-12) with pressure closure, cooling liquid cooler (3) and overflow bottle (2). Scheme of cylinder head cooling system is shown in Fig. 7-11.

When changing, the cooling liquid is filled up through the cap of expansion tank (1), during airplane operation it is replenished into overflow bottle (2) between the lines of maximum and minimum level.

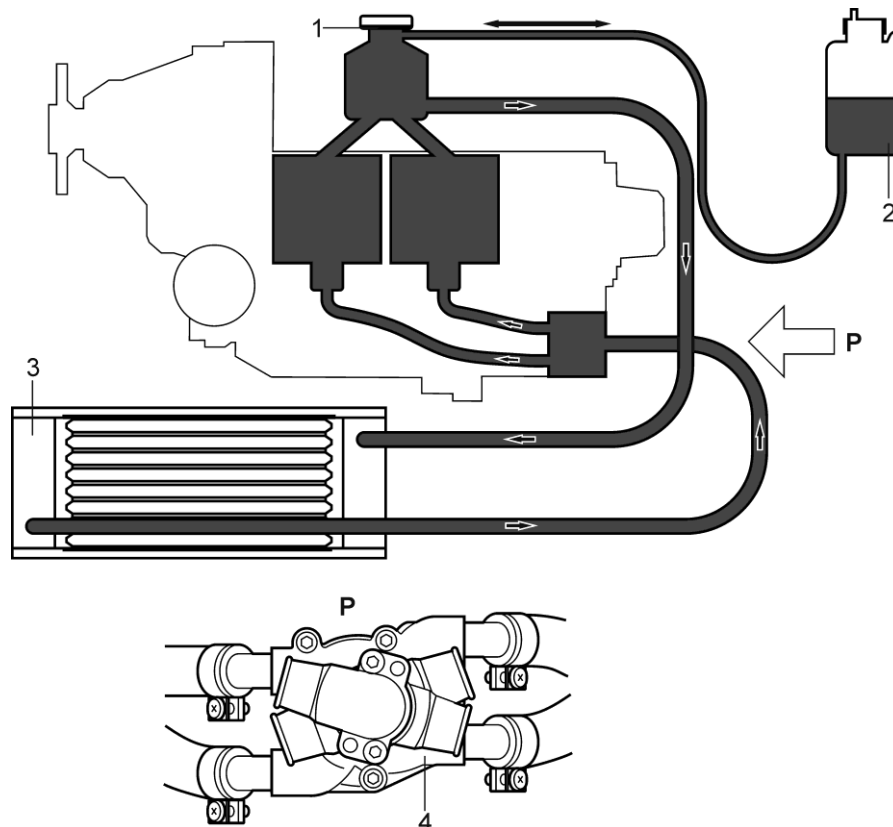


Figure 7-12 Scheme of cylinder head cooling system (page 1 of 2)



Figure 7-12 Scheme of cylinder head cooling system:

- | | | | |
|---|-----------------|---|-----------------------|
| 1 | Expansion tank | 3 | Cooling liquid cooler |
| 2 | Overflow bottle | 4 | Pump |

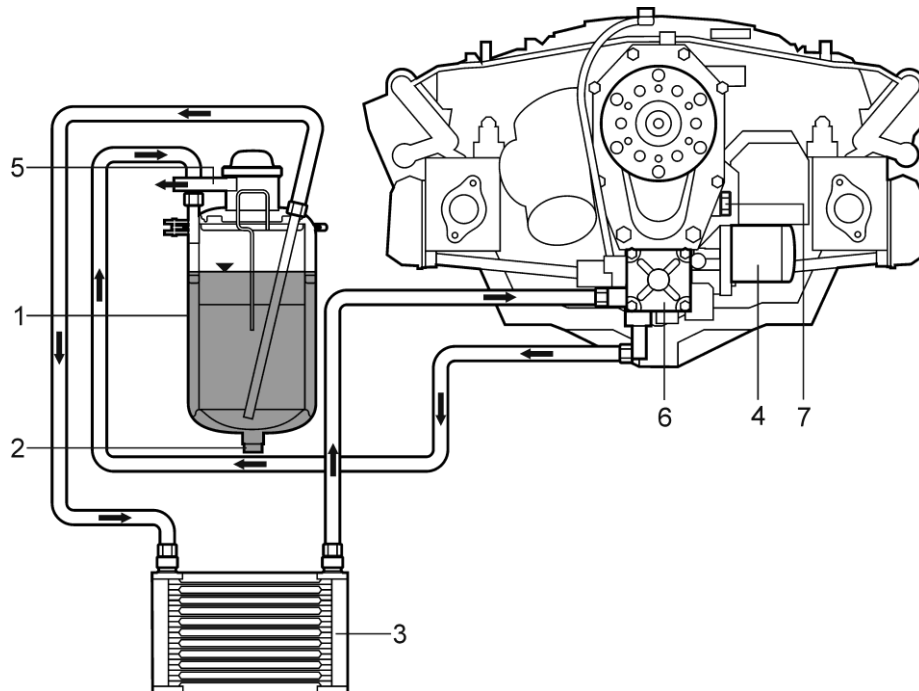
Figure 7-12 Scheme of cylinder head cooling system (page 2 of 2)

7.10.5 Engine Lubrication System

The engine is equipped with the lubrication system (Figure 7-13) with the dry sump and the oil pump that has a built-in pressure reducing valve and a sensor of oil pressure. The oil pump (6, Fig. 7 - 12), that is driven by the camshaft, takes the engine oil from the tank (1) through the thermostat (if installed), oil cooler (3) and the oil is forced through the oil filter (4) to the individual lubrication points in the engine. The oil flows down from the lubrication points to the bottom of the crankcase, and from there it is forced to the oil tank by means of the pressure shocks from the pistons. The venting of the system is realized by the outlet (5) on the oil tank.

The oil temperature sensor for reading of the oil temperature is located on the crankcase, on the mag side of the engine. The oil pressure sensor for reading of the oil pressure is located on the ignition housing.

Oil pressure and temperature are indicated on instruments in display GDU 460. Oil is replenished through the lid in the upper part of the oil tank (1).



Legend to Figure 7-13

- | | |
|--------------|-------------------------|
| 1 Oil tank | 5 Venting of oil system |
| 2 Drain plug | 6 Oil pump |
| 3 Oil cooler | 7 Magnetic plug |
| 4 Oil filter | |

Figure 7-13 Scheme of engine lubrication system

7.10.6 Engine Intake System

Engine intake system ensures delivery of sufficient air into engine. Air is taken into the engine through openings on the engine covers through the air filters.

The engine is equipped with an electronic fuel injection system.

This system is controlled by the ECU and enables highly accurate metering of the fuel according to operating and load conditions, whilst at the same time also taking ambient conditions into account.

The key input variables are throttle valve position, engine speed signal, intake air temperature, ambient pressure, manifold pressure and exhaust temperature.

Ultimately, the required fuel quantity or injection period is determined on the basis of the calculated air density in the airbox. It is monitored continuously.

7.10.7 Ignition System

The R 912 iS engine is equipped with 4 double ignition coils. The ignition system is almost entirely wear free, as the ECU generates and processes the ignition



signal electronically. It is fully autonomous on the other circuit of accumulator.
High voltage current is distributed to the spark plugs through high-voltage cables.
Ignition sequence of individual engine cylinders: 1-4-2-3.

Ignition circuits are controlled by the ignition switch **LANE A** and **LANE B** on the instrument panel.

Positions of ignition switch: **ON** or **OFF**

7.10.8 Engine electrical system

This System is responsible for supplying the Engine Management System (EMS) and the Airframe with electrical power. It consists of the Fusebox with Regulators and the Internal Generators.

7.10.9 Fuel System

Fuel system serves for keeping fuel in the airplane and it's feeding to the engine. Fuel system of Harmony LSA airplane is composed of integral fuel tanks (1, 2 Figure 7-15). The fuel flows from the tanks via a water separator/coarse filter (5) to the electric fuel pumps (6) (connected in series) from where it is pumped thru the fine filter (15) to the fuel rails (7, 8), the fuel injectors and to the fuel pressure regulator (11).

Fuel pump switches

The fuel pumps are activated directly through the switch OFF/ON. During take off and landing both switches (main and aux.) must be ON.

Fuel pressure regulator

A fuel pressure regulator ensures that the pressure differential between the fuel injectors and the intake manifold remains constant. This enables the fuel injection system to inject the same quantity of fuel at any point given the same injection period.

Return line

Through the return line surplus fuel flows back to the fuel tank. The return line must be always returned into the tank, from which fuel is sucked into the fuel pump.

7.10.10 Fuel Tanks

Fuel is contained in the wing integral tanks (1, 2) having volume 60 l each. Each tank is fitted with air venting (output is under the wing tip) and draining valve (15) on the bottom side of the wing.

Fuel is led from the tanks through the hoses to the fuel selector (4) located on a central console under the instrument panel and then through a fuel filter (5), the fuel pumps (6, 11), distributors (9, 10) to the carburetors (7, 8). Fuel return hose goes from the fuel distributor (9) into the fuel selector (4) and from there to fuel



tanks (1, 2) which the fuel is drawing off. See figure 7-14 for Scheme of fuel system.

7.10.11 Fuel Selector

The fuel selector (4) serves for tank selection and fuel delivery interruption in case of engine fire or long parking of airplane.

To move selector from **OFF** (closed) position it necessary pull the safety button on the fuel selector, turn the handle from the **OFF** position to the left and then release safety button. Now the handle can be freely moved between **LEFT** and **RIGHT** position. Safety button prevents unintentionally switch the selector to **OFF** position.

To move selector to **OFF** (closed) position it is necessary pull the safety button on the fuel selector, turn the handle to the **OFF** position and then release safety button. Now the handle is blocked in the **OFF** position. Safety button prevents unintentionally switch the selector from the **OFF** position during parking.

7.10.12 Fuel Filter

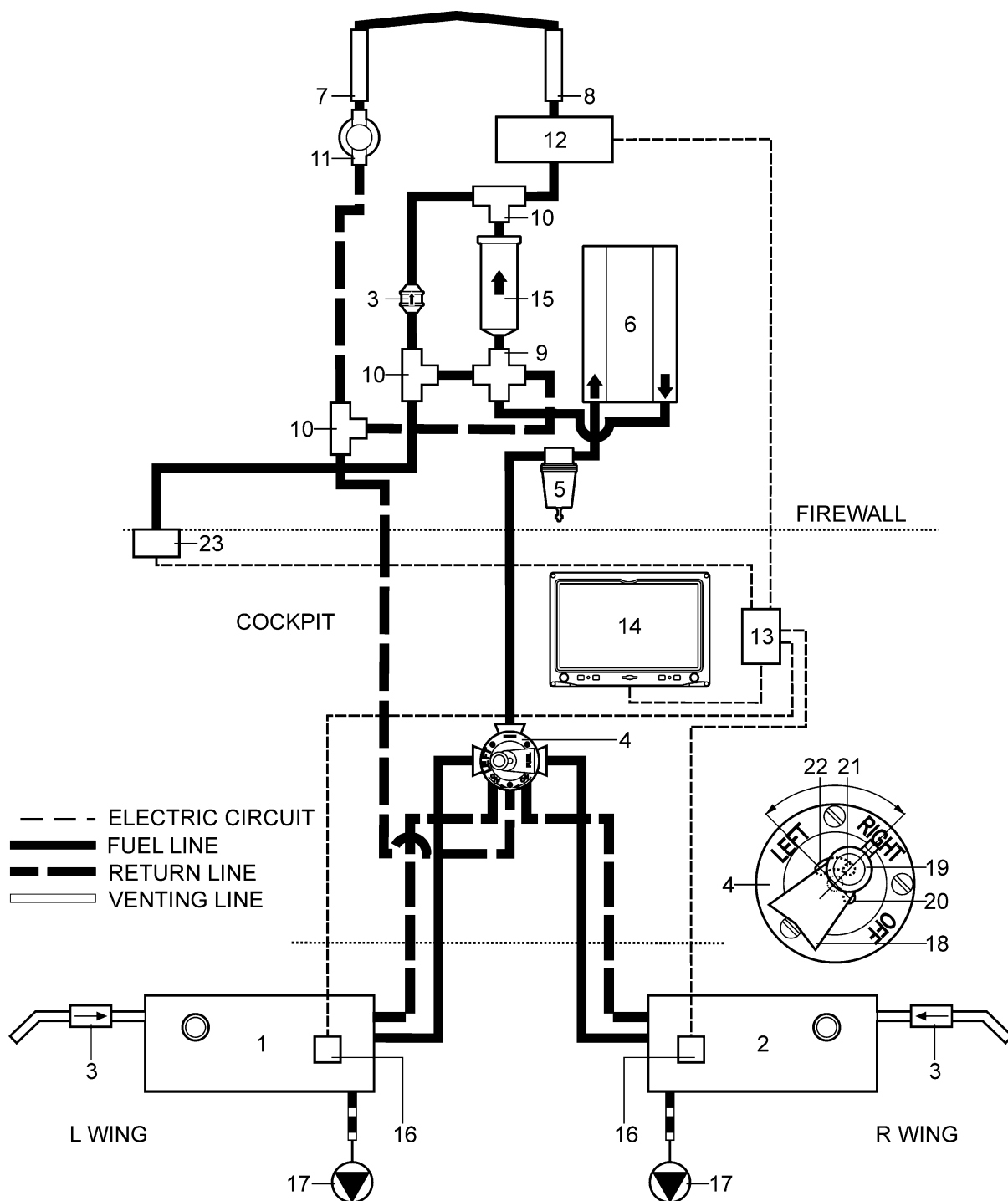
The fuel filter (5) separates all mechanical impurities from fuel. The fuel filter is located in the cockpit on the left airframe panel.

7.10.13 Indication of Fuel Quantity

Fuel quantity is measured by a float fuel gauge sensor (21) in each tank and indicated on fuel gauges (13, 14) on the instrument panel. LH fuel gauge indicates fuel quantity in the left tank, RH indicator in the right tank. True fuel quantity is indicated only on ground and in level flight and it takes approx. 2 minutes to level fuel after transition from climb/descent.

7.10.14 Fuel Tank Draining

Draining of the fuel tank is specified in Section 8, para 8.5.2.



Rotax 912 iS fuel system

Figure 7-15 Scheme of fuel system (sheet 1 of 2)

Section 7

Airplane and System Description



Legend to Figure 7-15

1 Left fuel tank	12 ECU
2 Right fuel tank	13 EIS GEA 24
3 Return valve	14 GDU 460 display
4 Fuel cock	15 Fuel filter
5 Fuel filter	16 Fuel quantity indicator R / L
6 Electric fuel pump	17 Drain valve
7 Left fuel rails	18 Handle of fuel selector
8 Right fuel rails	19 Safety button pin
9 Four-way distributor	20 OFF position locking hole
10 Three-way distributor	21 Safety button pin
11 Pressure regulator	22 Groove of left and right position
	23 Fuel pressure sensor

Figure 7-15 Scheme of fuel system (sheet 2 of 2)



7.11 Electrical System

The airplane is equipped with 14 V DC electrical installation (see Figure 7-16). A generator with power of 250 W is the primary source of electrical energy. The secondary source of energy is the accumulator 12V/15Ah(12V/20Ah optionally) that is located in the engine compartment on the fire wall. It is used for engine starting and in case of generator failure as an emergency source of energy and also serves as the smoothing filter of power system.

DC voltage is distributed to individual systems by main bus bar. Each system is protected by circuit breaker. If overloading of any of the circuits occurs, then the circuit breaker is pulled out. Circuit breakers are listed in the Aircraft Maintenance.

CAUTION

DO NOT USE CIRCUIT BREAKERS FOR NORMAL SWITCHING OFF OF THE SYSTEMS.

After switching **MASTER SWITCH** on and by turning the ignition key to **START** position the starter is activated. The starter is power supplied from the accumulator before engine start. After engine has been started and idle RPM reached, generator starts supplying current into electrical network.

7.11.1 Lighting

Airplane can be equipped with an external lighting.

External lighting can be composed of position lights and anti-collision beacons which are located in wing tip and landing headlight which is located in left wing leading edge or in the lower engine cowling. Position lights are switched by **POS. LIGHTS** switch and anti-collision beacon by **BEACON** switch. Landing headlight is switched by **LDG LIGHT** switch.

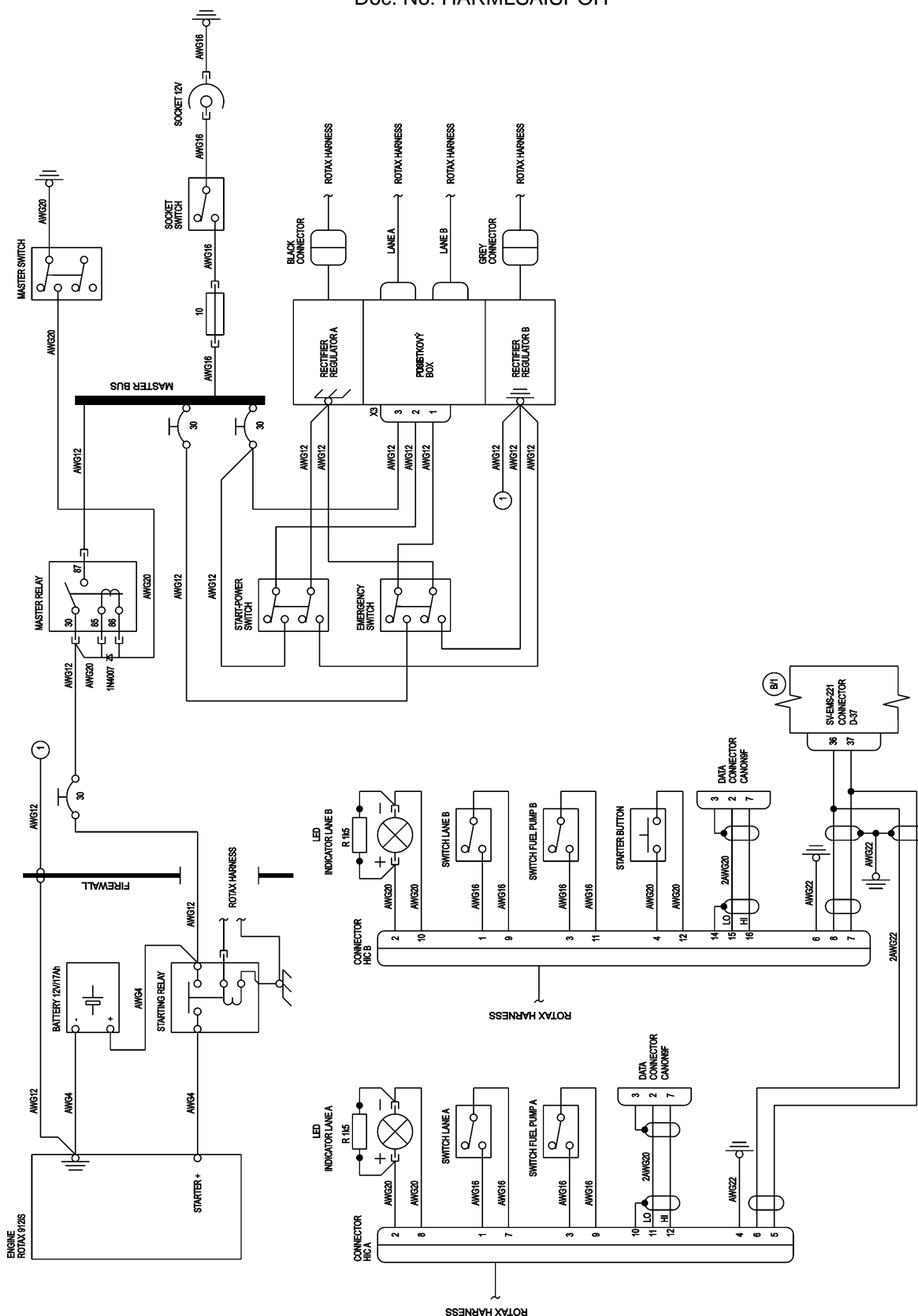


Figure 7-16 Scheme of electrical system



7.12 Pitot-static System

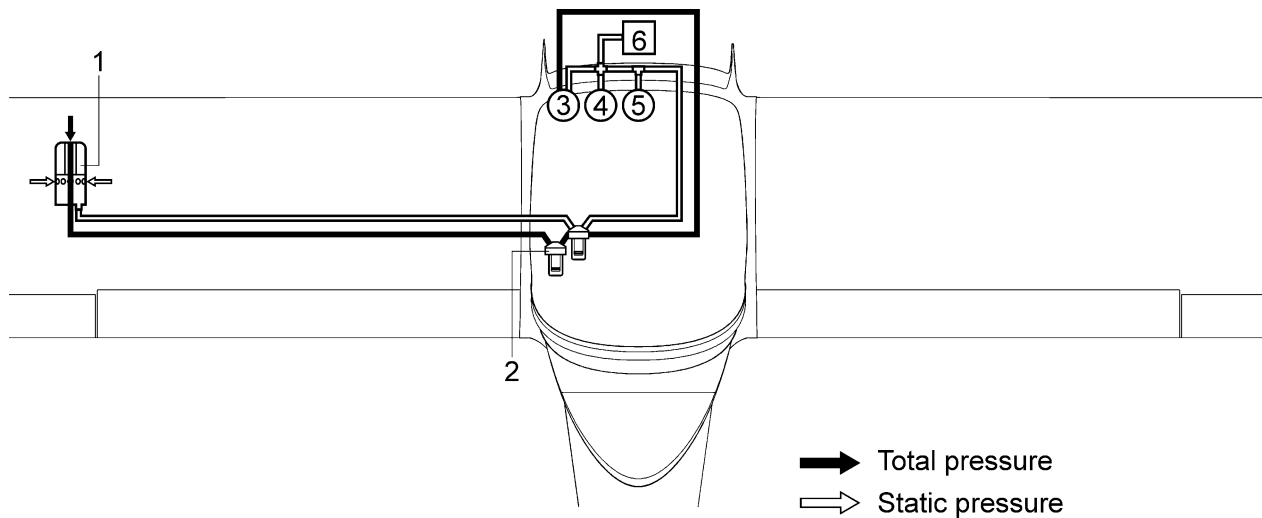
Pitot-static tube (1, Figure 7-17) for sensing static and total pressure is located under the left half of the wing. Total pressure is sensed through the opening in the Pitot-static tube face. Static pressure is sensed through openings on the tube circumference. System of pressure distribution to individual instruments is made by means of flexible plastic hoses.

Static pressure is led to altimeter (5), airspeed indicator (3), vertical speed indicator (4) and altitude encoder (6). Total pressure is led only to the airspeed indicator (3).

Both hose systems (total and static) are equipped with draining sumps (3) located inside the cockpit in front of the left pilot's seat under. These reservoirs are visible and can be checked from outside the fuselage bottom. If water appear in the draining sumps, unscrew the covers from the sumps and slightly blow into the Pitot-static head. Then screw the covers back and check the tightness of pitot-static system – see AMM for details.

CAUTION

AVOID BLOWING INTO THE PITOT-STATIC SYSTEM WITH THE CONDENSATE RESERVOIR COVER IS CLOSED - IT MAY CAUSE AN INSTRUMENT MALFUNCTION.



Legend to Figure 7-17

- | | |
|----------------------|---|
| 1 Pitot-static tube | 4 Vertical speed indicator (if installed) |
| 2 Drain sumps | 5 Altimeter |
| 3 Airspeed indicator | 6 Altitude encoder |

Figure 7-17 Scheme of pitot-static system

7.13 Supplementary Equipment

7.13.1 Stall Speed Warning System

The sensor of stall speed warning is located on the left wing leading edge. When approaching the critical angle of attack (stall speed proximity) the flap is reset and electrical circuit connected as a result of pressure differences acting on the front and the rear part of the flap. During stall speed warning the acoustic signaling is activated which lasts throughout the time of occurrence.



7.13.2 Ventilation and Heating System

Cockpit ventilation is ensured by 2 eye-ball vents (14, Figure 7-18) located on the left and right of the tip-up canopy frame. Vents are connected to the NACA inlets (14) through tip-up canopy frame front flaps.

Cockpit heating is ensured by hot air from the heat exchanger (2). The heat exchanger is located on the exhaust collector (18). Air from ambient atmosphere is warmed up in the exhaust collector and then led through the mixing chamber (6) on the firewall and hoses to the cockpit floor or to the hot air outputs through the instrument panel cover as well as into the hollow spaces in the canopy frame for canopy glass defrosting.

Hot air quantity is regulated by the **HOT AIR** knob, cold air quantity is regulated by the **COLD AIR** knob on the instrument panel. Proportion of the cold and hot air in the heating system can be set continuously. Other knob on the right of the **HOT AIR** knob serves for air routing to the cockpit floor or on the canopy glass.

Legend to Figure 7-18

1 Air inlet	11 Hose
2 Heat exchanger	12 Hose
3 NACA inlet	13 Hose
4 Hot air chamber	14 NACA inlet
5 Cold air chamber	15 Eye-ball vent
6 Mixing chamber	16 Air outlets
7 Hose	17 Controls
8 Hose	For information:
9 Hose	18 Exhaust collector
10 Hose	19 Cooling liquid cooler

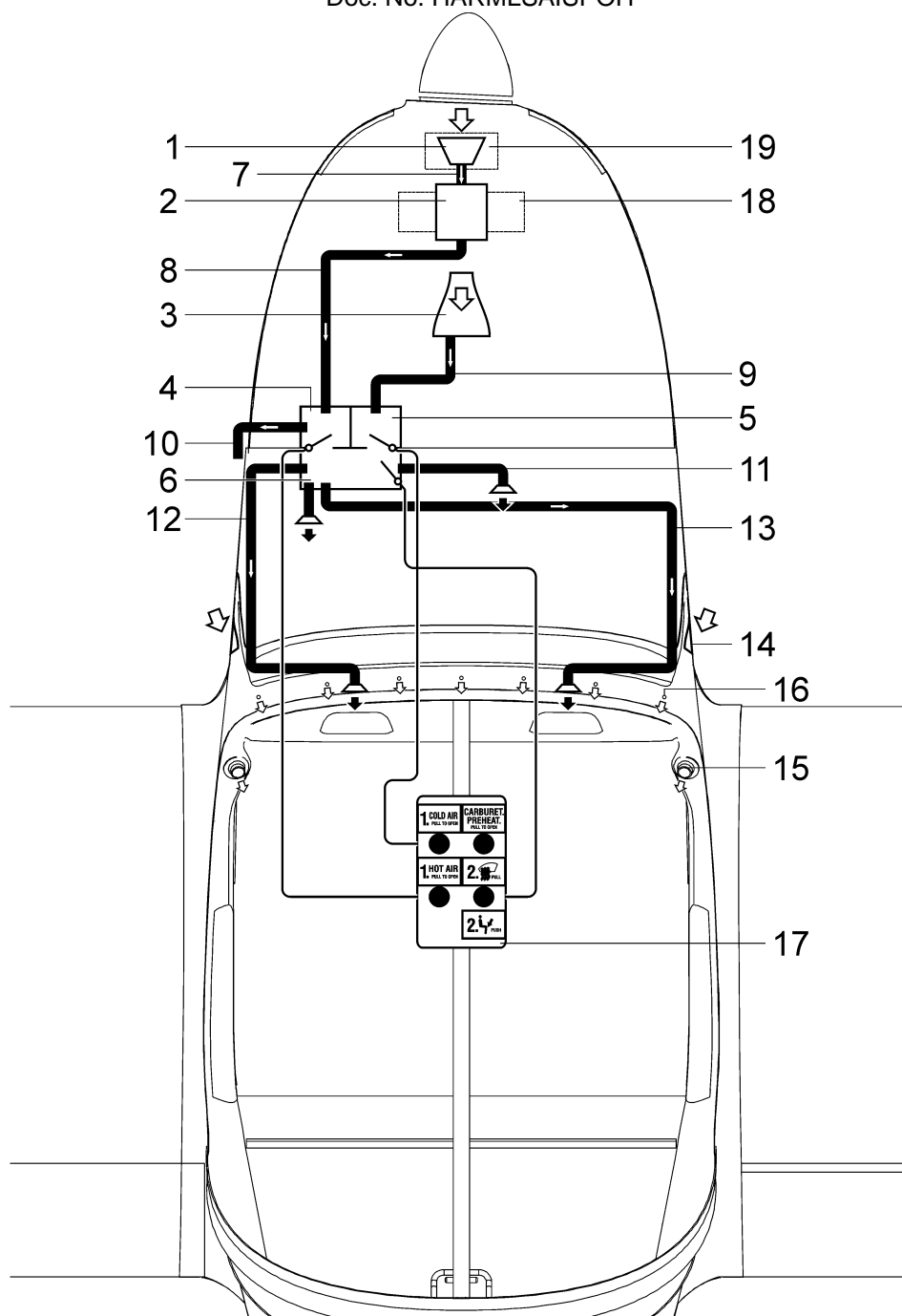


Figure 7-18 Scheme of ventilation and heating system



7.14 Navigation and Communication Equipment

Descriptions of operation of navigation and communication equipment see section 9 - Supplements.



Intentionally Left Blank



TABLE OF CONTENTS

8 Airplane Handling, Servicing and Maintenance

8.1	Introduction	8-3
8.2	Airplane Inspection Period	8-4
8.3	Modifications or Airplane Repairs	8-5
8.4	Road Transport.....	8-5
8.4.1	Airplane Towing.....	8-5
8.4.2	Airplane Parking	8-6
8.4.3	Airplane Anchoring	8-6
8.4.4	Airplane Jacking	8-6
8.4.5	Leveling	8-7
8.4.6	Road Transport	8-7
8.5	Airplane Servicing.....	8-8
8.5.1	Airplane Fuelling.....	8-8
8.5.1.1	Approved Fuel Grades	8-8
8.5.1.2	Fuelling Procedure	8-8
8.5.2	Draining of the Fuel Tank and Fuel Filter	8-8
8.5.3	Oil Refilling	8-9
8.5.3.1	Recommended Oil Brands	8-9
8.5.3.2	Oil Filling Procedure.....	8-9
8.5.4	Coolant Refilling	8-9
8.5.4.1	Coolant Types.....	8-9
8.5.4.2	Coolant Filling Procedure	8-10
8.5.5	Brake Fluid Refilling.....	8-10
8.5.5.1	Recommended Types	8-10
8.5.5.2	Brake Fluid Refilling Procedure.....	8-10
8.6	Cleaning and Care.....	8-10

Section 8

Airplane Handling, Servic.
and Maintenance

Harmony^{LSA}
PILOT'S OPERATING HANDBOOK



Doc. No. HARMLSAISPOH

Intentionally Left Blank



8.1 Introduction

This section includes the procedures for airplane handling, maintenance and operation recommended by the manufacturer.

It is necessary to follow the set-down lubrication plan, scope and periodicity of preventive maintenance depending on climatic and flight conditions according to the Airplane Maintenance Manual of HARMONY Light Sport Aircraft.

Airplane owner should be in a permanent touch with the manufacturer, either directly or through the network of business representatives, which enables him to get the newest information concerning airplane operation, handling and maintenance. The manufacturer distributes this information to users through Service bulletins (Mandatory bulletins), Information bulletins (letters) and further instructions.

Mandatory bulletins are especially important for keeping up airworthiness and the manufacturer considers them mandatory although they do not come into effect before Airworthiness Directive is issued by aviation authority of user's country.

All correspondence with the airplane manufacturer, distributor or service center must contain the airplane serial number. The airplane serial number is shown on the title sheet of these Instructions and on the Manufacturer's plate below stabilizer on the left side of the fuselage.

The manufacturer delivers along with aircraft HARMONY LSA the "Pilot's Operation Handbook (POH)" and the "Aircraft Maintenance Manual (AMM)"

Qualification requirements to perform maintenance and repairs are mentioned in the AMM.

8.1.1 Owner/Operator Responsibilities:

- Each owner/operator of an LSA airplane shall read and comply with the maintenance and continued airworthiness information and instructions provided by the manufacturer.
- Each owner/operator of an LSA airplane shall be responsible for providing the manufacturer with current contact information where the manufacturer may send the owner/operator supplemental notification bulletins.
- The owner/operator of an LSA airplane shall be responsible for notifying the manufacturer of any safety of flight issue or significant service difficulty upon discovery.

Section 8

Airplane Handling, Servic.
and Maintenance



Doc. No. HARMLSAISPOH

- The owner/operator of an LSA airplane shall be responsible for complying with all manufacturer issued notices of corrective action and for complying with all applicable aviation authority regulations in regard to maintaining the airworthiness of the LSA airplane.
- An owner of an LSA airplane shall ensure that any needed corrective action must be completed as specified in a notice, or by the next scheduled annual inspection.
- Should an owner/operator not comply with any mandatory service requirement, the LSA airplane shall be considered not in compliance with applicable ASTM Standards and may be subject to regulatory action by the presiding aviation authority.

8.2 Airplane Inspection Period

Periodical inspections and reviews of airplane must be carried out at the latest in the following intervals:

- After first 25 ± 2 hours of operation
- After first 50 ± 3 hours of operation
- After every 100 ± 5 hours of operation
- Annual inspection

Details on periodical inspections are provided in the Airplane Maintenance Manual for Harmony LSA.

Refer to the Rotax 912 Maintenance Manual for engine maintenance.

Refer to the Propeller Maintenance Manual for propeller maintenance.

8.2.1 Airplane Failure Card

The Failure Card in Section 95 in the Airplane Maintenance Manual of Harmony LSA is preferably used to report service difficulties.



8.3 Modifications or Airplane Repairs

USA

§91.327 require:

Each alteration accomplished after the aircraft's date of manufacture meets the applicable and current consensus standard and has been authorized by either the manufacturer or a person acceptable to the FAA;

Each major alteration to an aircraft product produced under a consensus standard is authorized, performed and inspected in accordance with maintenance and inspection procedures developed by the manufacturer or a person acceptable to the FAA; and

The owner or operator complies with the requirements for the recording of major repairs and major alterations performed on type certificated products in accordance with §43.9 (d) of this chapter, and with the retention requirements in §91.417.

Basic repairs of airplane are described in the Airplane Maintenance Manual of HARMONY LSA.

8.4 Road Transport

8.4.1 Airplane Towing

It is possible to move the airplane on a short distance by holding the fuselage end in the position before the fin, eventually by holding the root part of wings.

The hand towing bar can be used for airplane relocation which will be fastened to the nose wheel axis.

To turn the airplane on the spot, push on the fuselage end part in the area before the fin, lift the nose wheel and turn the airplane in required direction.

WARNING

**SWITCH OFF IGNITION BEFORE GROUND
HANDLING WITH THE AIRPLANE!**

CAUTION

**AVOID EXCESSIVE PRESSURES ON THE
AIRFRAME STRUCTURE, ESPECIALLY ON THE
WING TIPS, HTU, AND VTU ETC.**

**WHEN HANDLING THE AIRPLANE BY MEANS OF
THE TOWING BAR, PROPELLER BLADES MUST**



BE SET TO HORIZONTAL POSITION. MAXIMUM
DEFLECTION OF THE NOSE WHEEL IS $\pm 10^\circ$.

AT MANUAL ENGINE STARTING GRASP THE
PROPELLER BLADE AREA, I.E. NOT ONLY
PROPELLER EDGE.

8.4.2 Airplane Parking

It is the most suitable solution to place the airplane into a hangar possibly into another covered room with stable temperature, good venting, low humidity and dust-free environment. In case of parking out of the hangar it is necessary to anchor the airplane and at long-term parking to cover the canopy, possibly the whole airplane with suitable tarpaulins.

8.4.3 Airplane Anchoring

The airplane is anchored at parking out of hangar after termination of flight day or according to need. Anchoring of the airplane is necessary for its protection against possible damage, caused by wings and gusts. For this purpose the airplane is equipped with fixing eyes on the lower side of wings.

Procedure:

1. Check of fuel selector, off-position of all switches, ignition and master switch.
2. Lock manual control, e.g. by using safety belts.
3. Release parking brake
4. Close and lock the cockpit canopy
5. Place wheel chocks
6. Anchor the airplane to the ground by means of cables pulled through fixing eyes which are located on the lower side of wings. Further it is necessary to anchor the nose landing gear.

NOTE

In case that long-term airplane anchoring is supposed, namely in winter period, it is suitable to cover the canopy, eventually the whole airplane by appropriate tarpaulins which must be properly secured to the airplane structure.

8.4.4 Airplane Jacking

Airplane jacking presents no big difficulties due to relatively low airplane empty weight and can be performed by two persons.



On the bottom of the fuselage there are three jacking points intended for placing jacks. Jacking points are marked with **SUPPORT HERE** placards.

The airplane can be jacked in the following way:

- By pushing from the above to the fuselage rear part in the position before the fin the front part of fuselage can be jacked and subsequently supported under the fire wall.
- Rear part of fuselage can be slightly jacked only by grasping in the position near the auxiliary skid and by pushing from below and then the lower part of fuselage can be supported by the rest located in the area of the skid.
- Wings van is jacked by pushing on the wing from below in the area of the main spar. It is necessary to avoid jacking by grasping the wing tip.

8.4.5 Leveling

Leveling procedure is described in the Airplane Maintenance Manual for Harmony LSA.

8.4.6 Road Transport

The airplane can be transported on communication after its loading on an appropriate trail. It is necessary to dismount wings. The airplane must be secured against possible movement. This way you will preclude possible damage to the airplane.



8.5 Airplane Servicing

8.5.1 Airplane Fuelling

8.5.1.1 Approved Fuel Grades

Approved fuel grades are stated in Section 2, para 2.13.2 Approved Fuel Grades.

8.5.1.2 Fuelling Procedure

WARNING

NO SMOKING OR OPEN FLAMES DURING FUELING!

FIRE EXTINGUISHER SHOULD BE WITHIN REACH!

UNDER NO CIRCUMSTANCES ADD FUEL WITH THE ENGINE RUNNING!

NO PERSON ALLOWED IN THE COCKPIT DURING FUELING!

1. Connect the airplane to ground.
2. Open fuel tank cap.
3. Fill airplane with necessary amount of fuel.
4. After fuelling, wipe the remaining fuel out of the fuelling neck and close the fuel tank cap.
5. Disconnect the airplane from ground.
6. Perform the fuel draining procedure.

8.5.2 Draining of the Fuel Tank and Fuel Filter

Draining should be done after each airplane fuelling and prior to first flight each day.

There is a drain valve of each wing tank located on its bottom.

Procedure:

1. Put a transparent cup under the drain valve.
2. Open the drain valve by pressing in.
3. Drain required quantity of fuel.



NOTE

Fuel tank draining serves to elimination of impurities and deposits from the fuel. Drain until clean fuel flows from the drain valve.

4. Repeat procedure for the opposite tank.

8.5.3 Oil Refilling

8.5.3.1 Recommended Oil Brands

The recommended oil brands are listed in latest issue of Service Instruction SI-912-016.

8.5.3.2 Oil Filling Procedure

1. Check oil quantity in the oil tank.

NOTE

Before the check oil quantity, turn the propeller by hand (ignition must be switched OFF!) in the sense of engine rotation so that oil can fill in the engine space or operate the engine for 1 minute in idle mode. Oil level must lie between min and max marks (flattenings) on the dipstick.

2. Remove the upper engine cowling.
3. Fill appropriate amount of oil so the oil level is between min and max marks.

CAUTION

ALWAYS REFILL SAME OIL BRAND THAT IS IN OIL SYSTEM.

4. Close the cap of the oil tank and install the upper engine cowling.

8.5.4 Coolant Refilling

8.5.4.1 Coolant Types

Refer to the Rotax 912 Operator's Manual for recommended coolant types.

Section 8

Airplane Handling, Servic.
and Maintenance



8.5.4.2 Coolant Filling Procedure

1. Remove the upper engine cowling.
2. Fill appropriate amount of coolant into the reservoir located in the engine compartment.
3. Install the upper engine cowling.

8.5.5 Brake Fluid Refilling

8.5.5.1 Recommended Types

Refer to the Airplane Maintenance Manual for Harmony LSA airplane for recommended brake fluid types.

8.5.5.2 Brake Fluid Refilling Procedure

1. Remove the upper engine cowling.
2. Fill the brake fluid into reservoir located in the engine compartment on the firewall. A brake fluid level must be approx. 25 mm in the reservoir.
3. Step repeatedly on the pedal during refilling.
4. Bleed the system after refilling.
5. Install the upper engine cowling.

8.6 Cleaning and Care

Always use appropriate cleaning agents when cleaning airplane surface. Residuum of oil and fat can be removed from the airplane surface (excluding the canopy) by suitable detergents, possibly by petrol.

The canopy only to be cleaned by washing with ample stream of tepid water with addition of appropriate detergents. Use soft rag, sponge or wash leather. Use suitable polishing agent after wiping rests of water.

CAUTION

**NEVER DRY-CLEAN THE CANOPY AND NEVER
USE PETROL OR CHEMICAL SOLVENTS!**

Coating, upholstery and carpets in the cockpit can be removed from the cockpit, brushed and, if need be, cleaned with warm water with addition of appropriate detergent. Dry up upholstery after doing this.



TABLE OF CONTENTS

9 Supplements

9.1	Introduction	9-3
9.2	List of Inserted Supplements	9-3
9.3	Supplement Inserted	9-6



Intentionally Left Blank



This section contains the appropriate supplements necessary to safely and efficiently operate the airplane when equipped with various optional systems and equipment not provided with the standard airplane.

[illegible]

[illegible]

Doc. No. HARMLSAISPOH

[illegible]



9.3 Supplement Inserted



Supplement No. 01

Instrument panel

Serial Number: **2023 2222**

Airplane Registration Number:

Date of Issue: 03.03.2023

This Supplement must be contained in the Pilot Operation Handbook during operation of the aircraft.

Information contained in this Supplement add or replace information from the standard Pilot Operation Handbook in the further mentioned parts only.

Limitations, procedures and information not mentioned in this Supplement are contained in the standard Pilot Operation Handbook.



Log of revision

Rev.No.	Affected pages	Description	Approved / Date	Inserted / Date



Section 1 – General

This Supplement adds information necessary for airplane operation with equipment installed in the aircraft **Harmony LSA** of S/N 2023 2222.

Section 2 – Limitations

Not affected

Section 3 – Emergency procedures

Not affected

Section 4 – Normal procedures

Not affected

Section – Performance

Not affected

Section 6 – Weight and balance

Not affected



Section 7 – Airplane and system description

7.4 Controls in the Cockpit and Instrument Panel

INSTRUMENT PANEL S/N 2023 2222

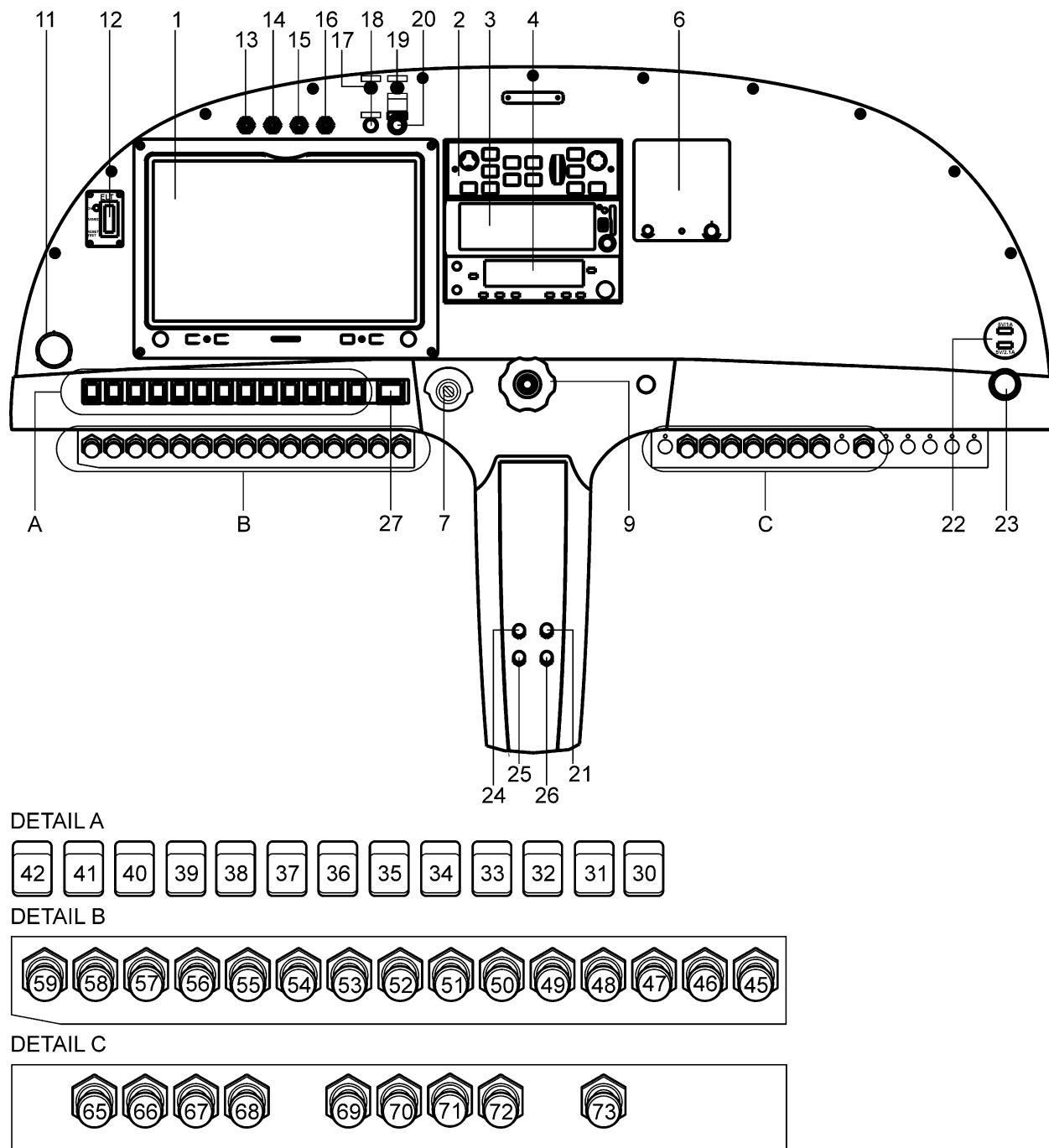


Figure 1. Cockpit controls and instrument panel



- 1 PFD display
- 2 Autopilot GMC 507
- 3 GNX 357
- 4 GNC 255 A
- 5 -
- 6 Garmin G 5
- 7 Switch box
- 8 -
- 9 Throttle
- 10 -
- 11 Static selector valve
- 12 ELT
- 13 Pitot tube heating
- 14 EMS Warning
- 15 Charging indicator 1
- 16 Charging indicator 2
- 17 Audio ON/OFF
- 18 TOGA
- 19 Day / Night light sw.
- 20 Instrument light reg.
- 21 Carburetor preheat.
- 22 USB socket
- 23 12 V socket
- 24 Cold air lever
- 25 Hot air lever
- 26 Air distribution lev.
- 27 Master switch
- 28 -

DET. A SWITCHES

- 31 Generator 1
- 32 Generator 2
- 33 Avionic switch
- 34 Aux. bat. G3X
- 35 Autopilot
- 36 Beacon
- 37 Nav. lights

- 38 Landing light
- 39 Cabin lights
- 40 Fuel pump
- 41 Pitot tube heating
- 42 Intercom
- 43 12 v socket

DET. B CIRCUIT BREAKERS

- 45 Batt. (50 A)
- 46 Refer. gen.1 (25A)
- 47 Gen. 2 (50A)
- 48 Gen. 2 excitation (5A)
- 49 Aux. batt. G 3X (5A)
- 50 EMS (2A)
- 51 Autopilot (5A)
- 52 Beacon (7.5A)
- 53 Nav. light (2 A)
- 54 Beacon (7.5A)
- 55 Nav. light (2A)
- 56 Landing light (4A)
- 57 Cabin light (1A)
- 58 Fuel pump (3A)
- 59 Pitot tube heating (10A)
- 60 Signalling (1A)
- 61 Trim (1A)
- 62 -
- 63 -

DET. C CIRCUIT BREAKERS

- 65 PFD (5A)
- 66 ADAHRS (2A)
- 67 EMS (2A)
- 68 G5 (5A)
- 69 Instrument light (7.5A)
- 70 Comm. 1 (10A)
- 71 Nav. (4A)
- 72 Transponder (5A)
- 73 GAD 29 (5A)



Kapitola 8 – Manipulace, obsluha a údržba letounu

Not affected

Intentionally Left Blank



Supplement No. 2

Equipment List

Airplane Serial Number: **2023 2222**

Airplane Registration Number:

Date of Issue: 03.03.2023

This Supplement must be contained in Pilot's Operating Handbook.

Information contained in this Supplement adds or supersedes information from basic Pilot's Operating Handbook in the further mentioned parts only. Limitation, procedures and information not included in this supplement are contained in the basic Pilot's Operating Handbook.

Section 9

Supplement No. 1

Equipment List

**PILOT'S OPERATING
HANDBOOK**

Doc. No. HARMLSAISPOH S 02

Log of Revisions

Rev. No.	Affected Pages	Description	Approved / Date	Inserted / Date



Section 1 – General Information

This Supplement adds information necessary for airplane operation with installed equipment, shown in this supplement.

Explanation

The column “No. of items” in the table shows the number of pieces on the airplane corresponding to the line item. Equipment is shown in more lines in the case of a different location on the airplane.

The sign “✓” in the column “Installed” means that the item is physically located on the airplane.

Section 2 – Limitations

Not Affected.

Section 3 – Emergency Limitations

Not Affected.

Section 4 – Normal Procedures

Not Affected.

Section 5 – Performance

Not Affected.

Section 9

Supplement No. 1

Equipment List


**PILOT'S OPERATING
HANDBOOK**


Doc. No. HARMLSAISPOH S 02

Section 6 – Weight & Balance

No..	Title	Type	No. of. items	Installed
1.	Engine	Rotax 912 ULS	1	✓
2.	Propeller	Klassic 170/3/R	1	
3.	Airspeed indicator	BK 300	1	
4.	Airspeed indicator	BK-15	1	
5.	Altimeter	BG 3 A	1	
5.	Rate-of-climb ind	BC 10-1 B	1	
6.	Rate-of-climb ind	BC-2A	1	
7.	Slipball indicator	CHY-1	1	
8.	Turn and bank ind.	RCA 83	1	
9.	Turn and bank ind.	RCA 82	1	
10.	Artificial horizon	RCA 26AK-1	1	
11.	Directional gyro	RCA 15AK-1	1	
12.	Magnetic compass	SIRS Navigator NV2A	1	✓
13.	Pitot tube	WA 037383	1	
14.	Engine speed ind.	Mitchel D1-211-5021	1	
15.	Oil press indicator	Mitchel D1-211-5054	1	
16.	Oil press indicator	Mitchel D1-211-5055	1	
17.	Oil temperature ind.	Mitchel D1-211-5084	1	
18.	Oil temperature ind.	Mitchel D1-211-5091	1	
19.	CHT indicator	Mitchel D1-211-5082	1	
20.	CHT indicator	Mitchel D1-211-5085	1	
21.	Fuel gauge	Mitchel D1-211-5074	2	
22.	Fuel press indicator	Mitchel D1-211-5068	1	
23.	Fuel press indicator	Mitchel D1-211-5089	1	
24.	Engine hour ind.	Hobbs, series 8500	1	
25.	Manifold press. ind.	UMA 7–100-20	1	



No..	Title	Type	No. of. items	Installed
26.	Voltmeter	Mitchel D1-211-5086	1	
27.	OAT thermomether	Mitchel D1-211-5122	1	
28.	Altitude encoder	ACK A - 30	1	
29.	ATC Ant.	AV-74	1	
30.	COMM Ant.	AV 530	1	
31.	COMM Ant.	AV-17	1	
32.	NAV/VOR/LOC Ant.	CI 158C-2	1	
33.	Beacon/position light	LED 90340-01	1	
34.	Beacon/position light	LED 90340-02	1	
35.	Beacon/position light	OR6001G	1	✓
36.	Beacon/position light	OR6001R	1	✓
37.	Beacon/position light	LED MB 3	1	
38.	Beacon/position light	LED MB 3	1	
39.	Landing light	LED 71141	1	✓
40.	Beacon/position light	Whelen Blaze	1	
41.	Beacon/position light	Whelen Blaze	1	
42.	Landing light	Whelen	1	
43.	Battery	FG 12200	1	✓
44.	Main wheel/brake	S5 00-31 01/02	2	
45.	Main wheel Matco	S5 00-30 01	2	✓
46.	Brake Matco	S5 00-61 01	2	✓
47.	Comm 2	Garmin GTR 20	1	
48.	Garmin	GMA 245 R	1	

Section 9

Supplement No. 1

Equipment List



**PILOT'S OPERATING
HANDBOOK**



Doc. No. HARMLSAISPOH S 02

Section 7 – Airplane & System Description

Not Affected.

Section 8 – Handling, Servicing & Maintenance

Not Affected.



Supplement No. 03

Garmin GNC 255A / 255B COM/NAV/LOC/ILS Receiver

Airplane Serial Number: **2023 2222**

Airplane Registration Number:

Date of Issue: 15.03.2013

This Supplement must be contained in Pilot's Operating Handbook if Garmin GNC 255A / 255B COM/NAV/LOC/ILS unit is installed on the airplane.

Information contained in this Supplement adds or supersedes information from basic Pilot's Operating Handbook in the further mentioned parts only. Limitation, procedures and information not included in this supplement are contained in the basic Pilot's Operating Handbook.



Log of Revisions

Rev. No.	Affected Pages	Description	Approved / Date	Inserted / Date



Section 1 – General Information

This Supplement adds information necessary for airplane operation with Garmin GNC 255A / 255B COM/NAV/LOC/ILS receiver is installed in the Harmony LSA airplane.

Section 2 – Limitations

Not Affected.

Section 3 – Emergency Procedures

Emergency Channel

The standard emergency channel (121.5 MHz) is stored in the Com memory of the GNC 255A / 255B.

1. Press **C/N** if the unit is not in Com mode already.
2. Press and hold the **FLIP/FLOP** key for approximately two seconds.

The Emergency Channel will be inserted into the Active Frequency position and the previous Active Frequency will become the Standby Frequency.

Section 4 – Normal Procedures

Switching On

AVIONICS MASTER switch **ON**

PWR/VOL/COM knob on the left side of the unit..... rotate clockwise to turn ON

Intercom On/Off

The Intercom On/Off function toggles intercom on and off.

1. Press **FUNC** to access the Functions. Turn the large knob to select the ICS Function. Turn the small knob to view the Intercom On/Off function. Then, press the **ENT** key.
2. Turn the **SMALL** knob to set the Intercom On or Off. Then, press the **ENT** key to save the selected value.



Adjusting an Intercom

The Adjust Intercom function allows you to set values for the Intercom squelch and volume. The Intercom On/Off function must be set to On to make the Adjust Intercom function available.

1. Press **FUNC** key to access the Functions. Turn the large knob to select the ICS Function. Turn the small knob to view the Adjust Intercom function. Then, press the **ENT** key.
2. Turn the small knob to set the ICS Squelch value. Then, press the **ENT** key.
3. Turn the large knob to select the ICS Squelch or Volume. Turn the small knob to set the value. Then, press the **ENT** key to save the selected values.

Selecting a Com Frequency

New frequencies are first selected as a Standby frequency and then toggled to the Active side with the **FLIP/FLOP** key.

While viewing the Standby frequency display, use the **TUNE** large and small knobs on the right side of the unit to select the desired frequency.

1. Press **C/N** to reach the Com radio function. The COM annunciator on the top line of the display will show.
2. Turn the large (outer) knob to change the values in 1 MHz increments.
3. Turn the small (inner) knob to change the values in 25 kHz or 8.33 kHz increments.
4. Press and release the **FLIP/FLOP** key to toggle the Standby frequency to the Active frequency.


Saving a Com Channel

The current Standby frequency may be saved into the Com User Frequency database from the Com display or the Com User Function. The Com User Frequency database can hold up to 15 frequencies.

1. Press **ENT**. The Standby frequency is selected and the Waypoint name field will be active.
2. Turn the small knob to select characters.
3. Turn the large knob to move the cursor.
4. After selecting the desired characters, press **ENT**.
5. Turn the large knob to select the waypoint type.
6. Turn the small knob to select the type from the list.
7. After making a selection, press **ENT**.



COM Database Look-Up

1. Press the **CRSR** (cursor) knob from the Com display to activate the database look-up function.
2. Turn the small knob to select characters and turn the large  knob to move the cursor.
3. After selecting the desired characters, press **ENT**. Turn the small knob to scroll through the list of waypoint types. Waypoint Types with a "+" sign will have more frequencies for the same type. After selection, the selected waypoint and type will be remembered for 30 minutes.
4. Press **ENT** to copy the frequency into the Standby frequency location. Press and release the **FLIP/FLOP** key to swap the Active and Standby frequencies.

Selecting a Nav Frequency

The selection of Nav frequencies is the same as for the Com frequencies.

1. Press **NAV** to reach the Nav radio function. The NAV annunciator on the top line of the display will show.
2. Turn the large (outer) knob to change the values in 1 MHz increments.
3. Turn the small (inner) knob to change the values in 50 kHz increments.
4. Press and release the **FLIP/FLOP** key to toggle the Standby frequency to the Active frequency.

Saving a Nav Channel

The current Standby frequency may be saved into the Nav User Frequency database from the Nav display or the Nav User Function. The Nav User Frequency database can hold up to 15 frequencies.

1. Press **ENT**. The Waypoint name field will be active.
2. Turn the small knob to select characters.
3. Turn the large knob to move the cursor.
4. After selecting the desired characters, press **ENT**.
5. Turn the large knob to select the waypoint type.
6. Turn the small knob to select characters.
7. Turn the large knob to move the cursor.
8. After selecting the desired characters, press **ENT**.



Listening to the Nav Audio Channel

Nav ident is enabled by pressing the **Nav Volume** knob when the Nav display is active. When Nav ident is enabled, the ID annunciation will appear to the left of the active Nav frequency.

Nav audio volume is adjusted using the **Nav Volume** knob. Turn the **Nav Volume** knob clockwise to increase volume, or counterclockwise to decrease volume.

OBS Mode

The OBS radial of the remote CDI will be decoded and displayed on the screen of the GNC 255A / 255B.

1. Press the **OBS** key to see the current OBS setting and graphic CDI.
2. Use the **LARGE** and **SMALL** knobs to change the displayed OBS values.

The GNC 255 graphic CDI is shown as a graph of five dots right or left of the triangle icon. Each dot indicates two degrees deflection with ten degrees full deflection to each side. Fly towards the bar to be on-course.

Advanced Operation

Advanced operational procedures are described in the Garmin GNC 255A/255B Pilot's Guide 190-01182-01 Rev. A or later available version..

Section 5 – Performance

Not Affected.

Section 6 – Weight & Balance

No.	Title	Type	No. of items	Installed
1.	Com/Nav/LOC/ILS Receiver	Garmin GNC 255A / 255B	1	✓
2.	CD Indicator	GI 106A	1	
3.	CD Indicator	GI 106B	1	✓



Section 7 – Airplane & System Description

General

Combining VHF communications transceiver with 200 channel VOR, Localizer and Glideslope receivers, the GNC 255A / 255B provides a full-functioned navigation and communication solution. The GNC 255A is available with a 10 watt com transmitter, while the GNC 255B is available with a 16 watt com transmitter.

The GNC 255A / 255B has the ability to monitor the standby Com frequencies. The GNC 255's Com radio operates in the aviation voice band, from 118.000 to 136.975 MHz, in 25 kHz steps (default). For European operations, a Com radio configuration of 8.33 kHz steps is also available. The unit VHF Nav receiver operates from 108 MHz to 117.95 MHz decoding both the VHF Omni Range and Localizer navigation signals. The built-in Glideslope receiver will automatically tune the corresponding glideslope paired frequencies (328 MHz to 335 MHz) when the localizer is tuned.

Unit and control description are shown in the Figure 1.

Key Features

- High-intensity alphanumeric LED display
- 200 VOR channel channel
- 760 communication channels
- Com frequency range: 118 to 136.992 MHz with 25 / 8.33 kHz spacing
- VOR frequency range: 108 to 117.95 MHz
- Glideslope frequency range: 328.60 to 335.40 MHz
- Localizer frequency range: 108 to 111.95 MHz
- Digitally decoded OBS setting
- Active and standby Flip/Flop frequencies
- Frequency monitor function
- Voice activated intercom
- Dedicated emergency channel selector



Description

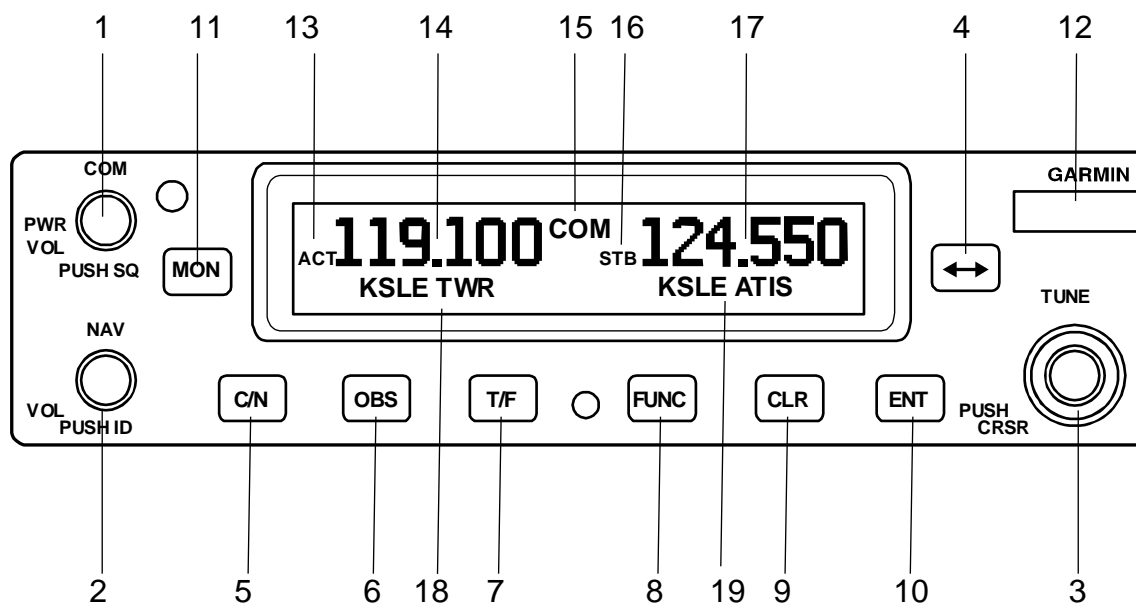


Figure 1 –Garmin GNC 255A display and control description

1. Power On/Off – Com Volume – Squelch On/Off

The knob located on the top left corner of the GNC 255A. Rotate knob clockwise (CW) past the detent to turn the power on. Continuing to rotate the knob to the right increases speaker and headphone amplifier volume level. When the Com radio is active, press the knob to toggle automatic squelch control On/Off for the Com radio.

2. Nav Volume/ID Knob

The **Nav Volume/ID** knob located in the bottom left corner of the bezel controls audio volume for the Nav radio. Press the **Nav Volume/ID** knob and the Morse code tones will be heard. When Morse code tone is active, "ID" will appear to the left of the Nav active frequency.

3. Large/Small knobs

The dual concentric knobs located on the right side of the GNC 255A / 255B are used to select frequencies, to enter data, to view the features available within a function, or make changes. Details are provided in the GNC 255A / 255B Pilot's guide.

4. FLIP/FLOP button

Press and release the **FLIP/FLOP** button to switch between the active (left-most) and standby (right-most) frequency. Switching between Com frequencies is disabled while you are transmitting.



5. C/N (Com/Nav Key)

Press **C/N** key to select the Com or Nav mode. The annunciator will light above the button when you are in Com mode.

6. OBS

Press the **OBS** key to see the current OBS setting and graphic CDI. The OBS page will be disabled if the unit is installed with an external converter.

7. T/F

Press **T/F** to toggle between the bearing TO or radial FROM the active VOR. The T/F button does not operate for Localizer frequencies.

8. FUNC (Function) Key

The **FUNC** (Function) key accesses function categories for the following: the Com Radio, Nav Radio, ICS Configuration, System Configuration, and Timer. Pressing the **FUNC** key once displays the Function mode. Pressing the **FUNC** key a second time exits the Function mode.

9. CLR (Clear) Key

Pressing the **CLR** key erases information, cancels entries, and resets timers.

10. ENT (Enter) Key

Press **ENT** to save selected values, to confirm a prompt, or save the Standby frequency.

11. MON (Monitor) Key

The **MON** (Monitor) key will engage the monitor function where the Standby frequency may be monitored while still listening to the Active frequency.

12. USB Port

The USB port is used to update the frequency database in the GNC 255.

13. ACT Symbol

The **ACT** symbol indicates active Com or Nav frequency displayed on right next to **ACT** symbol.

14. Active frequency window

15. COM / NAV Symbol

The **COM / NAV** symbol indicates active Com or Nav mode.

16. STB Symbol

The **STB** symbol indicates standby Com or Nav frequency displayed on right next to **STB** symbol.

17. Standby frequency window

18. and 19. Waypoint name and frequency type symbols



Instrument Panel

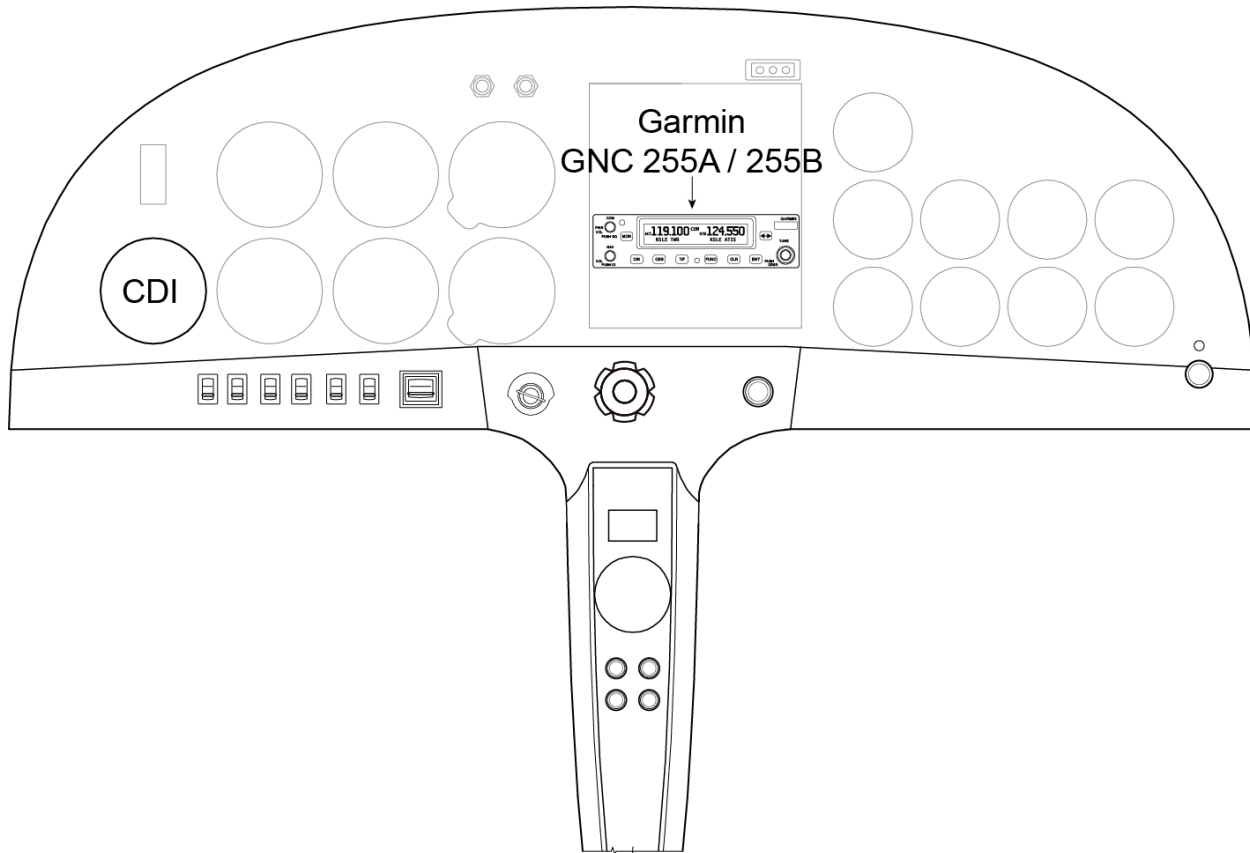


Figure 2 – Instrument panel with GNC 255A / 255B COM/VOR/LOC/ILS receiver and CDI installed

Section 8 – Handling, Servicing & Maintenance

Not Affected.

- THE END -



Supplement No. 04

Garmin G3X System with GDU 460 Displays

Airplane Serial Number: **2023 2222**

Airplane Registration Number:

Date of Issue: 06.03.2023

This Supplement must be contained in Pilot's Operating Handbook if Garmin G3X System with GDU 460 displays are installed on the airplane.

Information contained in this Supplement adds or supersedes information from basic Pilot's Operating Handbook in the further mentioned parts only. Limitation, procedures and information not included in this supplement are contained in the basic Pilot's Operating Handbook.



Log of Revisions

Rev. No.	Affected Pages	Description	EASA Approved / Date	Inserted / Date



Section 1 – General Information

This supplement adds information which is necessary for operation of the Harmony LSA airplane with the following equipment installed in the airplane:

- Dual GDU 460 display
- Dual ADAHRS GDU 25 with magnetometer GMU 22 and OAT probe GTP 59
- EIS GEA 24

The G3X is an integrated display system that presents primary flight instrumentation, navigation, and a moving map to the pilot through large format displays.

In normal operating mode, the Primary Flight Display (PFD) presents graphical flight instrumentation (attitude, heading, airspeed, altitude, vertical speed), replacing the analog flight instruments. The Multi-Function Display (MFD) normally displays an engine parameters and a full-color moving map with navigation information.

An analogue stand-by airspeed indicator and a stand-by altimeter provide the pilot with the primary flight information also in event of G3X system failure.

For other equipment not mentioned in this supplement see basic POH and other supplements to POH.

Section 2 – Limitations

2.12 Kind of Operation – Minimum Equipment

If airplane is equipped with Garmin G3X system the following instruments and equipment are required for daylight flights according to VFR:

- ..Magnetic compass
- ..One safety harness for every used seat

On at least one of two Garmin G3X screens must be displayed representation of:

- ..Airspeed indicator
- ..Barometric adjusted sensitive altimeter
- ..Engine speed indicator
- ..Cylinder head temperature indicator
- ..Oil temperature indicator
- ..Oil pressure indicator
- ..Fuel indicator for each fuel tank



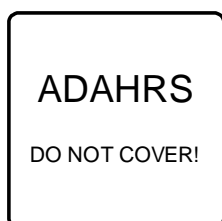
2.16 Electrical System Limitations

SOCKET switch must be in **OFF** position during taxiing and landing. **SOCKET**, **MFD**, **BEACONS** and **LDG. LIGHT** switches must be in **OFF** position during taxiing.

2.17 Other Limitation

G3X Touch Pilot's Guide – Doc. No. 190-01754-00 Rev. H, dated December 2016 or latest valid issue must be carried on-board the airplane at all times.

2.18 Limitations Placards



Located on the cover in the baggage compartment.



Located below the appropriate switch.

Section 3 – Emergency Procedures

CAUTION

BEFORE FLIGHT PILOT MUST BE FAMILIARIZED WITH GARMIN G3X SYSTEM OPERATION AS DESCRIBED IN G3X TOUCH PILOT'S GUIDE – DOC. NO. 190-01754-00 REV. H, DATED DECEMBER 2016 OR LATEST VALID ISSUE.

3.12.1 Loss of Both Generators

Failure of generator is signaled by switching on the red signaling lights **CHARGING** and **AUX. CHARG.** on the left side of the instrument panel. Backup battery **powers** the following units: PFD, MFD, ADAHRS 1, EIS. Backup battery **does not** power the following instruments: transponder and other external equipment.

1. **BATTERY G3X** **CHECK ON**
2. **BEACONS** **OFF**
3. **MFD** **OFF**
4. **LDG LIGHT** **OFF**
5. **SOCKET** **OFF**
6. Land within 30 min. as practicable.



3.14 Other Emergency Procedures

3.14.2 G3X System Failure

NOTE

In the event of a display failure, the G3X Touch System automatically switches to reversionary (backup) mode. In reversionary mode, the information is presented on the remaining display in the split-screen configuration.

When a LRU or a LRU function fails, a large red 'X' is typically displayed on the display field associated with the failed data.

NOTE

In most of cases, the red "X" annunciation is accompanied by an Alert Message. Refer to G3X Touch Pilot's Guide – Doc. No. 190-01754-00 Rev. H, dated December 2016 or latest valid issue., Section 10, Annunciations & Alerts.

Pulled Circuit Breaker

1. Appropriate circuit breaker CHECK
2. If circuit breaker is pulled PUSH again
3. If display will not start: circuit breaker PULL
4. Land as soon as practicable

3.14.3 Loss of Airspeed Information

If the display system is not receiving airspeed input from the Air Data Computer, a red X is displayed on the field.

1. Data from the backup airspeed indicator USE

3.14.4 Loss of Altitude Information

If the display system is not receiving altitude input from the Air Data Computer, a red X is displayed on the field.

1. Data from the backup altimeter USE



Section 4 – Normal Procedures and Checklists

CAUTION

BEFORE FLIGHT PILOT MUST BE FAMILIARIZED WITH GARMIN G3X SYSTEM OPERATION AS DESCRIBED IN G3X TOUCH PILOT'S GUIDE – DOC. NO. 190-01754-00 REV. H, DATED DECEMBER 2016 OR LATEST VALID ISSUE.

4.5.1 Before Engine Starting

1. Pre-flight check and check on weight and centre of gravity positiondone
2. Safety harnessescheck, fasten
3. Rudder pedals.....free
4. Control stickfree
5. Wing flapsfunction check
6. **BATTERY G3X**.....**ON**

NOTE

Ensure the G3X system connected units successfully boot-up and are operating properly. (During this period of time the units are running off of the backup battery. This test ensures the transfer circuit and backup battery are properly working).

7. **MASTER SWITCH**.....**ON**

NOTE

Ensure the G3X system connected units remain energized.

8. Trim tab.....function check
9. **PARKING BRAKE** handlerelease brakes
10. Brakes.....function check
11. **AVIONICS SWITCH****OFF**
12. Lane A, B**OFF**
13. Electric fuel pump A, B.....**OFF**
14. Canopy.....close



4.5.3 Before Taxiing

1. Transponder **SBY**
2. Outside lights as necessary
3. **BEACONS** **OFF**
4. **SOCKET** **OFF**
5. **MFD** **OFF**
6. **LDG. LIGHT** **OFF**

4.5.5 Before Take-off

1. Brakes Apply
2. **MFD** **ON**
3. **BEACONS** **ON** (as necessary)
4. Ignition check carry out, see NOTE
5. Wing flaps **TAKE-OFF** position (15°)
6. Trim tab **NEUTRAL**
7. Fuel quantity check on fuel quantity
8. **FUEL** selector **LEFT** or **RIGHT**
9. Electric fuel pump A, B **ON**
10. Engine instrument check
11. Flight instrument check
12. Radio station / avionics check, set
13. Ignition check **Lane A,B**
14. Safety harness tighten up
15. Canopy closed
16. Transponder **ON** or **ALT**

4.5.13 After Landing

1. Flaps **RETRACTED** position (0°)
2. Trim **NEUTRAL**
3. Outside light **OFF**
4. **LDG. LIGHT** **OFF**
5. Transponder **OFF**
6. Electric fuel pump A,B **ON**
7. **BEACONS** **OFF**
8. **MFD** **OFF**



4.5.14 Engine Shut-off

1. **THROTTLE** leveridle
2. Engine instrumentscheck
3. Radio station / avionics**OFF**
4. **AVIONICS SWITCH****OFF**
5. Other electrical equipment**OFF**
6. Electric fuel pump A, B.....**OFF**
7. Ignition **Lane A, B**.....**OFF**
8. **MASTER SWITCH**.....**OFF**

NOTE

Verify that G3X system connected units that derive back-up power from the backup battery remain ON.

9. **BATTERY G3X**.....**OFF**

NOTE

Ensure that G3X system connected units power down.

Section 5 – Performance

Not Affected.



Section 6 – Weight & Balance

No.	Title	Type	No. of items	Installed
1.	PFD Display	GDU 460	1	✓
2.	MFD Display	GDU 460	1	
3.	EIS Unit	GEA 24	1	✓
4.	ADAHRS Unit	GSU 25	2	✓
5.	Magnetometer	GMU 22	1	✓
6.	OAT Probe	GTP 59	1	✓
7.	GPS Antenna	GA 26 C	2	✓
8.	Backup battery	IBBS-12v-3ah	1	✓
9.	ARINC 429 Adapter	GAD 29	1	✓
10.	Airspeed ind.	7 FMS 5	1	
11.	Airspeed ind.	UMA 16-211-160	1	
12.	Altimeter	4 FGH 40	1	
13.	Altimeter	UMA 5-411-20	1	
14.	Airspeed ind.	UMA 16-212-300	1	



Section 7 – Airplane & System Description

7.3 Control

7.3.4 Elevator Trim Tab Control

The electromechanical strut is mounted inside the elevator; the connector is attached to the bracket on the pull-rod of elevator control. The relative position of the trim tab is indicated by the PFD.

7.4 Controls in the Cockpit and Instrument Panel

NOTE

For other switches and circuit breakers description see basic POH and other Supplements to POH. Cockpit description is announced in Supplement No. 01



7.4.1 Garmin G3X System Description

The G3X is an advanced technology avionics suite designed to integrate pilot/airplane interaction into one central system. The system combines primary flight instrumentation, airplane systems instrumentation, and navigational information, all displayed on two color screens. The G3X system is composed of several sub-units or Line Replaceable Units (LRUs). LRUs have a modular design. This design greatly eases troubleshooting and maintenance of the G3X system. Each LRU has a particular function, or set of functions, that contributes to the system's operation (see Fig. 7-6).

GDU 460 display unit

Featuring big, bright, high-resolution touchscreens, these easy-to-read, easy-to-use flight displays provide a whole new perspective on situational awareness with standard GPS navigation, ADAHRS, terrain/obstacles alerting, wireless connectivity, video input and more. G3X Touch even comes preloaded with Garmin FliteCharts, for terminal procedures for airports throughout the U.S., Canada and Europe, plus an option for Jeppesen charts for complete worldwide database coverage. And Garmin SafeTaxi diagrams identify runways, taxiways, FBOs and hangars as well as your airplane's exact location on the field for airports throughout the U.S., Canada and Europe.

Navigation function:

- Display of position and ground speed
- Display of stored navigation and map databases
- Area navigation functions using the determined position/velocity and stored navigation data
- Advisory approach navigation functions and associated databases
- Display of flight plan and navigation from an external GPS navigator
- Display of navigation data from an external VOR/ILS NAV radio

GSU 25 ADAHRS

The GPS-aided, digital GSU 25 ADAHRS provides highly accurate and reliable referencing of airplane position, rate, vector and acceleration data. The GSU 25 provides AHRS and Air Data information in a single mechanical package. The GSU 25 interfaces to a remote mounted GMU magnetometer for heading information and also computes OAT from inputs provided by the GTP 59.

GMU 22 Magnetometer

GMU series remote-mount, solid-state, tri-axial magnetometers use magnetic field measurements to create electronically stabilized heading references.

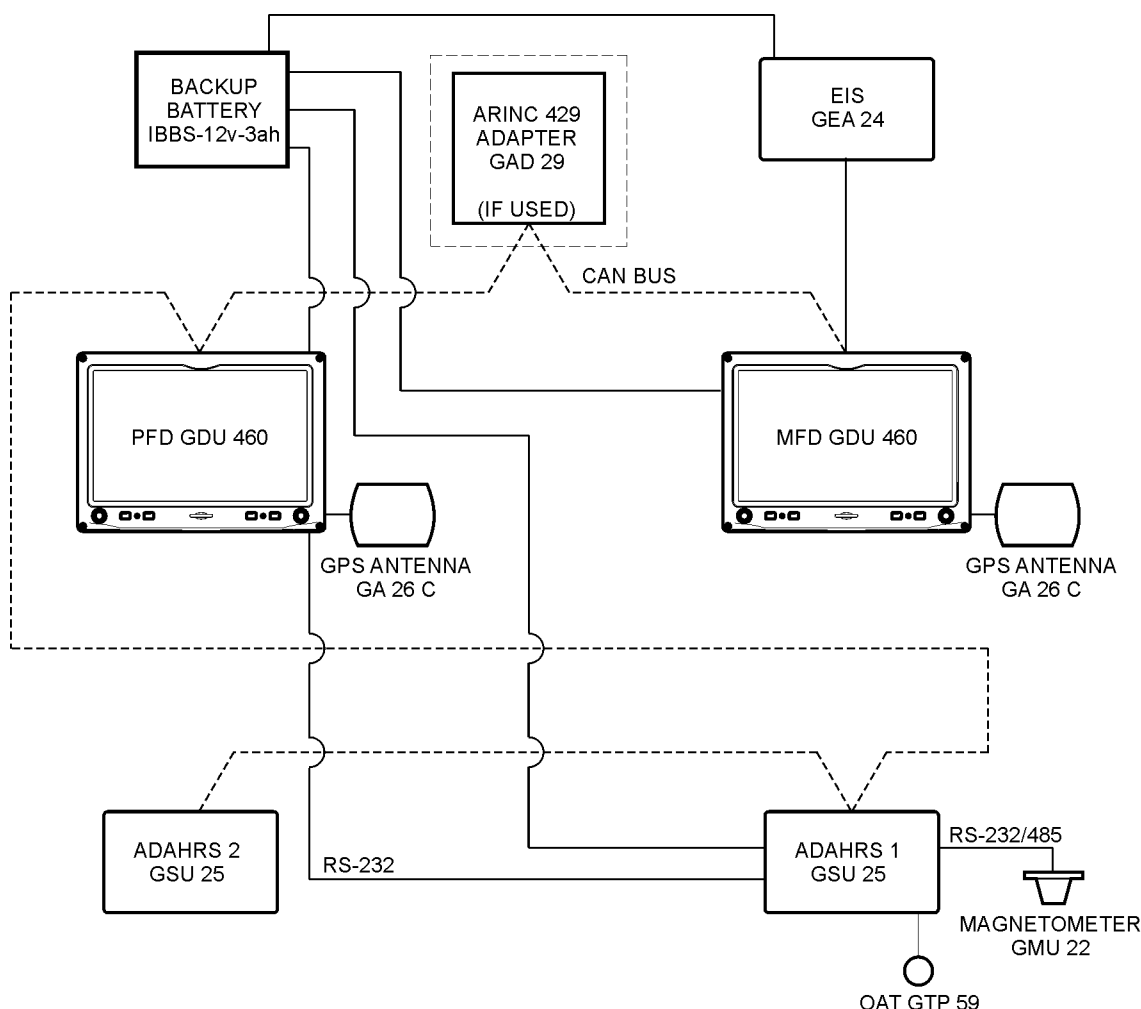


Figure 7-6 Scheme of G3X System

GEA 24 EIS

This EIS unit can measure a variety of engine parameters such as RPM, manifold pressure, oil temperature and pressure, exhaust gas temperature, coolant temperature, fuel level, voltage, current, fuel pressure, fuel flow, trim tab potentiometers, external contacts, and general purpose temperature sensors.

GTP 59 OAT Probe

GTP 59 is an outside air temperature (OAT) probe that provides data to the G3X Touch air data computer for true airspeed, density altitude and other essential flight calculations.

ARINC 429 Adapter GAD 29

The GAD 29 allows the G3X system to interface to IFR navigators such as the GNS and GTN series.



Backup Battery IBBS-12v-3ah

The Integrated Back-up Battery System, IBBS, is an electronic system that combines a Lithium-Iron-Phosphate (Li-Fe-PO₄) battery pack, a charger and switching logic in one convenient package.

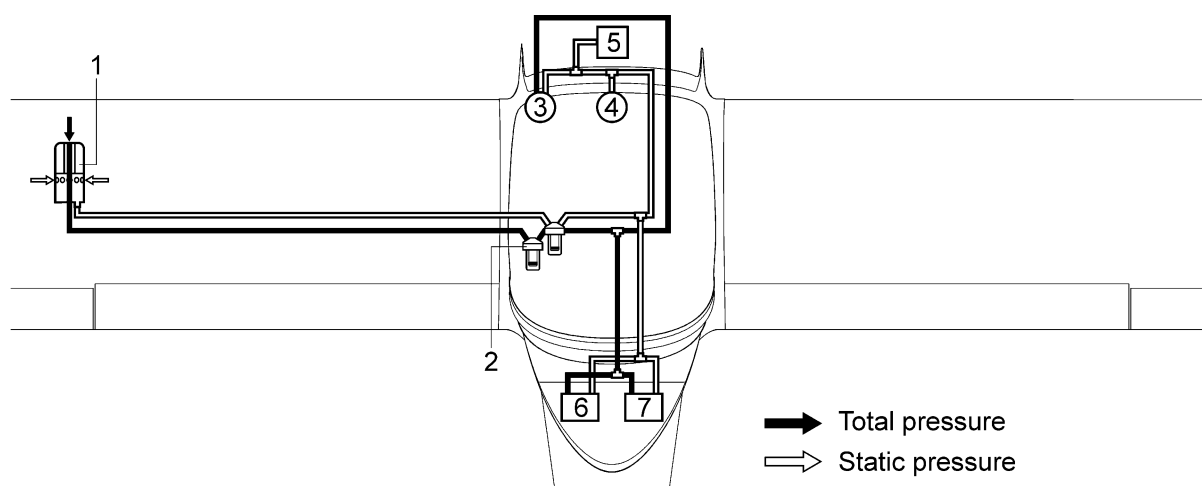
NOTE

Detailed description and operation of the Garmin G3X system is described in G3X Touch Pilot's Guide – Doc. No. 190-01754-00 Rev. H, dated December 2016 or latest valid issue.

7.13 Pitot-static System

Pitot-static tube (1, Figure 7–14) for sensing static and total pressure is located under the left half of the wing. Total pressure is sensed through the opening in the Pitot-static tube face. Static pressure is sensed through openings on the tube circumference. System of pressure distribution to individual instruments is made by means of flexible plastic hoses.

Static pressure is led to main (6) and standby ADAHRS unit GSU 25 (7), standby altimeter (4), standby airspeed indicator (3) and altitude encoder (5). Total pressure is led to the main (6) and standby ADAHRS unit GSU 25 (7) and standby airspeed indicator (3).



Legend to Figure 7–13

- | | | | |
|---|----------------------------|---|----------------------------|
| 1 | Pitot-static tube | 5 | Altitude encoder |
| 2 | Drain sump | 6 | Main ADAHRS unit GSU 25 |
| 3 | Standby airspeed indicator | 7 | Standby ADAHRS unit GSU 25 |
| 4 | Standby altimeter | | |

Figure 7–14 Scheme of pitot-static system



Section 8 – Handling, Servicing & Maintenance

8.5 Airplane Servicing

8.5.6 Backup Battery IBBS-12v-3ah

Refer to the Airplane Maintenance Manual for Harmony LSA airplane for battery maintenance practices.

8.6 Cleaning and Care

Make sure that no dust or grit accumulates at the bottom of the display glass. The GDU 460 display uses invisible infrared beams for touch detection, this makes it very important to keep the screen clean, especially along the edges.

- THE END -



Supplement No. 05

Garmin GMC 507

Autopilot

Airplane Serial Number: **2023 2222**

Airplane Registration Number:

Date of Issue: 03.03.2023

This Supplement must be contained in Pilot's Operating Handbook if the GMC 507 Autopilot is installed on the airplane.

Information contained in this Supplement adds or supersedes information from basic Pilot's Operating Handbook in the further mentioned parts only. Limitations, procedures, and information not included in this Supplement are contained in the basic Pilot's Operating Handbook.



Log of Revisions

Rev. No.	Affected Pages	Description	Approved / Date	Inserted / Date



Section 1 – General information

This Supplement adds information necessary for operation of the Harmony LSA airplane with the following equipment installed in the airplane:

- GMC 507 Autopilot
- GSA 28 servo drives

For other equipment not listed in this Supplement, refer to the basic Pilot's Operating Handbook and other Pilot's Operating Handbook Supplements.

Section 2 – Limitations

Garmin G3X Pilot's Guide (revision Q or later) Doc. 190-01115-00Q must be available on board.

Applicable modes

The autopilot installed in the Harmony airplane enables automatic control in pitch and roll axes. The yaw axis control is not used. Operation in automatic trim control mode is also possible.

NOTE

A detailed description of functions and settings of the Autopilot can be found in the Garmin G3X Pilot's Guide.

Section 3 – Emergency Procedures

Autopilot disengagement

If necessary, it is possible to immediately disengage the Autopilot using the AP DISC button on the control stick and switch to manual control.

1. **AP DISC** button Press
2. Switch to manual control.

Press the **AP DISC / CWS** button on the control stick to disengage the Autopilot. Autopilot disengagement may be accompanied by an acoustic signal. Pressing the button again acknowledges the autopilot disengagement notification and mutes the associated acoustic signal. The airplane is controlled manually, and the Autopilot is activated by pressing and holding the **AP DISC / CWS** button again.



Section 4 – Normal procedures

NOTE

Complete operating procedures can be found in the Garmin G3X Pilot's Guide.

Pre-flight inspection

1. **AVIONICS SWITCH** ON
2. **AP** switch on the instrument panel ON
3. Control stick Neutral position
4. **AP** button on the Autopilot control panel ON
5. Or **AP/ CWS** button Press and hold
6. Activation of servo drives Check

CAUTION

AFTER ACTIVATING THE SERVO DRIVES, DO NOT PURPOSELY OVERCOME THE INTRODUCED CONTROL RESISTANCE (PITCH + ROLL). IT COULD DAMAGE THE DEVICE.

7. **AP DISC** button Press
8. Autopilot disengagement and acoustic signal Check

NOTE

The acoustic signal depends on the Autopilot settings.
It is not mandatory.

9. Disconnection of servo drives, free movement of controls Check

Disengagement

1. **AP** switch on the instrument panel OFF
2. **AVIONICS MASTER** switch OFF



Section 5 – Performance

Not affected

Section 6 – Weight & Balance

No.	Title	Type	No. of items	Installed
1.	Autopilot	Garmin GMC 507	1	✓
2	Servo drive	Garmin GSA 28	2	✓

Section 7 – Airplane & System Description

Garmin GMC 507, installed in the Harmony airplane, works as a two-axis Autopilot cooperating with the Garmin G3X system.

The Automatic Flight Control System (AFCS) consists of a GMC 507 control unit and GSA 28 servo drives. In flight mode with the Autopilot engaged, the Flight Director provides pitch and roll commands to the Autopilot servo drives. The Autopilot function is shown on the PFD display.

A set of PFD/MFD GDU 460, ADAHRS GDU 25, GMU 22, OAT GTP 59 and EIS GEA 24 displays was created for the Harmony airplane (refer to Supplement No. 10).

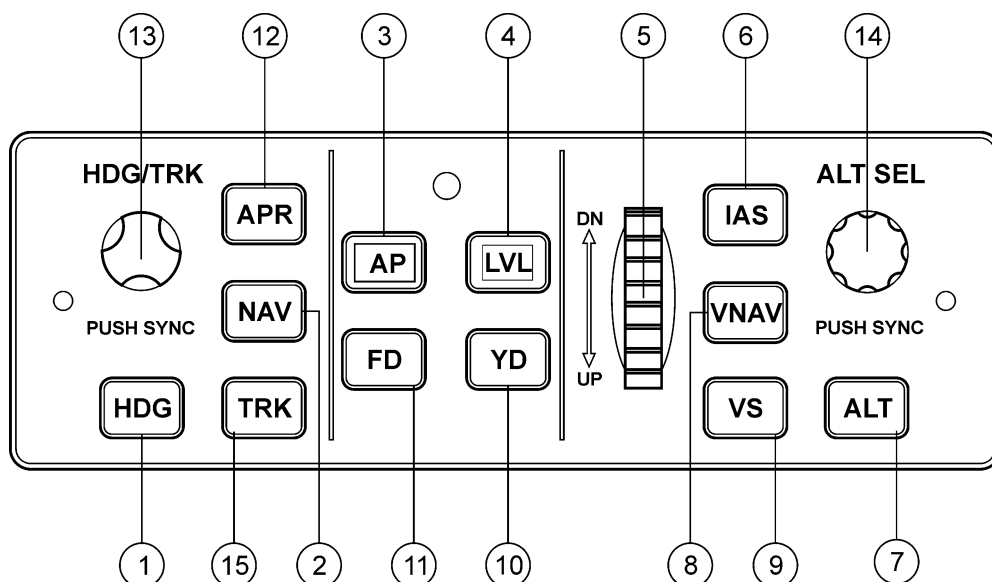


Fig. 1 – GMC 507 Autopilot panel description



GMC 305 Autopilot panel

1 HDG key

Selects/deselects the heading select mode.

2 NAV key

Selects/deselects the navigation mode.

3 AP key

Engages/disengages the Autopilot.

4 LVL key

Engages the Autopilot in level vertical and lateral modes.

5 NOSE UP / DN wheel

Adjusts the vertical mode reference in pitch hold, vertical speed, indicated airspeed, and altitude hold modes.

6 IAS key

Selects/deselects the indicated airspeed mode.

7 ALT key

Selects/deselects the altitude hold mode.

8 VNV key

Selects/deselects the vertical path tracking mode for vertical navigation flight control.

9 VS key

Selects/deselects the vertical speed mode.

10 YD key

No function.

11 FD key

Activates/deactivates the Flight Director only. Pressing once turns on the Flight Director in the default vertical and lateral modes. Pressing again deactivates the Flight Director and removes the command bars. If the Autopilot is engaged, the FD key is disabled.

12 APR key

Selects/deselects the approach mode.

13 HDG or HDG/TRK knob

Selects the desired heading.

14 ALT SEL knob

Selects the desired altitude setting.

15 TRK key

Selects/deselects the track mode.



Layout of functions on the PFD display

The automatic flight control status field displays the Autopilot mode notification. Active modes are displayed in green and armed modes in white.

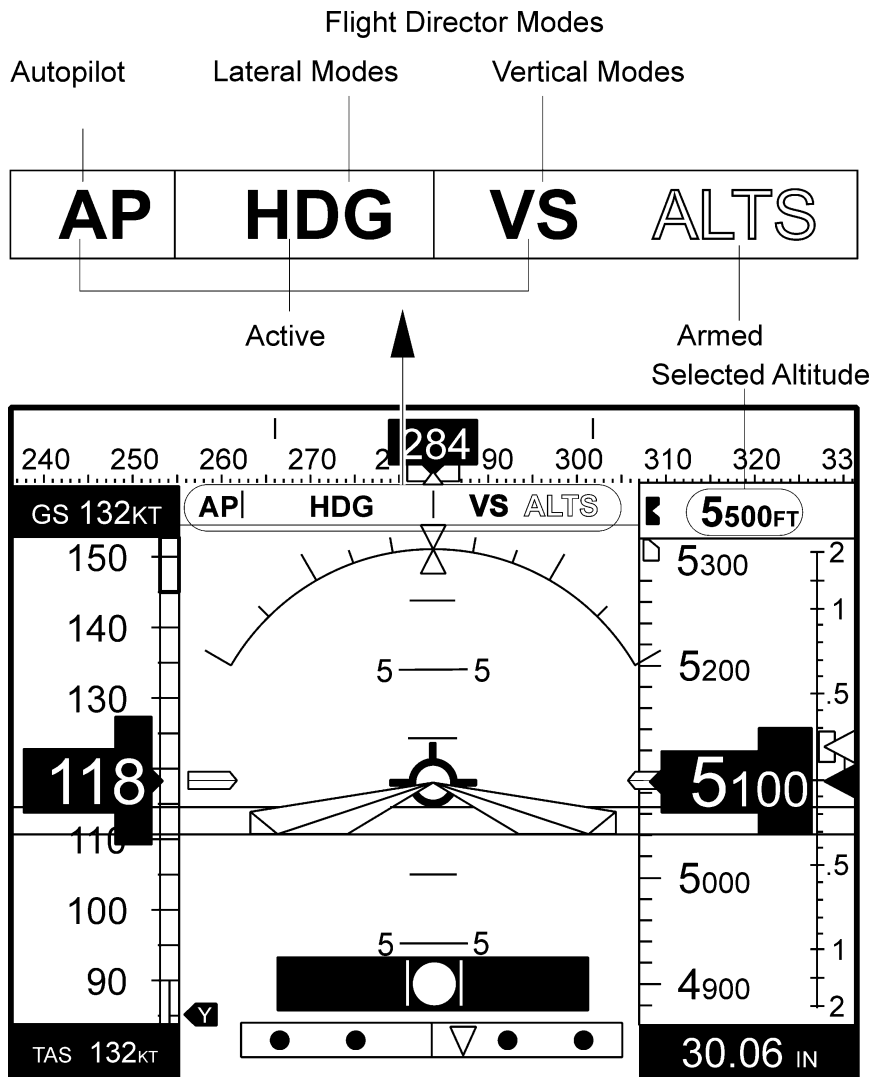


Fig. 2 – Layout of functions on the G3X PFD display



NOTE

Detailed instructions for setting up the Autopilot are included in the current version of the Garmin G3X Pilot's Guide.

Section 8 – Handling, Servicing & Maintenance

Not affected



Supplement No. 6

Garmin G5

Airplane Serial Number:	2023 2222
Airplane Registration Number:	
Date of Issue:	06.03.2023

This Supplement must be contained in Pilot's Operating Handbook if Garmin G 5 is installed on the airplane.

Information contained in this Supplement adds or supersedes information from basic Pilot's Operating Handbook in the further mentioned parts only. Limitation, procedures and information not included in this supplement are contained in the basic Pilot's Operating Handbook.



Log of revision

Rev. No.	Affected Pages	Description	Approved / Date	Inserted / Date



Section 1 – General Information

This supplement adds information which is necessary for operation of the Harmony LSA airplane with the following equipment installed in the airplane: Garmin G 5. The G5 can be installed as a standalone flight display or a fully integrated backup instrument in the G3X system. This section contains general information as well as installation information for the G5.

PRIMARY FUNCTIONS

Attitude (roll, pitch)
Air data (altitude and airspeed)
Slip/skid and turn coordinator
GPS (ground speed and ground track)
Autopilot control (when installed with optional equipment)
Optional battery backup with up to 4 hours of emergency power
RS-232 and CAN communication interfaces
Course and navigation display (when installed with optional equipmen

NOTE

A detailed description of functions and settings of the Garmin G 5 can be found in the G5 Electronic Flight Instrument Pilot's Guide for Certified Aircraft, č. dok. 190-01112-12, rev. D, date of issue 21 July, 2019 or next.

Section 2 – Limitations

1. Software:

Unit	Actual Software
G5 Electronic Flight Instrument	6.20

2. G5 Electronic Flight Instrument used as attitude indicator and HSI, must be equipped backup battery.

G5 Attitude

The G5 calculates aircraft attitude using information from its built-in inertial sensors. Any failure of the inertial sensors results in loss of attitude and information (indicated by red 'X' flags over the PFD attitude display). If the G5 senses that the attitude solution is valid, but not yet within



the internal accuracy limits, "ALIGNING" is displayed. The G5 can align itself both while taxiing and during level flight.

The G5 will also use GPS and airspeed data to provide the most accurate attitude information. If none of these additional sources of information are available, attitude calculations will still be valid but accuracy may be slightly affected.

G5 heading

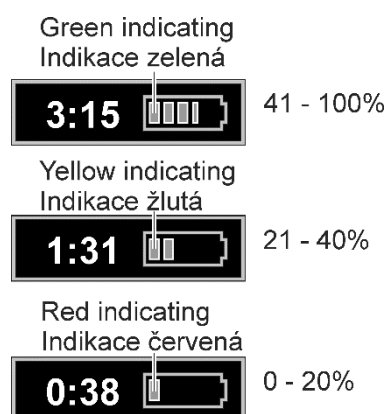
When installed as a backup instrument in a G3X/G3X Touch system, the G5 can display magnetic heading information received from an ADAHRS (Air Data and Attitude/ Heading Reference System) on the common CAN network. If magnetic heading input data is not available, the G5 will display GPS-derived ground track instead.

The G5 corrects for shifts and variations in the Earth's magnetic field by applying the Magnetic Field Variation Database. The Magnetic Field Variation Database is derived from the International Geomagnetic Reference Field (IGRF). The IGRF is a mathematical model that describes the Earth's main magnetic field and its annual rate of change. The database is updated approximately every 5 years via a software update. Failure to update this database could lead to erroneous heading information being displayed to the pilot.

If the G5 senses that the magnetic heading measurement is valid, but possibly outside of the internal accuracy limits, the numeric heading is displayed in yellow.

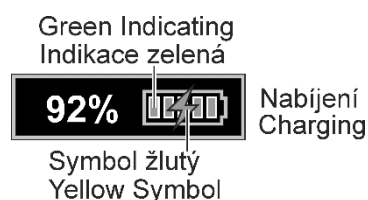
Battery Status Indicator

The current charge level of the battery is indicated by the filled-in portion of the battery icon. The battery icon turns yellow or red to indicate a low-battery condition.



When the G5 is powered by the battery, the estimated time until the battery is empty is displayed. Otherwise, the current charge level of the battery in percent is displayed as a numeric value.

When the G5 is connected to external power and the battery is being charged, a lightning bolt symbol appears over the battery icon.





Other battery indications:



Battery charger hardware fault, or temperature too high or low to safely charge the battery
Porucha hardwaru nabíječky nebo nevhodná (vysoká / nízká) teplota pro správné nabití baterie.



Porucha baterie.
Battery fault



Baterie chybí
(objeví se pouze v případě, když je pole stavu baterie nakonfigurováno pro takové zobrazení).
Battery is not present (appears only when the battery status field has been configured to always appear)



System Messages

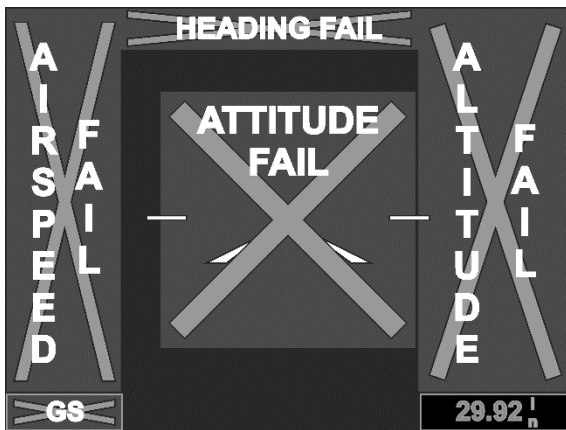
Message	Comments
Critical battery fault! Powering off... Battery fault	Battery has a critical fault condition and the unit is about to power off to avoid damage to the battery. Battery has a fault condition - examine fault display in configuration mode and contact Garmin if it persists.
Battery charger fault	Battery charger has a fault condition - examine fault display in configuration mode and contact Garmin if it persists.
Low battery	Battery charge level is low
Hardware fault	Unit has a hardware fault - contact Garmin for service
Power supply fault	Unit power supply fault detected - contact Garmin for service if it persists
Unit temperature limit exceeded	Unit is too hot or too cold
Network address conflict	Another G5 with the same address is detected on the network (most commonly a wiring error on one of the units)
Communication error	General communication error (most commonly appears in conjunction with Network Address Conflict message)
Factory calibration data invalid	Unit calibration data not valid - return to Garmin
Magnetic field model database out of date	Internal magnetic field database is out of date - software update required
Using external GPS data	GPS data from another network LRU is being used. The unit's internal GPS receiver is enabled, but unable to establish a GPS fix
Servo clutch fault	An autopilot servo is reporting a clutch monitor fault



Section 3 – Emergency Procedure

G5 Annunciations

When a G5 function fails, a large red 'X' is typically displayed over the instrument(s) or data experiencing the failure. Upon G5 power-up, certain instruments remain invalid as equipment begins to initialize. All instruments should be operational within one minute of power-up. If any instrument remains flagged, and it is not likely an installation related problem, the G5 should be serviced by a Garmin-authorized repair facility .



Annunciations

Section 4 – Normal Procedure

System Power – Up

During system initialization, the G5 displays the message 'ALIGNING' over the attitude indicator. The G5 should display valid attitude typically within the first minute of power-up. The G5 can align itself both while taxiing and during level flight.

Backlight Intensity

When set to Auto, the backlight is automatically adjusted according to ambient light conditions. When set to Manual, the backlight level is set by the pilot.

Adjusting backlight intensity:

- 1) While the unit is turned on, press the **Power** Button.
- 2) Turn the Knob to adjust the backlight intensity.
- 3) Press the Knob to close the backlight page.

Setting the backlight intensity to automatic:

- 1) While the unit is turned on, press the Power Button.
- 2) Press the **Power** Button again to select **Auto**.
- 3) Press the Knob to close the backlight page.

AFCS Pre-Flight Actions

To ensure that the Automatic Flight Control System (AFCS) is operating properly prior to flight, perform the following Garmin recommended preflight checks.



Before takeoff checklist:

- 1) Autopilot - ENGAGE (using AP/CWS button, or **AP** button on mode controller)
- 2) Flight controls - CHECK (verify autopilot can be overpowered in both pitch and roll)
- 3) **AP** DISC button - PRESS (verify autopilot disengages)
- 4) Flight director - SET FOR TAKEOFF (select IAS or VS mode or push FD Button to turn off the Flight Director)
- 5) Flight controls - CHECK (verify autopilot servos are disengaged from pitch, roll, and yaw controls, and all controls move freely)
- 6) Elevator trim control - SET FOR TAKEOFF

Section 5 – Performance

Not affected

Section 6 – Weight & Balance

No.	Title	Type	No. of items	Installed
1.	Garmin G 5	G 5	1	
2.	Garmin G 5 and battery pack	G 5	1	✓

Section 7 – Airplane & System Description

Description

G5 is an electronic instrument display capable of operating as a standalone flight display or a fully integrated backup instrument for G3X systems. It features a bright, sunlight readable, 3.5-inch color display.

When installed as part of a G3X system, the G5 provides a redundant source of attitude and air data to the G3X displays, and additionally provides backup autopilot control allowing coupled GPS approaches to be flown or continued in the event of primary flight display is unavailability. The G5 additionally provides backup autopilot control allowing coupled GPS approaches to be flown or continued in the event of primary flight display loss. In the case of aircraft power loss, the optional battery backup sustains the G5 flight display with up to 4 hours of emergency power.



Legend to Figure 1

- | | | | |
|---|----------------------|---|-------------------|
| 1 | Power / Backlight | 3 | MicroSD™Card Slot |
| 2 | Ambient Light Sensor | 4 | Knob |

Figure 1 Bezel Overview

Function

Power Button

microSD™ Card Slot

Knob

Press

Turn

Press to turn unit ON. Press and hold for 5 seconds to turn unit OFF. Once on, press to adjust the backlight.

Insert microSD card to update software and log data.

Press to access the Menu.

From the Menu, press to select the desired menu item.

Press to accept the displayed value when editing numeric data or selecting from a list.

From the Main Menu, turn the Knob to move the cursor to the desired menu item.

From the PFD Page, rotate to adjust the barometric setting.

From the HSI Page, rotate to adjust the heading or track bug.

Turn to select the desired value when editing numeric data or selecting from a list.



Micro- SD™ Cards

The G5 data card slot uses micro Secure Digital (SD) cards. The microSD™ card can be used for software updates and data logging. The maximum supported card size is 32GB.

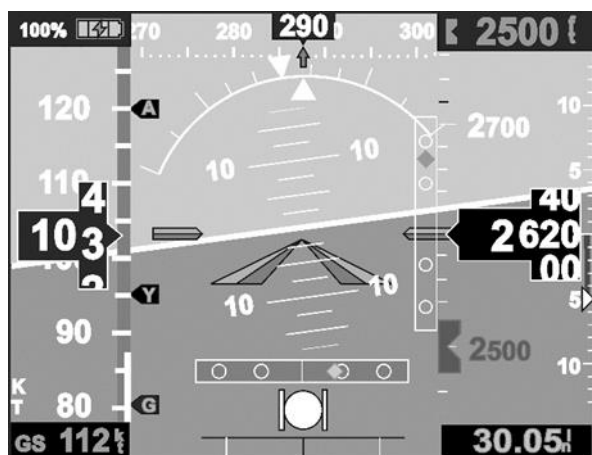
Installing an microSD™ Card:

- 1) Insert the microSD™ card in the microSD™ card slot with the card contacts facing down (the card should be flush with the face of the bezel).
- 2) To eject the card, gently press on the microSD™ card to release the spring latch.

Accessing Functionality

Pages:

The G5 has two main pages, the HSI Page and the PFD Page. The HSI Page can be accessed from the PFD Page (unless it has been disabled in configuration).



PFD Page



HSI Page

Displayng the HSI page from the PFD page:

- 1) From the PFD Page press the **Knob** to display the Menu.
- 2) Use the Knob to select **HSI**.



Menu:

Press the Knob to access the G5 Menu. Navigate the menu by rotating the Knob and make selections by pressing the Knob.



PFD Page Menu

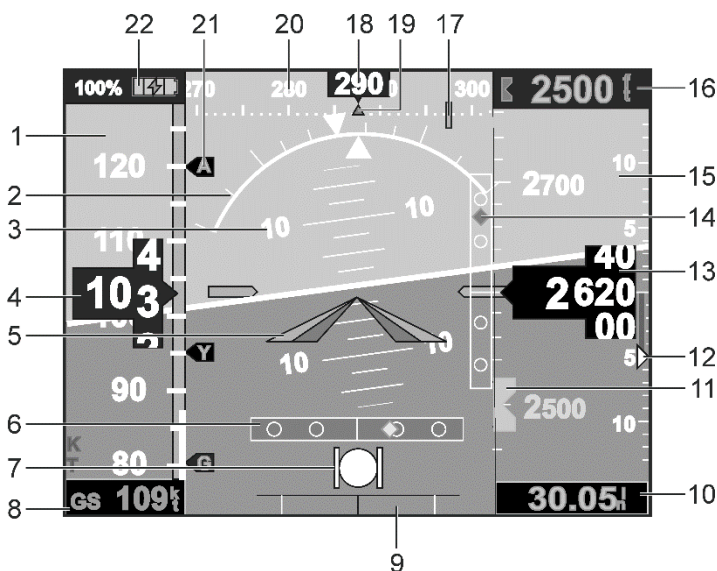


HSI Page Menu



PFD Page Description

The G5 PFD Page displays a horizon, airspeed, attitude, altitude, vertical speed, heading, and course deviation information. The following flight instruments and supplemental flight data are displayed on the PFD Page.



Legend to Figure 2

1	Airspeed Indicator	12	Vertical Speed indicator
2	Attitude Indicator	13	Current Altitude
3	Pitch Scale	14	VNAV Indicator or Vertical Dev. Ind.
4	Current Airspeed	15	Altimeter
5	Aircraft Symbol	16	Selected Altitude
6	Course Deviation Indicator	17	Navigation Course
7	Slip / Skid Indicator	18	Current Heading or Ground Track
8	Ground Speed (GS)	19	Ground Track
9	Turn Rate Indicator	20	Heading or Ground Track
10	Altimeter Barometric Setting	21	Vspeed Reference
11	Selected Altitude Bug	22	Battery status Indicator.

Figure 2 PFD Flight Instrument

HSI Page Description

The Horizontal Situation Indicator (HSI) on the HSI Page displays a rotating compass card in a heading-up orientation. Letters indicate the cardinal points and numeric labels occur every 30°. Major tick marks are at 10° intervals and minor tick marks at 5° intervals. The current track is represented on the HSI by magenta triangle and a dashed line. The HSI also presents course deviation, bearing, and navigation source information.

Displaying the HSI page from the PFD page:

- 1) From the PFD Page press the Knob to display the Menu.
- 2) Select HSI.



Legend to Figure 3

- | | | | |
|---|--------------------------|----|-------------------------------------|
| 1 | Distance to Waypoint | 8 | Selected Heading or Ground Track |
| 2 | Battery Status Indicator | 9 | OBS Annunciator |
| 3 | Navigation Source | 10 | Course Deviation Indicator (CDI) |
| 4 | Aircraft Symbol | 11 | GPS CDI Scale |
| 5 | Navigation Messages | 12 | Selected Heading / Ground Track Bug |
| 6 | Rotating Compass Rose | 13 | Current Heading / Ground Track |
| 7 | Ground Speed | 14 | Current Track |

Figure 3 Horizontal Situation Indicator (HSI)

3. Nav Source Annunciations			11. GPS CDI Scale Annunciations		
GPS /	VLOC /	VOR /	LP	LPV	LNAV
GPS 1 /	VLOC 1 /	VOR 1 /	LNAV / VNAV	LNAV+V	APR
GPS 2 /	VLOC 2 /	VOR 2 /	TERM	ENR	OCN
4. Navigator Messages Annunciations					
LOI	Loss of GPS Integrity		MSG	Pending Nav Message	
DR	GPS Dead – Reckoning Mode		WPT	Waypoint Arrival	

Navigation

A G5 installed as part of a G3X system with multiple navigation sources will only display data from the #1 navigation source. If the navigation source is a GNS/GTN unit, both GPS and



VLOC data can be displayed. Displayed navigation information is also dependent upon the selection on the navigation configuration page.

Installation Type Setting

G3X System Backup (with Navigation Data config mode set to Always Display)

G3X System Backup (with Navigation Data config mode set to Auto)

Standalone Instrument

Navigation Data Behavior

Always displays navigation data.

Displays navigation data only when the navigation data source selected on the G3X PFD is the same as the navigation data available to the G5. (If no G3X displays are present, this will function as if Navigation Data is set to Always)

Always displays navigation data

Automatic Flight Control

AFC System Architecture

An Automatic Flight Control System (AFCS) is typically comprised of two major components: A Flight Director (FD) and Autopilot servos. The Flight Director provides pitch and roll commands to the autopilot servos. These pitch and roll commands are displayed on the PFD Page as Command Bars. When the Flight Director is active the pitch and roll commands can be hand-flown by the pilot or when coupled with the autopilot, the autopilot servos drive the flight controls to follow the commands issued by the Flight Director. The Flight Director operates independently of the autopilot servos, but in most cases the autopilot servos can not operate independent of the Flight Director.

Autopilot Operation

The autopilot operate the flight control surface servos to provide automatic flight control. The autopilot controls the aircraft pitch and roll attitudes following commands received from the flight director. Pitch, Roll, provides trim commands to each servo to relieve any sustained effort required by the servo(s).

Flight Control

Pitch and roll commands are provided to the servos based on the active flight director modes.. Servo motor control limits the maximum servo speed and torque. This allows the servos to be overridden in case of an emergency.

Pitch Axis And Trim

The autopilot pitch axis uses pitch rate to stabilize the aircraft pitch attitude during flight director maneuvers. Flight director pitch commands are rate and attitude-limited, combined with pitch damper control, and sent to the pitch servo motor. The pitch servo measures the output effort (torque) and optionally provides this signal to the pitch trim



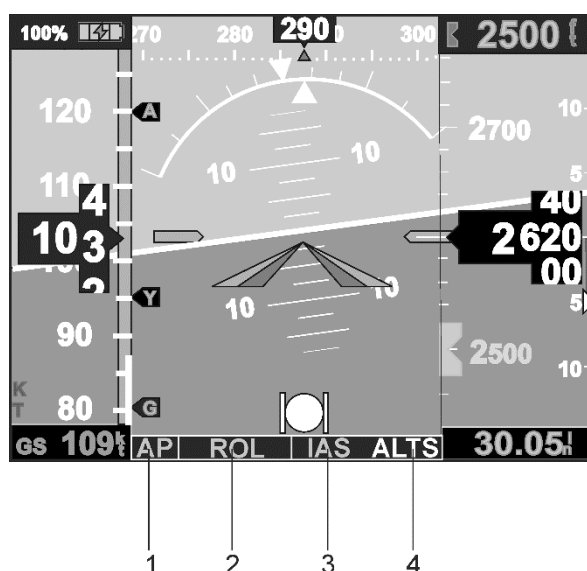
Roll Axis

The autopilot roll axis uses roll rate to stabilize aircraft roll attitude during flight director maneuvers. The flight director roll commands are rate- and attitude-limited, combined with roll damper control, and sent to the roll servo motor.

G5 AFC Status Box

The AFCS status box displays Autopilot (AP) and Flight Director (FD) mode annunciations on the PFD Page.

Autopilot (AP) status is displayed on the far left of the G5 Autopilot Status Box. Lateral modes are displayed in the center, and vertical modes are displayed on the right. Armed modes are displayed in white and active in green.



Legend to Figure 4

- | | | | |
|---|------------------|---|--------|
| 1 | Autopilot status | 3 | Active |
| 2 | Active | 4 | Armed |

Figure 4 Autopilot Status Box

G5 AFC CONFIGURATION

The G5 can be configured as a standalone unit or as a backup unit for a G3X or G3X Touch system.

When configured as a standalone unit with a GMC controller and GSA servos:

The G5 supports the following modes: LVL, PIT, ROL, TRK, GPS, VS, IAS, ALT, ALTS, GP, and VNAV.

GP mode requires ARINC 429 data from an IFR navigator.



The HDG button on the GMC is used for TRK mode.

VNAV mode requires RS-232 data from a portable GPS.

When configured as a backup unit for a G3X or G3X Touch system:

The G5 supports the following modes: LVL, PIT, ROL, HDG, TRK, GPS, VS, IAS, ALT, ALTS, TO, GA, and GP.

GP mode requires ARINC 429 data from an IFR navigator.

TRK mode is selected using the HDG Button on the GMC and is only available when magnetic heading is unavailable.

G5 AFC OPERATION

AFCS functionality is distributed across the following Line Replaceable Units (LRUs):

- GMC 305/307 AFCS Mode Control Unit
- GSA 28 AFCS Pitch/Roll/Yaw Damper (optional) servos.

The AFCS system can be divided into these main operating functions:

- **Flight Director (FD)** — Flight director commands are displayed on the display. The flight director provides:

- Command Bars showing pitch/roll guidance
- Vertical/lateral mode selection and processing
- Autopilot communication

- **Autopilot (AP)** — Autopilot operation occurs within the pitch and roll servos. It also provides servo monitoring and automatic flight control in response to flight director steering commands, Air Data and Attitude and Heading Reference System (ADAHRS) attitude, rate information, and airspeed.

- **Manual Electric Trim (MET)** — Manual electric trim may provide trim capability for any properly configured axis (pitch, roll) when the autopilot is not engaged.

Section 8 – Handling, Servicing & Maintenance

Not affected



Supplement No. 09

Garmin GPS 175 and GNX 375 ATC Transponder

Airplane Serial Number: **2023 2222**

Airplane Registration Number:

Date of Issue: 03.03.2023

This Supplement must be contained in Pilot's Operating Handbook if Garmin GPS 175 / GNX 375 ATC Transponder is installed on the airplane.

Information contained in this Supplement adds or supersedes information from basic Pilot's Operating Handbook in the further mentioned parts only. Limitation, procedures and information not included in this supplement are contained in the basic Pilot's Operating Handbook.



Log of Revisions

Rev. No.	Affected Pages	Description	EASA Approved / Date	Inserted / Date



Section 1 – General Information

This Supplement adds information necessary for operation of the Harmony LSA airplane with Garmin GPS 175 / GNX 375 ATC transponder that is installed in accordance with the approved airplane manufacturer documentation.

Garmin GPS 175

Moving Map

- Terrain
- Flight Plan
- Graphical Flight Planning
- Waypoint Information
- Nearest
- FIS-B Weather Display [1] [2]
- ADS-B In Traffic Display [1] [2]
- Terrain Avoidance
- System Advisories
- Scheduled Messages
- Clock
- CDI
- Internal GPS Receiver
- Built-in Bluetooth
- Database Concierge Access [3]

Garmin GNX 375

- Moving Map
- Terrain
- Flight Plan
- Graphical Flight Planning
- Waypoint Information
- Nearest
- FIS-B Weather Receiver & Display [2]
- ADS-B In Traffic Receiver & Display [2]
- ADS-B Out on 1090 MHz Extended Squitter
- Terrain Avoidance
- System Advisories
- Scheduled Messages
- Clock
- CDI
- Internal GPS Receiver
- Built-in Bluetooth
- Mode S Transponder
- Database Concierge Access [3]



[1] Requires external ADS-B In product.

[2] ADS-B In via 1090 MHz (traffic) and 978 MHz UAT (traffic and weather).

[3] Requires Wi-Fi connection via Flight Stream 510.

Section 2 – Limitations

2.16 Other Limitations

2.16.1 Garmin GPS 175 and GNX 375 Transponder

The Garmin GPS 175 / GNX 375 Pilot's Guide All-In-One ADS-B Transponder Pilot's Guide, P/N 190-02207-02 (revision B or later) must be available to the flight.

Section 3 – Emergency Procedures

3.14 Other Emergency Procedures

3.14.7 To Transmit an Emergency Signal

1. **ALT** key on XPDRpress
2. Numeric keys **0 - 7** on XPDRsquawk **7700**

3.14.8 To Transmit a Signal Loss of all Communication

1. **ALT** key on XPDRpress
2. Numeric keys **0 - 7** on XDPDsquawk **7600**

3.14.9 To Transmit a Signal during Hijacking

1. **ALT** key on XPDRpress
2. Numeric keys **0 - 7** on XPDRsquawk **7500**

Section 4 – Normal Procedures

4.5 Normal Procedures and Checklist

4.5.2 Engine Starting

18. **Avionics SWITCH**.....**ON**
19. **ON** key on XPDRpress
20. **VFR** key on XPDRsquawk code for VFR
21. **ALT** key on XPDRpress



- 22. Radio / station avionics **ON**
- 23. Other electrical equipment **ON** as necessary

4.5.5 Before Take-off

- 18. XPDR check if set ALT Mode and the required Squawk is set. Attend to directions from ATC

NOTE

If the ON key is pressed the transponder replies to interrogations. Replies do not include pressure altitude.

4.5.13 After Landing

- 18. XPDR leave set ALT Mode except as otherwise directed by ATC

4.5.14 Engine Shut-off

- 1. **THROTTLE** lever idle
- 2. Engine instruments..... check
- 3. **OFF** key on XPDR..... press
- 4. Radio station / avionics **OFF**
- 5. **AVIONICS SWITCH**..... **OFF**
- 6. Other electrical equipment **OFF**
- 7. Electric Fuel pump A, B..... OFF
- 8. Ignition **Lane A, B** **OFF**
- 9. **MASTER SWITCH** **OFF**



Section 5 – Performance

Not Affected

Section 6 – Weight & Balance

No.	Title	Type	No. of items	Installed
1.	GPS / ATC transponder	Garmin GPS 175 / GTX 375	1	✓

Section 7 – Airplane & System Description

7.15 Navigation and Communication Equipment

7.15.1 Garmin GPS 175 / GNX 375 ATC Transponder

The GPS 175 and GNX 375 are the first 2" by 6.25" panel mount navigators to employ full color capacitive touchscreen technology.

The GPS 175 is a TSO-C146e compliant GPS/WAAS navigator with en route, terminal, and precision/non-precision approach capabilities. The GNX 375 combines the functionality of the GPS 175 with a TSO-C112e (Level 2els, Class 1) compliant mode S transponder.

Each unit is Bluetooth compatible, providing flight plan, traffic, weather, and position data to an available portable electronic device.

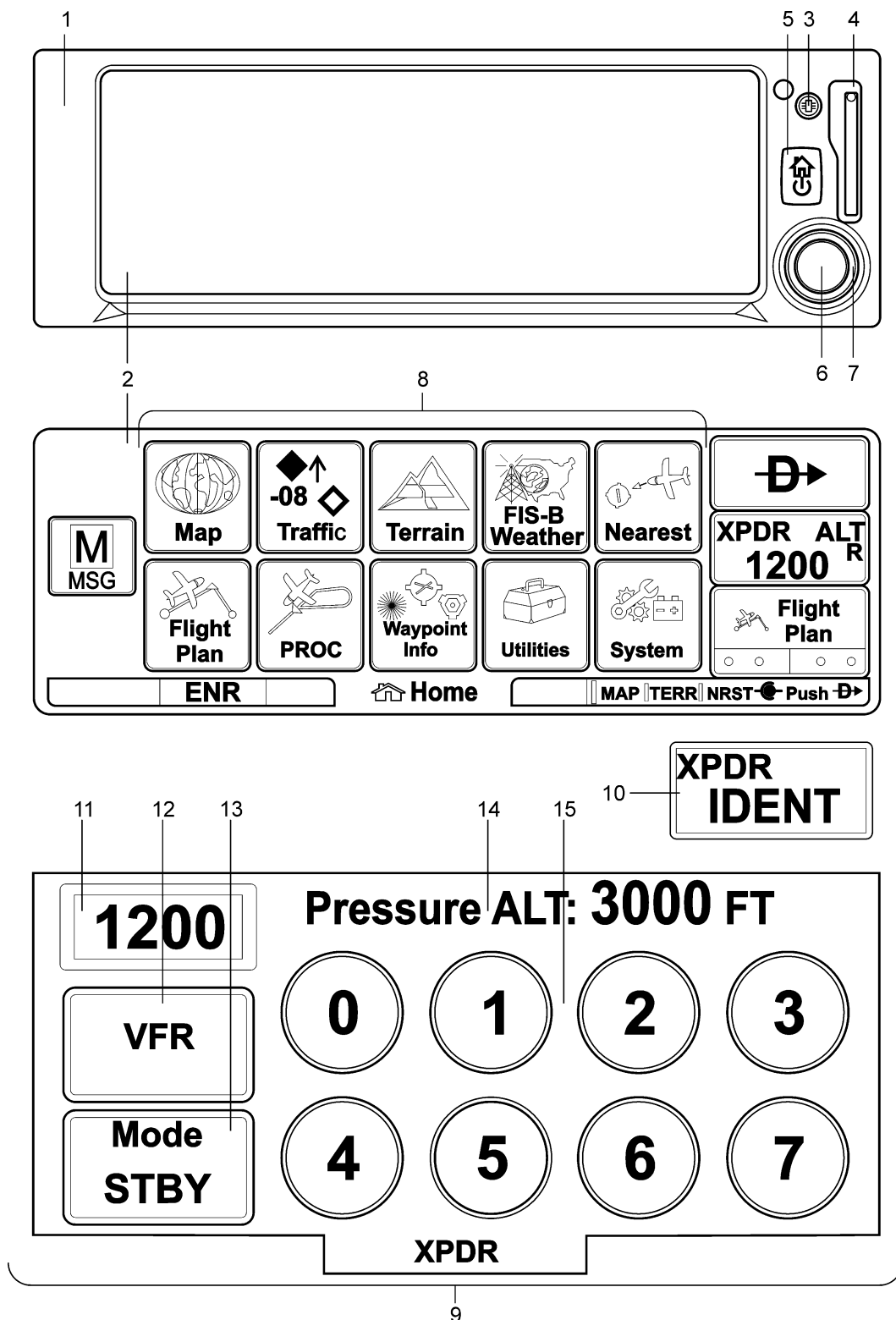


Figure 1 – Front panel of Garmin GPS 175 / GNX 375 (Page 1 of 2)



Legend to Figure 1:

1	Bezel	9	Transponder Controls
2	Touchscreen	10	Squawk Code Entry Field
3	Photo Cell	11	VFR Key
4	SD Card Slot	12	XPDR Mode Key
5	Ower / Home Key	13	Squawk Code Entry Keys
6	Inner Knob	14	Data Field
7	Outer Knob	15	XPDR Control Panel
8	APP Icons	-	-

Figure 1 – Front panel of Garmin GPS 175 / GNX 375 (Page 2 of 2)

Display Layout**1 Bezel**

Includes the power key, mechanical knobs, photocell, and SD card slot. Ledges provide hand stability when performing data entry and making selections.

2 Touchscreen

Multi-touch color display provides controls for unit operation.

3 Photocell

Measures cockpit ambient light level to automatically adjust display brightness for day and night.

4 SD Card Slot

Interface for loading database, exporting log files, and updating software. Compatibility with Flight Stream 510 allows wireless database transfer from the Garmin Pilot app via Database Concierge.

5 Power/Home Key Powers the unit on or off and provides direct access to the Home page.

6 & 7 Inner & Outer Knobs

Multipurpose dual concentric knob allows data entry, list scrolling, map range control, and page navigation.



Knob Functions

7 Outer Knob

- Selecting reference controls
- Selecting a page shortcut
- Cursor placement and initial field/page selections
- Moving cursor forward or backward within data field

6 Inner Knob (Turn)

- Zooming
- Scrolling lists
- Inputting data
- Modifying individual characters in data entry field

6 Inner Knob (Push)

- Entering current or specified numerical value
- Toggling Map page user fields on or off
- Accessing the Direct To function from the Home page

XPDR Control

Transponder controls are accessible via the **XPDR** key.

This key is unavailable when the control panel is active

The XPDR key becomes available when you:

- Enter a squawk code
- Open the XPDR menu
- View a message
- Select the **Mode** key
- Leave the control panel

PILOT INTERFACE

Unit Power

The unit receives power directly from the aircraft's electrical system. Upon power-up, the bezel key backlight momentarily illuminates. System failure annunciations typically disappear within the first 30 seconds after power-up.

The start-up screen presents the unit software versions, the name and status of all installed databases, and the Database Updates page access key. These features are available only at power up.

Tapping **Continue** advances to the Instrument Test page.

If an instrument remains flagged after one minute, check the status of the associated LRU, then contact a Garmin dealer for support.

Instrument Test

Section 9

Supplement No. 09

GPS 175/GNX 375



PILOT'S OPERATING HANDBOOK



Doc. No. HARMLSAISPOH S 09

To ensure safe operation, continuous built-in test features exercise the unit's processor, memory, external inputs, and outputs. The Instrument Test page displays the results of all external equipment checks performed by the unit.

LCDI	Half Left	TO/FROM	To
LFLG	Out of View	OBS	___°
VCDI	Half Up	DTK	150°
VFLG	Out of View		

All map and terrain data provided is only to be used as a general reference to your surroundings and as an aid to situational awareness.

Review this list to ensure that all CDI outputs and other displayed data are correct for the connected equipment.

Power Off


WARNING

NEVER ATTEMPT TO POWER OFF THE UNIT WHILE AIRBORNE UNLESS OPERATIONAL PROCEDURES DICTATE.

Unit powering off in:

3

Pushing and holding the **Power** key for 0.5 seconds initiates the power off sequence. Shutdown occurs once the timer reaches zero. Power off annunciation temporarily replaces the knob function indicator.

Hold  to power off

SD Card Slot

NOTE

Do not remove or insert an SD card while in flight. Always verify the system is powered off before inserting or removing an SD card.

The navigator requires an SD card for the following tasks.

INSERT AN SD CARD



When inserting an SD card:

1. Verify unit power is off and the slot is empty.
2. Hold card such that label faces left edge of display screen.
3. Ensure back edge of card is flush with display bezel after insertion.

EJECT AN SD CARD

1. Power off the unit.
2. Release the spring latch by pressing lightly on exposed edge of card.
 - Exporting data logs • Saving system configurations
 - Capturing screen images • Enabling Flight Stream connectivity
 - Upgrading software • Updating databases

COLOR CONVENTION

Red

- Warning conditions
- Operating limits

Yellow

- Cautionary conditions
- Conditional operating ranges

Green

- Safe operating conditions
- Normal operating ranges
- Engaged modes

White

- Scales and markings
- Current data and values
- Heading legs

Magenta

- GPS data
- Active flight plan legs
- Parallel track

Cyan

- Pilot-selectable references

Gray

- Missing or expired data
- Product unavailable

Section 9

Supplement No. 09

GPS 175/GNX 375

Harmony^{LSA}

PILOT'S OPERATING HANDBOOK



Doc. No. HARMLSAISPOH S 09

Blue

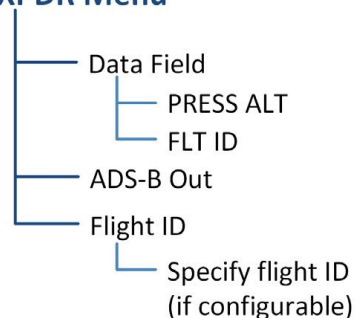
- Sky
- Water

Brown

- Ground

XPDR Set Up

XPDR Menu



Tap **Menu** to access the transponder setup options. From here you can:

- Change the display of data
- Enable 1090 ES ADS-B Out functionality (if configured)
- Assign a unique flight ID

XPDR Modes

Tapping **Mode** opens a menu of the available transponder modes. Options include Standby, On, and Altitude Reporting.



MODE FUNCTION

Standby

- Transponder does not reply to interrogations or transmit ADS-B Out
- Bluetooth functions remain operational
- Unit continues to receive ADS-B In information, but is not a TIS-B participant

On

- Transponder replies to interrogations. Replies do not



include pressure altitude

- Reply (R) symbol on the display indicates the transponder is responding

Altitude Reporting

- Transponder replies to identification and altitude interrogations
- Reply (R) symbol indicates the transponder is responding
- GNX 375 transmissions include pressure altitude

During Altitude Reporting mode, all aircraft air/ground state transmissions are handled via the transponder and require no pilot action. Always use this mode while in the air and on the ground, unless otherwise requested by ATC.

Squawk Code Keys

Eight squawk code entry keys (0 – 7) provide access to all ATCRBS codes. Tapping one of these keys begins the code selection sequence. Use the **Backspace** key or outer control knob to move the cursor.

NOTE

The identification code should be entered with care, regardless if the code was assigned by ATC or if a standard transponder code is being used.

Important Codes

NOTE

During regular operation avoid an accidental selection of the codes intended for emergency: 7500, 7600 and 7700.

- 1200 – VFR code in North America (refer to ICAO Standards)
- 7000 – VFR code commonly used in Europe (refer to ICAO Standards)
- 7500 – Hijack code (airplane is subject to unlawful interference)
- 7600 – Loss of communications
- 7700 – Emergency
- 7777 – Military interceptor operations
- 0000 – Military use



Digits that are not yet entered appear as underscores.



Activate the new code by tapping **Enter**.
To cancel the code entry and exit the page, tap **Cancel**.



Active squawk codes remain in use until a new code is entered.
Tapping

XPDR KEY

VFR





Tapping this key once sets the squawk code to the preprogrammed **VFR** code. This code is factory set to 1200, but may be changed during configuration.



Tapping the **XPDR** key activates the **IDENT** function for 18 seconds. This signal distinguishes the transponder from others on the air traffic controller's screen. Tapping this key when another page is active immediately opens the control panel.

TRANSPONDER STATUS INDICATIONS

Ident



- Reply active
- IDENT function active
- No change to transponder code

Stand By Mode



- Standby mode
- Current squawk code (inactive)

IDENT with New Squawk Code



- Reply active
- Transponder code modified



Altitude Reporting Mode



- Altitude reporting mode
- Reply active
- Identify function active
- VFR squawk code (active)

R	Reply active
ID	IDENT function active
ON	Transponder in operation
ALT	Altitude Reporting
STBY	Standby
IDENT	Tap to initiate the IDENT function (code unmodified)
ENT+ID	Tap to accept modified code and initiate IDENT function

REMOTE CONTROL

Transponder functions are controllable from a connected G3X Touch display.

Control features include:

- Squawk code
- Transponder mode
- IDENT
- ADS-B transmission
- Flight ID

XPDR ALERT



If the transponder fails:

- Red "X" displays over the IDENT key
- Advisory message alerts
- XPDR control page is not available

Transponder fail annunciations are designed to be immediately recognizable.

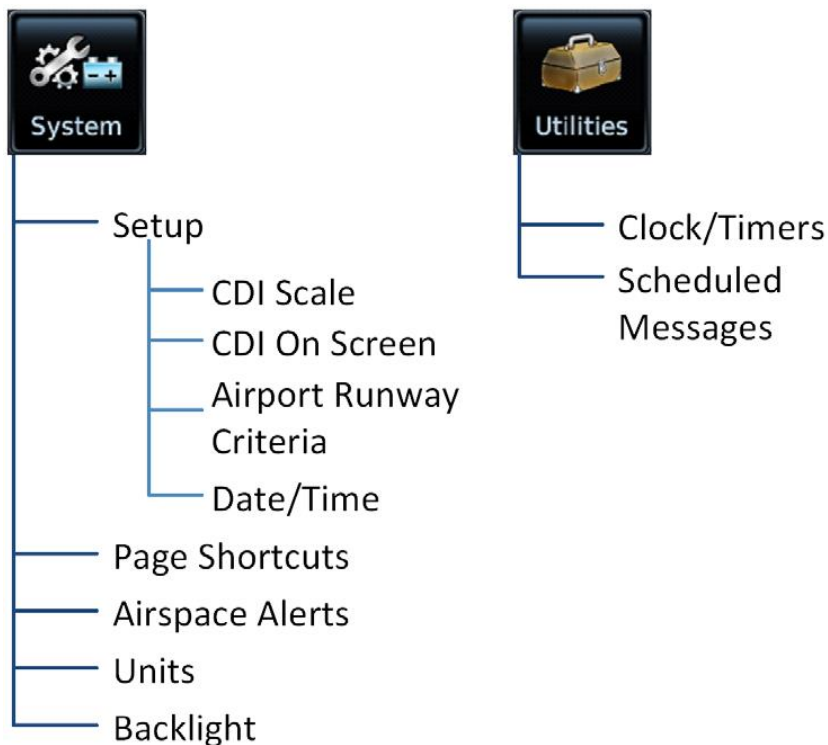
If a failure occurs while the control page is active, the display automatically returns to the previous page.

UNIT CONDITION

GNX 375 ADS-B interboard communication failure.



PILOT SETTING



System customization options allow you to:

- Set and display the CDI
- Specify runway criteria
- Set the date and time
- Create shortcuts
- Set the display units
- Adjust display brightness

Other setup options allow you to monitor time in flight and create custom reminder messages.

These reside in the system Utilities.

HORIZONTAL ALARM LIMITS

Horizontal alarm limits (HAL) are used to compare against GPS position integrity. These protection limits follow the CDI scale, unless the corresponding flight phase requires a lower HAL. For example, the selected scale setting is 1.0 nm, but full-scale deflection during approach still follows the approach scale setting (0.30 nm).

Section 9

Supplement No. 09

GPS 175/GNX 375



PILOT'S OPERATING HANDBOOK



Doc. No. HARMLSAISPOH S 09

FLIGHT PHASE	CDI SCALE	HORIZONTAL ALARM LIMIT
Approach	0.30 nm or Auto	0.30 nm
Terminal	1.00 nm or Auto	1.00 nm
En Route	2.00 nm or Auto	2.00 nm
Oceanic	Auto	2.00 nm

NOTE

Detailed operating instructions are stated in the Garmin GPS 175/GNX 375 Pilot's Guide, P/N 190-02207-02 (revision B or later).

Section 8 – Handling, Servicing & Maintenance

Not Affected



Supplement No. 12

Dual Pitot-static tube

Airplane Serial Number: 2023 2222
Airplane Registration Number:
Date of Issue: 30. 06. 2023

This Supplement must be contained in Pilot's Operating Handbook if the dual Pitot-static tube is installed in the airplane.

Information contained in this Supplement adds or supersedes information from basic Pilot's Operating Handbook in the further mentioned parts only. Limitation, procedures and information not included in this supplement are contained in the basic Pilot's Operating Handbook.



Log of Revisions

Rev. No.	Affected Pages	Description	EASA Approved / Date	Inserted / Date



Section 1 – General Information

Introduction

This supplement adds information which is necessary for operation of the Harmony LSA airplane with the dual Pitot-static tube installed on the airplane.

For other equipment not mentioned in this supplement see basic POH and other supplements to POH.

Section 2 – Limitations

Not Affected.

Section 3 – Emergency Procedures

Switch to an alternate source with the selector valve of static pressure if necessary.

Section 4 – Normal Procedures

Not Affected.

Section 5 – Performance

Not affected

Section 6 – Weight & Balance

No.	Title	Type	No. of items	Weight [kg]	Installed
1.	Pitot-static tube	LUN 1152.14	2	0.50	✓

Section 7 – Airplane & System Description

7.13 Pitot-static System

The pitot-static system senses total pressure and static pressure of air around the airplane. The pitot-static system differs based on the applied airplane instruments (see Fig. 1); it is composed of these parts: pitot-static tube (1), two drain sumps (4), tubes and hoses that are connected to the

Section 9

Supplement No. 12

Dual Pitot-static tube

Harmony LSA

PILOT'S OPERATING HANDBOOK

Doc. No. HARMLSAISPOH S 12



instruments in the airplane cockpit. In the case when the second pitot-static tube (2) is installed that senses only static pressure, this pressure is led via the drain sump to the selector valve (3) by which it is possible to switch over the source of static pressure.

The pitot-static tube senses static pressure and total pressure. The total pressure is sensed in the front part of pitot-static tube and the static pressure is sensed through the holes on the circumference of the tube. The pressure distributions to individual instruments are carried out by means of flexible plastic hoses. The transparent drain sumps (4) that catch water and impurities in the line are installed in the line of static pressure and in the line of total pressure.

The heated pitot-static tube is controlled by the **PITOT HEATING** switch, located on the left part of the instrument panel near the switches and circuit breakers. Switching on is signaled by the blue signaling light **PITOT HEAT.**, located on the left upper section of the instrument panel

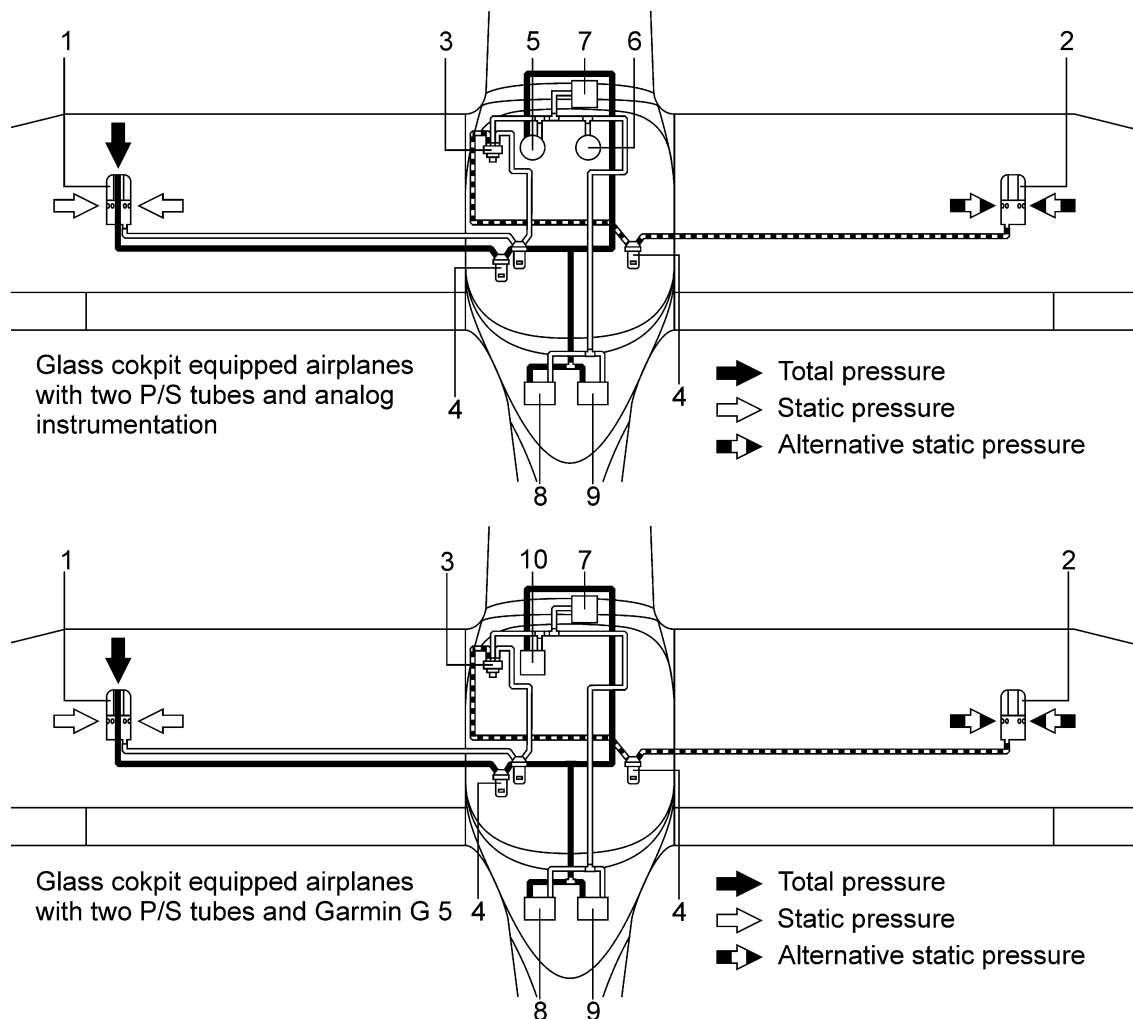


Fig. 1 Diagram of pitot-static system (page 1 of 2)



Legend to Fig. 1

1	Left pitot-static tube	6	Backup altimeter
2	Right pitot-static tube	7	Altitude encoder
3	Selector valve of static pressure	8	Main ADAHRS unit
4	Drain sump	9	Backup ADAHRS unit
5	Backup airspeed indicator	10	Garmin G 5

Fig. 1 Diagram of pitot-static system (page 2 of 2)

Section 8 – Handling, Servicing & Maintenance

Not Affected.

Section 9

Supplement No. 12

Dual Pitot-static tube



PILOT'S OPERATING HANDBOOK



Doc. No. HARMLSAISPOH S 12

Intentionally Left Blank



Supplement No. 13

Rotax 912 S and 912 ULS engine installed into Harmony LSA airplane

Airplane Serial Number: 2023 2222

Airplane Registration Number:

Date of Issue: 30.06.2023

This Supplement must be contained in Pilot's Operating Handbook if Rotax 912 S and 912 ULS engine is installed on the airplane.

Information contained in this Supplement adds or supersedes information from basic Pilot's Operating Handbook in the further mentioned parts only. Limitation, procedures and information not included in this supplement are contained in the basic Pilot's Operating Handbook.



Log of Revisions

Rev. No.	Affected Pages	Description	EASA Approved / Date	Inserted / Date



Section 1 – General Information

This Supplement adds information necessary for airplane operation with the Rotax 912 S and 912 ULS engine installed in accordance with the approved airplane manufacturer documentation.

Section 2 – Limitations

Power Plant

Engine type: Rotax 912 S and 912 ULS
Engine manufacturer: BRP-Powertrain GmbH & Co KG

NOTE

Engine limitations of Rotax 912 S are the same as of Rotax 912 ULS.

Section 9

Supplement No. 13

Rotax 912 S / ULS

**PILOT'S OPERATING HANDBOOK**

Doc. No. HARMLSAISPOH S 13

**Power Plant Instrument Marking**

The color-code of instruments is shown in the following table:

Instrument	Units	Red line	Green arc	Yellow arc	Red line
		Lower limit	Normal operation range	Caution range	Upper limit
RPM indicator	RPM	-	1400 - 5500	5500 - 5800	5800
Oil temperature indicator	°C	-	90 - 110	50 – 90 110 - 130	130
	°F	-	190 - 230	120 - 190 230 - 266	266
Oil pressure indicator	bar	0,8	2 - 5	0,8 – 2 5 - 7	7
	PSI	12	29 - 73	12 - 29 73 - 102	102
Fuel pressure	bar	0.15	0.15 – 0.4 (0.5*)	-	0.4 (0.5*)
	PSI	2.2	2.2 – 5.8	-	5.8
Cylinder head temperature see Note above	°C	-	-	-	128
	°F	-	-	-	262
Coolant temperature see Note above	°C	-	-	-	120
	°F	-	-	-	248



Section 3 – Emergency Procedures

Engine Failure

Engine Failure at Take-off Run

1. **THROTTLE** lever idle
2. Brakes as necessary
3. **FUEL** selector..... **OFF**
4. Ignition..... **OFF**
5. **MASTER SWITCH** **OFF**

Engine Failure at Take-off

1. Push the control stick to get the airplane to gliding.
2. Gliding speed:
 - Flaps in **TAKE-OFF** position (15°) min. 56 KIAS (103 km/h IAS)
 - Flaps retracted (0°) min. 58 KIAS (107 km/h IAS)
3. **THROTTLE** lever..... idle
4. Flaps..... as needed
5. **FUEL** selector..... **OFF**
6. Ignition..... **OFF**
7. **MASTER SWITCH** **OFF**
8. After touch down..... brake as needed

Engine Failure in Flight

1. Gliding speed 58KIAS (107 km/h IAS)
2. Altitude take a decision and carry out:
 - Engine starting in flight
 - Emergency landing it is included in the basic part of the POH.

Engine Starting in Flight

NOTE

It is possible to start the engine by means of the starter within the whole range of operation speeds as well as flight altitudes. The engine is started up after switching the ignition to **START** position.



If the engine is shut down, the altitude loss during engine starting can reach up to 1000 ft.

3. Gliding speed58 KIAS (107 km/h IAS)
4. Altitudecheck
5. **MASTER SWITCH****ON**
6. Unnecessary electrical equipment**OFF**
7. **FUEL** selector**LEFT** or **RIGHT**
8. **CHOKE**as needed
9. **THROTTLE** leveridle (choke open)
increased idle (choke closed)

The propeller is rotating:

10. Ignition**BOTH**

The propeller is not rotating:

11. Ignition**START**
12. If engine starting does not occur, increase gliding speed up to 108 KIAS (200 km/h IAS), so that air-flow turns the propeller and engine will start.
13. Ignition**BOTH**
14. If engine starting is unsuccessful, then continue according to the basic part of the POH.

Engine Fire

Fire on the Ground

1. **FUEL** selector**OFF**
2. Brakesbrake
3. **THROTTLE** leverfull
4. **HOT AIR** knobclose
5. **COLD AIR** knobclose

After the engine stops:

6. Ignition**OFF**
7. **MASTER SWITCH****OFF**
8. Airplaneleave
9. Portable extinguisheruse

If fire extinguisher not installed:



10. Fire try to extinguish by best
available means or call for
fire brigade

Fire at Take-off

1. **FUEL** selector..... **OFF**
2. **THROTTLE** lever..... full
3. **HOT AIR** knob close
4. **COLD AIR** knob close
5. Gliding speed 55 KIAS (103 km/h IAS)
6. Ignition..... **OFF**
7. Land
8. **MASTER SWITCH** **OFF**
9. Airplane leave
10. Portable extinguisher use

If fire extinguisher not installed:

Fire try to extinguish by best available means or call for fire brigade



Fire in Flight

1. **FUEL** selector **OFF**
2. **THROTTLE** lever full
3. **HOT AIR** knob close
4. **COLD AIR** knob close
5. Gliding speed 58 KIAS (107 km/h IAS)
6. Ignition **OFF**
7. **MASTER SWITCH** **OFF**

NOTE

For extinguishing the engine fire, you can perform slip under assumption that you have sufficient altitude and time.

If you manage to extinguish the engine fire, then it is possible to switch on the **MASTER SWITCH** again. You will switch all the section switches and after switching on the **MASTER SWITCH** the electrical system is switched on which is necessary to complete the flight.

WARNING

NEVER START THE ENGINE AGAIN!

8. ATC report, if possible
9. Emergency landing carry out according to basic
..... part of the POH
10. Airplane leave
11. Portable extinguisher use

If fire extinguisher not installed:

12. Fire try to extinguish by best
available means or call for
fire brigade

Low Oil Pressure

1. Oil pressure indicator check
2. **THROTTLE** lever min. necessary power
3. Perform Precautionary landing it is included in the basic part of the POH.



Unintentional Flight in Icing Conditions

1. **CARBURET. PREHEAT.** knob..... **ON**
2. Heating direct the hot air toward
canopy glazing
3. Icing area..... leave immediately

Carburetor Icing

Carburetor icing happens when air temperature drop in the carburetor occurs due to its acceleration in the carburetor and further cooling by evaporating fuel. Carburetor icing mostly happens during descending and approaching for landing (low engine RPM).

Carburetor icing shows itself by engine power decreasing, by engine temperature increasing and by irregular engine running.

CAUTION

CARBURETOR ICING MAY OCCUR AT AMBIENT
TEMPERATURE HIGHER THAN 32°F (0°C).

Recommended procedure for engine power regeneration is as follows:

4. **CARBURET. PREHEAT.** knob..... **OPEN**
5. **THROTTLE** lever..... set idle and cruising
power again

NOTE

Ice coating in the carburetor should be removed by
decrease and reincrease of engine power.

6. If the engine power is not successfully increased, then carry out landing at
the nearest suitable airport or, if it is not possible, carry out safety landing
according to the basic part of the POH.

Clogging of Air Inlet to Engine Intake

Clogging of the air inlet to the engine intake results in engine power reduction, increase of engine temperatures and irregular engine running.

The recommended procedure for engine power recovery is as follows:

7. **CARBURET. PREHEAT.** knob..... **OPEN**



Section 4 – Normal Procedures

Normal Procedures and Checklist

Before Engine Starting

1. Pre-flight check and check on weight and centre of gravity positiondone
2. Safety harnessescheck, fasten
3. Rudder pedals.....free
4. Control stickfree
5. Wing flapsfunction check
6. **MASTER SWITCH**.....**ON**
7. Trim tabfunction check
8. **PARKING BRAKE** handlerelease brakes
9. Brakes.....function check
10. **AVIONICS SWITCH**.....**OFF**
11. Ignition**OFF**
12. Canopy.....close

Engine Starting

1. Fuel gauge indicators.....check of fuel quantity
2. **FUEL** selector**LEFT**
Pull the safety button on the fuel selector, turn the handle to the left and then release safety button. Now the handle can be freely moved between left and right position. Safety button prevents unintentionally switch the selector to **OFF** position.
3. Electric fuel pump**ON**
4. **THROTTLE** leveridle
5. **CHOKE** - cold engine.....OPEN
- warm engine.....CLOSED
6. Space in the propeller areafree
7. **BEACONS****ON** (if necessary)
8. Brakes.....apply
9. Ignition**START** (see CAUTION)
after starting up **BOTH**



CAUTION

ACTIVATE STARTER FOR 10 SEC. AS A MAXIMUM, AND THEN LET IT COOL DOWN FOR 2 MINUTES.

AFTER STARTING UP ENGINE, DO NOT CARRY OUT SUDDEN RPM CHANGES, AFTER POWER DECREASE WAIT FOR ABOUT 3 SEC. IN ORDER TO REACH CONSTANT RPM BEFORE REACCELERATION.

10. **THROTTLE** lever..... as necessary (see NOTE)
11. Oil pressure up to 10 sec. min. pressure

NOTE

After starting up engine, adjust throttle for smooth engine running at about 2500 RPM. Check oil pressure. Pressure must increase within 10s. Increase engine RPM until oil pressure is stabilized over 2 bar (29 PSI).

12. Engine instruments..... check
13. **CHOKE** CLOSED
14. Electric fuel pump..... **OFF**
15. Engine warming up..... see NOTE

NOTE

Begin warming up with engine running at 2000 RPM. For about 2 minutes, continue at 2500 RPM. Warming time depends on outside air temperature until oil temperature reaches 50 °C / 122 °F.

16. **FUEL** selector..... **RIGHT**
Verify proper engine feeding from the right tank for approx. 1 minute.
17. **FUEL** selector..... **LEFT** or **RIGHT**
18. **AVIONICS SWITCH** **ON**
19. Radio station / avionics..... **ON**
Other electrical equipment..... **ON** as necessary

Section 9

Supplement No. 13

Rotax 912 S / ULS



PILOT'S OPERATING HANDBOOK



Doc. No. HARMLSAISPOH S 13

Section 5 – Performance

Not Affected.

Section 6 – Weight & Balance

No.	Title	Type	No. of items	Installed
1.	Engine	Rotax 912 S and 912 ULS	1	✓



Section 7 – Airplane & System Description

Power Unit

General

The engine ROTAX 912 ULS (100 hp) is used to power Harmony LSA airplane. ROTAX 912 ULS is a four-cylinder, four-stroke engine with opposite cylinders, central cam shaft, OHV valve mechanism and maximum take-off power of 100 hp (73.5 kW) at 5800 RPM.

The on-ground adjustable, composite, 3-blade propeller Warp Drive HPL. is mounted on the engine ROTAX 912 S and 912 ULS or other according to the user's wishes.

Engine Control

Engine power is controlled by means of **THROTTLE** lever, which is located in the middle of the instrument panel and which controls engine power range from idle up to maximum take-off. Engine power controller is mechanically interconnected with the flap on carburetors.

If the throttle lever is fully pushed in, then this position corresponds to maximum engine power. If the throttle lever is fully pulled out, then this position corresponds to idle (1600 – 1700 RPM set by airplane manufacturer). Rapid changes in engine power setting can be made by pressing down the round button on the lever body and by its pulling out or pushing in. Small changes in power setting can be performed through lever turning (clockwise - power increase).

WARNING

DO NOT APPLY AN EXCESSIVE FORCE IF THE THROTTLE LEVER IS CLOSE TO FULLY PULLED POSITION, OTHERWISE IT CAN CAUSE DAMAGE TO THE THROTTLE LEVER.

In the case of a throttle control damage as a result of excessive tightening when the controller starts “skipping” due to a stripped thread, then such “skipping” can lead to an increase of the engine idle speed.

The throttle lever is fitted with the locking ring, clockwise turning of which ensures locking of the lever in requested position.

Engine Instruments

The following instruments located on the instrument panel serve for engine performance monitoring:

**RPM indicator**

The electrical RPM indicator is controlled by signal from the generator RPM transmitter. Working range of the RPM indicator is 0 - 8000 RPM. Color code is stated in Power plant instrument marking table.

Cylinder head or coolant thermometer

The cylinder head or coolant thermometer transmitter senses temperature of cylinder No. 3 or coolant of cylinder No. 3. Working range of the thermometer is 50 ÷ 150 °C. Color code is stated in Power plant instrument marking table.

Oil thermometer

Oil temperature on engine input is measured by the sensor located behind the oil pump. Working range of oil thermometer is 50 ÷ 150 °C. Color code is stated in Power plant instrument marking table.

Oil pressure indicator

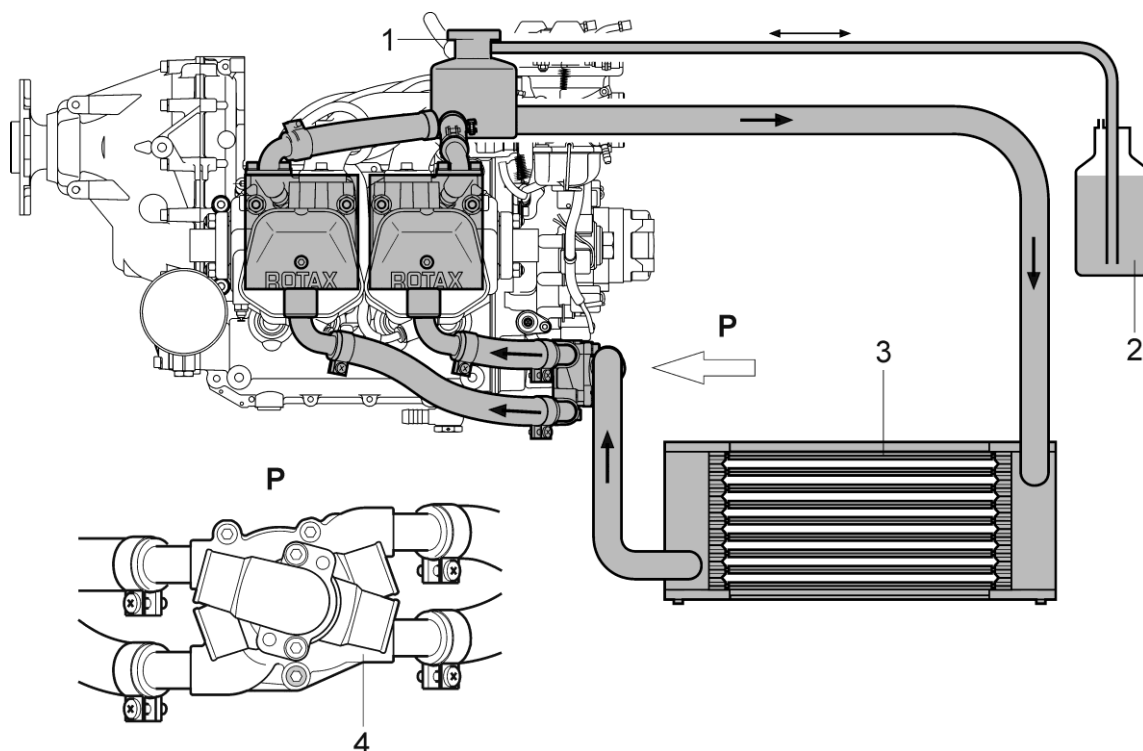
Oil pressure on the oil input into engine is measured by means of sensor which is located behind the oil filter. Working range is 0 ÷ 10 bar. Color code is stated in Power plant instrument marking table.

Engine Cooling System

Engine cooling is combined, cylinder heads are cooled by water, and cylinders are cooled by air.

Cooling circuit of cylinder heads is designed as a closed system containing pump, expansion tank (1) with pressure closure, cooling liquid cooler (3) and overflow bottle (3). Scheme of cylinder head cooling system is shown in Fig. 1.

When changing, the cooling liquid is filled up through the cap of expansion tank (1), during airplane operation it is replenished into overflow bottle (3) between the lines of maximum and minimum level.



Legend to Figure 1:

- | | | | |
|---|-----------------|---|-----------------------|
| 1 | Expansion tank | 3 | Cooling liquid cooler |
| 2 | Overflow bottle | 4 | Pump |

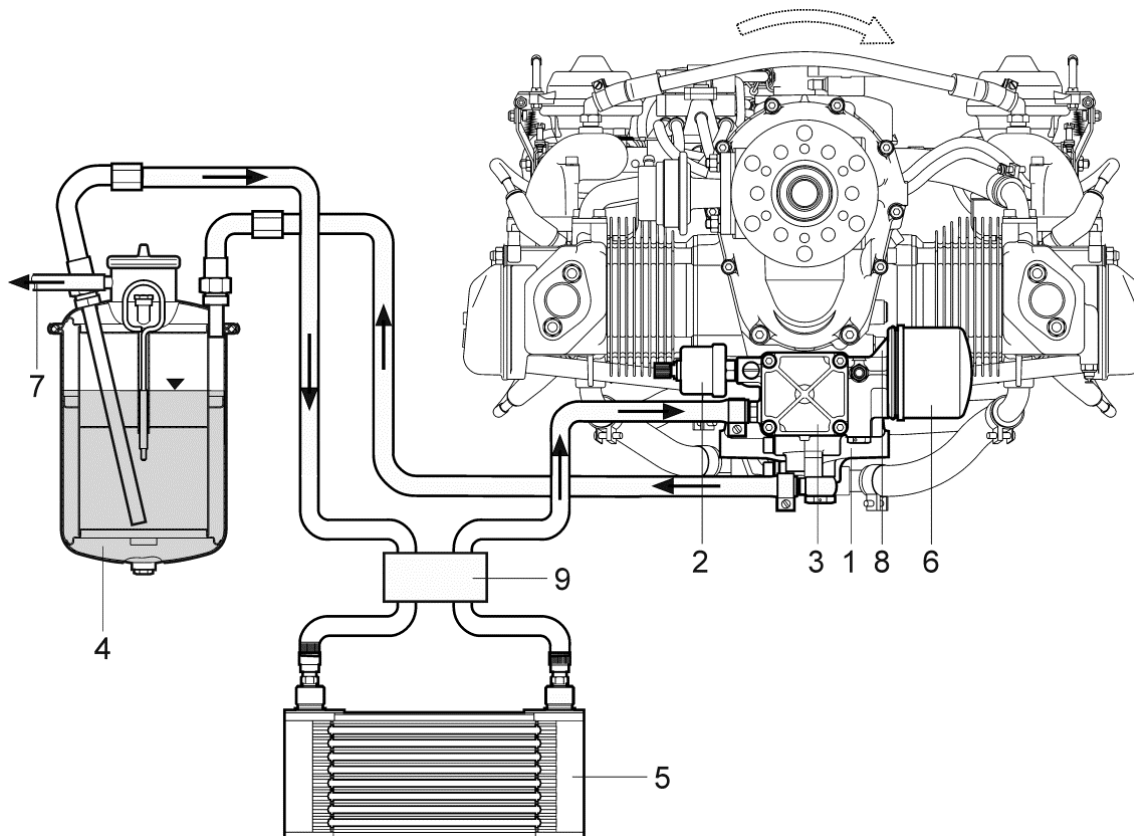
Figure 1 Scheme of cylinder head cooling system

Engine Lubrication System

The engine is equipped with the lubrication system with the dry sump and the oil pump that has a built-in pressure reducing valve (1, Figure 2) and a sensor of oil pressure (2). The oil pump (3), that is driven by the camshaft, takes the engine oil from the tank (4) through the thermostat (9), oil cooler (5) and the oil is forced through the oil filter (6) to the individual lubrication points in the engine. The oil flows down from the lubrication points to the bottom of the crankcase, and from there it is forced to the oil tank by means of the pressure shocks from the pistons. The venting of the system is realized by the outlet (7) on the oil tank.

The sensor of oil temperature (8) is located on the pump body and it measures the oil temperature on the inlet; the sensor of oil pressure (2) is installed along with the pressure reducing valve in the oil pump.

Oil pressure and temperature are indicated on instruments in right side of the instrument panel. Oil is replenished through the lid in the upper part of the oil tank (4).



Legend to Figure 2

- | | |
|--------------------------|-----------------------------|
| 1 Reduction valve | 6 Oil filter |
| 2 Sensor of oil pressure | 7 Venting of oil system |
| 3 Oil pump | 8 Sensor of oil temperature |
| 4 Oil tank | 9 Thermostat |
| 5 Oil cooler | |

Figure 2 Scheme of engine lubrication system

Engine Intake System

Engine intake system ensures delivery of sufficient air into engine. Air is taken into the engine through openings on the engine covers through the air filters.

The intake system can be equipped with carburetor heating system. Hot air from the heat exchanger (located on the exhaust collector) is taken to the mixing chamber. Amount of in-taken hot air is regulated by flaps in mixing chamber inlets. Flaps are controlled by the **CARBURET. PREHEAT.** knob on the instrument panel (17, Fig. 5).



Ignition System

The engine is equipped with the double contactless ignition system. Each ignition circuit has own source of energy, control unit, 2 ignition coils and 4 spark plugs. It is fully autonomous on the other circuit of accumulator. High voltage current is distributed to the spark plugs through high-voltage cables. Ignition sequence of individual engine cylinders: 1-4-2-3.

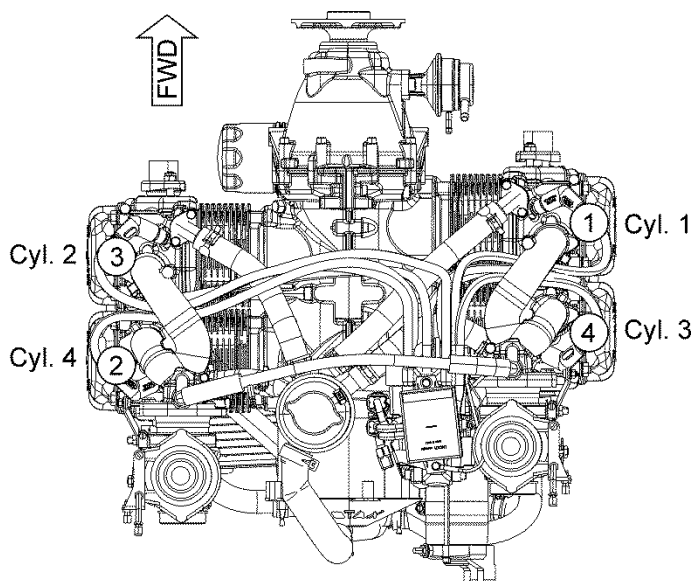


Figure 3 Ignition sequence

Ignition circuits are controlled by the ignition switch on the instrument panel.

Positions of ignition switch:

OFF	engine ignition is off
R	only ignition circuit B is on
L	only ignition circuit A is on
BOTH	both circuits are on
START	both circuits are on and starter is cranking the engine



Fuel System

Fuel system (Fig. 4; 5) serves for keeping fuel in the airplane and it's feeding to the engine. Fuel system of Harmony LSA airplane is composed of integral fuel tanks (1, 2 Figure 4), fuel line, fuel selector (4), check valve (5), fuel filter (5), mechanical fuel pump - located on the engine (11), electrical fuel pump (6), distributors (9, 10), distribution pipes of fuel with return branch, fuel gauges (13, 14), fuel pressure indicator (12) or display GDU 460 (24) and fuel tanks draining valves (15). Overflow fuel from engine fuel pump (11) is led via hose under the aircraft.

Fuel Tanks

Fuel is contained in the wing integral tanks (1, 2) having volume 60 l each. Each tank is fitted with air venting (output is under the wing tip) and draining valve (15) on the bottom side of the wing.

Fuel is led from the tanks through the hoses to the fuel selector (4) located on a central console under the instrument panel and then through a fuel filter (5), the fuel pumps (6, 11), distributors (9, 10) to the carburetors (7, 8). Fuel return hose goes from the fuel distributor (9) into the fuel selector (4) and from there to fuel tanks (1, 2) which the fuel is drawing off. See figure 4 for Scheme of fuel system.

Fuel Selector

The fuel selector (4) serves for tank selection and fuel delivery interruption in case of engine fire or long parking of airplane.

To move selector from **OFF** (closed) position it necessary pull the safety button on the fuel selector, turn the handle from the **OFF** position to the left and then release safety button. Now the handle can be freely moved between **LEFT** and **RIGHT** position. Safety button prevents unintentionally switch the selector to **OFF** position.

To move selector to **OFF** (closed) position it is necessary pull the safety button on the fuel selector, turn the handle to the **OFF** position and then release safety button. Now the handle is blocked in the **OFF** position. Safety button prevents unintentionally switch the selector from the **OFF** position during parking.

Fuel Filter

The fuel filter (5) separates all mechanical impurities from fuel. The fuel filter is located in the cockpit on the left airframe panel.

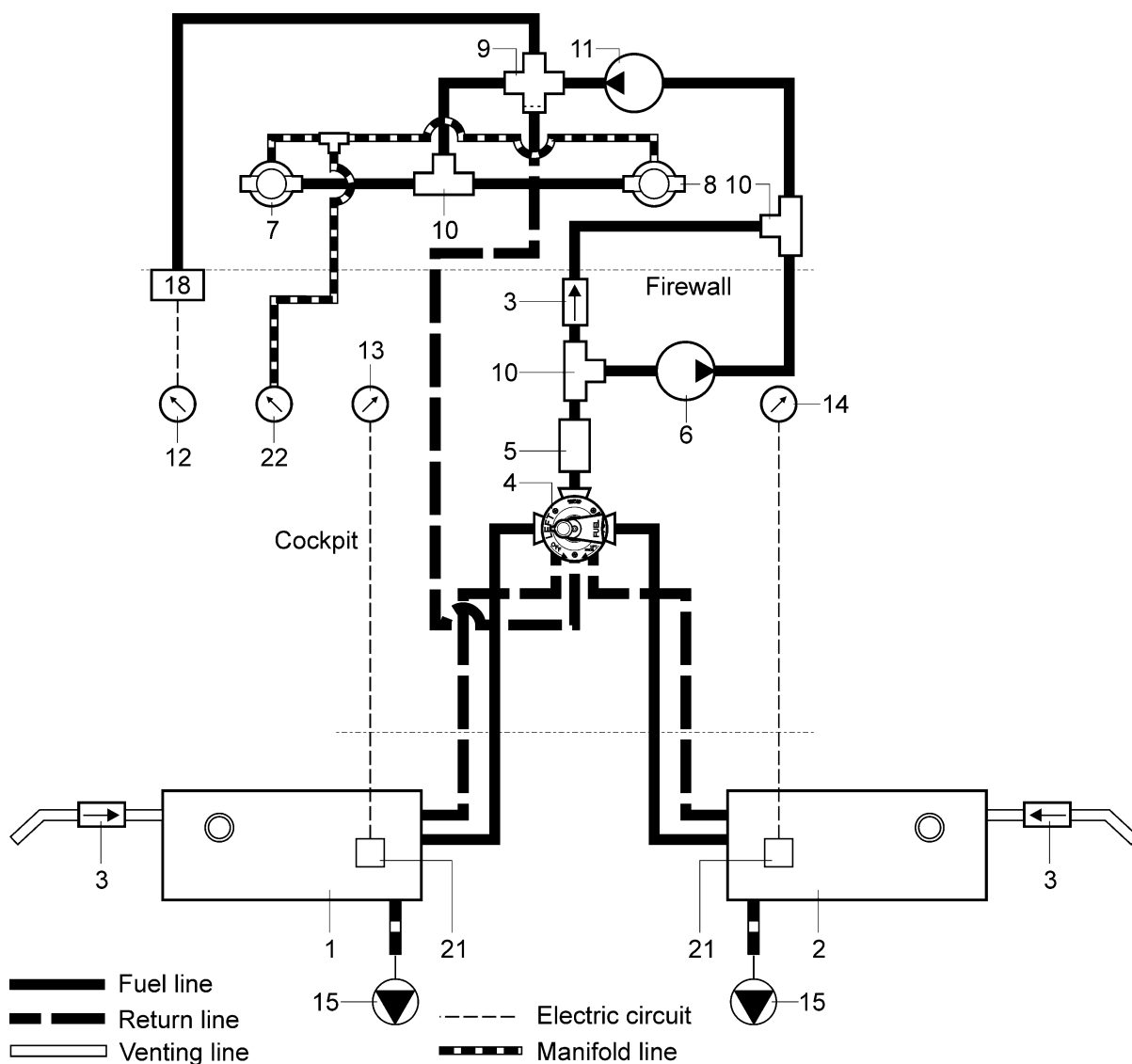


Indication of Fuel Quantity

Fuel quantity is measured by a float fuel gauge sensor (21) in each tank and indicated on fuel gauges (13, 14) on the instrument panel. LH fuel gauge indicates fuel quantity in the left tank, RH indicator in the right tank. True fuel quantity is indicated only on ground and in level flight and it takes approx. 2 minutes to level fuel after transition from climb/descent.

Fuel Tank Draining

Draining of the fuel tank is unchanged.



New version of the fuel system

Figure 4 Scheme of fuel system (sheet 1 of 2)

Section 9

Supplement No. 13

Rotax 912 S / ULS



PILOT'S OPERATING HANDBOOK



Doc. No. HARMLSAISPOH S 13

Legend to Figure 4

- | | |
|--------------------------|--|
| 1 Left fuel tank | 12 Fuel pressure indicator |
| 2 Right fuel tank | 13 Fuel quantity indicator of left tank |
| 3 Check valve | 14 Fuel quantity indicator of right tank |
| 4 Fuel cock | 15 Drain valve |
| 5 Fuel filter | 16 - |
| 6 Electric fuel pump | 17 - |
| 7 Left carburetor | 18 Fuel pressure sensor |
| 8 Right carburetor | 19 Manifold pressure sensor (only if the
the adjustable propeller installed) |
| 9 Four-way distributor | 20 Flow meter |
| 10 Three-way distributor | 21 Fuel level sensor in tank |
| 11 Engine fuel pump | 22 Manifold pressure indicator (only if
the the adjustable propeller installed) |

Figure 4 Scheme of fuel system (sheet 2 of 2)

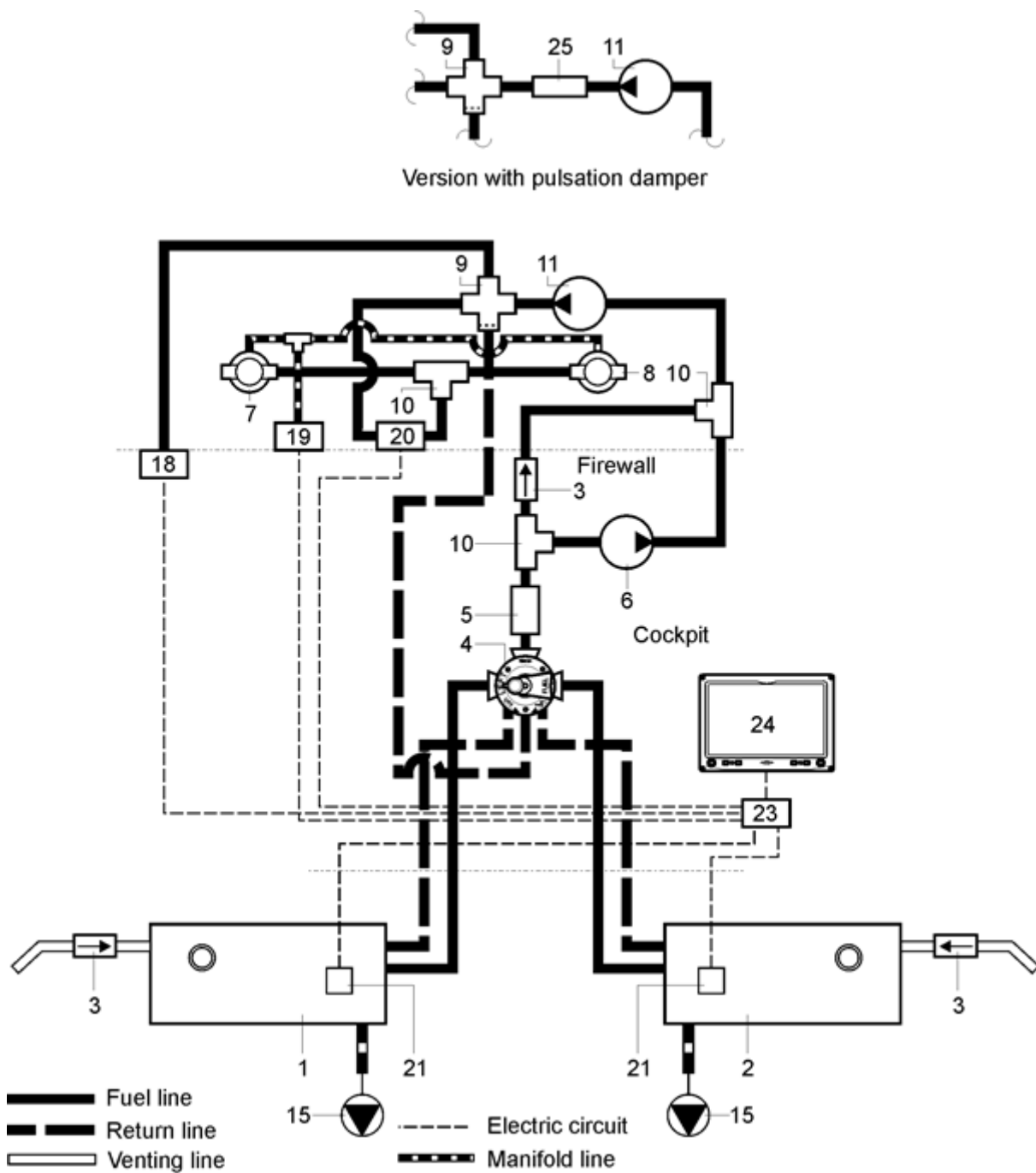


Figure 5 Scheme of fuel system with GDU 460 display (sheet 1 of 2)

V

**Legend to Chyba! Nenalezen zdroj odkazů.**

1 Left fuel tank	14 Fuel quantity indicator of right tank
2 Right fuel tank	15 Drain valve
3 Check valve	16 -
4 Fuel cock	17 -
5 Fuel filter	18 Fuel pressure sensor
6 Electric fuel pump	19 Manifold pressure sensor (only if the adjustable propeller installed)
7 Left carburetor	20 Flow meter
8 Right carburetor	21 Fuel level sensor in tank
9 Four-way distributor	22 Manifold pressure indicator (only if the adjustable propeller installed)
10 Three-way distributor	23 EIS GEA-24 unit
11 Engine fuel pump	24 MFD GDU 460
12 Fuel pressure indicator	25 Pulsation damper
13 Fuel quantity indicator of left tank	

Figure 5 Scheme of fuel system with GDU 460 display (sheet 2 of 2)**Ventilation and Heating System**

Cockpit ventilation is ensured by 2 eye-ball vents (14, Figure 6) located on the left and right of the tip-up canopy frame. Vents are connected to the NACA inlets (14) through tip-up canopy frame front flaps.

Cockpit heating is ensured by hot air from the heat exchanger (2). The heat exchanger is located on the exhaust collector (18). Air from ambient atmosphere is warmed up in the exhaust collector and then led through the mixing chamber (6) on the firewall and hoses to the cockpit floor or to the hot air outputs through the instrument panel cover as well as into the hollow spaces in the canopy frame for canopy glass defrosting.

Hot air quantity is regulated by the **HOT AIR** knob, cold air quantity is regulated by the **COLD AIR** knob on the instrument panel. Proportion of the cold and hot air in the heating system can be set continuously. Other knob on the right of the **HOT AIR** knob serves for air routing to the cockpit floor or on the canopy glass.

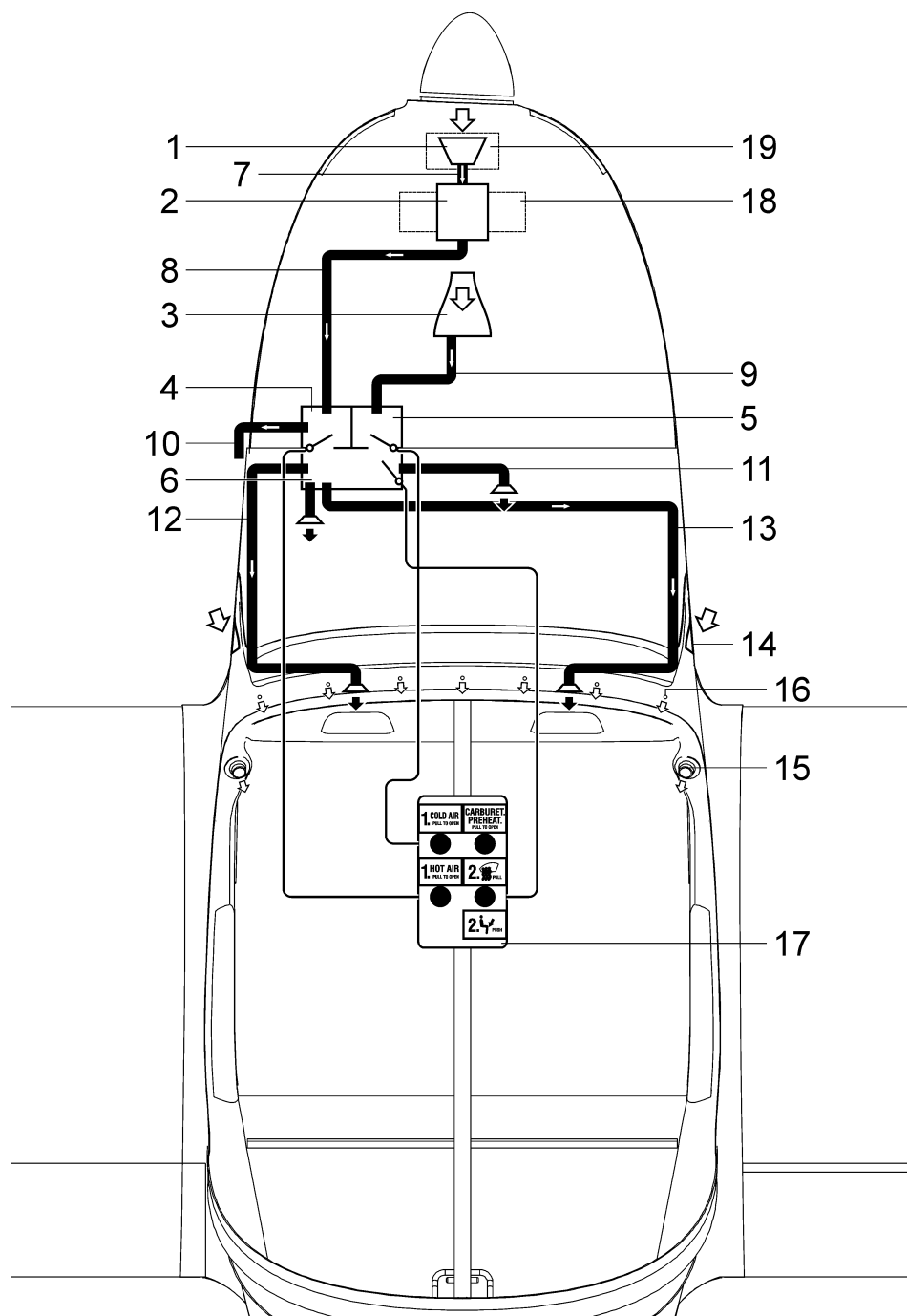


Figure 6 Scheme of ventilation and heating system (sheet 1 of 2)

Section 9

Supplement No. 13

Rotax 912 S / ULS



PILOT'S OPERATING HANDBOOK



Doc. No. HARMLSAISPOH S 13

Legend to Figure 6

- | | |
|--------------------|--------------------------|
| 1 Air inlet | 11 Hose |
| 2 Heat exchanger | 12 Hose |
| 3 NACA inlet | 13 Hose |
| 4 Hot air chamber | 14 NACA inlet |
| 5 Cold air chamber | 15 Eye-ball vent |
| 6 Mixing chamber | 16 Air outlets |
| 7 Hose | 17 Controls |
| 8 Hose | For information: |
| 9 Hose | 18 Exhaust collector |
| 10 Hose | 19 Cooling liquid cooler |

Figure 6 Scheme of ventilation and heating system (sheet 2 of 2)

Section 8 – Handling, Servicing & Maintenance

Not Affected.



Supplement No. 14

VFR Night Operation

Airplane Serial Number: 2023 2222
Airplane Registration Number:
Date of Issue: 30.6.2023

This Supplement must be contained in Pilot's Operating Handbook when the Harmony LSA airplane is equipped for VFR Night operation.

Information contained in this Supplement adds or supersedes information from basic Pilot's Operating Handbook in the further mentioned parts only. Limitation, procedures and information not included in this supplement are contained in the basic Pilot's Operating Handbook.



Log of Revisions

Rev. No.	Affected Pages	Description	EASA Approved / Date	Inserted / Date



Section 1 – General Information

Introduction

This supplement contains all the information the pilot and instructor require for the safe and efficient operation by VFR Night of the Harmony LSA airplane, when equipped with the applicable NVFR equipment.

WARNING

**THE PILOT SHOULD ALWAYS MAINTAIN
EXTERNAL VISUAL ATTITUDE REFERENCE!
THE PILOT SHOULD NOT RELY ON THE ATTITUDE
INDICATOR FOR ATTITUDE EVALUATION!**

NOTE

Although the airplane is equipped with dual ADAHRS sensors and a digital attitude indicator, the pilot must always maintain visual reference. Should visibility deteriorate to a point where the pilot can no longer determine the airplane's attitude using external visual references, the digital attitude indicator may be used to assist in identifying the airplane's actual attitude.

Section 2 – Limitations

Kind of Operation

The airplane is approved for VFR Day and VFR Night flights.



WARNING

FLIGHTS ACCORDING TO IFR AND INTENTIONAL FLIGHTS UNDER ICING CONDITIONS ARE PROHIBITED.

THE PILOT SHOULD ALWAYS MAINTAIN EXTERNAL VISUAL ATTITUDE REFERENCE!

THE PILOT SHOULD NOT RELY ON THE ATTITUDE INDICATOR FOR ATTITUDE EVALUATION!

THE PILOT SHOULD NOT FLY OVER AREAS WITH LIMITED VISUAL REFERENCE (E.G. ABOVE SEA)!

CAREFULLY CHECK THE WEATHER FORECAST ALONG THE ROUTE PRIOR TO TAKE-OFF.

GOOD VISIBILITY IS REASONABLY EXPECTED TO BE MAINTAINED FOR THE ENTIRE DURATION OF THE FLIGHT.

Instruments and equipment for Day / Night flights according to VFR

WARNING

NIGHT FLIGHTS ACCORDING TO VFR ARE APPROVED ONLY WHEN INSTRUMENTATION REQUIRED FOR SUCH FLIGHTS IS INSTALLED AND FLIGHT PERFORMED BY A PILOT WITH APPROPRIATE RATING! INTENTIONAL FLIGHTS UNDER ICING CONDITIONS ARE PROHIBITED.



Equipment	Kinds of operation	
	VFR Day	VFR Night
Electrical power		
Master switch	✓	✓
Switches, circuit breakers or fuses	✓	✓
Spare fuse set	-	✓
Equipment and Furnishing		
Safety harness for every used seat	✓	✓
ELT – if required	✓	✓
Fuel System		
Fuel quantity indication	✓	✓
Manifold pressure indication – if required	✓	✓
Lighting		
Anti-collision lights	-	✓
Position lights	-	✓
Landing light	-	✓
Instrument lighting	-	✓
One switch for each light	-	✓
Navigation and Pitot-static		
Airspeed indicator	✓	✓
Altimeter	✓	✓
Magnetic compass – if required	✓	✓
Attitude indicator (Artificial horizon)	-	✓
Powerplant		
Coolant temperature indication – if required	✓	-
RPM indication	✓	✓
Oil temperature indication – if required	✓	✓
Oil pressure indication – if required	✓	✓
Engine ignition switch	✓	✓
Engine instruments as required by the engine manufacturer	✓	✓

NOTE

“If required” means required by operating / flight rules

CAUTION

ADDITIONAL EQUIPMENT NECESSARY FOR AIRCRAFT IS GIVEN IN APPROPRIATE OPERATION REGULATION OF AIRCRAFT OPERATOR'S COUNTRY.



Pitot-Static System

Maximum time of heating Pitot-static tube on the ground must not exceed 30 sec.

Limitation Placards

The following placards are located on the titling canopy:

<p>This Light Sport Aircraft has been approved only for VFR day/night flights under no icing conditions. Flight operations are limited to VMC (Visual Meteorological Conditions). Flight operations in IMC (Instrument Meteorological Conditions) are prohibited.</p>	<p>This Light Sport Aircraft has been approved only for VFR day/night flights under no icing conditions. Flight operations are limited to VMC (Visual Meteorological Conditions). Flight operations in IMC (Instrument Meteorological Conditions) are prohibited.</p>																
<p>Aerobatics and intentional spins are prohibited!</p>	<p>Aerobatics and intentional spins are prohibited!</p>																
<p style="text-align: center;">AIRSPPEED IAS</p> <table> <tr> <td>Never exceed V_{NE}</td><td>146 kts</td></tr> <tr> <td>Design Manoeuvring V_A</td><td>90 kts</td></tr> <tr> <td>Max. Flap Extended V_{FE}</td><td>70 kts</td></tr> <tr> <td>Stalling V_{SO}</td><td>33 kts</td></tr> </table>	Never exceed V_{NE}	146 kts	Design Manoeuvring V_A	90 kts	Max. Flap Extended V_{FE}	70 kts	Stalling V_{SO}	33 kts	<p style="text-align: center;">AIRSPPEED IAS</p> <table> <tr> <td>Never exceed V_{NE}</td><td>168 MPH</td></tr> <tr> <td>Design Manoeuvring V_A</td><td>106 MPH</td></tr> <tr> <td>Max. Flap Extended V_{FE}</td><td>81 MPH</td></tr> <tr> <td>Stalling V_{SO}</td><td>38 MPH</td></tr> </table>	Never exceed V_{NE}	168 MPH	Design Manoeuvring V_A	106 MPH	Max. Flap Extended V_{FE}	81 MPH	Stalling V_{SO}	38 MPH
Never exceed V_{NE}	146 kts																
Design Manoeuvring V_A	90 kts																
Max. Flap Extended V_{FE}	70 kts																
Stalling V_{SO}	33 kts																
Never exceed V_{NE}	168 MPH																
Design Manoeuvring V_A	106 MPH																
Max. Flap Extended V_{FE}	81 MPH																
Stalling V_{SO}	38 MPH																
<p style="text-align: center;">ENGINE SPEED</p> <table> <tr> <td>Max. Take-off (max. 5 min.)</td><td>5800 rpm</td></tr> <tr> <td>Max. Continuous</td><td>5500 rpm</td></tr> <tr> <td>Min. Idling</td><td>1400 rpm</td></tr> </table>	Max. Take-off (max. 5 min.)	5800 rpm	Max. Continuous	5500 rpm	Min. Idling	1400 rpm	<p style="text-align: center;">ENGINE SPEED</p> <table> <tr> <td>Max. Take-off (max. 5 min.)</td><td>5800 rpm</td></tr> <tr> <td>Max. Continuous</td><td>5500 rpm</td></tr> <tr> <td>Min. Idling</td><td>1400 rpm</td></tr> </table>	Max. Take-off (max. 5 min.)	5800 rpm	Max. Continuous	5500 rpm	Min. Idling	1400 rpm				
Max. Take-off (max. 5 min.)	5800 rpm																
Max. Continuous	5500 rpm																
Min. Idling	1400 rpm																
Max. Take-off (max. 5 min.)	5800 rpm																
Max. Continuous	5500 rpm																
Min. Idling	1400 rpm																
<p>Unusable quantity of fuel 0.5 USgal</p>	<p>Unusable quantity of fuel 0.5 USgal</p>																

Section 3 – Emergency Procedures

Unintentional Flight in Icing Conditions

CAUTION

THE STALL SPEED INCREASES WITH ICE ACCUMULATION ON THE WING LEADING EDGE.

AIRSPPEED INDICATOR, ALTIMETER AND VERTICAL SPEED INDICATION MAY BE INACCURATE WITH ICE ACCUMULATION ON THE PITOT-STATIC TUBE. ADDITIONALLY, THE STALL WARNING SYSTEM MAY BE INOPERATIVE OR MAY NOT WORK CORRECTLY.

1. **PITOT HEATING** switch**ON**



2. Heating..... direct the hot air toward
..... canopy glazing
3. Icing area..... leave immediately

Other Emergency Procedures

G3X System Failure

NOTE

In the event of a display failure, the G3X Touch System automatically switches to reversionary (backup) mode. In reversionary mode, the information is presented on the remaining display in the split-screen configuration.

When a LRU or a LRU function fails, a large red 'X' is typically displayed on the display field associated with the failed data.

NOTE

In most of cases, the red "X" annunciation is accompanied by an Alert Message. Refer to G3X Touch Pilot's Guide – Doc. No. 190-01754-00 Rev. H, dated December 2016 or latest valid issue., Section 10, Annunciations & Alerts.

Pulled Circuit Breaker

1. Appropriate circuit breaker CHECK
2. If circuit breaker is pulled..... PUSH again
3. If display will not start: circuit breaker PULL
4. Land as soon as practicable

Loss of Airspeed Information

If the display system is not receiving airspeed input from the Air Data Computer, a red X is displayed on the field.

1. Data from the remaining display USE
2. Data from the backup airspeed indicator USE (if installed)

Loss of Altitude Information

If the display system is not receiving altitude input from the Air Data Computer, a red X is displayed on the field.

1. Data from the remaining display USE
2. Data from the backup altimeter..... USE (if installed)

**Loss of Attitude Reference****WARNING**

**THE PILOT SHOULD ALWAYS MAINTAIN
EXTERNAL VISUAL ATTITUDE REFERENCE!**

**THE PILOT SHOULD NOT RELY ON THE ATTITUDE
INDICATOR FOR ATTITUDE EVALUATION!**

**CAREFULLY CHECK THE WEATHER FORECAST
ALONG THE ROUTE PRIOR TO TAKE-OFF.**

**GOOD VISIBILITY IS REASONABLY EXPECTED TO
BE MAINTAINED FOR THE ENTIRE DURATION OF
THE FLIGHT.**

Although the airplane is equipped with dual ADAHRS sensors and a digital attitude indicator, the pilot must always maintain visual reference...

1. Carry out landing at the nearest suitable airport or, if it is not possible, carry out safety landing according to para 3.9.2.

Pitot-static tube heating failure

Pitot-static tube heating is signaled by illuminating of the **PITOT HEAT.** marking on MFD of the G3X system.

If the **PITOT HEAT.** marking on MFD of the G3X system is off:

1. **PITOT HEATING** switch **OFF**
2. **PITOT HEATING** circuit breaker **OFF** and then **ON**
3. **PITOT HEATING** switch **ON**

If the **PITOT HEAT.** marking on MFD of the G3X system is still off assume Pitot-static tube heating malfunction:

4. Flight in visible moisture conditions.....Avoid

Loss of instrument or cabin lighting

1. Flashlight.....use to illuminate area where
lighting has been lost
2. Continue flight towards a safe landing



Section 4 – Normal Procedures

Pre-flight Check

Lights and Pitot – tube heating check

- **MASTER SWITCH**..... **ON**
- Check **CANOPY** open / close signaling on MFD.
- **COCKPIT LIGHT, BEACONS, POS. LIGHTS, LDG LIGHT, TAXI LIGHT** switches **ON**, check, **OFF**
- **DAY NIGHT** switch **NIGHT**
- **INSTR PANEL DIM** knob..... check function, set
- **INSTR LIGHT DIM** knob check function, set
- **PITOT HEATING** switch **ON**
- **PITOT HEAT.** marking on MFD illuminates

CAUTION

MAXIMUM TIME OF HEATING PITOT-STATIC TUBE
ON THE GROUND MUST NOT EXCEED 30 SEC.

- Pitot-static tube heating..... check by touch
- **PITOT HEATING** switch **OFF**
- All switches **OFF**
- Instrument equipment check on condition
- Check of safety belts condition and attachment
- Flashlights..... check
- Check pressure in the portable fire extinguisher (press gauge in the green arc) (if installed)
- Check on presence of loose object in the cockpit
- Check on adjusting and securing the rudder pedals

WARNING

**RIGHT AND LEFT PEDAL OF RUDDER CONTROL
MUST BE SET TO THE SAME POSITIONS AND
WELL SECURED!**

- POH and other required documents check on completeness
and validity



Section 5 – Performance

Not Affected.

Section 6 – Weight & Balance

No.	Title	Type	No. of items	Installed
1.	External alternator assy	F3A	1	
2.	Taxi light	LED 71141	1	✓
3.	Pitot-static tube	LUN 1152.14	1	✓
4.	Instrument panel lighting	E7 99-10 01	1	✓
5.	Glareshield	S1 82-01 01	1	✓

Section 7 – Airplane & System Description

Controls in the Cockpit and Instrument Panel

See Supplement No. 1.

Electrical System

The airplane is equipped with 14 V DC electrical installation. A main generator with power of 250 W is the primary source of electrical energy.

A 600 W alternator (if installed) is mounted on the forward left side of the engine. It is mounted via brackets on the propeller gear case and is belt driven from the propeller hub. The alternator supplies power to the airplane. The power supplied by the alternator is controlled by the integrated voltage regulator. It combines three essential devices in one physical container:

1. It functions as a linear regulator.
2. It provides a vital safeguard for electrical system with a solid-state, over voltage protection system.
3. It contains a low-voltage detection circuit that illuminates a red warning light **AUX. CHARG.** Whenever bus voltage drops below 12.5 V.

The external alternator is switched on/off by **AUX. GEN** switch located on the lower left part of the instrument panel. There is also **AUX. GEN** circuit breaker located below the left part of the instrument panel.



In case of external alternator installation in the airplane there is also a **GEN** switch installed on the lower left part of the instrument panel. The **GEN** switch switches off and on the main generator.

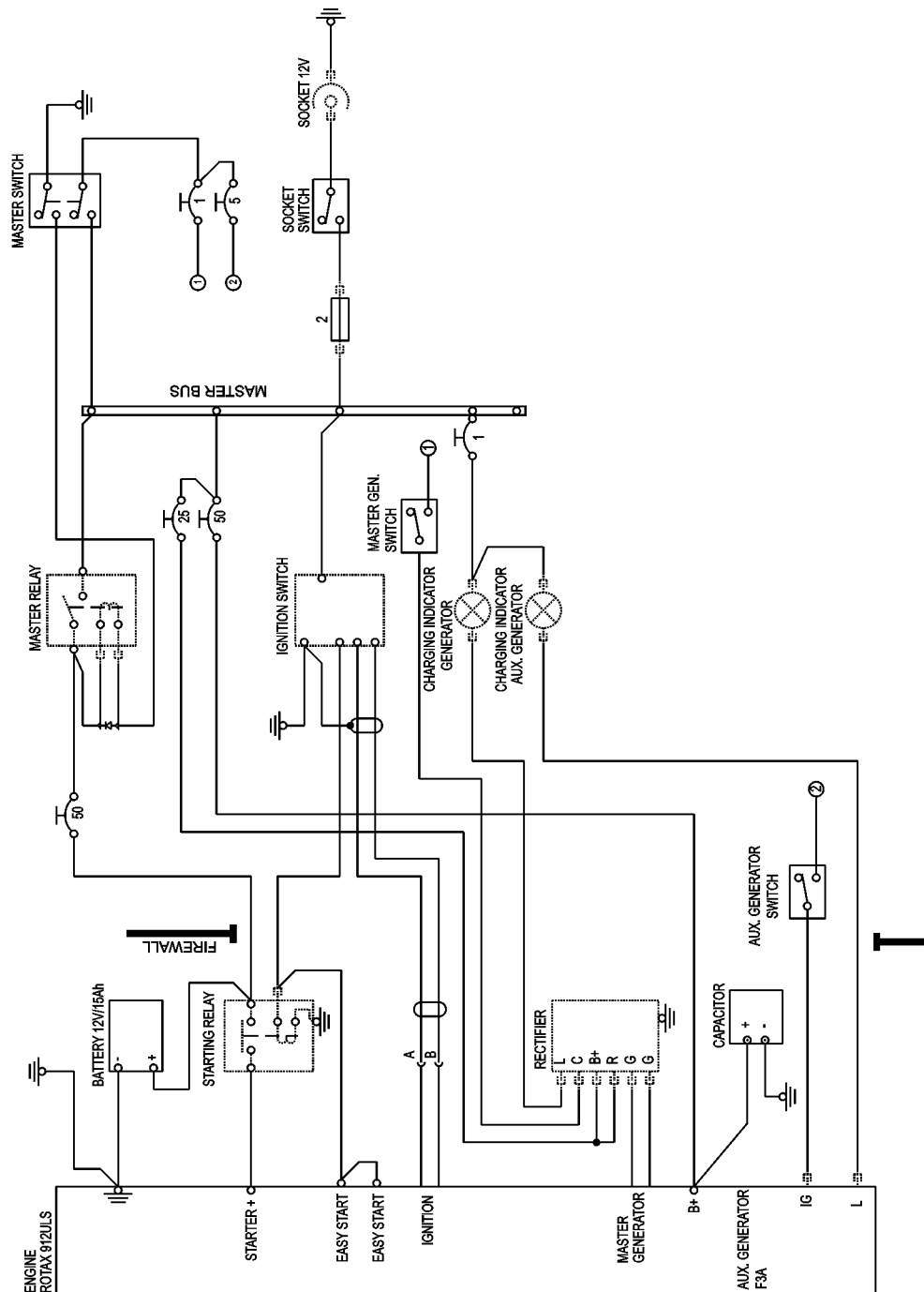


Fig. 1 Scheme of electrical system



Lighting

Airplane is equipped with an internal and external lighting.

Internal lighting is composed of adjustable lamp which is located on the canopy frame, instrument panel lighting which is located on the bottom part of the glareshield and instrument lighting. Canopy lamp is switched by **COCKPIT LIGHT** switch. The instrument panel lighting and the instrument lighting is switched on by the **DAY-NIGHT** switch to **NIGHT** position. The intensity of the lighting can be adjusted by the **INSTR PANEL DIM** and **INSTR LIGHT DIM** knobs.

External lighting is composed of position lights and anti-collision beacons which are located in wing tip and taxi / landing headlight which is located in right / left wing leading edge. Position lights are switched by **POS. LIGHTS** switch and anti-collision beacon by **BEACON** switch. Landing headlight is switched by **LDG LIGHT** switch; taxi headlight is switched by **TAXI LIGHT** switch.

Pitot-static System

Pitot-static tube for sensing static and total pressure is located under the left half of the wing. Total pressure is sensed through the opening in the Pitot-static tube face. Static pressure is sensed through openings on the tube circumference. System of pressure distribution to individual instruments is made by means of flexible plastic hoses.

Static pressure is led to main (Fig. 2, 6) and standby ADAHRS unit GSU 25 (7), standby altimeter (4), backup airspeed indicator (3) (if installed) and altitude encoder (5). Total pressure is led to the main (6) and standby ADAHRS unit GSU 25 (7) and backup airspeed indicator (3) (if installed).

Pitot-static tube is electrically heated. The heating is activated by **PITOT HEATING** switch, located in the left lower part of the instrument panel. Activation of the system is signaled by illuminating of the **PITOT HEAT.** marking on MFD of the G3X system.

CAUTION

AVOID BLOWING INTO THE PITOT-STATIC SYSTEM WITH THE CONDENSATE RESERVOIR COVER IS CLOSED - IT MAY CAUSE AN INSTRUMENT MALFUNCTION.

Section 9

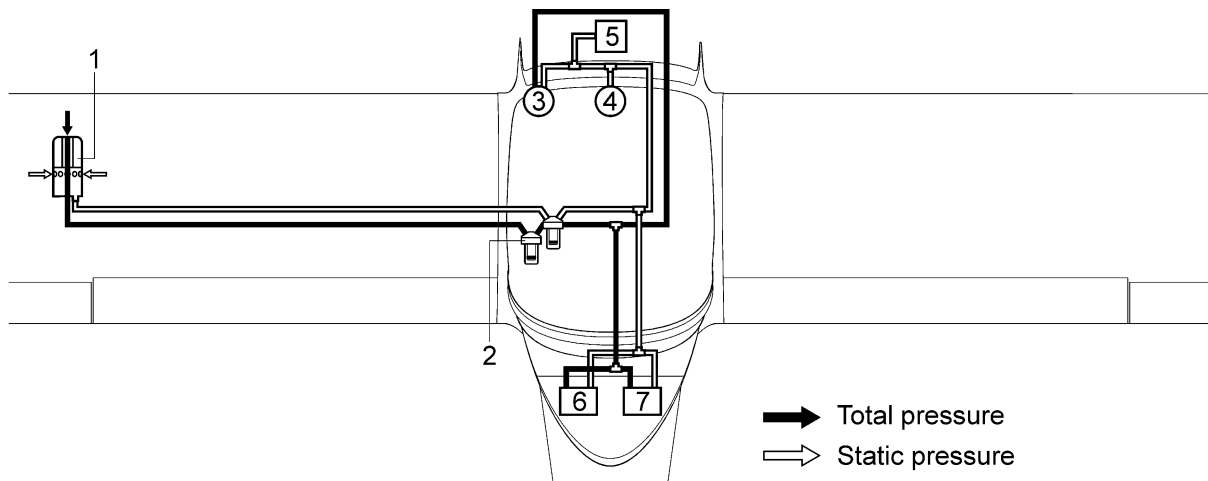
Supplement No. 14

VFR Night Operation

Harmony LSA

PILOT'S OPERATING HANDBOOK

Doc. No. HARMLSAIS POH S 14



- | | | | |
|---|--------------------------------------|---|----------------------------|
| 1 | Pitot-static tube | 5 | Altitude encoder |
| 2 | Drain sump | 6 | Main ADAHRS unit GSU 25 |
| 3 | Backup airspeed indicator (optional) | 7 | Standby ADAHRS unit GSU 25 |
| 4 | Backup altimeter (optional) | | |

Fig. 2 Scheme of pitot-static system

Section 8 – Handling, Servicing & Maintenance

Not Affected.