SIMULATION SOFTWARE WORKSHOP

Airbus A310-300
“The Master’s Edition”

Normal Procedures

Items marked by (*) are the only steps to be completed during a transit stop.

R The following procedure, performed by the PNF, ensures
R that required safety checks are made prior to the
R application of electrical power to avoid inadvertent
R systems operation and danger to A/C and personnel. Included is APU starting and establishement of electrical and pneumatic power.

R **ENG START selector** ..... **OFF**
R **WIPER** ..... **OFF**
R **FUEL HP VALVES** ..... **Check OFF**
R **LANDING GEAR LEVER** ..... **Check DOWN**

REAR and OVERHEAD C/B PANELS:

- Check all C/B are set, reset as applicable.

BATTERIES and EMERGENCY INVERTER :

- **BAT 1, 2 and 3** ..... **AUTO**
  - Check FLOW BARS in line and observe DOME tt is illuminated.
    If one or more flow bar is not in line check the voltage of corresponding battery.
- **AC EMER ON INV light** ..... **Check ON**
- **DC ESS ON BAT light** ..... **Check ON**
- **AC V/FRQ rotary sel** ..... **EMER**
  - Check INV parameters in white range.

CAUTION
In case of emergency inverter malfunction, switch off batteries before any other action to avoid damage to the electronic equipment.

HYDRAULIC

CAUTION
Do not pressurize the green hydraulic system without ground clearance.

R

APU FIRE PROTECTION

- **APU FIRE handle** ..... **check IN and Latched**
- **LOOP A and B pb** ..... **Check IN**
- **SQUIB TEST pb** ..... **PRESS**
- **AGENT SQUIB It** ..... **Check Illuminated**
- **LOOP TEST pb** ..... **Press and Hold**
  Check
  - LOOP A It illuminates (for 2 sec.) associated with AUDIO/MASTER CAUTION activation.
  - LOOP A and LOOP B illuminate associated with APU FIRE warning AUDIO/MASTER WARNING activation and APU fire handle illumination.
- **LOOP TEST pb** ..... **Release**
  Check
  - APU fire warning is cancelled
  - LOOP B and LOOP warnings remain activated for 2 seconds.

ELEC

EXT PWR (IF AVAIL Lt illuminated) ..... **ON**

AVAIL Lt goes OFF

APU START

- **if EXT PWR ON Lt Illuminated :**
  - **ECAM control panel** ..... **Adjust brightness**
  - **APU MASTER SW** ..... **ON**
    - ON It illuminates.
    - APU page appears on ECAM
  - **APU START** ..... **ON**
    - Blue ACCEL light illuminates and indicates that APU is accelerating
    - On ECAM APU page, N and EGT rise
      At 50 % of Speed
      Start PB-Switch is **released** automatically ON **white** light extinguishes **At 95 % of speed :**
    - On ECAM APU page, AVAIL indication appears
    - On APU panel : . ACCEL blue light extinguishes
      . AVAIL It illuminates 10 sec later :
    - **ECAM APU page is replaced by DOOR** page
  - **EXT PWR** ..... **AS RQRD**
    - The EXT PWR may be kept ON to reduce APU load, especially in hot conditions.

- **If EXT PWR ON It extinguished :**
  - **APU MASTER SW** ..... **ON**
    - **ON It illuminates**
  - **APU START** ..... **ON**
  - BLUE ACCEL light illuminates and indicates that APU is accelerating

  At 50 % of speed :

R START PB-switch is released automatically ON white light extinguishes

At 95 % RPM : R
- AVAIL It illuminates
- APU GEN on line :
- ECAM APU page appears after 10 seconds.
  If required, adjust brightness on ECAM control panel.

10 sec later : R
- ECAM APU page is replaced by DOOR page.

*** COCKPIT LIGHTS** ..... **AS REQ**

Set STD8Y COMPASS, DOME, STORM and PANEL Lts as required. DOME Light should be selected since it is the only lighting source in EMER ELEC configuration. DIM position is recommended for take-off.

ELEC PWR ..... **Check**

- Scan ELEC PWR panel : no amber light

illuminated except GEN 1 and GEN 2 FAULT lights.

FUEL:

LEFT INNER PUMP 2 ..... **NORM**

R - If there is sufficient fuel in the left inner tank, this avoids fuel depletion from the outer tanks which would lead to increased refuelling time.

PROBE/WINDOW HEAT ..... **Check OFF**

VENT

- Check all lights OFF

Note : On ground OVBD green flowbar in line.

ANN LT:

- **AUTO TEST PB** ..... **ON**
  - Check that all lights are serviceable

R The automatic test checks the lights of the overhead
R panel, instrument panels and pedestal except the following equipment:

OVERHEAD PANEL	INSTRUMENT PANEL	PEDESTAL
	MASTER CAUTION	
	MASTER WARNING	
MSU's	Altimeters	
ISDU	L/G CTL lever	FMCs
FIRE handles	TRP mode selector	ECAM CTL panel
FQI LO LVL lights	keys	ATC control unit
ENG TRIM	SFPI	VHF control unit
	FCU	ADF control unit
	EFIS control panel	
	AUTO LAND lights	

During AUTO TEST operation :

- R all the lights not checked by the automatic test are illuminated steady (except a - LOCK, MASTER CAUTION, MASTER WARNING flashing) : check all the corresponding lights are illuminated.
- all digital displays indicate «...888... » (except FQI during refuelling).
  In case of low accuracy of fuel quantity in any tank, FQI display indicates « LA » code for corresponding tank (except during refuelling).

Note: Duration of AUTO TEST is approximately 65 sec.

- If Windshear Warning is installed,
  check that: - WINDSHEAR appears in red on the PFD for at least 15 seconds
  - Aud.owaming "WlNDSHEAR"is announced three times. R

AIR BLEED/COMPT TEMP :

- **APU BLEED** ..... **ON**
  Do not use APU bleed if ground air is connected.
- **PACK VALVES 1 and 2 pb switches** ..... **ON**
  • Check Flowbars in line
- **COMPT TEMP selectors** ..... **AUTO/AS REQ**

R **PARKING BRAKE** ..... **ON**

R - Check ACCU PRESS and recharge if necessary.
R Check PARKING BRAKE pressure is 1500 PSI or more,
R PARKING BRAKE must be applied before performing
R the Exterior Inspection to allow removal of chocks and
R to check BRAKE wear indicators.

R **SPEED BRAKE HANDLE** ..... **Check in**
R **RETRACT position**
R

R **SLATS/FLAPS HANDLE** ..... **Check**

R - If handle position disagrees with slats/flaps position, set
R handle to corresponding position.

LATERAL PANEL

- Check ANN LT sel in OFF position.
- Check no light illuminated on lateral panel.

R **MAINTENANCE PANEL AUDIO SELECTOR :**
R
R - Select P.A. reception on audio selector of lateral panel,
R with volume selection in approx 12 o'clock position.

R INFO: This selection will allow recording of cabin
R attendants announcements on the cockpit voice
R recorder.

EMERGENCY EQUIPMENT

- Check:
  • Life jackets stowed
  • Asbestos gloves stowed
  • Axe stowed
  • Flashlights stowed
  • Smoke goggles stowed
  • Portable fire extinguisher lockwired and pressure within the green area

  • Oxygen masks stowed
  • Portable oxygen equipment and full face masks, bottle
R pressure within the green area and adapters stowed underneath right aft window
  • RH and LH evacuation handles stowed
  • L/G gravity extension handle stowed.

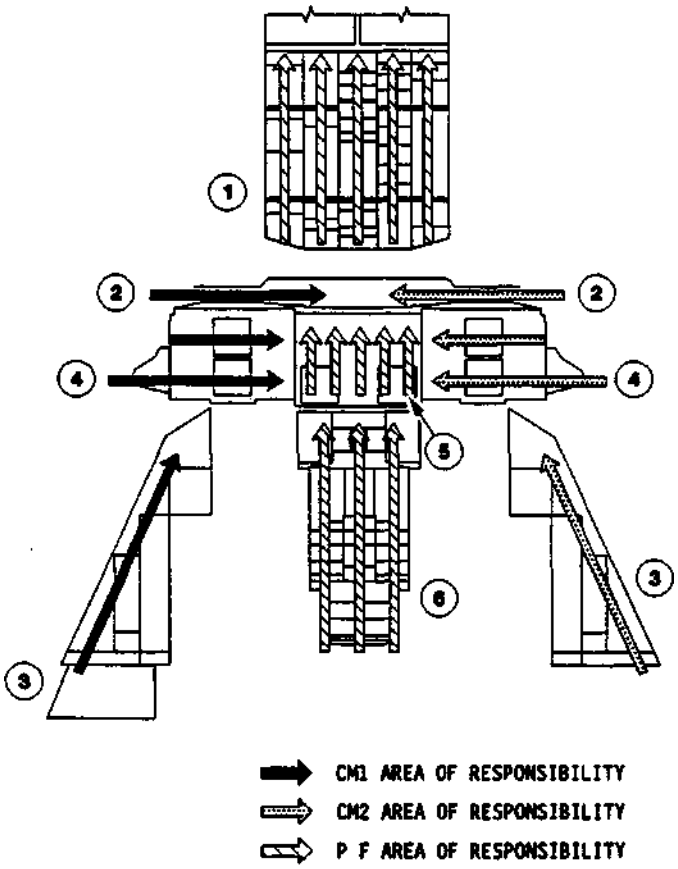
RAIN REPELLENT

- Pressure and quantity indicators ..... Check

INTRODUCTION

Items marked by (*) are the only steps to be completed during a transit stop.

PANELS SCAN SEQUENCE



Note 1 : IT IS A GENERAL RULE TO EXTINGUISH ALL WHITELIGHTS FOR ALL SYSTEMS DURING THE SCANSEQUENCE. THESE ACTIONS ARETHEREFORE NOT LISTED HERE.

Note 2: FUEL PUMPS MAYBE LEFT OFF UNTIL REFUELLING IS COMPLETED IF REQUIRED.

GEAR PINS and COVERS ..... **Check**

- Check three gear pins on board and stowed.

OVERHEAD PANEL

*** IRS MSU 1, MSU 2, MSU 3**

- **Mode rotary sel**.....**NAV**

INFO : ALIGN MODE will be illuminated.

Note : The IRS outputs are used by many systems of the aircraft, so it is essential to align the IRS as early as possible to provide data to the related systems. Select OFF position for more than 10 seconds for a compete realignment.

*** CABIN SIGNS**

- **NO SMOKING** .....**AUTO/ON**
- **SEAT BELT**.....**.SEAT BELTS/ON**

*** CALLS**

- Check CALL Its extinguished. Reset as required.

HYP PWR

-BLUE, GREEN, YELLOW RSVS . . WITHIN NORMAL RANGE

- Check the 3 fluid level indications are normal.

Note : On ground, system not pressurized, qty ind. needle should be in the outer green sector.

*** FLT RCDR**

GND CTL.....**ON**

Check DFDR and DFDAU Lts extinguished

ISDU (if installed)

- Check SYS rotary sel set to OFF.

*** EXT LT**..... **AS REQ**

- Check STROBE in AUTO position and BEACON in OFF position.

• PITCH TRIM/YAW DAMPER/ATS

PITCH TRIM 1+2.....**ON**

YAW DAMPER 1+2 .....**ON**

R **ATS 1 (+ 2 If installed)**.....**ON**

ENG 1 FIRE

- ENG 1 FIRE handle ..... check IN and latched.

Engine fire protection test

- **SQUID TEST pb** ..... **Press**

Check AGENT 1+2 SQUIB Lts illuminate

- **LOOP TEST pb**..... **Press and Hold**

Check

  - LOOP A It illuminates for 2 sec. associated with LOOP warning (AUDIO/MASTER CAUTION/ECAM) activation.
  - LOOP A and LOOP B Its illuminate associated with ENG 1 FIRE warning (AUDIO/MASTER WARNING/ ECAM) activation and ENG 1 FIRE handle (and fuel HP valve It illumination if HP valve open).

- **LOOP TEST pb**..... **release**

Check

  - ENG 1 FIRE warning is cancelled
  - LOOP B and LOOP warning remain activated for 2 seconds.

EVAC SIGNAL (if installed).....**AS REQ**

Usual position is CAPT

LDG GEAR ANNUNCIATOR..... **Check Normal Indications.**

- Cross check with center instrument panel.

* **FUEL**

- **X-FEED** ..... **check X-Line**
- **ISOL VALVES/LP VALVES** ..... **check in line**
  • Flow bars in line and steady.

Note : ISOL VALVES check must be done with « PED and OVHD PNL » control knob set to BRIGHT.

- For ETOPS Flights only
- **X-FEED** ..... **Press**
  • Check IN-LINE flow bar illuminated
- **X-FEED** ..... **Release**
  • Check X-LINE flow bar illuminated.

* **COCKPIT VOICE RECORDER**

- **CVR TEST** ..... **PRESS**
  • Check correct operation.

* **CABIN PRESS**

- **AUTO PRESS RATE LIMIT knob** ..... **NORM**
- **RATE LT** ..... **check extinguished**
- Check CAB ALT, DIFF PRESS and CABIN V/S for logical indication.

* **CREW OXYGEN**

* **SYSTEM HIGH PRESS** ..... **check indication between 1 400 PSI and 2 000 PSI.**

Note : If pressure is below 1 400 PSI, check oxygen duration chart to determine that quantity is sufficient for the scheduled flight.

- **SYSTEM LOW PRESS** ..... **check in green sector.**

ENG 2 FIRE PROTECTION

- Same as for ENG 1.

* **EMER EXIT LT** ..... **ARM**

- Check that DISARM light extinguishes.

COMPT TEMP

- **ECON FLOW** ..... **ON/AS REQ**
- **MAX COOL** ..... **AS REQ**
- **COMPT TEMP Selectors** ..... **AUTO/AS REQ**
- Select CRT position.

Note : ECON FLOW may be selected ON, if required, for flight with less than 160 pax. Approx 68 % flow is provided.

***COM**

TUNE VHF COM frequencies use VHF 1 for ATC (only
R VHF 1 is available in emergency elec config), VHF 2 can be
R used for ATIS and company frequencies. VHF 3 (if installed)
R is normally used for ACARS.

***AIRFIELD DATA**

Obtain necessary data for system initialization and cockpit preparation.This should include RUNWAY IN USE, ALTIMETER SETTING and WEATHER DATA. ATC Tower temperature should be used for all Take-off calculations.

R

*** FMS INITIALIZATION**

If the message "PLEASE WAIT" appears : DO NOT PRESS ANY CDU KEY until the message is cleared.

- **FMS data base validity**.....**Check**
  Press REF key and display A/C STATUS page
- Check DATA BASE validity and stored WPT/NAVAID if any review stored data for deletion decision.
- **NAVAID DESELECTION**..... **AS REQ**
  If NOTAMs warn of any unreliable DME or VOR/DME, access NAVAID page and DESELECT the related navaid.
- **FLIGHT PLAN INITIALIZATION**
- INIT key..... Press
- INIT A page is displayed.
- **CO RTE or city pair code**..... **INSERT**
- **INIT PAGE A**.....**CHECK/COMPLETE**
  - Check/modify ALTN/ALTN RTE
  - Enter FLT number, FLT ID (For aircraft with ATC mode S).
  - Enter Cost Index as per airline policy if it is not provided by the data base at the same time as the CORTE insertion.
  - Enter intended CRZ FL or check it if it was already provided by data base. Modify it if necessary taking into account ATC constraints or expected gross weight.
  - Insert CRZ wind
  - Check/modify Lat/long

- **ALIGN IRS prompt**.....**PRESS**
  When entering the cockpit, MSUs should have been OFF. If not, set then to OFF for more than 10 seconds and back to NAV, to erase the displayed coordinates on the ISDU.
  - Do not move the aircraft as long as the alignment is not completed.
  - To complete the IRS alignment use the ALIGN IRS prompt on CDU INIT page A.
  - For long range navigation, in order to minimize drift :

    1) Delay IRS alignment till prior to engine start
    2) The IRS are usually aligned to the departure airport reference point coordinates, however, if an aircraft gate coordinates are published, these may be inserted on INIT page A (insertion or slewing).
- ISDU..... CHECK VALID COORDINATES HAVE BEEN SENT
- **F-PLN A page**.....**COMPLETE AND CHECK**
  If CORTE has been inserted, the F-PLN should automatically include the preferential or most probable T/O RWY, approach and landing RWY, associated SIDs, STARs, transition and En Route WPTs. However some data bases will only include departure and arrival airport idents and EN ROUTE WPTs (IF appropriate). The crew must check, modify or insert (as applicable) the F-PLN according to the data given by ATIS, ATC or MET:
  - Lateral revision at Departure Airport, Select RWY then SID then TRANS (if appropriate)
  - Lateral revision at WPT for ROUTE modification if needed
  - Vertical revision : check or enter speed/alt. CONSTRAINTS
    according to ATC clearance.
- **F-PLN**..... **CHECK**
  - Check the Flight Plan versus computerized flight plan and NAV charts.
  - Check Dist to DEST along the F-PLN indicated on PROGRESS page.
- **F-PLN B page**.....**AS REQ**
  - Enter CRZ wind/Temp
- **SECONDARY FLIGHT PLAN**.....**AS REQ**
  This is routinely a copy of the active. However, consideration may be given to the following :

  a) Copy the active F-PLN but modify it at a suitable WPT for an immediate return to the departure airfield in the event of, for example engine failure.

  b) If weather is below landing minimum at the departure airfield the secondary flight plan should be that required for an immediate diversion after take-off.

  c) If there is a chance of a runway and/or SID change during taxi, this can be prepared by copying the active and making the necessary modifications.
- **PROG**.....**AS REQ**
  Check VOR tuned by FMS, modify if required.

FMS DATA INSERTION

* **FMS GROSS WEIGHT INSERTION**

- **ZFCG/ZFW** ..... **INSERT**
- **BLOCK FUEL** ..... **INSERT**

  • If ZFCG and ZFW are not yet available it is acceptable to enter the expected values in order to obtain predictions. Similarly the expected fuel on board may be entered if refuelling is not already completed at that time.

  • If ZFCG and ZFW are inserted, the FMS will provide the minimum fuel required for the trip according to fuel policy (Route Reserves, ALTN, FINAL)

  • If ZFCG, ZFW and BLOCK FUEL are inserted, the FMS will provide all predictions, as well as the EXTRA fuel if any.

* **FMS TAKE OFF DATA INSERTION**

- **V1, VR** ..... **INSERT**
- **THR RED/ACC** ..... **SET or CHECK**

  • Check or modify THR RED/ACC ALT as needed (they are defaulted to 1 500 ft AGL/3000 ft AGL)

- **TO SHIFT** ..... . **AS RQRD**

GLARESHIELD

* **EFIS**

- **PFD and ND brightness** ..... **AS REQ**
- **FPV/FD** ..... **ON/FD**
- **VOR/NAV/ILS sw** ..... **AS REQ**

Note : . VOR position : manual tune.
. NAV/ILS positions : auto tune.

- **EFIS control box** ..... **AS REQ**
- **ND mode and range** ..... **AS RQRD**

MODE : It is recommended to use MAP mode for take-off unless the SID is not in the data base, then PF should use ARC or ROSE.

RANGE : It is recommended to set the minimum range to display the first waypoint on departure, or as required for weather radar.

* **FCU** R

SPD/MACH setting knob ..... **turn to select V2**
SPD/MACH setting knob ..... **Push to Activate Preset**
SPD/MACH setting knob ..... **Turn to Preselect initial climb speed**
ALT Sel ..... **Initial cleared ALT**

AFS

- Adjust brightness.

LATERAL CONSOLES

RAT

- **HYD RAM AIR TURBINE handle** ..... **check OFF**

OXYGEN MASK

- Depress INT on audio panel and adjust volume.
- Select interphone transmit.

- Push down and hold RESET/TEST slide control and observe blinker momentarily yellow.
- Notice oxygen flow sounds through loudspeaker.
- Release RESET/TEST slide control.
- Set N/100% manual control to 100%.
- Check system Low Press indication within green band. R

GND SERVICE INTPH ..... **OFF**

CM1/CM2 INSTRUMENT PANELS

GPWS ..... **NORM**

- Check no FAULT light illuminated.

Note: GPWS FAULT light will be illuminated whilst IRS 1 is in align mode if a GPWS MK III is fitted. R R

ND ..... **Check**

- Check for correct display.
- Cross check compass information with RMI compasses.
- Check radar operation if desired.
- Check ground speed, heading, initial waypoint, VOR indications.

STBY ASI ..... **Check**

- Check speed pointer 0.
- Set one bug to V2 and another to Green Dot.

PFD ..... **Check**

- Check for correct display.
- Check IAS, FMA, initial target ALT, altimeter readings, attitude.

VSI ..... **Check**
- Check no flag and pointer 0.

R * **ALTIMETER** ..... **Check**
- Check no flag.
- **QNH/QFE** ..... **Set**

CLOCK ..... **Check/Adjust**
- Check time. Adjust if necessary.
  Set elapsed time and chrono to zero.

R **CM1 METRIC ALTIMETER (If installed)** ..... **Check**
R - **QNH/QFE** ..... **Set**

CTR INSTRUMENT PANEL

R * **STBY ALTIMETER** ..... **Check**
- Check no flag.
- **QNH/QFE** ..... **Set**

STBY HORIZON ..... **Check**
- Check no flag.
- Erect if necessary.

R * **ECAM** ..... **RECALL**

BRK-A/SKID ..... **NORM-ON**

* **ENG INSTRUMENTS**
- Check :
  - **OIL PRESS** ..... **check Zero**
    OIL QTY ..... **Check**
  - MIN OIL quantity before start is 10QT + estimated
R consumption. (estimated consumption is based on
R each operator's oil consumption monitoring)
  - **FF ind** ..... **check zero**
  - **N2 ind. needles and counter** ..... **check zero**
    No flags, and red max pointers in front of the red limit marks.
    EGT ind. needles and counter ..... **check logical temperature**
    No flags and red max pointers in front of the red limit marks.
  - **N1 ind. needles and counter** ..... **check zero**
    No flags, red max pointers in front of the red limit mark and N1 mode select knobs are pushed and counter for manual setting is masked.
  - **REV and REV UNLK Its** ..... **check extinguished**

* **THRUST RATING PANEL** R
- **TOGA/FLEX** ..... **set**
- **TAT** ..... **check logical**
- **THR LIMIT bugs** ..... **check correspond to THR LIMIT display**

LANDING GEAR WARNING

- **LDG GEAR WARN TEST pb** ..... **Press**
  Observe down arrow It on and continuous horn sounds and ECAM system activation.

* **LANDING ELEVATION** ..... **Set** R
DEPARTURE FIELD ELEVATION R

Note: If QFE is used set 0 on LANDING ELEVATION R
counter.

R

PEDESTAL

ADF ..... **Check**
- Check and set as required

RADIOS **Check**
- **INT knob** ..... **check volume**
  Make sure that the knob is turned up to enable ground crew contact.
  VHF ..... **Check**
- Check VHF transmission and reception.
  HF ..... **Check**
- Check HP transmission and reception if required for flight.
-

Note : Do not transmit on HF during refuelling.

WEATHER RADAR

Power supply ..... **Check OFF**

PARKING BRK ..... **OFF**

If chocks are in place, release PARKING BRK to increase R
brake cooling

ATC ..... **STBY (AUTO if installed)** R

VOR/ILS **CRS/FREQ** ..... **AS REQ**

FMS DATA CONFIRMATION

* **IRS ALIGN** ..... **Check**
- Confirm coordinates

* **FMS GROSS WEIGHT INSERTION** ..... **Check**
- The PNF check FMS data

* **FMS TO DATA** ..... **Calculate/Check**
- The PNF calculates and check TO data

* **FMS F-PLN**.....**Check**

- PNF ensures that inserted F-PLN agrees with planned routes.
- If company policy requires it, thoroughly check the whole F-PLN using the scroll key. Use ND PLAN mode while scrolling the F-PLN on the CDU.

AIRFIELD DATA .....**Confirm**

R

* **FUEL QUANTITY**.....**Check**

. After refuelling is completed :

R **- FUEL PUMPS**.....**NORM**

- Check fuel quantity corresponds to FLIGHT PLAN fuel, X check with sum of individual tank quantities.
- Check fuel load asymmetry within limits.

TAKE OFF BRIEFING

The purpose of the take off briefing is for the PF to inform the PNF of the planned course of action for both normal and abnormal situations during take off. It is also a recall of standard emergency procedures and is the time for the Captain to give any specific instructions to the First Officer. It should be completed prior to engine start.

It is most important that the take off briefing is given at a time when the cockpit workload is low so that both pilots may concentrate on it's content and at a time when the take off conditions are likely to be known. The most appropriate time, therefore, is at the end of the Cockpit Preparation, prior to start.

The take off briefing should include the following :

- A review of the emergency procedures relating to the take off.

e.g. for a Captain briefing :
"This will be a left hand seat take off. If any malfunction occurs before V1 I will call STOP or GO (a lack of any response to a malfunction could be considered a subtle incapacitation). If the call is STOP I will apply maximum reverser and bring the aircraft to a stop on the runway bearing in mind the wind direction if there is a fire. You will inform ATC and monitor the deceleration. When the aircraft has come to a stop and parking brake set you will carry out the necessary ECAM actions on my command. If the malfunction occurs after V1 we will continue the take off. No action other than the application of TOGA and silencing any aural warnings will be taken until the aircraft is safely established in the climb and above 400 ft AGL. At that point carry out the ECAM actions on my command up to second agent discharge, if necessary, for an engine fire."

Having completed the emergency briefing (which normally needs only be done in full on the first flight of the day for the crew) a review of the variable procedures must be made, making use of the CDU where possible :

- Runway state, use of anti ice.
- Take off configuration, V1, VR, V2, Flex Temp.
- PACKS ON or OFF
- Single engine acceleration altitude, thrust reduction altitude, normal acceleration altitude safety altitude, transition altitude and first cleared level.
- Action in event of immediate return or diversion after take off.
- SID routing and specific RAD/NAV tuning.
- Use of radar.

As already stated, make use of the FMS CDU wherever possible to confirm and emphasise the briefing.

LOADSHEET.....**Check**

The Captain should thoroughly check the load and trim sheet, particularly for gross errors.
If computerised load sheets are used the computations themselves are not normally suspect. Make sure, however, that the entered data is corect, e.g. correct flight, correct aircraft, dry operating index, configuration fuel onboard etc.

TAKE OFF DATA ..... **Prepare and Check/revise**

Once the load sheet is checked :

- Check/modify FMS weights/CG
- PNF checks or recomputes the Take Off speeds and Flex Temp using the RTOLW charts.
- PF then INDEPENDENTLY calculates theTake Off speeds and Flex Temp as a crosscheck.
  Ensure particular care is taken to determine the Take Off configuration.
- Confirm T.O. weight limitation.
- Select FLAP setting giving max Flex TEMP. If two FLAP settings give the same Flex TEMP use FLAP giving lower speeds.
- Enter the Flex TEMP and select FLEX T.O. on the TRP unless TOGA is required.
- Set V2 and green dot speed on ST BY ASI (all remaining bugs at 12 o'clock).
- PF enters (or revises) the take off data in the FMS CDU, TAKE-OFF and INIT page.

R - Set V2 and Preset initial climb speed on FCU.

SEAT, SEAT BELTS, HARNESSES, RUDDER PEDALS..... **Adjust**

The seat is correctly adjusted when the pilot's eyes are in line with the red an white balls.

CDU ....**In TAKE OFF Configuration**

- It is recommended to display F-PLN on PNF side, TAKE OFF on PF side.

EXT PWR.....**Check OFF**

Request external power removal

BEFORE START C/L DOWN TO THE LINE..... ...**COMPLETED**

PUSHBACK OR/AND START UP CLEARANCE

- At this stage, the « before start » preparation is stopped to :
  - obtain ground crew clearance (For pushback, chocks removed, NOSE WHEEL STEERING selector and BY-PASS PIN in place and area clear for START/PUSH BACK). R R R
  - obtain ATC pushback and start up clearance.

Engines may be started during pushback.

WINDOWS and DOORS .....**Check CLOSED**

- Check cockpit windows closed and locked check proper locking of sliding windows by pushing the window handle forward into full closed position.
- Check on ECAM DOOR page that all doors are closed.

BEACON ..... **ON/AUTO**

PARKING BRAKE .....**AS REQ**

- If no pushback required, check PARKING BRK handle at ON, check BRAKES PRESS indication. Chocks may be removed. R R

CAUTION
If, during engine start with parking brake on, the aircraft starts to move due to a parking brake failure, immediately release the PARKING BRK handle to restore braking by pedals.

If pushback required, set PARKING BRK to OFF.

CAUTION
Do not use brakes during pushback unless required due to an emergency.
Avoid the use of NOSEWHEEL STEERING and FLAP SELECTION during pushback.

Once pushback is completed set PARKING BRK to ON for towbar disconection and inform ground crew.

BEFORE START C/L BELOW THE LINE..... **COMPLETED**

ENGINE START

The following procedure applies upon completion of the BEFORE PUSHBACK OR START checklist.
ENG 2 is normally started first.

THROTTLE LEVERS.....**IDLE**
- be aware of prevailing surface wind, as tail wind may result in starting difficulties.

IGNITION sel.....**START A/B**
- Set IGNITION sel to START A (odd days) or START B (even days) and check both ARM lights illuminate on START 1 and 2 PB switches.
  INFO : PACK VALVE FAULT It illuminates during closure.

R - **Announce**.....**« START ENGINE 2 »**

R **START 2 (1) PB-switch**.....**PRESS**
- Check ARM white light extinguishes
- OPEN blue light illuminates.

- **Announce**.....**« VALVE OPEN »**
- Check BLEED PRESSURE is increasing on CRT. SYS DISPLAY

When N2 increases
- **Announce**.....**« N2 »**
- Check OIL PRESSURE increasing.

At 15 % N2 minimum
FUEL LEVER.....**ON**

Notes : 1. As required (quick turn-around, tail wind), set FUEL LEVER to ON at max motoring speed. 2. Max motoring speed is assumed when there is no significant increase in N2.

- **Announce**.....**« FUEL ON »**
- **CLOCK**.....**START**
  - 25 sec. max from FUEL ON to light up
- EGT increasing
  Announce.....**EGT**
- **CLOCK**.....**STOP/RESET**
- N1 increasing
  Announce.....**« N1 »**
- **N2 45 %**
  announce.....**« N2 45 % »**
- Check START 2 OPEN light extinguished.
  Note: Start valve is fully closed when engine reaches ground idle.
- **Announce**.....**« VALVE CLOSED »**
- **N1, N2, EGT and FF**.....**check at IDLE**
  (at ISA, sea level : N1 about 24%, N2 about 65%, EGT about 400 C and FF about 600 kg/h)
- **CRT SYS DISPLAY**..... **Check** Secondary Parameters.
- **Announce**.....**« ALL PARAMETERS CORRECT »**
- **Announce**.....**« START ENGINE 1 »**
- Repeat the start sequence as stated above

Note: Both ARM lights illuminate when ENG 1 N2 reaches 45%.

CAUTION

1. Monitor N2, EGT and FF indicators closely during the start for any abnormal indications. Sluggish N2 acceleration is an indication of an impending :
- HOT START, if FF is high and EGT rises rapidly.
- HUNG START, if FF is low and EGT is proportionally low.

2. The start attempt should be discontinued if :

a) EGT does not rise within 25 seconds after FUEL ON.

b) Sluggish N2 acceleration accompanied by rapidly increasing EGT or/and tail pipe torching reported by ground crew.

c) N2 stabilizes below ground idle.

d) If fuel or ignition is inadvertenly interrupted.

After placing the FUEL lever to OFF, maintain starter engagement and continue motoring the engine for 30 seconds to ventilate the combustion chambers.

3. The start attempt should be discontinued if an indication of N1 is not obtained within 30 seconds of N2 idle operation.

4. If starter engagement is interrupted, the starter may be reengaged below 20 % N2 (30 % maximum, 0 % recommended).

5. Operational conditions may necessitate the use of starter inlet air pressure below 25PSI. Should these conditions arise, extended time to idle and higher EGT peaks may result. Under these conditions, the start cycle must be closely monitored and appropriate action taken to prevent a hung or hot start.

R **APU BLEED**.....**OFF**
R APU BLEED is selected OFF just after engine start to avoid
R engine exhaust gas ingestion.
R
R **APU**
R **- MASTER sw** .....**OFF**
R **Note : APU shut down may be delayed if APU BLEED**
R **supply is required.**

ENG START PANEL
- IGNITION rotary sel .....**OFF**

INFO : ARM Its will extinguish

- The PF turning the ENG START IGNITION rotary selector to OFF is the signal for the PNF to commence the AFTER START actions.

ENGINE WARM-UP
After start to avoid thermal shock, the engine should be operated at idle or near idle for at least 3 minutes prior to advancing the thrust lever to high power. Taxi time at idle may be included in the warm-up period.

ENG ANTI ICE .....**AS REQ**

Note : Test of the ENGINE ANTI ICE VALVES must be performed prior the first flight of the day when icing conditions are expected or existing.

- **ENG 1 and ENG 2 ANTI ICE VALVE**.....**ON**
  Check ON blue lights illuminate.
- **ENG 1 and ENG 2 ANTI ICE VALVE**..... **OFF**
  (If icing conditions are not expected or existing).

Note 1: Icing conditions may be expected when OAT or TAT is below + 8°C with visible moisture.

Note 2: If icing conditions exceed 30 тin. or if significant engine vibration occurs, the engine should be accelerated to 70 % N1 minimum for approx 15 seconds prior to higher thrust operation.

WING ANTI ICE ....**AS REQ**

Note : WING ANTI ICE valves stay closed as long as the aircraft is on the ground.

SLATS and FLAPS..... .....**SET for T/O**

- Set SLATS/FLAPS and KRUGER for T/O, and
- Check position on SFPI.
- If taxiing in slush conditions, keep flaps retracted
- Until reaching the holding point before take off.

GROUND SPOILERS .....**ARM**

AIL TRIM and RUD TRIM..... .**ZERO**

PITCH TRIM..... **Set for T/O**

ECAM.....**check STATUS**

ECAM DOOR Page.....**Select**
Check all slides armed
Deselect DOOR page after slide verification.

Clear to disconnect..... **Announce** R

- Ground crew must ensure chocks removed, nose wheel R
  steering by-pass pin removed and area clear for taxi. R
  Interphone is disconnected. R
- Check for hand signal display on the left/right side to R
  show all clear for taxi. R

AFTER START CHECK-LIST..... **Completed**

NOSE Light ..... **TAXI**
Select NOSE Light to TAXI day and night

TAXI CLEARANCE ..... **OBTAINED**

PARKING BRAKE ..... **OFF**

- Release the parking brake handle and check brake pressure zero.

ELAPSED TIME ..... **Start**
To record block time

EXTERIOR LTS ..... **AS REQ**

THRUST LEVERS ..... **AS REQ**

In order to get the aircraft moving, little if any power above idle thrust will be required (max 40% N1). Thrust should normally be used symmetrically. Once aircraft is moving little thrust is required.

Use of engine anti ice increases ground idle thrust, care must be taken on slippery surfaces.

The wing mounted engines are close to the ground. Avoid placing engines over unconsolidated or unprepared ground e.g over the edge of taxyways. Avoid high thrust settings at low ground speeds due to the risk of ingestion (FOD).

BRAKES ..... **Check**

. Brakes should be checked once the aircraft is moving.

R The main purpose of the brake check is to check that green pressure has taken over and that yellow pressure is at 0 on the brakes pressure triple indicator.

. Thereafter the normal maximum taxi speed should be 20 lets in a straight line, 15 kts for a sharp turn. The ground speed is difficult to assess so monitor ground speed on ND. Do not "ride" the brakes, as 20 kts is exceeded, apply brakes smoothly and decelerate to 10 kts, release the brakes and allow the aircraft to accelerate again.

CAUTION
If the brakes fail during ground operations, immediately select the BRK/A/SKID sw to ALTN-OFF and modulate the brakes with pedals. Brake pedals should be released when the A/SKID is switched OFF. Otherwise the pedal braking orders will be taken into account and the aircraft will react strongly. In an extreme emergency and only if pedals are ineffective with the antiskid OFF the aircraft may be stopped with the parking brake (full pressure)

CAUTION
- If aircraft has been parked in wet conditions for a long period, efficiency of first brakes application at low speed will be reduced.

ECAM ..... **Select F/CTL page**

FLIGHT CONTROLS ..... **Check**

At a convenient stage during taxi:

1. The PNF checks full travel and feel of the elevators and ailerons/spoilers, whilst monitoring on the ECAM F/CTL page.
2. The PF holds the nosewheel steering handle to maintain the aircraft direction and checks full travel and feel or the rudder, whilst the PNF monitors the ECAM F/CTL page.
   Check ail indications return to zero position with respective controls neutrals except the ailerons where droop position is indicated.

Note 1: HYD SYS LO PR warning may occur if test is performed on more than one axis at a time.

Note 2: FLIGHT CONTROL check sould be done with CWS OFF. If CWS is selected, full travel will not be available.

Note 3: During aileron check, rudder deflects left or right coordinating with aileron movement (yaw damper input).

ECAM ..... **deselect F/CTL page**

ATC clearance ..... **obtain/confirm** R

TAKE OFF DATA/CONDITIONS . . .. **Check/Revise**

- If take off data have become more limiting such as wind charge or tower temperature increase, or in case of runway change, prepare updated take off data and as appropriate :

SLAT/FLAP LEVER ..... **AS APPROPRIATE**
• Select Take off position

V2 ..... **Reset on FCU**
Initial climb speed ..... **preset on FCU** R
FLX TO temperature ..... **REINSERT IN TRP**

FMS
V1, VR ..... **REINSERT**

F-PLN (Runway) ..... **REVISE**

F-PLN (SID, TRANS) ..... **REVISE or CHECK**
Particular care should be taken to confirm the ATC clearance agrees with the FMS if NAV is to be used.

AFS ..... **AS REQ**
AP cannot be selected in CMD for Take off.
CLEARED ALT ..... **Set on FCU**
IF PROFILE NAV mode is used R
PROFILE ..... **ARM**
NAV ..... **ARM**

- If an ATC HDG is required after take off set the heading on the FCU, NAV will be disarmed R

INITIAL AFTER TO. HDG ..... **Set on FCU/AS REQ** R

FD ..... **Check selected ON**
FMA ..... **Check**

FLIGHT INSTRUMENTS..... ....**Check**

- Scan instruments panels observe no abnormal flag on instruments.

RADAR (if required)..... ..**ON**

. If the radar is required for the flight the following test procedure is recommended :
Adjust the tilt downward until ground returns appear and then slowly adjust it in 1 to 2 degrees steps, up to 15° UP_r for weather returns. Select tilt at 4° UP for take off.

ATC code..... .....**Confirm/set**

TAKE OFF BRIEFING..... ....**Confirm**

This briefing should normally be only a brief confirmation of the thorough take-off briefing made at the gate. Any changes in the clearance should be addressed at this time. As extensive use as possible of the displays should be made. eg.

Take off on RWY 07 (TAKE OFF page), weight 150 t (left ECAM), Slat/Flap 15/15 (SFPI + handle), 50 t fuel (L-ECAM), FLEX 50°, 93% N1 (TRP), LMG2D departure (F-PLN page) V1 151, V2 161, VR 164 (TAKE OFF page + PFD) initial cleared ALT (PFD + FCU)."

CABIN REPORT .....**Received**

- Obtain cabin report from purser, as a minimum :
« CABIN SECURED for T.O. »

T/O CONFIG TEST pb..... ...**PRESS**

ECAM ....**NORM FOR TO**

BEFORE T.O. C/L DOWN TO THE LINE ...**COMPLETE**

TAKE OFF or LINE UP CLEARANCE ..... **Obtain**

APPROACH PATH CLEAR OF TRAFFIC .....**Check**

R **CABIN CREW** .....**Advise**

BRAKE Temperature..... **Check**

Check brake temperature on SYS display.

- If BRK FAN is ON, indicated temperature must be below 150°C to ascertain actual brake temperature below 300° C
- If above 150°C with BRK FAN is ON, delay takeoff and continue brake fan operation until indication drops below 150°C.

Note : 300°C actual brake temperature constitutes the BRAKETEMP HI threshold. Takeoff is only permitted with temperatures below.

BRAKE FAN ..... **OFF**

AUTO BRK.....**MAX**

- ON It illuminates
- AUTO BRK may be armed with parking brake on.
- Selection of MAX mode before take off will improve safety in the event of an aborted takeoff.
  If take off must be aborted, the autobrake system will apply the maximum braking (if the ground speed is above 85 kt) as soon as the thrust levers are set to idle which represents a single action done without delay.

Note : Do not set N1 above 75 % on both engines with parking brake ON.

IGNITION..... .....**CONT RELIGHT/AS REQ**

CONT RELIGHT is advisable if :
- Runway with standing water
- Heavy rain
- Heavy rain or severe turbulence expected after T.O.

PACK VALVE .....**AS REQ**

- If required to increase take-off performance, select pack valves OFF, or use APU bleed to supply the packs.
- If APU bleed supply is used and wing anti-ice is required one pack must be selected off.

ATC.....**SET ON/AS REQ**
ALT REPORTING .....**SET ON/AS REQ**

TCAS (if installed).....**Set to TA/RA**

R - For operation on parallel runways, select TA only.

EXT LTS.....**SET**

- Use NOSE TO, RUNWAY TURN OFF and LANDING LT to minimize bird strike hazard during T/O and set NAV and LOGO as required.

BEFORE TAKE OFF
CHECK LIST BELOW THE LINE.....**COMPLETED**

Take off with PMC and ATS ON is the normal procedure.

R - **Announce** ..... **"TAKE OFF"**
- **CLOCK** ..... **START**
- Slightly advance throttles and monitor spool-up, until both engine are above idle (approx. 40% N1).
- **BRAKES** ..... **RELEASE**
  Rolling takeoff is recommended when possible
- **GO-LEVERS** ..... **TRIGGER**

Note: CM1 keeps his hand on throttles until V1 is reached.

DIRECTIONAL CONTROL ..... **USE RUDDER PEDALS**

Note 1: Keep control column forward of neutral and release progressively to achieve the neutral position by 100 kt.

Note 2: In case of vibrations or shimmy of the nose wheels, release forward pressure and apply a slight back pressure on the control column as necessary. Vibrations will probably disappear as the weight on the nose wheel is reduced.

- **PFD/ND** ..... **SCAN**
- Check FMA on PFD
  THR, SRS, RWY (or HDG), FD1 (2)

R - **Announce** ..... **FMA indication**
- Check FMS position update (A/C symbol on runway threshold)
- **TAKE-OFF N1** ..... **CHECK**
- Check take-off N1 is set prior to reaching 80 Kt.
- **Announce** ..... **« POWER SET »**

AIRSPEED and

ENGINE INSTRUMENTS ..... **SCAN**

- Scan the airspeed and engine instruments throughout take off

When speed is 100 kt on PFD
- **PNF Announce** ..... **« ONE HUNDRED KNOTS »**
- PF Crosscheck speed reading on own PFD.
- **Announce** ..... **"Check"**

Below 100 kt the decision to abort the T.O., may be taken at the discretion of the captain. Above 100 kt rejecting the T.O. is a more serious matter and becomes more critical as V1 speed approaches.

Note : THR mode changes to blue indication (ATS declutch by 100 kts)

V SPEED

- At V1
  Announce ..... **"V1"**
- At VR
  Announce ..... **"ROTATE"**

AIRCRAFT HANDLING

- **ROTATION** ..... **PERFORM**
- At VR rotate the aircraft smoothly using continuous rotation to establish the required pitch attitude (not to exceed 18) as directed by SRS pitch command bar.
- The pitch bar is commanded to maintain V2 + 10 kt or a max pitch of 18°. In case of engine failure pitch bar will maintain V2 or the existing speed whichever greater.
- If no SRS rotate to 12.5° Pitch
- If into-wind aileron has been applied on the ground start to centralize the control column during rotation so that the aircraft gets airborne with wings level. R R

LANDING GEAR

- **Announce** ..... **« POSITIVE CLIMB »**
  Announce positive climb when the vertical speed indication is positive
- **Order** ..... **« GEAR UP »**
- **L/G lever** ..... **UP**

GROUND SPOILERS ..... **DISARM**

EXTERIOR LTS ..... **SET**
- **NOSE AND RWY TURN OFF Lts** ..... **OFF**

Landing lights may be left on according to the airline policy/local regulations

AP ..... **AS REQ**

AP 1 or AP 2 may be engaged. If AP already engaged in CWS press CWS/CMD pb to engage CMD.

AT THRUST REDUCTION ALT

- **TRP** ..... **Check LIM MODE Indication "CL" and "AUTO"**

Announce ..... **FMA indication** R
Check P.THR and P.CLB engagement R

LANDING GEAR lever ..... **Neutral**

- When L/G Its are extinguished, set the L/G lever to neutral.
- **Announce** ..... **« GEAR UP »**

PACK VALVE ..... **Set one to ON**

Check flow bar in-line.

Note 1: Selecting both packs on simultaneously may affect passenger comfort.
Note 2: Selecting a PACK ON before reducing T/O thrust may lead to an engine overboost. R

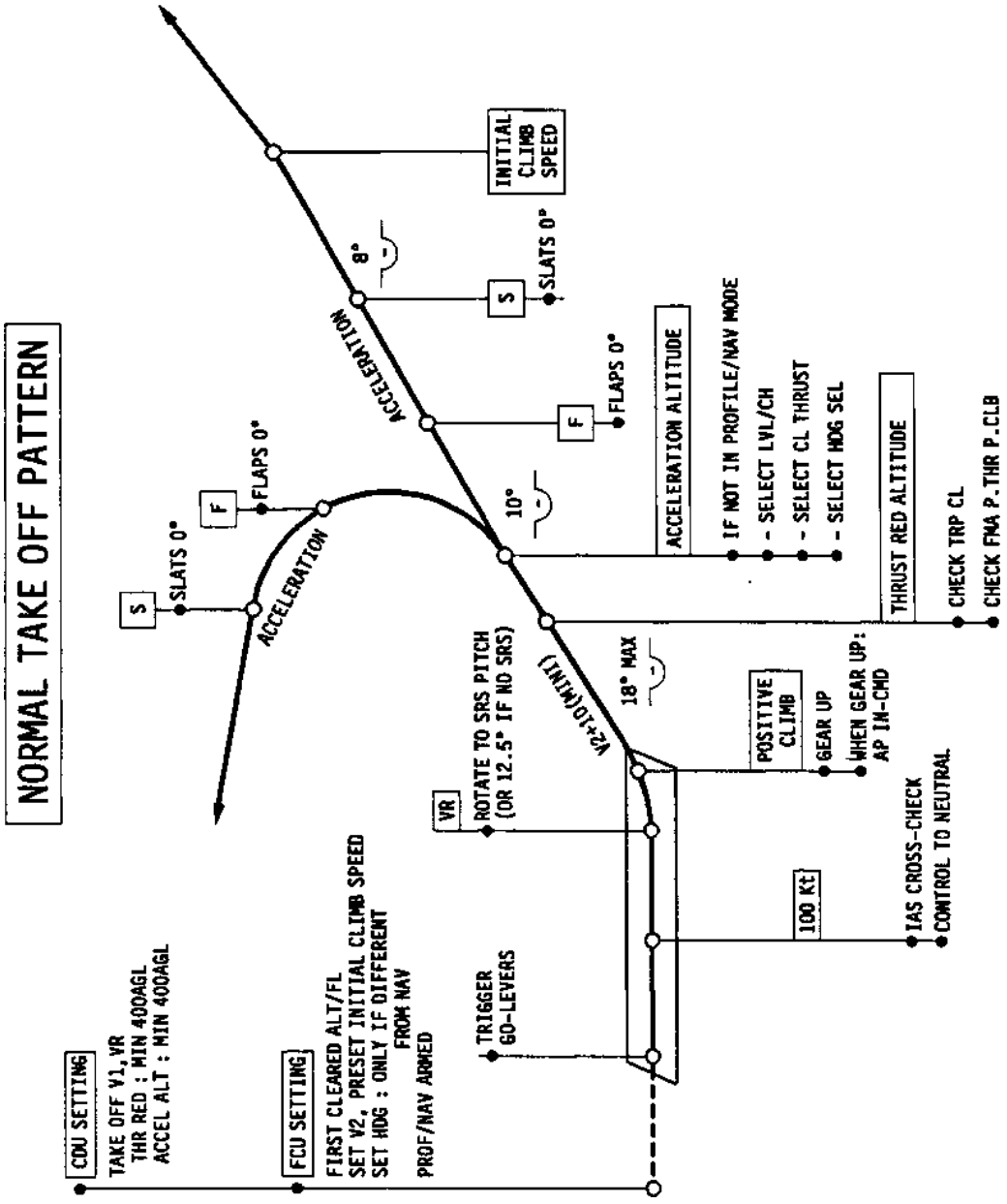
SLATS/FLAPS (and KRUGER)

Retract FLAPS once above acceleration altitude (or once in CLB phase). This ensures that the aircraft is effectively accelerating towards CLB speed.

- **At F speed minimum** (F **on** PFD)
  order.....**« FLAPS ZERO »**
- **SLATS/FLAPS** .....**FLAPS 0**
  When SFPI shows FLAPS ZERO
- **Announce** .....**"FLAPS ZERO"**
- **At S speed minimum** (S **on** PFD)
  order.....**« SLATS RETRACT »**
- **SLATS/FLAPS handle**.....**SLATS 0**
  When SFPI shows SLATS ZERO.
- **Announce** .....**"SLATS RETRACTED"**

PACK VALVE..... .....**Set second to ON**

Check flow bar in-line



APU BLEED.....**AS REQ**

if the APU has been used to supply air conditioning during take off, select APU BLEED to OFF.

Use of APU BLEED is limited to 20000 ft.

ENG START .....**AS REQ**

- Set CONT RELIGHT only if severe turbulence
- Heavy icing conditions or heavy rain is encountered.

ICE PROTECTION .....**AS REQ**

- ENG ANTI ICE must be ON when icing conditions
- Exist with TAT below + 8 °.

SIGNS .....**AS REQ**

- Set SEAT BELTS sw as required.

R **TCAS (If installed)** .....**Set to TA/RA**

R Action required only if the take off has been performed

R with TA only.

AFTER TAKE OFF/CLIMB

CHECKLIST DOWN TO THE LINE .....**COMPLETED**

LANDING LTS ....**OFF/RETRACT**

When reaching the appropriate altitude according to airline policy/local regulations turn off RWY TURN OFF LTS and turn off and retract LANDING LTS.

Normal climb mode is P. THR/P.CLB .

PF CDU ..... .**PROG**

- PF CDU should be preferably set on PROG page but other pages such as F-PLN may be selected as tactically necessary.
  With the AP engaged the PF will make any required F-PLN revisions.

R • The displayed MAX FL gives at least 0.2 g buffet margin. A cruise FL entry may be made above this level in the CDU and will be accepted by the FMS, provided it is not above 41000 ft. The message "CRZ FL above MAX FL" will appear on the CDU.

- The OPT FL displayed is function of the Cost Index.

PNF CDU ..... **F-PLN**

- PNF CDU should be preferably set on F-PLN page (allowing to carry out any ATC long term lateral or vertical revisions).

CLIMB SPEEDS MODIFICATIONS :

If a speed change is required by ATC, turbulence or ops criteria (increase CLB rate) :
Select new speed using FMS TACT MODE.

ALTIMETERS ....**SET**

R • At transition altitude set standard on all altimeters.

- Cross check baro settings and altitude readings.

CRZ FL ....**SET AS RQRD**

- If ATC clears the aircraft to intended CRZ FL or above, there is no need to modify the CRZ FL inserted in INIT A page during cockpit prep. Higher CRZ FL will be taken automatically into account by FCU ALT knob selection.
- If ATC limits CRZ FL to a lower level than the one inserted in the INIT A page (or present on PROG page) it is necessary to insert this lower CRZ FL in the PROG page. Otherwise there is no transition into CRZ phase : consequently the speed targets and Mach are not modified.
  In that case FMA will display SPD (MACH) / ALT / NAV instead of P.SPD/P.CLB/NAV.

AFTER T.O./CLIMB C/L

BELOW THE LINE ....**COMPLETED**

RADAR ..... .**AS REQ**

Adjust tilt angle depending on aircraft attitude and the selected range of the ND. A slightly negative tilt is required to avoid over-scanning and to provide some ground returns at the top edge of the ND.

* When time permits :

- Recopy the active flight plan in the secondary if an immediate return flight plan has been constructed.
- Check optimum and maximum altitude capability.

THRUST RATING PANEL ..... **CHECK**

- Check LIM MODE indication CL (Set CR if not in PROFILE).

ECAM MEMO/STATUS ..... **REVIEW**

ECAM SYS PAGES ..... **REVIEW**

Periodically review system pages and in particular :

ENG - Oil Press and temperature

HYD - Fluid quantities. Green sys is lower than on ground following L/G retraction

AC - GEN parameters, IDG OIL temp

DC - Battery charging status

BLEED - BLEED parameters

COND - Check duct temperature compared with zone temperature. Avoid large difference to improve pax comfort.

PRESS - Check Cabin ALT and V/S.

FUEL - Check distribution

F/CTL - Note any unusual surface position.

FLIGHT PROGRESS ..... **CHECK**

Flight progress should be monitored in the conventional way, when overflying a waypoint, check the track and distance to the next waypoint.

- Check Fuel: check FOB, Fuel PRED (FMS) and compare with computed Flight Plan.

AIRCRAFT TRIMMING

The minimum drag for cruise flight is obtained when the control wheel is neutral. This condition is obtained by the following procedure :

- Ensure symmetric fuel loading,
- Ensure accurate symmetric thrust, autothrottie disengaged,
- Engage the autopilot, if not already engaged, in HDG SEL mode and in ALT mode in CMD,
- Adjust the rudder trim in order to get a zero control wheel position (aileron deflection scale on the wheel),
- Verify that the bank angle is not too large for passengers comfort (1.5° appears to be a reasonable value),
- Check again the lateral trim conditions and retrim if necessary when there is a noticeable change in flight conditions.

Note: The same procedure applies to the low speed range of the aircraft including single engine climbout.

NAVIGATION ACCURACY ..... **CHECK**

Navigation accuracy must be monitored, particularly when IRS only navigation occurs.

Insert a VOR/DME ident in the FMS BRG/DIST to function, check the bearing and distance compared to the same VOR/DME remotely tuned on the PROG page and displayed on the DDRMI.

Note : It should be remembered that even in IRS ONLY navigation, the FMS may be more accurate than a distant VOR/DME.

If the check is satisfactory : FMS position is reliable.

- ND ARC or MAP and FMS NAV MODE may be used.

If the check is unsatisfactory : FMS position is not reliable.

- Refer to raw data for navigation and monitor.
- If a gross mismatch between display and real position is detected : disengage NAV mode and use Raw data navigation (possibly switch to ROSE MODE so as not to be mislead by FMS data).

RADAR TILT ..... **ADJUST**

Cruise : (middle alt up to 20 000 ft) — A near zero degree tilt setting should be adjusted. Should two different ranges be selected on both NDs it is recommended to set a down tilt with the shorter ND range (in order to monitor and detect weather activity) and a near zero tilt with the longer ND range (in order to plot course changes).

Cruise (high altitudes) : A slight downward tilt is recommended in addition to a visual scanning.

CABIN TEMP ..... **MONITOR**

Regular attention should be paid to the ECAM CRUISE page so that passenger cabin temperatures may be monitored and adjusted as necessary.

Descent preparation and approach briefing take approx 10 minutes. So they should be initiated approx 80-100 miles before top of descent.

ECAM MEMO PAGE.....**CHECK**

- Check STATUS on MEMO page. Review if required. Take particular note of any landing capability downgrade or any other aspect affecting the approach and landing.

WEATHER AND LANDING

INFORMATION.....**OBTAIN**

- Check weather at alternate and destination, including runway in use.

LANDING ELEVATION.....**Set**

Note 1: If QFE is used set 0 on LANDING ELEVATION counter.

Note 2: In case the destination field elevation is higher than the actual cruise CAB ALT, combined with low aircraft cruise FL, set the LANDING ELEVATION counter to landing field elevation before initiating the descent, in order to permit CAB ALT to reach the landing field elevation before landing.

FUEL.....**CHECK**

- If flight has been performed below FL 200, check on ECAM FUEL page that there is less than 2000 kg (4400 Ibs) of fuel in trim tank. If there is more than 2000 kg (4400 Ibs) of fuel in trim tank, check TRIM TK PUMPS are selected ON and select TRIM TK MODE push-button to FWD position.

FMS

LANDING DATA..... **PREPARE**

- Set speed bugs on STBY ASI (VAPP) and Green Dot.
- On FMS APPR page

R **LANGIND CONFIG**..... **Check**

R If landing in 20/20 config, select on FMS APPR page.

MDA..... **INSERT**

For CAT II or CAT III approach

On FCU DH..... **INSERT**

VAPP is computed as is the DECEL point where the aircraft should decelerate.

DESCENT WIND PROFILE.....**INSERT**

This insertion, on the DES FORECAST page should be made early to ensure optimum Top of Descent point can be re-computed and ensure that it is ahead of the present position.

If no wind is inserted, wind is computed by interpolation between CRZ wind and no wind at destination.

F-PLN..... **CHECK/MODIFY**

STAR/APPROACH.....**INSERT**

NAVAIDS..... **CHECK**

Set Navaids as required and check idents. If a VOR/DME exists close to the airfield, it should be selected systematically and its ident should be set on PROG page BRK/DIST for navigation accuracy monitoring during descent.

GO AROUND page.....**CHECK/MODIFY**

Check/modify the THR RED ALT and ACC ALT.

SEC F-PLN page.....**AS REQ**

If weather is OK, SEC F-PLN can be used for setting another possible approach and/or RWY as a backup at destination airfield.

If there is a last minute RWY change, it is then only necessary to activate SEC F-PLN not forgetting to set new MDA/DH and navaids.

APPROACH BRIEFING

It is recommended to use FMS pages and ND as a guide for descent and approach briefing. Main points to be covered are :

Navaid	- ILS, VOR selection procedures and Crossing altitudes.
F-PLN page	- STAR, APPR, TRANS, MISSED APPROACH
APPR page	- Landing Config, speeds, MDA,
FUEL PRED	- Fuel needed for diversion, holding fuel available.

Runway conditions, lighting, dimensions, go around procedure, ground spoiler, reverser operation, autobrake selection, weather at destination

Note : if AP disengaged, it is recommended to descent at 0.8 M or below to avoid alfa-trim activation.

DESCENT CLEARANCE.....**OBTAIN**

WHEN DESCENT CLEARANCE IS GIVEN BY ATC

FCU ALT KNOB.....**TURN to select cleared altitude**

FCU ALT KNOB.....**PULL**

P. THR/P. DES ARMED.....**CHECK FMA**

IMM DES prompt on CDU (1 R).....DISPLAYED

ANTI ICE.....**AS REQ**

During descent ENG ANTI ICE should be ON when icing conditions are met, or when moderate to severe precipitation is encountered.

IGNITION.....**AS REQ** R

Ignition should be selected to CONT RELIGHT prior to R

ENG ANTI ICE selection. R

DESCENT INITIATION

Descent will be initiated automatically in profile mode at the TOD point, provided a lower altitude has been preset on the FCU.
The FMS will hold the CRZ FL until the top of descent. 30 sec. before reaching the T/D, P. DES will flash to indicate that the descent will be initiated without any further pilot action.

- **If ATC requires an early descent.**
  The descent may be initiated immediately (before reaching T/D) by pressing IMM DES prompt on CDU (F-PLN line 1 R). In this case the descent will be performed at 1 000 FT min (value which can be changed on CDU) until the precomputed path is reached.
- **If the descent is delayed by ATC**
  When passing the T/D the A/C holds the CRZ ALT as the FCU has not yet been lowered. DECEL prompt is displayed in line 1 R. Pressing this prompt makes the A/C reduce speed to green dot (highest value between FAC and FMS if they are different). As soon as clearance is given by ATC. Select the cleared ALT on the FCU, select desired descent speed on the FCU, then pull the FCU Speed/Mach knob. The descent will now be initiated in LVL/CH mode.

DESCENT MONITORING

PF CDU .....PROG
- PF CDU should preferably be set to PROG page in order to see the VDEV and DIST TO DES information

PNF CDU .....F-PLN

Note: With AP engaged PF will make any required F-PLN revisions.

- **Descent monitoring can be achieved as follows :**
  - When flying in NAV mode, P. DES mode is most probably used.
    The a/c descends along the descent flight path : VDEV is provided on PFD and on PROG page, and may be thus monitored. All constraints of the FPLN will be taken into account by the FMS.
  - When flying in HDG (TRK) modes out of the lateral F.PLN, PROFILE DESCENT should not be used.
  - PROG page displays flight plan distance to DESTINATION and can display BRG/DIST to DESTINATION if selected. The comparison of this data is usefull to monitor the descent.

    The level ↘ symbols, on ND may be used to monitor the descent as well.
    Predictions on CDU assume a return to lateral FPLN and descent flight path ; these may be used so cleared by ATC.
  - From time to time, during stabilised descent select FPA on PFD and check that remaining distance to destination is approx. the FL change required divided by FPA in degrees.

$$FPA\ (°) = \frac{\Delta\ FL}{DIST\ (NM)}$$

DESCENT ADJUSTMENT

If RATE INCREASE is desired :

- PREFERABLY increase descent SPD (by use of selected speed) if comfort and ATC permit. It is economically better (Time / Fuel).
- Maintain High SPD as long as possible (SPD LIM may be cleared, subject to ATC clearance).
- If aircraft is high with high SPD, it is more efficient
- To keep high speed until ALT* and THEN decelerate
- Than to mix descent and deceleration.

  If A / C goes below the desired profile, use SPEED V / S mode to adjust rate of descent.
- **SPEED BRAKE**..... **AS RQRD**

  In DES speedbrake may be used to increase the rate of descent. 1/2 speedbrake extension may be used to maintain the required rate of descent when engine anti ice is used.

  In DES mode : if a/c is on, or below, the flight path and ATC requires increase rate of descent do not use speed brake since rate of descent is dictated by planned flight path. In this case select MAX DES mode on TACT page with speed brake.

  Note: 1. Use of full speedbrake above 0.78 M is uncomfortable for passengers.
  2. With ANTI-ICE ON engine power is increased which will reduce the descent path angle at idle. This can be compensated for by an increase of descent speed, or by extending 1/2 speed brake.
  3. Do not use speedbrake in 30/40 config.
  4. Do not change speedbrake position during configuration changes. R R

RADAR TILT..... **ADJUST**

Each 10 000 ft of the planned descent and down to around 15 000 ft some occasional increases of tilt in the upward sense are recommended to eliminate excessive ground clutter on the upper part of the ND.

From 15 000 ft and each 5 000 ft, increase the tilt angle setting of one degree upwards per 5 000 ft, in order to keep the ND relatively free of ground clutter.

ALTIMETERS.....**SET** R

Set QNH on all altimeters when cleared for an altitude. R
Crosscheck baro settings and altitude readings. R

NAV ACCY.....**CHECK**

When reaching Terminal Area, *(*~ 50 nm from DEST) xcheck NAV using PROG page (BRG/DIST computed data) and DDRMI (VOR/DME raw data).

The Following approach procedure assumes the use of AP on in profile mode, which is the recommended Procedure.

INITIAL APPROACH

IGNITION ..... **AS REQ**

- Select IGNITION rotary sel to CONT RELIGHT if required. It is recommended to select CONT RELIGHT if the landing runway is covered with standing water, in heavy rain, or if severe turbulence is expected in the approach or Go around area.

SIGNS

- **SEAT BELTS sw** ..... **ON/AUTO**

EXTERIOR LTS ..... **AS REQ**

- Set RWY TURN OFF It ON at FL 100
  Use LAND Lts as per company policy/regulatory recommendation

POSITIONING

R Check aircraft positioning for a smooth transition to the

R approach.

Rule of thumb : 9000 ft at 250 Kts - 30 nm to touchdown

NAV/COM FREQ ..... Check/Set

- Set VHF as required
- Set ILS frequency and course
- Set VOR/NAV/ILS switch to ILS as required

APPROACH PHASE

R If ATC requires a particular speed to be flown then use selected speed. When ATC speed constraint no longer applies, return to profile mode.

NAV ACCURACY ..... **Check**

Monitor NAV accuracy and be prepared to change approach strategy. If IRS ONLY NAVIGATION is displayed crosscheck nav accuracy.

RADAR TILT ..... **Adjust**

Increase tilt as required to keep the ND clear of ground clutter.

ND ..... **Check**

PF ND MODE ..... **MAP for ILS approach otherwise ROSE or ARC**
PNF ND MODE ..... **MAP may be kept**
ND RANGE ..... **Select 15 NM**

For non ILS approach PF ND must be used in ROSE or ARC.

DH ..... **CHECK**

- Both CM1 and CM2 confirm DH setting on EFIS control box in accordance with company policy.

Baro altimeter references should be used for MDA and CAT I DH.
Radio altimeter reference should be used for CAT II and CAT III approaches as defined by approach procedures.

APPROACH CHECK LIST ..... **COMPLETE**

FINAL APPROACH

STANDARD APPROACH

ASSUMING ILS approach with ATS ON and AP ON in FD mode.

The objective is to be stabilized on the final descent path at VAPP, thrust above idle, with landing configuration at 500 ft after continuous deceleration on the glide slope.

The advantages are :

- Lower fuel consumption
- Lower noise levels
- Time saving
- Flexibility and ability to vary speed to suit ATC.

FCU.....**Green dot speed**
Check airspeed below VFE
HDG SEL knob.....**AS REQ**
Order..... ...**SLATS extend**
SLATS 15.....**Select**
Slats 15 should be extended not later than 3NM prior to the FAP (Final Approach Point) When SFPI shows SLATS 15
Announce.....**SLATS extended**
FCU.....**S SPEED**
Check deceleration towards S speed.
The aircraft should be established on the glide slope with Slats 15 at S Speed at or above 2 000 ft AGL.

* In the event that a/c speed is significantly higher than S on the G/S, or the a/c does not decelerate on the G/S, extend the L/G in order to slow the a/c down.

GPWS

If landing is planned to be performed in S 20°/F 20° landing configuration select GPWS LANDING SLATS/FLAPS switch to 20/20.

WHEN CLEARED FOR FINAL APPROACH

LAND pb on FCU.....**Press**
This enables LOC and G/S capture. The LOC will be intercepted at an angle of 20°.
2ND AP.....**AS REQ**
R **FMA**.....**Check/announce**

R **TCAS (If installed)**.....**Set TA/AS REQ**

R If landing at an airport with parallel approaches TCAS

R must be set to TA.

LOC CAPTURE.....**Monitor**
R **Announce**.....**LOC***
At LOC capture, NAV is disengaged automatically.
R Check correct ILS course set.

R **HDG SEL**.....**Synchronise**
R Synchronise HDG SEL on runway heading
G/S CAPTURE.....**Monitor**
R **Announce**.....**G/S***

GO AROUND ALT.....**SET**

At 1800 ft AGL Minimum

(Final deceleration sequence from SLATS 15/S speed to FLAPS 40/VAPP) R
Check airspeed below VFE
Order.....**FLAPS 20**
FLAPS 20.....**Select**
FCU.....**VAPP**
If ATS is OFF
THROTTLES.....**IDLE**
When FLAPS 20 on SFPI
Announce.....**FLAPS 20**
Order.....**GEAR DOWN**
L/G LEVER.....**DOWN**
GND SPOILERS.....**ARM**
AUTO BRK.....**AS REQ**

* If required, select the appropriate p.b. according to the runway length and conditions and check related ON It R
illuminated. Do not select MAX mode. R

* When landing on short or contaminated runway or when operating in low visibility weather conditions the autobrake system use is recommended. It ensures a straight roll out and optimize landing distances.

On a normal length dry runway the use of the autobrake is not normally necessary. To save brakes it is recommended to use reverse thrust until 80 kts and brakes, as necessary, according to the remaining distance.

When L/G down
Announce.....**GEAR DOWN**
Order.....**FLAPS 40**
FLAPS 40.....**Select**
Retract SPD BRK before selecting FLAPS 40. R
Config FLAP 40/VAPP should be obtained by 500 ft min.
BRK/A-SKID.....**CHECK NORM/ON position**
ECAM wheel page.....**Check**

- Check gear down and locked and 3 green indications
- Check 8 brake release indications

Note: If any brake is not released, or if residual pressure is indicated on the triple indicator, modulate brake pedals several times until release of residual pressure. If pressure remains, use Autobrake, or apply a slight brake pressure at touchdown. R R R R R R

- When Flaps 40 on SFPI
- **Announce**.....**FLAPS 40**
  Check speed approaching VAPP
- **AUTOLAND Lights**.....**TEST** R
  For CAT 2 or 3 Autolands only. This also tests the LOC and GLIDE EXCESSIVE DEVIATION WARNINGS on PFDs. R R R

if ATS is not used.

THROTTLES..... **Adjust**

WING ANTI-ICE ..... **OFF**
Only use WING ANTI ICE in case of severe icing conditions

EXT ITS.....**ON**
Set NOSE sw to TAXI LANDING LT to ON
Selecting lights on even in day light will minimize bird strike hazard.

CABIN REPORT ..... **RECEIVED**
Obtain cabin report and advise cabin crew of landing.

LANDING CHECKLIST ..... **COMPLETE**

FLIGHT PARAMETERS ..... **Check**
PF should announce any FMA modification PNF calls out:
- V/S greater than 1 000 ft/min
- Airspeed deviations of more than + 10 kt or - 5 kt
- LOC or G/S deviation greater than 1 dot.

AT OUTER MARKER, OR FINAL APPROACH FIX
Announce, cross check altitude and start clock.

At 400 ft AGL
R Check/Announce..... "LAND Green"

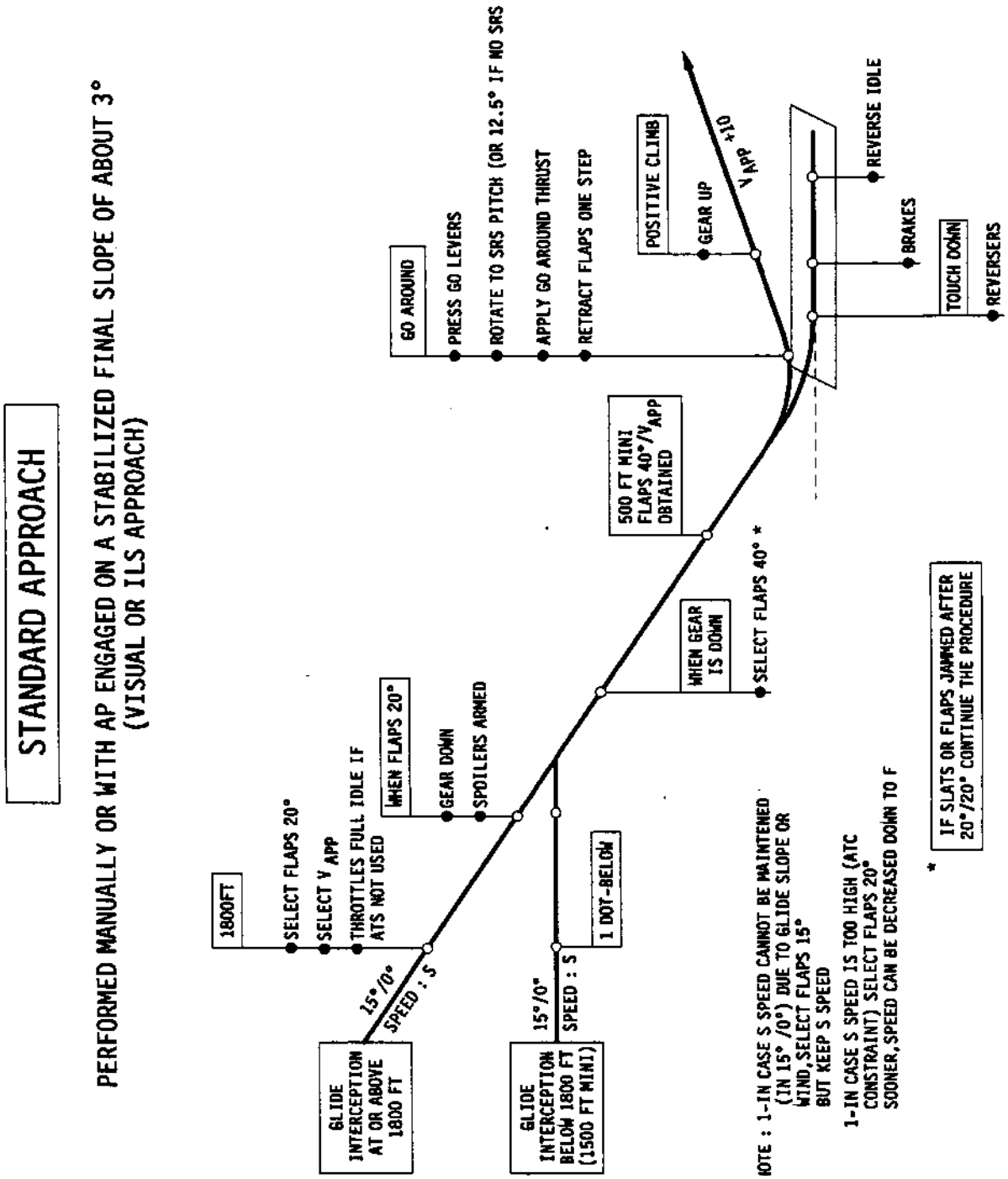
AT MDA + 100 ft

R **Announce**....."**ONE HUNDRED ABOVE**"

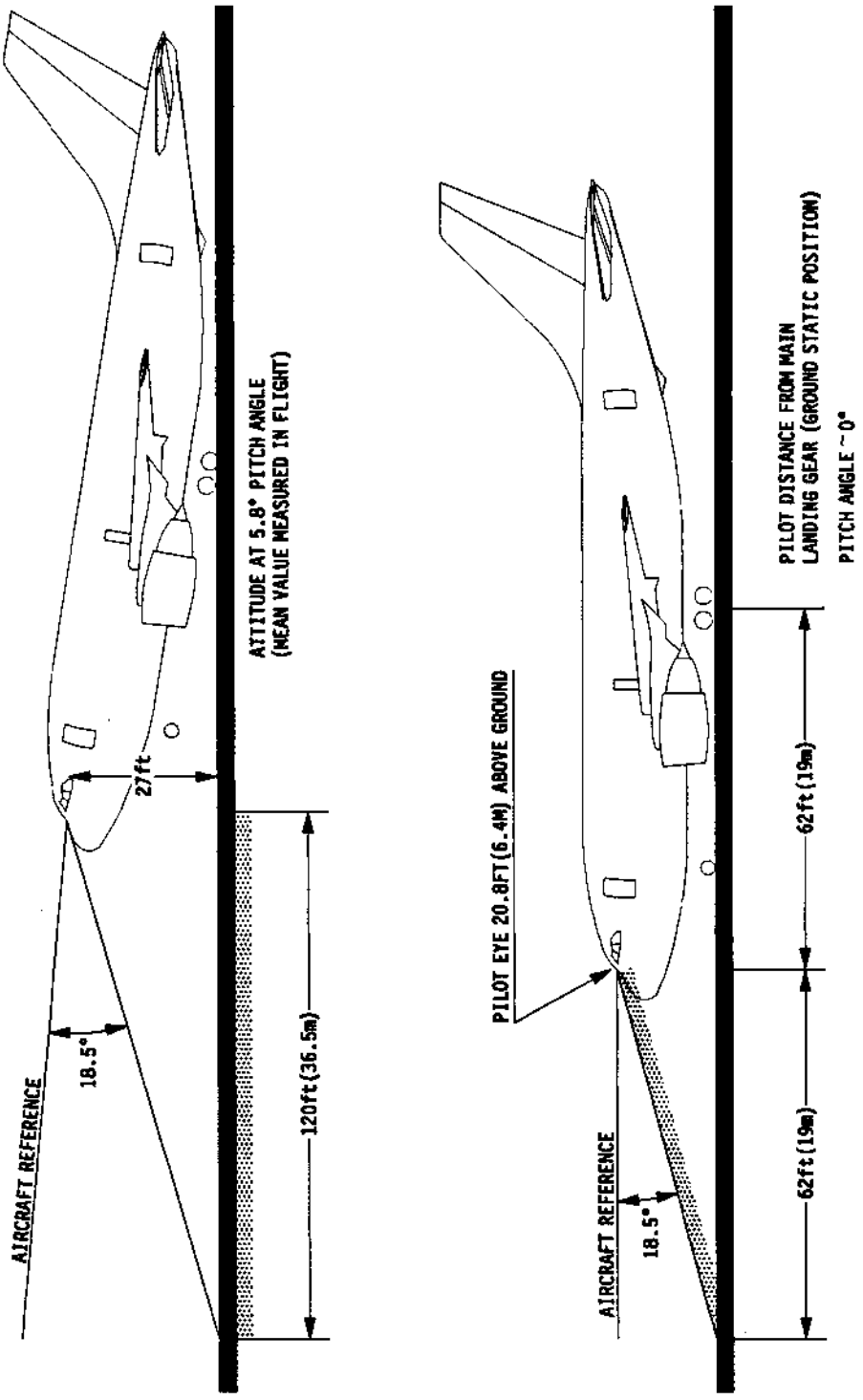
AT MDA or DH as appropriate

R **Announce**..... **"LANDING" or "GO AROUND"**
Do not "duck under" the G/S. Maintain a stabilized flight path down to the flare.

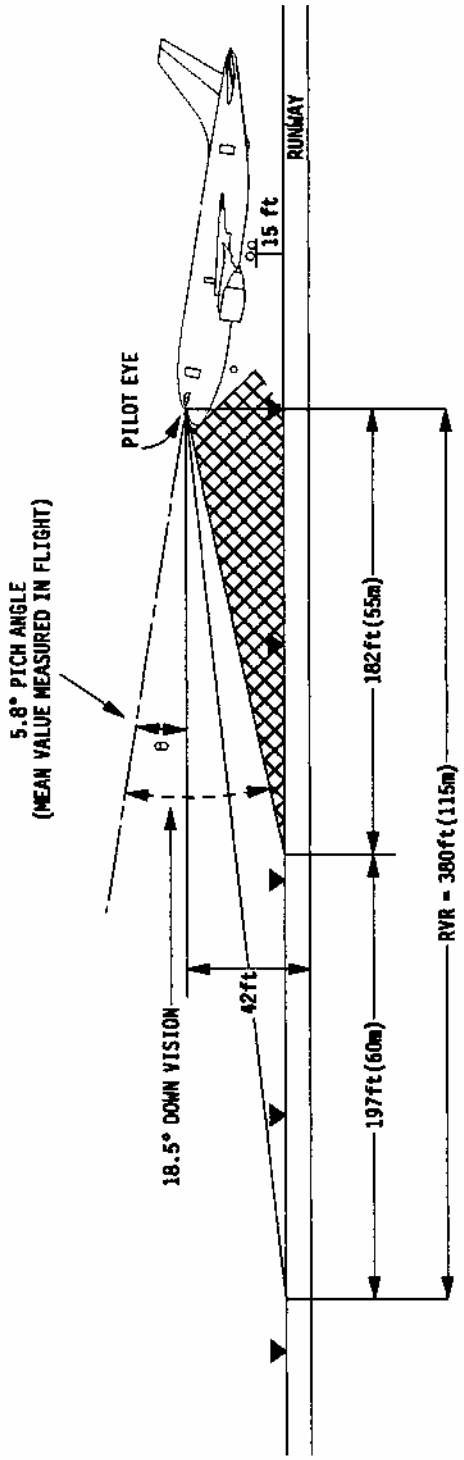
R **AUTO CALL-OUT**..... **MONITOR**
R or announce appropriate heights as per company policy
At 50 ft, aircraft one dot below G/S is 14 ft too low.

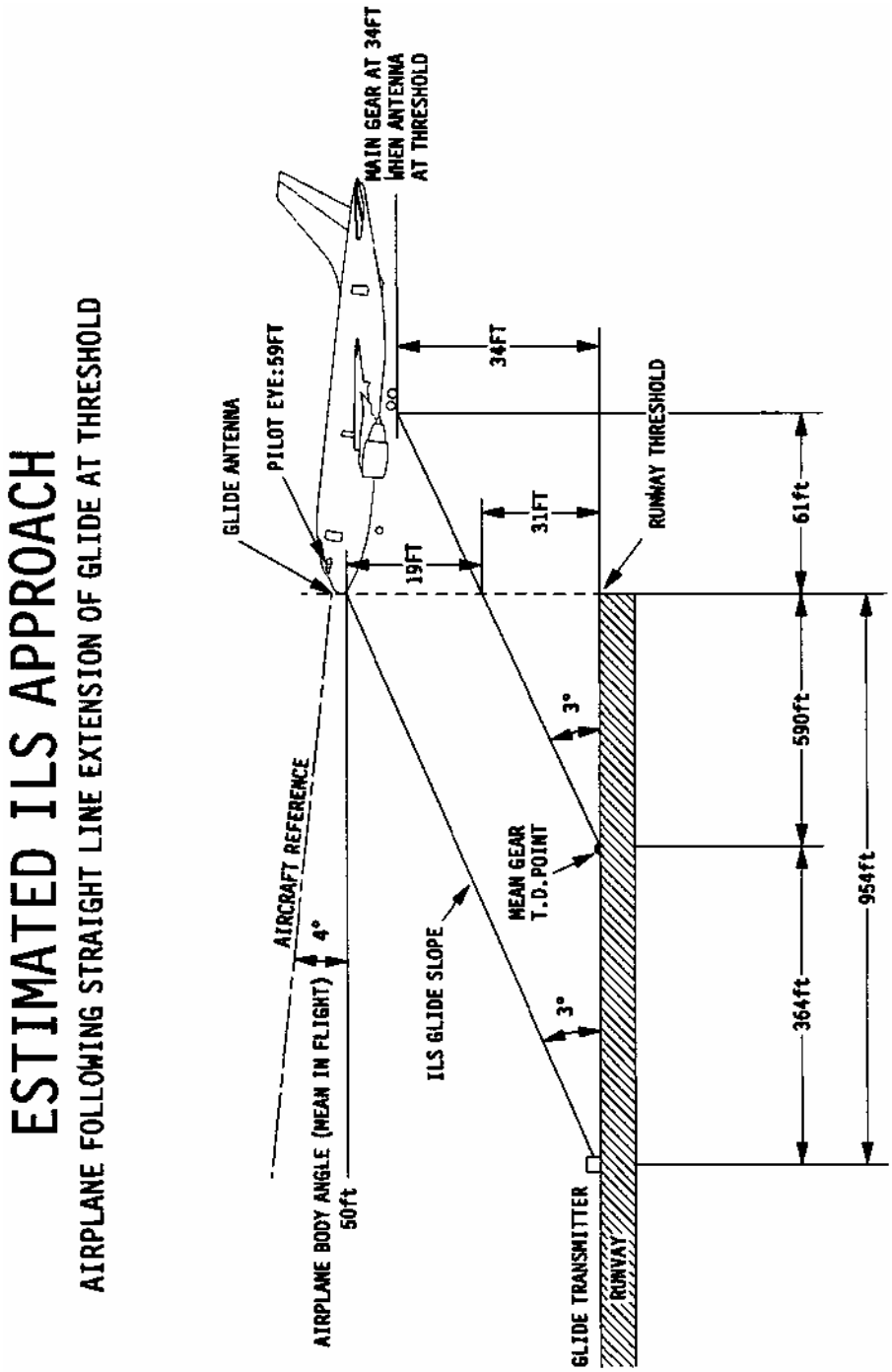


PILOT EYE ORIENTATION WITH GROUND



VISUAL GROUND SEGMENTS LANDING APPROACH H=15FT





AT 20-30 FT

FLARE.....**Perform**

Note : Do not flare too high or with too high pitch attitude. Tail strike will occur at + 13° pitch.

THROTTLES.....**monitor IDLE**

- Monitor throttles reduction to idle at 30 ft.

AT TOUCHDOWN

REVERSE . . ..**PULL**

- Immediately after touch down of main landing gear, pull reverse levers to the idle mechanical stop.

Note 1: Max/mum efficiency of the reverse is obtained at high speed.

Note 2: Maintain a slight backward pressure on reverse levers in order to identify the release of the idle mechanical stop. Dp not move reverse levers towards stow position while reversers are in transit; such action may cause system damage.

R **Note3: If one or both REV UNLK It remains on, apply reverse normally.**

R **Note 4: If the airport regulations do not permit the use of**
R **reversers, maintain reverse idle until taxi speed**
R **is reached**.

- **Max. reverse thrust**.....**APPLY**

- **N1, EGT and IAS**.....**MONITOR**

CAUTION
The use of high levels of reverse thrust at low airspeed should be avoided since the distortion at the air flow caused by gases re-entering the compressor can cause engine stalls which may result in excessive EGT.

GROUND SPOILERS.....**check extension**

- Check ground spoilers extension after touch down on ECAM system display.

INFO : If they are not armed they will extend by reverse lever operation.

DIRECTIONAL CONTROL.....**RUDDER PEDALS**

- Do not use NWS Control handle before taxi speed is reached

BRAKES..... .....**AS REQ**

- Apply brakes as required or monitor autobrake

CAUTION
If brakes are found inoperative, switch immediately BRK-A/SKID to ALTN/OFF and modulate brake pressure as required at or below 1000 PSI. Brake pedals should be released when the A/SKID is switched OFF. Otherwise the pedal braking orders will be taken into account and the aircraft will react strongly.

Note : Re/ease indication on ECAM appears only when the release order is 90% or more of the maximum possible order.

AT 80 KTS or IAS FLUCTUATIONS

REVERSE ....**IDLE**
At taxi speed
REVERSE levers ....**STOW**

- Stow the reversers when taxi speed is reached and before leaving the runway.

CAUTION
Do not recycle if reverse fails to stow. Engine shut down is recommended.

CAUTION
On taxiways, the use of reversers, even restricted to idle thrust, may have the following effects :
- Fine sand and debris may be ingested which might be detrimental to both the engine and airframe systems.
- On snow covered areas, snow will be recirculated into the air inlet, which may result in engine flame out or roil back.
Except in an emergency, reverse thrust should not be used to control aircraft speed while taxiing.

Simultaneously :
Announce ...."**GO AROUND-FLAPS...**"
R Announce GO AROUND and the required FLAP
R setting
GO LEVERS ....**Press**

Note : Depressing one GO LEVER is sufficient to initiate GO AROUND.

THROTTLE LEVERS ....**TOGA**
Follow through on THROTTLE LEVERS if ATS engaged or manually set GO AROUND thrust if ATS is not engaged.
Rotation ....**Perform**
Rotate aircraft to achieve a positive rate or climb and establish the required pitch attitude (not to exceed 18°) as directed by the SRS pitch command bar.

R **Announce**..... ...**FMA indication**
R Check THR, GO AROUND

Note : PF CDU switches automatically to GO AROUND phase.

FLAPS ....**Retract one step**
Announce new FLAP positon when indicated.
THRUST ....**Check/Adjust**
Announce ....**Positive climb**
Order..... .**GEAR UP**
L/G selector..... ..**UP**
NAV or HDG mode..... ..**Select**
Announce ..... .**GEAR UP**

At thrust reduction altitude
THROTTLES ....**Check/Adjust**
CL on TRP if ATS on.

At GA acceleration altitude
SPD/MACH ....**Select 250 Kts**
LVL/Ch..... ..**Select**
- Retract slats/flaps on schedule

MISSED APPROACH PROCEDURE ..... **FOLLOW**

This check should be done once the aircraft has cleared the runway.

LAND LTS ....**RETRACT**

Unless otherwise necessary.

ICE PROTECTION .....**AS REQ**

- Set ENG ANTI ICE OFF if not required
- IF ENG ANTI-ICE is used, take care to control taxi speed especially on wet or slippery surfaces (ground idle is increased)
- If in use set WING ANTI ICE SUPPLY PB-switch off.

IGNITION .....**OFF**

APU ....**START**

APU start may be delayed until just prior to Eng shutdown.

GROUND SPOILERS .....**DISARM**

TRANSPONDER..... ....**STBY/OFF**

TCAS..... ....**STBY/OFF**

R **RADAR**.....**OFF**

R Turn off RADAR to prevent RADAR emissions

R **TEST** ....**Select**

To put RADAR in test mode. Then in case of inadvertant

R switching on of the RADAR power, no RADAR emission will occur.

PITCH TRIM.....**1° NOSE UP**

SLATS/FLAPS.....**RETRACT**

It is recommended to retract FLAPS step by step to minimise the possibility of jamming (mainly on bumpy taxiways).

It the approach was made in icing conditions, or, if the runway was contaminated with slush or snow, do not retract the flaps until after engine shutdown once the ground crew has confirmed them clear of obstructing ice.

BRAKE TEMPERATURE.....**Check**

Check brake temperature on ECAM wheel page for discrepancy or high temperature.

A report for maintenance action must be made when :

- temperature difference between two brakes on the same gear is greater than 150°C AND
- temperature of one brake is below 60°C (LOSS of braking capability on this wheel)

BRAKE FANS (if installed)..... ....**AS REQ**

AFTER LANDING

CHECK LIST..... ...**COMPLETED**

R **NOSE LIGHT** .....**OFF/AS REQ**

R Turn nose light OFF before turning towards ground

R marshaller approaching stand.

PARKING BRAKE .....**ON**

- Set parking brake on and check brake pressure indication before releasing brake pedals.

Note : It is recommended not to leave PARKING BRK ON if "BRAKES HOT" ECAM message is displayed, ensure chocks are in plase as soon as possible SO PARKING BRK can be RELEASED.

APU BLEED.....**ON**

- Check APU bleed established

Note: Selection of APU BLEED before engine shut down avoids cycling of the packs. However delay as late as possible to avoid engine exhaust fumes entering the air cond. If APU is not available, set EXT PWR to ON before shutting down engines.

ENGINES FUEL LEVERS..... ...**OFF**

- Check engine parameters decrease

Note : 1) For thermal stabilization before shutdown the engines should be operated at idle or required taxi thrust for 3 min or until gate arrival, whichever is earlier.
2) If N2 does not decrease upon FUEL LEVER selection to OFF (HP VALVE It. illuminated) select hydraulic pumps OFF and pull fire handle. Engine will shut down after 70 to 90 sec.

Caution : Do not reengage PITCH TRIM levers within 12 sec following engines shut down. With some TCC Standards, such an action would prevent TCC re-initialization for the next flight resulting in take off thrust lower than required.

EXTLTS..... ....**AS REQ**

- Set all lights as required. Switch off BEACON once all engines have spooled down.

SLIDE DISARMED.....**CHECK**

Check on ECAM DOOR page. Warn cabin crew if a slide is not disarmed.

ELAPSED TIME ..... **STOP**

SEAT BELTS .....**OFF**
GROUND CONTACT..... **ESTABLISH**
PARKING BRAKE .....**OFF/AS REQ**

- Check chocks in place and release parking brake to improve cooling

It is recommended not to use the parking brake for prolonged periods when brake temperatures are above 200°C to avoid hydraulic fluid degradation.

RUD TRAVEL

Note : Do no select RUD TRAVEL p/b switches to OFF.

FUEL PUMPS **OFF**

- Set all fuel pumps to OFF except L INNER TANK Pump 2 if fuel remains in INNER TK and APU is used.
- TRIM TK MODE pushbutton..... ..Check AUTO

WINDOW HEAT.....**OFF**

PROBE HEAT.....**OFF**
- Select CAPT, STBY and F/O PB switches to OFF
-
IRS Drift rate ....**Check**

IRS MSU 1,2,3.....**OFF/AS REQ**

Note : 1) If aircraft electrical power is cut off less than 20 seconds after selection of IRS to OFF, this may lead to permanent IRU failure. 2) If latitude is above 70° N, IRS may not align in NAV mode. Therefore it is recommended to leave IRS operating (MSU rotary sel left in NAV position) during stops above 70° N.

BRAKE TEMP ....**Check**
- BRAKE FAN PB-switch .....**OFF/AS REQ**

CRT's : (FMC, ECAM, EFIS) ....**DIM /OFF**

Note: For long line stop (more than one hour) it is recommended to switch OFF all CRT's.

PARKING CHECK LIST .....**COMPLETED**

R This procedure should be accomplished every time the
R airplane is left unattended by qualified personnel or an
R estimated ground time of more than approx 2 hours can
R be assumed.

IRS MSU 1, 2, 3 ..... **OFF**

CREW OXYGEN ..... **OFF**

EXTERIOR LTS ..... **OFF**

APU AIR BLEED ..... **OFF/R**

EXT PWR.....**AS REQUIRED**

APU ..... **OFF**

- Set MASTER SWITCH to OFF after
- the passengers have disembarked.
- Set L INNER TK Pump 2 to OFF.

EMERG EXIT LT ..... **DISARM**

BATTERIES ..... **OFF**

CAUTION
If APU is running when leaving the aircraft do not switch off the BATTERIES.