AIRBUS FLIGHT TRAINING STUDY GUIDE

Introduction

This Study Guide is distributed to all pilots undertaking an A320 conversion course. It is intended solely as a guide to help you during the course and is not subject to amendment.

Whilst every effort has been made to ensure the accuracy of the Guide, the Aircraft Operating Manual and Flying Crew Orders remain the authoritative source of information.

If you identify any inaccuracies please advise Captain Phil Tolman.

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Normal Procedures

Taxiing

Nose-wheel steering is 'steer by wire' and the steering hand-wheel is very sensitive. It provides a steering angle of up to 75° with an increase in the rate of turn in four separate bands. Inputs from the pilots' hand-wheels are algebraically summed so this precludes handover of control whilst turning. Limited nose-wheel steering is also available using the rudder pedals.

Take-Off

Normal Procedure

- Think: **'Brakes Off, Watch On, Stick Forward, Power 1.05'**. This sub-routine should help you get started correctly!
- Release the brakes and start the stopwatch.
- Apply half forward side-stick; use the white cross on the PFD to gauge this control application.
- Set approximately 1.05 EPR or 50% N1.
- When both engines have stabilised, call 'setting power' and advance the thrust levers to the FLEX or TOGA detent.
- At light weights and rear C of G positions, thrust should be applied with care to ensure nose-wheel adhesion.
- At 80kt gradually release the forward pressure on the side stick, achieving the neutral position by 100kt.
- Keep straight using nose-wheel steering via the rudder pedals. As the groundspeed increases the rudder becomes effective and the nose-wheel steering input is progressively reduced to zero by 130kt.

Crosswind Take-off

For a crosswind greater than 20kt (or a tailwind):

- Apply full forward stick.
- Displace the white cross, into wind, by up to half its width.
- Set 1.05 EPR (50%), then when engines stabilised set 1.15 EPR (70%).
- Set Flex or TOGA by 40kt groundspeed.

Expedited Take-Off

- For a rolling take-off use up to 1.03 EPR or 30% N1 until lined up.

Rotation & Lift-Off

- At VR, rotate smoothly at 3º per second towards a pitch attitude of 15º then follow the flight director SRS pitch command.
- The normal attitude is 15º and should be achieved in about 5 seconds, so count to five as you rotate - start slowly as it is easier to increase the rotation rate but more difficult to slow it down.
- The rotation rate tends to reduce as the attitude reaches 10°, and additional side-stick back pressure is required to overcome this.

Initial Climb

Follow the SRS pitch demand (maximum is 18º) to the flap retraction altitude. The speed should stabilise at V_2 + 10kt, but at light weights the aircraft may achieve a higher speed. Retract the landing gear when a positive climb is indicated on the VSI and radio altimeter. It is not necessary to apply the brakes as they are automatically applied when the gear handle is placed in the UP position.

Flap Retraction

The acceleration altitude may be specified but is normally 1000ft AAL. The flight director pitch mode changes to CLB and commands a pitch down. Select climb thrust as the 'LVR CLB' prompt is displayed in the first FMA column. The normal take-off flap setting is flap 1; select flap zero as the aircraft accelerates through S speed. For take-offs with flap 2 or 3 retract the flaps on schedule: select flap 1 at F speed and flap zero at S speed.

Early Turn

Obstructions, or noise abatement procedures may dictate an early turn after take-off. Turn at the appropriate altitude and maintain the SRS attitude (V2 + 10kt) with flaps at the take-off setting. At acceleration altitude set climb power, accelerate and retract flaps on schedule.

Flex Thrust

A reduced thrust take-off results in lower EGTs and extends engine life. The maximum thrust reduction authorised is 25% below rated thrust and the resultant setting cannot be less than CLB. If conditions are encountered during the take-off where additional thrust is desired, such as temperature inversion or wind shear, select TOGA.

Flex thrust is not permitted in certain circumstances. Eg. If stopping performance is significantly degraded, TOGA thrust is used to shorten the take-off run. A comprehensive list of restrictions for the use of flex thrust can be found in the Performance Manual, Take-off Section.

FCU Handling

FCU settings must be confirmed on the PFD. First look at the FCU, to confirm the correct selector, and then look at the PFD while making the actual selection. Check the PFD to ensure the correct bug or digit is being adjusted and confirm any change on the FMAs.

This technique sounds simple enough but you will be surprised, initially, at how easy it is to make a mistake. Typically, for example, the aircraft continues in NAV when the crew think they have just selected HDG. The importance of checking the FMAs is routinely emphasised throughout conversion training - especially at times of high workload.

Control Laws

Side-Stick Handling

In Normal Law the side-stick is a 'load factor' selector in pitch and a 'rate of roll' selector in roll. The controls are very sensitive, so smoothly select the desired attitude and then release the pressure on the side-stick. The control laws will maintain 1G (within certain limits) without further input from the pilot. Most new pilots tend to over-control slightly until familiarity is gained. This over-controlling normally occurs at times of increased workload, but the tendency is easily overcome with a little practice.

The side-sticks are not linked so movement of one side-stick is not felt by the other pilot. Inputs from both side-sticks are algebraically summed and so care must be taken not to move a side-stick (eg. whilst using the RT switch) when the other pilot is flying manually. With the autopilot engaged both side-sticks are locked in the neutral position. Applying sufficient force to move them will disengage the autopilot.

High Speed Protection

Normal Law

With the autopilot engaged and auto-thrust active the system will not permit a Selected Speed greater than VMO/MMO. If an excessive speed (e.g. 380kt) is selected on the FCU, the aircraft will accelerate towards VMO/MMO and then thrust will automatically reduce to prevent an overspeed.

If an overspeed occurs, perhaps because of a sudden unexpected increase in headwind, the autopilot will disconnect, auto-pitch trim is frozen and overspeed protection will activate. The auto-pilot disconnect aural warning will be masked by the ECAM overspeed warning. Spiral static stability is reduced to zero bank and the maximum bank angle is reduced to 45°. As the speed increases, the side-stick nose-down authority is progressively reduced, and a permanent nose-up order is applied to aid recovery. To recover from an overspeed, reduce thrust and select (carefully) speedbrake.

Alternate Law

Above VMO / MMO the auto-pilot will disconnect and a simple nose up demand is introduced to avoid an excessive speed increase. This demand can be overridden by the pilot.

High AOA Protection

Normal Law

As the aircraft enters the α protection region, back stick pressure is necessary to maintain attitude and auto-pitch trim ceases. Prior to reaching α-max, autothrust α-floor protection is activated and TOGA thrust is automatically applied. Alpha-floor protection should be backed up with the thrust levers. If the stick is moved fully aft the aircraft will

stabilise at α-max. Lateral control is still effective but the maximum bank angle is limited to 45º.

The aural stall warning is triggered at α-max + 4º, but since the system limits alpha to α-max the warning should not activate in normal law.

Releasing the back stick pressure completely will allow the speed to increase and stabilise at α-prot. Forward pressure is required to accelerate further. As speed increases away from α-prot, the FMA changes from ALPHA FLOOR to TOGA LOCK indicating that thrust is locked at TOGA. Once an acceptable speed is reached, deactivate TOGA LOCK by pressing the instinctive disconnect button on the thrust levers and move the thrust levers to select the desired thrust.

In the landing configuration the deceleration is faster, acceleration in the recovery is slower and the speed range between VLS and the speed for α-max is smaller. During the recovery retracting the flaps from the landing position is not recommended until the speed is above VLS, as a greater altitude loss may occur.

Note: Alpha Floor protection is an *autothrust* mode - not a flight control protection mode.

Alternate Law

During the initial deceleration, a side-stick input is not required to maintain the pitch attitude for level flight. The speed scale markings display only VLS and the stall warning speed: VSW (the black red 'barber's pole'). As the angle of attack increases, 5 - 10kt above the stall warning, a low speed stability term is introduced resulting in a gentle nose down pitching moment which can to be resisted using back pressure on the side-stick. Autothrust α-floor protection is inoperative.

Eventually, the master warning and aural warnings will activate (crickets and "STALL, STALL"). Recover at the stall warning by selecting TOGA thrust, maintain a pitch attitude for level flight and accelerate through VLS.

Direct Law

The control laws transition from alternate to direct when the landing gear is selected down and the crew are reminded to 'USE MAN PITCH TRIM'. The aerodynamic static stability causes a nose-down pitching moment as the aircraft decelerates. This can be countered with back stick pressure. Autothrust α-floor protection is inoperative and stall warnings occur as in alternate law. During recovery, the pitching moment induced by the selection of TOGA thrust is not opposed by the control laws and must be resisted by an appropriate side-stick input. Recovery is conventional: select TOGA thrust and the pitch attitude for level flight.

Normal Law Protections - Summary

Load Factor

Flap retracted: +2.5g / -1g
Flap extended: +2.0g / 0g

Pitch

Load factor demand.
Nose-Up: 30° ⇒ 25° at slow speed.
25° ⇒ 20° at slow speed in Config full.
Nose Down: 15°
F/D bars and FMA modes Off at: Up 25° / 13° Down.

Roll

Roll rate demand – max 15° per sec.
Normal - up to 33° bank angle.
33°-67° with side-stick pressure - no auto-pitch trim.
Maximum 67° – 2 green bars.
F/D bars and A/P Off at 45°

High AOA Protection

Available from take-off to 100ft on the approach.
Active at α prot – top of the black/amber band.
AOA is then proportional to side stick deflection.
No auto-pitch trim.
A/P disconnects at α prot + 1°.
α floor (TOGA) activated after α prot region penetrated.
Max bank angle 45°.
Max AOA is α max – top of the red band.
If side-stick is released AOA returns to α prot and sticks.

High Speed Protection

Active at or above VMO 350kt / MMO .82M
Auto-pitch trim frozen.
A/P disconnects but aural warning masked by....
ECAM red overspeed warning at VMO + 4kt.
Activates at = 2 green bars at VMO + 6kt.
Side-stick nose-down authority progressively reduced.
Permanent pitch-up signal to aid recovery.
Pilot can exceed VMO/MMO using forward side-stick pressure.
Max bank angle 45°.
If the side-stick is released: aircraft pitches up and maintains zero bank angle.

Flare Mode

Active at 50ft attitude memorised.
Auto-trim freezes at 50ft manual - 100ft autopilot.
At 30ft pitch attitude reduced to –2° over 8 seconds.

Alternate Law Protections- Summary

Load Factor

No change – but this is the only protection available in Alternate Law without protections.

Pitch

No pitch protections – amber crosses.
Control response same as normal law – load factor demand.

Roll

No roll protections – amber crosses.
Control response - control surface demand – max 30°.per sec
Roll rate restricted by use of spoilers 4 and 5 only.
A/P disconnects above 45° AOB.

Low Speed Stability

Available in Alternate Law with Protections.
Black/Red barber's pole below Vs.
Active at about Vs + 5-10kt.
Introduces a progressive nose down signal.
Introduces bank-angle compensation to maintain max AOA in a turn.
Audio: crickets + Voice: "STALL".
α floor inoperative.

High Speed Stability

Available in Alternate Law with Protections.
Active above V_{MO}.
Introduces a nose-up pitch demand.
Pilot can override.
Conventional overspeed warning at V_{MO}.

Note:
The ECAM STATUS message 'F/CTL ALTN LAW (PROT LOST)' refers to the loss of Normal Law Protections and does not necessarily imply Alternate Law Without Protections. Confused? Blame the French.

Direct Law - Summary

Load Factor

Not available.

Pitch

Control surface demand.
No auto-pitch trim – 'USE MAN PITCH TRIM'.
No protections.

Roll

As alternate.

Low / High Speed

Aural warnings as alternate.
Alpha floor inoperative.

Descent

Preparation

Complete the descent preparation as early as possible; on a very short sector some aspects can be set-up prior to departure.

The following sequence of FMGS programming is often referred to as 'FRPP'. FLT PLN page: Complete a lateral revision at the destination and select the Approach and STAR, or VIA. Cross-check the STAR, Approach and Go-Around waypoints, and ensure that all altitude and speed constraints are relevant.

RAD NAV page. Check the correct ILS has auto-tuned. Manually tune any NDBs or VORs as required.

PERF pages. Check the descent speeds are as required. Enter the ATIS weather, the approach minima and the Go-around Aa.

PROG page. Check Nav accuracy.

Set the QNH on the standby altimeter and bug the Cat 1 or non-precision MDA. Bug VAPP on the standby ASI. Back-set the QNH on the EFIS control panel.

Use the Descent Checklist aide-memoir to confirm all preparations are complete ***before*** starting the approach briefing. This will prompt you to consider the various items before you begin to speak and should result in a more efficient delivery.

Descent Monitoring

The FMGS is very sophisticated; however, experience shows that a simple, basic method is necessary to monitor the descent. Try to ensure that the FLT PLN 'distance-to-go' is an accurate reflection of the ATC routing, and consider using the '3 times table' - it is a useful tool for avoiding a rushed approach and for finessing the intermediate descent. Either:

- Multiply range by 3 to give desired altitude.
  Eg. 60 miles / 18000 feet - (slightly less than 3°).
- Multiply height by 3 to give desired range.
  Eg. 18000 feet / 54 miles - (slightly steeper than 3°).

The aim is to try to fly a 3 degree descent throughout the approach, avoiding level flight at intermediate flight levels - except as part of a planned, level deceleration.

Alternatively, the required vertical speed to achieve a 3º descent angle can be estimated by 'halving' the ground speed. Eg. Groundspeed 480kt, a vertical speed of 2400ft/min would be required. Using this method, adjustments can be made for a head or tailwind, and also for variations in descent speed.

FMGS

The FMGS will calculate all the descent parameters providing it has been correctly set up. It will insert a pseudo way point in the FLT PLN and, if in managed NAV, a descent arrow will be displayed on the ND. Managed DESCENT is only available in NAV mode and is achieved by pushing the

altitude selector knob having first selected a lower altitude. Autothrust IDLE will be annunciated on the FMA and the Managed Speed is controlled by elevator, within a set range, to achieve the required FMGS vertical profile. If the computed descent profile is too steep a 'MORE DRAG' message is displayed. Conversely, if the profile is too shallow to maintain the speed with idle thrust the autothrust will increase power and engage in SPEED or MACH mode.

Above FL 310, if the aircraft is more than 500ft above the required descent profile, the use of the DESCENT mode can lead to a MMO exceedance. In this case use OPEN DESCENT until the profile is regained or until the aircraft descends below FL 310. OPEN DESCENT is achieved by pulling the altitude selector knob having first selected a lower altitude. It results in idle thrust with speed controlled by elevator.

The ECON descent speed is displayed on the PERF page of the FMGC. This is the Managed Speed and is determined by the cost index. It can be modified, but only prior to entering the descent phase; thereafter speed modifications can only be accomplished using Selected Speed. The ECON speed defaults to 250kt below 10,000 feet unless a vertical revision is made to delete or amend the speed restriction.

Deviations from the programmed speed schedule can result in being too high (or low); use speedbrake or an increase in speed to regain the profile. Increase the Selected Speed gradually to avoid an excessive nose down pitch attitude. The descent is normally flown with autothrust engaged as this offers speed protection when capturing a pre-set altitude.

Plan the descent to achieve green dot speed at 12 miles, or at about 8 miles out when making an abeam approach. A good cross check is to be at 10,000ft AAL, 33nm from the airport, with a maximum speed of 280kt decelerating towards 250kt. The following table gives approximate target 'Gates' for still air with engine anti-ice OFF.

Distance	Height	Speed	Config
33	10000	280 max	Clean
20	6000	250	Clean
12	3800	210 or Green Dot	Flap 1
8	2500	180 or S speed	Flap 1
4.5	1500	160 or F speed	Flap 2 or 3 + Gear

Descent In Icing Conditions

The use of engine anti-ice, and the increase in idle thrust that is associated with it, will increase the descent distance required. Engine icing often forms when unexpected and can occur when there is no evidence of icing on the ice detector. Once ice has formed, an increasing accumulation can occur rapidly. The engine anti-ice system should be turned on whenever

visible moisture is present, or the visibility is 1500m or below and the TAT is at or below +10ºC. Engine anti-ice may be turned off during the climb and cruise when the SAT is below -40°C.

Deceleration

At idle thrust in level flight, deceleration from VMO to 280kt takes about 1 minute, and from 280kt to 210kt takes about 1minute 10 seconds. Using speedbrakes to aid deceleration will reduce these times and distances by approximately 40%.

Speed Reduction	Time	Distance
350-210	2 mins 10 secs	10 nm
350-280	1min	6 nm
280 - 210	1min 10 secs	4 nm

Speedbrake extension causes a pitch up which is useful in containing an overspeed excursion; however, rapid retraction causes a pitch down and can cause a small altitude 'bust' if retraction takes place in ALT* during level off after a descent. All speedbrake selections should be made slowly to avoid rapid pitch changes and for passenger comfort.

Holding

Complete a lateral revision at the appropriate way point to insert a hold. Check the parameters displayed on the HOLD page and amend if necessary. Standard ICAO timing is achieved by checking or inserting 1 or 1.5 min in the appropriate field. A gross error check, however, should still be made by timing the hold using the stopwatch.

Once inserted, the aircraft will enter and remain in the hold. The FMGS will compute the hold entry using a variable bank angle to pick up the holding axis. The ND depicts the race track pattern with the inbound and outbound turns drawn for still air but takes no account of the variable bank angle employed. The aircraft symbol may not follow the holding pattern as drawn if there is a significant cross-axis wind component. If the cross-axis wind component exceeds 40kt, the aircraft will not immediately pick up the holding axis on completion of the inbound turn. If the crosswind component exceeds 80 - 100kt, the FMGS may not be able to keep the aircraft within the protected holding area, and pilot intervention will be needed.

To exit use the Immediate Exit prompt, or perform a Direct To, or select HDG. It is important to ensure that the Hold is cleared from the FMGS Flight Plan; if it is not the waypoints will not sequence correctly and the Go-around Flight Plan will be unavailable.

The normal holding speed is 5 - 10kt above green dot and the aircraft configuration should be clean. As the aircraft approaches the holding fix in NAV mode, the Managed Speed target will reduce from the descent

speed to green dot and the aircraft will decelerate. However, on leaving the hold, if the FMGS is still in the PERF DES phase (ie. approach not activated), the speed target will jump to the previous descent speed. If this is not desired 'activate the approach' or change to Selected Speed. This can be done at any time prior to or during the hold.

Intermediate Approach

Using Managed Speed, the initial approach is flown clean at Green Dot. Select Flap 1 on base leg and reduce to S speed. For further deceleration select Flap 2 and slow to F speed. Remember that these are procedural speeds rather than minimum speeds. The minimum speed for the configuration is always displayed as VLS on the PFD speed scale.

Config	Procedural Speed	Minimum Speed
Clean	Green dot	VLS
Flap 1	'S' speed	VLS
Flap 2 & 3	'F' speed	VLS
Flap Full	VAPP	VLS

To enable automatic deceleration with configuration change, 'activate the approach' on the PERF page, and ensure that Managed Speed is selected on the FCU. The speed will then re-datum automatically according to the table above. The magenta speed target bug will be at VAPP and may not be visible until the speed has reduced. If ATC requires speed control use Selected Speed and set the required speed on the FCU.

The use of speedbrakes on the approach with flaps extended up to Flap 3 is permitted but not recommended as this causes an unwanted increase in VLS. The recommended method, to achieve greater deceleration, is to extend the landing gear earlier than normal. Speedbrake is inhibited with Flap Full.

If the approach pattern requires a downwind leg select NAV ROSE to enable the runway and final approach to remain in view. At other times most pilots use NAV ARC, gradually decreasing the selected range throughout the approach. Select the ILS display using the push-button on the EFIS control panel. The ILS ident and DME are shown at the bottom left of the PFD. Select VOR/ADF needles as required, and display a VOR DME range if required by the procedure. When cleared to intercept the localiser arm LOC on the FCU. When cleared for the ILS approach arm APP and engage the second autopilot. At glideslope capture set the go-around altitude on the FCU and check the 'TO' waypoint is appropriate on the ND.

Go Around

During a go-around, as the NHP raises the landing gear he announces the FMA modes: "TOGA, SRS, GA TRK" The aircraft will maintain the GA TRK until the FCU heading knob is pushed for NAV or pulled for HDG. If NAV is available the FMGS will guide the aircraft along the FLT PLN, but only if the waypoints have sequenced correctly. Obviously, it is essential that the correct go-around altitude has been selected on the FCU.

From an Unstable Approach

If a go-around is initiated at, for example 1000ft/160kt, additional considerations apply. TOGA power should be selected as this action engages Go-Around mode and ensures NAV will be available throughout the missed approach. However, it may be prudent to re-select CLB power almost immediately; this will provide adequate power, re-activate autothrust and help prevent a possible flap overspeed.

From Level Flight

A go-around may need to be initiated from ALT mode, for example at 3000ft when the aircraft has failed to capture the glideslope and is now too high. Selecting TOGA power will engage go-around mode, but this may not be the best option as the aircraft will commence a climb away from the cleared altitude. This could cause obvious problems in a busy ATC environment.

Without Selecting TOGA

The FMGS section of the Flying Manual states that performing a go-around without selecting TOGA will sequence the destination and erase the active flight plan when flying over or abeam (less than 7 miles) the airport. If this occurs activate the secondary flight plan at an opportune moment. Alternatively, enter a waypoint, perform a lateral revision and insert a new destination.

Flight Director

The flight directors automatically re-engage during a go-around and the autothrust will re-arm even though it may have been disengaged for the approach. Thereafter, it will activate when the thrust levers are set to the climb detent, just as it does on a normal take-off. As the go-around altitude is captured thrust will reduce to maintain the speed.

Decelerated ILS Approach

Managed Speed

Judgement of the vertical profile and deceleration is one of the more difficult aspects of the final approach. When ATC speed control is not required use Managed Speed. Glide-slope interception is achieved, preferably in a continuous descent, in Config 1 at 'S' speed. Flap 2, Landing Gear, Flap 3 and Full are selected in sequence in order to achieve a stabilised approach by 1000ft. Remember that the Flying Manual requires Flap 2 and Landing Gear extension to be accomplished by 2000ft AAL. The precise timing of the configuration changes, and thus the rate of deceleration, can be controlled by the crew to suit the local met conditions.

Selected Speed

ATC often require some form of speed control, and most AERAD booklets give details of the likely speed profile. Therefore, it is quite normal for pilots to initiate the descent in Managed Speed and then change to Selected during the intermediate approach in order to meet these requirements. Thereafter, it may not be appropriate to re-select Managed Speed until Flap 3 or Full is selected during the landing checklist. Speed control is therefore an important consideration and one that can be easily overlooked - even in good weather.

Example

It is common practice for ATC to request "160 to 4 DME" or "170 to the marker". So how can this be achieved? The technique to be used is basically dependant on the presence or absence of a headwind.

Headwind

Consider using Selected Speed 160kt and, when appropriate, select flap 2 and lower the landing gear as normal. Then at 4.5 DME (1500ft) select Flap 3 and change to Managed Speed. Observe the deceleration and select Flap Full in time to achieve the stable approach criteria by 1000ft radio.

Tailwind

In light winds, or a tailwind, the aircraft might stabilise on the glideslope at say 10 miles, 3200ft Flap 1, at 205kt. Simply plan to lower the landing gear early, at say 2800ft, in order to achieve a deceleration to S speed (eg 180kt) by 2500ft and guarantee a stable approach. Alternatively if ATC require 180kt at 10 DME extend the landing gear without delay and use Selected Speed. The landing gear is far more effective than speedbrake in stabilising the approach. The Flying Manual states: the use of speedbrake will cause an unwanted increase in VLS.

Good judgement and experience are required, so early in your training be conservative and do not hesitate to refuse an instruction to 'maintain 170kt to 4 DME'. Decide at the briefing stage what you can achieve, eg. 160 to 4.5 DME, and tell ATC. Furthermore, beware of foot-notes on the THALES ILS chart which point out that the DME reads 1.1 mile at touchdown.

If the non-landing pilot misjudges the deceleration the speed may exceed the VAPP target at 1000ft radio and a go-around must be considered. The landing pilot might then announce: 'considering a go-around'. This would alert both pilots so that if the stabilised criteria are not met by 500ft a mandatory go-around would not come as a surprise.

Automatic Non Precision Final Approach

Non precision approaches using Managed guidance (APP NAV/FINAL) are not permitted at present. Therefore, the following procedures specify the use of Selected vertical and horizontal guidance, and Managed Speed. The recommended technique is to fly an automatic, speed stabilised approach using the FPV and autothrust.

NDB

Check the FMGS Arrival page and select the NDB approach if available. If there is no NDB approach in the data base select the ILS approach if the procedure and go-around are similar. Alternatively select RW but note that a go-around profile will not be available. Tune the NDB and display the needles using the NAV ARC or NAV ROSE display. NAV ROSE is normally used during the initial approach, whilst the NAV ARC display gives an expanded compass segment enabling precise monitoring on the inbound track. The map range should be adjusted to prevent 'clutter' at the top of the ND.

For an NDB/DME approach, enter the DME ident or frequency in a VOR field, identify and display the DME on the ND by selecting the respective needle to VOR. Only one needle will then be available for NDB tracking. Alternatively, enter the DME frequency in the ILS field and display the range on the ND by selecting ILS on the EFIS control panel.

VOR

Check the FMGS Arrival page and select the VOR approach if available. If there is no VOR approach in the data base select the ILS approach if the procedure and go-around are similar. Alternatively select RW but note that a go-around profile will not be available. The VORs should auto-tune provided a VOR approach has been selected. Alternatively, manually tune both VORs, enter the inbound course on the NAV RAD page, identify normally and display the needles using ROSE VOR, NAV ARC or NAV ROSE.

Localiser

Set-up the FMGS for a normal ILS approach. Select the ILS display on the PFD and identify. Deselect the GPWS G/S mode. Select either ROSE ILS, NAV ARC or NAV ROSE.

Vertical Profile

The final approach track should be intercepted at S speed, flap 1. Aim to select flap 2 and landing gear at approximately 3 miles prior to the final descent point. The aircraft should be in the landing configuration and speed stabilised at VAPP approximately 1 mile prior to commencing the descent. (For single-engine approaches Flap Full is selected during the final descent) To commence descent simply turn the FPA knob to select

the desired FPA and **PULL**. This selection should be made .3 nm prior to the descent point to allow time for the autopilot to respond.

To avoid unwanted ALT capture do not select a lower altitude on the FCU. The Go-Around altitude should be pre-set on the FCU when the aircraft has descended below Go-Around altitude. Note that 0.5° FPA equates to approximately 100 feet per minute rate of descent and to vary the profile remember that 1° achieves a 100 feet per mile adjustment. Eg. if 100 feet high select 4° to achieve the correct glideslope in 1 nm.

Horizontal Profile

For NDB, VOR, or radar approaches, make appropriate TRK selections on the FCU to intercept and maintain the inbound course. For a LOCALISER approach, arm LOC on the FCU and monitor capture.

MDA Or When Visual

If the required visual references are obtained before MDA control handover takes place. The autopilot should be disconnected and the flight directors selected OFF.

Manual Non-Precision Approach Flight Director Off

A Non-precision approach may be flown without using the flight director or autopilot. The FMGS set-up is the same.

Vertical Profile

Select pitch attitudes on the PFD referring to the fixed aircraft symbol in the conventional way. Check the achieved FPA (indicated by the FPV) and vertical speed, then adjust pitch attitude as necessary. Try to resist the temptation to 'chase' the FPV and VSI; remember they are performance instruments. FPA selections are not made on the FCU.

Horizontal Profile

The FCU selected track is displayed by a blue index on the PFD horizon line. It is selected to the inbound course for the final approach and is used as a track reference.

The correct inbound track is maintained by positioning the FPV with reference to the blue TRK index. When the FPV is aligned with the TRK index the aircraft will maintain the track selected on the FCU.

Naturally it is necessary to ensure that the aircraft is established on the correct QDM before aligning the FPV and TRK index. Failure to do so simply results in the aircraft paralleling the desired track.

MDA Or When Visual

For the visual segment consider selecting the FCU track to the runway centreline if this differs from the inbound course.

Circling Approach

A circling approach is an IFR approach (either precision or non-precision) followed by a visual circuit. Each circling situation is different because of variables such as runway layout, final approach track, and meteorological conditions. A single procedure will not cater for all circumstances.

An appropriate time for handover of control should be discussed and should take account of the circuit direction. Consideration should be given to the appropriate response when the decide call is made. Also, the Missed Approach Point (MAP) has particular significance on this type of approach.

FMGS Set-Up

The FMGS set-up is not ideal as the landing runway is not the same as that used for the instrument approach. Furthermore, in the event of a go-around the missed approach procedure for the instrument approach must be followed.

The recommended compromise is as follows:

- Enter the instrument approach in the primary flight plan. Complete the PERF APPR page - enter the ATIS etc.
- Copy the flight plan and modify the secondary - enter the landing runway.
- If desired, construct waypoints in the secondary flight plan to assist orientation for the circling manoeuvre. For example for BRU RW02:
    - EBBR02/200/2, (PBD01)
    - PBD01/290/2, (PBD02)

These are two very useful waypoints depicting the end of a downwind leg and a point on short final.

Initial Approach

The initial instrument approach should be flown in Flap 3 (Flap 2 single engine) with the gear down. If the autopilot is in use the flight directors should be on. If flying an ILS to circle, an early selection of TRK/FPA during the ILS may be preferred. The go-around altitude should be set in the FCU as normal.

About 100 feet above the circling minima select (push) FPA zero on the FCU. The aircraft must be levelled at or above the MDA. It is not permissible to descend below the MDA until the aircraft is in a position to commence a descent to the landing threshold at the normal rate on a 3° flight-path.

If the required visual references are not achieved at MDA go-around immediately. The references are described in FCO 752: ‘sufficient visual reference with the terrain and either the approach lights or the runway must be continuously in view.’

At MDA there is no immediate requirement to disconnect the autopilot, or turn off the flight directors, or handover control. The autopilot may

remain engaged until the final descent when it must be disconnected by 100 feet below MDA; the flight directors should then be switched off.

JAROPS subpart E stipulates that the instrument approach track should be maintained until the crew estimate that:

- The required visual references can be maintained throughout the procedure.
- The aircraft is within the circling area.
- The aircraft's position in relation to the runway can be determined visually.

If these conditions are not met by the MAP a missed approach must be carried out.

Circling Manoeuvre

Initially, display but do not activate the secondary flight plan. This is achieved by pressing the SEC F-PLN key on each MCDU; the secondary route is then displayed in white. The primary route remains active (green) and thus the instrument go-around procedure remains available.

When downwind, and when a landing is considered assured, activate the secondary flight plan. The managed speed target will now be correct for the landing runway.

Alternatively, if it is considered more prudent to retain the go-around profile do not activate the secondary but remember that the managed approach speed for the landing runway will be wrong as the incorrect wind component will be used to calculate VAPP and the VAPP Target. Therefore use Selected Speed and calculate manually the correct VAPP adding wind increments as necessary.

The low visibility pattern in the Flying Manual suggests an initial turn through 45° for 30 seconds followed by a downwind leg, extending beyond the landing threshold by 20 secs per 500ft. This is only a guide and must be adapted for the actual conditions.

Experience in the simulator suggests that the waypoints on the ND are very useful for confirming lateral separation from the runway. With NAV ROSE and minimum range displayed, comfortable separation is achieved when the runway symbol is just inside the 2.5 nm range circle. Use all available aids, eg. Nav Display, VOR or NDB, to assist your ***visual*** judgement of when to turn onto base leg. Care must be taken to remain within the circling radius.

When turning onto final, the aircraft should be fully configured at the correct speed and comply with the stable approach criteria. If the waypoints have cycled correctly the magenta vertical deviation symbol on the PFD may be used to assist judgement of the final descent.

Go Around

If at any time visual reference is lost a Go-around must be flown by entering a climbing turn towards the runway and establishing on the missed approach procedure specified for the instrument approach. Different patterns will be required depending on the aircraft's position at

the time the Go-around was commenced; however, it may be prudent to clarify precise requirements with ATC.

AWOPs

Departure - Additional Considerations

- Met, AIS, ADDs, Crew Qualifications, Extra Fuel.
- FCO 1621a: Min RVR for a take-off without LVP protection is 400m.
- FCO 1716: CAT 3A (or better) airport must be available within 1 hr at single engine cruise speed.
- FCO 1304: Captain may decide to autoland overweight in an emergency.

Take Off Ban

FCO 725:

- TDZ or reported met visibility - above minima.
- Mid-Point - above take-off minima - when reported.
- Stop-End - when specified in AOM, otherwise for info only.
- Cloud Ceiling - when specified in AOM, otherwise for info only.
- Runway indistinguishable from its surroundings.
- Captain's assessment of RVR - Captain can over-ride TDZ report.

Note: For RVR minima of 125 m and 15 m CL lights: 8 lights required.

Arrival

- AWOPs briefing items from checklist.
- Flightdeck lighting - minimum.
- Consider landing & taxi lights - OFF.
- Confirm LVPs in force.
- Check RVRs prior to 1000 feet; thereafter advisory only.
- Captain is HP from 1000ft.
- Landing clearance by 200ft or Go-around. (FCO1661).
- 'Hundred Above,' & 'Minimum' when DH entered on Perf Appr Page.
- No callouts when 'NO' entered in DH field on Perf Appr Page.
- Captain: Head-up by 50ft above.
- First Officer: Head-down throughout.
  Monitor raw data and FMAs.
  LAND by 350ft, FLARE by 30ft, ROLL OUT.
  Calls '50 above'' and 'Decide' if auto-callouts inoperative.
- 'Attitude' Callout if 7.5° exceeded - disconnect AP.
- Autobrake medium.
- Disconnect AP before RW exit.

Limits

Headwind 30k in Managed or Selected (but CFM 20k in Selected).
Crosswind 20kt. Tailwind 10kt.
Contaminated Runway: CAT 3A.

Modes

LAND - 400/350ft FCU locked until on ground for 10 secs or TOGA.

FLARE - 40/30ft Yaw aligns, Pitches, Autothrust commands idle at 10ft.

ROLL-OUT - Wings are levelled, Runway Guidance.

Failures

Single Engine = CAT 3A No Autothrust = CAT 2 CONFIG 3 = OK

Downgrade

- Check QRH for equipment failures not monitored by FMGS/ECAM.
- Check PM for effect of downgraded or failed airport equipment.
- Downgrade acceptable above 1000ft provided:
- FD available. Minima acceptable. Briefed.

Below 1000 Feet

Go-Around for:

- Engine Failure.
- Amber Caution / Single Chime. (note: many warnings are suppressed).
- Autoland or Autopilot or Autothrust downgrade.....

.....unless visual with CAT 1 RVR.

Below 200 Feet

Additionally, Go-Around for:

AUTOLAND WARNING LIGHT

- Test before approach. Check flashing deviation scales.
- Active below 200ft - Go-around mandatory.
- Indicates:- Deviation, or Total AP failure, or ILS ground or aircraft equipment failure, or Rad Alt discrepancy.

Go-Around From Low Altitude

- G/A below 10ft may result in ground contact.
- G/A is available until reverse selected.
- If G/A is selected when on the ground - both autopilots disconnect.

Approach Ban

FCO 739:

- Approach to be discontinued by 1000 feet (or FAF for non-precision) unless the reported RVRs are above the minima:
- TOUCHDOWN - from Performance Manual (PM).
- MID POINT - 75m (150m - no CL lights).
- STOP END - 75m if specified in the PM.
- RVRs received when below 1000ft are advisory only.

RVR Unavailable

FCO 765:

Cat 1 or non-precision only.

Day 1.5 or Night 2 x the met vis .....High Intensity Approach RW Lights.

Day 1 or Night 1.5 x the met vis.....Other.

Typical Minima & Required Visual References

FCO 740:

Approach	RVR Metres	DH Feet	Visual Reference
CAT 3B no DH	75	Nil	Nil
CAT 3B	75	0-50	One light
CAT 3A	200	50	Three lights
CAT 2	300	100	Three lights + one crossbar
CAT 1	550	200	Approach lights or Threshold lights or Edge lights or Touchdown Markings or PAPIs

FCO 741: When an approach is not coupled to a glidepath visual reference must be established about 3 seconds or 30ft before DA.

Incapacitation

FCO 653: If incapacitation occurs after TOD it is considered safer to continue to the (CAT 3) destination rather than to divert to a (CAT1) alternate.

FCO 1662: An autoland may be completed following crew incapacitation. If the Captain fails to respond to the 'Decide' call, it is considered safer for the P2 to continue to autoland in CAT 3 conditions than to execute a go-around.

Landing Technique

Flare & Touchdown

The landing gear should cross the runway threshold at approximately 50ft. Go-around if threshold clearance is doubtful. Just before the flare make a conscious effort to look towards the far end of the runway and avoid any temptation to fixate on the touchdown zone. This will assist in determining the flare point.

Under normal stable approach conditions, at 30 ft hold the attitude, close the thrust levers and commence the flare by 20ft. Most initial landing attempts in the simulator using this technique result in a slightly firm touchdown, and trainees can be re-assured that this is not unusual! However resist the temptation to over-compensate - only a small side-stick input is required and flaring at 50ft is not the solution. During your first attempts concentrate on using the correct technique and do not be put off if your landings are firmer than you would like.

After the initial rotation there should be little additional increase in pitch attitude to complete the flare, back pressure is only required to counter the nose down effect of the flight control flare law. This mode mimics the normal response of a conventional aircraft. Do not allow the aircraft to float but fly the aircraft onto the runway. After main gear contact gently lower the nose using the side stick.

The aircraft does not exhibit a pitch up tendency after touchdown when the ground spoilers deploy; however, a reduction in the nose down pitch rate is evident. Application of autobrakes after main gear touchdown increases the nose down forces but can be easily countered by elevator inputs.

If a bounce occurs, hold or re-establish a normal landing attitude. Thrust need not be added for a shallow bounce or skip. If a high, hard, bounce occurs go-around immediately. A second touchdown may occur during the go-around. Do not retract the landing gear until a positive rate of climb is established.

Crosswind Landing

Position the aircraft on the extended runway centre line with drift applied. In conditions of strong crosswinds, because of the length of the aircraft, the pilot will be positioned on the upwind side of the centre line.

In the flare, progressively apply rudder to visually align the aircraft heading with the runway. At the same time apply sufficient bank to maintain the runway centreline. Remember that a sustained lateral side-stick input will produce a roll-rate demand and not a constant bank angle, so once the desired bank angle is achieved centre the side-stick. Touchdown should be on the 'into-wind' landing gear. After touchdown keep a little into-wind side stick to help prevent any subsequent wing lift.

Landing Roll

For maximum effectiveness use autobrakes or commence manual braking and apply reverse thrust at main wheel touchdown Apply the brakes smoothly with steadily increasing pedal pressure as required for runway

condition, distance available or for a desired turn off point. Maintain deceleration rate with constant or increasing brake pressure as required until stopped or desired taxi speed is reached. Excessive brake modulation should be avoided for passenger comfort and to minimise brake wear.

Rudder control and rudder pedal steering are sufficient for maintaining directional control during the roll out. As it is difficult to slide feet up the rudder pedals in crosswinds, feet should be positioned with the toes at the top of the pedals prior to touchdown. Steering after touchdown is accomplished with the heels and braking with the toes.

Wind Corrections - Final Approach

The approach speed, VAPP target, is continuously adjusted to take into account the actual wind conditions. It is therefore recommended that Managed Speed is used in gusty conditions. However the system may demand speeds in excess of VFE; in this case use a Selected Speed until below 1,000ft AAL. The FMGS compares the actual wind conditions (at the aircraft) with the ATIS wind entered on the PERF APPR page. If the actual headwind at the current altitude is greater than that entered in the FMGS, the VAPP target on the PFD will increase. However, if the headwind is less than reported or if an unexpected tailwind is encountered the VAPP target is limited to the VAPP calculated on the PERF APPR page

When the wind is close to 90° across the runway an increment will not be added automatically. Consider increasing VAPP by up to VLS + 15kt to give a comfortable margin.

Speeds - Summary

PFD	Calculated aerodynamically by FAC. (Except VAPP and VAPP Target which are calculated by the FMGC).
FMGS	Calculated with reference to FMGC GW.
VLS	Lowest selectable speed - top of the amber strip.
F & S	Minimum for configuration retraction.
Green Dot	Best Lift/Drag ratio.
Vα prot	Black/Amber Strip.
Vα max	Red Strip.
Vsw	Red/Black Strip (normal law inoperative).
Vmax	Either VMO MMO VLE VFE.
VMCG	Min control speed after sudden engine failure, the other engine at take-off power.
VMCA	Min Speed with: 1 engine at take-off power. 5° AOB. Gear-up. Flaps at T/O setting.
V1	Max speed at which you can reject a take-off.
VR	Rotate to achieve V2 at 35′ on one engine. (not displayed on PFD).
V2	Take-off safety speed to maintain on one engine from 35′ to accel alt during second segment. Min value = 1.13 Vs.
V REF	VLS for Config FULL.
V APP	VLS + 1/3 ATIS headwind (min 5kt, max15kt). Calculated by FMGC (new FMGS standard).
V APP	VLS + 5 + 1/3 ATIS headwind (min 0kt, max 15kt). Calculated by FMGC (old FMGS standard).
GS Mini	VAPP minus the forecast (ATIS) headwind. But for headwind less than 10kt or tailwind: GS Mini = V APP–10kt.
V APP Tgt	V APP – the forecast headwind + actual headwind. No maximum value,.....minimum value is VAPP.

Autothrust - Summary

Arming

When armed, A/THR is shown in blue in the 5th FMA column. 1st FMA column shows MAN THR.

On Ground.

With FDs on set levers to FLX or TOGA with engines running. - SOP.
Press the FCU push button whilst engines not running. - Not SOP.

In Flight.

Press the FCU push button whilst the levers are out of the active range.
Or if already active set the levers beyond CLB, (or MCT on single engine).
Or engage Go-Around mode.

Activation

Active when A/THR is shown in white in the fifth FMA column and FCU push button is green.
If armed it activates as soon as the levers are moved into the active range: CLB to IDLE. (Or MCT to IDLE on single engine).
If disconnected it is activated by pressing the FCU push button whilst in the active range - including IDLE position.
If Alpha floor is activated, autothrust is activated regardless of the thrust lever position or current status.

Disconnection

Use the instinctive push button or select idle. - SOP
Use the FMA push button. - Non SOP
Below 100ft if the pilot sets more than CLB - autothrust disconnects:

- If FDs ON - system re-arms when TOGA selected.
- If FDs OFF - system does not re-arm.
  (On A319 and A320s with new FMGS, FDs auto ON if TOGA selected)

Note: If the levers are moved forward of the CLB detent when below 100ft, Autothrust will disconnect and not re-arm when re-set to the CLB detent.

Retard Mode

Available only on Autoland. Commands idle thrust in the flare.
Retard callout at 10 feet is just a reminder.

Alpha Floor Protection

Available from lift-off to 100ft radio on the approach.
Not available in Alternate or Direct Law.
Inop on single engine - on 320 & 319 in config greater than 1. TM 12-22-40-4.
Inop on single engine. - on A319 in Config greater than 1. TM 12-27-20-5.
TOGA signal from FAC – regardless of thrust lever position.
When AOA is reduced TOGA is frozen – TOGA lock.
To cancel Alpha Floor or TOGA lock disconnect autothrust.

Can be disabled permanently by pressing the instinctive push button for

more than 15 seconds. Autothrust and Alpha Floor are then disabled until next FMGC power-up on the ground.

Engine Start - Summary

Auto-Start

FADEC will:

- Auto-crank to reduce residual EGT to less than 250° (IAE only).
- Control Start and HP Valve.
- Control IGN - alternate the A and B igniter.
- Detect a hot or hung start, stall or no light-up.....
- Indicate FAULT and provide ECAM warning and procedure.
- If start aborted - FADEC dry cranks for 30 secs at max motoring.....
- CFM only.....may attempt further start.
- FADEC also determines use of starter assistance for in-flight relight.

Manual Start

Manual Start is recommended following, or anticipating an auto-start abort. Additionally for IAE engines a manual start is recommended in tail winds greater than 10kt.

- Use the QRH.
- When ENG MODE is selected to IGN, FADEC will:
- Open the Start Valve when Manual Start is selected ON....
- and control the HP Valve and IGN when ENG MASTER is ON.
- Crew select ENG MASTER to ON at min .....15% IAE .....or 20% CFM.
- Start Valve closes and IGN cut off at ....43% IAE .... or 50% CFM.
- FADEC will monitor the start and provide ECAM warning but.....
- **Crew must interrupt sequence if necessary by.....**
- Manual Start to OFF, Engine Master to OFF ..... *displayed on ECAM.*
- ENG MODE to CRANK. MAN START ON.....*not displayed on ECAM.*
- CFM only.....FADEC will abort a hot manual start (on the ground only).

Limits

The Flying Manual does not instruct the crew to time the start; however some pilots prefer to do so in order to monitor the starter limitation of 2 minutes.

Altimeter Callouts

Altimeter callouts cause some confusion during route training. This guide may help.

On departure passing MSA:

HP	NHP
1. MSA.	2. Three thousand seven hundred confirmed.

When cleared to FL 150:

HP	NHP
1. Set Standard.	2. Standard set and cross-checked.

At FL 100:

HP	NHP
1. Altimeter Check.	2. Flight level one hundred climbing flight level one five zero, Standard set.

When further cleared to FL 350:

HP	NHP
	1. Open Climb, flight level three five zero.

When passing FL 200:

HP	NHP
1. Altimeter check.	2. Flight level two zero zero climbing flight level three five zero, Standard set.

At FL 340:

HP	NHP
2. Checked	1. One thousand to go.

When cleared to descend FL 120:

HP	NHP
	1. Open Descent, flight level one two zero.

When passing FL 200:

HP	NHP
1. Altimeter check.	2. Flight level two zero zero descending flight level one two zero, Standard set.

When cleared to descend FL 70:

HP	NHP
	1. Open Descent, flight level seven zero.

When passing FL 100:

HP	NHP
1. Altimeter check.	2. Flight level one hundred descending flight level seven zero, Standard set.

When cleared descent below transition level to an altitude of 4000 feet:

HP	NHP
1. Set QNH.	2. 1003 set and cross-checked.

On passing MSA:

HP	NHP
1. MSA.	2. Three thousand seven hundred confirmed.

Unused Page

Team Skills

Enhancing Operational Integrity

Introduction

During a type conversion course it is natural for trainees and trainers to focus closely on the technical characteristics of the new aircraft type. However, an equally important consideration is the individual's ability to employ Team Skills for the purpose of Error Management and maintenance of Situation Awareness. The notes on this page are a précis of FCIB 44 which covers this subject in more detail.

Error Management

Through CRM and Human Factors training, pilots learn that the most effective crews employ the behaviours described in the NASA Team Skills. In essence, the aim is for crew members to use the skills to:

- ***Avoid Errors*** - completely, for example, through careful briefing, preparation, planning and projecting ahead.
- ***Trap Errors*** - for example, through vigilance, and being aware of FMGS, FCU and FMA status.
- ***Mitigate*** **-** the consequences of errors, for example, through decisiveness and timely intervention.

Situation Awareness

A number of serious incidents and accidents in modern glass cockpit aircraft have been attributed to degraded Situation Awareness (SA).

Consider three areas comprising SA:

- ***Plane*** - Aircraft technical systems and FMA status.
- ***Path*** - The flight path and external environment .
- ***People*** - The crew and passengers.

Consider three levels of SA:

- ***Perceiving*** - where the crew are merely aware of elements in the environment and just react to the situation.
- ***Comprehending*** - where the crew are attending to the current situation but not attending to future requirements.
- ***Projecting*** - where the crew are projecting ahead, anticipating contingencies.

Team Skills

The requirement to absorb large quantities of new information during training can diminish the SA of the most capable pilots, and even qualified crews may suffer when faced with the high workload demands of a genuine emergency, or when dealing with the routine pressures of tiredness or a busy ATC environment.

Therefore, pilots have an individual responsibility to work effectively as team-members and it is essential that they use the behaviours described in the Team Skills to develop this aspect of their professional competence.

TEAM SKILLS

Briefings

- open, interactive and relevant
- identify potential problems
- state operational guidelines including management of auto-systems

Leadership / Followership

- use all resources and manage time
- adhere to SOPs
- balance authority and assertiveness
- act decisively when required

Communications / Decisions

- free and open comms. atmosphere
- establish bottom lines
- all crew contribute to decision-making
- decisions clearly stated and acknowledged
- verbalise auto-system changes

Interpersonal Relationships / Group Climate

- sensitive to other crew members
- set a relaxed and supportive tone
- crew remain calm under stress
- identify stress in self and others

Crew Self Feedback

- objective and constructive
- both positive and / or negative
- given at appropriate times
- accepted non - defensively

Preparation / Planning / Vigilance

- share plans and mental models
- seek the ‘ big picture ‘
- project ahead of the aircraft
- aware of auto-system status and changes

Enquiry / Advocacy / Assertion

- question actions and decisions
- speak up with information
- seek information or direction
- verify auto-system status & programming

Workload / Distractions

- admit overload and recognise it in others
- share tasks efficiently and prioritise
- avoid conflict between secondary and key tasks

	• aware of auto-system distractions

Maintaining SA - Descent and Approach

Introduction

Whilst all pilots acknowledge the importance of using Team Skills to maintain SA, a few have difficulty incorporating some of the concepts into a routine sector. Indeed, it is not always easy to see how psychological theory can be integrated within the operational techniques described in the Flying Manual.

Since one of the most variable and challenging phases of flight concerns the planning, execution and monitoring of the approach, this is perhaps an area where the skills can be more easily identified. In the following text italics are used for the phrases describing Team Skills.

A high level of SA is achieved when crews use spare mental capacity to ***project ahead***. However, as the workload increases spare capacity reduces so consequently, the aim throughout the approach should be to ***manage the workload effectively*** in order to create time for coping with unforeseen contingencies. One of the simplest ways to manage or reduce workload is to slow down in good time - a rushed approach often occurs when a crew's failure to ***manage the workload*** results in diminished SA.

Identifying potential problems and briefing ***operational guidelines*** are skills which are not easy to employ until experience is gained on the new aircraft. However, one aim of this section is to try to identify some problems and guidelines by describing an ideal ***mental model*** which illustrates how a crew might:

- Remain ***vigilant*** throughout approach.
- ***Communicate effectively.***
- ***Manage workload.***
- Retain spare mental capacity to ***project ahead***.

Descent Speed

If behind schedule and striving to make up time, cost Index 40 is normally sufficient to ensure a cruise at M.79 and a descent at moderate speed. A higher cost index simply generates the same cruising speed but a faster descent, and this allows little opportunity for modification should the crew find themselves high on the profile.

Operational Guideline:
Do not brief or plan for a high speed descent.

Descent Profile

Steep approaches may be recognised early if the crew discuss their progress at eg. FL200 and FL100. If on radar headings, the crew should update the FMGS to reflect the likely routing and note the track miles to go on the MCDU.

Operational Guideline - when possible try to ***verbalise*** progress**:**
66 track miles to go at FL200
50 track miles to go at FL150
33 track miles to go at FL100

Fast Descents Below 10000ft

The time saved at 320kt compared to 250kt is less than 1 minute. Additionally, a high speed descent may exceed 3000fpm within 3000ft of MSA. However, since ATC often 'keep us high' a 250kt descent is frequently an impracticable option.

Operational Guideline:
Aim for 280kt max at 10000ft at 33 track miles - ***verbalise*** progress.

Distractions Below FL100

Avoid company RT calls, PAs, discussion with the cabin crew or jump seat passengers, and non operational conversation when below FL100.

Avoid Conflict between Key and Secondary Tasks:
Both crew members must remain focused on flight path monitoring.

6000ft at 20 DME at 250kt

This gate is just below the 3 degree slope enabling further deceleration to take place without 'going high'.

Operational Guideline:
Use speedbrake early (if necessary) to achieve the 6000ft gate.

3800ft at 12 DME at 210kt, Flap 1

This gate allows a continuous 3 degree intermediate approach at 210kt - as specified by many aerodrome booklets. This intermediate phase is often the most difficult to judge and is sometimes characterised by rapid FCU inputs and FMA changes - at a critical time.

A simple example: Approaching the localiser at 12 miles the NHP will feel uncomfortable if the speed seems too high, especially if the HP seems 'busy' and remains silent. The NHP may be pre-occupied wondering when further deceleration will occur and is unable to ***project ahead***. A simple instruction from ATC to change frequency may be enough for the NHP to miss an FCU input, and an FMA change may pass unnoticed and unannounced.

Avoid Overload and Remain Aware of Auto-System Status:
Operational Guideline:
Brief or expect a deceleration at 12 miles from 210kt to180kt.
The NHP should advise the HP if this gate is missed - ***Advocate or Assert.***

2500ft at 8 DME at 180kt

Use speedbrake (or landing gear if necessary) to achieve 180kt on the glideslope by 2500ft. This progress check may be 'tied' to the radio altimeter callout - an excellent reminder. At 8 DME, if under ATC speed control, obtain clearance to reduce to 160kt - select flap 2 and landing gear.

Act Decisively When Required:
If the aircraft is faster than 180kts at 8 miles extend the landing gear.

1500ft at 4.5 DME at 160kt

Assuming speed control, maintain selected speed 160kt to 4.5DME, then select managed speed, flap 3 and full without delay.

Glideslope Intercept from Level Flight

Difficulties sometimes arise when the aircraft is, for example, level at 2000ft on an intercept heading.

Operational Guideline: Select 160kt, flap 2 and gear down at one dot (GS).

Simultaneous Intercept of the Localiser and Glideslope

At some airports ATC often vector the aircraft for a simultaneous capture of the localiser and glideslope. During localiser capture, if the aircraft is just a fraction high it will not capture the glideslope. If the crew are not quick to recognise the problem the aircraft 'goes high' and selected speed may be forgotten as the glideslope is captured from above.

Identify Potential Problems:
Operational Guideline: Recognise the possibility of a simultaneous capture and consider selecting managed speed and VS zero in readiness for GS intercept from above.

Weather

Obviously these guidelines need to be modified for strong winds or adverse weather.

Summary

Range	Height	Speed	Configuration
50	15000	Cost Index 40 max	
33	10000	280 max	
20	6000	250	
12	3800	210	
8	2500	180	Flap 1
4.5	1500	160	Flap 2 + Gear
	1000	VAPP	Landing Config

Conclusion

This descent profile is not intended to be a rigid example of a perfect approach. However using these gates (or others) helps considerably to focus attention on a ***shared mental model*** and assists in effective flight path monitoring.

The aim of this section has been simply to illustrate how Team Skills and Airbus operating techniques can be combined to result in a high level of SA throughout the approach. Research suggests that up to 80% of serious incidents can be attributed to degraded SA - and not to technical problems or aircraft handling.

Team Skills and Complex ECAM Procedures

The aim of this section is to help trainees improve their performance by passing on guidance on how to manage effectively a complex ECAM procedure or high workload situation.

ECAM Procedure

Consider a complex failure. The first priority is aircraft control - is the flight path safe and suitable for the immediate situation? As the NHP completes the initial ECAM actions the HP must avoid conflict between the key and secondary tasks. The HP's key task is to monitor the PFD and ND, and he/she must avoid the temptation to become over absorbed in the detail of the ECAM procedure.

Problems often arise following rapid or hasty FCU selections when, to the crew's surprise, the FMAs do not display the intended modes. It is vital that the crew remain aware of the auto-flight status and maintain a high level of SA.

Once any primary actions are completed the ECAM may prompt the crew to LAND ASAP. This may require them to pause in the procedure, consider the priorities and use the DODAR mnemonic. Should an immediate diversion be initiated? Alternatively, it may be necessary to view the STATUS page first to complete the diagnosis and identify the options.

STATUS

As the NHP works through the STATUS page, both pilots must remain aware of each other's workload, share tasks efficiently and prioritise. One common mistake occurs when the NHP reads out information without due consideration to the current workload of the HP.

Work through the STATUS page and note the various requirements, for example:

CTR TK FUEL UNUSABLE
SLATS/FLAPS SLOW

Some crews like to leave the STATUS page displayed until all preparations are complete whilst others prefer to take notes and clear the lower ECAM so that the Cruise page is once again displayed. Remember that the STATUS page will be reviewed again during the Descent Checklist.

DODAR

Once the ECAM actions are completed consider using the DODAR mnemonic:

Diagnosis

Use all resources to identify the symptoms. What exactly is the failure? Beware of confirmation bias - ie. the tendency to ignore symptoms that do not support the initial diagnosis. Having identified the failure, what exactly are the consequences - for example, how will the landing and deceleration be affected?

Options

What precisely are the options? Is an immediate diversion necessary or is continuing to the destination a viable option? Should the SCCM be called to the flight deck immediately? Has any other crew member identified an alternative option?

Decision

As there may not be a perfect solution, the crew must identify the best option. Are all crew members aware of the decision?

Assign Tasks

Consider the workload and individual crew member's experience when assigning tasks. In most cases the Captain adopts the NHP role, manages the overall situation and, if appropriate, takes control for the landing.

Review

Is the original plan still the best option? Are there any new factors to consider? Should the cabin be prepared for an emergency landing?

QRH

The STATUS page may instruct the crew to consult the QRH. For example the Ops Data and Flight Pattern Guides are used to calculate landing distance corrections and to assist in planning the subsequent approach.

FMGS

The next priority may be to re-program the FMGS. Distractions and the need to monitor the HP often result in the subsequent re-programming being incomplete at the time the Descent Briefing is given. The crew then muddle through, sweeping up forgotten items such as radio aids, revised minima or an approach speed correction - as the briefing takes place. A much better method is to develop a 'sub-routine' of your own whereby you always use the same sequence to modify or confirm the FMGS set-up. One commonly used routine is FRPP.

F. Select the F-PLN page, insert the approach and check the waypoints.

R. Select the RAD-NAV page and check the radio aids are set.

P. Select the PERF APPR page and enter the ATIS, approach minima, amend the VAPP etc. Select next phase and enter the Go-around Aa.

P. Select the Progress page and check Nav Accuracy.

Descent Checklist

Use the Descent Checklist aide-memoir to confirm that all preparations are completed - before you begin the briefing.

Identify Potential Problems. For example, will the flaps and slats extend at the normal rate? Is autobrake available? Will the FD be available during a go-around? Where do you hope to vacate the runway?

Establish Bottom Lines. Do not brief generalities - eg. "we should decelerate early and ask for a long final". Be specific - eg. "decelerate to S speed at 20 miles and tell ATC that we need a 15 mile final".

If you consider all the items on the aide memoir, before you begin to speak, you will avoid overloading or confusing the HP during the briefing. Only when the descent checklist is complete should you tell ATC that you are ready for the approach.

Approach

Throughout the approach the crew should communicate effectively and try to project ahead. Ask - *what is the next 'event'?* For example:

At 15 miles the crew might identify the next 'event' and verbalise: "At 10 miles we will gravity extend the gear".

At 1500ft the crew might identify the next 'event' and verbalise: "At 1000ft we'll make the emergency PA: Cabin Crew take your seats for landing".

At 700ft the crew might identify the next 'event' and verbalise: "At 500ft we'll disconnect the autopilot - watch out for the unusual approach attitude".

In this way the crew members can share and update their mental models and maintain a high level of Situation Awareness.

Conclusion

Most genuine emergency situations are not highly complex or catastrophic, but analysis of incidents suggests that the principles highlighted in this section will help crews to prioritise and maintain Situation awareness in both routine situations and when under stress.

Unused Page

Non-Normal Procedures

ECAM Operation

Warning Display		HP	NHP
HYD B RSVR OVHT - BLUE ELEC PUMP...OFF			Calls the failure. Cancels Master Caution.
		Confirms the failure. Calls: 'ECAM actions my radio.'	
			Reads and actions successively, each line of the procedure.
HYD B RSVR OVHT B SYS LO PR	*F/CTL		When actions complete: (to next underlined item). Calls: 'OK to Clear?'
		Checks: actions complete. Confirms: 'OK to Clear.'	
			Presses the Clear button
SEAT BELTS	*F/CTL		Reviews successively the 'affected' system(s) on the Lower ECAM display. (F/CTL) After each page has been reviewed: Requests 'OK to Clear?'
		Checks and confirms: 'OK to Clear.'	
			Presses the Clear button.

Warning Display		HP	NHP
STATUS			Reads: STATUS left column. Reads: INOP SYS column
APPR PROC HYD LO PR IF BLUE OVHT OUT - BLUE ELEC PUMP...AUTO SLATS SLOW CAT 3 SINGLE ONLY	INOP SYS BLUE HYD SPLR 3 CAT3 DUAL B ELEC PUMP		Requests 'OK to Clear?'
		Checks and confirms: 'OK to Clear.'	
			Presses the Clear button 'ECAM actions complete'.

Independent failures are underlined eg: HYD B RSVR OVHT

Primary failures are boxed eg: **B SYS LO PR**

Secondary failures - systems affected by the Primary failure, are listed in the right-hand column and annotated with an asterisk.

ECAM actions, STATUS and FMA review are sufficient to handle the fault. If time permits, the crew may refer to Abnormal & Emergency Procedures for supplementary information.

NO ECAM CLEAR ACTION
BEFORE CROSS CONFIRMATION

Engine Failure

Recognition

An engine flameout may be recognised by uncommanded yaw, a rapid decrease of EGT, N2 and fuel flow followed by a decrease in N1.

Engine damage may be accompanied by an explosion, vibrations, repeated stalls and associated indications such as hydraulic fluid loss, or no N2 rotation - the onset of yaw may be more rapid.

The ECAM procedure requires the crew to consider whether the failed engine is damaged. However the Flying Manual advises that the engine shall be considered damaged unless the cause of failure is obvious and can be removed.

Take-Off Technique

If an engine fails between V1 and VR, maintain directional control by smoothly applying rudder to contain the yaw. TOGA power is available and may be used, although the aircraft is certified to climb safely on one engine at FLEX power.

At VR rotate at the normal rate towards 12º, (or 10° if thrust remains at FLX), then follow the FD pitch bar; do not rotate early or rapidly. Try to avoid the tendency to under rotate due to the loss of thrust which induces a nose down pitching moment. After lift-off, apply rudder smoothly to centre the β target. Avoid over-controlling (especially lateral sidestick inputs) as the control laws will maintain the selected attitude and only very small inputs are required to fly accurately.

Centralising the β target results in a minimum drag configuration for the climb out, enabling the aircraft to fly wings level, constant heading with an optimum level of side-slip. Use rudder trim to eliminate rudder pedal loads, not to zero the β target.

Engage the autopilot as soon as practical after take-off, preferably when the rudder has been trimmed.

Initial Climb

The SRS mode commands either the speed at which the failure occurred, or a minimum of V2. The crew must remember the Acceleration Altitude as the normal take-off 'LVR CLB' and flight director prompt will be absent. At or above the minimum Aa, once the Vital Actions are completed, select V/S zero (push the FCU knob) and announce 'suspend ECAM actions'; the managed speed target will then become 250kt. Accelerate, retract the flaps on schedule and at green dot speed select OPEN CLB and MCT. Confirm that the speed target changes to green dot and announce 'resume ECAM actions'.

Following flap retraction, if the initial climb was conducted at FLEX thrust, the levers must be moved back from FLEX/MCT into the CLB detent, and then forward again to achieve MCT and to remove the 'LVR MCT' message.

ECAM Vital Actions

When the aircraft is safely established in the climb with the landing gear retracted and above 400 feet, the NHP restates the failure, the HP confirms and responds “ECAM actions, my radio”. The NHP methodically completes the procedure ensuring that the HP confirms any movement of a thrust lever, engine master switch or fire push button. If the procedure requires the use of a fire extinguisher, the discharge should be confirmed on the ECAM as the overhead panel indication may be obscured by the Fire Push Button. The vital actions are defined as the initial actions of the ECAM procedure up to and including the discharge of all agents specified.

EO Mode

After any engine failure the PERF page is automatically displayed and an ‘EO CLR’ prompt will appear at field 1R. This indicates that the FMGS has entered ‘single engine mode’. ‘EO’ also appears before the title of some other FMGS pages.

The EO mode restricts bank angle in certain conditions and provides other features such as modifying the target speeds and the maximum engine out altitude on the PROG page. The exact functions differ slightly according to FMGS standard and can be found in the Flying Manual.

EO SIDs and Emergency Turns are not contained in the BA database so these will require manual intervention. The flight director will demand a maximum of 15º of bank when below the configuration speed. Furthermore, if the SEC F-PLN has been programmed with an emergency turn use HDG; because depending on the FMGS standard, the use of NAV mode may result in a 15° bank angle limit which may compromise terrain clearance.

If ‘EO CLR’ is pressed by the pilot, normal twin engine mode is restored. EO mode cannot be restored unless a new engine out condition is detected. Therefore, the pilot should not press the ‘EO CLR’ if there is an actual engine failure.

During the approach phase, the FMGS restricts the bank angle to 15° when below the speed for the appropriate configuration, except during localiser capture.

Immediate Return

If an immediate visual return is required, activate the approach at Aa to remain at ‘S’ speed, in Config 1. The ECAM procedure takes precedence over FMGS programming so an arrival runway or approach may not be available; however, use basic autopilot modes if desired.

Wing Anti-Ice

The ENG SHUT DOWN drill is described in the Abnormal and Emergency Procedures. It instructs the crew to turn off one pack (affected side), if wing anti-icing is required; the cross-bleed valve is then opened. However, the manual also explains that this procedure should only be used if a fire push-button has ***not*** been pressed. Therefore, in most cases wing anti-ice will be unavailable. Engine anti-icing for the remaining engine is unaffected.

Single Engine Automatic Approaches

The automatic single engine approach procedures are essentially the same as for two engines. A decelerated approach may be flown - full use of automatics is recommended. Flap selection and speed targets are as for two engines. However, in conditions of high weight and temperature, consideration should be given to the TGA limit. It is possible that this will dictate a reduced flap setting for the final approach.

Single Engine Manual Approaches

The aircraft is relatively easy to control due to the flight control laws. For example, stick free, on final approach if TOGA is selected the aircraft yaws but remains almost wings level. Nonetheless, to prevent yaw it is necessary to co-ordinate thrust changes with rudder - as with a conventional aircraft -aim to keep the slip index centred. *Think*: Power, Rudder, Trim.

Try to use small thrust changes to achieve low rates of deceleration. Remember, drag increases with decreasing speed and a high thrust setting may be required to recover any speed loss. Inadvertent activation of SRS and GA TRK will occur if it becomes necessary to advance the thrust lever beyond MCT.

Autothrust is normally available but unnoticed changes can be lead to slight over-controlling and some pilots prefer to fly manual approaches with autothrust disconnected. The yellow speed trend arrow on the PFD simplifies speed control.

Constant Power Technique

Normally the crew would make maximum use of the automatics; however, the following technique is particularly useful when practising manual approaches in the simulator.

- Note the N1 power setting required when flying level at green dot speed. It is normally about 10% above the aircraft gross weight. The same power setting will normally maintain S speed when flap 1 is selected.
- When the glideslope becomes active select flap 2 and extend the landing gear.
- Maintain the ‘datum’ power setting, monitor the yellow speed trend arrow and allow the aircraft to decelerate.
- At about ‘one dot’ below the glideslope select flap 3; then aim to select flap full as the aircraft intercepts the glideslope at the VAPP Target.
- Normally, only small power adjustments are necessary to maintain the correct speed throughout the approach, but if more thrust is necessary it should be applied sooner rather than later.
- This method may be easily adapted for non-precision approaches using suitable DME ranges.
- Other methods and techniques may be equally effective.

Heavyweight Single Engine Approach

As the thrust available is considerably reduced, delay the selection of full-flap until commencing the final descent. This will help prevent the inadvertent activation of go-around mode which will occur if it becomes necessary to advance the thrust lever beyond MCT.

Single Engine Go-Around

The single engine procedure is similar to the two engine procedure until acceleration altitude when the aircraft is flown level until clean at green dot speed (select V/S zero). OPEN CLB is then selected with MCT power. The crew must remember the Aa as the normal go-around 'LVR CLB' and flight director prompt will be absent. The β-target will appear when TOGA is applied and a substantial rudder input is required to keep it centred, particularly at light weights. Trim the rudder to relieve foot loads.

Engine-Out Climb

If an engine fails during the climb, select MCT power on the remaining engine, allow the speed to decay to green dot. Maintain green dot to MSA or until terrain is no longer a factor, then fly at ECON speeds.

Engine Out Cruise

If an engine fails in the cruise a drift-down may be required. Select MCT and a suitable flight level on the FCU. Disconnect autothrust and select OPEN DESCENT. Descend at .78M / 300kt, or green dot if obstacle clearance is a consideration.

Engine inoperative cruise information is available from the FMGS with the EO CLR prompt visible. The gross single-engine ceiling at max weight, and ISA + 10ºC, is never less than 15,000ft.

Centre the slip index and trim out the rudder. When time permits, ensure that spoilers are not extended causing additional drag. Select the ECAM flight controls page and apply rudder trim towards the raised spoilers, or ailerons, to bring the lateral controls back to neutral.

Emergency RT Calls

Following an engine fire the initial ECAM procedure instructs the crew to 'Notify ATC'. This prompt, occasionally causes problems if the HP chooses to make the distress RT call at a time of high workload - typically during the acceleration or flap retraction when the key task is to fly accurately and achieve OPEN CLB and MCT at green dot speed. Clearly, the crew should prioritise and avoid conflict between key and secondary tasks. However, an early RT call is necessary in the case of a deviation from the SID in order to follow an emergency turn procedure. A fire warning will result in a red 'LAND ASAP', ECAM message; it will change to amber when the fire is extinguished.

MAYDAY. Normally**,** a red 'LAND ASAP' requires a MAYDAY call.

PAN. An amber 'LAND ASAP' requires a PAN call, though special circumstances (e.g. smoke or additional failures) may dictate that a MAYDAY is more appropriate.

Rejected Take-Off

- Review the ECAM procedures in AOM Chapter 3:

  ENG FIRE on ground (FIRE PROTECTION)

  ENG 1(2) FAIL · Before take-off or after landing (POWER PLANT)

- Review the QRH checklists:

  ENG FIRE on ground

  ON GROUND EMERGENCY/EVACUATION

- Use QRH drills only if an ECAM procedure is not displayed.
- ECAM is lost when second engine shutdown. Continue drill using QRH.
- Select Dome light to Dim at night - only lighting available on batteries.
- Captain is responsible for communication, F/O for ECAM/QRH actions.
- Use the correct phraseology for an emergency evacuation:

  'This is an emergency, EVACUATE, EVACUATE. Possible hazard left (or right).'

- The ENG FAIL ECAM procedure requires the fire pushbutton to be pressed and the agent to be discharged. Is this optional? No, - complete the drill. The fire pushbutton can be reset easily and the extinguishing agent (halon) does not corrode or otherwise damage the engine.
- If the take-off is rejected because of a failure (as opposed to a fire) the second engine may not be shutdown. Other considerations apply:

  Is it safe to taxi clear?

  Can the aircraft be inspected?

  Would it be prudent to clear the runway, shutdown and be towed in?

  Can the SCCM see any evidence of damage?

RTO - Engine Fire

HP	NHP	Common Errors
Closes the thrust levers.		Forgets to remove hand from thrust levers.
Monitors the autobrake, keeps straight using rudder, (and possibly tiller at low speed).		Prematurely disconnects autobrake by instinctive use of the footbrakes.
	Selects: Full reverse above 80kt. Idle reverse below 80kt. Calls '70kt.' Selects forward idle.	Forgets or is slow to select reverse.

Captain	First Officer	Common Errors
If F/O's take-off: When a safe stop is assured, takes control.		
Stops the aircraft. Headwind: Turns towards failed engine. Tailwind: Turns away.		Aircraft comes to a complete halt with autobrake engaged, - Captain unable to turn - therefore consider using the 70kt call as a trigger to disconnect.
Applies the parking brake. Checks forward idle. Assesses the situation.	Assesses the situation Reads ECAM warning.	
'ECAM actions my radio.'		
	Completes ECAM actions, swiftly, does not seek confirmation of actions.	F/O hesitant, slightly confused, unfamiliar with ECAM actions.
Communicates with ATC, crew and passengers: 'Mayday Mayday Mayday, Speedbird 320, rejected take-off, engine fire, standby.'		
Captain can time any transmission to avoid talking when the (second) generator drops off line.	If ECAM drill requires second engine to be shutdown, F/O indicates that the Master Switch is about to be switched off. If required, selects Dome light to Bright	F/O incorrectly seeks approval before shutting down the second engine. Captain fails to assess the situation and makes hasty decision to evacuate – fails to seek confirmation of fire.
Seeks confirmatory signs of fire from possibly ATC, fire crew, or observation from flight deck window. Advises F/O of decision to evacuate.		Captain orders evacuation before second engine is shutdown.
PA: 'This is an emergency evacuate evacuate possible hazard on the left-hand-side'.	Completes drill using QRH ENG FIRE on ground checklist. Start checklist below the shaded items.	F/O reads out the complete drill from QRH. Captain makes non standard PA.
Lifts safety cover, presses EVAC COMMAND cancels flight deck warning using HORN		Captain presses EVAC COMMAND before making PA.

SHUT-OFF.		
Informs ATC: Evacuating.		

Emergency Descent

Don oxygen masks and establish crew communication at the first indication of rapid de-pressurisation. Commence descent without delay at MMO/VMO minus approximately 10kt or the current speed if structural damage exists. In some cases, a gradual decompression may permit time for diagnosis and communication with the cabin crew. The standard procedure is to leave the autopilot engaged.

Handling Pilot

- Rotate the altitude selector to a lower altitude and pull to engage open descent.
- Rotate the heading selector to the desired heading and pull to engage in heading.
- Set the desired speed and pull to engage Selected Speed. Use the SPD/MACH pushbutton to ensure that the aircraft does not descend at constant Mach No.

These first actions can be summarised as "Turn/Pull, Turn/Pull, Select Speed".

- The expedite mode may be used if structural damage is not suspected.
- As the speed increases gradually extend the speedbrake. This causes an increase in VLS and there is a risk of automatic speedbrake retraction.
- Refine the selected altitude, heading, and speed.
- Declare a Mayday.
- Select engine anti-ice if required.
- Descend to MSA or 10000ft whichever is higher.
- Anticipate the level-off by about 2000ft and retract the speedbrake.

Non Handling Pilot

- Monitor the flight path and initial actions of the HP.
- Carry out the ECAM actions; however, if the descent is initiated before the cabin altitude exceeds 10000ft the ECAM warning will not be displayed - use the QRH drill.

After Level Off

- PA : "The descent is now complete, will the SCCM report to the flight deck".
- Re-check pressurisation system and evaluate the situation.
- Do not remove oxygen masks if cabin altitude remains above 10,000ft. If oxygen masks are to be removed this should be done one at a time while one pilot monitors the RT.
- Determine a new course of action based on weather, oxygen, fuel remaining and available airports. Obtain a new ATC clearance.

Raw Data ILS

Raw Data ILS approaches are included in the conversion syllabus and are practised during the various technical failures during the simulator phase. In these circumstances the crew should consider requesting a long, speed-stabilised final approach to minimise the increased workload of manual instrument flying using raw data - possibly in alternate/direct law.

Vertical Profile

Select pitch attitudes on the PFD referring to the fixed aircraft symbol in the conventional way. Check the achieved FPA (indicated by the FPV) and vertical speed, then adjust pitch attitude as necessary. Try to resist the temptation to 'chase' the FPV and VSI; remember they are performance instruments. FPA selections are not made on the FCU.

Plan to select Flap 2 and landing gear at 3000ft aal. This may seem unnecessarily early but you will be pleasantly surprised at how much this helps to stabilise the approach.

During the deceleration and whilst configuration changes take place, quite significant attitude and trim changes are apparent. Make sensible attitude selections and do not chase the G/S or FPV. Thereafter select a desired pitch attitude and scan G/S, V/S and FPV; adjust attitude as necessary. Remember to check go-around altitude is set - easy to forget when you are busy.

Horizontal Profile

During the initial approach, the desired radar heading should be set in the FCU track window; it will then be displayed by a blue (TRK) index on the PFD horizon line. The heading is maintained by aligning the fixed aircraft symbol (not the FPV) with the blue index. As you approach localiser intercept, remind the NHP to be particularly vigilant about calling 'localiser active' - it is very easy to fly through the centreline when the flight director is off.

The FCU track is then set to the inbound course for the final approach. The correct track is maintained by positioning the FPV with reference to the blue TRK index. When the FPV is aligned with the TRK index the aircraft will maintain the track selected on the FCU. Naturally, it is necessary to ensure that the aircraft is established on the localiser before aligning the FPV and TRK index. Failure to do so simply results in the aircraft paralleling the localiser.

Consider selecting Rose ILS on the ND as this gives a more prominent indication of lateral progress. Occasionally it is necessary to displace, laterally, the FPV a small amount to maintain the localiser; nonetheless, it is still very useful once you have worked out how much to offset it. When errors occur make small positive track adjustments rather than weaving continuously.

Speed Control

When using raw data without autothrust, close monitoring of speed control is vital. The speed trend arrow on the PFD is usually available and provides valuable assistance.

Speed and Landing Distance Corrections for Failures

Many ECAM procedures require the crew to modify the approach speed and calculate the landing distance. For example:

APPR SPD.....VREF + 25
LDG DIST PROC.....APPLY

The crew should consult the QRH - OPS DATA and use the table: 'APPR SPD - LDG DIST CORRECTIONS FOR FAILURES'.

Approach Speed

Page 1 of OPS DATA explains how the speed correction is applied. The approach speed increment should be added to the VREF (shown as VLS on the PERF APPR page) for **Flap FULL.** In addition, provided that the resultant VAPP does not exceed VREF +20kt, one third of the headwind component should be added to this figure.

The resultant speed should be inserted, if possible, in the VAPP field on the PERF APPR page and bugged on the standby airspeed indicator. If the situation requires the speed to be Selected, rather than Managed, then the speed calculated above can be set on the FCU.

Insertion of the calculated VAPP on the PERF APPROACH page will ensure that if Managed speed is available, the correct approach speed will be flown. Also the benefits of GS mini will be available, even though the aircraft is landing in an abnormal configuration.

For example, a DUAL ADR FAULT requires a direct law landing flown in Config 3, using a VAPP of VLS **Flap FULL** plus 10kt, plus one third of the head wind component, subject to the 20kt limit described above.

Landing Distance Procedure

Any increase is based on the landing distance obtained from the QRH OPS DATA chart: 'LANDING DISTANCE WITHOUT AUTOBRAKE CONFIGURATION FULL' - even when the landing is actually planned to take place in Config 3. The distance extracted from this chart requires the use of maximum braking. However, most crews also check the 'AUTOLAND LANDING DISTANCE WITH AUTOBRAKE CONFIGURATION FULL' chart to assess the likely stopping distance using medium autobrake. For dry runways longer than 2500m landing distance is not normally a limiting consideration.

Landing Without Slats and/or Without Flaps

Two SFCCs each posses one slat and one flap channel.
If one SFCC is inoperative, slats and flaps travel at half speed.
If one HYD inoperative, corresponding surfaces operate at half speed.
ECAM: 'SLATS (F) LOCKED'..... indicates WTB on - mechanical failure.
ECAM: 'SLATS (F) FAULT'.....indicates SFCC - computer failure.

PFD Indications

Overspeed ***Aural*** Warning and VLS are for the actual flap/slat configuration.
VFE and VFE Next correspond to the flap lever position.
If a double SFCC failure no AP, FD or AT, also.....
No characteristic speeds, no VLS - use QRH Op Data.
Use Selected Speed.

ECAM

The initial ECAM actions are straightforward.

The STATUS procedure mainly concerns the set-up for the landing.
For Slat **or** Flap failure, the flap lever is selected to position Flap 3.
For Slat **and** Flap failure, the flap lever is selected to Flap 1 to enable G/A mode to be available.
However, Config FULL is selected on the PERF APPR page

For a SLATS FAULT alternate law is active - direct law when gear selected down.

Following the ECAM actions the crew will need to refer to the QRH for:
APP SPD - LDG DIST CORRECTIONS.

Approach

Use the QRH drill: 'Landing with Slats **or** Flaps Jammed'.
However, for a landing without Slats **and** Flaps use the QRH Flight Pattern.
The NHP uses the QRH to guide the HP through the approach.
Use Selected Speed.
Use AP and AT if available but.....
Disconnect AP by 500 feet.
Disconnect AT by 500 feet for a Slat **and** Flap failure.

Final Approach

The approach attitude is unusual. When visual, resist the temptation to alter the pitch attitude and continue to monitor the flight director.

Go-Around

For failures other than dual hydraulic, raise the landing gear, but maintain flap/slat configuration.
For an SFCC double channel fault (Flap or Slat), remember that AP, FD and AT are unavailable - don't forget to consider a raw data go-around.

Dual Hydraulic Failures

Basic Considerations

The first consideration following a dual hydraulic failure is the loss of both auto-pilots and basic aircraft control. Consequently, the first ECAM procedure is to cancel the Master Warning and clear the first underlined item: 'AUTO FLT AP OFF'.

Alternate Law is active; careful handling and smooth control inputs are required. The aircraft will seem sluggish but copes well considering about half the basic control surfaces are non-operational. Pitching moments generated by the autothrust may exacerbate the handling difficulties.

ECAM

Most captains adopt the NHP role, enabling them to employ CRM, and carry out the ECAM actions.

The ECAM procedure is quite lengthy and complex, but can prove straightforward provided a calm and logical style is employed.

The failure results in a red (MAYDAY) LAND ASAP message, but it will take some time to set-up the aircraft for an approach so it may be prudent to enter a hold whilst carrying out the ECAM procedure. This will enable a subsequent approach to be made without delay once all preparations are complete.

- Following the ECAM actions the crew will need to refer to the QRH for Landing Gear Gravity Extension and APP SPD - LDG DIST CORRECTIONS.
- Approach Speed.
  The landing is made in Config 3; however, remember that the corrections are made to the Flap FULL VREF shown as VLS with Config FULL selected on the PERF APPR page. Enter the corrected speed in the VAPP field as an aide memoir. The approach is flown in Selected Speed.
- Landing Distance Correction.
  The required distance is obtained from the chart 'Landing Distance Without Autobrake - Config FULL'. Most crews also check the 'Autoland Landing Distance with Medium Autobrake - Config FULL'. For runways longer than 2500 metres, landing distance is not normally a limiting consideration.

The list of inoperative systems indicated on STATUS is considerable and the NHP may easily swamp the HP by reciting it without due consideration. To achieve more effective crew understanding, it may prove useful to handover control briefly to enable the other crew member to read and absorb STATUS . The crew may wish to refer to the 'architecture' diagram in the QRH; however, the LAND ASAP imperative may sway them against this option.

Approach

Brief the approach using the QRH drill: 'Landing With Slats or Flaps Jammed'. The NHP uses the drill to talk the HP through the configuration and speed changes, and most crews are pleasantly surprised to find the

procedure relatively straightforward. Remember that extension of the Flaps or Slats will take more time, and the gear will be extended using the gravity system - this will result in the loss of Nose-Wheel Steering even though the Green system may still be operational. The landing capability is CAT 1.

Special care is required in the case of a Green and Yellow failure as the stabiliser is frozen and thus trim is unavailable. Throughout the initial approach in alternate law this will not be apparent; however, when the landing gear is extended the aircraft will revert to direct law and the trim will be set at the speed achieved at the time of gear extension. It is for this reason that the crew should select Flap 3, reduce speed to VAPP and then extend the landing gear.

Landing

The landing attitude may be unusual: high without flaps, or close to normal without slats. Monitor the FD until familiar with the required attitude.

One or both reversers will be inoperative. NWS is inoperative but, depending on the failure, some form of anti-skid and possibly autobrake may be available. In most cases it should be possible to vacate the runway prior to shutdown.

Dual FMGC Failure

A dual FMGC failure results in the loss of: autopilots, flight directors, autothrust, and maps. The ACARS can be accessed as normal.

ECAM warnings and procedures are displayed for several affected systems, but the FMGC failures are not, themselves, indicated on ECAM.

The FMGC reset procedure is in the QRH and involves pulling and resetting the specified circuit breakers; however, the reset of 'tripped' circuit breakers is not recommended.

Turn the FDs OFF to remove the red FD symbol on the PFDs and to enable use of the blue, selected track indicator.

Standby Nav tuning is required. The ILS DME is inoperative.

Characteristic speeds are displayed normally on the PFD, so VLS is displayed but VAPP is not. Calculate it manually with reference to the QRH (Ops Data) if necessary.

A raw data approach is required. TRK/FPA is recommended. Rose ILS for the ND.

Bus Faults

A BUS FAULT indicates that the services from a particular busbar are inoperative. Some of the inoperative systems are indicated on the STATUS page but others are listed in the Abnormal and Emergency section of the Flying Manual.

A failed busbar cannot normally be restored; however, the procedure for an AC BUS 1 FAULT requires the crew to select AC ESS FEED to ALTN ; this should restore the services on the AC ESS BUS via AC BUS 2.

DC ESS Bus Fault

This failure *inter alia* results in the loss of:

RMP1, ACP1 & 2, VHF 1, Flight Intercom and P1 Speaker.

The following suggestion for an Emergency Communications set-up is not displayed on ECAM, the QRH or Flying Manual.

First Officer:

Use RMP2 to tune VHF 2 (or 3) for normal VHF communications.
Set ACP3 to transmit and receive on VHF 2 (or3).
On the overhead panel select Audio Switching to F/O 3.
The FO can then transmit using the sidestick trigger via ACP3.
The FO can receive VHF and cabin intercom via ACP3.
The flight intercom is inoperative - (suggest FO uncover left ear).
Turn up the volume on the P2 loudspeaker.

Captain:

The Captain's sidestick trigger and ACP1 transmit switch are inoperative.
The Captain may transmit using the FO's hand microphone, stretch.....
.....the cable behind FO's seat and the centre pedestal.
The Captain may receive via the FO's loudspeaker.

Dual Generator Failure

Basic Considerations

The first consideration following a dual generator failure is the loss of both autopilots; consequently, the first ECAM procedure is to cancel the Master Warning and clear the first underlined item: 'AUTO FLT AP OFF'.

The RAT extends automatically, supplies power to the Blue hydraulic system, which in turn powers the emergency generator via a hydraulic motor. Within a few seconds the AC SHED and DC SHED Essential Busses are once again operative. Many systems are lost and alternate law is active. The only flight deck lighting remaining is the FO's dome light.

As the FO's screens are inoperative the Captain becomes the HP and must rely on the FO to work methodically through a complex ECAM procedure. The Captain's management task is demanding as the AP, FD, and AT are inoperative. FMGC 1 can be regained via the Menu page on the MCDU, but reprogramming it is a task for later. Consider asking for radar vectors to remain in a suitable area rather than entering a hold, since the latter would further increase the workload as the flight director is inoperative.

ECAM

Only the Upper ECAM is available. After completing the ECAM actions in the left hand column the affected systems can be displayed for up to 3 minutes by pressing and holding, in turn, the respective button on the ECAM Control Panel (ECP). To view the STATUS page press and hold STS on the ECP.

When operating on a single ECAM display, as you progress to the bottom of the first STATUS page check to establish if a green (⇓) arrow is prompting you to release and press the STS button again to scroll the next page. (The CLR button is not used for this purpose when only one screen is available).

After completing the left hand column of STATUS it is not necessary to review all the inoperative systems in the right hand column. Whilst many systems have been lost the significant ones (Auto Rad-Alt Callouts, Reverser 2, Nose-Wheel Steering, and Anti-skid) are illustrated in the QRH Flight Pattern Guide which is used when completing the approach briefing.

FAC 1 is reset and thus characteristic speeds are regained on the PFD but the crew will need to refer to the QRH for:

- Gravity Fuel Feeding.
- APP SPD - LDG DIST CORRECTIONS.

Differences

Older Aircraft

On the older aircraft the RAT will stall at speeds below 140kt, and additionally when the landing gear is extended. Thereafter the final approach is flown on battery power, and for this reason landing gear extension is delayed until 1000 feet. FAC 1 is then inoperative so

characteristic speeds are lost - take a note of the F and S speeds in case of a go-around.

An APU start attempt is not permitted since this places a considerable load on the batteries and successful coupling is considered unlikely. Use standby nav aid tuning on RMP 1 as FMGC 1, and thus auto-tuning, is lost when the landing gear is extended.

Newer Aircraft

On the newer aircraft the RAT is capable of supplying the emergency generator down to 125kt, it does not stall until the landing flare and is therefore available throughout the final approach. Since battery life is not so critical the ECAM procedure includes an APU start.

The Captain's Nav Display is operative, FMGC 1 is not lost on landing gear extension and thus the ECAM procedure does not instruct the crew to tune the approach nav-aid on RMP 1.

Simulator

The simulator performs like an older aircraft in that the RAT stalls at landing gear extension and the crew are instructed to tune the approach nav-aid on RMP 1. However, the FMGS performs to a newer (ETOPS) standard and thus the ND map remains operative.

AOM

For more information study the type specific pages in the Technical and, Abnormal and Emergencies Manuals.

Approach

The approach is flown manually, using raw data in alternate law for a direct law landing. To display the blue track index on the PFD turn off the inoperative flight directors.

Go-Around

Following a go-around (on raw data), if the aircraft is on battery power, the emergency generator will need to be reset after gear retraction. The associated ECAM warning 'ELEC ESS BUSES ON BAT' requires the crew to re-select the RAT & EMERG GEN to MAN ON. The ECAM drill also indicates actions in the event that the gear cannot be retracted.

Unused Page

Smoke

Cargo Smoke

Each cargo compartment has 2 smoke detectors. If both detectors sense smoke the crew are alerted by the ECAM: **SMOKE FWD (AFT) CARGO**. The procedure instructs the crew to discharge the single extinguisher into the relevant compartment. The warning triggers a red **LAND ASAP**.

The procedure is not included in the QRH but further information in AOM Chapter 3 reminds the crew that the ECAM warning may remain on even though the source is extinguished This is because the extinguisher gasses are not evacuated and the detectors are sensitive to the agent.

Lavatory Smoke

There is a single smoke detector in each lavatory. Warnings are displayed on the CIDS panel and the ECAM: **LAVATORY SMOKE**. Each waste bin has an automatic fire extinguisher.

Avionics/Air Conditioning/Cabin Equipment Smoke?

This emergency clearly emphasises the need for the crew to diagnose the failure and not simply to react to the symptoms.

AVNCS SMOKE appears as an amber ECAM warning when smoke is detected for at least 5 seconds by the single detector in the avionics compartment. If smoke is detected for longer than 5 minutes the warning is latched and **LAND ASAP** will remain displayed for the remainder of the flight - even though the warning may be spurious, or the smoke might clear for example, after 6 minutes. The GEN 1 LINE 'Smoke light' illuminates amber when smoke is detected - it does not latch on and will go out if the smoke clears.

As there is just one detector the warning is only considered genuine if 'perceptible' smoke is detected by the flight crew. When there is no 'perceptible' smoke the crew may assume that the warning is spurious, in which case the **LAND ASAP** is not mandatory.

Additional complications arise because the Airbus philosophy: '***ECAM procedures and STATUS information, supplemented by a PFD/ND check, are sufficient to handle the fault'***..... does not seem to apply in this case. Awareness of the AOM Chapter 3 and QRH procedure is essential for correct diagnosis of the fault.

The explanatory notes indicate that the origin of the smoke may not be defective avionics equipment. This is because the ventilation system draws conditioned air from the flight deck into the avionics bay and, for example, faulty **cabin equipment** or **air conditioning** may be the cause. The italic text also appears to suggest that smoke from a **lavatory** or **cargo hold** could also trigger an **AVNCS SMOKE** warning - although a review of the schematic diagrams makes this hard to imagine.

The procedure in AOM Chapter 3:

- Is different to that displayed on ECAM - and more comprehensive.
- Requires the crew to consider the origin of the smoke.

- Is included in the QRH in an abridged format.

Therefore, in the event of a warning thorough diagnosis is essential - the ECAM does not help with this; use the QRH procedure. This leads the crew to consider the various pre-conditions. Once the QRH procedure is complete check the ECAM and review the STATUS display as usual. If the source is considered to be the avionics, the procedure has three phases:

Phase One: If Perceptible Smoke

If the ECAM warning is **confirmed** by perceptible smoke the crew don oxygen masks, check 100% selected and if necessary purge smoke by turning the emergency knob. The ventilation system is then reconfigured in an attempt to remove the smoke. (The oxygen should last for 30 minutes).

Phase Two: If Smoke After 5 Min

If the SMOKE disappears within 5 minutes the crew restore normal ventilation.

If the WARNING persists after 5 minutes, the crew select EMER ELEC GEN 1 LINE to OFF, EMER ELEC PWR MAN ON and turn GEN 2 OFF, to reduce to a minimum the number of operative electrical systems.

Turning off the GEN 1 LINE has the same effect as switching off GEN 1 but keeps No1 fuel pumps running in each wing tank. As in the case of a Dual Generator Failure, only the Captain's PFD, ND and the Upper ECAM are available.

When reviewing the STATUS page bear in mind that it does not fully reflect the *anticipated* STATUS of the aircraft on the final approach. This is because the information presented is for the Electrical Emergency Configuration; whereas electrical power will be restored for the approach, and the landing is planned to take place, simply, in alternate/direct law.

A subsequent review of the Chapter 3 procedure (time permitting) would remind the crew that Normal Braking and Anti-skid will be available and the landing distance factor is 1.2 (Alternate law) and not 1.7 (Dual Generator Failure). Confusing isn't it?

Phase Three: Before L/G Extension

Phase three involves re-establishing normal electrical power prior to landing. However since IRS 2 & 3 remain inoperative, alternate law remains active and the approach is flown manually using raw data for a direct law landing.

Footnote:

BA Flight Deck magazine (Spring 2000) contained an article: 'Fire in Flight'.

Extensive research showed:.....

Historically if you have a cabin or cargo fire and aren't able to extinguish it within 2 minutes .....you will not be able to extinguish it.

If you have an inextinguishable fire you have only 14 minutes to land/ditch and evacuate. If you fail to do this the fire will destroy the aircraft.

Dual Engine Failure

Basic Considerations

If a dual engine failure occurs both generators drop off-line and the autopilot disconnects. The RAT extends and after a short interval electrical power is established in the emergency configuration, alternate law is active, direct law when the landing gear is extended. The Master Warning 'ENG DUAL FAILURE' is displayed on ECAM. A relight attempt takes place automatically. If the engines are not windmilling only the Blue hydraulic system is available - manoeuvre with care.

On the new aircraft the Captain's ND is available. However, on the older aircraft it will be necessary to tune nav aids or ask for radar vectors; the approach nav-aid should be tuned on RMP 1.

The cabin altitude will climb at about 1200ft per min and the aircraft will descend at about 1500ft per min, the two meeting perhaps at say FL 200. The ECAM will provide warning of excess cabin altitude, but since only one screen is operative, this may easily pass unnoticed by the flight crew unless they are particularly vigilant.

Below FL 250 the APU may be started and below FL 200 Bleed Air may be used to supply the Packs; in the interval it may be necessary to use oxygen. However, if the engine failures were caused by empty fuel tanks the APU cannot be started!

Captain's Role

As the FO's screens are blank the Captain becomes the HP and also has responsibility for the RT. The FO's screens are regained when the APU is available.

- Select a pitch attitude to achieve a gliding speed of 280kt. This is the optimum speed for a windmilling relight - and is prompted by ECAM.
- Select NAV ROSE, 80 mile scale with 'airports' overlay.
- Turn the aircraft towards the nearest suitable airport and declare a MAYDAY.
- When the APU is available select TRK FPA, Open Descent FL 00100, (100 feet is the lowest FCU setting). Selected Speed to Green Dot and engage an autopilot - if available.
- With only the Blue hydraulic pump operative it is important to avoid large control inputs.

First Officer's Role

The FO should monitor the Captain's initial manoeuvring, ensure that the aircraft stabilises in a 280kt glide towards a suitable airport, and then carry out the ECAM procedure when requested; this basically involves:

- Unassisted relight attempts at 280kt.
- APU start below FL 250.
- Establishing APU bleed air below FL 200.
- Assisted start attempts at Green Dot speed. (Use the QRH)

- Ensuring the Cabin is secure for a forced landing or ditching.
- Gravity Landing Gear Extension. (ECAM recommends this at 5000ft which may be desirable in VMC and if circling overhead the airport).

Familiarity with the italic notes contained in the Abnormal and Emergency Procedures expanded ECAM drill will greatly assist the efficient accomplishment of these tasks.

Navigation and IMC Approach

In poor weather, if time and workload permit, re-programme the FMGS for a new destination, appropriate runway and instrument approach, (FRPP).

- Ask for radar vectors to intercept a 5 degree approach. (24 miles at 12000ft, 8 miles at 4000ft etc.) Halve the DME to give the required altitude. Once established select FPA 5 degrees to maintain the glideslope, and ALT SEL above the current altitude to prevent a low altitude capture, (with the lowest setting '00100' selected ALT* may occur at eg. 700ft on final).
- If high and close to a suitable airport utilise the ND to try to set up a downwind leg with 5 miles lateral separation from the approach path, glide downwind at green dot speed and allow 2500ft for a 180 turn to establish on the localiser. (Eg: At 28 miles, 16500 feet downwind, turn to achieve 14000 feet at 28 miles on the localiser). This procedure seems complex but is simple in practice.
- Select Config 1 and reduce to S speed (180kt) when established on the glideslope.
- It is likely that the speed will tend to increase not decrease.
- Use speedbrake not Config 2 to prevent an excessive gliding speed.
- Maintain a 5 degree approach; the FO should call desired altitude against ILS DME adding the airfield elevation to the basic calculation.
- Be ready to select gravity extension of the landing gear at 1500ft. If the speed has increased to say 210kt extend the gear at say 2000ft. (As time may not permit use of the QRH, simply rotate the gravity lowering lever until the stop is reached and place the gear selector lever in the down position).
- With the gear extended increase the rate of descent to intercept a 3 degree approach and select further stages of slat - (and possibly flap, if green or yellow hydraulic pressure is available) - if speed/energy permit.
- Make the Emergency Landing PA calls:
- 1000 feet: "Cabin Crew take your seats for landing"
- 200 feet: "Brace, Brace"
- Keep your fingers crossed.

Note

Advice on the use of the Yellow Electric Hydraulic Pump has been omitted since it is not specified in the ECAM procedure or the Abnormal and Emergencies Manual. However, if available, it would seem sensible to use it. In this case the PTU should be switched OFF as the pump output is considered insufficient to supply both the Green and Yellow systems.

QRH Memory Items

SMOKE	
CREW OXYGEN MASK	ON/100%
CREW COMMUNICATION	ESTABLISH

RUDDER JAM	
On Ground	
DIFFERENTIAL BRAKING	USE ASAP

STABILIZER JAM	
A/P	OFF
MAN PITCH TRIM	CHECK

LOSS OF BRAKING	
• IF AUTO BRAKE ON	
BRAKE PEDALS	PRESS
• IF NO BRAKING	
REVERSE	MAX
BRAKE PEDALS	RELEASE
A/SKID & N/W STRG	OFF
BRAKE PEDALS	PRESS
MAX BRAKE PR	1000 PSI
• IF STILL NO BRAKING	
PARK BRAKE	SHORT APPLICATIONS

ENG STALL	
On the Ground	
ENG MASTER	OFF
In Flight	
Only ENG 1(2) STALL is displayed on ECAM The following procedure is not displayed.	

THR LEVER	IDLE
ENG PARAMETERS	CHECK
If abnormal:	
ENG MASTER	OFF

LOW ENERGY WARNING	
THRUST LEVERS *('Speed, Speed, Speed')*	MOVE FWD

EGPWS	
PULL UP GO-AROUND	ANNOUNCE
A/P	OFF
PITCH	PULL UP
THRUST LEVERS	TOGA
SPEED BRAKES	RETRACT
BANK	WINGS LEVEL or
for EGPWS if required	ADJUST

TCAS TRAFFIC ADVISORY 'Traffic, Traffic'	
SPD/MACH ON PFD	CHECK
V/S KNOB	(If required)PULL
LOOKOUT	MAINTAIN
When traffic has passed	
REQUIRED FMA MODES	CHECK/ENGAGE

TCAS RESOLUTION ADVISORY 'Climb or Descend' 'Maintain, Adjust or Monitor Vertical Speed'	
Determine if manoeuvre is required.	
A/P	OFF
F/Ds	OFF
Manually adjust vertical speed to avoid the red VS area.	

WINDSHEAR	
If after V1.	
THR LEVERS	TOGA
WINDSHEAR GO-AROUND	ANNOUNCE
REACHING VR	ROTATE
SRS ORDERS	FOLLOW
Initial climb or landing.	
THR LEVERS AT TOGA	SET OR CONFIRM
WINDSHEAR GO-AROUND	ANNOUNCE
SPEEDBRAKE LEVER	CHECK RETRACTED
A/P (if engaged)	KEEP
SRS ORDERS	FOLLOW

UNRELIABLE SPEED INDICATION	
AP/FD	OFF
A/THR	OFF
FLAPS	MAINTAIN CURRENT CONFIG
SPEEDBRAKES	CHECK RETRACTED
L/G	UP WHEN AIRBORNE
PITCH & THRUST GUIDANCE	
• WITH SLATS EXTENDED	
THRUST LEVER	MCT
PITCH ATTITUDE	12.5°
• IN CLEAN CONDITION	
THRUST LEVER	CLB
PITCH ATT below FL 100	10°
PITCH ATT above FL 100	5°

EMERGENCY DESCENT	
CREW OXY MASK	ON
CREW COMMUNICATIONS	ESTABLISH
DESCENT	ACCOMPLISH
THR LEVERS(If MAN THR)	IDLE
SPD BRK	FULL
SPEED	MAX/APPROPRIATE

ENG TAILPIPE FIRE	
MAN START (If manual start)	OFF
ENG MASTER (Affected)	OFF
AIR BLEED PRESS	ESTABLISH
MODE SEL	CRANK
MAN START	ON

Base Training

Base Training & ZFT - Summary

The aim of this summary is to enable trainees to revise swiftly the key points relating to a base training or zero flight time simulator detail. Most of the handling advice is covered in more detail elsewhere in this guide and within the Flying Manual.

Briefing

- Aim: To achieve safe and consistent landings.
- Also an opportunity to introduce the external check, the actual flight deck and cabin interior.
- Safety is paramount speak up - don't be shy.
- Trainee is P3 not P2.
- Use SOPs, but the focus is on handling not route-training.
- Trainer inputs on the sidestick will not be felt, but he will announce control take-over - sidestick priority may indicate.
- Emergency? - Trainee to continue initially, if handling pilot - Trainer may take control. P2 will check actions and monitor drills.
- Trainer will brief each approach - speak-up if uncertain.
- High fuel load to make aircraft weight representative.
- Call for checklists, trainer may abbreviate responses but will always confirm complete.
- For full stop landings - full reverse to 70kt, no unnecessary braking above 100kt - avoid heating the brakes.
- Check performance manual and AERAD booklet for emergency turns and noise abatement.
- Circuit may be modified, or may fly radar vectors/ILS to visual final.

Flightdeck Familiarisation

- Trainer will introduce or explain the following:
- Briefcase stowage.
- Library, safety equipment and circuit breakers.
- Seat position.
- Avoidance of sidestick 'clutter'.
- Use of visor, and side shades.
- Window operation.
- Position of cup holders - pass drinks outboard of crew seats.
- Air vents.
- Screen brightness.
- Thrust lever friction - compared to simulator.

Taxiing

- Idle is normally sufficient. Otherwise very small amount of power.
- Groundspeed indicated on Nav Display.
- Don't ride the brakes.
- 30kt max on the straight. 15kt for curves. 10kt maximum for tighter turns.
- Gentle brake application, if brakes snatch apply one then the other.
- Hand position on tiller.
- Steer by wire, pressurise tiller then very gradually increase deflection.
- Rudder fine steering is sometimes smoother.
- To maintain centreline - place centreline under inboard leg.
- To avoid lights - place centreline through outboard leg.
- When stopping release brake pressure gradually to avoid a lurch.
- Parking Brake provides 2500psi instantly. Look sideways to ensure stationary before applying.
- Avoid brake heating.

Take Off

- Release brakes, sidestick half forward, set 1.05 EPR or 50% then FLEX/TOGA.
- Steer with rudder - maintain centreline.
- Rotate - 3° per second towards 15° then SRS.
- Wings level at lift-off.
- Positive climb, gear-up.
- Feet off rudder soon after take-off.

Initial Climb

- 'LVR CLB' will flash at about 700ft - target speed becomes 250kt.
- Select CLB, accelerate to S speed and request 'Activate the approach'.
- Level off, **LOOKOUT** and turn downwind.
- Later when confident, consider turning after 500 feet.

Circuit

- **LOOKOUT**
- Relax downwind - use the auto-pilot if desired to relieve the tension!
- Double the drift - even with FPV.
- Modify pattern as required due to weather and ATC.
- Confirm the briefing for each approach.

Base-leg

- **LOOKOUT**
- Turning base leg, fly level initially, "Flap 2 Gear down"
- If using manual thrust remember to reduce power to decelerate to F speed.
- Turn final in 2 stages. Give yourself say a 40° cut.

Final

- Plan for 20° bank angle for final turn - permits an increase if necessary.
- Allow for inertia.
- Make early correction to the centreline.
- Make early correction to the vertical profile.
- Do not chase FPV for close in visual final approaches.
- Note VSI, datum is half groundspeed (indicated top left of ND).
- Turbulence - as conventional aircraft but do not over-control.

Landing.

- Do not expect featherlight touchdowns.
- Do not continue a messy approach below 100 feet.
- Feet up on rudders.
- Aim for a constant approach angle and vertical speed.
- Do not chase PAPIs below 200ft.
- Do not chase G/S indications below 100ft. Better to land *slightly* deep or go-around.
- Maintain a stable approach through 100 feet.
- **At 50 feet .....pressurise the sidestick.....**
- **At 30 feet .....hold the attitude - tiny pitch input..... close the thrust levers and.....**
- **Look well ahead.....**
- **Flare by 20 feet - increase the back pressure.**
- Attitude - increase in the flare is only about 2 degrees *judged visually*!
- Don't extend the flare by floating at 2ft with increasing attitude - A320 lands more smoothly at a shallow attitude.
- Use rudder to align as conventional aircraft but.....
- Maintain centreline with small bank angle adjustments but.....
- Do not hold a sidestick input or the aircraft keeps rolling (roll rate demand).

Bounce

- Small - maintain landing attitude.
- Large or divergent - go-around.

Touch and Go

- Only Training Captain to call 'STOP'.
- Spoilers disarmed.
- No autobrake or manual brake.

Trainer	Trainee
	Lowers the nose without delay
'Set 50%'	
	Sets 50% or 1.05 EPR
Selects Flap 2, F/D and Hdg/VS	
Checks trim in the Green-band	
Calls 'GO'	
	Selects TOGA
Calls 'Rotate' at 140kt or VAPP	
	Rotates

External & Internal

- Trainer will introduce or explain the following:
- Refuelling Panel.
- Engineers panel, APU shutdown facility.
- Door arming
- CIDs panel - Reset procedure.
- Ground Service Bus.
- Cabin Interphone.
- Water heater switch in toilet.
- Water shut off valves in galleys and toilets.

Unused Page

Route Training

Conversion Course

This section was written for ***Trainers*** but is equally informative for ***Trainees***.

Objectives

The aim of Route Training is to assist the trainee to:

- Gain confidence and consolidate his/her training.
- Gain familiarity with the normal operation and route structure.

Standard Required on Completion.

- Achieve a 'good' or better overall standard during a Final Route Check.

Licence Check

- Check the trainee's licence prior to the first route training sector.

Safety

- Training should be suspended if safety is likely to be compromised.
- SOPS with control handover during the approach should normally be employed.
- The normal operation of the aircraft systems must not be interfered with.
- The passengers should not be informed that training is in progress.
- Do not make deliberate ***significant*** errors to 'test' the trainee. ***Minor*** omissions (eg during flight deck preparation) are permitted in order to assess a trainee's monitoring.
- Whenever possible allow trainees time to correct minor errors; significant errors should be corrected immediately.
- Do not allow a situation to occur where either crew-member becomes overloaded. For example, trainers should avoid allowing a scenario to develop where a go-around is required simply because trainer intervention was delayed.
- The use of normal SOPs, with control handover during the approach, reduces fatigue and allows the trainee the opportunity to observe and the trainer to demonstrate.
- A trainee with limited experience may exhibit symptoms of tiredness sooner than normal. As the course progresses the trainee must demonstrate the ability to operate safely and effectively throughout a multi-sector day.

Schedule

- Remain aware of commercial considerations and the importance of maintaining schedule. When applicable use the SP to assist in a timely departure.

AWOPs Limitations

- Trainees who have a previous Cat 3 AWOPs qualification do not need to complete an autoland during route training.
- Other trainees must complete one practice autoland prior to operating below CAT 1 minima. Consider the medium-term weather trends and try to complete this early if fog is a possibility.

Weather Limitations

- Command course trainees may operate to captain's limits.

Planned Sectors

Category	Planned	SP	Gate 1	Gate 2	Minimum
TEP	45	14	14	30	35
DEP	16	2	8	12	10
Conversion	16	2	8	12	10
Command	24	2	10	20	10
Command-on-Type	16	0	4	8	10

The 2 sector route check forms part of the minimum sector requirement.

Initial Sectors and Landings - with a BTC or LTC

Category	Sectors	Take-Offs & Landings
TEP	6 TRI A or TRI A ZFT or TRE	
Non ZFT	6 TRI A or TRI A ZFT or TRE	
ZFT*	4 TRI A or TRI A ZFT	4 TRI A or A ZFT

*ZFT: 6 TRI A or TRI A ZFT sectors will be planned. Exceptionally only 2 take-offs & landings required initially, the other 2 may be completed during the course - 1 may even be completed during the route check.

- The first sectors should be flown within 7 days of Base or ZFT sim. However, this may be extended to 15 days with FTM approval.
- 6 sectors must be completed within 21 days of the first flight.
- TEP: 5 of the minimum 35 sectors may be observation sectors with the SP operating from the RHS.

Grading - Route Training

Grade	Description
Route Check Standard	Item or Detail was Route Check Standard

More Practice	More practice required. No trainer input required.
Training Input	Verbal or physical trainer input was needed.

Report Writing

- Dedicated Trancomm PCs are located at the Compass Centre, the CAT facility and at Jubilee House. Trainers can apply for remote access so reports can be completed at home.
- If the trainee is progressing normally there is no requirement to enter comments opposite each item.
- However, to assist FTM to review progress swiftly, overall performance should be summarised with approximately 2 or 3 sentences in the **Detail** comment box.
- Commentary/Appraisal/Pointers. (CAP)
- Accurate/Brief/Clear. (ABC)
- For example: *4 Sectors flown. Most items at RCS but descent monitoring still needs more practice. Suggest re-read Study Guide re. gates and try 3 times table to facilitate swifter assessment of profile.*

Progress

- If a trainee is making poor progress tick the 'Alert FTM' Trancomm box and inform the FTM in person or by telephone.
- 'Alert FTM' is a useful Trancomm facility which allows the FTM to identify all pilots whose progress is causing concern.
- If unable to contact the FTM attempt to contact a Core Training Manager or Head of Technical & Training.
- Trainers should not self-authorise additional sectors - these may only be authorised by FTM.
- The number of sectors required is indicated in the trainee's file.

Trancomm

The following 'check' boxes are ticked to indicate a trainee's progress towards Route Check:

Needs Extra Sim Details:	•	**Gate 1 Completed:**	•	**Gate 2 Completed**	•
Simulator Complete:	•	**Release Safety Pilot:**	•	**Ready for Route Check**	•
Base Complete:	•	**Scoring Complete**	•	**Route Complete**	•
Number of extra Safety Sectors required:	•	**Date trainee viewed scores:**			

Release Safety Pilot

The Safety Pilot (SP) may be released by the trainer subject to the minimum number of sectors being completed. Tick the 'Release Safety

Pilot' Trancomm box when the trainee is judged competent in the basic operation of the aircraft.

- The SP is to occupy the observer's seat and alert the trainer of any concerns relating to safety.
- A SP is not required for command-on-type or refresher courses.
- The SP should be briefed on his/her duties prior to each sector.
- Update Current Ops to ensure that the SP's roster correctly reflects his/her duties.
- Advise FTM, Training Admin and Current Ops when an SP is required beyond the planned sectors.
- Many pilots progress at a faster rate following the release of the SP. Consequently do not retain the SP when no longer needed.

Gate 1

Gate 1 is no longer coincident with the release of the SP. Gate 1 is achieved when ***significant*** training input is no longer required in routine situations. Normally about one third to one half of the planned sectors will have been completed. Tick the Gate 1 Trancomm box when:

- The trainee is competent in all basic aspects of route flying.
- The trainee needs further route flying practice to gain confidence.
- The trainee may still lack familiarity with the fleet route structure.
- Occasional trainer input may still be required in high workload situations.
- Advise FTM if remedial training is required to achieve Gate 1.
- For command course trainees Gate 1 signifies that conversion is complete and command training should commence.

Gate 2

Gate 2 is achieved when ***minor*** training input is ***seldom*** required in routine situations. Normally, about two thirds of the planned sectors will have been completed. Tick the Gate 2 Trancomm box when:

- Trainer input is seldom required.
- The trainee needs simply to consolidate his training.
- Trainees should be confident in most aspects of route flying.
- Advise FTM if remedial training is required to achieve Gate 2.
- For command course trainees this signifies that command training is complete and the candidate is ready for practice route checks with the 'competent, friendly co-pilot' who lacks initiative.

Scoring Complete

Tick this Trancomm box to indicate that all syllabus discussion items are complete.

- The route syllabus discussion Items are listed in Trancomm and should be checked off systematically as training progresses.

- Check for a level of knowledge and understanding commensurate with the trainee's role and experience. Eg. A TEP is not expected to achieve the same level of knowledge as a command course trainee.
- Try not to leave discussion items until the end of training.
- In-flight discussion must not continue to the extent that the trainee has insufficient time to project ahead and plan for the descent and approach.

Route Check Standard

Route Check Standard is achieved when:

- The trainee demonstrates a sound working knowledge of the AOM.
- The trainee demonstrates the ability to implement effective CRM.
- P1 and P2 duties are performed with only a few ***significant*** points to debrief.
- Several ***minor*** points were noted but not necessarily debriefed.

Ready for Route Check

Tick the appropriate Trancomm box when:

- The trainee has completed at least the minimum number of sectors.
- The trainee has completed a practice route check.
- On completion of the practice check the trainer is confident that the trainee will achieve a ***'good'*** or better grade in the route check.
- The trainee should be re-assured that there is no such thing as a perfect sector. A good sound performance is all that is required.

Conversion Course Route Check

Tick the 'Route Complete' Trancomm box when the trainee has achieved a 'good' or better standard on a 2 sector route check.

- The check should be independent - ie. not carried out by the preceding trainer. (LCT is an exception).
- The candidate should demonstrate the appropriate level of knowledge, skill and CRM commensurate with role and experience.
- When weather conditions require, captains and command trainees may complete an autoland. A manual landing does not have to be observed.
- After considering the weather, the trainee should be encouraged to make the decision as to which sector to act as P1.
- If a trainee fails on the first sector a trainer may conduct the return sector as a training sector.
- A management pilot or nominated TSC will conduct a command course route check from the jump seat. The training captain, in command, will occupy the RHS and adopt the role of a competent, friendly co-pilot who lacks initiative.

- When route checking a conversion course trainee, it is appropriate to offer the normal level of help and assistance that might be expected of a line captain or co-pilot.
- The Check Captain must advise Current Operations and Training Admin of the outcome. If the check is failed FTM should be informed.
- For a conversion course, an 'adequate' grade is a fail. Remedial training will be required and FTM should be informed.
- Following a successful route check remind trainees to complete a feedback form and return it to FTM.

Annual Route Check

Objectives

The aim of the annual route check is to allow pilots to:

- Demonstrate that operational performance and standards have been maintained.
- Receive assessment and feedback on CRM.

Administration

- An annual route check may be conducted on an individual or a crew.
- It should be conducted from the observer's seat; but exceptionally it may be conducted from an operating seat.
- JAR-OPS requires each crew member to be route checked every 12 months.
- New pilots and new commands complete a 6 monthly check and thereafter start a 12 monthly cycle.
- In shorthaul the annual check is usually carried out over two sectors; exceptionally, a single sector route check may be planned with either pilot acting as P1.

Conducting a Check

Ascertain how new the crew members are to the operation. If a pilot has joined the Company recently he may not have experienced a route check from the jump seat. Explain that you are supernumerary and will only interject if safety is a consideration.

Do not ask questions during the briefing. Simply observe the skills employed and make a note of any significant points. If possible print your own copy of the NUBRIEF for ease of reference.

Introduce yourself to the cabin crew and remind them of your role. At the aircraft observe the initial interaction between the crew and ground-staff. Throughout the check try to remain quiet and unobtrusive and if the crew try to engage you in conversation keep your replies friendly but short.

During the flight do not comment on crew activities. Before departure most errors are normally ‘trapped’ and corrected; there are usually very few that compromise safety yet remain undetected prior to take-off. If intervention is necessary try to be as discreet as possible.

Some individuals and crews become very nervous and every effort should be made to help them feel more comfortable. If a comment concerning safety is required try to make it in a manner that will cause as little unease as possible.

The Trancomm form can serve as an aide memoir to areas of the operation that should be closely observed. Try to avoid forming an early or hasty assessment but consider the overall performance on completion of the check. Do not focus on small points in isolation, it is the overall ‘big’ picture you should assess.

Pay particular attention to the briefings: are they relevant, open and interactive? Do they identify potential problems, and are operational

guidelines established? Are SOPs employed effectively? Are mandatory callouts made correctly? Does the Captain balance authority and assertiveness?

All pilots make poor landings from time to time; if it happens during the check assess whether the technique was correct but the arrival unfortunate, or whether there might be a more deep rooted problem. When weather conditions require captains may complete an autoland.

On arrival at the gate don't say anything until the shut-down checks have been completed. If possible, the de-briefing should be conducted in a quiet place away from the aircraft. Do not be pedantic and avoid criticism unless you are certain of the facts. Always recognise and acknowledge the good areas as well as debriefing the not-so-good. If a crew member has performed poorly consider informing discreetly the SCCM so that embarrassing enquires from the cabin crew can be avoided.

Most of the considerations for conducting a check from the jump seat also apply when occupying a pilot's seat and this is the normal format for a conversion course check. Try to set a calm and relaxed atmosphere and carry out the procedures applicable to your operating seat as efficiently as possible.

Grading - Route Checks

	Grade	Description
1	Outstanding	Performance in all areas was outstanding. This grade is rarely awarded. FTM letter to crew member.
2	Very Good	Performance overall was very good. Minor points observed/debriefed.
3	Good	Performance overall was good. Some significant points debriefed.
4	Adequate	Performance overall was poor but adequate. Numerous significant points debriefed. Copy of report to trainee. FTM informed.
5	Unsatisfactory	Failed Check. Ops Certificate withdrawn. Copy of report to trainee. FTM and Current Ops informed.

Consideration should be given to an individual's contribution to the overall performance. Good team skills by one pilot should be recognised especially when these improve the overall performance.

Should the standard fall below the norm then a grade 4 or 5 will have to be awarded. Try to ensure that your debrief remains focused on the key

points and give guidance as applicable. Ensure that a copy of the report is given to the pilot - this is an OTM requirement.

For a conversion course the minimum grade is a 3. For an annual Route Check a grade 4 is a pass but will result in an interview or telephone call from the FTM. A grade 5 is a fail, and the pilot cannot operate again until remedial training and a successful route check are completed. The performance and result of the check should be judged over two sectors but exceptionally, in the case of an obvious fail on the first sector, it may be necessary for you to operate the return sector. During a conversion course remedial training may begin immediately - if appropriate.

Failures are rare and there are no hard and fast rules as to what constitutes a fail. A poor performance is normally due to weak CRM, often due to lack of spare capacity resulting in a failure of situation awareness. Whatever the reason try to be accurate, brief and clear (ABC) when completing the Trancomm report. Tick 'Alert FTM' and contact FTM and Training Admin as soon as possible.

Important Reminder: New pilots and new commands complete a 6 monthly check and thereafter start a 12 monthly cycle. When completing Trancomm please be very careful to tick the appropriate box as considerable difficulties can occur when the wrong box is ticked inadvertently.

Standard Required

The trainee must be sufficiently familiar with the recommended procedures, allocation of duties, and technical aspects of the aircraft while demonstrating the requisite level of operational skill, that he/she can fit into a crew complement without the need for additional supervision over and above that normally exercised during line operations and without impairing the accepted safety standards.

Line Continuation Training

Objectives

TEPs and DEPs undertake LCT 4 to 6 months after initial conversion. The aim is to allow new pilots:

- To demonstrate that standards have been maintained.
- To receive additional training in PICUS duties.
- To receive additional crosswind handling when possible.
- To complete a 6 month route check to a good, or better, standard.
- Additionally, trainees should be encouraged to take responsibility for their own development as future captains.

Flight Managers may arrange LCT at other times for example, following a poor performance during a simulator or route check.

Administration

Normally a two day tour comprising 6 to 8 sectors is followed by a route check.

- The trainer should assign the LCT Trancomm course.
- LCT files are maintained entirely within Trancomm. Paper records are not required.
- An abbreviated syllabus is available in Trancomm. Remember to score the 'syllabus' form.
- The route check does not need to be 'independent' - the same trainer may be planned for both.
- Assign the route check in the usual way using Trancomm.

Training Considerations

- Check for appropriate uniform standards and the awareness of the importance of punctuality in all aspects of the operation.
- Ensure the trainee is familiar with the finer points of planning, such as checking for restricted airfields or landing capability at unfamiliar alternates.
- Ensure the trainees are competent in the use of the Tech Log and MEL.
- Ensure that the trainees understand how to check the loadsheet and the limits for 'compliance'.
- Try to encourage the development of the trainee's team skills and CRM.
- Discuss descent monitoring.
- Watch for 'unusual' autopilot handling, for example continual fiddling with V/S or excessive descent rates.
- In good weather and ATC conditions a raw data ILS may be flown. This is desirable but not essential.

- Ensure trainees use correct handling techniques for example: taxiing, take off and landing etc.

Pre-Command Training

Objectives

A command course trainee must possess sound technical, operational, handling and non-handling, commercial and CRM skills.

The aim of PCT is:

- To help the trainee to gain confidence in his/her ability to undertake the captain's role.
- To make clear the high personal and professional standards expected of a BA captain.
- To help the trainee to achieve the required level of knowledge and skill deemed essential for a command course trainee.
- To provide relevant training in the new role and responsibilities.
- To recommend progression to a command course or further development training.

Administration

- The trainer should assign the PCT Trancomm course.
- PCT files are maintained entirely within Trancomm. Paper records are not required.
- An abbreviated syllabus is available in Trancomm. Remember to score the 'syllabus' form.
- The course does not conclude with a route check.
- PCT is conducted in two phases: 8 sectors of training and 4 sectors of assessment.
- If sectors are lost please advise FTM who will decide if additional sectors need to be allocated.
- All sectors are conducted with the trainee acting as Captain in the RHS.

Training Considerations

- Occasionally simulator training may be planned when the trainee's history suggests that additional training is essential for the development of command skills in a LOFT environment.
- The trainer should adopt the co-pilot role - this is not easy to do well when operating from the LHS.

During the first 8 sectors your aim is:

- To give training in the role of the captain.
- To help the trainee to achieve a high standard of aircraft operation and CRM.
- To remind the trainee on the necessity to employ effective CRM.

- To help the trainee to recognise the sensitivities of dealing with staff from other departments.
- To remind the trainee that in general most people react in kind and a friendly, cheerful approach will usually solicit helpfulness in return.
- To progressively sign off all the route syllabus items.

During the final 4 sectors your aim is:

- To encourage the ground staff and cabin crew to liaise/consult the trainee.
- To act, when 'in role', as a ***competent,*** friendly co-pilot lacking in initiative, but be prepared to come out of role and train as necessary.
- To try to 'sit on your hands' to stop yourself from 're-taking' command.
- To make an assessment of the trainee's potential as a captain.
- To complete a Trancomm narrative report making clear your overall assessment.
- To be careful not to create an atmosphere where the trainee becomes pre-occupied trying to 'trap' your deliberate mistakes.
- To remember that it is essential for the trainee to feel confident that you are '***both batting on the same side!'***
- To encourage the trainee to give feedback to the trainer on his performance as a co-pilot.

Command Course

Objectives

The aim of Command Course route training is:

- To help the trainee to gain confidence in his/her ability to undertake the captain's role.
- To make clear the high personal and professional standards expected of a BA captain.
- To help the trainee to achieve the required level of knowledge, skill and CRM deemed essential for a captain.
- To provide relevant training in the new role and responsibilities.
- To help the trainee to achieve a recommendation for a Command Check following a 2 sector practice check.

Administration

All new pilots are categorised B until they meet the criteria for command training. Progression from Cat B to Cat A is dependent on gaining/completing the following:

- ATPL
- Minimum hours/sectors.
- Line Continuation Training (LCT).
- A Flight Management review.

- Essentials for Command (EFC) Course.
- Pre-Command Training (PCT).

Prior to commencing a command course the receiving FTM confirms that these criteria have been met.

Command Training Considerations

The 3 phases of command training overlap to a certain extent but progress from one to another is indicated within Trancomm by Gates 1 and 2.

Phase 1 - Conversion Training

This phase leads to the trainee becoming technically competent in the LHS. This broadly equates to the route check standard expected of conversion course trainees after about 10 sectors.

Regardless of a trainee's previous experience the first sector will require almost all of his/her capacity simply to get from A to B. Obviously they will not be ready for command training and should not be dealing with command issues.

Guide them through the sector, demonstrating how to deal with all the aspects of the operation (briefing, bus departure, setting the tone with the cabin crew and dispatcher, pre-flight preparation, paperwork etc.) In other words, command the flight yourself and let them observe and operate essentially as a co-pilot. This allows them to settle into the LHS and gives them an opportunity to start from a secure foundation.

Maintain an instructional style throughout the first day judging how much of the operation to give them and how much to demonstrate; it is better to underload than to risk overload. Like all trainees they will learn most quickly if they have spare capacity to reflect, so if there are quiet moments don't fill these with technical issues. A lot will depend on the sector length and turn-round times as well as their previous experience of the Airbus, the shorthaul environment and their natural ability.

After the first day always, start from where the trainee starts. To do this effectively the previous trainer must give a clear indication how much of the operation the trainee was able to run themselves - and ask the trainee, of course. Concentrate on teaching the aircraft (eg. manual handling, the different climb and descent modes, aircraft limitations, FMGC programming etc) and if possible make a start at the Discussion Items relevant to operation of the aircraft.

At the same time the trainee's capacity should be increasing such that they are able to run a standard operation with guidance required only to deal with problems. The trainer's style should be moving from instruction to facilitation and should always be helpful. During night-stops trainees should be encouraged to take on the command role with regard to accommodation, socialising, pick-up etc with help and encouragement from the trainer.

This phase continues until the trainee is technically competent (note competent rather than perfect) and able to run a standard Airbus operation with minimal trainer assistance required to deal with unusual problems. This roughly equates to co-pilot route check standard. It is

important that trainees do not proceed to the command training stage until they have reached this level, even if they have completed more than the normal number of sectors. This phase is likely to have the most variance in number of sectors necessary since trainees from different starting points should be the same standard by its end. It should normally be somewhere between 6 and 14 sectors, the plan being 10.

Phase 2 Command Training

- Act when 'in role', as a ***competent,*** friendly co-pilot lacking initiative; try to stay in role but be willing and prepared to train if necessary.
- Do not make deliberate ***significant*** errors to 'test' the trainee. ***Minor*** omissions (eg during flight deck preparation) are permitted in order to assess a trainee's monitoring.
- Be careful not to create an atmosphere where the trainee becomes pre-occupied trying to 'trap' your mistakes.
- Try to 'sit on your hands' to stop yourself from 're-taking' command.
- This will allow the trainee to develop his/her CRM skills for resolving the many types of problems encountered by a captain.
- Remember it is essential for the trainee to feel confident that you are '***both batting on the same side!***'
- Encourage the trainee to give feedback to the trainer on his performance as a co-pilot.

Since the trainee is now able to operate the aircraft competently, the trainer is in a position to become a 'co-pilot'. The objectives of this are twofold, firstly to give practice in the team skills required to lead the operation effectively and secondly, to give the trainee a feeling of the buck stopping with him!

The trainee will need to be briefed before starting this phase and a clear delineation made when you change from training captain to first officer. Once changed, try to remain in role as much as possible, reverting to training captain if there is significant benefit to be gained from doing so. In order to achieve the first aim of practising team skills it is valuable to go into co-pilot mode before any aspect of the flight briefing is started. You can then allow the trainee to lead from the outset.

Please act simply as a competent and friendly co-pilot lacking initiative. Do not change your personality! Simply try not to use your initiative and if necessary 'sit on your hands'. Do not attempt to role-play different characters as this can be very off-putting and is not required for a successful command route check.

On any routine tour there are usually plenty of problems that naturally occur on each sector which at times will challenge most trainees. It is possible to give powerful feedback to a trainee without going into 'trainer mode' e.g. If a briefing is not interactive simply listen to it and make the minimum contribution possible but without appearing sullen or uninterested.

With regard to the second aim of 'giving a feeling of the buck stopping with the trainee', try to go with all his decisions and leadership even if it is

not ideal in your opinion. As long as safety is not compromised you should be able to let the trainee decide the outcome of every situation.

There is obviously a commercial side to consider and there will be times when you should suggest a course of action even in your role as co-pilot simply in order to get things back on track. However, be careful to make the minimum input necessary. Throughout this phase it is likely that most of your training will be through facilitation but it may still be appropriate to use demonstration and instruction.

During this phase ensure that the trainee is given full responsibility for handling the Tech Logs, Loadsheet and NOTOC. The trainee should check/prepare the documents and indicate their acceptance by writing the date and TC's name in the appropriate boxes before handing them over for signature. When the TC is satisfied that the documents are correct, he/she should sign and then pass them back to the trainee without any further action. It is the trainee's responsibility to ensure that the correct pages are extracted and given to the dispatcher.

By the end of this phase the trainee should be commanding the whole operation, using all the resources available to him (including you as a co-pilot) and dealing with any difficulties which may arise. He will obviously still be inexperienced in terms of the aircraft and operation but he should be demonstrating the skills needed to compensate for this and therefore be able to keep the operation within his experience level.

Only then is he/she ready for the final stage of training. There should be less variation in the number of sectors required for this phase of the training since all trainees should enter it with roughly the same standard of operation. It should normally be completed in about 8 sectors.

Phase 3 - Route Check Practice

The final phase is designed to prepare the command trainee for the command route check. You should try to simulate the route check scenario as much as possible, and avoid making training input during the sectors.

Explain to the trainee that the flightdeck is likely to be quieter than normal, but this doesn't mean that you must conduct the sector in silence! There is no reason why normal conversation should not take place - at appropriate times - just as it does during any other route-check.

Once again, you should act as a competent friendly co-pilot lacking initiative, but unlike Phase 2 do not even make any ***minor*** omissions. This should help to accustom the trainee to flight-deck 'atmosphere' during the actual route check.

It is crucial that the trainer is competent but responds only to the lead given by the trainee. A few examples:

- Do not offer advice that runway 25L is the preferred landing runway, but if the trainee asks for your knowledge of a certain airfield then tell him.
- Do not point out that the weather at the alternate is unsuitable, but if asked whether you consider it suitable say 'No'.

- Do not point out that the TOD is only 25 miles from destination due to a FMGS error, but if asked whether you can see why the TOD is so late then identify the problem.
- If you are high on the approach don't take action until the trainee notices and gives guidance to resolve the issue.
- If a briefing is not interactive then say very little.

It is good CRM for a trainee to check whether there is anything they have missed but try to make sure they are being specific. For example:

- '*I can't see anything in the forecast that could affect our arrival, can you?*' is a specific and valid question.
- *'Is there anything I've missed?*' at the end of the briefing is not specific enough to warrant pointing out a problem with the destination weather.

When to recommend a trainee for final check is sometimes a difficult matter. Ask yourself:

- Did I have to use any initiative during this flight?
- If I had been seated on the jump-seat conducting a route check on a fully qualified crew, would the 'Captain's performance definitely merit a Grade 3 - ***some significant*** - as opposed to ***numerous significant*** - debrief points.

If the answer to either of the above is no, then the trainee is not ready for a command route check. Most trainees should only need 4 sectors or so to complete this final stage, but trainees should never be recommended simply because of the number of sectors completed.

Command Course Route Check

This check is conducted by a Flight Manager or TSC. The check must be preceded by a 2 sector practice route check.

Briefing

Arrange to meet the candidate and trainer about 10 or 15 minutes before the normal briefing time. Candidates are usually nervous so try to help them to relax. Explain the following points:

- That the emphasis is on the 'big picture' - whilst you expect to see a 'good' sound knowledge of the aircraft operation and obvious competence in SOPs - you are not going to be picky or pedantic about trivial points.
- That the focus will also be on CRM and team skills. You will be interested to see how problems are resolved and how errors are managed.
- That you are more interested in how an approach is briefed and managed - as opposed to how gentle the landing is.
- That the trainer should be competent and friendly but lacking initiative.
- That the trainer is the legal commander but will only operate to first officer's limits.

- That you are there simply to observe and not to take the part of an additional (or 'heavy') crew member - do not be put off by note taking.
- The candidate should choose the most suitable sector - just as if he was the actual captain.
- Remind the candidate to brief the Cabin Crew about the Check.

Onboard the Aircraft

- Give the crew some 'space' to settle in. Try to stand back yet observe any interaction with staff or cabin crew etc.
- Take your place on the flight deck in time to hear the Before Start Checklist and Briefing. Pay particular attention to team skills employed.
- Listen to PAs.
- Monitor the progress of the flight - just as you would for any route check.
- You should not intervene at any stage.
- If the candidate fails - give support. He/she will feel very deflated and will need very careful handling. Discreetly, you may decide to tell the Cabin Crew the bad news.
- The candidate will have to be interviewed by FTM before any further training and assessment is organised.

Debriefing

Encourage the 'First Officer' trainer to listen in and debrief the following:

- Identify the 'key' good and not so good ***significant*** points.
- Avoid a lengthy debrief of ***minor*** points.
- The trainee is promoted to Captain with immediate effect. The examiner should tell Current Operations, Training Administration and Training Management.
- Remind the new Captain of his extensive responsibilities detailed in FCOs.
- BA captains are expected to maintain the highest possible personal and operational standards.
- If a Captain's standards slip the First Officer will think it is acceptable to operate in a substandard way.
- Should a significant incident occur please discuss it with fleet management without delay.
- TSCs should remind the new Captain to arrange an interview with the FTM.
- He/she must complete 2 sectors within the next 7 days and will be 'brown-lined' for 40 sectors.
- He/she must operate 10 sectors before allowing a first officer to complete a landing.

- He/she must not operate below Cat I minima until they have completed 50 hours or 20 sectors - can include training.
- A re-braided uniform should have been arranged prior to the course but it is acceptable to operate in SFO uniform.
- A re-braiding authority can be obtained from FOAC.
- Complete the Trancomm route check form as usual. Try not to include comments that indicate further improvement in any areas might be necessary.

A Short, Standard Sector

The following notes are intended to supplement the Flying Manual with practical advice that is routinely passed on during Route Training. The aim is not to be overly prescriptive, but to illustrate a possible work cycle on a ***short sector***, and to pass on advice about common mistakes.

Pre-Flight Preparation

If you are unfamiliar with the route, destination or alternates, allow plenty of time to prepare yourself thoroughly before the briefing. 'Chair-fly' the trip:

- Obtain and study an example SWORD and NUBRIEF. Check the AERAD booklets and study the relevant SID & STAR, the airfield layout, start-up procedures and of course the approach plates.
- Check the performance manual for the destination and alternates. What are the acceptable forecast minima at the alternate? Is there an emergency turn on departure? Are there any restricted airfields?
- If required, inform dispatch that there will be '3 on the flight deck' and order an extra crew meal.

Cabin Crew

Brief the SCCM on the following points if they are relevant:

- It is a training trip, 3 crew on the flight deck.
- Forecast turbulence? - a 'double ding' on the Seat Belts sign when it is safe for the cabin crew to begin the cabin service.
- Short taxi prior to take-off.
- Slot time.
- Crew Meals - when do the flight crew want to eat? - Probably not on a short turnaround.

Pre-Flight Set-Up

TIME. Make every effort to get out to the aircraft early if possible, an extra 10 minutes makes all the difference.

DELEGATE. Few trainees can carry out all the NHP pre-flight tasks conscientiously in 30 minutes - without the help of the HP. So if you are the NHP don't hesitate to delegate some tasks.

TECH LOG. Check the log ASAP, delays are often caused by an open tech log entry that is simply awaiting a signature.

SAFETY CHECK. Security, Library, Safety Equipment - a thorough check of these 3 items can take a long time - so familiarity is essential. As you take your seat do not dive straight into the FMGS, complete the Safety Check and remember to check the ECAM pages. Then copy the ATIS onto the SWORD prior to starting the Panel Scan. Most pilots wait until the HP completes the external check before starting the APU at STD-20. Once started, switch over to internal power without delay.

PANEL SCAN. Complete the Panel Scan swiftly and then programme the FMGS. If time is short, consider asking the HP to extract the performance figures and initialise the ACARS.

When the FMGS loading is complete, scan the flight deck a second time to 'sweep up' the following items which you may not have been able to set-up earlier. These items are frequently missed:

- Seat Belts ON.
- External Power OFF.
- APU Bleed ON.
- Standby Altimeter and ASI bugs.
- FCU ALT SEL.
- Radio frequencies for start-up clearance.

Check that the ACARS has been initialised. Check/enter the Take-off performance calculation. The HP should enter the Fuel figures into the Tech log and check for any discrepancy (300kg max).

Departure Briefing

The following example of a departure briefing is simply a training aid and is not intended to be prescriptive. The crew should identify potential problems and focus on the significant differences of the particular departure, rather than regurgitate a hackneyed briefing.

MEL. Well there's nothing in the Tech Log to affect the departure, the only ADD is for the Strobe Lights which are U/S.

AIS. The only items in the Nubrief concern taxiway Charlie which is closed, and the Sigmet for the Scottish FIR.

SIG WEATHER. Its 3° so we'll have Engine Anti-Ice on after start. Turbulence is forecast so we'll have the Radar on for take-off and keep everyone strapped in during the climb. We'll limit the speed to 250kt until we're in clear air - I've briefed the CSD that I'll give them a double ding on the Seat Belts sign when its safe for the cabin crew to leave their seats.

RETURN ALTERNATE. No reason why we shouldn't return here if necessary, we're taking-off below max landing weight so no overweight landing considerations

Refer to the MCDU, not the checklist aide-memoir, for the following items.

PERF TAKE OFF page - *Right Hand Column*

RUNWAY- 24, intersection Charlie.
T**AKE OFF SHIFT** - 571 metres.
FLAP - 1
FLEX - 67°.

PERF TAKE OFF page - *Left Hand Column*

V SPEEDS - Its a wet runway, VR is not bugged, call rotate at 140kt.
TRANSITION ALTITUDE - is 6000 feet - agrees with the SID page.
ACCEL ALT - is 1000 feet above.

Return to the aide-memoir.

TERRAIN and PERFORMANCE RESTRICTIONS. Well there's high ground out towards TALLA and the emergency turn is noted on my SWORD, its .....before Uniform Whisky, ahead to Uniform Whisky then right turn to EDN and join the hold.....and I see you've programmed that in the Secondary Flight Plan - thanks.

What do you make the **MSA**?.....and the **SSA**?.....yes that's agreed.

Refer to the MCDU, not the checklist aide-memoir, for the following item.

FLT PLN page - *ND selected to PLAN.*

SID. We're expecting a Dean Cross 2 Charlie, on page? ....yes M2. Well, since you loaded it would you read out the AERAD profile whilst I check it on the Flight Plan page? ..... (scroll the waypoints as the NHP reads through the profile, glancing at the Nav Display to confirm the routing and altitude constraints). OK well its 6000 for the FCU window and there are no special notes at the top of the page to affect us.

Note: If both pilots have already checked the FMGS SID there is no need to repeat the procedure during the briefing. Simply mention the pertinent points such as an automatic frequency change immediately after take-off.

FLIGHT DIRECTORS. I've got Climb & Nav blue, 1FD2.... *"and I've got Climb & Nav blue, 1FD2"*.... Managed, managed, Hdg/VS 6000 and managed.

FMGS. Is loaded with the provisional figures, the FLT PLN page indicates 277 miles - agrees with the SWORD.

RADIO AIDS. Dean Cross is auto-tuning on VORs 1 and 2, and EDN is selected on the ADF should we need to return. I'm displaying VORs, (Refer to Nav Display selected to NAV mode) not yet idented.

EMERGENCIES

Captain Handling

Before V1, either of us call STOP for?.....
"*Any fire, engine failure confirmed by 2 parameters or a red warning*".
Anything else just announce it and I'll call stop or continue.
To stop, I'll close the thrust levers, and monitor the autobrake.
What will your actions be?.....
"I'll give you full reverse above 80, reverse idle below, and call 70kt."
We'll bring the aircraft to a halt and park any fire downwind of the fuselage.
I'll confirm: parking brake on, forward idle and we'll review our situation.
I'll ask you to carry out the ECAM actions.
I'll communicate with ATC and the cabin.
If a fire drill requires the second engine to be shut down whilst I'm talking,
Tap me on the elbow and I'll pause the transmission.
Then we'll complete the drill using the QRH, below the shaded items.
Hopefully we'll be able to taxi clear,
But if a fire does not extinguish we'll evacuate.

Fire or failure above V1 we'll continue.
Just announce it - don't specify the side.
Call positive climb, I'll call for gear-up,
***I'll plan to climb in Flex, but remind me TOGA power available.**
I'll trim it out, select autopilot.....
And above 400 feet I'll ask you to read out the ECAM.
I'll confirm it, call for ECAM actions - my radio.
Make sure I confirm your actions before moving…..
A thrust lever, engine master switch or fire push button.
****At or above Aa, once the Vital Actions are completed.....**
I'll select VS zero and call 'suspend ECAM actions'.
We'll clean-up, accelerate to green-dot, select open climb, MCT.....
And then 'resume ECAM actions'.
We'll complete the ECAM procedure, the After Take-Off Checklist.....
And follow the SID in NAV.....or.....comply with the Emergency Turn.

***Flex or TOGA?**

Consider the circumstances and conditions on the day. Certification does not require the use of TOGA - adequate performance is available in Flex.

****Vital Actions**

In the case of an engine fire or failure between V1 and flap retraction, the vital actions are defined as the initial items of the ECAM procedure up to and including the discharge of all agents specified.

EMERGENCIES

Co-Pilot Handling

Before V1 I can call STOP for:
Any fire, engine failure confirmed by 2 parameters or a red warning.
Additionally I can stop for:
A blocked runway, significant handling difficulty or if you call STOP.
To stop, I'll close the thrust levers, and monitor the autobrake.
What will your actions be?....
"I'll give you full reverse above 80, reverse idle below, and call 70kt"
When a safe stop is assured I'll expect you to take control.
We'll bring the aircraft to a halt and park any fire downwind of the fuselage.
We'll confirm: parking brake on, forward idle, and review our situation.
I'll expect you to call for ECAM actions.
I'll carry out the actions,
Whilst you communicate with ATC and the cabin.
If a fire drill requires the 2nd engine to be shut down whilst you're talking,
I'll tap you on the elbow so you can pause in the transmission.
Then we'll complete the drill using the QRH, below the shaded items.
Hopefully we'll be able to taxi clear,
But if a fire does not extinguish I'll expect you to order an evacuation.

Fire or failure above V1 we'll continue.
Just announce it - don't specify the side.
Call positive climb, I'll call for gear-up,
***I'll plan to climb it in Flex, but remind me TOGA power available.**

I'll trim it out, select autopilot....
And above 400 feet I'll ask you to read out the ECAM.
I'll confirm it, call for ECAM actions - my radio.
Make sure I confirm your actions before moving....
A thrust lever, engine master switch or fire push button.
****At or above Aa, once the Vital Actions are completed.....**
I'll select VS zero and call 'suspend ECAM actions'.
We'll clean-up, accelerate to green-dot, select open climb, MCT.....
And then 'resume ECAM actions'.
We'll complete the ECAM procedure , the After Take-Off Checklist.....
And follow the SID in NAV.....or.....comply with the Emergency Turn.

REVIEW. Is there anything we haven't considered?

LOADSHEET.
Both pilots display the INIT B page.
The loadsheet is checked by the HP,
Who then reads out the MACZFW and ZFW.
NHP records these on the SWORD and then enters them in the FMGS.
NHP then enters the Block Fuel from the ECAM....
And then reads out the FMGS calculated TOW.
The HP checks this figure with the loadsheet TOW and then calls out:
Landing Weight, Passengers-On-Board and MACTOW (trim setting).
The NHP records these on the SWORD.

OK.....well we've had the loadsheet so.....Below The Line

Start & Push Back

CLEARANCE. Prior to push-back check or obtain the following:

1. ATC clearance.
2. Push-start checklist complete.
3. Engineer's clearance.

A common mistake is to forget either number 1 or 2.

Before releasing the parking brake check these items which are often forgotten:

1. Nose-wheel steering disconnect memo.
2. APU Bleed Air.
3. Thrust levers at idle.

Initial Climb - Sid Þ FL 100

TAKE-OFF. The take-off is obviously a busy and sometimes stressful phase. Once the After Take-Off Checklist is complete try to relax and take in the 'big picture'. In poor weather (or under high workload) engage the autopilot soon after take-off.

WEATHER. Do you need: Anti-Ice? Weather Radar? Seat Belts? Track deviation for weather?

CALLOUTS. Try not to miss a single standard callout - the effort will focus your mind on flight path monitoring and prevent you from being

distracted on supplementary tasks such as filling in the SWORD. Use the correct terminology, and give the other crew member the opportunity - and a few seconds grace - to make his (or her) own callouts before prompting them if necessary. Avoid any non-essential tasks following the '1000ft to go' call.

NAV AIDS. The Flying Manual states that it is unnecessary to force-tune Nav Aids but some pilots feel more comfortable by doing so. Did you force-tune for departure? Are your needles still pointing to the NDB you tuned for the initial part of the SID?

CABIN CREW. Are the Cabin Crew still strapped in? Did you agree with the CSD a signal for them to begin the cabin service?

Climb FL 100 þ FL 200

SEC FLT PLN. If this was programmed for an Emergency Turn you will need to copy the Active.

SWORD. On a short sector this is often the earliest opportunity for the NHP to update the SWORD. However, ideally it should be left until the cruise. There is no urgency for the HP to do the same - his (or her) full attention should be focused on monitoring the flight path.

CRUISE ALTITUDE. Is the final cruise altitude unsuitable for any reason? Now is the time to consider an alternative.

RADAR. Is the weather radar still on? Is it still required and if so is the tilt setting correct?

SEAT BELTS. Are the Seat Belts signs still On?

Climb FL 200 þ TOC

NAV ACCURACY. On a short sector this is a good time to complete a Nav Accuracy Check.

ANTI-ICE. Is Anti-ice still required? Is the SAT below 40°?

GROSS WEIGHT. For flight times greater than 1 hour, update the Gross Weight to reflect the final loadsheet figures.

COST INDEX. Check the ETA; would it be a good idea to change the Cost Index?

Cruise

ECAM SYSTEM PAGES. If time permits check the System pages.

FUEL CHECK. FCOs require a fuel check at the first convenient waypoint after TOC and at least hourly thereafter, but if the flight has been cleared 'direct-to' a distant waypoint, consider the following options:

1. Display the SEC FLT PLN and check the fuel when abeam a convenient waypoint.
2. Use the FLT PLN A page distance-to-go and relate it to a waypoint on SWORD.

A leak check can be completed at any convenient time.

PA. Try to complete the en-route PA as soon as you have the latest destination weather and ETA. Be careful if you discuss the intended route - on the new aircraft it is depicted on the cabin overhead screens. Early in your training consider keeping the PA succinct: (Greeting, Name, Position, Weather, ETA). Eg.

Hello ladies and gentlemen, this is the first officer Albert Ball with a progress report. As you may see on the overhead screens we have just crossed the Dutch coast and will shortly begin our descent. I've just got the latest weather report from ..... It is wet and windy, and the temperature is 10 degrees. But, the good news is that we are early - we should be arriving ahead of schedule at 1500 local time, 30 minutes from now.

You are encouraged to develop your own style, but initially, try practising this basic PA, for a variety of destinations, whilst driving to work in your car.

ACARS. Discuss the next sector fuel requirements and send an ACARs, or make a Company RT call. Pass any additional 'specials'. The destination station staff will already be aware of the 'specials' detailed on the passenger list. The ACARS should provide an acknowledgement indicating the arrival stand number and possibly a slot time for the return sector.

ATIS. Normally available by 200 - 220 miles to go. Annotate the SWORD and pass a copy to the HP. Re-set the standby altimeter on destination QNH. Back-set the PFDs.

FMGS. Check and complete the FMGS set-up for the arrival. F-PLN, RAD NAV, FUEL PRED, SEC F-PLN, PERF and PROG

TOD. Is the TOD predicated on sensible information? Does the FMGS arrival routing reflect the likely clearance? What descent speed do you want? Have you inserted any descent-planning altitudes annotated on the STAR?

Arrival Briefing

The following example of an arrival briefing is simply a training aid and is not intended to be prescriptive.

A lengthy, dull, ill-prepared briefing can take a long time. It can also be very boring. Use the Checklist aide-memoir to prepare. For example, common mistakes include forgetting to consider Fuel Capability, Radio Aids, or the likely taxiing route until half way through the briefing. Try to ensure that you have checked every detail before begin to speak, identify potential problems and consider appropriate gates or operational guidelines.

If the sector length is very short consider covering as many items as possible at the pre-flight briefing. For example: forecast tailwinds on the approach, the various notes concerning the STAR, the considerations for a late runway change at FRA or the complex taxi route at CDG. If these points are covered on the ground you will then have time to complete the briefing prior to descent, and not feel uneasy that you are glossing over important detail due to lack of time. It is utterly pointless to rush a briefing.

PERFORMANCE MANUAL. During the cruise (or before flight) check the Performance Manual arrivals page. Start at the top and point out eg:

John can I just show you this? Glasgow runway 23, 7700 feet, notes 1 & 2: note 1 is noise abatement on a visual final, note 2 doesn't apply. Missed approach acceleration alt is 2000. Cat 1 ILS 220, 550.

- - - BRIEFING - - -

CONFIGURATION. .....So there's nothing on STATUS - serviceable aeroplane.

AIS. (nubrief in hand). The only items here concern the work in progress - the inner section of the approach lighting to RW 23 is U/S and it's CAT 1 only. Oh - and don't forget the guidance on stand 22 is dodgy so we'll expect a marshaller for stopping.

WEATHER. Its cold and cloudy so engine anti-ice on at some stage during the descent, and we'll have the Radar on as well - it's getting dark and there are still some cu-nimbs about. No problems with cloudbase or visibility so if you'd like to fly a manual approach....? No? Well, automatic is fine by me.

QNH. 1023 is backset on both PFDs and also on the standby.

MSA is?.....and the **SSA**?.....yes but its 5000 to the north so shall we use 5000 for the call-out?

Now refer to the FLT PLN page and point out the STAR, Approach and Go-Around. Scroll the waypoints so that you can point out the following and cross-refer to the booklet. Also, it is sometimes useful to select the Nav Display to PLAN.

Note: If both pilots have already checked the FMGS loading there is no need to repeat the procedure during the briefing. Simply draw attention to the pertinent points.

STAR. We're expecting a LANAK 1 Alpha arrival, on page? ....yes H3. As you'll be flying the descent would you describe to me the probable height and speed profile?.....

Yes, we can expect flight level 160, ten before TALLA - that's the speed limit point - and LANAK at a flight level equivalent to 7000. I'll plan to decelerate to 210 by 12 and be no faster than 180 at 8 - they may turn us in tight - will you let me know if I'm likely to miss these gates, - then we'll lower the gear early.

APPROACH. We're expecting radar vectors to an ILS 23, on page..... yes M3.

Have you checked the FMGS routing for the approach and go-around?..... I've checked it too and Nav should be available in the event of a go-around - 3500 feet for the window. There are no special notes at the bottom of the page.

Display the PERF APPR page and point out:

Right Hand Column

ILS - 23 is selected.
MINIMA - 220 feet.
FLAP - Full.

Left Hand Column

ATIS - the data is entered.
SPEEDS - there's a strong crosswind so I've increased V App by 5kt.

Press the NEXT PHASE prompt and show the Go-Around Acceleration Altitude.

Go-Around Aa is 2000 feet.

AIRFIELD ELEVATION. Is 30 feet, ECAM shows zero in AUTO.

GO-AROUND. What would your actions be if I called Go-Around?

I'll call go-around flap 3, set TOGA and check the A/P pitches up to follow the SRS. You'll select flap 3 call positive climb and I'll call for gear-up. You'll then call out the FMA modes and I'll select NAV. We'll accelerate at 2000 feet, clean up and continue in NAV climbing to 3500 feet.

RUNWAY. Page D1 shows the runway layout - inset threshold, PAPIs etc. - and all the usual lighting. Note 3 is a bird hazard -watch out for swans at dawn and dusk.

STOPPING. We'll use reverse-idle and medium autobrake - plan to turn-off at Delta.

AIRFIELD. It'll be a very short taxi to stand 22. Better start the APU soon after vacating.

Display the Rad Nav page and point out:

RADIO AIDS. I'll let the VORs auto-tune. India Oscar Oscar, 110.1 is checked - inbound course 233. The ADF is tuned to GLG, not yet idented.

ALTERNATE. The alternate is Edinburgh and .....

FUEL CAPABILITY. ...well the FMGS thinks it'll take 400 to get there but SWORD estimates a ton, so I've entered 600 in the Route Reserve and now the fuel prediction page shows 15 minutes holding time whilst retaining EDI as the div.

REVIEW. Any points we haven't considered? ..... *Yes,.... we passed the descent point 5 minutes ago.*

Descent

WEATHER. Do you need: Anti-Ice? Weather Radar? Seat Belts? Track deviation for weather?

FMGS PREDICTIONS. In all flight phases the system mixes the actual wind with the forecast to compute the wind ahead of the aircraft. As a general rule:

> **ND**. The predictions displayed on the ND (eg Top of Descent, Bottom of Descent, ETA at the TO Waypoint) assume that the aircraft will continue to operate at the current speed in the modes (selected or managed) that are currently active.
>
> **MCDU**. Alternatively, the predictions displayed on the MCDU assume that the aircraft will be flown in Managed modes (SPD, NAV and DES). If a different speed is Selected, the MCDU predictions

assume that the aircraft will remain at the present speed until it reaches the next speed constraint or flight phase.

DESCENT MONITORING. The Normal Procedures, and Team Skills sections of this guide provide detailed advice about descent monitoring. There are several methods available and the following is simply one recommendation:

Try to ensure that the FMGS 'distance-to-go' is an accurate reflection of the ATC routing, and use the '3 times table' - it is a most useful tool for avoiding a rushed approach and for finessing the intermediate descent. Either:

- Multiply your range by 3 to give desired altitude in hundreds.
  e.g. 60 miles / 18000 feet - (slightly less than 3°).
- Multiply your height in thousands by 3.
  e.g. 18000 feet / 54 miles - (slightly steeper than 3°).

The aim is to try to fly a 3 degree descent throughout the approach, avoiding level flight at intermediate flight levels - except as part of a planned, level deceleration.

FL100. As the aircraft descends below FL 100 (or exits the hold), consider using the following sub-routine to check the aircraft is set-up for the approach:

- PA (10 minutes to landing).
- SEAT BELTS.
- SELECTED SPEED
- ACTIVATE APPROACH
- DISPLAY ILS - EFIS Push-button, (or other aids as required).
- IDENTIFY AIDS

LATE RUNWAY CHANGE There is more than one method for coping with a late runway change:

The secondary flight plan may be programmed for the alternate runway and activated if required. This method seems attractive but you will have to ensure that the ATIS has been entered (or copied from the original route) and that the PERF APPR page is complete. Additionally check that the 'To' waypoint is valid.

Alternatively complete a lateral revision at the destination and insert a new runway. The new minima must then be inserted on the PERF APPR page.

Finally it may be prudent to complete a quick FRPP: Is NAV available for the new go-around? Are the correct nav aids tunes? Has the new DA been entered? Is the missed approach Aa correct.

LATE RUNWAY 'SWING' At some destinations once visual, ATC may invite you to 'swing' from say 25L to 25R. If you decide to accept the invitation do not forget that you must , nonetheless, meet the stabilised approach criteria at 500ft. Additionally you must switch the FDs off (as per visual approach) and may need to switch off the GPWS G/S mode.

Due consideration should be given to any change in Go-around procedure.

Training the Visual Approach on the Airbus

Introduction

The aim of this section is to help trainers and trainees identify the key techniques used when flying visual approaches and manual landings during route training. The aim is to 'keep it simple' rather than produce a paper on landing theory. Hopefully, this will enable us to 'speak a common language', share effectively our perceptions and aid analysis during discussion or debriefing. Most pilots do not fly by numbers, but they use a variety of parameters to finesse their technique for the particular landing conditions. However when teaching or learning a skill such as landing, it is often necessary to refer to a sequence of actions or a set of numbers - eg:

"at 30ft hold the attitude, close the thrust levers and flare by 20ft".

Over-reliance on the radio altimeter callouts can lead to a mechanical, 'by numbers', flare technique which is inflexible and inappropriate. Whilst the callouts are a valuable guide, it is essential that the flare manoeuvre is made in response to visual, not aural, cues. Remember that landing is a ***dynamic*** skill - whilst the actions and numbers provide a framework, it is necessary to adapt technique for the conditions experienced on the day.

Initial Approach in IMC

Most IMC approaches are flown with the autopilot coupled to an ILS. When the aircraft is stable in the landing configuration, formulate a mental model by including in your scan the following:

- Pitch attitude (about 2 or 3 degrees) and N1 rpm.
- Vertical speed (about 600 or 700 fpm).
- Wind vector and drift angle on the ND.
- The relationship between VLS and the VAPP Target.

When Visual

When visual reference is obtained, leave the automatics engaged and transfer from instrument to visual cues:

- Note the runway aspect, and identify the touchdown zone and aiming point.
- Imagine an extended runway centreline and visually identify the drift angle.
- Check the PFD and note the vertical speed.
- Confirm that the autothrust is maintaining an accurate VAPP Target.
- When comfortable, disconnect the autopilot but leave the autothrust engaged.

Finals

Initially monitor the flight director but progressively extend the majority of your attention from the PFD to the visual aiming point, whilst glancing at the performance instruments to confirm that the desired flight-path is

maintained. Monitor, but do not slavishly chase, the ILS glideslope - the aim is to fly a visual approach.

- Ideally the visual aiming point should remain fixed in the windscreen. Use small but positive pitch inputs to maintain a constant runway aspect, approach angle and vertical speed.
- Make small but positive roll corrections to remain on the extended runway centreline, with drift applied if necessary.
- Check the relationship between VLS and the VAPP Target.
- Be positive with the aircraft but do not oscillate or overcontrol.
- Do not 'chase' the PAPI's when below 200ft.

100ft

- Maintain a stable approach, monitor the aiming point, but take glances down the runway in order to develop a feel for the timing of the forthcoming flare manoeuvre.
- Below 100ft if the aircraft is slightly high it is too late to try to correct with an increase in vertical speed.
- Normally, when below 100ft, the HP pilot looks out continuously. The NHP monitors the aircraft's progress visually but continues scanning the instruments and makes appropriate callouts if necessary.

50ft

The approach may be flown in ideal weather with only tiny control inputs. Occasionally, this sidestick inactivity leads to an inadequate pitch response at the flare, and a firm touchdown. The 50ft callout may be useful as a 'wake-up call' to help prevent this - pressurise the sidestick.

30ft

At 30ft, the aircraft will start to pitch nose-down unless sidestick back pressure is applied.

Flare

First close the thrust levers and ***then*** commence the flare. During, or just before the flare make a conscious effort to look towards the far end of the runway, (avoid any temptation to fixate on the touchdown zone). Some pilots do this automatically, but for others it is a conscious, deliberate act. This will enable you to:

Control the Flare. Co-ordinate the pitch rate, sink rate and attitude with your mental model of the touchdown 'picture'.

Identify and Remove Drift. During the flare, use rudder smoothly to remove drift, and apply bank to maintain the centreline prior to touchdown. However, do not maintain a lateral sidestick input - (roll-rate demand).

Finesse the Final Touchdown. The attitude increase in the flare is about 2 degrees *judged visually!* Do not extend the flare by 'floating' at 2ft with increasing attitude. The Airbus lands more smoothly at a shallow attitude.

After Touchdown

Lower the nose gently and make a positive effort to maintain or regain the centreline. Monitor the deceleration, identify the runway exit and disconnect autobrake at an appropriate moment. Exit the runway without delay.

Unused Page

Airbus
Fast Facts

LIMITATIONS

WIND LIMITS		
Crosswind	Start (IAE)	35
	Take Off	29→38
	Landing	33→38
	NWS failure	20
Autoland	Headwind	30 in MAN (20 CFM if SEL)
	Crosswind	20
	Tailwind	10
Miscellaneous	Doors/Taxi	65
	Window	200
	Wipers	230

WEIGHTS & MEASUREMENTS				
W/SPAN 34.1	320 IAE	320 200	320 100	319
MTOW	73.5	73.5	68.0	64.0
MLW	64.5	64.5	63.0	61.0
MZFW	61.0	60.5	59.0	57.0

VMCG @ SEA LEVEL			
	320 IAE	320 CFM	319
1+F	110.5	105	104
2	108.5	103	104
3	108	103	104

APU		
LOW OIL LVL on ECAM?	OK - 10 Hr!	
After 3 Attempts	60 min	
Battery Start	25K	
Bleed Air Extraction	22.5 IAE	20 CFM

FLAPS					
Alt 20K	1 230	1+F 215	2 200	3 185	Full 177

GEAR			
Alt 25K	Extend 250	Extended 280	Retract 220

ENGINE STARTER MOTOR	
Maximum cycle	2 min
Between start attempts	15 sec
After 2 attempts check manual limitations	

ENGINE WARM-UP / COOL-DOWN	
CFM after start	Idle for 2 min
IAE start after 2hr?	Idle for 5 min
Prior to shutdown	Idle for 3 min

AUTOPILOT	
Take-Off	100
Non Precision	MDA
Circling	MDA - 100
ILS Cat 1	160
Other	500

BRAKES		
Max temp at T/O	Fans ON 150	Fans OFF 300
Power against Park Brake	CFM 75% N1	IAE 1.18 EPR

ALTIMETER LIMITS	
PFD	25ft of airfield datum
PFD Comparison	20ft of each other
Standby	300ft of airfield datum

CO-PILOTS LIMITS	
Take Off	RVR 600m

Landing	CAT 1

Crosswind	2/3 limit

PLANNING

ALTERNATES Down One Step Applies:	
AIRPORT	FORECAST
Cat 3 or 2	Cat 1 - RVR
Cat 1	Non Precision
Non Precision	RVR + 1000m Ceiling + 200ft

Take Off Alternate	Cat 3A required within 1 hour, on single engine. Annotate SWORD.
Two Destination Alternates	You may not depart unless the weather at destination is above operational minima - unless you have 2 alternates.
No Alternate (not for normal ops)	OK for a flight less than 6hr and 2 destination runways available with forecast weather: ceiling 2000ft or circling + 500ft, vis 5k.

CONTINGENCY To cover *unforeseen* variations. Eg. errors in forecast weather or ATC restrictions. May be used any time from start-up onwards.	
No ERA Greater of:	15 mins @ 1500ft @ PLW @ destination or….
	5% of Trip Fuel (TF)…..
	But for a *last minute increase* in required fuel you can accept 5% of TF.
If ERA Greater of:	15 mins (as above), or
	3% of TF or,
	5% of TF from abeam ERA to destination.
	But for a *last minute increase* in required fuel you can accept 5% from abeam ERA.
	Also, to increase ZFW you can opt for 15 mins provided this is more than 5% from abeam the ERA.

RESERVE
30 mins holding at 1500ft at PLW at Alternate. Engineering will ASR for 30 mins at MLW.

IN FLIGHT FUEL POLICY
Basically, you must land with Diversion plus Reserve at the destination but:-
If short of fuel:
ATC delays not known: OK to continue if 2 airports available and landing is 'assured' with at least Reserve. Nb: 2 runways within 2 hours = 2 airports if likely delays are taken into account.
ATC delays are known: OK to continue if landing at destination is 'assured' with at least Reserve.
Assured if: You can cope with any forecast deterioration. You can cope with any plausible single failure. Example of a plausible failure?
Note: CAA AIC 36/98 states: '*no delay expected*' means that you can expect to hold for up to 20 mins!
PAN: if you ***may*** land with less than reserve. MAYDAY: if you ***will*** land - less than reserve.

FORECASTS	
Applicable	1hr before to 1hr after ETA.
TEMPO	Expect variation for up to 1hr for half the period.
BCMG	Assume the pessimistic timings.

TANKERING

Due wing ice, do not tanker in winter if: Destination is wet and……
OAT is between -2 / +10 and.....
Sector is 1hr 15min to 4hr.
Applies to night stops as well.

LOADING

FUELING ZONE
Zone 6m radius from tank, vents & equipment.
Minimum personnel and equipment within.
No: passengers, smoking, matches, lighters, studs, RT, Photo-flash, thunder.
No maintenance of oxygen, limited radio, no engines running, landing lights, strobes.

FUELING WITH PASSENGERS
Not permitted when uplifting wide-cut fuel or 2 subsequent uplifts.
Crew, staff and passengers notified. Two exits clear and manned. Flight Crew or SCCM near the flight deck. SCCM to advise if fumes - stop cleaning.
No-Smoking ON. Emergency lights ARM. PA serviceable. Stretchers and seat belts unfastened. 50kg dry powder or..... 90 litres of foam available.

CARGO CODES *(for example)*	
MUW	Munitions of war. CAA written permission.
RIS	Infectious Substance - Cargo.
MIS	Infectious Substance - Mail.
VAL	Valuable Cargo.
HR	Human Remains.
NOTOC - SPECIAL LOAD	

Carry in compliance with IATA otherwise criminal offence.
Sign and retain form even when nil carried.
Leave for next Captain if appropriate.
Advise ATC in an emergency.

ENGINEERING SPARES
Un-manifested spares may be carried on the flight deck if not dangerous goods. Notify station control of size and weight.

LIVESTOCK
Captain notified. In the hold only. Welfare to be considered - fed and watered. Guide dogs OK in cabin.

DIPLOMATIC BAGS
Sealed and cannot be opened or searched. Queen's Messengers and BA Couriers are responsible for the bags, but are subject to Captain's authority.

FIREARMS
Only UK Special Branch to carry a loaded gun. All others cases - Heads of State etc: Unloaded weapon and ammo carried in the hold and Captain notified. Sporting guns and ammo - in hold - P1 notified.

PASSENGERS

MINIMUM CREW		
	Normal	Unforeseen + ASR
A320	4	3 (130 max)
A319	3	2 (95 max)

DEPORTEES
Captain will be advised and is responsible for compliance with the deportation order. Deportee not necessarily escorted.

PAX - BOADING REFUSAL
Captain can refuse but should refer to FCO's.

PRISONERS
Captain to be advised. Normally only one at a time. Escort in plain clothes, unarmed. Boarded first, disembarked last. Not isle seat, but near toilet.

No alcohol.
Diversion? - Advise local police.

FLIGHT OPERATIONS

ACF PROCEDURE
OCTEC? If no MEL procedure, and acceptable to Captain, annotate defect ACF, sign Tech Log and advise Maintrol when convenient. If MEL procedure, contact Maintrol and try to find Lufthansa engineer!

ACARS LOADSHEET		
Confirm Issue No and AC registration. No significant change:		
TOW	+1000kg	−2000kg
MACTOW within:	2% 2.3%	319 320

FUEL LMC ± 500 kg
Update copy of loadsheet. If using provisional, no need to amend dispatchers copy.

MANUAL START
Recommended following or anticipating auto-start abort. IAE - tailwind greater than10kt.

GROUND IDLE FUEL BURN	
ENG: APU:	12kg per min. 2kg per min.

FLEX THRUST
Flex temp must be greater than OAT and TREF, but must be less than ISA + 65° IAE or ISA + 41° CFM.
Flex T/O Prohibited: Windshear, inversion, contamination or braking action below medium, or thrust reverser or anti-skid u/s, or Perf Manual restriction.

MAX ALTITUDES	
Optimum:	For economy (best SAR).
Maximum:	Allows 1.3g buffet boundary.

RADIO FAIL
European Procedure Squawk 7600 and start timing: Complete the SID then maintain speed & level (or MSA if higher).until 7 mins. Then adjust level & speed IAW Flt Plan. UK - if on vectors - maintain for 3 mins. Continue to destination via STAR to Hold. Arrive at Hold at ETA. Descend in Hold at VS > 500 fpm. Land within 30 mins of descent. Or leave on specified route, obtain VMC. Maintain VMC and divert.
If Departing LHR Departure off SID on radar heading? Maintain for 2 mins then UK procedure.

NON RADAR SEPARATION MINIMA	
T/O or Land behind a Heavy.	2 min
Intersection T/O bhind a Heavy.	3 min
Displaced Threshold:	
Take-Off after a Heavy arrival.	2 min
Land after Heavy departure.	2 min

RADAR SEPARATION MINIMA	
Heavy followed by a Medium	5nm
Medium followed by a Medium	3nm

HOLDING		
Above FL 140	240kt	1.5 min.
Below FL 140	230kt	1 min.

NAV ACCURACY	
GPS Primary?	
YES	NO
No additional check required.	En Route: Range 3nm.
	Approach: Range 1nm.

INCAPACITATION
Side-stick priority, if required. Lock harness, motor seat aft. SCCM alert. Mayday, (or Pan if not seriously ill). Doctor or Positioning Crew? Check QRH.

MSA / SSA	
Obstacle height: Round up to next 100 ft..... then add vertical clearance:	
Up to 5000 feet:	1000 ft
Over 5000 feet:	2000 ft.
MSA:	20 miles either side of track. Min 2000 ft when track entirely over sea, otherwise 3000ft.
Beware:	Departure airport to first fix and last fix to destination - assumed direct track.
SSA:	Centred on aerodrome reference. Aligned with true north.

THALES BOOKLETS
Contour envelope MSA's Aerodrome elevation - round up to next 100 ft, add 500 ft, then..... add appropriate vertical clearance as above.

MOA
In IMC or Night: MSA, SSA or Radar Cleared Altitude.
In VMC by day: 500 ft above all obstacles.

MOA CORRECTIONS
Temperature: 4% of height per 10°C below ISA.
Turbulence: When wind velocity at MSA>50kt..... increase MOA by 2000 ft.
Mountain Waves: Vertical clearance over highest ridge at least equal to the height of the ridge above the surrounding terrain.

DESCENT BELOW MSA
IMC:
Do not rely on any single aid or system. Descent to SSA within 25 nm. Descent to radar cleared altitude under positive radar control. If in doubt use published IFR procedure.
VMC:
By day: Clear of all obstacles. OK to descend VMC over low cloud or fog.
By night: Additionally only towards a lit area, i.e. the airfield. DME checked against altitude.

SPECIAL LANDING CLEARANCE
Day only. Captain responsible for safe clearance. 2000M if preceding aircraft is taking-off. 2500M if preceding aircraft is landing.

ADVERSE WEATHER

ACCEPTABLE ICE
All surfaces clear except: Frost on upper surface of fuselage Frost on underside of wing tanks but….. No re-frozen frost-ice ridges under wing No asymmetric de-icing.

GROUND ICING	
IAE	OAT<3 set 50% N1 every 15 min.
CFM	After 30 min apply 70% for 30 sec.

AFTER COLD SOAK	
PROBE/WINDOW HT	ON
After 1st engine start	OFF

GROUND OPS IN HEAVY RAIN
EXTRACT to OVERRIDE PACKS ON After take-off EXTRACT to AUTO.

CROSSWIND TAKE-OFF
Crosswind above 20kt or if a tailwind: Full forward stick 50% then 70% (EPR 1.05 then 1.15)…… then TOGA or Flex by 40kt groundspeed

RUNWAY CONTAMINATION
If runway de-iced with urea crystals use APU to pack for take-off and landing. Use TOGA and don't reject for minor failures. Normal take-off technique. Use full reverse - cancel by 40kt in loose snow.

SEVERE TURBULENCE	
Engine Mode	IGN
Cruise	A/P in A/T out
Approach	A/T in, managed speed

TURBULENCE SPEEDS		
Below 20K	250kt	All
Above 20K	267kt / .76M	100
	275kt / .76M	200 & 319

FLIGHT IN ICING CONDITIONS
Engine and Wing ANT-ICE are preventative. Avoid extended flight with slats extended.
Accumulation? Add 5kt to VLS and Landing Distance x 1.1

WINDSHEAR
Definition: 15kt, 500fpm, 5° pitch, 1 dot G/S, or Unusual thrust for a long time.
Approach Technique: Flap 3 Landing. Increase VAPP up to VLS +15kt. A/P and A/T in.

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Trainer Feedback Form

A vital part of training is to receive feedback, both positive and negative, and this is equally important for a trainer as for a trainee. Please find time to complete this form. You may remain anonymous and return the form via my pigeonhole. Please give your candid opinion. Please put a mark on the scales below wherever you feel it reflects the training you received.

Briefing

How would you describe the amount of information briefed by the trainer?

Far too much---------- Way too little

How did the trainer's tone, set in the briefing, affect your performance?

Vastly improved ---------- Greatly worsened

Training

(simulator session or flight)

How well did the training you received meet it's objective? (Did you learn what you thought you should have learnt?)

Totally---------- Not at all

How well did the training you received meet your needs? (Were your problems solved effectively?)

Perfectly---------- Not at all

Debriefing and Assessment

How would you describe the content of the debriefing?

Everything pertinent and useful---------- Nothing pertinent or useful

Far too much information ---------- Far too little information

How did you feel about the assessment you received?

Excessively generous---------- Unduly harsh

Overall

How would you describe the overall effect of the tone set by the trainer?

Extremely helpful---------- Extremely hindering

How would you rate the training you received?

Outstanding---------- Poor

How would you rate the trainer in comparison with other Airbus trainers you have experienced?

Best---------- Least good

Did you think any training was at variance with SOPs or other training you have received?

Do you have any other comments you would like to make?

Thank you for completing this form, please return it to your trainer or via his/her drop-file in Compass.

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