Jet MD-81

Technical Description and Flight Operation

ELITE® Jet v8

The aircraft simulated by ELITE Jet represents the **well known civil airliner MD-81.**

The instrumentation of the cockpit represents all standard instruments. Only the captain's side of the cockpit is represented for the navigation instruments. In a real cockpit, the same navigation and flight instruments are installed on each side.

The performance characteristics and behavior of ELITE Jet exactly matches those of the simulated aircraft. Also flight envelope and aerodynamic characteristics exactly match those of the real plane.

ELITE Jet provides for the use of a flight director and autopilot. The autopilot is a replica of the full digital autopilot found in the simulated airliner. The autopilot's functions and modes represent the actual state of the art of a first generation full digital autopilot.

ELITE Jet supports all instrument procedures including non-precision approaches (NDB, VOR, localizer, and backcourse) and precision approaches (ILS) up to cat 3 which means an automatic landing with no decision height and RVR of 150 ft. The only notable exception is the GCA (talk down) approach, which is rarely used in civil aviation.

All instruments are displayed on the screen and behave exactly like their real counterparts. Instrument scanning and handling may thus be exercised in the same way as in the aircraft. Proper and valuable navigation training can only be achieved with a training device which exactly represents the real cockpit.

Genuine navigation instruments with rotating compass cards are indispensable for a professional training tool and cannot be replaced by digital readouts such as found on other PC-based flight simulators.

ELITE Jet's engine instruments have been improved. There is one indication for each engine. The purpose of this version of ELITE Jet is navigation, orientation in space, and handling of jet performance characteristics including the flight guidance system. It is not intended for teaching people how to solve technical problems like in the real simulator. For this reason, this simplified layout of the engine instruments panel is wholly adequate.

Due to the complexity of the Jet aircraft all instruments are following explained in detail.

Please read the functional overview …

FLIGHT & NAVIGATION

ATTITUDE DIRECTOR INDICATOR

ATTITUDE DIRECTOR INDICATOR

The Attitude Director Indicator (ADI) is the most important instrument in the cockpit for instrument flying. ELITE Jet has a standard ADI. For attitude reference, an integrated scale is provided with a mark every 5˚ through the first 20˚ and a larger mark and degree indication every other 10˚ through 40˚. This scale represents the aircraft nose up (ANU) or aircraft nose down (AND). At the top of the ADI there is a small yellow triangle called the skypointer that is used for bank angle reference.

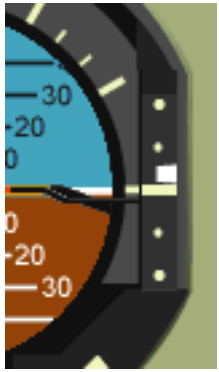
LOCALIZER

Localizer:
Below the ADI there is a repeater of the localizer deflection called the expanded localizer. Its sensitivity is three times higher than the normal localizer representation.

GLIDESLOPE

Glideslope:

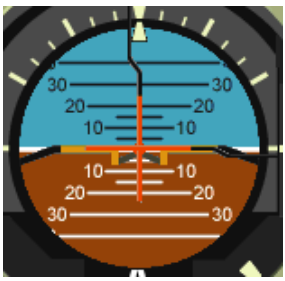
There is a glideslope repeater displayed on the ADI which will be on the left side when using the V-bar type flight director and will be on the right side when using the Cross-bar type flight director.

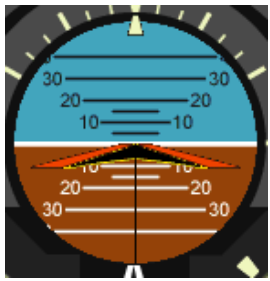


FLIGHT DIRECTOR BARS

Flight Director Bars:

The flight director bars are superimposed on the ADI. Two types of flight director bar representations are available in the ELITE Jet program. The Cross-bar type is represented by two orange bars arranged perpendicular to one another intersecting at or near the middle of the ADI, depending upon flight condition. The V-bar type is represented by a shallow inverted 'V' that lies on, or nearly on, the triangular aircraft symbol, also depending upon flight condition.





SPEED POINTER

Speed Pointer:

The pointer on the left is the fast/slow gauge that indicates toward the desired speed value set into the SPD/MACH window. The SPD/MACH window is located on the left side of the Flight Guidance Panel in the autothrottle panel. The speed pointer is located on the left of the ADI when configured for the Cross-bar flight director and on the right side of the ADI when configured for the V-bar flight director.

HORIZONTAL SITUATION INDICATOR

HORIZONTAL SITUATION INDICATOR

The Horizontal Situation Indicator (HSI) is a multi-function display for orientation with heading, VOR, LOC, ILS and NDB. It operates like a standard gyro-compass with heading graduations every 30˚ and cardinal points indicated by N, E, S, and W.

Course Pointer:
The main needle is the yellow course pointer and works in conjunction with NAV1. A digital repeater for the needle position is located at the top of the instrument panel above the knob labeled CRS. The CRS knob sets the position of the course pointer.

COURSE POINTER

Deviation Bar:
The deviation bar indicates the difference in position between the selected course and the current position of the aircraft relative to that course.

DEVIATION BAR

Heading bug:
The heading bug on the HSI is controlled by the HDG knob located near the center of the Flight Guidance Panel.

HEADING BUG

ADF INDICATORS

ADF Indicators:
The red #1 ADF indicator and the green #2 ADF indicator automatically point to the station whose frequency is set into their respective ADF radios. The ADF needles will default to the three o'clock position if no signal is received.

GLIDESLOPE INDICATOR

Glideslope Indicator:
The primary glideslope indicator display is located in the HSI. When NAV1 is tuned to an ILS frequency and the aircraft is within the glideslope coverage area the indicator will show the position of the aircraft relative to the glideslope. The glideslope indicator will appear on the right side of the HSI when using the Cross-bar type flight director and will be on the left side when using the V-bar type flight director.

Limits -The amber BELOW G/S light will illuminate if during an ILS approach the aircraft is allowed to fly below the glideslope and a full indicator deviation is displayed.

FLAGS

Flags:
There are two flags on the HSI. The first is the NAV flag, appearing inside the compass rose, which signifies inadequate NAV1 reception. The second flag appears on the glideslope indicator and denotes lack of glideslope signal.

DME:
DME for each NAV is displayed in the upper corners of the HSI with DME for NAV1 on the left and DME for NAV2 on the right.

DME

AIRSPEED INDICATOR

The Airspeed Indicator (ASI) is located just left of the ADI. It works as a standard air speed indicator, but all information is coming from the air data computer.

AIRSPEED INDICATOR

The airspeed needle shows the indicated airspeed (IAS). The scale reads from 60 knots (kts) up to 450 kts.

Barberpole:
The red and white barberpole shows the maximum speed allowed. The position of this maximum speed will change during flight. The position of the barberpole will trend toward a slower speed at higher altitudes.

BARBERPOLE

MACH

MACH:
The MACH speed of the aircraft is displayed digitally on the ASI.

Limits - When the airspeed is allowed to get too slow the stall warning horn will sound and the red stall warning light will illuminate in the upper left hand corner of the instrument panel.

SPEED POINTER

Speed Pointer:
The ASI contains a small red pointer located on the speed scale. It is this speed/mach pointer that can be set with the IAS/Mach select rotary dial located on the Flight Guidance Panel. Turning this bug gives the pilot a speed reminder when flying manually.

ALTIMETER

The Altimeter (ALT) is computer corrected. It receives all information from the air data computer (ADC). The altitude display is in feet of elevation above sea level with the correct altimeter reporting station, QNH, set. Use a QNE altimeter setting of 29.92"Hg, or 1,013 millibars (mb), for altitudes above 18,000 feet.

The main needle of the instrument indicates hundreds of feet. One full rotation corresponds to 1,000 feet. The exact altitude can be read digitally inside the instrument.
The orange bug on the ALT is controlled by the knob in the lower right corner of the instrument and serves merely as reminder to the pilot.

Below the center of the ALT are two windows. They represent the actual altimeter setting in inches of mercury (“Hg), or mb. Both indications are coupled and will move together by turning the knob located in the bottom left corner.

RADAR ALTIMETER

RADAR ALTIMETER

The RADAR Altimeter serves as the main instrument for the determination of the minimum decision height during a precision approach. The indication is the exact height, or absolute altitude, of the main landing gear above the ground. The scale moves vertically. The aircraft reference symbol is situated halfway up the instrument on the right-hand side.

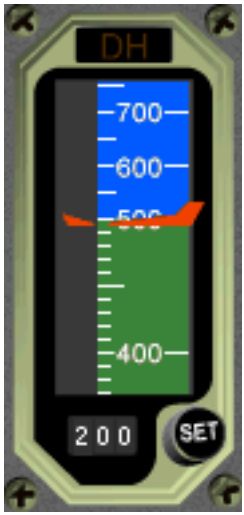
DECISION HEIGHT

Decision Height:

At the bottom of the RADAR Altimeter is a setting knob and associated window. The knob allows the user to set a Decision Height (DH) reference bug and the window indicates the exact bug value.

As the aircraft approaches the DH an audio warning will sound at 50 ft above the minimum altitude. The tone will increase in pitch until reaching DH whereupon the sound stops. An amber DH light will illuminate at the top of the instrument when passing through DH as set by the bug.

The indication range of the RADAR Altimeter is from 0 to 2,500 ft. At altitudes above 2,500 ft there is no indication. The scale will appear blue when descending below 2,500 ft. The scale expands for greater accuracy when flying at 1,000 ft or below. At 500 ft the scale changes to green and is further expanded for greater accuracy.



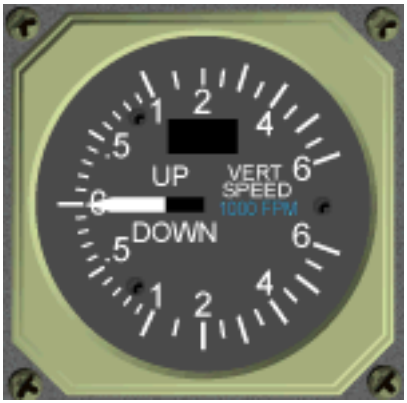
Limits - Below 2,450 ft radio altitude the terrain warning may sound along with illumination of the red TERRAIN warning light if any of the following conditions are met:

- ➟ Excessive descent rate
- ➟ Excessive terrain closure rate
- ➟ Altitude loss after takeoff or go-around
- ➟ Terrain clearance while not in the landing configuration
- ➟ Descent below glideslope

VERTICAL SPEED INDICATOR

VERTICAL SPEED INDICATOR

The graduations on the Vertical Speed Indicator (VSI) are depicted in thousands of feet per minute. The VSI in the ELITE Jet does not indicate instantaneous vertical movements; therefore it is not an instantaneous vertical speed indicator (IVSI).



RADIO NAVIGATION RECEIVERS

VHF NAVIGATION RADIOS

The navigation package is comprised of two separate VOR / LOC / ILS radios and two ADF radios.

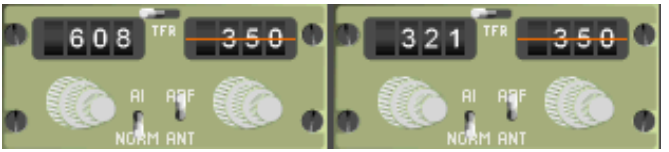
Setting a frequency on one of the VHF nav radios is a direct action with no standby mode. The VHF radio on the left side is tied to the HSI and the #1 needle on the RMI. The VHF radio on the right side only drives the #2 needle of the RMI.

Use the toggles labeled VOR on the switch panel located to the left of the RMI to identify VHF radios. DME identification is simultaneously emitted if available.

ADF

ADF

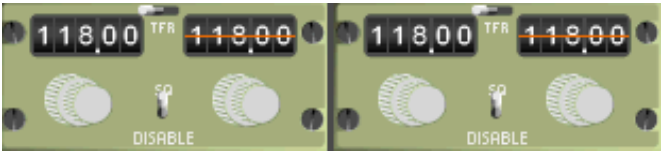
The two ADF radios are located below the VHF Comm radios. Each ADF radio has an active and standby mode. Frequencies may be tuned in either mode. The radio in standby mode has a red line covering the frequency display. Transfer between active and standby frequencies by using the TFR toggle.



VHF COMM

VHF COMM

The ELITE Jet has two VHF Comm radios that, although non-functional, may be used for practice purposes. However, tuning the VHF Comm radio to an ATIS frequency will display the current ATIS report at the top of the screen.



RMI

The RMI, like the HSI, has a rotating card that is slaved to the aircraft's compass and therefore shows the heading being flown at all times. The RMI has two needles: one thin needle and one double-sided needle. The thinner needle corresponds to NAV1 and the double-sided needle to NAV2. When NAV1 is tuned to a LOC / ILS frequency, or when either NAV radio is tuned to a station not receiving a signal, the needles will default to parked position. The NAV1 needle defaults to the nine o'clock position and the NAV2 needle defaults to the three o'clock position.

RMI

ENGINE INSTRUMENTS

There are four specific instruments relating to engine operation: EPR, N1, N2 and EGT gauges.

ENGINE PRESSURE RATIO

ENGINE PRESSURE RATIO

The Engine Pressure Ratio (EPR) gauges indicate the ratio of turbine discharge pressure to engine inlet pressure. The pointer on the gauge indicates the maximum allowable EPR setting as calculated by the Thrust Rate Computer (TRC).

Limits - Do NOT exceed the EPR bug value as this represents the maximum calculated by the TRC.

REVERSE

Reverse:

When the throttle levers are pulled back beyond the flight idle position the amber reverse unlock (REV UNL) lights will illuminate followed by the blue engine reverse (ENG REV) lights.

N1

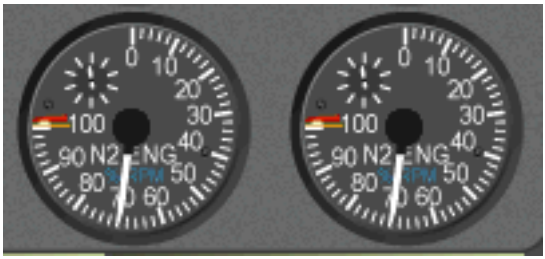
The N1 gauge indicates as a percentage the rotational speed of the low-pressure, or N1, compressor.

Limits - Maximum N1 for take off: 99.2%.

N2

The N2 gauge, like the N1 gauge, indicates the rotational speed of the high-pressure, or N2, compressor.

Limits - Maximum N2 for take off: 101%

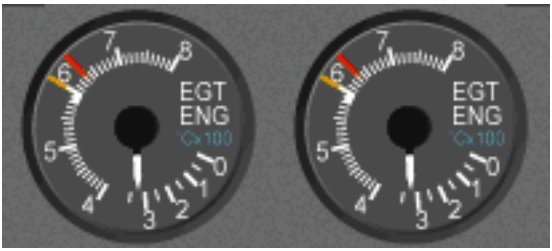


EXHAUST TEMPERATURE GAUGE

EXHAUST TEMPERATURE GAUGE

The Exhaust Gas Temperature (EGT) gauge indicates the average temperature of the engine exhaust gases.

Limits - Maximum for;
Take off: 570˚
Climb: 530˚
Cruise: 505˚



FUEL AND GROSS WEIGHT

FUEL & GROSS WEIGHT

The fuel quantity and gross weight indicator displays the current fuel load and aircraft gross weight. Fuel consumption is dependent upon aircraft gross weight and altitude. The average fuel consumption is approximately 2,800 kg (6,174 lbs) per hour. An alarm will sound when the fuel level goes below 1,000 kg and a message stating FUEL LOW will appear in the upper right hand corner of the monitor. The weights are displayed in either units of kilograms or pounds.

FLAPS / LANDING GEAR / SPEEDBREAKS

FLAPS / SLATS

The Jet is equipped with a lift augmentation system incorporating both flaps and slats. The needle on the Flap indicator points to a position on the gauge corresponding to the degree of flaps selected. It also has a window to numerically display the setting chosen. The following settings are possible:

CLEAN	No flaps or slats set
0	Flaps retracted, slats in takeoff position
7	Flaps 7˚, slats in takeoff position
15	Flaps 15˚, slats in takeoff position
28	Flaps 28˚, slats in landing position
40	Flaps 40˚, slats in landing position

Limits -	*Flap setting*	*Speed limit*
	0	*280 kts*
	7	*280 kts*
	15	*240 kts*
	28	*195 kts*
	40	*195 kts*

Several warning sounds are associated with incorrect use of the Flap / Slat system. A warning will sound if any of the following situations occur:

- ➟ If takeoff power is set without a correct flap setting selected.
- ➟ In case of flap/slat over speed.
- ➟ If flap setting is greater than 28˚ without the landing gear down and locked.
- ➟ If speedbrakes are used with any flap/slat setting.

To the right of the FLAP / SLAT indicator is a bank of four vertically arranged lights labeled SLAT. During flap/slat extension and retraction these lights will flash through a predetermined sequence but the TAKEOFF light will remain on in the 0˚, 7˚ and 15˚ positions. The LAND light will remain on in the 28˚ and 40˚ positions.

LANDING GEAR

LANDING GEAR

The landing gear indicator consists of three lights labeled LEFT, NOSE and RIGHT; and a fourth light labeled GEAR DOOR OPEN located to the left of the first three. The three lights indicate green when that landing gear is down and locked, red while in transit and neutral gray when stowed during flight. The fourth light is amber and appears bright amber while any gear door is open or in transit.

Limits -
Maximum speed for retraction: 240 kts
Maximum speed for extension:300 kts

Alarms associated with landing gear use:

- Landing gear not extended when flaps are set to 28˚ or more.
- Landing gear is in UP position with throttle low EPR range (= 1.3 EPR) with a radio altitude below 1,200 feet and speed below 210 kts.
- Landing gear in DOWN position and speed above 300 kts.

A GEAR OVERSPEED warning will appear in the upper right corner of the monitor if 300 kts is exceeded.

SPEEDBRAKE

Limits -There is no maximum speed limit for deployment of the speedbrakes.

With slats extended the minimum speed for speedbrake operation is 200 kts.

Alarms associated with speedbrake use:

➟ Speedbrake use with flaps extended.
➟ Speedbrake use when setting takeoff power.

A Speedbrake Extended message will appear in the upper right corner of the monitor if the speedbrakes are extended in flight with flaps selected or if the spoilers are extended while on the ground with takeoff power set.

AUTOMATIC FLIGHT INSTRUMENTS

The ELITE Jet is equipped with a full digital flight guidance system and autothrottle.

FLIGHT MODE ANNUNCIATOR

FMA

The Flight Mode Annunciator (FMA) is located just above the landing gear indicators and consists of four windows that display information pertaining to the status of the aircraft's automatic systems and alerts the pilot to certain changes. The left window is the autothrottle window and the three remaining windows belong to the autopilot. The left-center is the 'arm' window, the right-center is the roll window and the right window is the pitch window. Each window is independent.

There are two types of indications presented by the FMA:

Primary modes - actuated by selection of a respective mode button, such as EPR LIM and SPD SEL; and *Secondary modes* - automatically engaged as a function of autopilot logic, such as CLMP and RETD.

AUTOTHROTTLE

The autothrottle (AT) panel is co-located with the AUTO THROT engage switch on the left side of the Flight Guidance Panel. AUTO THROT is a simple ON/OFF switch and will engage in the mode that has been pre-selected. Speeds or MACH numbers are selected at the AT panel by using the SPD/MACH knob.

TRC:

The Thrust Rate Computer (TRC) calculates the appropriate maximum setting of EPR depending upon the mode selected on the Thrust Rate Indicator (TRI) panel and atmospheric parameters such as Static Air Temperature (SAT) and Ram Air Temperature (RAT). The RAT is displayed on the TRI panel above the digital EPR LIM. The TRC sets the reference bug on the EPR gauges as well as the digital EPR LIM value on the TRI. The SAT is displayed along with the TAS readout on a separate unit to the right of the VSI.

TRI

TRI:

The TRI is located to the left of the EPR gauges and functions as the EPR controller for various modes of flight. EPR settings for takeoff (TO), maximum continuous thrust (MCT), climb (CL), cruise (CR) and go around (GA) are selected simply by pressing the appropriate button. The TO FLX function is not available in the ELITE Jet.

SPEED SELECT

SPD SEL:

The speed select (SPD SEL) button engages the AT and will cause the aircraft to seek the selected speed. If the speed selected is within the correct speed range the left window of the FMA will display SPD XXX, where XXX is the desired speed.

MACH SELECT

MACH SEL:

The MACH select (MACH SEL) button engages the AT and will cause the aircraft to seek the selected MACH number. MACH XXX will be displayed when the MACH number chosen is within the correct speed range.

To switch between SPD SEL and MACH SEL modes simply press the SPD/MACH knob to affect the desired scale, dial in the chosen value and then press the corresponding button on the AT panel.

EPR LIM:

EPR LIMIT

Choosing the EPR limit (EPR LIM) button will cause the aircraft to fly at the highest EPR setting available as calculated by the TRC according to the TRI mode selection. The left window of the FMA will indicate EPR MCT, EPR CL, EPR CR or EPR GA depending upon the mode selected. Selecting EPR LIM in TO mode will cause the FMA window to display CLMP.

TOGA:

TOGA

Located at the bottom of the Instrument screen is the Takeoff / Go Around (TOGA) button. This component has a dual purpose. It will activate the Go Around procedure in flight if the autopilot is engaged and will drive the flight director accordingly if the autopilot is disengaged.

Use of the TOGA button with flaps less than 28˚ will cause the TRI to switch to GA mode and activate the EPR LIM on the AT panel causing EPR GA to appear on the FMA. The autopilot will then switch off forcing the procedure to be flown manually.

FMA SPEED MODES

Use of the TOGA button where the flap setting is ≥28˚ will have the same affect as above, but the autopilot will remain engaged.

Secondary FMA speed modes:
The following are secondary display messages that will appear in the left window of the FMA:

CLMP - The AT is in clamp mode meaning that power is removed from the autopilot servo. This will occur automatically when the TRI is in TO mode or when incompatible modes are selected between the autopilot and AT. In this case the autopilot will take priority and the AT will revert to CLMP mode.

To disconnect CLMP mode simply press EPR LIM and then select a compatible mode on the autopilot.

RETD - This means the throttles are automatically retarded during the flare while landing. The throttles will go to idle power at 50 feet.

ALFA SPD - This means the AT is in alfa speed mode, which occurs when the selected speed or mach number is below a calculated safe margin above the stall. The alfa speed is affected by configuration.

SPD ATL - This occurs when the AT is in SPD SEL mode and it has set the power to correspond with the EPR LIM position.

MACH ATL - This occurs when the AT is in MACH SEL mode and it has set the power to correspond with the EPR LIM position.

LOW LIM - This occurs when the AT is in SPD or MACH SEL mode and the thrust required is at the minimum possible EPR.

VMO LIM - This occurs when the AT is setting power to maintain a maximum operating speed when the selected speed is higher than the design limit speed for that configuration.

MMO LIM - This occurs when the AT is setting power to maintain a maximum operating Mach number when the selected Mach number is higher than the design Mach limit for that configuration.

FLAP LIM - This means the AT sets power to maintain the maximum flap limit speed for the current configuration if the selected speed or Mach number is higher.

SLAT LIM - This means the AT sets power to maintain the maximum slat limit speed for the current configuration if the selected speed or Mach number is higher. In the last four cases: VMO LIM, MMO LIM, FLAP LIM and SLAT LIM, the AT, operating in either SPD SEL or MACH SEL mode, will automatically set or reduce EPR to keep the speed from exceeding the appropriate limitation. In the case of operating in EPR LIM mode the AUTO THROT will automatically switch OFF and require selection of a lower appropriate speed or Mach number.

AUTOPILOT

AUTOPILOT

The use and functions of the autopilot (AP) and flight director (FD) systems are the same with the exception that in FD-only mode the aircraft must be flown manually. The AP control switch is located on the Flight Guidance Panel on the right side next to the ALT set knob.

FMA

FMA:

All AP mode selections and changes are displayed on the right three windows of the FMA. The left-center window is the ARM or PRESELECT window; the right-center window is the ROLL channel window and the right window is the PITCH channel window. An active mode is displayed in green and an armed mode is displayed in orange.

FLIGHT DIRECTOR

Flight Director:

The FD switch is located on the Flight Guidance Panel to the left of the AT panel and is labeled FD/OFF. In FD mode the command bars will be present on the HSI. The FD does not have to be engaged when using the AP.

AP Pitch Channel:
All AP pitch commands are directed from the Flight Guidance Panel.

AP PITCH CHANNEL

ALT HLD:
Pressing the ALT HLD button will direct the AP to maintain the altitude present at the time of engagement and will direct the FD command bars accordingly if they are being used. Pressing ALT HLD while in another pitch control mode such as IAS, MACH or VERT SPD will have the same affect as described above. However, pressing ALT HLD while in LOC TRK or GS TRK mode while executing an instrument approach will cause the AP to revert to basic modes of HDG HLD and VERT SPD. To hold altitude the ALT HLD button must be pressed once more.

ALT HLD

VERT SPD:
Pressing the VERT SPD button will initially direct the AP to maintain the existing vertical speed but allows the vertical speed value to be changed by use of the manual thumbwheel. The vertical speed value is displayed above the thumbwheel and indicates a 'V' for vertical speed and a '+' sign for climbing flight and a '–' for descending flight.

VERT SPD

Vertical speed mode is automatically engaged if the pilot moves the thumbwheel out of ALT HLD, ALT CAP, GS CAP, GS TRK or TAK OFF mode.

VERT SPD disengages when another pitch mode is selected, upon capture of glideslope or when a pre-selected (armed) altitude is reached.

IAS

IAS:
Pressing the IAS button will direct the AP to hold the existing speed. The display above the thumbwheel will indicate 'S' for speed and the speed value present during IAS selection. Turning the thumbwheel will change the speed value in IAS mode. Turning it toward ANU will decrease speed and toward AND will increase speed.

MACH

MACH:
Pressing the MACH button will direct the AP to hold the existing MACH number. The display above the thumbwheel will indicate 'M' for MACH number and the value present during MACH selection. Turning the thumbwheel will change the MACH number value in MACH mode. Turning it toward ANU will cause a decrease in MACH number and toward AND will cause an increase in MACH number.

MACH and IAS modes will automatically disengage if another pitch mode is selected, when capturing a glideslope or when reaching an armed altitude.

FMA PITCH MODES

Secondary FMA pitch modes:
The following are secondary display messages that will appear in the right window of the FMA:

TAK OFF - This indicates the condition of the pitch channel for take off when the TOGA button has been pressed. After takeoff the FD command bars will display pitch commands to maintain V2 +10 kts.

G/S CAP - This indicates the AP / FD has captured the glideslope. This occurs when ILS or LND have been selected on the Flight Guidance Panel.

G/S TRK - This indicates the AP / FD is tracking the glideslope. This occurs after G/S CAP parameters are stabilized.

GO RND - This means the go around mode has been engaged by pressing the TOGA button.

AUT LND - This indication appears when the AP has been armed for automatic landing and all parameters have been met.

FLAR - This indication appears during an automatic landing at initiation of the flare and occurs at 50 ft.

NO FLAR - This indication appears if the AP is in ILS mode and is still engaged below 100 ft. RADAR altitude. This feature will land the Jet safely but does not provide any help on rollout as in LND mode.

ROL OUT -This appears after an automatic landing and remains on during rollout until the AP has been disengaged.

SPD LOW - This appears during the VERT SPD, TAK OFF or GO RND mode when the speed is too slow and getting close to STALL. It is a passive safety device only.

AP ROLL CHANNEL

AP ROLL CHANNEL

All AP roll or heading commands are directed from the Flight Guidance Panel and all functions associated with lateral command of the aircraft are located between the speed and pitch control sections.

The heading display appears just above the heading (HDG) control knob. Movement of the HDG knob also sets the position of the heading bug on the HSI. Clicking once on the HDG knob with the AP or FD selected will automatically engage the HDG HLD mode on the FMA. If the AP is engaged the aircraft will maintain the current heading.

Clicking twice on the HDG knob will engage the HDG SEL mode whereby movement of the heading bug will automatically cause the aircraft to turn toward the heading bug and seek the bug position.

Co-located with the HDG knob is the Bank Limit Selector. This feature allows for maximum angles of bank of up to 30˚ be selected for flight during all roll modes except VOR track, NAV and LOC capture / track and autoland.

VOR / LOC:
Pressing the VOR / LOC button will arm the AP / FD to capture the localizer or selected VOR radial. The correct frequency and course must first be set on NAV1 for this feature to function correctly.

When setting an ILS frequency, LOC will be displayed in the roll channel window of the FMA. The AP / FD is now armed to intercept, capture and track the localizer.

When setting a VOR frequency, VOR will be displayed in the roll channel window of the FMA. The AP / FD is now armed to intercept and track the selected VOR radial.

VOR / LOC BUTTON

ILS:
Pressing the ILS button will arm the AP / FD to not only capture and track the ILS localizer course, but will also intercept, capture and track the glideslope. The correct frequency and course must first be set on NAV1 for this feature to function correctly.

ILS BUTTON

AUTO LAND:
Pressing the AUTO LAND button will arm the AP for an automatic landing. The correct frequency and course must first be set on NAV1 and NAV2 for this feature to function correctly.

AUTOLAND BUTTON

Secondary FMA roll modes:
The following are secondary display messages that will appear in the right-center window of the FMA:

VOR CAP - This indicates the selected VOR course has been captured.

VOR TRK - This will appear after VOR CAP when the aircraft is well established on the selected VOR radial.

FMA ROLL MODES

VOR CRS - This appears when the aircraft is directly over a VOR station and inside the so-called 'Cone of Confusion'. The aircraft will maintain the existing heading and then recapture the outbound radial.

LOC CAP - This appears when the localizer has been captured out of an armed mode, i.e. VOR / LOC, ILS or AUTO LAND mode.

LOC TRK - This will be displayed after LOC CAP when the aircraft is well established on the LOC course.

TAK OFF - This means that FD take off mode is engaged. After lift off the FD will command the heading of the nose wheel at take off be maintained.

GO RND - This means the go around mode is engaged and will command level flight.

AUT LND - This appears when the AP has been armed for an automatic landing and the necessary parameters have been met.

ALN - This appears during an automatic landing at 145 ft. when the aircraft commences its final alignment with the runway.

ROLL OUT - After a successful automatic landing the roll out mode is engaged, which provides lateral guidance along the runway. This message is displayed until the AP is disengaged.

MISCELLANEOUS

MASTER CAUTION & WARNING

The amber MASTER CAUTION light will illuminate when a condition occurs that requires corrective action. The red MASTER WARNING light will illuminate when a condition occurs that requires immediate action.

LONGITUDINAL TRIM

The trim indicator is located below the marker beacon lights and displays degrees of NOSE down (DN) or NOSE UP longitudinal (LONG) TRIM. The amount of trim indicated is equal to the amount of deflection occurring on the trim tab.

Limits - There are no speed limits associated with trim.

RUDDER TRIM

RUDDER TRIM

Rudder trim functions in a similar fashion as the longitudinal trim system. Its indicator is located below the longitudinal trim indicator and also displays in degrees of deflection. However, the rudder trim indicator displays deflection values left or right of neutral center.

CLOCK

CLOCK

The clock serves two purposes: one, it is a simple two-handed chronometer, which, if set properly to GMT, will keep time in a standard fashion without a sweep hand; and two, it is a stopwatch that is controlled by the white button located at the top right corner of the clock.

Stopwatch:
The stopwatch function of the clock utilizes two narrow hands of different lengths to measure elapsed time. The longer needle measures seconds and the shorter needle measures minutes.

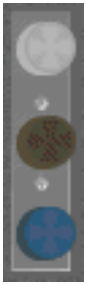
Depending upon the condition of the stopwatch, pressing the white button will have one of several affects: one, it will start needle movement; two, it will stop the needles movement and; three, it will return the needles to the twelve o'clock position.

STOPWATCH

MARKER BEACON LIGHTS

The marker beacon lights will light accordingly when passing a beacon transmitter, however the aural tone may be eliminated by using the toggle switch labeled MKR on the switch panel to the left of the RMI. The white marker beacon light will illuminate when passing either an inner marker or an airway beacon.

MARKER BEACON LIGHTS



FLIGHT GUIDANCE SYSTEM

This chapter will explain the use of the ELITE Jet flight guidance system. This explanation has been deliberately created to be a fairly generic in its content and scope. Please use your own flight operations manual if necessary and make any required procedural changes.

TAKEOFF

TAKEOFF

Prior to takeoff make sure the FD and AP switches are on. Set the initial values for altitude and speed into the flight guidance panel and press the TOGA button.

Following are some basic terms common to the operation of jet aircraft:

V1 -Takeoff decision speed. An engine failure below this speed requires the takeoff be aborted, while an engine failure at, or above, this speed requires the takeoff to be continued.

VR - Rotation speed.

V2 - Takeoff safety speed. After takeoff the flight guidance system will attempt to maintain at least V2 + 10 knots during the initial climb.

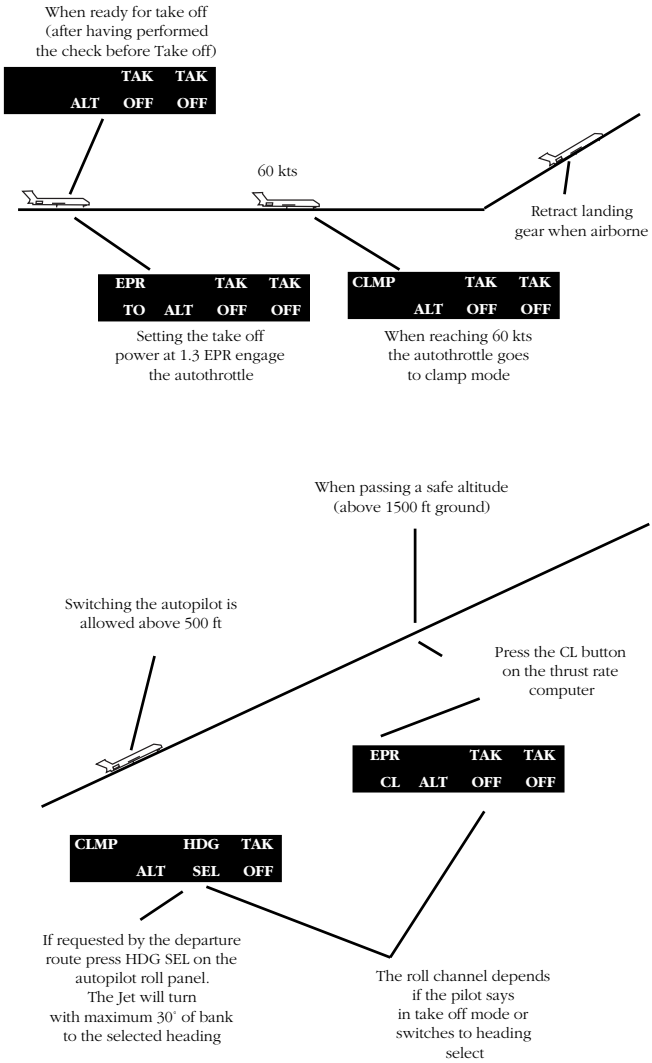
Verify the FMA, it should indicate:

Then set approximately 1.3 EPR and switch the AUTO THROT on.

At 60 kts CLMP will appear on the FMA.

Airborne:

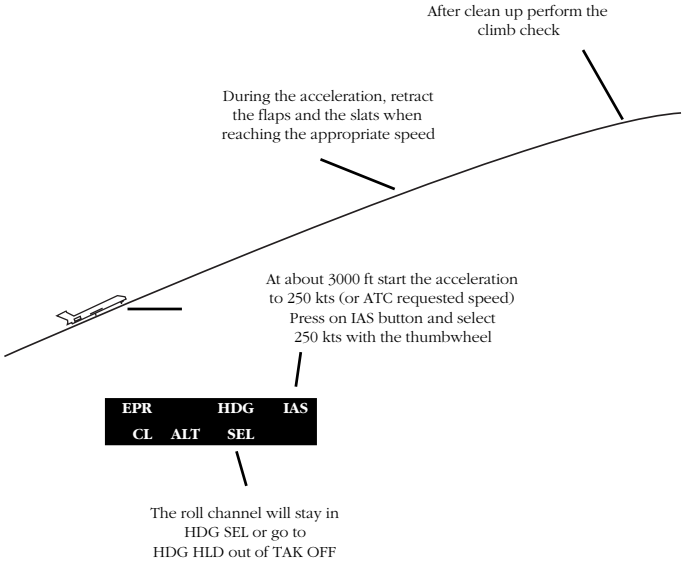
When **airborne** raise the landing gear (check the radio altimeter) accomplished by pressing HDG SEL (preselect the correct initial heading before the take off).



SELECT CL

Select CL:

At 1,500 ft select CL on the thrust rate computer. **The TO thrust is limited to 5 minutes to avoid engine damage.**



ADJUST SPEED

Adjust speed:

At 3,000 ft above ground, **start the acceleration** to 250 kts. Press IAS and adjust the speed with the thumbwheel.

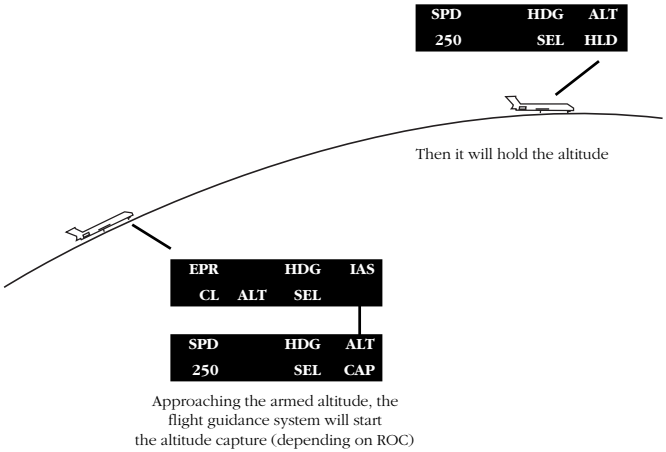
When reaching V_{0flaps}, retract the flaps.

When reaching V_{0slats}, retract the slats.

After the clean up, perform the climb check.

INITIAL LEVEL OFF

Depending on the clearance, continue on QNH or if cleared to a flight level, set 1,013 mb (29.92 inches Hg) on the altimeter.



Approaching the armed altitude, the flight guidance system will start the altitude capture (depending on ROC)

Rate of climb:

Depending on the rate of climb the ELITE Jet will start a level off and indicate ALT CAP, then it will maintain the altitude ALT HLD.

CONTINUATION OF CLIMB AND CRUISING

CONTINUATION OF CLIMB AND CRUISING

If cleared to a new altitude or flight level, first arm the cleared altitude (flight level), then start climbing by using the thumbwheel. The autopilot will then engage in the VERT SPD mode. Wait until the autothrottle has increased the power to the maximum and then set EPR LIM.

CLIMB SPEED

Climb speed:

When EPR LIM is set, press IAS and adjust the optimum climb speed (V_{Climb}) with the thumbwheel.

CHANGE TO MACH

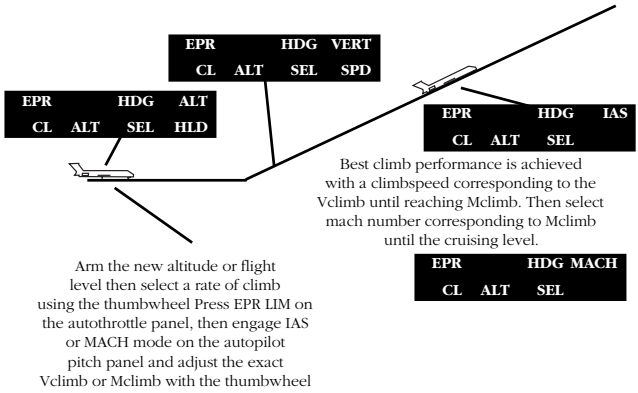
Change to MACH:

As soon as the V_{Climb} equals the M_{Climb}, press MACH and adjust the value of the mach number with the thumbwheel if necessary. Continue the climb until reaching the cruising flight level.

CRUISE SPEED

Cruise speed:

Select the cruise speed 290 kts or mach number 0.78 whichever is lower on the autothrottle panel, using the rotary dial. At altitude capture, ELITE Jet will accelerate to the preselected speed. At cruising level press CR on the thrust rate computer (not compulsory, CL setting is unlimited). In cruise it is possible to fly in HDG SEL, in HDG HLD or VOR TRK on the roll channel of the autopilot.



LEVEL CHANGE, DESCENT

LEVEL CHANGE, DESCENT

When cleared down to another altitude or flight level first ARM the new altitude. If the clearance is down to an altitude, do not forget to change to the local QNH on the altimeter. Perform the check for approach during the descent or before starting it.

Rate of descent:

RATE OF DESCENT

Start the descent using the thumbwheel in VERT SPD. A rate of descent of 3,000 ft/min is a good figure. Let the autothrottle hold the MACH/SPD initially. When you have reached 290 kts, descend at approximately 2,500 ft/min.

Speed:

SPEED

Below 10000 ft reduce to 250 kts (international regulation). FMA in level flight below 10,000 ft:

SPD	HDG	ALT
250	SEL	HLD

If the pilot wants to keep an exact speed, he may let the autopilot do the job either in IAS or in MACH mode.

This will clamp the autothrottle. The autopilot will keep the speed by adjusting its pitch. The pilot can influence the descent rate by setting the power manually . Setting more power will reduce the descent rate.

POINT OF DESCENT

Point of descent:

Calculation of the point of descent (start of descent in idle power) must be made before starting the descent.

ANGLES

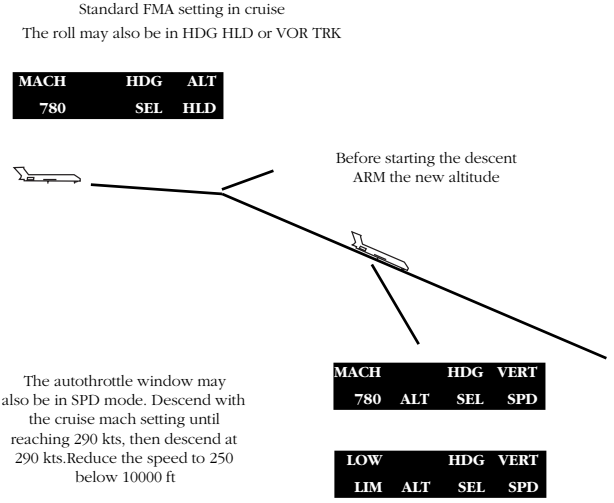
Angles:

ELITE Jet has a descent angle of about 4° in idle above 20,000 ft and then about 3°. These are mean values. The gross weight can have an important influence on that.

SIMPLE RULE

Simple rule:

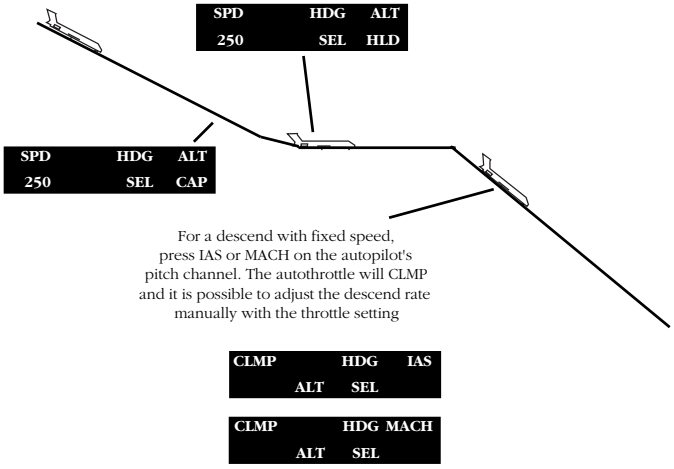
A simple rule is about 4,000 ft altitude loss for 10 NM above 20,000 ft and then about 3,000 ft altitude loss for 10 NM. Do not forget the distance you need to reduce the speed below 250 kts.



Fine corrections:

Monitor the actual altitude and the remaining distance to the landing airport continuously and make all corrections as early as possible.

An ideal descent is performed with idle power with no use of the speed brakes.



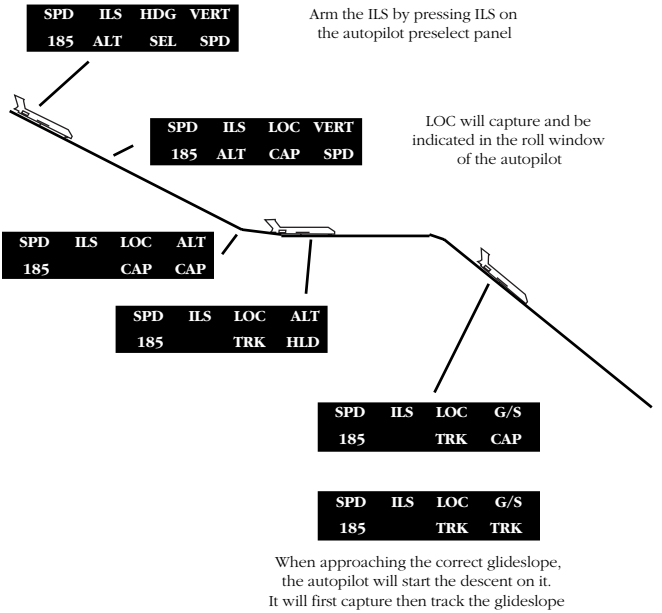
ILS APPROACH

The ILS procedure described below concerns a level off before capturing the glideslope. This is the better balanced procedure. Once properly familiar with ELITE Jet and its descent procedure, it is possible to intercept the ideal glideslope in a continuous descent, this method being more fuel efficient than the method described below.

Intercept:

Once on an intercept heading to the ILS, the ILS can be armed by using the ILS button on the preselect panel of the autopilot. Take a small intercept angle. This intercept angle depends on aircraft speed, wind direc-

tion, wind speed and distance to the threshold. With speeds higher than 200 kts, use maximum 20°. Below 200 kts use 30°. When the localizer starts moving, the autopilot will start the intercept turn and **display LOC CAP**.



Once correctly established, it will track the localizer and **display LOC TRK**. When approaching the glideslope, the autopilot will capture it, start the descent and follows the glideslope. Once properly established the autopilot will track it. **The display will be G/S CAP and then G/S TRK.**

AUTOMATIC TESTS

Automatic tests:

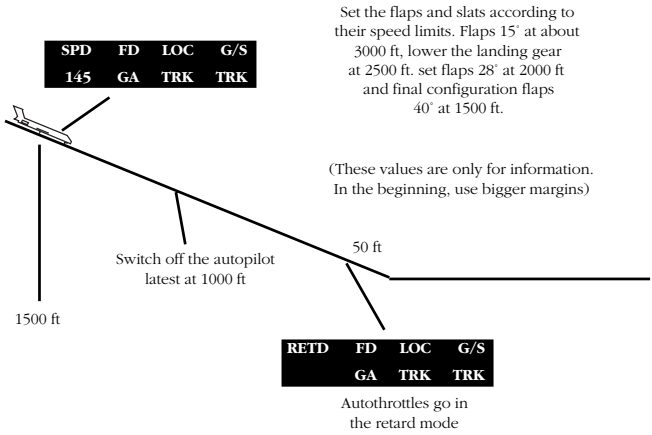
At about 1,500 ft, the flight guidance will perform certain internal tests and will **display FD GA** in the preselect window. When passing the outer marker (blue light associated with a pulsating sound) perform the outer marker check.

Manual landing:

For a manual landing, disconnect the autopilot at 1,000 ft at the latest. Try to follow the flight director signal down to 200 ft and then continue visually. At 50 ft, the throttles will move back automatically for the landing. Autothrottle window **displays RETD**.

Landing:

ELITE Jet considers the landing successful if the descent rate at touch down is less than 1,000 ft/min.



AUTOLAND APPROACH

The initial part of an autoland approach is almost the same as that of the ILS approach. Reduce the speed earlier for autoland than for normal ILS approach. A correct approach tracking on final and a correct landing will only be possible if established early on the ILS.

DECISION HEIGHT

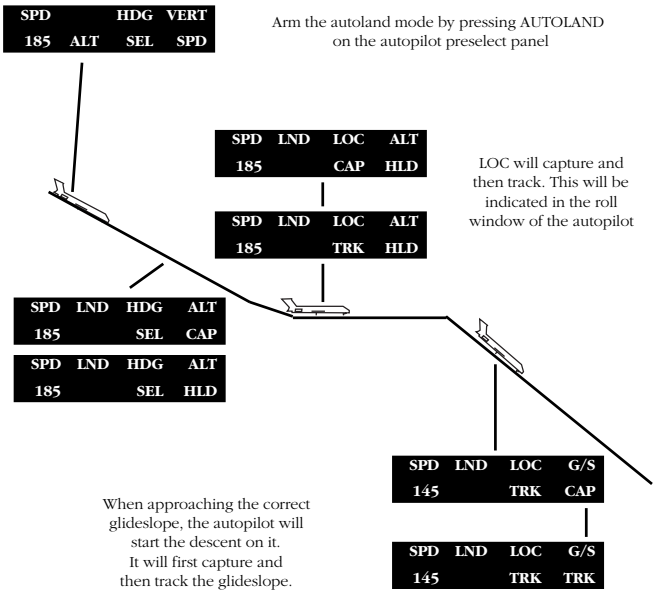
Decision Height:

The decision height and visibility certified for ELITE Jet is 20 ft and 150 meters RVR (runway visual range) respectively.

AUTOLAND

Autoland:

On intercept heading press the Autoland button. **The autopilot must be engaged.**



The sequence of events is then exactly the same as for an ILS approach until reaching 1,500 ft. At 1,500 ft, the autopilot performs a logic and conditions test. If the test is successful, it will then indicate **AUT GA** for the automatic go around and **AUT LND** for autoland.

Note: Both frequencies on Nav1 and Nav2 must indicate the same station including course. If they do not correspond the computer will not allow an Auto Land.

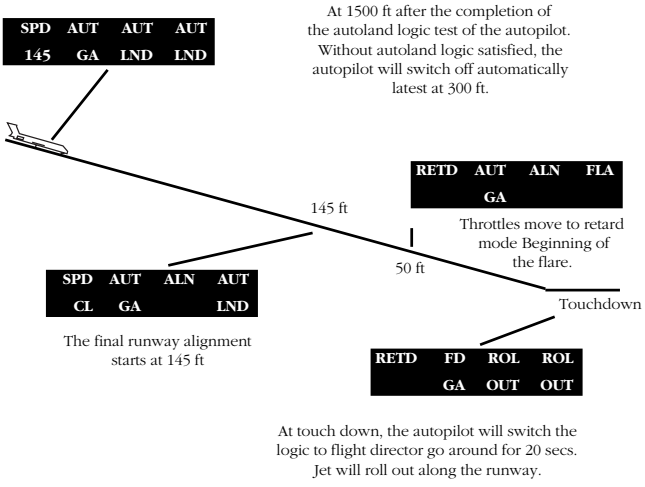
Note

At 145 ft, **ALN** appears in the roll window of the FMA. ELITE Jet starts its final alignment sequence. At 50 ft, the throttles will retard and the flare will start. On the FMA the display will show **RETD** and **FLARE**.

TOUCH DOWN

Touch Down:

After touch down, the autopilot will change to roll mode for the pitch and roll channel. The preselect window will show **FD GA**, which means flight director go around is available. This indication will stay on for 20 seconds.



GO AROUND

GO AROUND

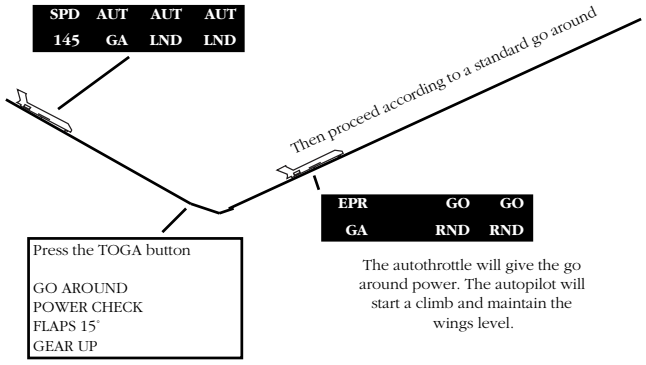
Out of an autoland approach, the go around is very easy to initiate. The pilot only needs to press the TOGA button located below the throttles. ELITE Jet will automatically increase the power, select GA on the thrust rate computer, apply EPR LIM, start a climb with wings level and try to maintain the go around speed V_{GA}

TOGA

TOGA:

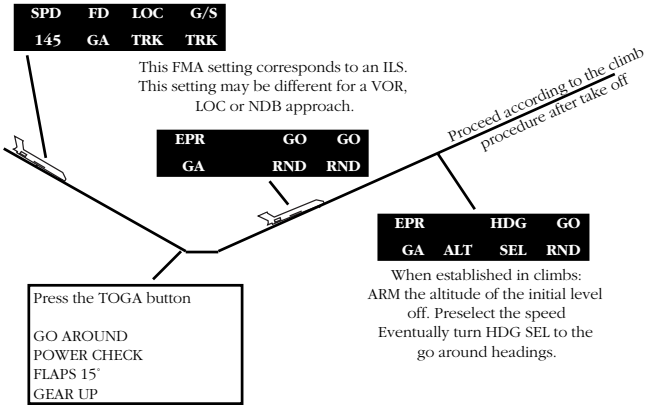
Manipulations to be carried out during the go around maneuver are: press the TOGA, retract the flaps to 15° and raise the landing gear.

Then continue further manipulations according to the normal go around.



Out of an ILS or another type of approach, press the TOGA button. Then if the autopilot is engaged, the manoeuvre sequence will be the same as the automatic go around described for the autoland.

If ELITE Jet is flown manually, follow the flight director bars.



OPERATIONAL LIMITATIONS

MAXIMUM SPEEDS

Maximum speeds

Vmo		340 kts
Mmo		0.84
Gear		300 kts
Slats		280 kts
Flaps	0.1-11	280 kts
	11.1-15	240 kts
	15.1-40	195 kts
Speedbrakes		200 kts min.

WEIGHTS

Weights

Max. ZFW	54,430 kg
(**Z**ero **F**uel **W**eight)	
Max. LW	58,960 kg
(**L**anding **W**eight)	
Max. TOW	67,810 kg
(**T**ake **O**ff **W**eight)	

CHECK BEFORE TAKEOFF

Check before Takeoff

NAV1	SET + CHECKED
NAV2	SET + CHECKED
ADF1	SET + CHECKED
ADF2	SET + CHECKED
Flight Director	ON

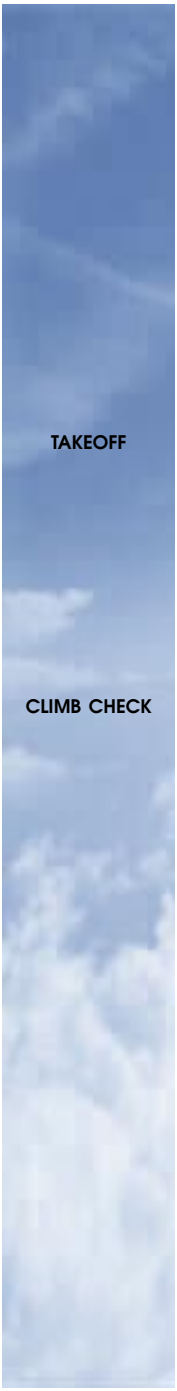
Stabilizer	7° to 9° range
Speed Select	SET
Heading Bug	SET
Altitude Preselect	SET + ARMED
Radio Altimeter	SET 300 ft
Flaps	7° SET
TOGA	PRESS

Take off

Throttle advance to	1.3 EPR (spin up)
Autothrottle	ON

Climb Check

Altimeter	Standard
Flaps, Slats	UP
Landing gear	UP



CHECK FOR APPROACH

Check for Approach

Nav Aids	SET FOR APPROACH
Speed	250 BELOW FL 100
Altimeter	SET QNH
	(when cleared down to an altitude)
Decision altitude	SET (altitude bug)
Decision height	SET (radioaltimeter)

OUTER MARKER CHECK

Outer marker Check

Altitude	CHECKED
Decision Height	RECHECKED
Decision altitude	RECHECKED
Heading	SET FOR GA
Altitude	SET FOR GA

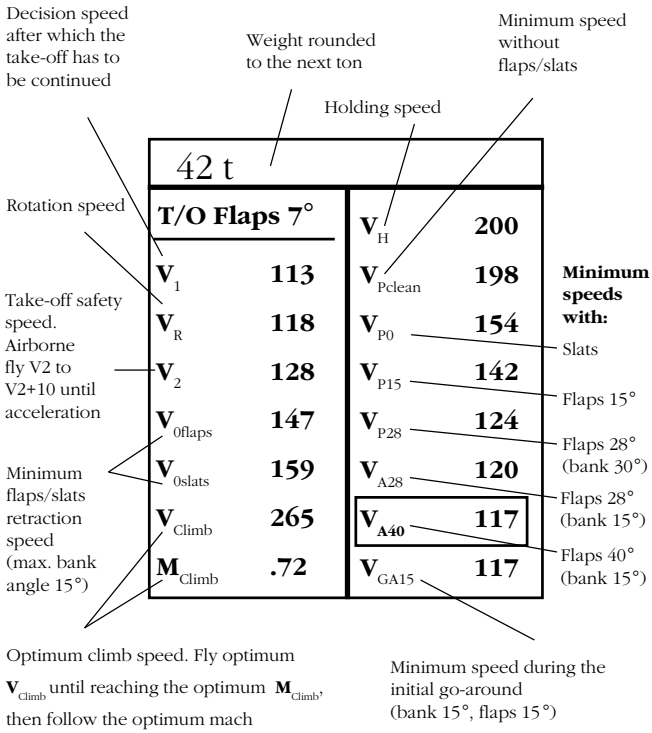
FINAL CHECK

Final Check

Gear	DOWN
Flaps	28° OR 40°
Slats	LAND

Reference Speeds

This section shows the reference speeds used for take-off, approach and landing dependent on aircraft gross weight (rounded up to the next ton).



40 t

T/O Flaps 7°			
V_1	113	V_H	195
V_R	118	V_{Pclean}	193
V_2	128	V_{PO}	151
V_{0flaps}	143	V_{P15}	138
V_{0slats}	155	V_{P28}	121
V_{Climb}	263	V_{A28}	117
M_{Climb}	.72	**V_{A40}**	**114**
		V_{GA15}	116

41 t

T/O Flaps 7°			
V_1	113	V_H	195
V_R	118	V_{Pclean}	195
V_2	128	V_{PO}	153
V_{0flaps}	145	V_{P15}	140
V_{0slats}	157	V_{P28}	122
V_{Climb}	264	V_{A28}	119
M_{Climb}	.72	**V_{A40}**	**115**
		V_{GA15}	116

42 t

T/O Flaps 7º			
V_1	113	V_H	200
V_R	118	V_{Pclean}	198
V_2	128	V_{PO}	154
V_{0flaps}	147	V_{P15}	142
V_{0slats}	159	V_{P28}	124
V_{Climb}	265	V_{A28}	120
M_{Climb}	.72	**V_{A40}**	**117**
		V_{GA15}	117

43 t

T/O Flaps 7º			
V_1	113	V_H	200
V_R	119	V_{Pclean}	200
V_2	128	V_{PO}	156
V_{0flaps}	149	V_{P15}	143
V_{0slats}	161	V_{P28}	125
V_{Climb}	266	V_{A28}	121
M_{Climb}	.72	**V_{A40}**	**118**
		V_{GA15}	118

44 t

T/O Flaps 7°			
V_1	113	V_H	205
V_R	121	V_{Pclean}	202
V_2	129	V_{PO}	158
V_{0flaps}	151	V_{P15}	145
V_{0slats}	162	V_{P28}	127
V_{Climb}	267	V_{A28}	123
M_{Climb}	.72	**V_{A40}**	**119**
		V_{GA15}	119

45 t

T/O Flaps 7°			
V_1	115	V_H	205
V_R	122	V_{Pclean}	205
V_2	131	V_{PO}	160
V_{0flaps}	152	V_{P15}	147
V_{0slats}	164	V_{P28}	128
V_{Climb}	268	V_{A28}	124
M_{Climb}	.72	**V_{A40}**	**120**
		V_{GA15}	120

46 t

T/O Flaps 7º			
V_1	117	V_H	210
V_R	124	V_{Pclean}	207
V_2	132	V_{PO}	161
V_{0flaps}	154	V_{P15}	148
V_{0slats}	166	V_{P28}	130
V_{Climb}	269	V_{A28}	125
M_{Climb}	.72	**V_{A40}**	**121**
		V_{GA15}	121

47 t

T/O Flaps 7º			
V_1	118	V_H	210
V_R	125	V_{Pclean}	209
V_2	134	V_{PO}	163
V_{0flaps}	156	V_{P15}	150
V_{0slats}	168	V_{P28}	131
V_{Climb}	270	V_{A28}	127
M_{Climb}	.72	**V_{A40}**	**123**
		V_{GA15}	123

48 t

T/O Flaps 7°			
V_1	120	V_H	215
V_R	127	V_{Pclean}	211
V_2	135	V_{PO}	165
V_{0flaps}	157	V_{P15}	151
V_{0slats}	170	V_{P28}	132
V_{Climb}	271	V_{A28}	128
M_{Climb}	.72	**V_{A40}**	**124**
		V_{GA15}	124

49 t

T/O Flaps 7°			
V_1	122	V_H	215
V_R	129	V_{Pclean}	213
V_2	137	V_{PO}	167
V_{0flaps}	159	V_{P15}	153
V_{0slats}	172	V_{P28}	133
V_{Climb}	272	V_{A28}	129
M_{Climb}	.72	**V_{A40}**	**125**
		V_{GA15}	125

50 t

T/O Flaps 7º			
V_1	123	V_H	215
V_R	130	V_{Pclean}	215
V_2	138	V_{PO}	168
V_{0flaps}	161	V_{P15}	155
V_{0slats}	173	V_{P28}	135
V_{Climb}	273	V_{A28}	130
M_{Climb}	.74	**V_{A40}**	**126**
		V_{GA15}	126

51 t

T/O Flaps 7º			
V_1	125	V_H	220
V_R	132	V_{Pclean}	217
V_2	140	V_{PO}	170
V_{0flaps}	162	V_{P15}	156
V_{0slats}	175	V_{P28}	136
V_{Climb}	274	V_{A28}	132
M_{Climb}	.74	**V_{A40}**	**127**
		V_{GA15}	127

52 t

T/O Flaps 7°			
V_1	127	V_H	220
V_R	133	V_{Pclean}	220
V_2	141	V_{PO}	172
V_{0flaps}	164	V_{P15}	158
V_{0slats}	176	V_{P28}	138
V_{Climb}	275	V_{A28}	133
M_{Climb}	.74	**V_{A40}**	**129**
		V_{GA15}	129

53 t

T/O Flaps 7°			
V_1	129	V_H	225
V_R	135	V_{Pclean}	222
V_2	143	V_{PO}	174
V_{0flaps}	166	V_{P15}	159
V_{0slats}	178	V_{P28}	139
V_{Climb}	276	V_{A28}	134
M_{Climb}	.74	**V_{A40}**	**130**
		V_{GA15}	130

54 t

T/O Flaps 7°			
V_1	130	V_H	225
V_R	136	V_{Pclean}	224
V_2	144	V_{PO}	175
V_{0flaps}	167	V_{P15}	161
V_{0slats}	180	V_{P28}	140
V_{Climb}	277	V_{A28}	135
M_{Climb}	.74	**V_{A40}**	**131**
		V_{GA15}	131

55 t

T/O Flaps 7°			
V_1	132	V_H	230
V_R	137	V_{Pclean}	226
V_2	145	V_{PO}	177
V_{0flaps}	169	V_{P15}	162
V_{0slats}	182	V_{P28}	142
V_{Climb}	278	V_{A28}	137
M_{Climb}	.74	**V_{A40}**	**132**
		V_{GA15}	132

56 t

T/O Flaps 7°			
V_1	133	V_H	230
V_R	139	V_{Pclean}	228
V_2	146	V_{PO}	178
V_{0flaps}	171	V_{P15}	164
V_{0slats}	183	V_{P28}	143
V_{Climb}	280	V_{A28}	138
M_{Climb}	.74	**V_{A40}**	**133**
		V_{GA15}	133

57 t

T/O Flaps 7°			
V_1	135	V_H	230
V_R	140	V_{Pclean}	230
V_2	148	V_{PO}	180
V_{0flaps}	172	V_{P15}	165
V_{0slats}	185	V_{P28}	144
V_{Climb}	281	V_{A28}	139
M_{Climb}	.74	**V_{A40}**	**134**
		V_{GA15}	134

58 t

T/O Flaps 7º			
V_1	137	V_H	235
V_R	142	V_{Pclean}	232
V_2	149	V_{PO}	181
V_{0flaps}	174	V_{P15}	167
V_{0slats}	186	V_{P28}	146
V_{Climb}	282	V_{A28}	140
M_{Climb}	.74	**V_{A40}**	**136**
		V_{GA15}	137

59 t

T/O Flaps 7º			
V_1	138	V_H	235
V_R	143	V_{Pclean}	234
V_2	150	V_{PO}	183
V_{0flaps}	175	V_{P15}	168
V_{0slats}	188	V_{P28}	147
V_{Climb}	283	V_{A28}	141
M_{Climb}	.74	**V_{A40}**	**137**
		V_{GA15}	137

60 t

T/O Flaps 7°			
V_1	140	V_H	240
V_R	144	V_{Pclean}	236
V_2	152	V_{PO}	185
V_{0flaps}	177	V_{P15}	170
V_{0slats}	190	V_{P28}	148
V_{Climb}	284	V_{A28}	142
M_{Climb}	.74	**V_{A40}**	**138**
		V_{GA15}	138

61 t

T/O Flaps 7°			
V_1	141	V_H	240
V_R	146	V_{Pclean}	238
V_2	153	V_{PO}	186
V_{0flaps}	178	V_{P15}	171
V_{0slats}	191	V_{P28}	149
V_{Climb}	285	V_{A28}	144
M_{Climb}	.74	**V_{A40}**	**139**
		V_{GA15}	139

62 t

T/O Flaps 7º			
V_1	143	V_H	240
V_R	147	V_{Pclean}	240
V_2	154	V_{PO}	188
V_{0flaps}	180	V_{P15}	172
V_{0slats}	193	V_{P28}	150
V_{Climb}	286	V_{A28}	145
M_{Climb}	.74	**V_{A40}**	**140**
		V_{GA15}	140

63 t

T/O Flaps 7º			
V_1	144	V_H	245
V_R	148	V_{Pclean}	242
V_2	156	V_{PO}	189
V_{0flaps}	181	V_{P15}	174
V_{0slats}	194	V_{P28}	152
V_{Climb}	287	V_{A28}	146
M_{Climb}	.74	**V_{A40}**	**141**
		V_{GA15}	141

64 t

T/O Flaps 7°			
V_1	146	V_H	245
V_R	150	V_{Pclean}	244
V_2	157	V_{PO}	191
V_{0flaps}	183	V_{P15}	175
V_{0slats}	196	V_{P28}	153
V_{Climb}	288	V_{A28}	147
M_{Climb}	.74	**V_{A40}**	**142**
		V_{GA15}	142

65 t

T/O Flaps 7°			
V_1	148	V_H	250
V_R	151	V_{Pclean}	246
V_2	158	V_{PO}	192
V_{0flaps}	184	V_{P15}	177
V_{0slats}	198	V_{P28}	154
V_{Climb}	289	V_{A28}	148
M_{Climb}	.74	**V_{A40}**	**143**
		V_{GA15}	143

66 t

T/O Flaps 7º			
V_1	149	V_H	250
V_R	152	V_{Pclean}	248
V_2	159	V_{PO}	194
V_{0flaps}	186	V_{P15}	178
V_{0slats}	199	V_{P28}	155
V_{Climb}	290	V_{A28}	149
M_{Climb}	.74	**V_{A40}**	**144**
		V_{GA15}	144

67 t

T/O Flaps 7º			
V_1	150	V_H	250
V_R	154	V_{Pclean}	250
V_2	161	V_{PO}	195
V_{0flaps}	187	V_{P15}	179
V_{0slats}	200	V_{P28}	156
V_{Climb}	291	V_{A28}	150
M_{Climb}	.74	**V_{A40}**	**145**
		V_{GA15}	145

68 t

T/O Flaps 7°			
V_1	152	V_H	255
V_R	155	V_{Pclean}	251
V_2	162	V_{PO}	196
V_{0flaps}	188	V_{P15}	180
V_{0slats}	202	V_{P28}	157
V_{Climb}	292	V_{A28}	151
M_{Climb}	.74	**V_{A40}**	**146**
		V_{GA15}	146

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