LOCKHEED
MODEL 188A
Electra

Cockpit Manual

Version 5.0 February 2010

For use with J.R. Lucariny's Electra model for Flight Simulator 2004,

by Fraser McKay

Weather Radar requires a registered copy of Peter Dowson's FSUIPC.

Please use the aircraft configuration and air. files supplied with the panel package. These provide my interpretation of the aircraft's characteristics and enable certain systems to function correctly, which those provided with the original model may not.

NOTE

The Allison 501-D13 engine and its propeller are primarily controlled through a single lever, referred to as the power lever. In the simulator, both propeller pitch and fuel mixture are automatically controlled, therefore joystick/game controller pitch and mixture controls should be left in the fully forward position.

CONTENTS

0. INSTALLATION

THIS IS A COMPLETE ELECTRA PACKAGE, THEREFORE:

If you already have J.R. Lucariny's Electra model (or any other Electra for that matter) on your system, remove that file from your FS9 Aircraft folder and place it somewhere convenient, like the Desktop, as you will need it again later.

Unzip the downloaded FML188A.zip file to a convenient location (if you are reading this you must have already done that); the Desktop is ideal.

The contents of the unzipped file are thus:

FML188AP Self Installer

README file and various jpegs.

MANUAL in Word and PDF formats.

Run the FML188AP Self Installer; note that the default installation path is:

C:\Program Files\Microsoft Games\Flight Simulator 9

You may need to edit this if the location of your Flight Simulator 9 folder is different.

Start FS9 and look for the Lockheed Electra on the aircraft menu. It will appear in one of four liveries, that of Lockheed c/n 1002, Air Bridge Carriers, Fred. Olsen Air Transport and Shillelaghs Travel Club. Select the aircraft and start FS9. You will now be sitting in a nice new Electra cockpit with Allison sounds audible. Allow the engines to spool up to low RPM of around 10300 and the No4 generator to come on line.

Now is the time to read the rest of this manual. The manual is available in text only format on the aircraft kneeboard.

Adding New or Existing Textures.

The make up of each texture entry in the new aircraft.cfg file is thus:

[fltsim.3]
title=LOCKHEED ELECTRA II 1002
sim=L188A_ElectraII
model=
panel=
sound=
texture=1002
kb_checklists=
kb_reference=L188A_REF
prop_anim_ratio=3.0
description=LOCKHEED L-188 ELECTRA II
ui_manufacturer=LOCKHEED
ui_type=L-188 ELECTRA II
ui_variation=2 C/N 1002
atc_heavy=0
atc_id=N1882
atc_airline=LOCKHEED
atc_flight_number=882
ATC_PARKING_CODES=

Any new textures you download may be added in the usual way. Many painters provide an aircraft.cfg entry to add to your existing aircraft.cfg. When doing this, ensure that the [fltsim.X] line is numbered the next sequential number in the list; Adding to the above example would be [fltsim.4] and so on.

Also ensure that the sim= line is edited to sim=L188A_ElectraII

The kb_reference= line should be edited to kb_reference=L188A_REF

You can add textures which were installed previously in the same way by copying the relevant entries from the original aircraft.cfg you moved out of FS9 back to the new aircraft.cfg and amending the lines quoted above. Make sure you move the desired texture folders over as well.

CREDITS

MODEL by J.R. Lucariny.
PANEL and flight dynamics by Fraser McKay.
SOUNDS by W.C. Shultz, Victor Merculief and Ryuji Ozawa, sound cfg. adjusted for this configuration by Fraser McKay.
TEXTURES Air Bridge, Fred. Olsen and Shillelaghs repaints by Fraser McKay.
XML SOUND GAUGE by Doug Dawson.
TRAFFIC RADAR GAUGE by Arne Bertels.

1. FLIGHT INSTRUMENTS

1. AIRSPEED INDICATOR.
Calibrated from 50-350kt IAS, the instrument has two pointers, the white indicating airspeed and the striped indicating maximum operating speed for a given flight situation. This is 325kt up to 12000ft, thereafter Mach 0.6.

The speed bugs are set by default at VR, V2 and 140kt which is the flap retraction speed. Clicking the face of the instrument resets the bugs to show the threshold reference speed.

2. RADIO MAGNETIC INDICATOR.
The RMI consists of two pointers superimposed over a rotating compass rose, which is aligned with the main compass unit and indicates current heading at the top datum. The single pointer, in conjunction with the left hand knob can be selected to display bearing information for either VOR1 or ADF1. The dual pointer shows either VOR2 or ADF2 relative to the right hand knob selection.

3. TURN AND BANK INDICATOR.
Electrically powered turn pointer and balance ball

4. APPROACH HORIZON.

The approach horizon combines attitude information with steering and pitch commands. When the right hand knob is in the HEADING position (shown), the vertical steering pointer shows bank commands relative to heading index/actual heading displacement on the Course Indicator positioned immediately below. With the knob set to the ILS position, the steering pointer shows bank commands relative to localiser displacement.

The left hand knob allows selection of desired pitch on the pitch pointer on the left of the instrument, provided the steering knob is not in the ILS position, in which case it will show glide path deviation.
Two red flags show GS and LOC when the appropriate signals are not received or are invalid. Additionally two red flags at the bottom of the instrument show GYRO and/or STEERING should those parts of the system fail.

5. COURSE INDICATOR.

The course indicator consists of a compass rose, heading index and course pointer, with associated beam bar. The left knob rotates the heading index, the right knob the course pointer. Clicking the face of the instrument, or using the Nav Select switch on the radio panel, selects either Nav1 or Nav2 information to the Course Indicator. Note that when the autopilot is in LOC/VOR or GS Engage mode, only Nav1 can be selected.
A red COMPASS flag will show at the bottom of the instrument in the event of power failure.

6. SERVO ALTIMETER.

The Servo Altimeter has a single pointer indicating hundreds of feet and a drum display indicating thousands of feet. The knob is used to set the pressure datum on the subscale. Clicking the subscale allows selection of millibars or in. hg. A striped flag covers the window if the instrument is not powered.

7. VERTICAL SPEED INDICATOR.

Pressure operated.

8. DISTANCE MEASURING EQUIPMENT (DME).

Two counter displays, the top shows Nav1 DME, the bottom Nav2 DME.

9. RADIO ALTIMETER.

The radio altimeter is calibrated from 0 to 2500 feet radio height, the pointer being hidden behind a mask above this height. The knob allows decision height selection, displayed on the yellow pointer rotating around the edge of the scale. The amber light illuminates as when the selected height is reached and will remain on. An aural MINIMUM warning is also triggered as the decision height is reached.

10. AUTOPILOT TRIM INDICATOR.

Pointers show the relative positions of the trim controls for the rudder, aileron and elevator. Trim may be applied by clicking on the respective areas.

11. CLOCK.

12. MARKER BEACON LIGHTS.

Top white, AIRWAYS, centre amber, MIDDLE, bottom blue, OUTER.

13. GROUND PROXIMITY WARNING SYSTEM (GPWS).

The GPWS provides visual and aural warning of a potentially hazardous flight condition relative to terrain closure;

Excessive rate of descent with respect to terrain clearance.

Excessive radio altimeter rate of closure with terrain.

Height loss after take off or overshoot.

Flight into terrain when not in the landing configuration.

Excessive glidepath deviation.

A flashing red PULL UP warning annunciator will be activated by the above scenarios, together with a PULL UP or GLIDESLOPE aural warning. The Glideslope channel may be isolated by operation of the guarded switch labelled G/S, and the adjacent annunciator will show G/S INHIB. The entire system may be isolated using the guarded GPWS switch, when the amber GPWS FAIL annunciator will light. This lamp will also light when there is no power to the system.

14. LANDING GEAR LEVER.

The Landing Gear lever has four positions; UP, NEUTRAL, DOWN and EMERG. DOWN. The lever should be in the down position during all ground operations.

15. ELEVATOR TRIM WHEEL.

16. WEATHER RADAR SCREEN.

The radar will display AI traffic provided a registered copy of Peter Dowson's FSUIPC is installed first. The left knob adjusts brightness the right adjusts range up to 60 nm. For reasons known only to itself, the radar stops refreshing periodically, this can be overcome by toggling between windowed and full screen modes.

17. EMERGENCY BRAKE HANDLE.

Clicking on the Emergency Brake handle actually operates the parking brake. The handle will deliberately stay fixed.

18. PANEL SUB WINDOWS MENU.

In addition to the main panel, there are a further fourteen sub windows displaying the various other parts of the cockpit. The menu located beneath the coaming hood lists the various panels and clicking the left side of each caption will open its respective window. The menu may be clicked again to close any window, or a cross area on each panel may be clicked to perform the same function.

There are two variations in instrumentation; that fitted with the Collins Integrated Director System described above and an alternative arrangement fitted with the Collins Integrated Flight System. In the aircraft cfg, those entries which have the line:

Panel =

will have the IDS arrangement, those which have the panel line

Panel =IFS

will have the IFS arrangement. You can edit the aircraft cfg entries as desired.

The integrated flight system is programmed such that it may be used in manual or automatic flight, independent of the auto-pilot.

1. FLIGHT DIRECTOR INDICATOR.
The attitude information is powered by the Essential Bus or Emergency Inverter. A red GYRO flag appears in the bottom left of the instrument when it is not powered. The flight director V command bars, localiser displacement and glide slope deviation pointers are supplied by Priority Bus A. A red COMPUTER flag appears when the inputs are invalid.

2. FIXED AIRCRAFT DATUM.

3. BANK ANGLE POINTER.

4. PITCH SCALE.

5. FLIGHT DIRECTOR V COMMAND BARS.

Visible when the Mode Switch (9) is not in the GYRO/OFF position. Flight director pitch and bank commands are followed by flying the aircraft so that the fixed datum is kept aligned with the V command bars.

6. GLIDE SLOPE SCALE.

Obscured by a red flag when glide slope signals are invalid.

7. LOCALISER DISPLACEMENT SCALE & POINTER.

Full scale deflection is equivalent to one dot displacement on the course indicator. The pointer and scale are obscured from view if glide slope signal is invalid.

8. PITCH TRIM KNOB.

The knob can be used to adjust the desired pitch commands between 15' up and 5' down.

9. FLIGHT DIRECTOR MODE KNOB.

Allows selection of Heading, VOR or Localiser and ILS information to the flight director.

10. BALANCE BALL.

11. COURSE INDICATOR.

12. FIXED HEADING DATUM.

Beneath the fixed datum is a shutter covering a red COMPASS flag. The shutter will reveal the flag when the input the compass card is at fault.

13 & 13A. HEADING INDEX AND ADJUSTMENT KNOB.

14 & 14A. COURSE POINTER AND ADJUSTMENT KNOB.

15. COURSE SETTING WINDOW.

16. RADIAL DISPLACEMENT SCALE AND BEAM BAR.

A red VOR/LOC flag appears on the right of the instrument when there is no input to the beam bar.

17. GLIDE SLOPE SCALE AND POINTER

Obscured by a red flag when glide slope signals are invalid.

18. DME DISPLAY.

Shows the DME readout for whichever facility is selected to the flight system. The opposite radio, if tuned, will display DME information on the adjacent independent display.

2. ENGINE CONTROLS AND INSTRUMENTS.

The Allison 501-D13 is a constant speed axial flow turbine engine, driving a 13 feet, 6 inch diameter propeller though a two stage reduction gear. Fourteenth stage compressor bleed air valves are provided for anti-icing and starting.

The Power Levers have Start, Ground Idle, Flight Idle and Takeoff detents. During ground operation, the power lever controls both fuel flow and propeller pitch. RPM Selector Switches enable both Normal and Low taxi RPM to be selected. In the Low position, the engine will operate at 9900-10300 RPM. When the switches are moved to Norm, the idling RPM will accelerate to 13150-13750. As a safety feature, the switches will automatically trip to Norm when the power levers are moved beyond the ground, or Beta range.

During flight, the power lever affects fuel flow only, the propeller governor maintaining constant engine speed. In flight, once the power lever has been

positioned above approximately 60 % travel, the fuel control system will maintain selected Turbine Inlet Temperature (TIT) automatically.

The TIT is the primary datum for selecting engine power, provided in doing so limitations on maximum shaft horsepower are not exceeded.

1. TURBINE INLET TEMPERATURE GAUGES.

The presentation of the TIT gauge is in the form of a pointer against a scale from 0-1200 'C. Additionally an electronic display shows the precise TIT. The gauges are normally powered by the Essential Bus, or in an emergency or when the Essential Bus is not powered, by the standby inverter. The inverter is normally set to Emerg. before take off and landing.

MAX TAKEOFF……………………………………….971'C
MAX CONTINUOUS…………………………………895'C
MAX CRUISE……………………………………………847'C

2. SHAFT HORSEPOWER GAUGES.

Four LCD shaft horsepower gauges show the power output from the engines in both digital and pictorial form. These gauges may be substituted for the original analogue type by editing the gauge names in the panel cfg. from No1_HP_LCD to No1_HP and so on for each gauge.

MAX TAKEOFF…………………………………….4000 HP
MAX CONTINUOUS………………………………3400 HP
MAX CRUISE……………………………………….3200 HP

Note that the SHP reading is affected by ambient conditions, a minimum of 1500 SHP is required when the power levers are set to takeoff.

3. ENGINE RPM GAUGES

Engine RPM is displayed on dual pointer gauges, the inner displays 1000s of RPM, the outer 100s of RPM. The system is self contained, requiring no electrical power.

4. FUEL FLOW GAUGES.

Calibrated in hundreds of pounds per hour.

5. REDUCTION GEAR OIL PRESSURE

Calibrated in pounds per square inch.

6. ENGINE OIL PRESSURE.

Calibrated in pounds per square inch.

7. ENGINE OIL TEMPERATURE

Calibrated in degrees Celsius.

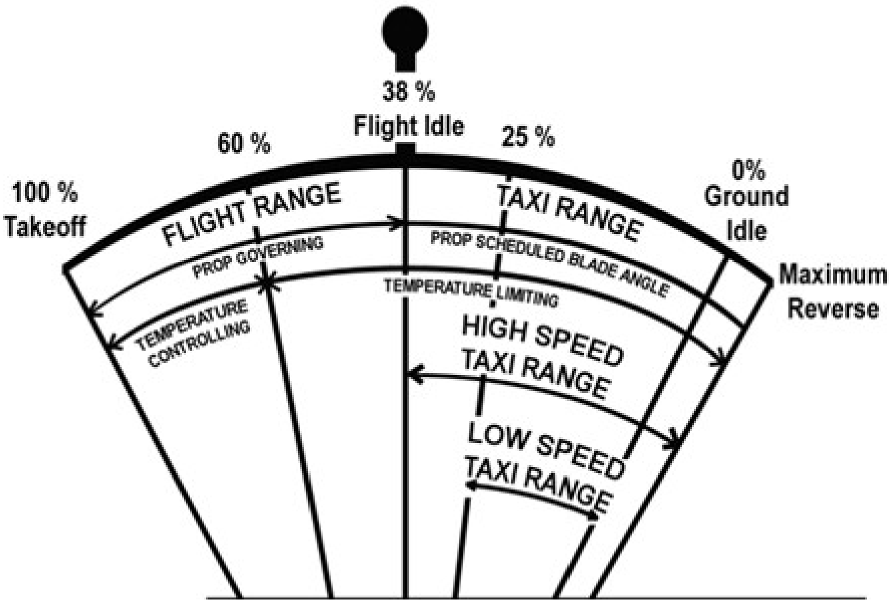
8. OIL COOLER FLAP POSITION.

Calibrated in percentage open.

Note that the secondary engine instruments pertaining to the oil system can be substituted for the primary engine instruments by clicking on any of the faces of the former.

9. POWER LEVERS.

The power levers may be advanced or retarded individually by way of the mouse wheel. Each is tooltipped in percentage of total travel. The Flight Idle position equates to approximately 38% of the lever travel and the lever cannot be retarded below this position in flight. Should the NTS lights flicker at the Flight Idle position, advance the levers slightly. A more convenient way to adjust individual levers is by selecting the desired engines on the selector below the oil quantity gauges, thereafter adjusting with the keyboard or joystick controller. Reverse is selected by holding the F2 key down, although disc braking from the propellers generally renders this superfluous.



10. RPM SELECTOR SWITCHES.

These solenoid held switches enable the selection of Normal or Low Idle RPM. The switches must be in the Low position for starting, and are set to Normal before entering the runway. The Solenoid function will trip the switches to Normal should they be inadvertently left in the Low position when the power levers are opened for takeoff. The switches are returned to Low once the runway has been vacated after landing. Note that when the switches are returned to Low, No4 should be operated first to maintain AC power integrity. (See ELECTRICAL). Ensure the Emergency Shutdown Handle is covered before operating the switches as a considerable TIT surge normally follows selection.

11. NEGATIVE TORQUE SYSTEM (NTS) LIGHTS.

Four green annunciator lights, one for each engine are on the lower panel behind the power levers, and illuminate when the NTS operates. This system senses negative torque and coarsens the propeller toward the feathered position. The lights may flicker at the Flight Idle setting. Additionally it is normal for them to come on as the engines are moved back to Low RPM.

12. BETA WARNING LIGHTS.

The four annunciators, captioned BETA, light when the power lever, and propeller are in the beta or ground range.

13. FIRE WARNING LIGHTS

The Engine Fire Warning Lights are located on the glareshield panel and as backlit in two sections per engine; ZONE1 and ZONES 2 & 3. Test switches on the overhead propeller panel can be operated to test the filaments and aural bell warning.

14. EMERGENCY SHUTDOWN HANDLES.

Operation of the Emergency Shutdown Handle closes the engine fuel control shutoff, feathers the propeller, closes the engine oil shutoff valve, arms the engine fire extinguisher, closes bleed air shutoff and shuts off fuel at the firewall. If an airstart is subsequently attempted, the handle must first be pushed back in to the normal position.

15. FEATHERING AND AIRSTARTING BUTTONS.

Manual feathering buttons are located on the forward overhead panel and have three positions; PUSH TO FEATHER – PULL TO AIRSTART – RELEASE TO RUN.

16. AUTOFEATHER SYSTEM.

The controls for the Autofeather System are adjacent to the Autopilot panel in the same window. The switch is set to ARM before takeoff and the annunciators will light. Apply power smoothly though 1500 SHP then increase to takeoff. If the power levers are too far forward before sufficient SHP has been developed the propeller will autofeather. The system is disarmed after takeoff by returning the switch to OFF

17. SYNCHRONISER.

The synchronising control is adjacent to the autofeather switch. Select either engine 2 or engine 3 as the master to which the remainder will be synchronised.

18. ENGINE STARTING.

The engines are started using a compressed air supply of at least 50psi. The first engine takes the supply from a ground Gas Turbine Compressor starter.
The starting controls are grouped in the centre of the overhead panel.

19. GAS TURBINE COMPRESSOR START SWITCH.

Connects the external air supply. This switch must be ON and the aircraft stationary to start the first engine on the ground. Disconnect once two engines are running, one of which should be running at Normal RPM (13150-13750).

20. BLEED AIR MANIFOLD PRESSURE GAUGE.
A minimum of 50 PSI must be registered on the gauge before start.

21. BLEED AIR VALVE SWITCHES AND ANNUNCIATORS.
Switches and annunciators must all be open for engine starting and bleed air airfoil anti-icing. This opens the 14th stage compressor valves.

22. FUEL AND IGNITION CUTOFF SWITCHES.
Four guarded switches, switch OFF to shutdown engine normally. All switches must be ON before start.

23. ENGINE START SELECTOR.
Select desired engine to be started.

Note: The normal starting order is 4, 1, 2, 3.

24. STARTER BUTTON.
Push to commence start cycle, pull out to stop start cycle.

25. STARTER OVERSPEED ANNUNCIATOR.
This light may come on momentarily as the start cycle disengages.

26. PRIMER.
Used in conjunction with the Engine Start Selector to provide additional fuel for starting. Do not prime at indicated TITs greater than 200'C.

27. PRIMARY FUEL PUMP FAILURE ANNUNCIATORS.
Indicate failure of the engine driven fuel pumps. The lights normally glow during start.

See onboard checklist for full starting procedure.

3. ELECTRICAL SYSTEM

The controls for the electrical system are on the right hand side of the overhead panel.

AC SYSTEM

AC power is provided by four engine driven 60 KVA 3 phase AC generators through a system of four bus bars; PRIORITY BUS A, PRIORITY BUS B, UTILITY BUS C and the ESSENTIAL BUS. The busses are normally powered thus:

PRIORITY BUS A…………….GENERATOR NO3
PRIORITY BUS B…………….GENERATOR NO2
UTILITY BUS C……………….GENERATOR NO1
ESSENTIAL BUS…………….GENERATOR NO3

Services supplied by the various busses are placarded at the top of the panel.

Generator No4 is normally on standby. In case of generator failure, loads are automatically transferred to the remaining generators and generator No4 is brought into service.

During ground operations, with the engines operating at normal RPM, conditions are the same as in flight. In low RPM, generators Nos 1,2 and 3 are not capable of providing sufficient output, are taken off line. Generator No4 is driven through a two speed gearbox which permits it to be driven at both normal and low RPM. Under these conditions, power will be supplied to all busses by generator No4. When reducing engine speeds to LOW, select No4 first, while the remaining engines are at NORMAL RPM. When increasing speed to NORMAL, select engines 1, 2 and 3 while No4 is at LOW, then increase No4 to NORMAL.

INVERTER

Emergency AC power is provided by a 250VA single phase inverter. This 115V 400cps inverter operates from battery power when no power is available from the AC Essential Bus. Its primary purpose is to supply AC power for starting when external power is not available. The inverter supplies power for the TIT gauges and the oil cooler doors when the switch is at START. With the switch in the EMERG position, power is additionally supplied to the vertical gyro, gyro horizon and turn & bank instruments.

DC SYSTEM

DC power is supplied by two transformer rectifiers (TR). TR No2 is supplied by Priority Bus A, TR No1 from Priority Bus A via the Essential Bus. Either is capable of supplying the full DC requirement. If neither TR is operating, DC power is automatically supplied by the battery provided both switches are ON.

1. GENERATOR CONTROL SWITCHES.
Four TEST/OFF/ON switches are the primary controls for the individual AC generators.

2. GENERATOR TRIPPED ANNUNCIATORS.

3. BATTERY EMERG DISCONNECT SWITCH. 3a BATTERY SELECTOR SWITCH.
The battery emergency disconnect switch is wired in series with the battery selector switch, if either is off the battery is isolated. When the battery selector switch is at ON, the battery is connected to the Essential DC Bus and the Ground Operation DC Bus. With the switch at GROUND, only the Ground Operation Bus is connected.

4. GENERATOR DISENGAGE SWITCHES.
Disconnects the generator from the engine drive.

5. GENERATOR DISENGAGED ANNUNCIATORS.

6. GENERATOR AMMETERS.
Ammeter for generators No1, 2 & 3. No4 indicates generator current when it is supplying power. This ammeter also displays current supplied by an external source.

7. AC VOLTMETER.

8. BUS INDICATOR ANNUNCIATORS.
These lights identify the busses being supplied by each generator.

9. AC VOLTMETER SELECTOR SWITCH.

10. TRANSFORMER RECTIFIER CONTROL SWITCHES.

11/12. DC VOLTMETER AND SELECTOR SWITCH.

13/14. DC AMMETER AND SELECTOR SWITCH.

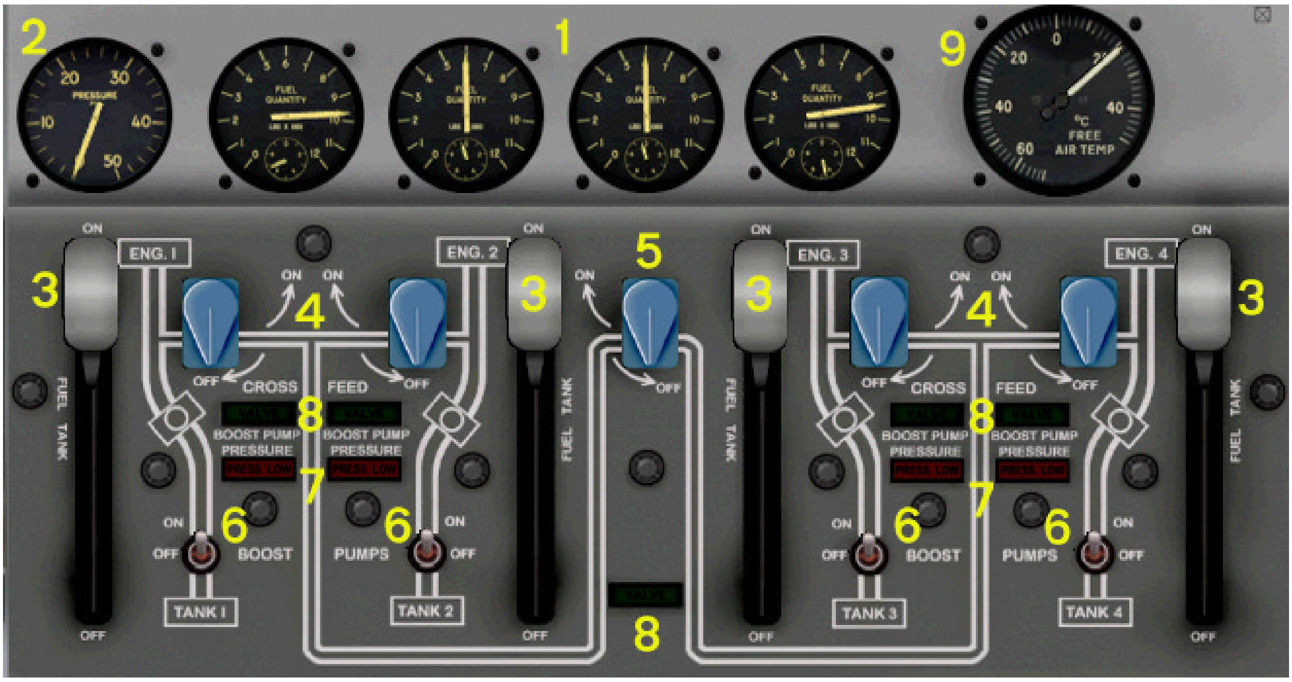
15. INVERTER CONTROL SWITCH.
Three position switch; EMERG, NORM, START. The switch should be placed to START prior to starting engines. After start, EMERG is selected until after takeoff, when the switch is returned to NORM. Select EMERG again during the approach for landing.

16. EXTERNAL POWER SWITCH AND ANNUNCIATOR.
Annunciator shows CONN when the external unit is connected and POWER when it is supplying the busses. Disconnect after the first two engines have been started provided one is No4.

4. FUEL SYSTEM (L188A)

The controls pertaining to the fuel system are on the forward pedestal.

Fuel is supplied to the engines from four integral wing tanks. The system incorporates an independent tank-to-engine fuel system for each engine as well as a cross-feed system to that any tank may supply any engine or engines by way of a cross-feed manifold. Note that the fuel system will not work correctly unless the aircraft cfg. file provided is used.



1. FUEL CONTENTS GAUGES.
There are four fuel contents gauges, one per tank, calibrated in thousands of pounds. The sub-dial shows hundreds of pounds.

2. MANIFOLD FUEL PRESSURE GAUGE.
Used to check fuel pressure when cross-feeding from tanks.

3. FUEL TANK SHUTOFF VALVES.
The four fuel tank shutoff valves are used to isolate individual tanks when cross-feeding is taking place. If any particular shutoff valve is ON, then the engine corresponding to that tank can only receive fuel from that tank, irrespective of cross-feed valve position.

4. ENGINE CROSS-FEED VALVES.
There are four engine cross-feed valves which, when opened connect engines and their associated tanks to the distribution manifold.

5. MAIN CROSS-FEED VALVE.
Connects the manifolds on each side of the aircraft.

6. FUEL BOOST PUMP SWITCH.
Each tank has an electrical boost pump fitted, in addition to the mechanical engine driven pumps.

7. BOOST PUMP LOW PRESSURE ANNUNCIATORS.

Four annunciator lights show low pressure across the electrical booster pumps. Additionally a LOW FUEL PRESS annunciator is on the Central Warning Panel.

8. VALVE POSITION ANNUNCIATORS.

The annunciator light will show whenever a valve is away from the position selected by the cross-feed valve switches. Illumination during selection is normal.

9. FREE AIR TEMPERATURE GAUGE.

Calibrated +50 to -70 'C.

Normal use of the system:

Fuel should be loaded equally between the tanks until the inner are full. The balance should then be divided between the outer tanks.

For takeoff and landing each tank should supply its respective engine. This is also desirable at any time the tanks are equally balanced. By default, the controls are set up for this scenario.

After take off, if the outer tanks contain significantly more than the inners, it is necessary to run them down to an equivalent amount to the inners.

The procedure is as follows (No1 Tank will feed Nos 1 & 2 engines, No4 Tank will feed Nos 3 & 4 engines);

1. **Open all of the Engine Cross-Feed Valves, observe annunciators, check manifold pressure.**
2. **Close No2 and No3 Fuel Tank Shutoff Valves.**
3. **Switch off Boost Pumps in Tanks No3 and No4, check annunciators and manifold pressure**

Fuel will now be supplied from the outboard tanks only.

When the tanks are balanced,

1. **Switch on all Boost Pumps. Check annunciators.**
2. **Open Nos 2 and 3 Fuel Tank Shutoff Valves.**
3. **Close all of the Engine Cross-Feed Valves, observe annunciators.**

Tanks will now supply their respective engines.

The procedure is similar to supply from any tanks,

1. Engine Receiving	CROSSFEED VALVE OPEN.
2. Tank Supplying	CROSSFEED VALVE OPEN.
3. Main Crossfeed	AS REQUIRED.
4. Tank in use	SHUTOFF VALVE ON, BOOST PUMP ON.
5. Tank not in use	SHUTOFF VALVE OFF, BOOST PUMP OFF.

5. DE-ICING & ANTI-ICING SYSTEMS

The anti –icing controls are grouped on the left side of the overhead panel.

ICE DETECTOR SYSTEM

The Ice Detector probe is heated as ice forms over its sensing hole, actuating a pressure switch allowing the heater to operate and the ICING caption on the centre warning panel to light. Subsequently the process is repeated. The Ice Detector is only operational when the Pitot Heaters are ON.

AIRFOIL DE-ICING SYSTEM

Hot bleed air from the 14th stage compressor of each engine is used for anti-icing and de-icing of the leading edges of the wing and empennage. Part of the bleed air is recirculated and the rest exhausted overboard.

Use of the system on the ground is prohibited.

The system is designed primarily as a de-icer; its most effective performance is by allowing ice to accumulate on the leading edges until it is approximately ¾ in thick. Turning the system on by OPENING the bleed air valves and switching the wing and empennage de-icers ON, will cause the ice to break off the leading edges when the temperature reaches approximately 10'C. After the leading edges are clear of ice, turn off the system (close the bleed air valves only for convenience) until ice builds up again.

The onboard checklist will prompt airfoil de-ice selection by showing a cross until it is turned on, otherwise a tick will show. When the cross reappears, turn off the system again, and a tick will show. This will repeat about every 20 minutes or so, as long as potential icing conditions prevail.

The system may be used as an anti-icer, but note:

Airfoil anti-icing switched on can cause as much as a 21 % loss in SHP, and when coupled with intake anti-icing, as much as 32% loss in SHP.

1. WING AND EMPENNAGE DE-ICING SWITCHES.
Control solenoid and pneumatically operated valves, amount of air passing through which is thermostatically regulated. Engine bleed air valves must also be open.

2. FUSELAGE BLEED AIR SHUTOFF SWITCHES.
Two switches used to control valves in the bleed air manifold outboard of the fuselage in each wing. If either OVERHEAT annunciator lights below glows, indicating an overheat condition in the fuselage , the switches should be placed to the CLOSE position. This shuts off all air to the fuselage ducting, and consequently the empennage.

3. OVERHEAT WARNING TEST SWITCH.

4. WING BLEED AIR SHUTOFF SWITCHES.
Shuts off the engine bleed air shutoff valves and the fuselage bleed air shutoff valve in either wing, isolating the entire wing from the bleed air system should an OVERHEAT annunciator light.

5. AIRFOIL LEADING EDGE SKIN TEMP GAUGE.

6. AIRFOIL LEADING EDGE SKIN TEMP GAUGE SELECTOR.

ENGINE ANTI-ICING SYSTEM

The accumulation of ice on the air inlet housing, inlet guide struts, inlet probe, fuel control probe and the torque meter shroud is prevented by controlling the flow of hot air from the 14th stage compressor by individual engine solenoid valves.

7. ENGINE AIR SCOOP AND INLET VANES SWITCHES.
Four ON-OFF engine ice control switches actuate the solenoid valves controlling the flow of air. With the switches ON, anti-icing air flows to the engine ducts.

8. ENGINE AIR SCOOP AND INLET VANES ANNUNCIATORS.
Green annunciators light whenever sufficiently heated air is ducted to the engine air scoop and inlet vanes.

Turn on anti-icing air when icing conditions are first encountered, check annunciators light.

NOTE:

Engine anti-icing switched on can cause as much as a 9 % loss in SHP, and when coupled with intake anti-icing, as much as 32% loss in SHP.

PROPELLER DE-ICING AND ANTI-ICING SYSTEM.

De icing and anti-icing heating elements are bonded to the external surfaces of the spinners and islands of the propellers and to the surfaces of the cuffs. Electrical current is normally supplied by Priority Bus B or Priority Bus A for alternate operation. The 3 phase system supplies continuous power for the forward spinners. A propeller de-ice timer cycles power to the propeller blades, aft spinners, cuffs and islands.

9. POWER SWITCH.

The Power Switch has three positions; OFF, NORMAL and ALTERNATE. Placing the switch ON energises both the de-icing and anti-icing circuits through Priority Bus B for normal operation. Placing the switch to ALTERNATE energises the circuits though Priority Bus A.

10. GROUND TEST SWITCH.

The Ground Test Switch has two positions, NORMAL and GROUND TEST. The switch is used to test the system on the ground by operating at a reduced voltage.

11. TIMER SEQUENCE ANNUNCIATOR LIGHTS AND CONTROL SWITCH.

Blue annunciator lights, one for each propeller, glow during each respective part of the timer sequence. The switch can be used to dim or isolate the lights.

12. ANTI-ICING CONTINUOUS LOAD AMMETERS.

13. DE-ICING CYCLED LOAD AMMETERS.

14. TIMER OVERRIDE BUTTON AND SELECTOR SWITCH.

The Timer Override push button is used in conjunction with the adjacent selector switch to direct current between cycles to any part of the cycled current heater elements.

The Propeller De-icing system should be selected on when icing conditions are first encountered and left on whilst they prevail. Except for Ground Test operation, the system should never be switched on while on the ground unless the engines are running.

PITOT HEATERS

Pitot heat supply is controlled by two switches, left and right, on the lower part of the left overhead panel. Two annunciator lights on the main panel glow whenever the heaters are de-energised.

WINDSHIELD HEAT

The windshield panels are electrically heated by current from Priority Bus A. Temperature is sensed and current subsequently cycled. The system is controlled by three LOW – OFF – HIGH switches. Low should be selected before takeoff. Cycling lights glow as current is applied. Three OVERRIDE push switched can be used to apply current between cycles.

6. PRESSURISATION & AIR CONDITIONING

The controls relating the cabin pressurisation are located on the lower part of the right hand overhead panel.

Air for pressurisation is provided by compressors driven by each inboard engine. The cabin and flight station temperature controls enable heating or cooling of the air as required. The following cabin altitudes can be maintained:

S.L to 15500 feet……………………….SEA LEVEL
30000 feet……………………………..8000 feet

1. CABIN PRESSURE CONTROLLER.

2. BAROMETRIC SELECTOR.
Used to set barometric pressure, in inches of mercury, of departure airfield. Subsequently reset at top of descent to barometric pressure of destination airfield.

3. CABIN ALTITUDE SELECTOR.
Set desired cruising cabin altitude before departure. Reset to destination airfield elevation at top of descent.

4. CABIN RATE OF CLIMB/DESCENT KNOB.
Used to adjust the rate of climb or descent to selected cabin altitude. By default this is set to 300 feet per minute.

5. CABIN RATE OF CLIMB/DESCENT INDICATOR.

6. CABIN PRESSURE DIFFERENTIAL INDICATOR.
Cabin differential pressure, calibrated in inches of mercury, maximum 14.45 in/Hg.

7. CABIN ALTIMETER.

8. COMPRESSOR AIRFLOW INDICATORS.

9. CABIN ALTITUDE WARNING HORN SWITCH.
An aural warning is tripped if the cabin altitude exceeds approximately 9800 feet. Additionally the CABIN PRESS caption on the main panel will light. The warning horn may be isolated by placing the switch to SILENCE.

10. AUXILIARY VENTILATION SWITCH.
Used to increase ventilation during unpressurised flight.

11. AIR COMPRESSOR DUMP SWITCHES.
Moving the switches to DUMP opens the compressor dump valves and subsequently dumps compressor air overboard. Normally set to NORMAL after start and DUMP after shutdown.

12. AIR COMPRESSOR DISCONNECT SWITCHES.
Disconnect the compressor from the engine drive. The compressor may only be re-connected by engineering on the ground.

13. CABIN COMPRESSOR HIGH OIL TEMP AND LOW PRESSURE ANNUNCIATORS.

14. OUTFLOW VALVE CONTROL SWITCH.
The Outflow Valve Control switch is used to regulate the flow of air from the cabin and maintain or adjust cabin pressure. The switch should normally be left in the AUTO position. Manual control is possible by holding the switch in the OPEN or CLOSE positions. Care should be exercised as the cabin can be depressurised as the valve moves towards fully open.

15. SAFETY VALVE KNOB.
The knob is normally closed tightly to the clockwise position. Turning the knob anti-clockwise can be used in an emergency to reduce cabin pressure and to depressurise the cabin.

Normal use of the system:

Before Start - Compressor Dump Valves- DUMP

Set the departure airfield barometric pressure together with the desired cabin altitude on the Pressure Controller. The cabin altitude selected should be at least the elevation of the departure airfield and be consistent with the limitations shown above. Avoid choosing a cabin altitude which will result in maximum differential being achieved at cruising altitude, as any increase in cruising altitude will result in the pressure relief valve operating until the cabin pressure is safely below maximum differential. By default the cabin altitude is set to 5500 feet which results in maximum differential being reached at just over 25400 feet. The cabin rate is set at 300 feet per minute by default, which is normal. This may be increased or decreased by rotating the Rate knob.

During taxi, or just prior to take off:

Compressor Dump Valves – NORMAL

At top of descent, set destination barometric pressure and airfield elevation.

Shutdown checks – Compressor Dump Valves – DUMP

AIR CONDITIONING

Cabin heating is accomplished by heating air from the compressors. An 18KW heater raises the temperature of the air as required before it is circulated in the cabin area. Electrical panel type radiant heaters are installed in the cabin sidewalls between the floor and cabin windows and also in the floor beneath the seating areas. Power is supplied by Priority Bus B. The flight station is heated by compressor air heated by a 10 KW element ducted into the overhead outlets, foot-warmer and windshield de-fogger.

Cooling is primarily achieved by the air cycle refrigeration unit, and can be supplemented by the Freon system in high ambient temperatures.

1 & 1a. FLIGHT STATION TEMPERATURE AND PROGRAM SWITCH.

The Temperature Selector rotary switch used to increase or decrease desired temperature with the Program Switch in the AUTO position. The selected temperature will thus be maintained. The temperature is manually controlled using the DECR and INCR positions of the Program Switch. In this mode the temperature will not be automatically maintained.

2 & 2a. CABIN TEMPERATURE AND PROGRAM SWITCH.

As above.

3. DUCT HEATER SWITCH.

Two position switch; AUTO – OFF. In the AUTO position the heater is controlled by the temperature control unit. Additionally the heater will not operate unless the Recirculating Fan switch is in the AUTO position. Both switches are required to be in the AUTO position therefore to obtain flight station heating.

4. FLOOR AND WALL HEATER SWITCH.

Two position switch; AUTO – OFF. In the AUTO position the heater is controlled by the cabin temperature control unit. OFF shuts off the radiant floor and wall heat.

5. CARGO HEATER SWITCH.

In the AUTO position, the heater is controlled by the cargo compartment temperature control system. (Not modelled).

6. FREON SYSTEM SWITCH AND MANUAL START SWITCH.

In the AUTO position the Freon system is controlled by the master temperature control unit. The system is de-energised in the OFF position. Manual Start switch is normally OFF.

7 & 7a. CONDENSER DOOR SWITCH & POSITION INDICATOR.

Three position switch OPEN – AUTO – CLOSE. In AUTO position, is controlled by the program selector. Placing the switch to OPEN energises the condenser door actuator. The door will go to the GROUND OPEN position provided the power levers are below 63% travel and the landing gear scissors switch is closed. During flight the door will go to the FLIGHT OPEN position. Placing the switch in the CLOSE position closes the condenser door. The condenser door indicator has two pointers; one for the inlet door and the other for the exit door.

8. RECIRCULATING FAN SWITCH.

See 3.

9. CABIN AIR TEMPERATURE INDICATOR.

Calibrated in degrees Fahrenheit.

10. PROGRAM POSITION INDICATOR & SELECTOR SWITCH.

The Program Position Indicator has three scales, from the outside inward; CABIN,AIR CYCLE and FLIGHT STATION. With the selector switch at FLT STA, The inner pointer shows flight station program position and setting. With the switch at AIR CYCLE, same pointer shoes air cycle position and setting over the same scale. The outer pointer always shows cabin position and setting.

7. HYDRAULIC SYSTEM & FLIGHT CONTROLS

The hydraulic system consists of two completely independent and separate 3000 psi power systems designated the No1 and No2 systems respectively. Each system contains its own reservoir, pumps control valves and operating units. Hydraulic power is obtained from pumps driven by liquid cooled AC motors, two pumps in the No1 system and one in the No2 system. Pumps 1A and 2 are powered by Priority Bus A and pump 1 by Priority Bus B. The No1 system has a 5 USG reservoir and the No2 system a 1 USG reservoir. For cooling purposes the fluid is routed through heat exchangers submerged in the inboard fuel tanks prior to returning to the reservoirs.

The No1 system furnishes power to the following units:

Surface Control Boosters – No1 Cylinder Section
Wing Flaps – No1 Motor
Passenger Stairs
Landing Gear
Nose Gear Steering
Brakes
Windshield Wipers

The No2 system powers only the No2 Cylinder Section of the Surface Control Boosters and The No2 Wing Flap Motor.

Each hydraulic system powers half the force required by the flight control boosters and wing flaps. If hydraulic power is completely lost from both systems, the booster mechanism incorporates a ratio shift which allows the pilot the control the aircraft manually.

The controls and indicators for the hydraulic system are located on the lower centre instrument panel to the fight of the fuel flow and fuel quantity gauges. These can be viewed by clicking on any of the fuel flow gauges. The panel may be hidden again by clicking on the brake pressure, hydraulic quantity or hydraulic pressure gauges.

1. HYDRAULIC PUMP LOW PRESSURE WARNING LIGHTS.
These annunciator lights glow whenever the hydraulic pump pressure drops below 2200 psi or the pumps are switched off.

2. HYDRAULIC PUMP SWITCHES – NO 1 SYSTEM.

3. HYDRAULIC PUMP SWITCH – NO 2 SYSTEM.

4. RESERVOIR OVERHEAT WARNING LIGHTS.
Light when the hydraulic reservoir oil temperature exceeds a safe value.

5. COOLING SWITCH.
A cooling switch, when placed to COOLING, activates the scavenge pumps in the inboard fuel tanks. This increases the effectiveness of the hydraulic oil to fuel heat exchangers.

6. BRAKE PRESSURE GAUGE
Two pointers show normal brake pressure and that of the emergency bottle supply.

7. HYDRAULIC QUANTITY GAUGE.

8. HYDRAULIC SYSTEM PRESSURE GAUGE.
Two pointers; one for the No1 system pressure and one for the No2 system.

WING FLAPS

The flaps are high lift Fowler type, which move both rearward and downward, and are powered by the No1 and No2 hydraulic systems. Either system is capable of operating the flaps, therefore no emergency system is provided.

The flaps have four selectable settings, calibrated in percentage of fully outboard;

UP
39%
TAKEOFF - APPROACH 78%
LAND 100%

The action of flap movement is almost entirely rearward until the 78% position is reached, before the drooping action commences.

A Flap Position gauge, calibrated in percentages, is located in the centre of the instrument panel.

A Flap Asymmetry annunciator forms part of the central warning panel.

There is an audible warning horn, which sounds if the power levers are advanced for takeoff and the flaps are not in the TAKEOFF – APPROACH position.

LANDING GEAR

The three landing gear units are extended and retracted by hydraulic cylinders, and are designed for a maximum takeoff weight of 113000 lb, a maximum landing weight of 95650 lb, and a maximum zero fuel weight of 86000 lb.

The Landing Gear lever has four positions; UP, NEUTRAL, DOWN and EMERG. DOWN. The lever should be in the down position during all ground operations.

Three green and three red Landing Gear Position lights are located on the lower centre instrument panel, and are controlled by the landing gear downlocks and uplocks. The green lights glow when their respective legs are in the locked down position, the reds when the leg is neither locked down nor locked up.

8. RADIO INSTALLATION & AUTOPILOT

The controls for the radios and autopilot are mounted in the centre pedestal, and appear in two separate windows.

1. Comm1 Radio Selector.
2. Comm1 Whole Numbers of Mhz Selector Knob.
3. Comm1 Decimal Numbers of Mhz Selector Knob.
4. Comm1 Transmit Selector Switch.

These controls are identical for the Comm2 unit.

5. Nav1 Radio Selector.
6. Nav1 Whole Numbers of Mhz Selector Knob.
7. Nav1 Decimal Numbers of Mhz Selector Knob.
8. Nav1 Ident Selector Switch.

These controls are identical for the Nav2 unit.

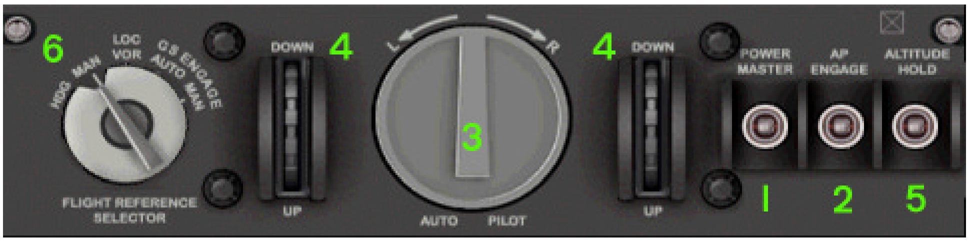
9. ADF1 Radio Selector.
10. ADF1 hundreds of Khz selector knob.
11. ADF1 tens of Khz selector knob.
12. ADF1 Khz and decimal Khz selector knob.
13. ADF1 Ident Selector Switch.

These controls are identical for the ADF2 unit.

14. Transponder Selector Unit.
15. Transponder Code thousands and hundreds selector knob. Click left side to increase thousands and right side to increase hundreds.
16. Transponder Code tens and units selector knob. Click left side to increase tens and right side to increase units.

17. Radio Master Switch.
18. Marker Sound ON-OFF Switch.
19. GPS Autopilot Couple Switch. Connects GPS plan to autopilot when switched in together with autopilot VOR/LOC selection.
20. Nav1/Nav2 Selector Switch. Selects desired facility to the Course Indicator. Note Autopilot VOR/LOC or GS Engage modes only available with Nav1 selected.

ECLIPSE PIONEER AUTOPILOT CONTROLLER



The autopilot is powered by Priority Bus A.

1. POWER MASTER SWITCH.
Selected on prior to use of the autopilot.

2. ENGAGE SWITCH.
With the Power Master ON, selection of the Engage switch physically engages the autopilot in manual mode, the current pitch attitude will be held and the wings level attitude adopted.

3. MANUAL TURN SELECTOR.
Used to make manual turns with the autopilot engaged and the Flight Reference Selector set to MAN.

4. MANUAL PITCH CONTROL WHEELS.
Used to adjust pitch with the autopilot engaged. Inoperative when Altitude Hold selected or GS ENGAGE selected on Flight Reference Selector.

5. ALTITUDE HOLD SWITCH.
Selects Altitude Hold function. With the autopilot engaged maintains altitude at the point the switch is selected ON.

6. FLIGHT REFERENCE SELECTOR.
The Flight Reference Selector is used to select the desired autopilot mode and has five positions; HEADING, MANUAL, VOR/LOC and GS ENGAGE AUTO AND MANUAL

HEADING MODE: Autopilot maintains heading selected on the heading index of the Course Indicator.

MANUAL MODE: Autopilot controlled in pitch and bank through use of the pitch wheels and manual turn selector knob.

VOR/LOC MODE: Autopilot maintains selected VOR radial or Localiser beam set on the Course Indicator. (Nav1 Only)

GS ENGAGE MODE: Autopilot maintains Localiser and Glide Slope beams. (Irrespective of GS AUTO or GS MAN selection)

9. MINOR SYSTEMS

EXTERNAL LIGHTS

The controls for the external lights are at the foot of the left hand overhead panel. For convenience, switches for the landing lamp filaments and extension motors are above the windshield in the main view.

VITAL DATA CARD

The vital speeds are provided for takeoff and landing, together with current weight and fuel information, on a card which can be viewed by clicking the VITAL DATA part of the Panel Sub Window Menu. The card also carries wind information.

AUTOMATED CHECKLIST

An automated checklist for the major items is provided, and can be viewed by clicking the CHECKLIST area of the Panel Sub Menu Window. Each item will show a blue tick when the relevant action is taken, otherwise a red cross will show.

ALTITUDE MANAGEMENT SYSTEM

The AMS has several alerting functions and display pages. The left knob is used to select the desired page, the right knob to set the values fro any given page. By default the BARO page is shown, and before use the barometric pressure is set using the right knob. Scrolling through the subsequent pages thus:

TAlt	**Target Altitude**
Alt	**Current Altitude**
DES	**Destination Altitude**
DH	**Decision Height**
MDA	**Minimum Descent Altitude**

Once the barometric pressure is set go to the DES page and set the destination airfield elevation. By default the MDA and DH values will be set 400 and 200 feet above DES respectively. These minimums may be subsequently adjusted but cannot be set until the DES elevation is input; otherwise the values will show DES?

Returning to the TAlt page set the cleared altitude. The display will flash LEVEL when within 100 feet (default) of the set target altitude. Reset TAlt as desired.

Pages beyond the MDA page allow adjustments from the default settings;

SETUP……

GEAR	**Gear warning 1000 ft above DES ON/OFF**
BARO	**Barometric setting MB or IN.HG**
BUFR	**Altitude Warning Buffer 100 – 300 feet**

Note that the AMS has no influence over the auto-pilot altitude selection.

10. LIMITATIONS

WEIGHT LIMITATIONS (L188A)

MAXIMUM TAKEOFF WEIGHT 113000 LB
MAXIMUM LANDING WEIGHT 95650 LB
MAXIMUM ZERO FUEL WEIGHT 86000 LB

NOTE THAT BY DEFAULT THE AIRCRAFT WILL LOAD IN AN OVERWEIGHT CONDITION. THE PAYLOAD/FUEL RATIO HAS BEEN SET TO PROVIDE A REALISTIC GROSS WEIGHT ON THE SHORT TO MEDIUM RANGE SECTORS NORMALLY OPERATED BY THE AIRCRAFT. THE VITAL DATA CARD WILL CONTINUE TO SHOW 'OVERWEIGHT' UNTIL THE FUEL LOADING HAS BEEN REDUCED ACCORDINGLY.

AIRSPEED LIMITATIONS

Vne	364 KT IAS sea level to 8000ft, thereafter 0.64 MACH
Vno	324 KT IAS sea level to 12000ft, thereafter 0.61 MACH
Va	203 KT IAS
Vfe	190 KT IAS Flaps 0 to 78%
	170 KT IAS Flaps 79% to 100%
Vlo	190 KT IAS
Vle	217 KT IAS
Vs1	130 KT IAS (AT MAX TOW)
Vs0	94 KT IAS (AT MAX LW)

ENGINE LIMITATIONS

Condition	TIT 'C	RPM	RG Oil Press PSI	Pow. Unit Oil PSI	Oil Temp 'C	Indicated Horsepower
Start	965 (5 secs)	-	-	-	-32	-
Low RPM Taxi		9900-10300	50 Minimum	50-75	60-100	1000 Max Oil temp between 60-100
High RPM Taxi		13150-13750	130-240	50-75	60-100	,,
Flight Idle (Ground)		13050-13600	,,	,,	,,	,,
Maximum Reverse		13350-14500	,,	,,	,,	,,
Take Off 100%MRT	971 (5 mins)	13680-13960	150-240	,,	60-85 90 for 5 min	4000 (5 min)
Max Climb	895	,,	,,	,,	,,	3400
Max Cruise	847	,,	,,	,,	,,	3200
Max Continuous	932	,,	,,	,,	,,	3400 for any TIT between 847 and 932

11. ENGINE & FLIGHT HANDLING

Before commencing the Before Start Checks, set the desired cruise cabin altitude on the pressure controller. Turn on the anti-collision and position lights.

Complete the Engine Start and After Start Checklists.

Before moving off, ensure all the RPM switches are in LOW, 9900-10300 RPM.

Very little throttle movement is required to get the aircraft moving, and less to keep it moving once under way.

Complete the taxi checklist, selecting 78% TO-APP flaps and take off trim, which is always 10’ nose up.

Entering the runway, the RPM switches are shifted to NORM, in order 1, 2, 3, 4. Cover the emergency handles as there is a rapid TIT surge as the RPM moves to the NORM range, 13150-13750 RPM. Ensure the remaining AC generators come on line, and No4 returns to standby by checking the power distribution annunciators.

Check that the takeoff speeds are bugged on the ASI, and crosscheck with data card.

At commencement of the takeoff, smoothly advance the power levers until the beta lights extinguish, and 1500 HP is indicated, then smoothly advance the levers to the fully forward takeoff position.

At Vr, rotate the aircraft and unstick at V2, and on indication of positive climb rate select landing gear up. Hold the attitude reducing the nose up trim to initially climb at 1200 fpm as the aircraft accelerates.

When the gear lights extinguish reduce power to 912-932’C TIT.

Above 140kt, select flap 39% initially, and be aware of the considerable lift reduction; avoid sinking. When the attitude settles, select flaps up and set climb power at 895’C TIT, 3400 HP max.

Allow the aircraft to accelerate to 210-220kt climb speed and complete the Climb Checklist.

When levelled at the top of the climb set cruise power, 847’C TIT, 3200 HP max. In particularly cold conditions at lighter weights and at higher flight levels, power may require to be reduced to avoid exceeding 0.61 Mach as indicated by the barbers pole.

Complete the Cruise Checklist and monitor the systems listed on it.

At the top of descent, set the pressure controller to destination airfield elevation and barometric pressure. The system will begin to reduce cabin altitude when it is safe to do so without exceeding the maximum differential of 13.34 in hg.

Reduce power to flight idle. Flight idle is reached at approximately 38% lever travel. If the NTS lights cycle at flight idle, advance the levers slightly until cycling stops.

Descent is made at 200-240 kt at 1500-1800 ft per minute.

Complete Approach Checklist.

When level at 2000 ft aal, or as directed by ATC, select flap 78%. Hold the controls forward and trim out the considerable increase in lift. Establish airspeed at 155kt.

Do not engage the GS Engage mode on the autopilot until the aircraft is level with 78% flap extended and trimmed.

For an ILS approach, as the glide slope pointer reaches 1 dot above the centre mark, select landing gear down.

Establish on the glide slope, adjusting power if necessary, at 140 kt.

Select flaps 100% and reduce speed to Vat +10.

Crossing the threshold at Vat, reduce power, round out and flare gently. Once all three landing gears are on the ground select ground idle and observe the beta lights illuminate. On some game controllers it may be necessary to crack the power lever open slightly and then closed to select ground idle. Disc braking from the propellers requires little or no use of the brakes during the landing run.

Once the runway is vacated, retard the power levers completely and select LOW RPM, in order 4,1,2,3. Complete the After Landing and Shutdown Checklists.

Fraser McKay, Feb 2010.