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SECTION II

LIMITATIONS

INTRODUCTION

This section of the Airplane Flight Manual presents the FAA approved operating limitations, the significance of such limitations, instrument markings and basic placards necessary for the safe operation of the airplane, its powerplant, standard systems and standard equipment. Optional equipment may require additional operating limitations and placards, which are presented in Section IX of this manual.

CERTIFICATION BASIS

The RUSCHMEYER R 90-230 RG is certificated in the "Normal" Category according to FAR Part 23, including Amendments 23-1 to 23-34.

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AIRSPEED LIMITATIONS

Airspeed	KCAS	KIAS	Remarks
Maneuvering Speed V_A	128* (2977 lbs/ 1350 kg) 124 (2803 lbs/ 1271 kg) 108 (2119 lbs/ 961 kg)	128 124 107	Do not make abrupt control movements above this speed.
Maximum Flap Extended Speed V_{FE}	103	102	Do not exceed this speed with the given flap setting.
Maximum Landing Gear Operating Speed V_{LO}	140	140	Do not extend or retract landing gear above this speed.
Maximum Landing Gear Extended Speed V_{LE}	140	140	Do not exceed this speed with landing gear extended.
Never Exceed Speed V_{NE}	194* (MSL - 12,000 ft) 182 (16,000 ft) 171 (20,000 ft)	193 181 171	Do not exceed this speed in any operation at any time.
Maximum Structural Cruising Speed V_{NO}	157	157	Do not exceed this speed except in smooth air and then only with caution.
Maximum Airspeed, Cowl Flaps Open	194	193	Do not exceed this speed with cowl flaps open.
* Linear Interpolation between given values.			

AIRSPEED INDICATOR MARKINGS

Marking	KIAS	Significance
White Arc	60 - 102	Operating range with wing flaps extended. Lower limit is maximum weight stalling speed in landing configuration. Upper limit is maximum speed permissible with flaps extended.
Green Arc	71 - 157	Normal operating range. Lower limit is maximum weight stalling speed with flaps and landing gear retracted. Upper limit is maximum structural cruising speed.
Yellow Arc	157 - 193	Caution range. Operations must be conducted with caution and only in smooth air.
Red Radial	193	Maximum speed for all operations.

POWERPLANT LIMITATIONS

ENGINE: Lycoming IO-540-C4D5

Engine Operating Limits for Take-Off and Continuous operation:

Maximum Power	172 kW (231 HP)
Max. Permissible Propeller Speed	2 400 RPM
Maximum Manifold Pressure	
@ prop. speed 1800 RPM	25 in Hg*
1900 RPM	26 in Hg*
2000 RPM	27 in Hg*
2100 RPM	28 in Hg*
2200 - 2400 RPM	maximum
Maximum Cylinder Head Temperature	260 °C (500 °F)
Maximum Oil Temperature	118 °C (245 °F)
Minimum Oil Pressure	1.7 bar (25 psi)
Maximum Oil Pressure	7.9 bar (115 psi)
Minimum Fuel Inlet Pressure at Fuel Injection System	
Normal Operation	0.96 bar (14 psi)
Idle	0.83 bar (12 psi)
Maximum Fuel Inlet Pressure at Fuel Injection System	3.1 bar (45 psi)
Maximum Fuel Nozzle Pressure	0.56 bar (8.0 psi)

* Linear Interpolation between given values

PROPELLER:

Mühlbauer MTV-14-B/190-17

Diameter:

 $74.8 \text{ in (1.90 m)} + 0.0 \text{ in (0.00 m)}$
 $- 1.2 \text{ in (0.03 m)}$

High Pitch Limit:

 $30^\circ \pm 1^\circ$

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POWERPLANT INSTRUMENT MARKINGS

Instruments	Red Radial	Yellow Arc	Green Arc	Red Radial
	Lower Limit	Caution Range	Normal Oper. Range	Upper Limit
Tachometer (RPM)	-----	-----	1800 - 2400	2400
Manifold Pressure (inHg)	-----	25 - 29.4	15 - 25	29.4
Oil Temperature Indicator (°C)	-----	93 - 118 below 74	74 - 93	118
Cylinder-Head Temperature Indicator (°C)	-----	224 - 260	130 - 224	260
Oil Pressure Indicator (bar)	1.7	1.7 - 3.8 6.6 - 7.9	3.8 - 6.6	7.9
Fuel Gauges	0 (Zero)	-----	-----	-----
Fuel Pressure (bar)	0.83	0.83 - 0.96	0.96 - 3.1	3.1

MAXIMUM CERTIFIED WEIGHT

Maximum Take-Off and Landing Weight	2977 lbs (1350 kg)
Maximum Load in Baggage Compartment	110 lbs (50 kg)

CENTER OF GRAVITY LIMITS

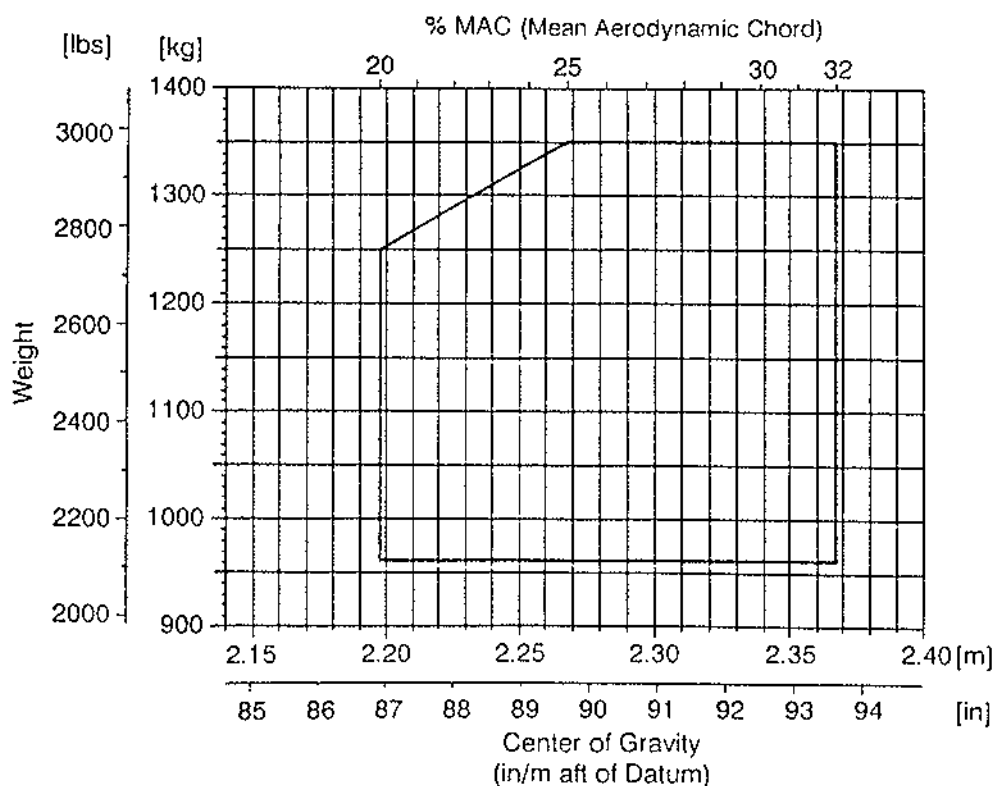
Forward Limit:

- 89.3 in (2.2685 m) aft of datum (25 % MAC) at 2977 lbs (1350 kg)
- 86.5 in (2.1976 m) aft of datum (20 % MAC) at 2756 lbs (1250 kg)
- 86.5 in (2.1976 m) aft of datum (20 % MAC) at 2119 lbs (961 kg)

Aft Limit:

- 93.2 in (2.3677 m) aft of datum (32 % MAC) at 2977 lbs (1350 kg)
- 93.2 in (2.3677 m) aft of datum (32 % MAC) at 2119 lbs (961 kg)

Position of Reference Datum : Fuselage Station 0.00 in (0.00 m)
 Mean Aerodynamic Wing Chord (MAC) : 55.8 in (1.418 m)
 Position of MAC : between Stations 75.4 in (1.914 m)
 and 131.2 in (3.332 m)



MANEUVER LIMITS

This airplane is certificated in the "Normal" category. This category applies to aircraft, designed for normal operation (i.e. nonacrobatic). This includes any maneuver incident to normal flying, slow stall, lazy eights, chandelles and steep turns in which the angle of bank is not more than 60°. Acrobatic maneuvers including spins are prohibited.

FLIGHT LOAD FACTOR LIMITS

Flaps retracted	+3.8 g to -1.52 g ^{*)}
Flaps extended (15° und 30°)	+2.0 g to 0.00 g

^{*)} Intended maneuvers with negative load factors are prohibited.

KINDS OF OPERATIONS LIMITS

The following types of operations are approved when the required equipment is installed and operational as defined in the KINDS OF OPERATIONS EQUIPMENT LIST.

1. VFR Day
2. VFR Night
3. IFR Day
4. IFR Night

Flights in known icing conditions are prohibited.

KINDS OF OPERATIONS EQUIPMENT LIST

This airplane may be operated in day or night VFR, or day or night IFR, when the appropriate equipment is installed and operable.

The following equipment list identifies the systems and equipment upon which type certification for each kind of operation was predicated. The systems and items of equipment listed must be installed and operable for the particular kind of operation indicated unless:

1. The airplane is approved to be operated in accordance with a current Minimum Equipment List (MEL) issued by the FAA.

or;

2. An alternate procedure is provided in the Pilot's Operating Handbook and FAA approved Flight Manual for the inoperative state of the listed equipment and all limitations are complied with.

Numbers on the Kinds of Operations Equipment List refer to quantities required to be operative for a specified condition.

Note

The following systems and equipment list may not include all equipment required by the applicable operating requirements. It also does not include components obviously required for the airplane to be airworthy such as wings, empennage, engine, etc.

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SYSTEM and/or COMPONENT	<i>VFR Day</i>				<i>Remarks and/ or Exceptions</i>
	<i>VFR Night</i>				
	<i>IFR Day</i>				
	<i>IFR Night</i>				
ELECTRICAL POWER					
Battery	1	1	1	1	
DC Generator	1	1	1	1	
DC Generator Annunciator	1	1	1	1	
DC Load Meter	1	1	1	1	
DC Volt Meter	1	1	1	1	
ENGINE INDICATIONS					
Cylinder Head Temperature Indicator	1	1	1	1	
Exhaust Gas Temperature Indicator	1	1	1	1	
Manifold Pressure Indicator	1	1	1	1	
RPM Indicator	1	1	1	1	
ENGINE OIL					
Oil Pressure Annunciator	1	1	1	1	
Oil Pressure Indicator	1	1	1	1	
Oil Temperature Indicator	1	1	1	1	
FLIGHT CONTROLS					
Flap Position Indicator	1	1	1	1	
Flap System	1	1	1	1	
Elevator Trim Tab Position Indicator	1	1	1	1	
Stall Warning System	1	1	1	1	

SYSTEM and/or COMPONENT	<i>VFR Day</i>				<i>Remarks and/ or Exceptions</i>
	<i>VFR Night</i>				
	<i>IFR Day</i>				
	<i>IFR Night</i>				
FLIGHT INSTRUMENTS					
Airspeed Indicator	1	1	1	1	
Altimeter	1	1	0	0	
Magnetic Compass	1	1	1	1	
Outside Air Temperature Indicator	0	0	1	1	
Sensitive Altimeter	0	0	1	1	
Vertical Speed Indicator	1	1	1	1	
FUEL					
Auxillary Fuel Pump System	1	1	1	1	
Fuel Flow Indicator	1	1	1	1	
Fuel Pressure Indicator	1	1	1	1	
Fuel Quantity Indicator	2	2	2	2	
Fuel Tank Selector Valve	1	1	1	1	
ICE AND RAIN PROTECTION					
Alternate Static Air System	0	0	1	1	
Pitot Heat	0	0	1	1	
LANDING GEAR					
Emergency Extension Valve	1	1	1	1	
Landing Gear Hydraulic Power Pack	1	1	1	1	
Landing Gear Position Indicator Lights	4	4	4	4	
Landing Gear Warning Horn	1	1	1	1	

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SYSTEM and/or COMPONENT	<i>VFR Day</i>				<i>Remarks and/ or Exceptions</i>
	<i>VFR Night</i>				
	<i>IFR Day</i>				
	<i>IFR Night</i>				
LIGHTS					
Cockpit and Instrument Lighting System	0	1	0	1	
Landing Light	1	1	1	1	
Position Lights	0	3	0	3	
Anticollision Lights (incl. Strobes)	0	3	0	3	
NAVIGATION INSTRUMENTS					
Gyroscopic Rate of Turn Indi- cator with Slip-Skid Indicator	0	0	1	1	
Gyroscopic Bank & Pitch Indicator	0	0	1	1	
Gyroscopic Direction Indicator (or equivalent)	0	0	1	1	
PROPELLER					
Propeller Governer	1	1	1	1	
Propeller Spinner	1	1	1	1	
PUBLICATIONS					
LBA Approved Airplane Flight Manual	1	1	1	1	
RESTRAINT SYSTEM					
Seat Belt (per Seat)	1	1	1	1	
Shoulder Harness (per Seat)	1	1	1	1	
VACUUM SYSTEM					
Instrument Air System	0	0	1	1	
Suction Gauge	0	0	1	1	

MAXIMUM FUEL CAPACITY

	Left Tank	Right Tank
Total Capacity	125 l (33.0 US Gal)	125 l (33.0 US Gal)
Unusable Fuel	71 (1.8 US Gal)	71 (1.8 US Gal)
Usable Fuel	118 l (31.2 US Gal)	118 l (31.2 US Gal)

Maximum permissible difference between
left and right tank 50 l (13.2 US Gal)

EXHAUST GAS TEMPERATURE LIMITS

Leaning of the fuel mixture is not allowed at continuous power of more than 85%.

FLIGHT CREW

Minimum Flight Crew:..... 1

Maximum Number of Usable Seats:..... 4

OTHER OPERATIONAL LIMITATIONS

Permissible Wing Flap Settings:

Take-Off Range: 0° or 15°

Landing Range: 0°, 15° or 30°

PLACARDS

The placards and markings installed in this airplane contain operating limitations which must be complied with when operating this airplane in normal category. Other limitations which must be complied with when operating this airplane in this category are contained in the airplane flight Manual.

No acrobatic maneuvers, including spins, approved.

Operation under known icing conditions is prohibited.

This aircraft is approved for
day/night VFR and IFR flights
if the required equipment is installed.

Right Side of Panel
(bottom left)

MAXIMUM SPEED	
KIAS	ALTITUDE
193	MSL-12000ft
181	16000ft
171	20000ft

Left Side of Panel
(above ignition switch)

MANEUVERING SPEED	128 kt
MAXIMUM SPEED FOR LANDING GEAR OPERATION	140 kt

Left Side of Panel
(below ignition switch)

NO INDICATION OF USABLE FUEL QUANTITIES
ABOVE 88 L FOR EACH TANK

Left Side of Panel
(above fuel indicators)

LEFT		RIGHT	
INDICATION	USABLE FUEL	INDICATION	USABLE FUEL
1/1	118.87 L	1/1	118.87 L
3/4	72 L	3/4	72 L
2/4	47 L	2/4	47 L
1/4	22 L	1/4	22 L

Left Side of Panel
(part of fuel indicators)

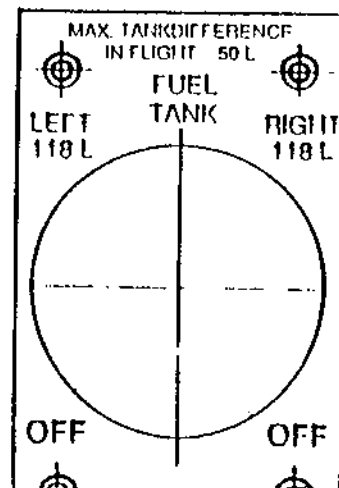
NO SAFE USE OF FUEL REMAINING, WHEN INDICATOR REEDS ZERO IN LEVEL FLIGHT

Left Side of Panel
(below fuel indicators)

TANK FILLER CAP
PULL TO OPEN
DO NOT OPEN DURING FLIGHT I

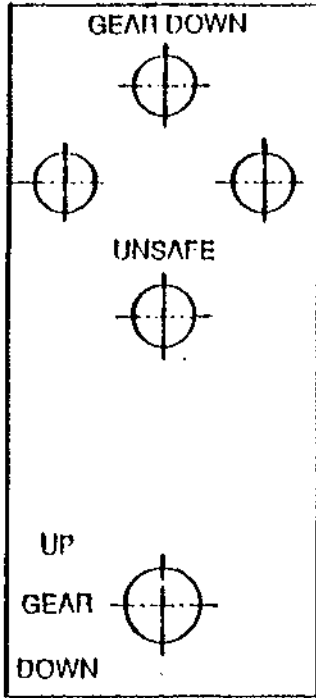
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Entrance Hatch
(beside the front seats)

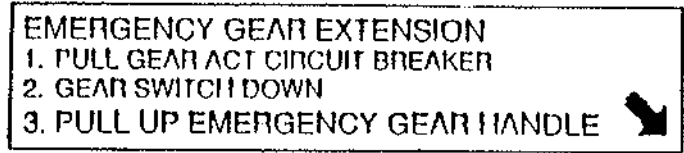


Central Pedestal
(center)

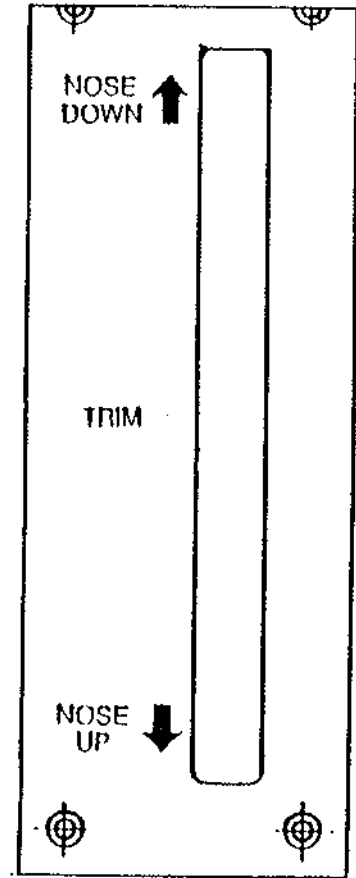
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Left Side of Panel
(beside the avionics stack)



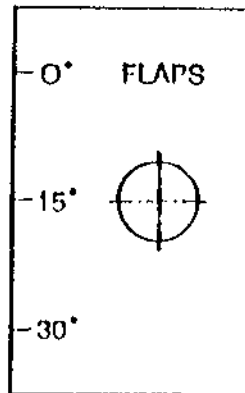
Central Pedestal
(pilot's side)



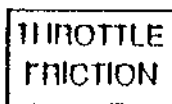
Central Pedestal
(rear)



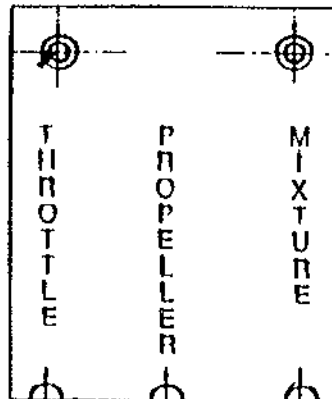
Right Side of Panel
(next to trim indication)



Right Side of Panel
(next to flap position indication)



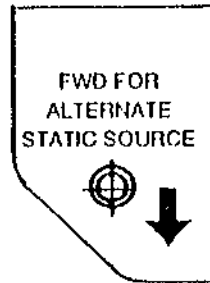
Central Pedestal
((next to engine controls) 1)



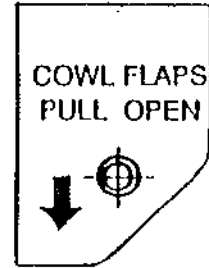
Central Pedestal
(front)



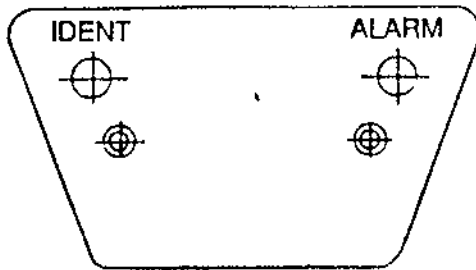
Stick
(top)



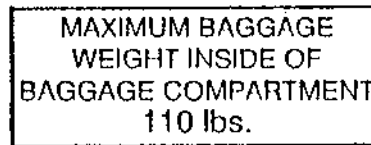
Avionics Stack
(bottom left)



Avionics Stack
(bottom right)



Stick
(orifice)



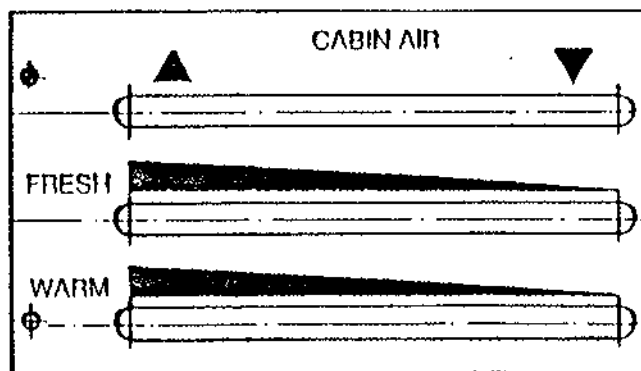
Baggage Compartment Door
(on the inside)



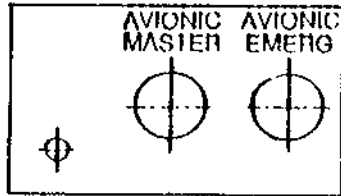
Parking Break
Button



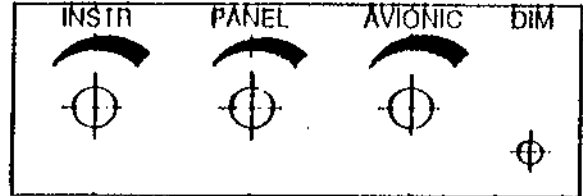
Entrance Hatch
(pilot's side)



Right Side of Panel
(bottom)



Avionics Stack
(above avionics)



Avionics Stack
(above avionics)