Flight Manual
AL50/MPG1(TB20)

Alsim

19/1/2007
Table of Contents

0-1 INTRODUCTION ......................................................... 0-7
0-2 REVISIONS .............................................................. 0-7

1 SAFETY INSTRUCTIONS .............................................. 1-1
  1-1 EMERGENCY STOP .................................................. 1-1

2 GENERAL ................................................................. 2-1
  2-1 WARNINGS, CAUTIONS AND NOTES ................................. 2-2
  2-2 SYMBOLS, ABBREVIATIONS AND TERMINOLOGY ................ 2-2
  2-3 UNITS OF MEASUREMENT ........................................... 2-5
    2-3-1 SPEED .......................................................... 2-5
    2-3-2 DISTANCE ....................................................... 2-5
    2-3-3 MASS ........................................................... 2-5
    2-3-4 VOLUME .......................................................... 2-5
    2-3-5 VOLUME/MASS RELATION ...................................... 2-5
    2-3-6 PRESSURE ....................................................... 2-5
    2-3-7 TEMPERATURE .................................................. 2-6

3 LIMITATIONS ............................................................. 3-1
  3-1 GENERAL ............................................................. 3-2
  3-2 AIRSPEED LIMITATIONS FOR SAFE OPERATION .................. 3-2
  3-3 AIR SPEED INDICATOR MARKERS .................................. 3-3
  3-4 POWER PLANT LIMITATIONS ....................................... 3-3
  3-5 STARTER LIMITATIONS ............................................. 3-4
  3-6 POWER PLANT INSTRUMENT MARKINGS ............................. 3-5
  3-7 WEIGHT LIMITS ..................................................... 3-6
  3-8 CENTER OF GRAVITY LIMITS ....................................... 3-6
  3-9 MANEUVER LIMITS .................................................. 3-6

19/1/2007 0-1
3-10 CREW LIMITS .................................................. 3-6
3-11 FUEL LIMITATIONS ........................................ 3-6
3-12 EQUIPMENT AND SYSTEM LIMITATIONS .............. 3-6

4 NORMAL PROCEDURES ........................................... 4-1
4-1 GENERAL ....................................................... 4-2
4-2 COCKPIT PREPARATION ....................................... 4-2
4-3 BEFORE ENGINE START ......................................... 4-2
4-4 ENGINE START UP ............................................. 4-3
4-5 WARM-UP ....................................................... 4-3
4-6 BEFORE TAXI ................................................... 4-3
4-7 TAXIING ......................................................... 4-4
4-8 ENGINE RUN-UP ................................................ 4-4
4-9 BEFORE TAKE-OFF ............................................. 4-5
4-10 NORMAL TAKE-OFF ........................................... 4-5
4-11 CLIMB ........................................................ 4-6
4-12 CRUISE ........................................................ 4-6
4-13 DESCENT ....................................................... 4-6
4-14 APPROACH AND LANDING ................................. 4-7
  4-14-1 NORMAL LANDING ....................................... 4-7
  4-14-2 SHORT FIELD LANDING .................................. 4-7
4-15 GO-AROUND .................................................... 4-7
4-16 AFTER LANDING ............................................... 4-8
4-17 ENGINE SHUT-DOWN ....................................... 4-8
4-18 PARKING ....................................................... 4-8

5 EMERGENCY PROCEDURES ..................................... 5-1
5-1 GENERAL ....................................................... 5-2
5-2 ENGINE INOPERATIVE PROCEDURES ...................... 5-2
  5-2-1 ENGINE FAILURE DURING TAKE OFF (Before Rotation)  5-2
  5-2-2 ENGINE FAILURE DURING TAKE-OFF (After Rotation)  5-2
5-3 ENGINE POWER LOSS IN FLIGHT ................................ 5-3
5-4 POWER OFF LANDING .......................................... 5-3
5-5 ENGINE OVERHEATING ........................................ 5-3
5-6 OIL PRESSURE LOSS ............................................. 5-3
5-7 FIRE ................................................................. 5-4
  5-7-1 ENGINE FIRE DURING START UP .......................... 5-4
  5-7-2 ENGINE FIRE IN FLIGHT ................................. 5-4
  5-7-3 ELECTRIC FIRE ............................................ 5-5
5-8 LANDING GEAR PROBLEMS ..................................... 5-5
  5-8-1 LANDING GEAR UNSAFE WARNING ......................... 5-5
  5-8-2 MANUAL LANDING GEAR EXTENSION ..................... 5-6
5-9 ELECTRICAL FAILURES .......................................... 5-6
  5-9-1 ALTERNATOR FAILURE .................................... 5-6
5-10 SPIN RECOVERY ................................................ 5-7
5-11 PROPELLER OVERSPEED ........................................ 5-7

6 PRESET VALUES FOR DIFFERENT FLIGHT PHASES 6-1
  6-1 TAKE-OFF ..................................................... 6-2
  6-2 CLIMB ............................................................ 6-2
  6-3 CRUISE ........................................................... 6-2
  6-4 DESCENT ........................................................ 6-3
  6-5 HOLD .............................................................. 6-3
  6-6 APPROACH ....................................................... 6-3
  6-7 LANDING .......................................................... 6-3

7 OVERVIEW OF THE COCKPIT 7-1
  7-1 COCKPIT FITTINGS ........................................... 7-2
    7-1-1 OPENING THE CABIN ...................................... 7-2
    7-1-2 SEAT ....................................................... 7-3
    7-1-3 LIGHTS ..................................................... 7-4
    7-1-4 START/STOP PANEL ....................................... 7-5
    7-1-5 HEADSETS ................................................ 7-5
  7-2 FLIGHT DECK ................................................... 7-6

8 OPERATION OF THE SIMULATED AIRCRAFT’S SYSTEMS 8-1
  8-1 FLIGHT CONTROLS ............................................. 8-3
    8-1-1 PRIMARY FLIGHT CONTROLS ............................... 8-3
8-1-2 SECONDARY FLIGHT CONTROLS ........................................ 8-4
8-2 POWER PLANT ............................................................. 8-6
8-2-1 ENGINE AND PROPELLER CONTROLS .............................. 8-6
8-2-2 ENGINE INSTRUMENTS .............................................. 8-7
8-3 STARTER ................................................................. 8-10
8-4 LANDING GEAR ............................................................ 8-11
8-4-1 NORMAL OPERATION .................................................. 8-11
8-4-2 EMERGENCY LANDING GEAR OPERATION ....................... 8-12
8-4-3 WHEEL BRAKES ...................................................... 8-13
8-5 FLIGHT INSTRUMENTS ................................................... 8-14
8-5-1 AIRSPEED INDICATOR ................................................ 8-14
8-5-2 VERTICAL SPEED INDICATOR ..................................... 8-15
8-5-3 TURN AND BANK INDICATOR ..................................... 8-15
8-5-4 ALTIMETER ............................................................ 8-16
8-5-5 ATTITUDE INDICATOR ............................................... 8-17
8-6 NAVIGATION INSTRUMENTS .......................................... 8-18
8-6-1 RMI ...................................................................... 8-18
8-6-2 HSI ...................................................................... 8-19
8-6-3 GYRO SYSTEM ........................................................ 8-20
8-6-4 MAGNETIC COMPASS .............................................. 8-20
8-6-5 OBI ...................................................................... 8-21
8-6-6 DME ..................................................................... 8-21
8-7 AVIONICS ................................................................. 8-23
8-7-1 RADIO NAVIGATION .................................................. 8-23
8-7-2 MARKER ANNUNCIATORS ......................................... 8-27
8-7-3 COMMUNICATION .................................................... 8-28
8-8 ELECTRICAL SYSTEM ................................................. 8-31
8-8-1 OVERVIEW ............................................................. 8-31
8-8-2 ELECTRICAL CONTROLS AND INDICATORS .................... 8-32
8-9 FUEL SYSTEM ............................................................ 8-33
8-9-1 FUEL QUANTITY INDICATORS ..................................... 8-33
8-9-2 FUEL SELECTOR ...................................................... 8-33
8-9-3 ELECTRIC FUEL PUMP .............................................. 8-34
8-10 AUTOMATIC FLIGHT .......................... 8-35
   8-10-1 FLIGHT DIRECTOR ..................... 8-35
   8-10-2 AUTOPILOT ............................. 8-36
   8-10-3 AUTOMATIC FLIGHT DISENGAGEMENT ....... 8-38
8-11 ICE PROTECTION ............................ 8-39
   8-11-1 PROPELLER DE-ICE .................... 8-39
   8-11-2 PITOT HEAT ............................ 8-39
8-12 LIGHTS ................................... 8-40
8-13 MISCELLANEOUS INSTRUMENTS AND CONTROLS .... 8-41
   8-13-1 ANNUNCIATOR TEST SWITCH .......... 8-41
   8-13-2 STOPWATCH ............................ 8-42
   8-13-3 BUG SELECTOR SWITCH ................ 8-43

9  Failure Reports and Modification Requests ....... 9-1
0-1 INTRODUCTION

This is the flight manual for the Alsim Synthetic Training Device model AL50, serial number A05G11, flight model MPG1(TB20). The flight modelling software is based on the aircraft Socata TB20, but it is not identical to it - neither is the hardware.

This manual contains the information needed by the pilot to operate the trainer A05G11. The procedures presented are the result of Alsim’s knowledge and experience up to the date of issue of the manual or its latest revision. The manual is not intended to be a guide for basic flight instruction or a training manual.

For information on the instructor station, please refer to the Instructor’s User Manual, for maintenance information to the Maintenance Manual.

Please address all comments, questions or suggestions to

Alsim Simulateurs
Z. I. No Bachelon
44430 Le Loroux Botteneau
France
Tel. +33 2 40 03 77 74
Fax. +33 2 51 71 98 06
E-Mail service@alsim.com

0-2 REVISIONS

Changes in hard- or software will lead to updates of this manual. Please replace the pages we will send you and fill in the log of revisions. The pages of this manual are identified by date of issue and page number (in the format chapter-page).
## LOG OF REVISIONS

<table>
<thead>
<tr>
<th>Rev.</th>
<th>Issue Date</th>
<th>Reason for Revision</th>
<th>Author</th>
<th>Pages Revised</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>19/1/2007</td>
<td>Initial creation of document</td>
<td>Alsim</td>
<td>all</td>
</tr>
</tbody>
</table>
1 SAFETY INSTRUCTIONS

WARNING: This Synthetic Training Device has been designed for professional flight training. Whenever somebody is “flying” it, an instructor trained in its use must be present!

Assuming the trainer is installed correctly and in proper working order, there is only a minimum of rules to follow:

CAUTION: Do not smoke, eat or drink in the cockpit or at the instructor station!

For further safety information, on topics such as installation, moving or cleaning of the trainer, please see the Maintenance Manual.

1-1 EMERGENCY STOP

There are two emergency stop buttons: One on the start/stop panel in the instructor station; the second one is connected to the side of the cockpit by means of a cable and can be used either inside or outside the cockpit.

In the case of an emergency, hit the button - the power supply to the trainer will be cut and everything stops.

NOTE: Do not hit the emergency stop button “for fun”. It will switch off everything, including the projectors, which may destroy their lamps.

Have the problem solved before restarting the trainer.
2 GENERAL

Contents

2-1 WARNINGS, CAUTIONS AND NOTES ......................... 2-2
2-2 SYMBOLS, ABBREVIATIONS AND TERMINOLOGY .......... 2-2
2-3 UNITS OF MEASUREMENT ................................. 2-5
  2-3-1 SPEED ............................................ 2-5
  2-3-2 DISTANCE ........................................ 2-5
  2-3-3 MASS ............................................. 2-5
  2-3-4 VOLUME ............................................ 2-5
  2-3-5 VOLUME/MASS RELATION ............................ 2-5
  2-3-6 PRESSURE ....................................... 2-5
  2-3-7 TEMPERATURE ................................. 2-6
2-1 WARNINGS, CAUTIONS AND NOTES

Special statements in the Airplane Flight Manual concerning the safety or operation of the airplane are highlighted. All three are presented indented and centered, cautions and warnings in bold print.

WARNING means that the non-observation of the corresponding procedure leads to an immediate or important degradation in flight safety.

CAUTION means that the non-observation of the corresponding procedure leads to a minor or to a more or less long term degradation in flight safety.

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

2-2 SYMBOLS, ABBREVIATIONS AND TERMINOLOGY

This is not a complete list of all aeronautics terminology, but just an explanation of the terms used in this manual.

AC  Alternating current
ADF  Automatic direction finding
ADI  Attitude and direction indicator
AP   Autopilot
ATC  Air traffic control
CAS  Calibrated Airspeed means the indicated speed of an aircraft, corrected for position and instrument error. Calibrated airspeed is equal to true airspeed in standard atmosphere at sea level.
C/B  Circuit breaker
DC   Direct current
DME  Distance measuring equipment
EGT  Exhaust gas temperature
Feathered propeller  Propeller blade at an angle which offers minimum drag and propeller rotation is at or near zero.
FD   Flight director
FNPT Flight Navigation and Procedures Trainer (ground-based training device which represents the flight deck environment of a class of aeroplanes) - for details see the JAR-STD 3A

g  Acceleration due to gravity
GNS  Global Navigation System
HDG  Heading
HSI  Horizontal situation indicator
IAS  Indicated Airspeed is the speed of an aircraft as shown on the airspeed indicator.
**ICAO** International Civil Aviation Organization

**IFR** Instrument flight rules

**ILS** Instrument landing system

**ISA** International Standard Atmosphere: 15 °C and 1013.2 hPa at MSL (mean sea level), with a decrease of 6.5 °C per 1000 m of altitude from MSL to 11000 m.

**ITT** Interturbine temperature

**JAA** Joint Aviation Authorities

**JAR STD 3A** Joint Aviation Requirements regarding Aeroplane Flight & Navigation Procedures Trainers

**KCAS** Calibrated airspeed in knots

**KIAS** Indicated airspeed in knots

**mb** millibar - unit for pressure (see below under “units”)

**MSL** Mean sea level

**OAT** Outside air temperature

**OBI** Omni-bearing indicator

**OBS** Omni-bearing selector

**PAX** Passenger

**Pressure altitude** Altitude measured from standard sea level pressure (1013.2 hPa) by means of a pressure (barometric) altimeter.

**psi** Pounds per square inch - unit for pressure (see below under “units”)

**RMI** Radio magnetic indicator

**RPM** Revolutions per minute - unless otherwise indicated, in this manual the term refers to the propeller’s revolutions.

**TAS** True Airspeed is the airspeed of an airplane relative to undisturbed air which is the CAS corrected for altitude, temperature and compressibility.

**Unusable fuel** Fuel that is not available to the engine (due to tank configuration etc.)

**Usable fuel** Fuel available for flight planning

**$V_A$** Maneuvering speed: Maximum speed at which application of full available aerodynamic control will not overstress the airplane

**$V_{FE}$** Maximum flaps extended speed: Maximum speed with wing flaps in extended position

**$V_{FO}$** Maximum flaps operation speed: Maximum speed at which flaps may be extended or retracted

**VFR** Visual flight rules

**$V_{LE}$** Maximum landing gear extended speed: Maximum speed with landing gear extended

**$V_{LO}$** Maximum landing gear operating speed: Maximum speed at which the landing gear may be extended or retracted
Chapter 2. GENERAL

AL50/MPG1(TB20)  2-2. SYMBOLS, ABBREVIATIONS AND TERMINOLOGY

\( V_{\text{MCA}} \) Minimum control speed in flight (not applicable to single-engine aircraft): Minimum speed at which the airplane is controllable with one engine inoperative, the other engine at take-off power and a bank angle of not more than 5° into the operative engine.

\( V_{\text{MO}} \) Maximum operating speed: Speed that may not be exceeded in normal flight operation

\( V_{\text{NE}} \) Never exceed speed: Speed that may never be exceeded under any circumstances

\( \text{VOR} \) Very high frequency omni-directional range

\( V_X \) Best angle-of-climb speed: Speed for the greatest gain in altitude in the shortest possible horizontal distance.

\( V_Y \) Best rate-of-climb speed: Speed for the greatest gain in altitude in the shortest possible time.

\( V_{Y\ SE} \) Best single-engine rate-of-climb speed: Speed for the greatest gain in altitude in the shortest possible time with one engine inoperative.

**Windmilling propeller** Propeller rotating from airstream inputs
2-3 UNITS OF MEASUREMENT

Again, this is not a complete units conversion table, but only a list of those units used in Alsim Flight Manuals. All figures are rounded to the third digit after the decimal point.

2-3-1 SPEED

1 Knot = 1 nautical mile per hour = 1.852 km/h
1 km/h = 0.54 kt

2-3-2 DISTANCE

1 nm (nautical mile) = 1.852 km
1 km = 0.54 nm
1 (statute) mile = 1.609 km
1 km = 0.621 (statute) mile
1 ft = 0.305 m
1 m = 3.281 ft

2-3-3 MASS

1 lb = 0.454 kg
1 kg = 2.205 lbs

2-3-4 VOLUME

1 US gallon = 3.785 liter
1 l = 0.264 USG

2-3-5 VOLUME/MASS RELATION

For Aviation fuel: 1 US gallon = approx. 6 lbs
For Jet A fuel: 1 US gallon = approx. 6.84 lbs

2-3-6 PRESSURE

1 in.Hg = 33.864 hPa = 0.491 psi
1 psi = 68.948 hPa = 2.036 in.Hg
1 hPa = 0.0145 psi = 0.0295 in.Hg
1 mb = 1 hPa
2-3-7 TEMPERATURE

°C = (°F - 32) / 1.8
°F = °C * 1.8 + 32
3 LIMITATIONS

Contents

3-1 GENERAL .......................................................... 3-2
3-2 AIRSPEED LIMITATIONS FOR SAFE OPERATION .... 3-2
3-3 AIR SPEED INDICATOR MARKERS ...................... 3-3
3-4 POWER PLANT LIMITATIONS .............................. 3-3
3-5 STARTER LIMITATIONS ....................................... 3-4
3-6 POWER PLANT INSTRUMENT MARKINGS ............... 3-5
3-7 WEIGHT LIMITS .................................................. 3-6
3-8 CENTER OF GRAVITY LIMITS .............................. 3-6
3-9 MANEUVER LIMITS .............................................. 3-6
3-10 CREW LIMITS ................................................... 3-6
3-11 FUEL LIMITATIONS ........................................... 3-6
3-12 EQUIPMENT AND SYSTEM LIMITATIONS .......... 3-6
3-1 GENERAL

This section provides the operating limitations and instrument markings for the flight model MPG1 (based on Socata TB20) installed on an Alsim flight trainer model AL50.

3-2 AIRSPEED LIMITATIONS FOR SAFE OPERATION

Do not exceed the speeds listed below. These speeds are calculated for MPG1 at its maximum mass in normal conditions at sea level.

Unless otherwise specified, all speeds listed in this manual are indicated airspeeds (IAS).

<table>
<thead>
<tr>
<th>Speed</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>V_{NE} — never exceed speed</td>
<td>187 kt</td>
</tr>
<tr>
<td>V_A — design maneuvering speed (max. mass)</td>
<td>129 kt</td>
</tr>
<tr>
<td>V_NO — normal operating speed</td>
<td>150 kt</td>
</tr>
<tr>
<td>V_FE — maximum flaps extended speed</td>
<td>102 kt</td>
</tr>
<tr>
<td>V_LO — maximum landing gear operating speed</td>
<td>129 kt</td>
</tr>
<tr>
<td>V_LE — maximum landing gear extended speed</td>
<td>139 kt</td>
</tr>
<tr>
<td>Maximum speed with autopilot engaged</td>
<td>175 kt</td>
</tr>
</tbody>
</table>

Maximum crosswind component .............................................. 25 kt
Maximum tailwind component for takeoff or landing .......................... 10 kt

Initial climb speed .................................................. 70 kt
Normal climb speed .................................................... 100 kt
V_Y — best rate of climb speed ......................................... 95 kt
V_X — best angle of climb speed ......................................... 85 kt

Normal approach speed (flaps down) ................................... 75 kt

Stall speed (wings level, maximum mass)
  Flaps up .......................................................... 63 kt
  Flaps down .......................................................... 53 kt

Best maneuvering speed (gear and flaps up) .......................... 100 kt

Best glide speed .......................................................... 92 kt
3-3  AIR SPEED INDICATOR MARKERS

Red radial (Never Exceed Speed) .................................................. 187 kt

Yellow arc ........................................................................... 150 to 187 kt
Caution range — smooth air only.

Green arc (Normal Operating Range) ................................. 70 to 150 kt
Lower limit: stall speed, flaps up, maximum weight ($V_{S1}$)
Upper limit: normal operating speed ($V_{NO}$)

White arc (Flaps Extended Range) ........................................... 59 to 103 kt
Lower limit: stall speed, flaps down and maximum weight ($V_{SO}$)
Upper limit: maximum speed with flaps extended($V_{FE}$)

![Airspeed Indicator]Figure 3.1: Airspeed Indicator

3-4  POWER PLANT LIMITATIONS

ENGINE

Maximum horsepower .......................................................... 250
Maximum rotation speed (RPM) ............................................. 2575
For this engine maximum take off power is equal to maximum continuous power.

TORQUE

Do not exceed manifold pressure of 27 in.Hg with an engine speed inferior or equal to 2300 RPM.

OIL

Minimum pressure ............................................................ 25 psi (1.7 bar)
Maximum pressure .......................................................... 100 psi (6.9 bar)
3-5 STARTER LIMITATIONS

Use of the starter is limited to 30 seconds ON, 3 minutes OFF.
3-6 POWER PLANT INSTRUMENT MARKINGS

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Red radial</th>
<th>Yellow arc/radial</th>
<th>Green arc</th>
<th>Red radial</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimum</td>
<td>Caution</td>
<td>Normal operating range</td>
<td>Maximum</td>
</tr>
<tr>
<td>Fuel flow</td>
<td>2 gal/h</td>
<td>–</td>
<td>2 to 25 gal/h</td>
<td>25 gal/h</td>
</tr>
<tr>
<td>Manifold pressure</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>27 in.HG</td>
</tr>
<tr>
<td>Tachometer</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>2575 rpm</td>
</tr>
</tbody>
</table>

Figure 3.2: Manifold Pressure and Fuel Flow Indicator

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Red bar</th>
<th>Yellow bar</th>
<th>Green bar</th>
<th>Yellow bar</th>
<th>Red bar</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimum</td>
<td>Caution</td>
<td>Normal operating range</td>
<td>Caution</td>
<td>Maximum</td>
</tr>
<tr>
<td>Oil pressure</td>
<td>&lt;1.7 bar</td>
<td>1.7 to 4.1 bar</td>
<td>4.1 to 6.2 bar</td>
<td>6.2 to 6.9 bar</td>
<td>&gt;6.9 bar</td>
</tr>
<tr>
<td>Oil temp.</td>
<td>–</td>
<td>&lt;40˚C</td>
<td>40 to 118˚C</td>
<td>–</td>
<td>&gt;118˚C</td>
</tr>
<tr>
<td>Cyl. temp.</td>
<td>–</td>
<td>–</td>
<td>93 to 224˚C</td>
<td>224 to 260˚C</td>
<td>260˚C</td>
</tr>
</tbody>
</table>

Figure 3.3: Tachometer

Figure 3.4: Oil Pressure, Oil Temperature, Cylinder Temperature
3-7 WEIGHT LIMITS

Maximum Takeoff Weight ................................................................. 1400 kg

3-8 CENTER OF GRAVITY LIMITS

The center of gravity of the Alsim synthetic training device A05G11 is fixed.

3-9 MANEUVER LIMITS

This is a normal category aircraft. No acrobatic maneuvers (including spins) approved.

3-10 CREW LIMITS

Minimum Crew: One pilot

3-11 FUEL LIMITATIONS

Number of tanks ................................................................. 2
Total capacity ................................................................. 336 l
Unusable fuel per tank ...................................................... 5 l
Total usable fuel ............................................................. 326 l
Minimum pressure .......................................................... 0.1 psi (7 hPa)
Maximum pressure ......................................................... 8 psi (552 hPa)

3-12 EQUIPMENT AND SYSTEM LIMITATIONS

AUTOMATIC PILOT

ALSIM’s A05G11 is equipped with an ALSIM autopilot.

- During autopilot operation, the pilot must be seated at the controls.
- The autopilot must be disabled for take-off, landing, and in approach below 200 ft AGL.
- The minimum height for autopilot engagement during climb or cruise is 1000 ft AGL.
- Autopilot (APR mode) approaches in category 1 conditions are approved until 200ft AGL.
- Maximum operating speed ............................................. 175kt
- Maximum fuel dissymmetry ............................................. 75 l
COMMUNICATION

The avionics master switch must be OFF before connection to a ground power unit.
4 NORMAL PROCEDURES

Contents

4-1 GENERAL .................................................. 4-2
4-2 COCKPIT PREPARATION ................................. 4-2
4-3 BEFORE ENGINE START ................................. 4-2
4-4 ENGINE START UP ....................................... 4-3
4-5 WARM-UP ................................................... 4-3
4-6 BEFORE TAXI ............................................... 4-3
4-7 TAXIING ...................................................... 4-4
4-8 ENGINE RUN-UP .......................................... 4-4
4-9 BEFORE TAKE-OFF ....................................... 4-5
4-10 NORMAL TAKE-OFF .................................... 4-5
4-11 CLimb ...................................................... 4-6
4-12 CRUISE ..................................................... 4-6
4-13 DESCENT ................................................... 4-6
4-14 APPROACH AND LANDING ......................... 4-7
   4-14-1 NORMAL LANDING ................................ 4-7
   4-14-2 SHORT FIELD LANDING ......................... 4-7
4-15 GO-AROUND .............................................. 4-7
4-16 AFTER LANDING .......................................... 4-8
4-17 ENGINE SHUT-DOWN .................................. 4-8
4-18 PARKING .................................................. 4-8
4-1 GENERAL

The checklists presented in this chapter are checklists for a non-specific single-piston engine aircraft installed on an Alsim trainer model AL50.

NOTE: These checklists cannot replace qualified flight instruction.

4-2 COCKPIT PREPARATION

Flight documentation .................................. checked on board
Flight Manual ........................................... checked on board
Cockpit illumination ..................................... on
Seats ....................................................... adjust and lock
Parking brake ............................................ on
Magnetos ................................................... off
Fuel pump switch ....................................... off
Landing gear control .................................... down
Throttle .................................................... idle
Mixture .................................................... fuel cut-off
Flight controls .......................................... check
Avionics master ......................................... off
All electric switches .................................... off
Battery ..................................................... on
Fuel gauge ............................................... check fuel quantity
Fuel selector ............................................. fullest tank
Annunciators ............................................. test
Avionics master ......................................... on
ATIS ....................................................... received
Clearance ................................................ received
Avionics master ......................................... off
Gear lights ................................................ 3 greens
Battery ..................................................... off

4-3 BEFORE ENGINE START

Parking brake ........................................... confirmed on
Landing gear control .................................... confirmed down
Avionics master ......................................... confirmed off
Throttle .................................................... confirm idle
Propeller control ....................................... full forward
Mixture .................................................... confirm fuel cut-off
Alternators .............................................. confirm off
4-4 ENGINE START UP

Mixture .................................................. full rich
Throttle .................................................. 1/4 inch open
Propeller lever ......................................... confirm full forward
Battery .................................................... on
Electric fuel pump ..................................... on
Beacon light ............................................. on
Propeller ................................................. clear
Throttle .................................................. idle
Starter .................................................... engage

When engine is running and tachometer indicates more than 500 rpm,
starter ...................................................... off
Throttle .................................................. 1000 RPM when engine starts
Alternator .................................................. on
Electric fuel pump ..................................... off
Oil pressure .............................................. check
Voltmeter ................................................ check

4-5 WARM-UP

Throttle .................................................. 1000 to 1200 RPM

4-6 BEFORE TAXI

Flaps .................................................. extend, then retract
Gyros .................................................. slave
Altimeter .................................................. set
Avionics master ......................................... on
Frequencies .............................................. set and check
Lights .................................................. as necessary
Electric trim ............................................ check
Passenger briefing ...................................... done
Fuel selector .......................................... other tank
4-7 TAXIING

Taxi area ............................................................ cleared
Parking brake ......................................................... release
Throttle .......................................................... move slowly forward
Brakes ............................................................. check
Steering .......................................................... check
Instruments ......................................................... check

4-8 ENGINE RUN-UP

Parking brake ......................................................... on
Engine instruments ................................................ check
Fuel selector ....................................................... fullest tank
Mixture .......................................................... full rich
Propeller lever .................................................... full forward
Throttle .......................................................... 1900 RPM
Prop lever ........................................................ operate
Magnetos ......................................................... check (maximum drop 175 RPM
....................................................... and maximum difference 50 RPM)
Alternator load .................................................. check
Throttle .......................................................... idle
Throttle .......................................................... 1000 rpm
4-9 BEFORE TAKE-OFF

Battery ..................................................... confirm on
Alternator .................................................. confirm on
Magnetos .................................................. confirm 1+2
Flight controls ............................................ check
Flight instruments ........................................ check
Engine instruments ........................................ check
Fuel quantity .............................................. check
Fuel selector ............................................. fullest tank
Electric fuel pump .......................................... on
Mixture ........................................................ confirm full rich
Pitch trim ................................................... confirm set
Engine run-up ............................................. done
Automatic pilot ............................................. off
Pitot heat ................................................... as necessary
Transponder ................................................ alt
Flaps ........................................................ set and checked
Parking brake ............................................. release
Approach sector and runway .......................... free
Wind ......................................................... checked

NOTE: Adjust mixture prior to takeoff from high elevations. Do not overheat. Adjust mixture only enough to obtain smooth engine operation.

4-10 NORMAL TAKE-OFF

Flaps ......................................................... as required
Pitch trim ................................................... check
Throttle .................................................... full power
Rotation .................................................... 70 kt
Climb speed ............................................... 100 kt
Brakes ....................................................... apply
At 300 ft AGL: Gear ....................................... retract
4-11 CLIMB

Mixture .......................................................... full rich
Power ......................................................... climb (see presets)
RPM .......................................................... climb (see presets)
Climb speed .................................................. 100 kts
Flaps .......................................................... up
Gear .......................................................... confirm up
Electric fuel pump ......................................... off
Landing light .................................................. off
Altimeter ..................................................... set

4-12 CRUISE

Refer to chapter on presettings.

Throttle .................................................... set according to presettings
Mixture ....................................................... adjust
Engine instruments ......................................... check
Prop de-ice .................................................. as necessary
Fuel quantity ................................................ check
Fuel selector ................................................ fullest tank
Lights (nav, strobe) ....................................... as necessary

4-13 DESCENT

ATIS .............................................................. received
Altimeter ..................................................... set
Briefing ......................................................... completed
Directional gyro ......................................... check deviation with compass
Lights ......................................................... as necessary
Mixture ....................................................... adjust with descent
4-14  APPROACH AND LANDING

Altimeter ............................................................. set
Electric fuel pump .................................................. on
Fuel selector ........................................................... fullest tank
Landing gear ......................................................... down
Gear lights ............................................................ check - 3 greens
Mixture ................................................................. full rich
Propeller lever ........................................................ full forward
Automatic pilot ....................................................... off
Landing and taxi lights ............................................. on

4-14-1  NORMAL LANDING

Flaps ................................................................. as necessary
Speed ................................................................. adjusted
Trims ................................................................. as necessary

4-14-2  SHORT FIELD LANDING

Flaps ................................................................. down
Speed ................................................................. adjusted
Trims ................................................................. as necessary
When touching down: Flaps ................................... up
Brakes ................................................................. apply full

4-15  GO-AROUND

Control column ................ pull back to desired climb angle
Propeller control .......................... full forward
Throttle ......................................................... full power
Mixture ........................................................... full rich
Flaps ............................................................... 0°
Gear ................................................................. up
Climb speed .................................................. 100 kts
4-16  AFTER LANDING

Flaps ......................................................... up
Landing lights .............................................. off
Transponder ......................................... standby
Fuel pump ................................................. off
Pitot heat .................................................. off

4-17  ENGINE SHUT-DOWN

Parking brake ................................................ on
Taxi lights .................................................. off
Avionics master ........................................ on
Throttle ...................................................... idle
Magneto cut-off ........................................... test
RPM ......................................................... 1000
Mixture ..................................................... fuel cut-off
Magneto ................................................... off (after engines stop)
Alternator ................................................... off
All electric switches ....................................... confirm off
Battery ................................................... confirm off

4-18  PARKING

Parking brake ............................................. confirm on
Flaps ....................................................... confirm full up
Cockpit illumination ..................................... off
5 EMERGENCY PROCEDURES

Contents

5-1 GENERAL ......................................................... 5-2
5-2 ENGINE INOPERATIVE PROCEDURES ...................... 5-2
  5-2-1 ENGINE FAILURE DURING TAKE OFF (Before Rotation) 5-2
  5-2-2 ENGINE FAILURE DURING TAKE-OFF (After Rotation)  5-2
5-3 ENGINE POWER LOSS IN FLIGHT ............................. 5-3
5-4 POWER OFF LANDING ............................................ 5-3
5-5 ENGINE OVERHEATING ......................................... 5-3
5-6 OIL PRESSURE LOSS ............................................ 5-3
5-7 FIRE ................................................................... 5-4
  5-7-1 ENGINE FIRE DURING START UP ........................ 5-4
  5-7-2 ENGINE FIRE IN FLIGHT ................................. 5-4
  5-7-3 ELECTRIC FIRE ............................................. 5-5
5-8 LANDING GEAR PROBLEMS .................................... 5-5
  5-8-1 LANDING GEAR UNSAFE WARNING .................. 5-5
  5-8-2 MANUAL LANDING GEAR EXTENSION .................. 5-6
5-9 ELECTRICAL FAILURES ......................................... 5-6
  5-9-1 ALTERNATOR FAILURE ................................. 5-6
5-10 SPIN RECOVERY ................................................ 5-7
5-11 PROPELLER OVERSPEED ..................................... 5-7
5-1 GENERAL

The checklists presented in this chapter are checklists for a non-specific single-piston engine aircraft installed on an Alsim trainer model AL50.

NOTE: The procedures described here are not a substitute for sound judgment and common sense. Neither can these checklists replace qualified flight instruction.

5-2 ENGINE INOPERATIVE PROCEDURES

5-2-1 ENGINE FAILURE DURING TAKE OFF (Before Rotation)

Throttle ..................................................... immediately completely closed
Brakes ............................................................ as necessary
Stop straight ahead.
Inform ATC.
Vacate Runway as soon as possible.

If inadequate runway remains to stop:
Mixture ....................................................... fuel cut-off
Throttle .......................................................... closed
Brakes ........................................................... apply max. braking
Fuel selectors .................................................. off
Magnetos .......................................................... off
Master switch .................................................. off
Keep directional control, turning to avoid obstacles.

5-2-2 ENGINE FAILURE DURING TAKE-OFF (After Rotation)

If sufficient runway remains for a normal landing, leave gear down and land straight ahead.

If area ahead is rough, or if it is necessary to clear obstructions:
Gear selector switch ........................................ up

If sufficient altitude has been gained to attempt a restart:
Maintain safe airspeed.
Fuel selector ................................................ switch to other tank
Electric fuel pump ......................................... check on
Mixture ...................................................... check rich

If power is not regained, proceed with power off landing.
5-3 ENGINE POWER LOSS IN FLIGHT

Fuel selector ........................................ switch to other tank
Electric fuel pump .................................. on
Mixture ........................................... rich
Engine gauges .......... check for indication of cause of power loss

If no fuel pressure is indicated, check tank selector position to be sure it is on a tank containing fuel.

When power is restored:
Electric fuel pump .................................. off

If power is not restored prepare for power off landing.

5-4 POWER OFF LANDING

Trim for best glide speed.
Locate suitable field.
Inform ATC.
Transponder 7700.
Establish spiral pattern.
1000ft above field at downwind position for normal landing approach.
When field can easily be reached reduce speed for shortest landing.
When it is certain that the field will be reached, flaps may be used to decrease speed and shorten landing distance.

5-5 ENGINE OVERHEATING

Mixture ........................................... rich
Throttle ........................................... reduce
Speed ........................................ increase (if altitude allows)

Land as soon as practical. Prepare for power-off landing.

5-6 OIL PRESSURE LOSS

Land as soon as practical. Prepare for power-off landing.
5-7  FIRE

5-7-1  ENGINE FIRE DURING START UP

If engine has not started:

- Mixture ..................... fuel cut-off
- Throttle ..................... full power
- Starter ..................... keep on operating

If engine has already started, and is running, continue operating to try pulling the fire into the engine.

NOTE: If the fire is on the ground, it may be possible to taxi away.

If fire continues:

- Fuel selector ..................... off
- Electric fuel pump ..................... off
- Mixture ..................... fuel cut-off
- Throttle ..................... full power
- Magnetos ..................... off
- Battery ..................... off
- Alternator ..................... off

5-7-2  ENGINE FIRE IN FLIGHT

- Fuel selector ..................... off
- Throttle ..................... close
- Mixture ..................... fuel cut-off
- Fuel pump ..................... off
- Alternator ..................... off

Proceed with power-off landing.
5-7-3 **ELECTRIC FIRE**

Battery .............................................. off
Alternators ........................................... off
All electric switches .............................. off
Avionics ............................................... off

If flight can be continued safely without electric power, land on nearest airport and have the electric circuit repaired.

If flying in controlled airspace:

Battery .............................................. on
Avionics master ................................. on
Alternators ........................................ on

Send Mayday message to ATC.

Alternator ........................................... off
Avionics master ................................. off
Battery ............................................... off

Land as soon as possible.

**WARNING:** Gear must be extended with the back-up system.

5-8 **LANDING GEAR PROBLEMS**

5-8-1 **LANDING GEAR UNSAFE WARNING**

Red warning light indicates gear in transit.
Recycle gear if indication continues.
5-8-2 MANUAL LANDING GEAR EXTENSION

Check the following points before extending gear manually:

- **Battery** .............................................................. on
- **Alternators** ...................................................... check

To extend, proceed as follows:
- **Airspeed** .......................................................... reduce
- **Gear selector** .................................................... down and locked
- **Emergency gear switch** ................................. select down
- **Gear lights** ......................................................... 3 greens
  Leave emergency gear switch open.

5-9 ELECTRICAL FAILURES

5-9-1 ALTERNATOR FAILURE

Ammeter indicates zero:

- **Verify failure** ................................................ check ammeters
- **Electrical loads** .......................... reduce to minimum
- **Alternator switch** ................................................. off
- **Alternator switch** (after off for at least 1 second) ............. on

If power is not restored:
- **Alternator switch** ................................................. off
- **Electrical loads** .......................... reduce to minimum

Land as soon as practical. The battery is the only remaining source of electrical power. Anticipate complete electrical failure.

**WARNING:** Compass error may exceed 10 degrees with alternator inoperative.

**NOTE:** If the battery is depleted, the landing gear must be lowered using the emergency gear extension procedure. The gear position lights will be inoperative.
5-10 SPIN RECOVERY

Intentional spins prohibited.

Throttles .................................................... retard to idle
Ailerons ..............................................neutral — keep wings level
Rudder .............................................. full opposite to direction of spin
Control wheel ........................ release back pressure
Control wheel ................. full forward if nose does not drop
Rudder ................................. neutralize when rotation stops
Control wheel .......... smooth back pressure to recover from dive

5-11 PROPELLER OVERSPEED

Throttle .................................................... retard
Oil pressure .................................................... check
Propeller lever ........................ fully decrease RPM,
..............................................................then set if any control available
Airspeed .................................................... reduce
Throttle .................................................... as required to remain
.................................................... within limitations
6 PRESET VALUES FOR DIFFERENT FLIGHT PHASES

Contents

6-1 TAKE-OFF ........................................... 6-2
6-2 CLIMB .................................................. 6-2
6-3 CRUISE ............................................... 6-2
6-4 DESCENT ............................................. 6-3
6-5 HOLD .................................................. 6-3
6-6 APPROACH .......................................... 6-3
6-7 LANDING .............................................. 6-3
All the values given in this chapter are recommended values for optimum performance of the simulated aircraft at maximum mass and ISA. Values will vary for different masses and meteorological conditions.

### 6-1 TAKE-OFF

Altitude: 500 ft.

<table>
<thead>
<tr>
<th>Landing Gear</th>
<th>Wing Flaps</th>
<th>IAS (kts)</th>
<th>Mani. Press. (in.HG)</th>
<th>RPM</th>
<th>Pitch $\theta$ $^\circ$</th>
<th>$V_z$ (ft/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Down</td>
<td>Up</td>
<td>70</td>
<td>29</td>
<td>2575</td>
<td>8</td>
<td>1200</td>
</tr>
</tbody>
</table>

Table 6.1: Preset Values for Take-Off

### 6-2 CLIMB

Altitude: 2000 ft.

<table>
<thead>
<tr>
<th>Landing Gear</th>
<th>Wing Flaps</th>
<th>IAS (kts)</th>
<th>Mani. Press. (in.HG)</th>
<th>RPM</th>
<th>Pitch $\theta$ $^\circ$</th>
<th>$V_z$ (ft/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Climb</td>
<td>Up</td>
<td>100</td>
<td>25</td>
<td>2500</td>
<td>8</td>
<td>1000</td>
</tr>
<tr>
<td>Climb at $V_y$ (best rate of climb)</td>
<td>Up</td>
<td>95</td>
<td>28</td>
<td>2575</td>
<td>12 $^\circ$</td>
<td>1390</td>
</tr>
</tbody>
</table>

Table 6.2: Preset Values for Climb

### 6-3 CRUISE

Altitude: 6000 ft.

<table>
<thead>
<tr>
<th>Landing Gear</th>
<th>Wing Flaps</th>
<th>IAS (kts)</th>
<th>Mani. Press. (in.HG)</th>
<th>RPM</th>
<th>Pitch $\theta$ $^\circ$</th>
<th>$V_z$ (ft/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up</td>
<td>Up</td>
<td>135</td>
<td>23</td>
<td>2300</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 6.3: Preset Values for Cruise
6-4 DESCENT

Altitude: 4000 ft.

<table>
<thead>
<tr>
<th>Landing Gear</th>
<th>Wing Flaps</th>
<th>IAS (kts)</th>
<th>Mani. Press. (in.HG)</th>
<th>RPM</th>
<th>Pitch $\theta^\circ$</th>
<th>$V_z$ (ft/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up</td>
<td>Up</td>
<td>150</td>
<td>22</td>
<td>2300</td>
<td>-2 $^\circ$</td>
<td>-450</td>
</tr>
</tbody>
</table>

Table 6.4: Preset Values for Descent

6-5 HOLD

Altitude: 3000 ft.

<table>
<thead>
<tr>
<th>Landing Gear</th>
<th>Wing Flaps</th>
<th>IAS (kts)</th>
<th>Mani. Press. (in.HG)</th>
<th>RPM</th>
<th>Pitch $\theta^\circ$</th>
<th>$V_z$ (ft/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up</td>
<td>Up</td>
<td>100</td>
<td>16</td>
<td>2300</td>
<td>2.5 $^\circ$</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 6.5: Preset Values for Hold

6-6 APPROACH

Altitude: 1000 ft.

<table>
<thead>
<tr>
<th>Landing Gear</th>
<th>Wing Flaps</th>
<th>IAS (kts)</th>
<th>Mani. Press. (in.HG)</th>
<th>RPM</th>
<th>Pitch $\theta^\circ$</th>
<th>$V_z$ (ft/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Down</td>
<td>10 $^\circ$</td>
<td>100</td>
<td>19</td>
<td>2300</td>
<td>2 $^\circ$</td>
<td>0</td>
</tr>
<tr>
<td>Down</td>
<td>10 $^\circ$</td>
<td>100</td>
<td>14</td>
<td>2300</td>
<td>-1 $^\circ$</td>
<td>-600</td>
</tr>
</tbody>
</table>

Table 6.6: Preset Values for Approach

6-7 LANDING

Altitude: 500 ft.

<table>
<thead>
<tr>
<th>Landing Gear</th>
<th>Wing Flaps</th>
<th>IAS (kts)</th>
<th>Mani. Press. (in.HG)</th>
<th>RPM</th>
<th>Pitch $\theta^\circ$</th>
<th>$V_z$ (ft/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Down</td>
<td>40 $^\circ$</td>
<td>75</td>
<td>16</td>
<td>max.</td>
<td>-2.5 $^\circ$</td>
<td>-500</td>
</tr>
</tbody>
</table>

Table 6.7: Preset Values for Landing
7 OVERVIEW OF THE COCKPIT

Contents

7-1 COCKPIT FITTINGS ........................................... 7-2
  7-1-1 OPENING THE CABIN ................................ 7-2
  7-1-2 SEAT ..................................................... 7-3
  7-1-3 LIGHTS .................................................. 7-4
  7-1-4 START/STOP PANEL ................................. 7-5
  7-1-5 HEADSETS ............................................... 7-5
7-2 FLIGHT DECK ............................................... 7-6
7-1 COCKPIT FITTINGS

7-1-1 OPENING THE CABIN

The AL50’s cabin can be opened and closed using the holes in the cabin’s roof as handles. Simply pull the canopy in the desired direction - there is no locking mechanism.

Figure 7.1: Canopy handles
7-1-2 SEAT

The seat can be adjusted backwards and forwards by pulling the black handle upwards and then sliding the seat in the desired position.

![Seat diagram](image)

Figure 7.2: Seat

You can also change the headrest’s height:

1. Unlock the support by pushing the rear part of the port-side support’s mounting:

![Mounting diagram](image)

Figure 7.3: Mounting of the port-side headrest support

2. Push the headrest in the desired position.
7-1-3 LIGHTS

There are the following lights installed in the AL50:

The flight deck is illuminated by two lamps right and left of the windshield. In order to switch the lights on and off, turn the upper part of the lamp to the position indicated below:

![Lamp on the side of the windshield](image1)

Figure 7.4: Lamp on the side of the windshield

The start/stop panel is illuminated by a red nightlight which cannot normally be switched off. (If you absolutely want to extinguish it, pull the cables out of the lamp)

![Nightlight above start/stop panel](image2)

Figure 7.5: Nightlight above start/stop panel
7-1-4 START/STOP PANEL

The AL50’s start/stop panel contains not only the normal start/stop buttons and the emergency stop button, but also the audio control panel.

Figure 7.6: Start/stop panel

7-1-5 HEADSETS

The AL50 is equipped with two headsets with microphones (one for the pilot and one for the instructor).

Figure 7.7: Headset
Chapter 7. OVERVIEW OF THE COCKPIT

7-2 FLIGHT DECK

Figure 7.8: Flight Deck of an AL50 with Flight Model MPG1(TB20)
Chapter 8. OPERATION OF THE SIMULATED AIRCRAFT’S SYSTEMS

Contents

8-1 FLIGHT CONTROLS ................................................. 8-3
  8-1-1 PRIMARY FLIGHT CONTROLS ............................. 8-3
  8-1-2 SECONDARY FLIGHT CONTROLS ......................... 8-4
8-2 POWER PLANT .................................................. 8-6
  8-2-1 ENGINE AND PROPELLER CONTROLS ..................... 8-6
  8-2-2 ENGINE INSTRUMENTS .................................. 8-7
8-3 STAR TER .......................................................... 8-10
8-4 LANDING GEAR .................................................... 8-11
  8-4-1 NORMAL OPERATION ........................................ 8-11
  8-4-2 EMERGENCY LANDING GEAR OPERATION ................. 8-12
  8-4-3 WHEEL BRAKES ............................................ 8-13
8-5 FLIGHT INSTRUMENTS ........................................... 8-14
  8-5-1 AIRSPEED INDICATOR .................................... 8-14
  8-5-2 VERTICAL SPEED INDICATOR ............................. 8-15
  8-5-3 TURN AND BANK INDICATOR ............................... 8-15
  8-5-4 ALTIMETER ................................................ 8-16
  8-5-5 ATTITUDE INDICATOR ..................................... 8-17
8-6 NAVIGATION INSTRUMENTS .................................... 8-18
  8-6-1 RMI .......................................................... 8-18
  8-6-2 HSI ........................................................ 8-19
  8-6-3 GYRO SYSTEM ............................................. 8-20
  8-6-4 MAGNETIC COMPASS ...................................... 8-20
  8-6-5 OBI ........................................................ 8-21
  8-6-6 DME ........................................................ 8-21
8-7 AVIONICS .......................................................... 8-23
  8-7-1 RADIO NAVIGATION ....................................... 8-23
  8-7-2 MARKER ANNUNCIATORS ................................ 8-27
  8-7-3 COMMUNICATION ......................................... 8-28
8-8 ELECTRICAL SYSTEM ........................................... 8-31
  8-8-1 OVERVIEW .................................................. 8-31
  8-8-2 ELECTRICAL CONTROLS AND INDICATORS .............. 8-32
8-9 FUEL SYSTEM ..................................................... 8-33
  8-9-1 FUEL QUANTITY INDICATORS .............................. 8-33
  8-9-2 FUEL SELECTOR ........................................... 8-33
  8-9-3 ELECTRIC FUEL PUMP .................................... 8-34
8-10 AUTOMATIC FLIGHT ............................................ 8-35
  8-10-1 FLIGHT DIRECTOR ....................................... 8-35
  8-10-2 AUTOPILOT ............................................... 8-36
  8-10-3 AUTOMATIC FLIGHT DISENGAGEMENT ...................... 8-38
8-11 ICE PROTECTION ................................................ 8-39
  8-11-1 PROPELLER DE-ICE ...................................... 8-39
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-11-2</td>
<td>PITOT HEAT</td>
<td>8-39</td>
</tr>
<tr>
<td>8-12</td>
<td>LIGHTS</td>
<td>8-40</td>
</tr>
<tr>
<td>8-13</td>
<td>MISCELLANEOUS INSTRUMENTS AND CONTROLS</td>
<td>8-41</td>
</tr>
<tr>
<td>8-13-1</td>
<td>ANNUNCIATOR TEST SWITCH</td>
<td>8-41</td>
</tr>
<tr>
<td>8-13-2</td>
<td>STOPWATCH</td>
<td>8-42</td>
</tr>
<tr>
<td>8-13-3</td>
<td>BUG SELECTOR SWITCH</td>
<td>8-43</td>
</tr>
</tbody>
</table>
8-1 FLIGHT CONTROLS

The flight control system consists of primary and secondary controls.

8-1-1 PRIMARY FLIGHT CONTROLS

Wheel

Turning the wheel controls roll (i.e. the simulated aircraft’s movement about the longitudinal axis).

On the wheel there are buttons for disconnecting the autopilot (red) and starting/stopping/resetting the stopwatch (black) as well the electric pitch trim switch. On the wheel’s back there is the PTT (push to talk) — the transmission switch for the communications system.

![Figure 8.1: Pilot’s wheel](image)

Stick

Moving the stick for and aft controls pitch (i.e. the simulated aircraft’s movement about the lateral axis). Pushing the stick forward lowers the simulated aircraft’s nose, pulling the wheel back raises it.
Pedals

The pedals control the simulated aircraft’s rudder and thus its yaw (movement about the vertical axis) when the aircraft is in the air. On ground the pedals control nose wheel steering. The wheel brakes are activated by pressing the upper part of the pedal with one’s toes.

![Figure 8.2: Pedals with toe brakes](image)

**8-1-2 SECONDARY FLIGHT CONTROLS**

The secondary flight controls consist of electric pitch trim and the wing flaps.

**Pitch Trim**

The electric pitch trim switch is on the wheel. Pushings both parts of the switch simultaneously forward lower’s the aircraft’s nose and vice versa.

![Figure 8.3: Electric pitch trim switch](image)
The pitch trim indicator is located under the HSI. The values range from -30 (maximum down) to +83 (maximum up).

![Pitch Trim Indicator](image)

Figure 8.4: Pitch trim indicator

**Wing Flaps**

The flaps lever is located to the right of the gear lever. There are three positions: up (0°), approach (10°) and landing (40°). The lever must be pulled before it can be moved up or down.

![Flaps Lever and Indicator](image)

Figure 8.5: Flaps lever and indicator

The flaps’ position is indicated by the annunciators to the right of the flaps lever:

- Red annunciator: Flaps in transit, i.e. lever’s position does not correspond to flap’s position.
- Blue annunciator: Flaps in position “approach”
- Amber annunciator: Flaps in position “landing”
- No annunciator: Flaps up
8-2 POWER PLANT

This chapter is not concerned with the type of engine and propeller installed on the aircraft being simulated, nor with how they function. This chapter only deals with how to actuate the controls and how to read the instruments in the trainer’s cockpit.

8-2-1 ENGINE AND PROPELLER CONTROLS

The levers for controlling power (black handle), propeller (blue handle) and mixture (red handle) are located in the flight deck’s bottom right-hand corner.

![Power Plant Controls](image)

Power  Propeller  Mixture

Figure 8.6: Power Plant Controls

Pushing the power lever forward increases the manifold pressure.

Pushing the propeller lever forward increases the desired propeller RPM.

Pushing the mixture lever forward increases the richness of the mixture (more fuel, less air).
8-2-2 ENGINE INSTRUMENTS

Manifold Pressure/Fuel Flow Indicator

This is a dual instrument.

On the left-hand side it shows the manifold pressure in inches of Mercury. The scale is graduated in increments of 1 from 10 to 35 with numerals at 10, 15, 20, 25, 30 and 35. The red radial line for maximum manifold pressure is drawn at 27 in.Hg.

On the right-hand side the instrument shows the fuel flow in US gallons per hour. The scale is graduated in increments of 2 from 2 to 32 with numerals at 2, 10, 14, 18, 22, 26 and 30. The minimum red radial line is at 2 gal/hr, the maximum red radial line at 25 gal/hr. The green arc goes from 2 to 25.

![Manifold Pressure/Fuel Flow Indicator](image)

Figure 8.7: Manifold Pressure/Fuel Flow Indicator

Tachometer

The tachometer is graduated in increments of 100 from 0 to 3000 RPM with numerals at 0, 500, 1000, 1500, 2000, 2500 and 3000. The red radial line for maximum RPM is at 2575.

![Tachometer](image)

Figure 8.8: Tachometer
Cylinder TemperatureIndicator

This instrument shows the cylinder temperature in degrees Celsius. The scale is graduated in 50-degree increments from 50 to 300 with numerals at 50, 100, 150, 200, 250 and 300. The green bar goes from 93˚ to 224˚, the yellow bar from 224˚ to 260˚ and the red bar indicating maximum temperature is at 260˚ Celsius.

![Figure 8.9: Cylinder Temperature Indicator](image)

Oil Temperature Indicator

This instrument shows the oil temperature in degrees Celsius. The scale is graduated in 30-degree increments from 0 to 140 with numerals at 40, 70, 100, and 130. The green bar goes from 40˚ to 118˚, the yellow bar (caution) goes up to 40˚ and the red bar indicating maximum temperature begins at 118˚ Celsius.

![Figure 8.10: Oil Temperature Indicator](image)
Oil Pressure Indicator

This instrument shows the oil pressure in bar. The scale is graduated in increments of 1 from 0 to 8 with numerals at each bar. The red bar for minimum is below 1.7, the lower yellow caution range goes from 1.7 to 4.1, the green bar goes from 4.1 to 6.2, the upper yellow caution range from 6.2 to 6.9 and the red bar for maximum begins at 6.9.

Figure 8.11: Oil Pressure Indicator
8-3 STARTER

The starter is located to the left of the turn indicator.

![Starter Diagram]

Figure 8.12: Starter

The switch has the following positions:

- OFF
- 1: only magneto 1 is used
- 2: only magneto 2 is used
- 1+2: both magnetos are used
- START: starts the engine

For starting the engine, put the switch on START. Once the engine is running, switch to 1+2.

NOTE: For the starter to work, the master switch must be on (and the battery working) or a ground power unit must be connected.
8-4 LANDING GEAR

8-4-1 NORMAL OPERATION

The landing gear control is located to the right of the stick.

![Landing Gear Control](image)

Figure 8.13: Landing Gear Control

The landing gear lever needs to be pulled away from the flight deck before it can be raised or lowered.

The gear cannot be retracted on ground.

**Annunciators**

The landing gear annunciators are located on the left-hand side of the landing gear lever.

The three green annunciators form a triangle. The right-hand light represents the right main gear, the left-hand light the left main gear, the top light the nose gear.

When none of the annunciators are lit, the landing gear is retracted. When three greens are lit, the landing gear is extended and locked. When the red warning light is lit, the gear is on its way up or down. The landing gear extension (or retraction) time should not exceed 7.5 seconds. If the red warning light stays lit longer, then:

- If no green light is lit, none of the gears are locked in the correct position.
- If one or two green lights are lit, only the gear(s) corresponding to the lights is (are) locked in the correct position.

**Gear Warning System**

There is a gear warning horn which will sound and the red annunciator will blink when the gear is not down and locked and

- power is set to idle
- or/and the flaps are lowered
8-4-2 EMERGENCY LANDING GEAR OPERATION

The emergency gear lever is located on the left edge of the flight deck (next to the master switch). It consists of a switch protected by a cover to prevent accidental actuation of the lever.

![Emergency Gear Control](image)

Figure 8.14: Emergency Gear Control

Before engaging the emergency gear lever, make sure your gear lever is down. Then lift the security cover and raise the switch.

NOTE: The gear cannot be raised by means of the emergency gear lever.
8-4-3 WHEEL BRAKES

Toe Brakes

The wheel brakes are activated by pressing the upper part of the pedal with one’s toes.

![Toe brakes](image)

Figure 8.15: Pedals with toe brakes

Parking Brake

The parking brake is located on the flight deck’s left hand side (to the right and above the emergency gear lever).

It is set by turning a quarter turn to the right (clock-wise) and released by turning a quarter turn to the left (anti-clockwise) - compare the markings on the flight deck.

![Parking brake switch](image)

Figure 8.16: Parking brake switch
8-5 FLIGHT INSTRUMENTS

8-5-1 AIRSPEED INDICATOR

The airspeed indicator installed for the flight model MPG1 shows the airspeed in knots. Its scale is graduated in 10-knot increments from 30 to 220. The green arc (normal operating range) goes from 70 to 150 knots. The yellow arc (caution range - smooth air only) goes from 150 to 187 knots, the white arc (flaps extended range) from 59 to 103 knots. There is one red radial at 187 knots to indicate the never exceed speed.

![Airspeed Indicator](image)

Figure 8.17: Airspeed Indicator

Three speed bugs can be set on the airspeed indicator. In order to activate the first one, put the “bug selector switch” (see below) on “SPEED BUG 1”. Then turn the rotary switch marked “ROTATE” until the bug is in the desired position. To activate the second bug, put the selector on “SPEED BUG 2”, and so on.

![Bug Selector Switch](image)

Figure 8.18: Bug selector switch
8-5-2 VERTICAL SPEED INDICATOR

The vertical speed indicator has a graduated scale above and below a zero horizontal reference, in 100-ft increments, from zero to 2000 ft/min and -2000 ft/min.

Figure 8.19: Vertical Speed Indicator

8-5-3 TURN AND BANK INDICATOR

The ball indicates sideslip (i.e. the aircraft’s longitudinal axis is not aligned with its heading), the needle indicates direction and rate of bank. If the needle is aligned with one of the white markers next to “L” or “R”, the turn is at the standard rate of 2 minutes for 360˚.

Figure 8.20: Turn and bank indicator

The annunciator light is green when the engine turns (as indicated by the tachometer) and red when the engine does not turn (engine off on the ground or propeller feathered in the air).
8-5-4 ALTIMETER

There are two altimeters installed: one on the pilot’s panel, the other on the central panel.

The altimeter’s scale is graduated from 0 to 1000 feet with increments of 20 feet. Altitude is displayed by means of three pointers. A long pointer (hundreds of feet), a short pointer (thousands of feet) and a triangle-tipped thin pointer (ten thousands of feet).

The left-hand window in the altimeter’s dial shows the air pressure in mbar, the right-hand window shows the air pressure in in.Hg. The values in the windows can be adjusted by means of the rotary switch in the instrument’s corner.

Three bugs can be set on the pilot’s altimeter. In order to activate the first one, put the “bug selector switch” (see below) on “ALTI BUG 1”. Then turn the rotary switch marked “ROTATE” until the bug is in the desired position. To activate the second bug, put the selector on “ALTI BUG 2”, and so on.

There are no bugs on the standby altimeter.
8-5-5 ATTITUDE INDICATOR

There is one attitude indicator installed.

The roll attitude index on the instrument’s frame has fixed reference marks at 0˚ (white triangle), 10 and 20˚ (short white bar), 30˚, 60˚ and 90˚ (long white bars). The white triangle at the instrument’s inside symbolizes the aircraft.

Pitch attitude marks are in 2.5-degree increments from 0 to 15 degrees. The aircraft is symbolized by either orange angles (cross-bars chosen in the Instructor Station’s “Aircraft Menu”) or an orange triangle (V-bars).

Figure 8.23: Attitude indicator in mode V-bars

Figure 8.24: Attitude indicator in mode crossbars
8-6 NAVIGATION INSTRUMENTS

8-6-1 RMI

The RMI comprises two needles (one single and one double yellow pointer) which can be set to indicate either a NDB or a VOR beacon by means of the two toggle switches to the left of the instrument.

The switch on the left-hand side will make the single needle point to a VOR or a NDB. A little arrow, located inside the instrument will show which beacon the thin needle is indicating. If the VOR display is selected, then the single needle will indicate the information received by the NAV 1.

The switch on the right-hand side will make the double needle point to a VOR or a NDB. A little arrow, located inside the instrument will show which beacon the double needle is indicating. If the VOR display is selected, then the double needle will indicate the information received by the NAV 2.
In case of a gyro failure a red flag HDG will be displayed. When no valid frequency is received, the corresponding needle points to a 3 o’clock position.

8-6-2 HSI

The HSI is located in the center of the pilot’s deck.

A HDG warning flag is displayed when the instrument is inoperative.

The NAV warning flag disappears when the NAV information is valid.

The lubber line (white line on the top part of the HSI) is a fixed reference mark for the compass card. It represents the nose of the aircraft.

The compass card indicates the aeroplane magnetic heading with reference to the lubber line.

The heading select knob positions the heading bug on the compass card. The knob shows an orange symbol representing the heading bug and is located on the right-hand side under the HSI. A digital display indicates the selected heading and is located in the upper right corner of the HSI.

The course select knob positions the course selector on the compass card. The knob shows a yellow arrow representing the course arrow and is located on the left-hand side under the HSI. A digital display indicates the selected course and is located in the upper left corner of the HSI.

The lateral deviation indicator is driven by the NAV 1 receiver and indicates VOR or localizer deviation. It indicates the deviation from the selected VOR radial, localizer beam or track with respect to aircraft location. The maximum deviation is 10˚ on each side for a VOR and 2.5˚ on each side for an ILS localizer.

The glideslope deviation indicator is driven by the the NAV 1 receiver and indicates the aircraft’s position related to the selected glideslope path. The pointer will be centered when the aircraft is on the glideslope beam, deflected up (0.5˚ maximum) when the aircraft is below, and down (0.5˚ maximum) when the aircraft is above the glideslope beam.

The TO/FROM indicator is driven by the the NAV 1 receiver and indicates whether the aircraft is flying to or from a selected VOR station. It is represented on the instrument as a white triangle pointing either in the same direction as the course arrow (moving to the beacon) or in the opposite direction (from the beacon).
8-6-3 GYRO SYSTEM

In case of a failure of the directional gyro system, the trainer is equipped with a heading correction system:

Figure 8.28: Heading correction system

In normal operation the gyro switch will be in position SLAVE. In case of a failure of the directional gyro system, setting the switches to position FREE will allow heading corrections on the HSI by means of the +/- switch.

8-6-4 MAGNETIC COMPASS

Figure 8.29: Magnetic compass

The magnetic compass is located over the radio receivers and annunciators. With the gyro in mode SLAVE, there is no deviation between the magnetic compass and the HSI. Yet when the heading is changed suddenly, there will be a small delay until the magnetic compass shows the correct indication.
8-6-5 OBI

The heading select knob positions the compass card in order to find the heading to the selected VOR beacon or to find the runway axis (selected ILS) relative to the central vertical needle.

The lateral deviation indicator is driven by the NAV 2 receiver and indicates VOR or localizer deviation.

The glideslope deviation indicator is driven by the glideslope receiver (NAV 2), and indicates the aircraft’s position relative to the selected glideslope path. The pointer will be centered when the aircraft is on the glidepath beam, deflected up when the aircraft is below, and down when the aircraft is above the glidepath beam.

The TO/FROM indicator is driven by the NAV 2 receiver and indicates whether the aircraft is flying to or from a selected VOR station. It is represented on the instrument as a white triangle pointing up or down.

The maximum deflection of the needle will be 10° on both sides in VOR mode. In ILS mode the maximum deflection of the needle will be 2.5° on both sides for the localizer indication and 0.5° for the glide.

8-6-6 DME

The DME is located between the ADF and the engine instruments.

In order to change its frequency or its mode, you first need to select the DME as your active radio (surrounded by the bright yellow rectangle). You do this by means of the frequency SELECT button (to the right of the radios). If you turn the button clockwise, the radios will be activated in
the following sequence: COM1, NAV1, NAV2, XPDR, DME, ADF, COM2. If you turn the button anti-clockwise, the yellow rectangle jumps counter-clockwise as well.

![Frequency selection buttons](image)

Figure 8.32: Frequency selection buttons

There are three working modes for the DME, which you change by pushing the button ACTIVATE (see picture above):

- The first mode displays the beacon’s frequency and the distance from it in nautical miles. This mode permits setting the frequency, which you do with the double encoder FREQ. The small rotary switch changes the digits after the decimal point, the large rotary switch changes the digits before the decimal point.

![DME display](image)

- The second mode displays the distance from the beacon in nautical miles, the calculated groundspeed in knots and the time to the beacon in minutes. The beacon in question is the one selected on the DME.

![DME display](image)

- The third mode, which can be identified by the letters RMT being displayed, gives the same information as the second mode, but the beacon is the one chosen on the NAV1.

![DME display](image)
8-7 AVIONICS

For the systems to work the avionic master needs to be ON

![Avionics Master Switch](image)

Figure 8.33: Avionics Master Switch

8-7-1 RADIO NAVIGATION

 Receivers NAV 1 and 2

The NAV 1 and 2 are located in the radio block, over the engine instruments.

![NAV 1 and 2](image)

Figure 8.34: NAV 1 and 2

Both receivers are identical and operated the same way:
First you need to select the NAV you want to use as your active radio, meaning it will be surrounded by the bright yellow rectangle. You do this by means of the frequency SELECT button (to the right of the radios). If you turn the button clockwise, the radios will be activated in the following sequence: COM1, NAV1, NAV2, XPDR, DME, ADF, COM2. If you turn the button anti-clockwise, the yellow rectangle jumps counter-clockwise as well.

![Frequency selection buttons](image)

Figure 8.35: Frequency selection buttons

Then you set the stand-by frequency by means of the double encoder FREQ. The small rotary switch sets the digits after the decimal point (0.05 MHz increment). The large button sets the digits before the decimal point.

Finally you put the stand-by frequency to in-use by pushing the button ACTIVATE.

The frequency displayed on the upper part of the digital display is in use, the frequency displayed on the lower part is on stand by.
ADF

The ADF is located in the radio block between COM2 and DME.

![ADF](image)

Figure 8.36: ADF

In order to change the ADF frequency, you first need to select the ADF as your active radio, meaning it will be surrounded by the bright yellow rectangle. You do this by means of the frequency SELECT button (to the right of the radios). If you turn the button clockwise, the radios will be activated in the following sequence: COM1, NAV1, NAV2, XPDR, DME, ADF, COM2. If you turn the button anti-clockwise, the yellow rectangle jumps counter-clockwise as well.

![FREQ SELECT ACTIVATE](image)

Figure 8.37: Frequency selection buttons

Then you set the stand-by frequency by means of the double encoder FREQ. The small rotary switch sets the digit after the decimal point and the one immediately before it (0.5 KHz increment). The large button sets the two left-hand digits (10 Khz increment).

Finally you put the stand-by frequency to in-use by pushing the button ACTIVATE.

The frequency displayed on the upper part of the digital display is in use, the frequency displayed on the lower part is on stand by.
Transponder

The transponder is located in the radio block between the NAV2 and the DME.

In order to set the squawk code, you first need to select the XPDR as your active radio (surrounded by the bright yellow rectangle). You do this by means of the frequency SELECT button (to the right of the radios). If you turn the button clockwise, the radios will be activated in the following sequence: COM1, NAV1, NAV2, XPDR, DME, ADF, COM2. If you turn the button anti-clockwise, the yellow rectangle jumps counter-clockwise as well.

Then you put the transponder on stand-by (by means of the XPDR switch right of the transponder) and set the squawk code by means of the double encoder FREQ. The small rotary switch changes the two right-hand digits, the large switch the two left-hand digits. Turning the knobs clockwise increments the numbers, turning the knobs anticlockwise decreases them.
The OFF/SBY/ON/ALT button sets the transponder to the corresponding function. When set on ON or ALT an annunciator starts blinking on the digital display. When the ident button is depressed, the annunciator stays lit for four seconds.

- **ON**: the transponder transmits the aircraft’s position.
- **ALT**: the transponder transmits the aircraft’s position and altitude.

### 8-7-2 MARKER ANNUNCIATORS

The blue annunciator will be lit when the aircraft passes over an outer marker.
The orange annunciator will be lit when the aircraft passes over a middle marker.
The white annunciator will be lit when the aircraft passes over an inner marker.
The marker’s morse code can be heard by putting the switch below the inner marker annunciator in the position MKR.
The three position test switch can be set to the following positions:

- **TEST**: lights all the annunciators
- **HIGH**: the marker signal is received a short while before and after flying over the marker
- **LOW**: the marker signal is only received when flying above the marker

![Figure 8.41: Marker annunciators](image)
8-7-3 COMMUNICATION

Communication with air traffic control needs to be simulated with the flight instructor playing the ATC’s part. For details of how Alsim’s software supports this simulation, please refer to the Instructor’s Manual.

Audio Control Panel

For the system to function the avionic master needs to be ON.

The audio control panel is located on the lower part of the radio block, on the right-hand edge of the flight deck.

![Audio control panel](image)

Figure 8.42: Audio control panel

MIC three position switch:

- Position 1: The messages are transmitted through the frequency selected on COM1.
- Position 2: The messages are transmitted through the frequency selected on COM2.
- Position off: Turns off the microphone

The two-position toggle switches in the lower row serve to choose which message or morse code is heard in the cockpit.

COM1 switch: With the switch on COM 1, the messages received on the COM 1 frequency can be heard.

COM2 switch: With the switch on COM 2, the messages received on the COM 2 frequency can be heard.

NAV1 switch: When set on NAV1 the morse code of the beacon selected on NAV1 can be heard.

NAV2 switch: When set on NAV2 the morse code of the beacon selected on NAV2 can be heard.

DME switch: When set on DME the morse code of the beacon displayed on the DME can be heard.

ADF switch: When set on ADF the morse code of the beacon selected on the ADF can be heard.
Radio COM 1 and COM 2

The COM 1 and 2 are located on the upper part of the radio block, just below the annunciators.

Both radios are identical and operated the same way:

In order to change the COM frequency, you first need to select the COM you want to use as your active radio (surrounded by the bright yellow rectangle). You do this by means of the frequency SELECT button (to the right of the radios). If you turn the button clockwise, the radios will be activated in the following sequence: COM1, NAV1, NAV2, XPDR, DME, ADF, COM2. If you turn the button anti-clockwise, the yellow rectangle jumps counter-clockwise as well.

Then you set the stand-by frequency by means of the double encoder FREQ. The small rotary switch sets the digits after the decimal point (0.25 MHz increment). The large button sets the digits before the decimal point.

Finally you put the stand-by frequency to in-use by pushing the button ACTIVATE.

The frequency displayed on the upper part of the digital display is in use, the frequency displayed on the lower part is on stand by.
In order to transmit a message, you need to:

1. Set the correct frequency on one of the COM transceivers.
2. Make sure the MIC switch is in the correct position.
3. Press the transmission button on the control wheel while speaking. A “T” will light up on the COM display when you are transmitting:

![COM Display Image]
8-8 ELECTRICAL SYSTEM

8-8-1 OVERVIEW

The diagram below shows the simulated aircraft’s electrical system with breakers.

Connection of a ground power unit can be simulated by means of the instructor station (Aircraft Window).
8-8-2 ELECTRICAL CONTROLS AND INDICATORS

The battery and alternator are each controlled by one switch. These switches are located on the flight deck’s left-hand side - next to the emergency gear lever.

![Electrical switches](image)

Figure 8.46: Electrical switches

The master switch controls only the battery.
The switch ALT controls the alternator.
When the alternator is not working, a red annunciator will illuminate above the radios:

![Alternator annunciator](image)

Figure 8.47: Alternator annunciator

With the alternator out, the battery’s charge will be depleted after approximately 15 minutes.
Battery charge is indicated by a voltmeter (under the DME):

![Voltmeter](image)

Figure 8.48: Voltmeter
8-9 FUEL SYSTEM

In the AL50 the fuel system consists of the left and right tank, fuel gauges for both tanks, the fuel selector switch and the electric fuel pump switch.

The fuel tanks are filled by means of the instructor station’s “Aircraft Window”. You can find the maximum amount in the chapter “Limitations” in this manual.

8-9-1 FUEL QUANTITY INDICATORS

The fuel gauges consist of a green column (from under one quarter full to full) and a red column for reserve. The white line with the two rhombi shows the amount of fuel in the tank. The left-hand gauge indicates fuel in the left tank, the right-hand gauge is for the right tank.

Figure 8.49: Fuel Gauge

8-9-2 FUEL SELECTOR

The fuel selector is a switch with three positions: LEFT, CLOSE and RIGHT.

Figure 8.50: Fuel Selectors
8-9-3 ELECTRIC FUEL PUMP

On the left-hand lower edge of the flight deck, between the avionics master switch and the de-ice switches, there is a switch marked FUEL PUMP. This two-position toggle switch controls the electric fuel pump.

![Electric Fuel Pump](image)

Figure 8.51: Electric Fuel Pump

When the electric fuel pump is working, the corresponding annunciator will illuminate above the radios:

![Fuel Pump Annunciator](image)

Figure 8.52: Fuel pump annunciator
8-10 AUTOMATIC FLIGHT

The autopilot is a 3-axis system with flight director and yaw damper. The flight director can be active without the autopilot.

8-10-1 FLIGHT DIRECTOR

The flight director is engaged by means of the push button on the autopilot control panel situated on the flight deck’s right-hand side:

![Autopilot control panel](image)

The flight director offers visual information on the attitude indicator, which helps the pilot to guide the aircraft.

The flight director’s guidance bars can be displayed either as a cross or as an inverted V. Which mode is active depends on the setting in the instructor station’s “Aircraft Window”.

![Flight director in mode V-bars](image)

![Flight director in mode cross-bars](image)
8-10-2 AUTOPILOT

Autopilot Control Panel

The autopilot control panel is situated on the flight deck’s right-hand side:

![Autopilot Control Panel Diagram]

Figure 8.56: Autopilot control panel

It consists of the following elements:

- Switch DOWN/UP for the autopilot’s pitch trim: This switch allows you to change the aircraft’s pitch attitude with the autopilot engaged. If the autopilot is in altitude maintain (ALT) mode, you need to disengage this mode before using the trim switch.
- Push buttons for setting the autopilot’s modes — see next section.

Autopilot Modes

When one of the modes is being engaged, an aural signal will sound. When a mode is active there will be an indicator above the attitude indicator.

![Autopilot Indications]

Figure 8.57: Autopilot indications

The following modes are available:
Chapter 8. OPERATION OF THE SIMULATED AIRCRAFT’S SYSTEMS

AL50/MPG1(TB20)

8-10. AUTOMATIC FLIGHT

• FD: This button activates the flight director (FD).

• AP: This button activates the autopilot (AP) as well as FD. If no other mode is engaged, the AP will maintain the current pitch attitude and the wings level.

• HDG: In heading select mode the autopilot searches and follows the heading set with the orange heading bug on the HSI. To use heading select mode, set the heading bug to the desired heading, then engage AP (if not yet active) and HDG. You can also set the bug with the AP engaged.

• ALT: In altitude maintain mode the autopilot keeps the aircraft on its current altitude. To use it, bring the aircraft manually (or, if AP engaged, by means of the pitch trim switch) to the desired altitude, then activate AP (if not yet the case) and ALT. The autopilot will maintain the altitude at which the aircraft is when ALT mode is engaged.

• APPR: In approach mode the autopilot follows an ILS’s localizer and glideslope. Use it as follows:
  1. Set the aircraft on a course that intercepts localizer and glideslope.
  2. Set the ILS frequency on NAV1.
  3. Activate AP and APPR. APPR ARMED will illuminate while the aircraft is not on the ILS.
  4. When the localizer has been captured, HDG SEL will disengage (if engaged before), APPR ARMED will disappear and APPR CPLD will illuminate.
  5. When the glideslope has been captured, ALT will disengage (if engaged before), GS CPLD will illuminate.
  6. Disconnect the autopilot at 200 feet AGL.

• VS: This mode maintains the vertical speed which you have set either manually or by means of the autopilot’s pitch trim switch. The autopilot will maintain the vertical speed at which the aircraft is when VS mode is engaged.

• NAV: In NAV mode the autopilot follows a VOR signal. Use it as follows:
  1. Set the VOR frequency on NAV1.
  2. Search the VOR by means of the course pointer on the HSI and set the heading bug in the desired position.
  3. Engage the AP, mode HDG and NAV. NAV ARM will illuminate.
  4. When the VOR signal has been captured, HDG disengages (if engaged before), NAV ARM will disappear and NAV CPLD illuminate.

• IAS: In IAS mode the autopilot maintains the aircraft’s current speed (the aircraft’s speed at the moment of IAS mode engagement).

When one of the modes is being engaged, an aural signal will sound.
8-10.3 AUTOMATIC FLIGHT DISSCENGAGEMENT

There is an autopilot disconnect button on the control wheel:

Pushing the disconnect button the first time disconnects the autopilot, pushing it a second time will disconnect the flight director as well.

Pushing the electric pitch trim switches will also disconnect the autopilot, but leave the flight director engaged.

Pushing FD on the autopilot control panel disconnects autopilot and flight director.

Pushing AP on the autopilot control panel disconnects the autopilot, leaving the flight director engaged.

Whenever the autopilot disconnect button is pushed, an aural warning will sound.

Figure 8.58: Autopilot disconnet button on the wheel
8-11 ICE PROTECTION

The following ice protection systems are installed on the A05G11:

- Propeller de-ice
- Pitot heat

Figure 8.59: Propeller de-ice and pitot heat switches

8-11-1 PROPELLER DE-ICE

The Propeller de-ice can be used for the check-lists but will not have any effects.

8-11-2 PITOT HEAT

When pitot heat is on, an annunciator will illuminate above the radios, but there will be no other effect.

Figure 8.60: Pitot heat annunciator
8-12 LIGHTS

The following light switches are installed on the A05G11 as two-position toggle switches:

- Strobe lights
- Position lights (beacon)
- Navigation lights
- Landing lights
- Taxi lights

![Figure 8.61: Light switches](image)

Switching on the landing lights will illuminate a green annunciator above the radios:

![Figure 8.62: Landing lights annunciator](image)

For the taxi lights there is an annunciator as well:

![Figure 8.63: Taxi lights annunciator](image)

As there are no actual lights installed on the simulator’s outside, there are no other effects.
8-13 MISCELLANEOUS INSTRUMENTS AND CONTROLS

8-13-1 ANNUNCIATOR TEST SWITCH

In the upper left-hand corner of the flight deck there is a two-position toggle switch for testing the annunciators:

![ ANNUNCIATOR TEST Switch Image ]

Figure 8.64: Annunciator test switch

Putting the switch in position TEST will illuminate the following annunciators:

- Autopilot indications
- Annunciators above the radios
- Marker beacon lights
- Flaps annunciators
- Landing gear annunciators
8-13-2 STOPWATCH

The digital stopwatch is located above the HSI.

![Digital stopwatch on instrument panel](image)

You control the stopwatch by pressing the button on the wheel (see picture below)

- once to start the stopwatch
- a second time to stop the stopwatch
- a third time to reset the stopwatch to zero

![Stopwatch start/stop/reset button on pilot’s wheel](image)
8-13-3 BUG SELECTOR SWITCH

Most positions of the bug selector switch have been described in the connection with the instruments on which the bugs can be set.

The following positions do not have any function:

- CHRONO BUG
- TIME

Figure 8.67: Functions not implemented on the bug selector switch
9 Failure Reports and Modification Requests

The failure report is to be filled in whenever there is a technical problem (hard- or software) with the trainer.

The modification request is to be filled in when you would like Alsim to change something about the trainer (for example, add a region to the instructor station’s database), even though the trainer is working correctly at the moment.
## COMPTE RENDU MATERIEL
### FAILURE REPORT

<table>
<thead>
<tr>
<th>Nom de l'opérateur</th>
<th>A05G11-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer’s name</td>
<td></td>
</tr>
</tbody>
</table>

**Give the failure report and identification number** (trainer’s serial number + sequential number)

<table>
<thead>
<tr>
<th>Date - Heure</th>
<th>No. de série</th>
<th>FNPT Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date - Time</td>
<td>FNPT serial number</td>
<td>Qualification type</td>
</tr>
<tr>
<td></td>
<td>A05G11</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Observation/description de l'anomalie</th>
<th>Réponse d’Alsim</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation/Description of Anomaly</td>
<td>Alsim’s Response</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nom et signature/Name and signature</th>
<th>Nom et signature/Name and signature</th>
</tr>
</thead>
</table>

**Principe des CRM**

- Essayer d’être le plus précis et le plus exhaustif possible dans la description de l’anomalie.
- Faire une fiche par anomalie constatée et seulement pour les anomalies.
- Donner un numéro d’identification à l’anomalie.
- Faxer à Alsim au numéro suivant : 02 51 71 98 06.

**How to fill in the document**

- Try to be as accurate as possible.
- Only one anomaly per page.
- Give an identification number to the failure report.
- Fax to Alsim: 00 33 2 51 71 98 06

19/1/2007 9-2
### DEMANDE DE MODIFICATION
MODIFICATION REQUEST

<table>
<thead>
<tr>
<th>Nom de l’opérateur</th>
<th>Customer’s name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numéro d’identification</td>
<td>Identification number</td>
</tr>
<tr>
<td></td>
<td>A05G11-</td>
</tr>
</tbody>
</table>

*Give the modification request an identification number (trainer’s serial number + sequential number)*

<table>
<thead>
<tr>
<th>Date - Heure</th>
<th>No. de série</th>
<th>FNPT Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date - Time</td>
<td>FNPT serial number</td>
<td>Qualification type</td>
</tr>
<tr>
<td></td>
<td>A05G11</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Observation/description de l’anomalie</th>
<th>Réponse d’Alsim</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation/Description of Anomaly</td>
<td>Alsim’s Response</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nom et signature/Name and signature</th>
<th>Nom et signature/Name and signature</th>
</tr>
</thead>
</table>

### Principe des demandes de modification

- Essayez d’être le plus précis et le plus exhaustif possible dans votre demande de modification.
- Faire une fiche par demande de modification.
- Donner un numéro d’identification à la demande de modification.
- Faxer à Alsim au numéro suivant: 02 51 71 98 06.

*How to fill in the document*

- Try to be as accurate as possible.
- Only one anomaly per page.
- Give an identification number to the modification request.
- Fax to Alsim: 00 33 2 51 71 98 06