Lockheed L-1011-1/50/100 Procedures
(RB211-22B)

ENGINE START
The normal start sequence is two, one, three. The engines may be started before, during, or after gate pushback. Normally the APU is used to start all three engines.

- Turn on anti-collision (beacon) lights.
- Press the ground start switch, not the valve open light on, and check for N3 rotation within ten seconds.
- The engineer will check the engine isolation and high pressure flowbars on, duct pressure normal, APU max mode light on, oil pressure increasing within 30 seconds, and N2 turning.
- After N3 is turning, check duct pressure.
- When N3 is 25%, or at max motoring speed, whichever occurs first, and TGT is below 100 degrees, place fuel and ignition switch on.
- Observe an increase in fuel flow, TGT within 30 seconds, and N1.
- At the first indication of TGT increasing, place and hold the fuel and ignition switch to enrich until engine stabilizes at idle (TGT decreases). Do not cycle switch between enrich and on.
- The engineer will close the engine isolation valve at 46% N3.
- Start the remaining engines with APU bleed air.

Cold Weather Starting
On cold soaked engines when outside temp is 0C and colder, place fuel and ignition switch to enrich at 17% N3. Any rise in TGT within 60 seconds is considered a light off. Hold fuel and ignition switch to enrich until engine stabilizes at idle.

Engine Starting - Abnormal Indications
The following are the more likely abnormal indications which could occur:

- No rotation within 10 seconds of start valve open light on.
- No light off indications within 30 seconds of placing the fuel and ignition switch to on.
- No oil pressure indications within 30 seconds of start of rotation.
- Hot start is observed or anticipated before starter cutout.
- Hot or aborted start after starter cutout.
- Engine does not continue to accelerate after starter cutout.
- Engine decelerates from ground idle.
- Start valve open light or ground start release push light on after 55% N3.

TAXIING
If possible, keep the nose wheel centered until the aircraft starts rolling. If it's necessary to use more than idle thrust to move the aircraft, slowly advance engine 1 and 3 to a maximum of 45%

N1. If added thrust is needed, ensure area aft of the aircraft is clear. Slowly increase engine 2 thrust to a maximum of 45% N1. If a lengthy taxi delay is anticipated, No. 2 engine may be shut down provided the engine is at idle for at least one minute.

After leaving the ramp, place flap handle to the required takeoff setting.

Make large radius turns whenever possible. Do not use reverse thrust for backing or taxiing the aircraft.

180 degree turns on runways less than 164 feet wide should not normally be attempted without ground signaling assistance.

TAKEOFF PERFORMANCE

For a standard thrust takeoff, a pack may be used if standard thrust EPR is at least .005 less than maximum thrust EPR. No performance adjustments are necessary.

For a maximum thrust takeoff, a pack may be used performance permitting. Use of a pack requires performance adjustments. Use the takeoff data worksheet to reduce runway zero wind and climb limit weights by 4,000 pounds. Reduce maximum thrust EPR by .005.

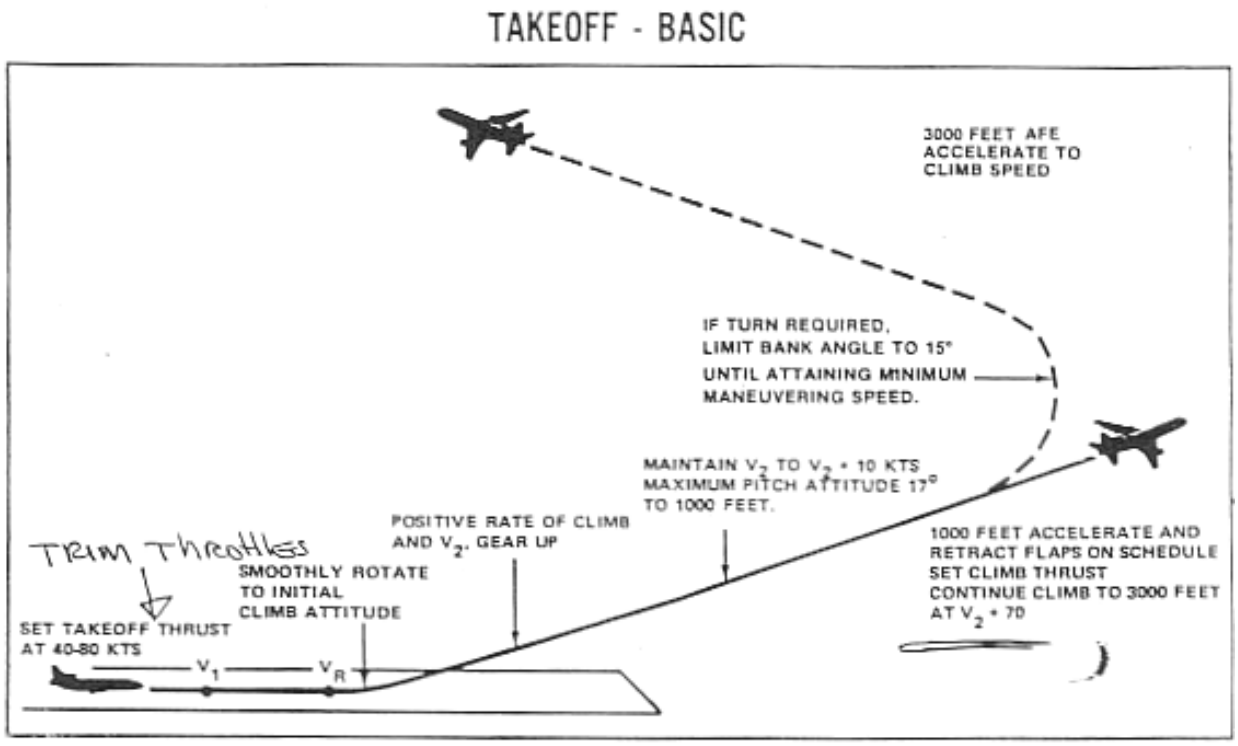
TAKEOFF PROCEDURES

Basic

- As the throttles are advanced for takeoff, check the engine No. 2 fail arm light is on.
- At slightly less than takeoff EPR command the engineer to "Trim throttles." The engineer will set takeoff EPR between 40 to 80 knots.
- If the takeoff warning horn sounds as the throttles are advanced, immediately check the positions of the flaps, slats, speed brake lever, and stabilizer trim. If any discrepancy noted cannot be corrected immediately or it the warning continues, abort the takeoff.
- Maintain forward pressure on the yoke and use rudder pedal steering for directional control. If rudder pedal steering is inoperative, use the nose wheel steering wheel until the rudder becomes effective, normally 80 knots.
- At Vr, smoothly rotate to initial climb attitude and stabilize airspeed at V2 to V2 + 10 knots but do not exceed 17° nose up attitude. Rotating too early or too fast a rate can cause a tail skid strike.
- The aircraft is committed to takeoff after reaching V1. If the aircraft fails to accelerate normally to Vr, apply maximum available thrust, initiate rotation a the normal rate no later than 2,000 feet from the end of the runway, and continue rotation until airborne.
- Retract landing gear when airborne with a positive rate-of-climb (altimeter and vertical speed indicators increasing) and at least V2.
- Maintain takeoff flaps and V2 to V2 + 10 until reaching 1000 feet AFE. Limit pitch attitude to a maximum of 17 degrees and accept any resulting speed increase.
- If a turn is required, limit bank angle to 15° until attaining maximum maneuvering speed. Begin turn as soon as practicable consistent with safety.

- At 1000 feet AFE, lower the nose to approximately 8 to 10 degrees to establish a suitable climb gradient while accelerating for flap retraction. During cleanup, it is desirable to continue to climb at no less than 500 fpm.
- Retract flaps on schedule.
- Set climb thrust when flaps are fully retracted and continue climb to 3000 feet AFE at V2 + 70 knots.

1011 Takeoff – Basic



FLAP RETRACTION SCHEDULE	
FLAPS	SPEED
10 TO 4	V_2 + 30
4 TO 0	V_2 + 60

MINIMUM MANEUVERING SPEEDS	
FLAPS	SPEED
0	V_2 + 60
4	V_2 + 30
10	V_2 + 20

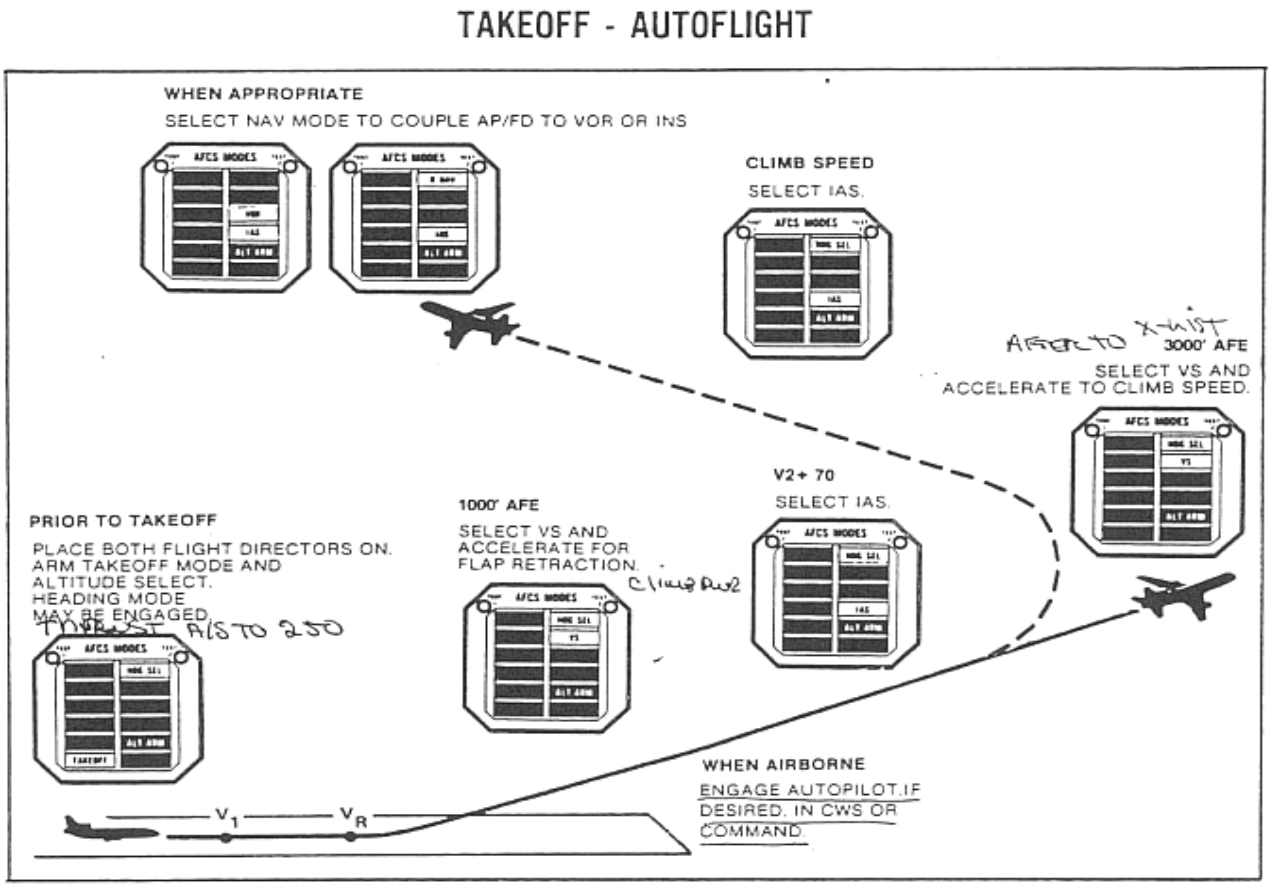
At 1,000 feet above field elevation (AFE), lower nose to approximately 8 to 10 degrees to establish a suitable climb gradient while accelerating for flap retraction. During clean up, it is desirable to continue climb at no less than 500 feet per minute.

Autoflight

- Turn on both flight directors and select the TAKEOFF mode.
- Set and arm the first level off altitude in the altitude select panel.
- If roll guidance is desired, set the HSI heading cursor to runway heading and select the HDG mode.

- An autopilot can be engaged in CWS or command when airborne.
- Make a normal rotation at Vr and comply with the Basic Takeoff climb profile. Do not fly the flight director until airborne.
- At 1000 AFE, select the VS mode and accelerate for flap retraction.
- At V2 + 70, select the IAS mode.
- At 3000 feet AFE, select the VS mode and accelerate to climb speed.
- When reaching climb speed, select the IAS mode.
- When appropriate, select the NAV mode to couple the autopilot/flight directors to VOR or INS.

1011 Takeoff – Autoflight



Auto flight status must be confirmed and progress monitored by observing the AFCS modes annunciators.

Make a normal rotation at Vr and comply with the basic takeoff climb profile.

Do not fly the flight director until airborne. Position the aircraft symbol slightly below the flight director keeping a thin line between each.

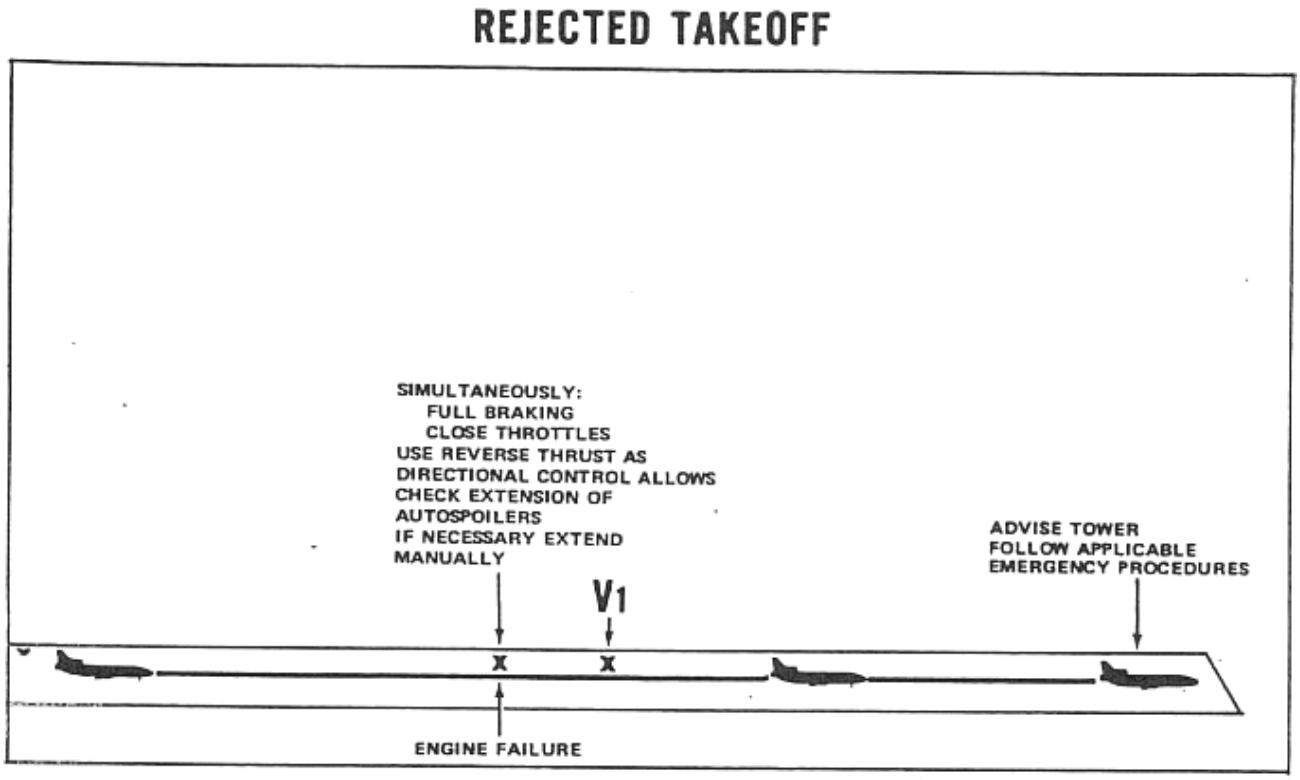
Limit bank angle to 15 degrees until obtaining minimum maneuvering speed.

Select NAV mode when appropriate to couple flight directors and/or autopilot to either a VOR radial or an INS.

Intermediate level off may be accomplished by selecting ALT or VS and zeroing the climb rate.

Other Takeoff Maneuvers and Procedures

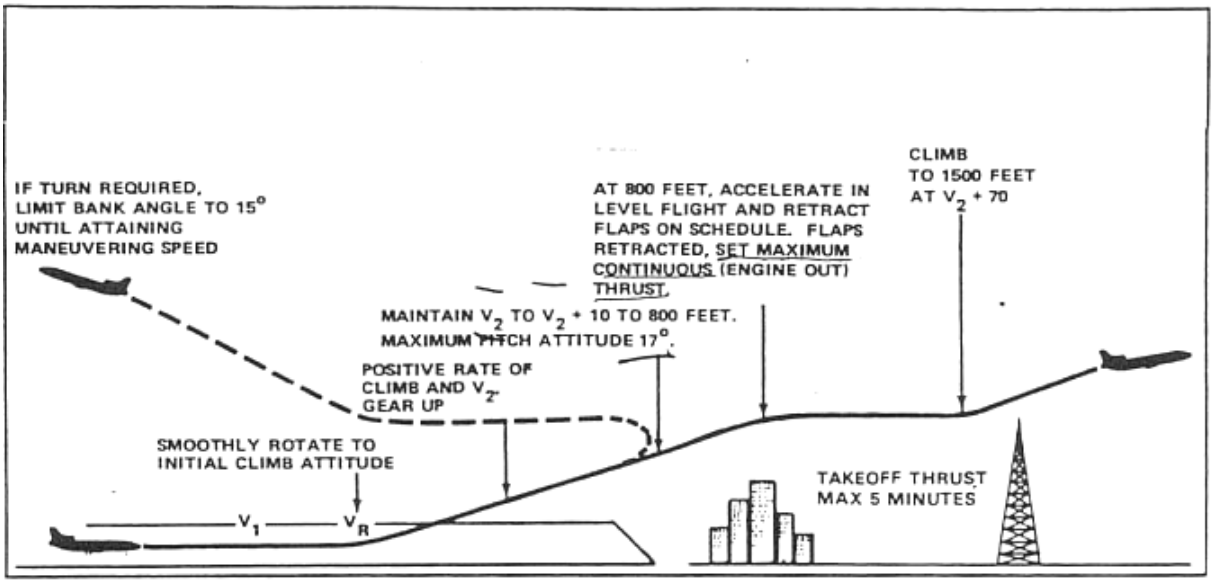
1011 Rejected Takeoff



The decision to reject a takeoff is solely the responsibility of the captain. Maximum effort stopping technique shall be initiated.

1011 Takeoff - Engine Failure After V1

TAKEOFF - ENGINE FAILURE AFTER V1



FLAP RETRACTION SCHEDULE	
FLAPS	SPEED
10 TO 4	V_2 + 30
4 TO 0	V_2 + 60

MINIMUM MANEUVERING SPEEDS	
FLAPS	SPEED
0	V_2 + 60
4	V_2 + 30
10	V_2 + 20

Close engine instrument monitoring on takeoff by all crew members is essential to detect possible engine failure or malfunction. Except for engine 2 fail lights, failure of the number 2 engine may be difficult to recognize because of lack of yaw.

Use a normal rate of rotation at Vr.

V2 + 70 knots must be maintained to 1,500 feet, or higher if required, thus providing optimum obstacle clearance along the takeoff flight path.

If an engine fire warning occurs on takeoff, fly the engine failure profile as depicted above, whether the engine is producing significant thrust or not.

Use good judgment and ensure the correct controls are operated when shutting down an engine. This is more important than quick action. Conditions such as aircraft buffeting or vibrations and/or reported visible fire may require earlier or immediate compliance with the engine fire or failure procedure. Circumstances must dictate the action taken.

CLIMB

Climb Thrust

Select cruise mode on the EPR computer and subtract .01 EPR for climb thrust setting until rate of climb decreases to 500 fpm. At this point, select climb mode on the EPR computer and increase thrust to climb mode EPR.

If additional climb capability is required to achieve an ocean crossing track altitude, when climb rate again decreases to 500 fpm add .01 EPR to climb mode EPR.

If the EPR computer is inoperative, follow the above substituting the Normal Climb/Maximum Cruise thrust setting chart for the cruise mode and the Maximum Climb chart for the climb mode.

Anti-Icing
Use wing anti-ice as required. During takeoff, delay turning on win anti-ice until reaching 800 feet above the field.

Turn on continuous ignition before turning on engine anti-ice. If heavy icing is anticipated or encountered, select flight start for all engines.

Maintain at least 50% N1 on all engines and ensure heat lights are on when operating in heavy precipitation or in heavy icing conditions.

Altitude Select
Set altitude select panel to each altitude assigned by ATC. Set only those altitudes requiring a level-off when departing via a SID.

Turbulence Penetration
Before entering areas of know turbulence:

- Determine best penetration altitude. When above 30,000 feet, do not climb to higher altitude to avoid turbulence unless the storm can definitely be topped.
- Adjust thrust if necessary, to maintain the applicable target penetration speed range of 280-290 knot or mach .82-.85. If airspeed is greater than 290, reduce to 290 regardless of mach. If airspeed is below 280, do not further reduce speed if mach is within target range. If both mach and airspeed are less than minimum target values, increase speed until the first target is attained.
- Turn on continuous ignition.
- Engage autopilot in any mode, except altitude hold.
- Make thrust changes only if necessary to maintain target airspeed.
- Monitor autopilot response, but avoid overriding the controls when the autopilot is applying corrections.

CRUISE & DESCENT

Cruise Thrust
As cruise altitude is reached, gradually level the aircraft while continuing to use climb EPR for acceleration to cruise speed. Program the ADI slow-fast pointer for cruise speed by using the IAS control knob. Set airspeed bugs to the appropriate cruise indicated airspeed.

When cruise speed is attained, smoothly retard throttles to cruise chart EPR. Allow speed to stabilize while monitoring the slow-fast pointer. If pointer indicates a trend toward speed change, adjust thrust with No. 2 throttle. Use No. 2 throttle to trim thrust until a .03 EPR difference from chart is required, then adjust No. 1 and 3 throttles .01 EPR and realign No. 2. Periodic update of cruise IAS shall be accomplished as weight and/or wind conditions change.

Fuel Calculations
Use fuel flow indicators when computing fuel burn while maintaining the fuel log. For any 20 minute period the total fuel burn is the average actual indication of the fuel flows.

Because of a slight amount of internal leakage, some of the fuel passing through the fuel flow transmitter is measured more than once. This causes the fuel used indicators to be on the high side. Considering this with the three transmitters it can be expected that a total of up to 400 lbs per hour of fuel is registered but is not consumed by the engines.

The number 2 tank quantity indicators are slightly affected by aircraft pitch attitude. With 15° nose up attitude the indicators should be expected to be approximately 2000 lbs low.

Descent
Remain at cruise altitude as long as possible so that thrust may be reduced to the minimum practical level consistent with operational requirements during descent.

To begin descent, smoothly lower the nose then close the throttles. Descend in a clean configuration at cruise mach until intersecting 290 KIAS. Continue at 290 KIAS until reaching 20,000 feet. Adjust speed to 300 knots and maintain until reaching 10,000 feet or lower as local ATC regulations and speed limits permit.

Anti-Icing Systems During Descent
When using engine anti-ice, maintain enough throttle to keep heat light on.

Altitude Select During Descent
During descent set the altitude select panel to each altitude assigned by ATC. If on a published segment when approach clearance is received, set the published minimum altitude for that segment unless assigned an altitude that is higher.

If not on a published segment when approach clearance is received, set the last assigned altitude until established on a track which has a charted altitude, then set the appropriate altitude for that charted segment unless assigned a higher altitude.

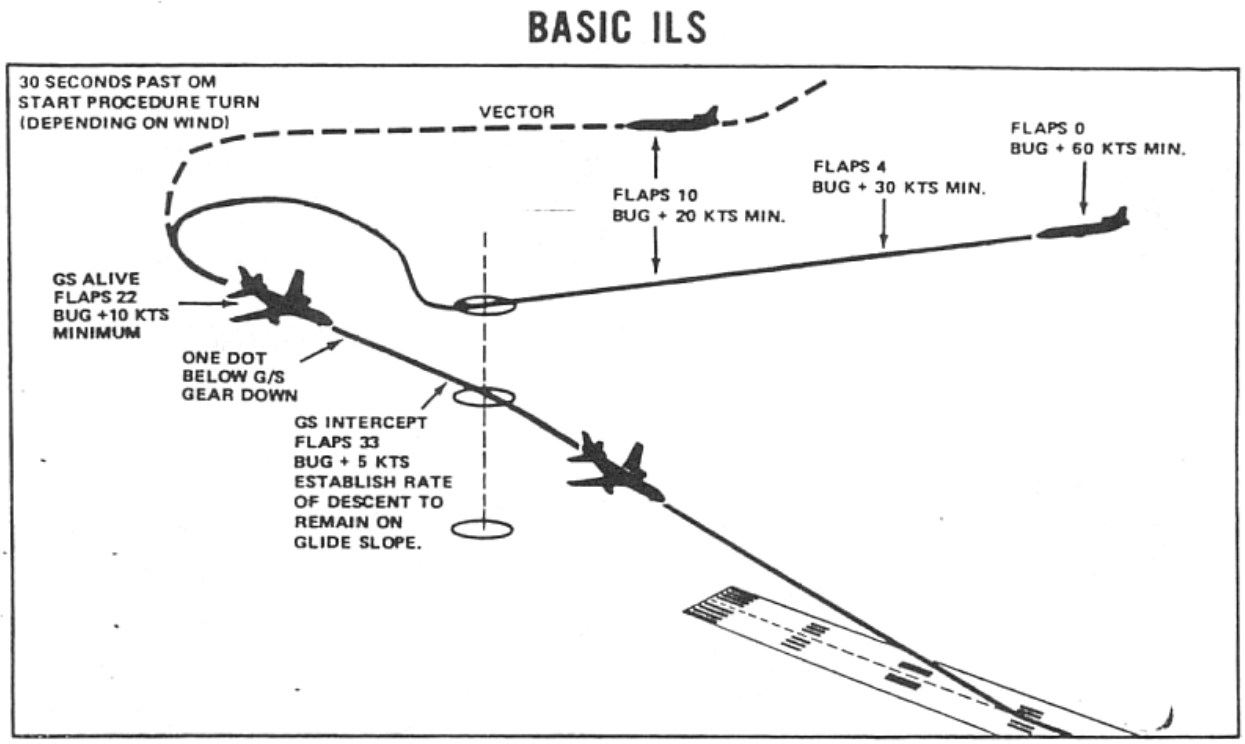
Set each assigned or charted altitude, as applicable, down to and including the final approach altitude.

APPROACH AND LANDING

Approach Descent
When cleared to descend prior to final approach, descent to 1,000 feet above the assigned altitude using minimum thrust for existing conditions. When a significant altitude change is required at a high rate of descent, speed brakes may be used. Do not use speed brakes with any flaps extended or when below final approach fix altitude.

Final Approach Speed
Final approach speed for all approaches is bug +5 knots plus 50% of any gust value. If heavy to moderate icing conditions have been encountered in flight and the airport temperature is below 46°F, increase approach and landing speeds by 5 knots to compensate for ice buildup on the unheated surfaces of the aircraft.

1011 Basic ILS



Minimum maneuvering speeds are the bug plus speeds for the appropriate flap.

Crew coordination and approach plate review should be completed as soon as approach information is available. Position awareness during any approach is important to aid in anticipating speed and configuration changes. Radios should be tuned to facilitate position awareness during initial vectoring in the terminal area.

After initial flap extension, the Landing Final check list should normally be completed to the boxed items.

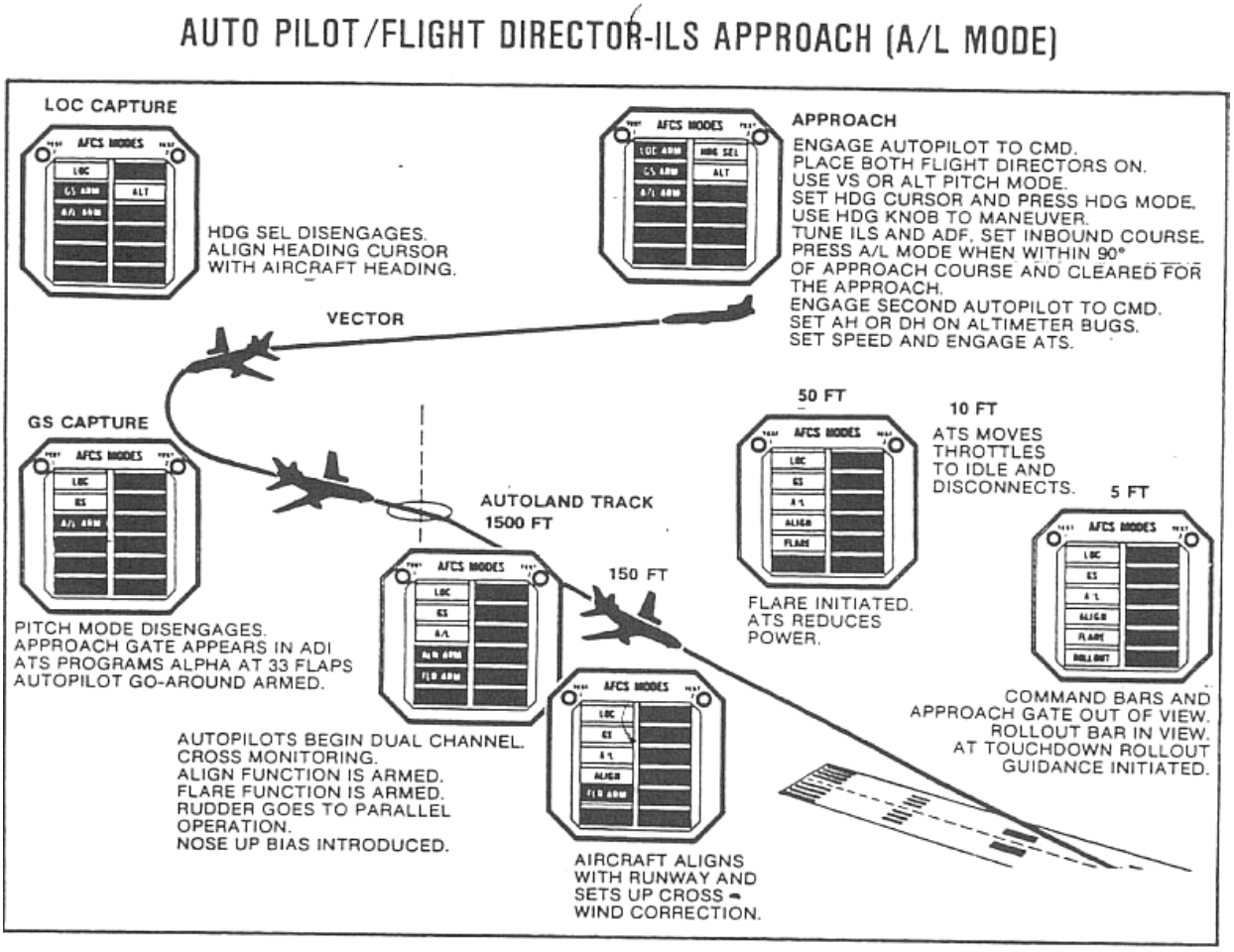
When on the localizer intercept heading, all radios should be tuned for the approach. Proper RMI needle selection should be made.

After seeing three green lights, complete the Landing Final Check list.

See the "Flight Director Approach" or "Autopilot Approach" diagrams for pertinent details.

No later than the final fix inbound, all radios should be tuned and identified on the ILS facilities.

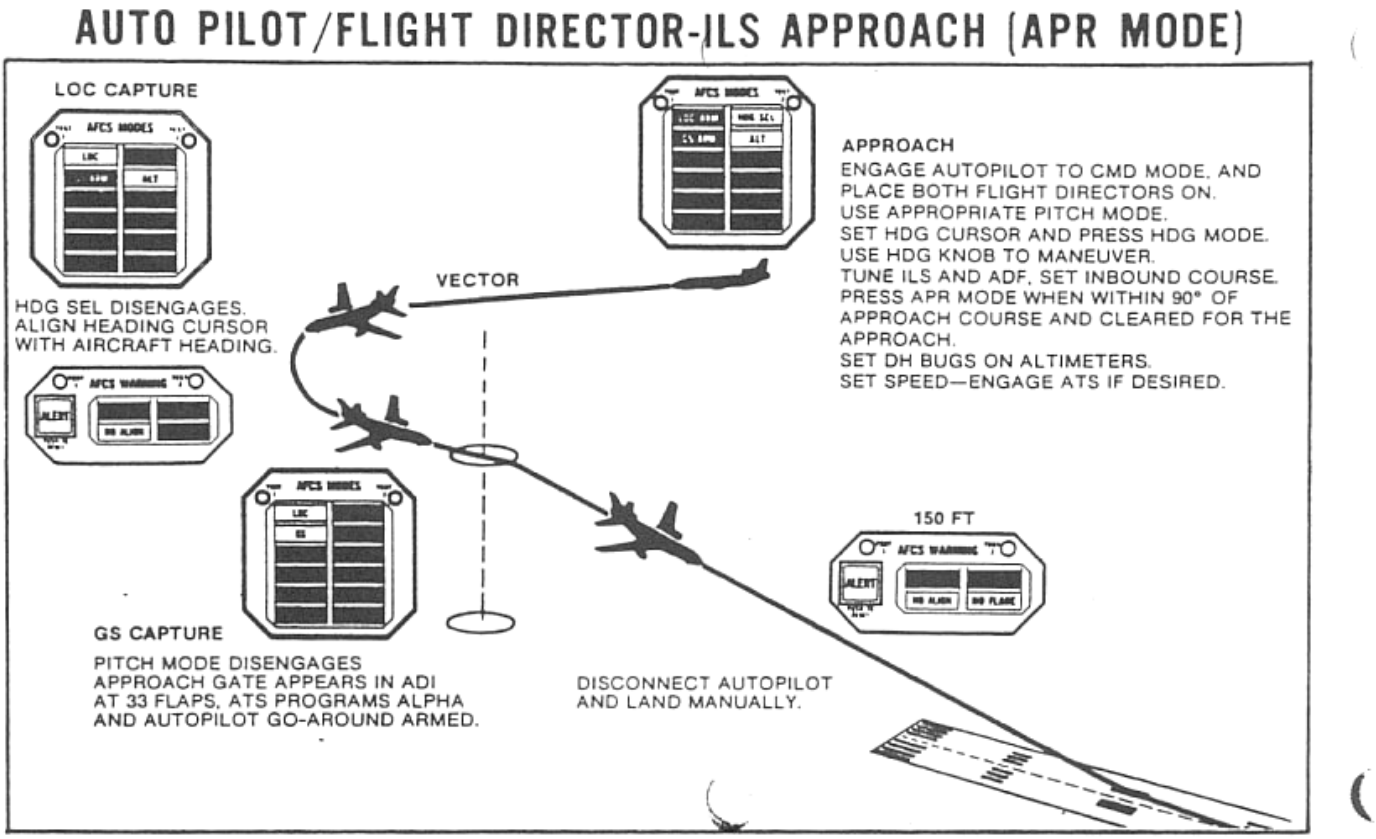
1011 Autopilot / Flight Director ILS (A/L Mode)



Autoflight status must be confirmed and progress monitored by observing the AFCS modes annunciators.

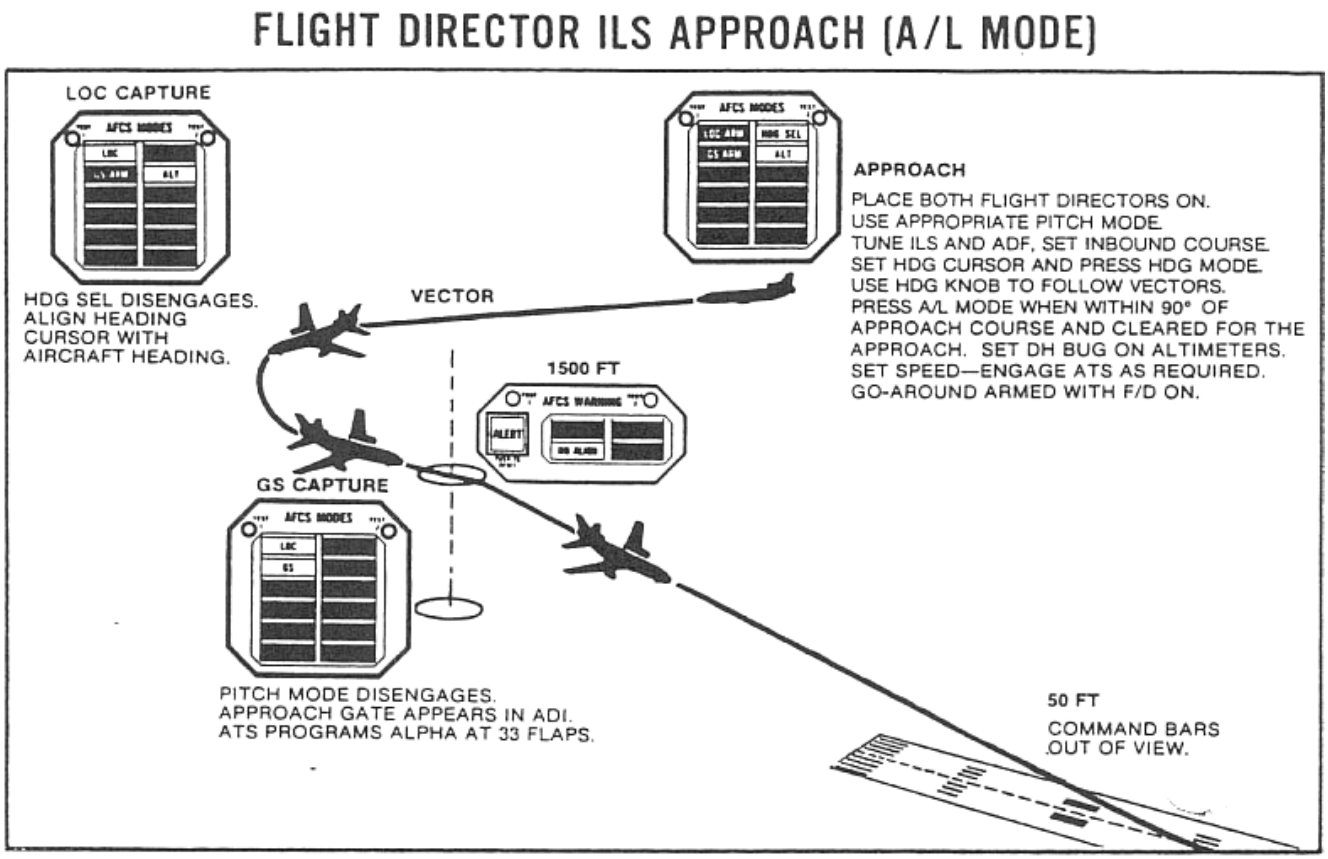
A satisfactory automatic landing is a touchdown in the touchdown zone and nose wheel within 25 feet of the centerline.

1011 Autopilot / Flight Director – ILS Approach (APR Mode)



Autoflight status must be confirmed and progress monitored by observing the AFCS modes annunciators.

1011 Flight Director ILS Approach (A/L Mode)

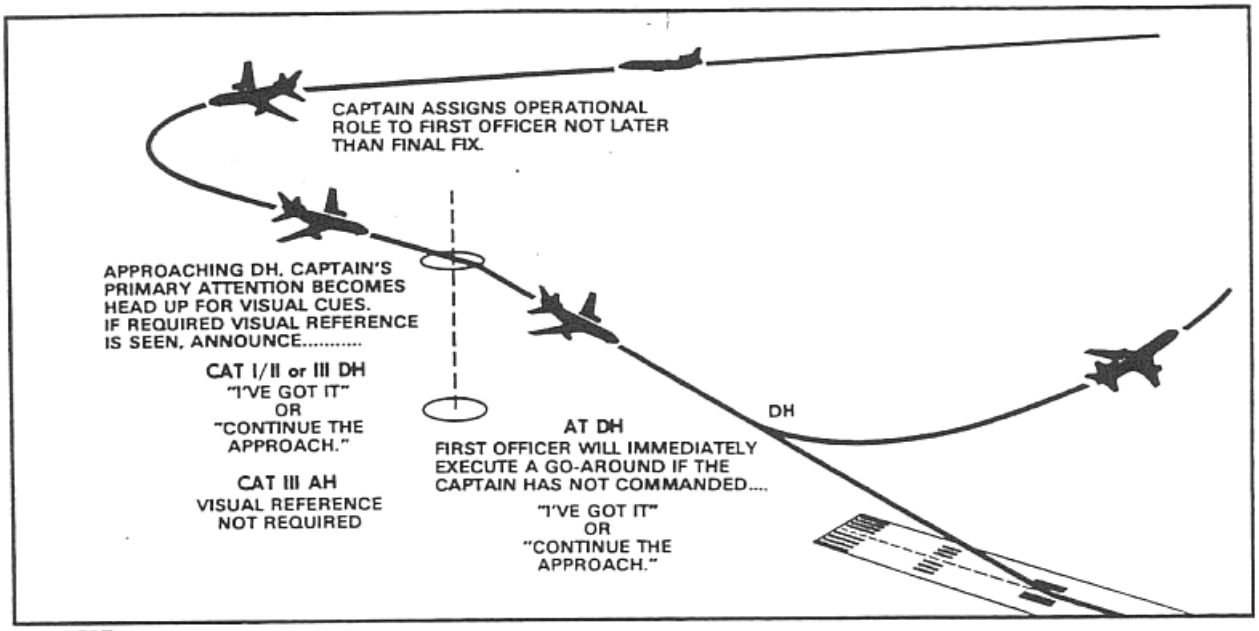


The flight director wing tip positions will give the earliest indication of the need for a course correction.

Auto flight status must be confirmed and progress monitored by observing the AFCS modes annunciators.

1011 Monitored ILS Approach

MONITORED ILS APPROACH



CONCEPT:

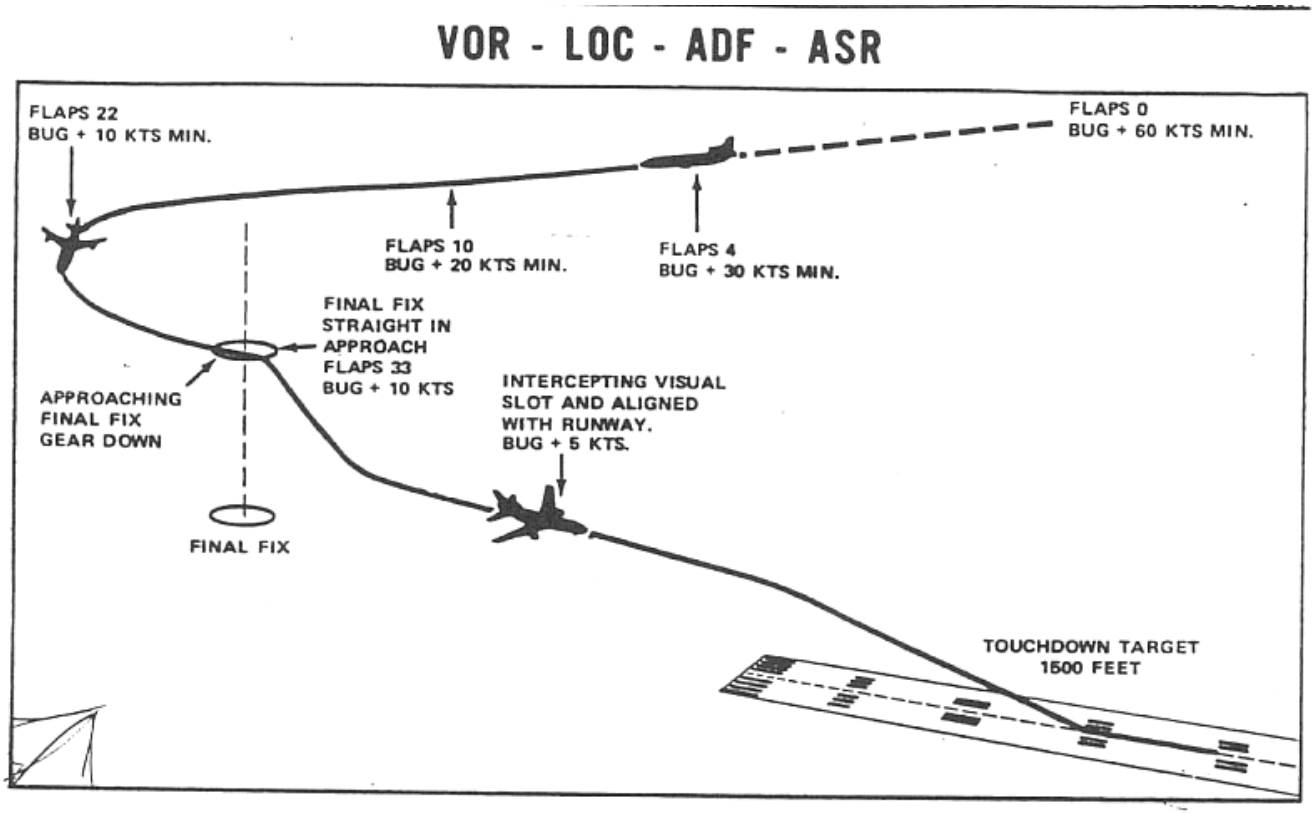
First officer will fly the approach head down using the flight director and/or autopilot and make all callouts below 500 feet. Captain will monitor the approach primarily head up and assume control no later than 50 feet for a manual landing. For an automatic landing, the captain must assume control no later than nose wheel touchdown.

1. The captain is in command and must take control any time the situation requires such action, or command "go-around" when appropriate.
2. This approach is recommended anytime the RVR is less than 4000 feet or the ceiling below 400 feet.
3. After the captain takes control, the first officer's primary attention continues to be head-down to monitor instruments and make required callouts. First officer remains head-down until reaching taxi speed.
4. The first officer will call out autoflight status below 150 feet, localizer deviation during rollout and normal 80 kt. airspeed callout.
5. The flight engineer will perform normal crew coordination duties.
6. Crew Coordination Callouts:

	CAT I/II or CAT III DH		CAT III AH	
POSITION	FIRST OFFICER CALLS	CAPTAIN CALLS	FIRST OFFICER CALLS	CAPTAIN CALLS
OM	"Outer marker"	(Engineer responds, "Flags checked")	"Outer marker"	(Engineer responds, "Flags checked")
500 feet		"___Knots, Sink___"		"___Knots, Sink___"
100 feet above DH/AH	"100 to go"		"100 to go"	
150 feet	"Align"*		"Align"	
DH	"Minimums"	"I've got it" or "Continue the approach"		
100 feet	"100 feet"		"100 feet"	
50 feet/ manual landing		"I've got it"		
50 feet	"Flare/Go-around"*		"Flare/Go-around"	"I've got it"
5 feet	"Rollout"*		"Rollout"	

*Required only for automatic landing.

1011 Non-Precision



Minimum manuvering speeds are the bug plus speeds for the appropriate flaps.

Crew coordination and approach plate review should be completed prior to arrival in the terminal area. Position awareness during any approach is important to aid in anticipating speed and configuration changes. Radios should be tuned to facilitate position awareness during initial vectoring in the terminal area.

After initial flap extension, the landing final check list should be completed to the boxed items.

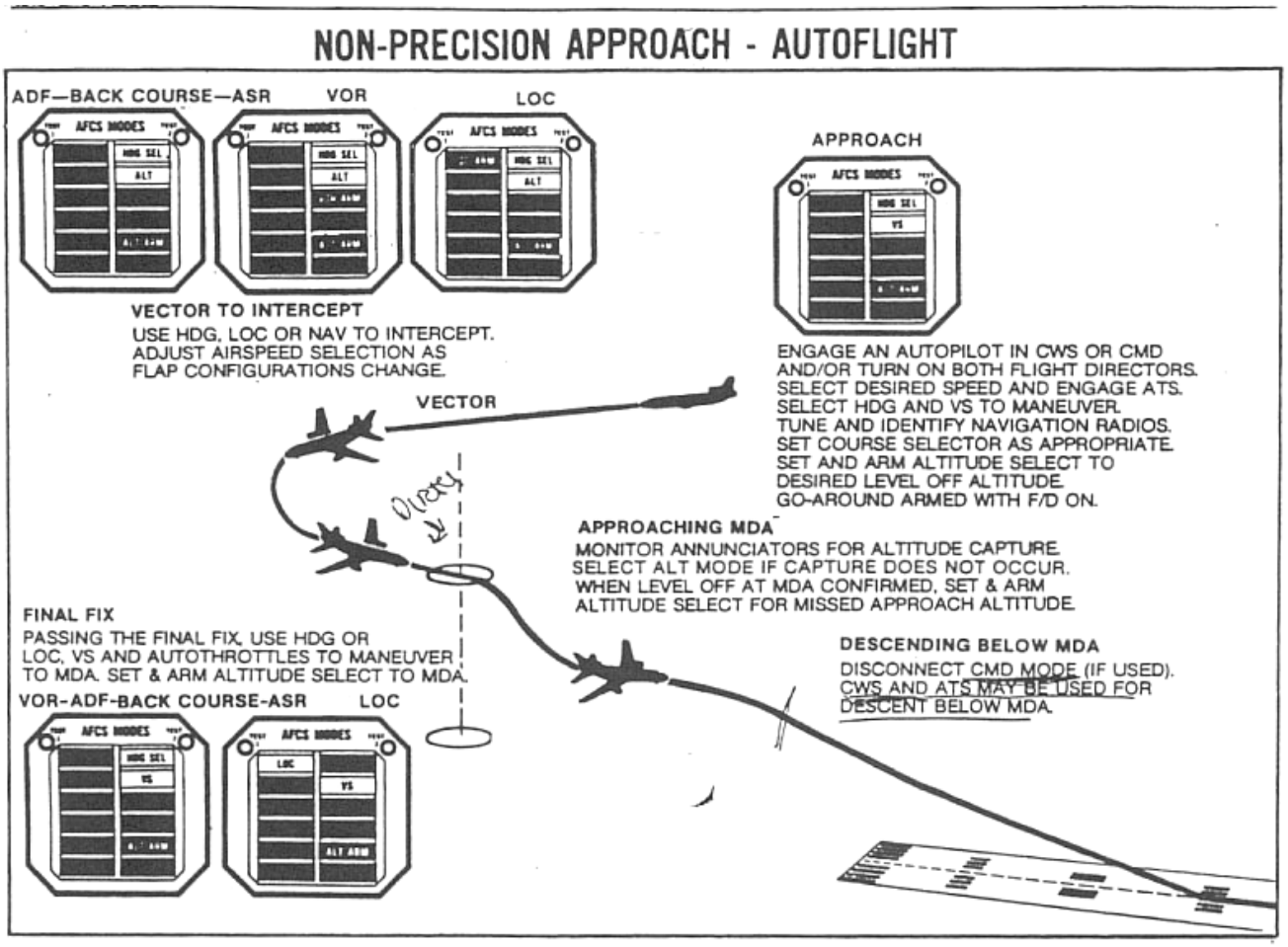
When on the final approach course intercept heading, all radios should be tuned for the approach. Proper RMI needle selection should be made.

After seeing three green lights, complete the landing final check list.

No later than the final fix inbound, all radios should be tuned and identified on the appropriate facilities.

Sink rate from the final approach fix to "MDA" will depend on ground speed, altitude change and Missed Approach Point.

1011 Non-Precision – Autoflight



The flight director wing tip positions will give the earliest indication of the need for a course correction.

Autoflight status must be confirmed and progress monitored by observing the AFCS modes annunciators.

Normal Approach and Landing

When approaching the traffic pattern, select flaps 4 and check that the LE slat green light is on. Slow to a minimum of bug +30 knots. On downwind leg, select flaps 10 and slow to a minimum of bug +20 knots.

When opposite the approach end of the runway, select flaps 22 and slow to a minimum of bug +10 knots. Turning base leg, extend the gear.

When intercepting the approach slot, start a normal descent. Turning final select flaps 33 and slow to a minimum of bug +5 knots plus 50% of the gust value.

Adjust sink rate so as to be stabilized in the slot as soon as practicable but no later than 500 feet AFE.

Use pitch t rim to keep control column forces near zero throughout the approach. Once the aircraft is in trim, further trimming should not be necessary as long as airspeed control is maintained.

Frequently crosscheck sink rate, pitch attitude, and the visual position of the 1,500 foot touchdown target to maintain the aircraft in the approach slot.

When approaching the touchdown point, initiate the flare and smoothly reduce thrust to idle. Touchdown should occur as the throttles reach idle with a pitch attitude of 8 to 9 degrees. Fly the aircraft onto the runway. Do not increase pitch attitude further as floating may result causing an excessive amount of runway to be used. Also, increasing pitch attitude may cause the tail skid to contact the runway.

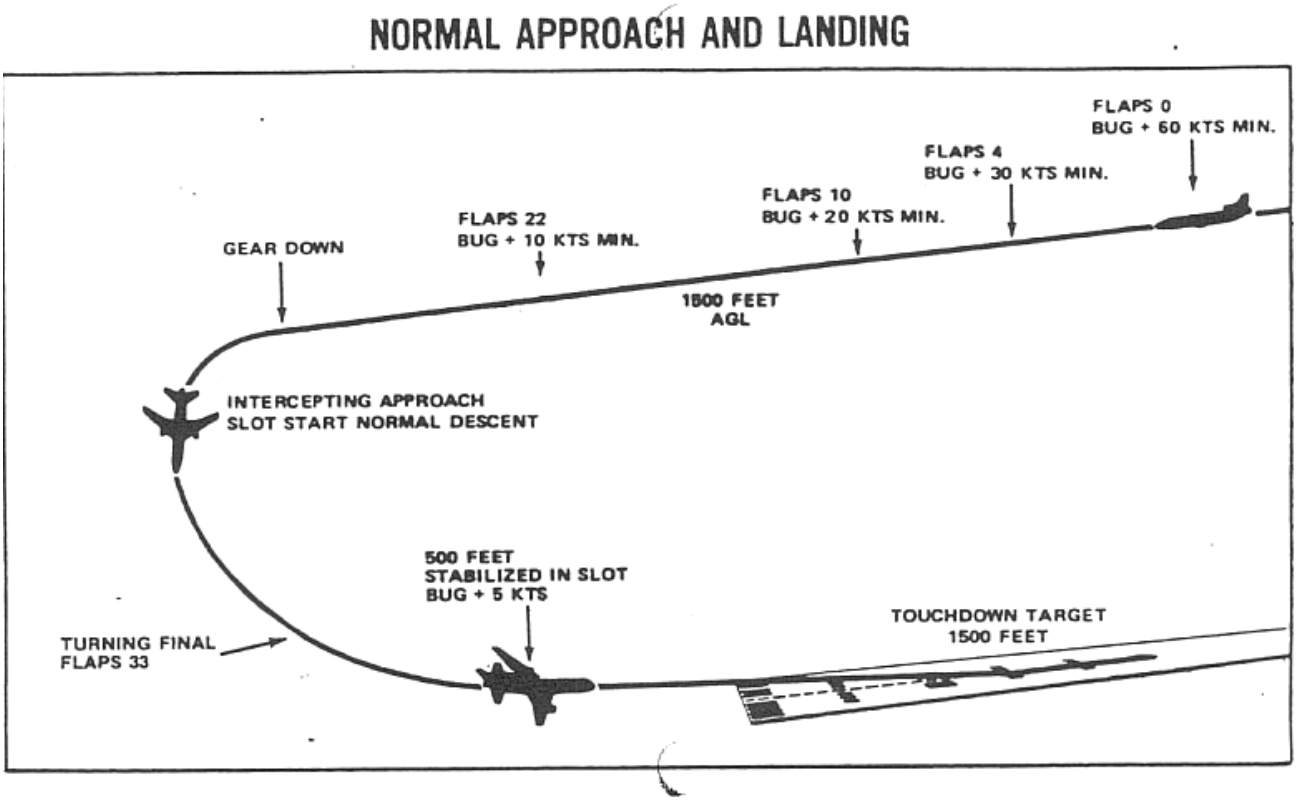
Immediately after the main gear touches down, observe autospoiler operation and raise the reverse levers to the interlock position while lowering the nose wheel onto the runway. As soon as the nose wheel touches down, apply full reverse thrust. Apply forward pressure on the yoke.

Braking effectiveness is reduced when landing on a wet or slippery runway if brakes are applied before wheel spin-up. Therefore, delaying application of brakes until at or below 100 knots improves stopping capability. Spoilers and reverse thrust provide the most effective deceleration forces in the higher speed regime.

Do not use nose wheel steering above 80 knots.

At 80 knots, gradually reduce reverse thrust so as to approach reverse idle by 60 knots. Hold steady brake pressure until the aircraft has slowed to a safe taxi speed.

1011 Normal Approach and Landing



Minimum maneuvering speeds are the bug plus speeds for the appropriate flaps.

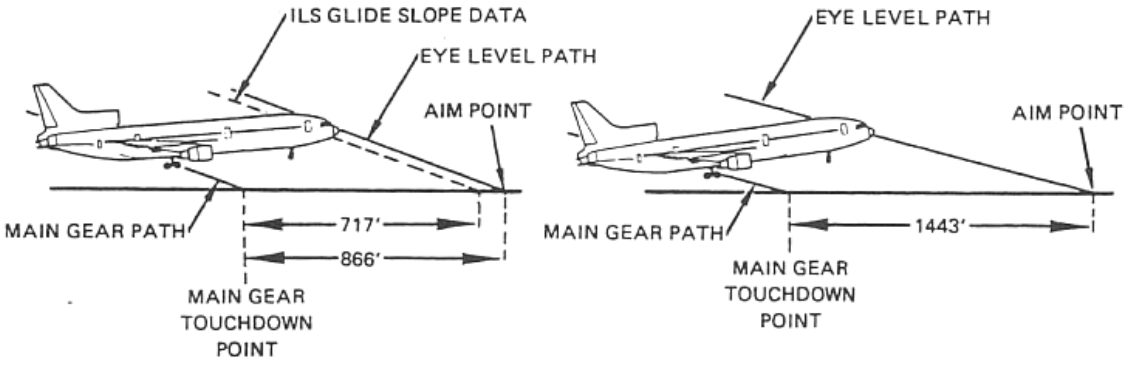
Below 500 feet, if any significant departure from the normal approach path occurs, and corrective action is not immediately effective, a go-around should be executed.

Normal pitch attitude on final approach is approximately 7 degrees, based on a 3 degree glide slope.

1011 Approach and Landing Geometry

APPROACH AND LANDING GEOMETRY

GROSS WEIGHT 358,000 LBS
FLAPS 33 (DLC OPERATIVE)

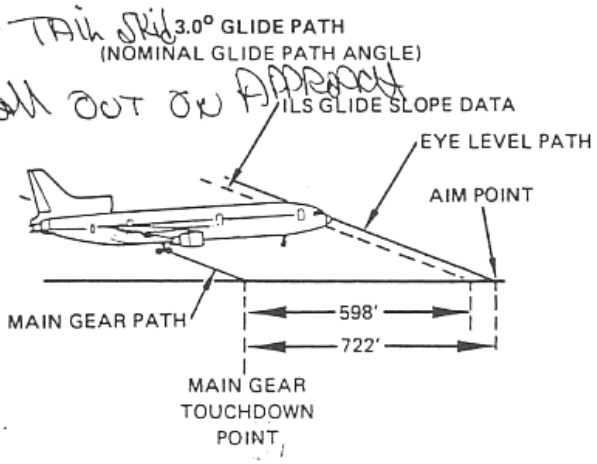


RUNWAY THRESHOLD HEIGHT DATA

GLIDE PATH, DEGREES	BODY ATTITUDE, DEGREES	THRESHOLD CLEARANCE – FEET EYE LEVEL AIM POINT					
		1000 FT		1500 FT		2000 FT	
		EYE LEVEL	GEAR	EYE LEVEL	GEAR	EYE LEVEL	GEAR
1.5	8.7	26.2	(–)11.6	39.3	1.5	52.4	14.6
2.5	7.7	43.7	5.9	65.5	27.7	87.3	49.5
3.0	7.2	52.4	14.6	78.6	40.8	104.8	67.0
3.5	6.7	61.2	23.4	91.7	53.9	122.3	84.5

12'6 to 13° Get TAIL SKID

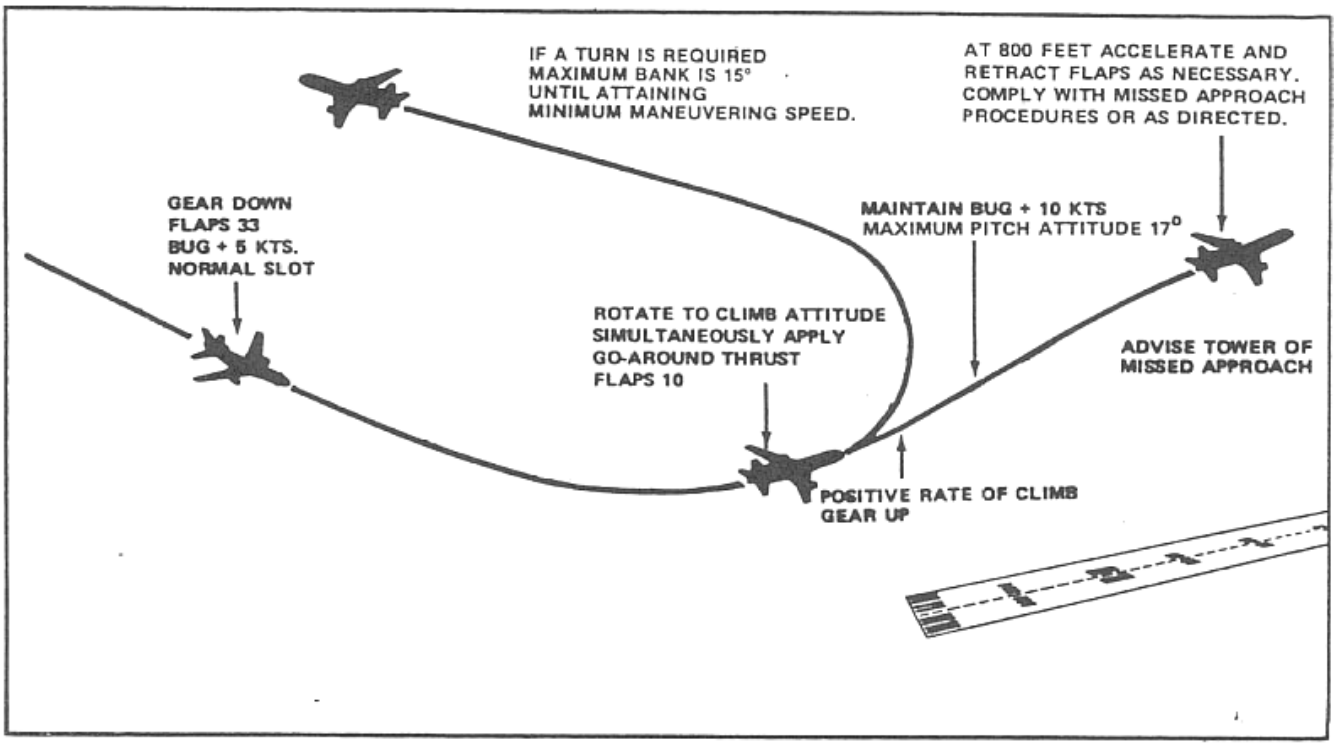
10° Attitude Call Out On Approach



Crosswind Landing Technique
Maintain the crab angle until approximately 150 feet above the touchdown zone. At this time, apply rudder to align the aircraft with the runway and lower the upwind wing as necessary to maintain center line. As the upwind gear touches down, maintain aileron deflection until both the downwind gear and nose gear are on the runway.

1011 Go-Around – Basic

GO-AROUND - BASIC

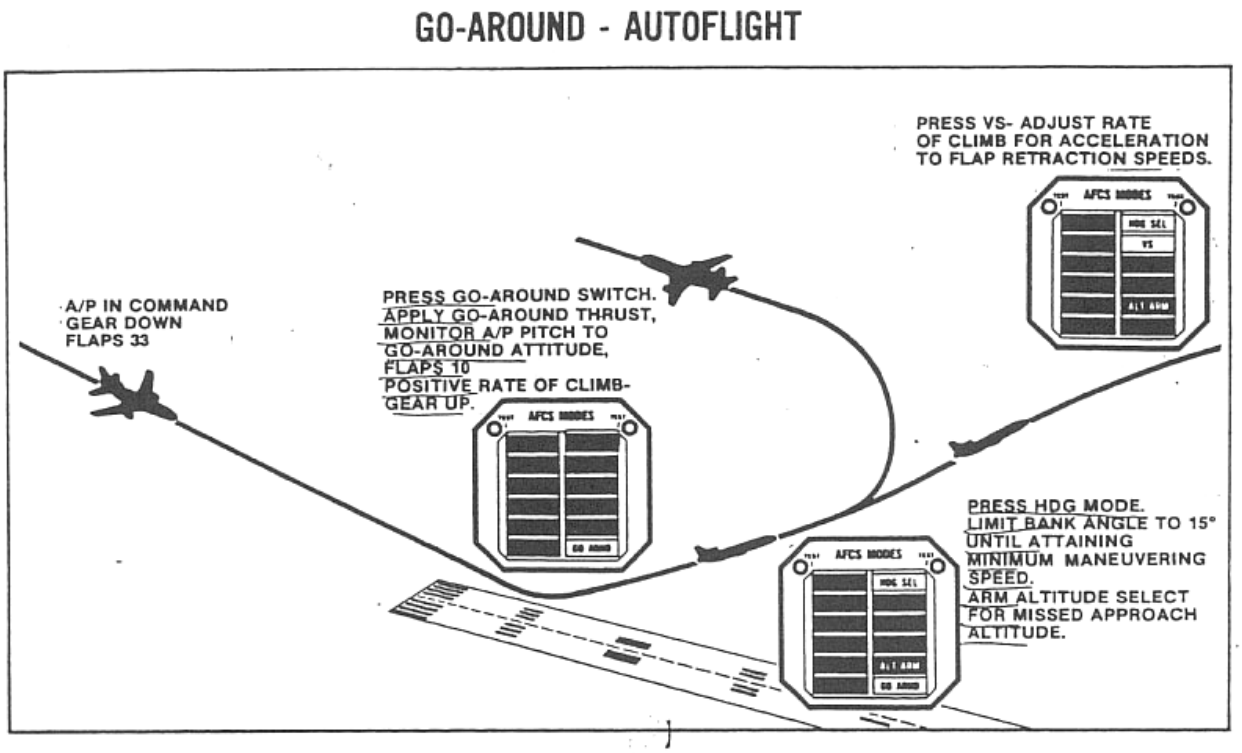


FLAP RETRACTION SCHEDULE	
FLAPS	SPEED
10 TO 4	BUG + 30
4 TO 0	BUG + 60

MINIMUM MANUVERING SPEED	
FLAPS	SPEED
0	V_{ref} + 60
4	V_{ref} + 30
10	V_{ref} + 20

If a go-around is initiated with an engine inoperative, coordinate rudder with thrust application. At 800 feet, shallow climb and retract flaps as necessary while accelerating to appropriate speed.

1011 Go-Around – Autoflight



FLAP RETRACTION SCHEDULE	
FLAPS	SPEED
10 TO 4	BUG + 30
4 TO 0	BUG + 60

Go-around mode is available with a flight director or an autopilot engaged in CMD and flaps 33.

Autoflight status must be confirmed and progress monitored by observing the AFCS modes annunciators.