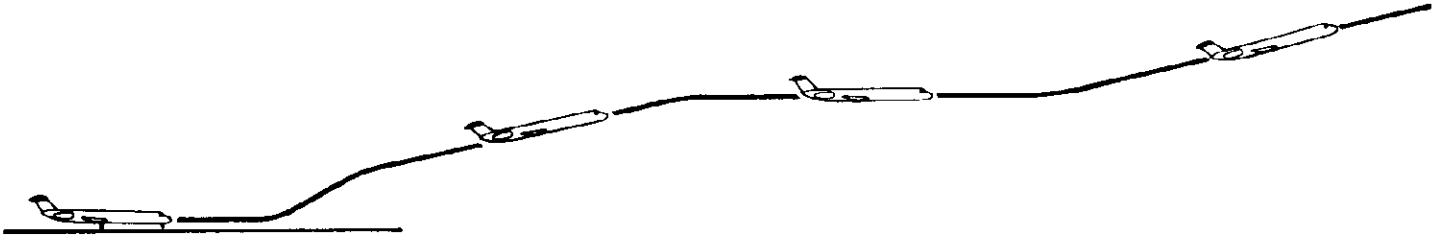
OPERATION

TAKE-OFF AND CLIMB



PRIOR TO TAKE-OFF

CLMP | ALT | TAK OFF | TAK OFF

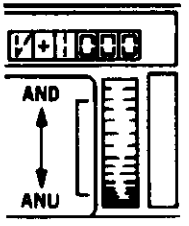
T.O. or T.O. FLX
Mode Button ..... PUSH
FD Sw ..... FD
SPD/MACH Readout ..... SET
Heading Readout ..... SET
Bank Limit Sel. ..... SET 15°
TO/GA Button ..... PUSH
(TAK OFF will be displayed in roll and pitch FMA's.)
ALT Readout ..... SET
Throttles ..... VERTICAL
Advance throttles to 1.4 EPR or 80% N_2 (throttles approximately vertical) and check to see that EPR's are approximately matched.
ATS Sw ..... AUTO THROT
Throttles advance to EPR LIM as displayed on TRI. ATS FMA'S will display EPR TO (if in T.O. mode) or EPR and Assumed Temperature Thumbwheel setting (if in T.O. FLEX mode).

The ATS Clamp (CLMP) Mode will engage at 60 knots and the ATS FMA's will change to CLMP.

800 FOOT - CLIMB POWER

EPR CL | ALT | HDG HLD | VERT SPD

Pitch Wheel ..... ROTATE
Rotate pitch wheel to achieve approximately one-half existing rate of climb and observe pitch FMA's switch from TAK OFF to VERT SPD. Roll FMA's switch from TAK OFF to HDG HLD.



Flaps ..... UP
Retract flaps when on the required airspeed.
CL Mode Button ..... PUSH
Establishes EPR climb limit. Also disengages CLMP Mode.
(CLMP mode must be disengaged before SPD SEL or MACH SEL mode can be engaged. Selecting MCT or CR will also disengage CLMP mode.)

NOTE:

AUTOTHROTTLE EPR SYNCHRONIZATION

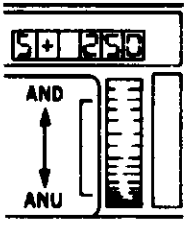
When the autothrottle system is engaged in an EPR Limit mode with the engine sync switch off, if the EPR's are within .03 of each other, the eng sync system will trim the left engine EPR to that of the right engine.

Slats ..... RETRACT
Retract slats when on required airspeed.
AP Sw (above 1000 feet) ..... AP ON
EPR CL, ALT, HDG SEL, VERT SPD will be displayed in the FMA's.

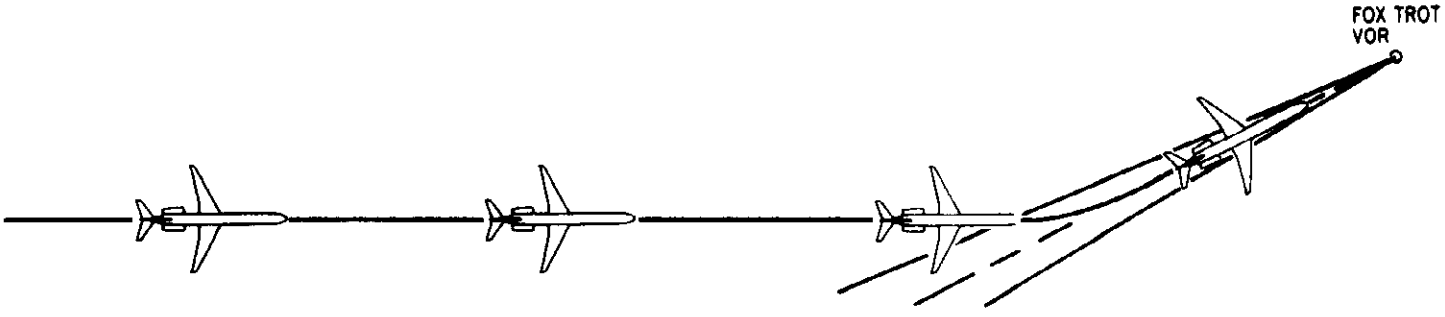
ENROUTE CLIMB SEGMENT BELOW 10,000 FEET

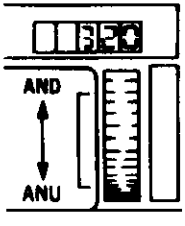
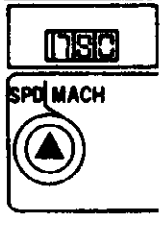
EPR CL | ALT | HDG SEL | IAS

HDG Readout ..... SET
Rotate heading control knob to new heading and observe airplane automatically responds and turns to new heading.
IAS/MACH Button ..... PUSH
When desired airspeed is reached, push IAS/MACH button. Autopilot will automatically adjust airplane pitch to maintain desired airspeed. Pitch readout will display "S" followed by the numeric indicated airspeed. (Manual rotation of pitch wheel will increase or decrease the value displayed in pitch readout while in IAS or MACH modes.)

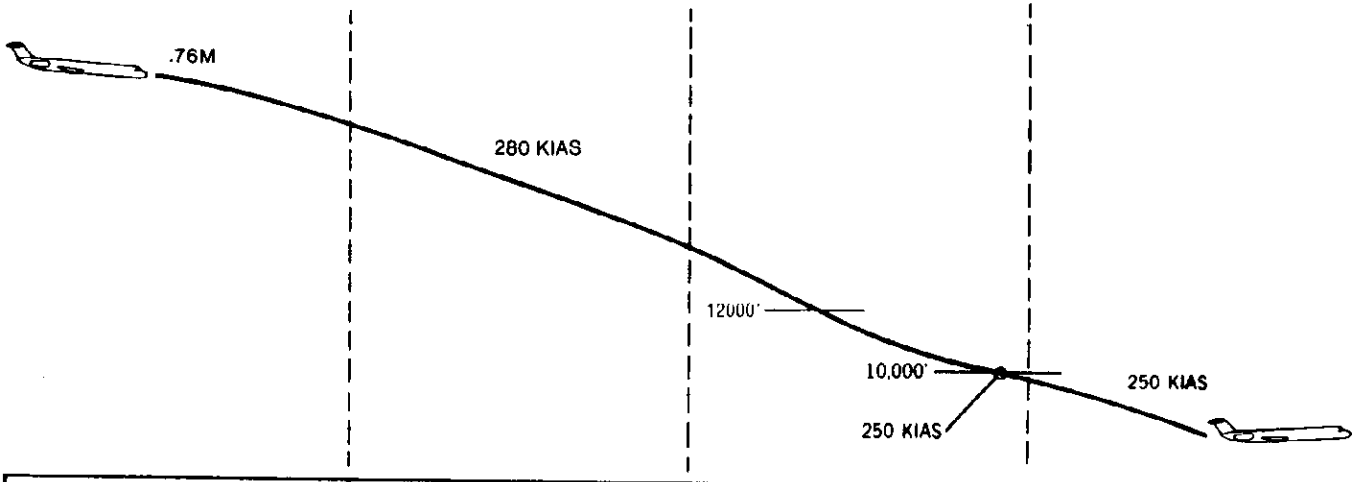


TAKE-OFF AND CLIMB (CONT'D)



TRANSITION 10,000 FEET	ENROUTE CLIMB	CRUISE
EPR CL / ALT / HDG SEL / IAS	EPR CL / VOR ALT / HDG SEL / MACH	MACH 770 / VOR TRK / ALT HLD
Rotate pitch wheel toward AND at 10,000 feet and set the next climb airspeed in pitch readout. The FGS will now respond to new airspeed and will adjust pitch as required to maintain it. (Autopilot sw in AP ON.)  	SPD/MACH Readout . . . . . SET Speed is presently primary in SPD MACH readout. MACH is desired for cruise. Push SPD MACH knob to maximum detent. Last used Mach value is now present in SPD MACH readout. Rotate knob to set desired Mach number. Release SPD MACH knob to normal position. Mach is now primary in SPD MACH readout.  VHF NAV Readout . . . . . SET Set required VOR frequency and identify. CRS Readout . . . . . SET Set desired VOR course in CRS readout. VOR LOC Button . . . . . PUSH Observe VOR appears in arm FMA's.	As airplane enters VOR capture zone the arm FMA's go blank and VOR CAP appears in roll FMA's. After acquiring course centerline, roll FMA's change to VOR TRK. When Altitude Capture (ALT CAP) mode engages, the ATS FMA's will change from EPR CL mode to the mode associated with the value currently displayed in the SPD/MACH readout, in this case, MACH. Note that the selected Mach number is displayed below MACH in the FMA's. When on selected altitude, pitch FMA's will engage into altitude hold mode. CR Mode Button . . . . . PUSH Establishes maximum EPR limit for cruise.

DESCENT

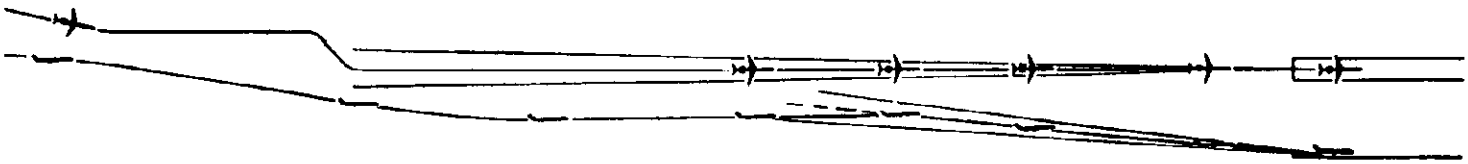


MACH SPEED SCHEDULE	IAS SPEED SCHEDULE	TRANSITION TO 250 KIAS
CLMP ALT HDG SEL MACH	CLMP ALT HDG SEL IAS	CLMP ALT HDG SEL IAS
FD Sws ..... FD ATS Sw ..... AUTO THROT AP Sw ..... AP ON ALT Readout ..... SET/ARM For cleared altitude. Mach Hold Mode ..... SELECT Observe ATS FMAs change to CLMP and flash 5 seconds and pitch FMAs change to MACH. Throttles ..... IDLE	SPD/MACH Readout ..... SET 250 KNOTS Upon intercepting 280 KNOTS, IAS Hold Mode ..... SELECT Observe pitch FMAs change to IAS.	At 12,000 feet, Pitch Wheel ..... SELECT 250 Above action will cause airplane to pass thru 10,000 feet at 250 knots.

FLIGHT DIRECTOR ILS APPROACH

INITIAL CONDITION	MANEUVERING	INTERCEPT	LOC CAP/TRK	GS CAP/TRK
SPD 210 / HDG SEL / ALT HLD	SPD 210 / ALT / HDG SEL / VERT SPD	SPD 210 / ILS / HDG SEL / ALT HLD	SPD 210 / ILS / LOC CAP / ALT HLD	SPD 145 / ILS / LOC TRK / G/S TRK
FD Sws . . . . . ON ATS Sw . . . . AUTO/THROT HDG SEL Mode . . . . . ENGAGED DH Bug . . . . . SET	ILS frequency tuned and identified and course set. ALT Readout . . . . . SET/ARM For initial approach altitude. Pitch Wheel . . ROTATE As required for descent HDG Select . . . . . AS REQD For maneuvering Airplane is manually flown to flight director commands.	Airplane has captured selected altitude and flight director commands turn to final intercept heading. ALT Readout . . . . . SET Set (but not armed) for missed approach altitude. ILS Button . . . . PUSH	At capture, LOC CAP is displayed in roll FMAs and flight director command bar commands turn on course. ALFA SPD / ILS / LOC TRK / ALT HLD When established on localizer, roll FMAs change to LOC TRK. SPD MACH Readout . . . SET Final approach speed. ALFA SPD replaces SPD in ATS FMAs until flaps are in final approach setting. The Fast/Slow indicator is reference to Alpha Speed whenever logic required it.	Glideslope Track logic is satisfied, and G/S TRK is displayed in the pitch FMAs. SPD 145 / FD GA / LOC TRK / G/S TRK If flight director go-around logic is satisfied, FD GA is displayed in arm FMAs. If FD GA is not valid, MAN GA will be displayed. RETD / FD GA / LOC TRK / G/S TRK Retard mode engages and RETD is displayed in ATS FMAs when radio altimeter senses retard altitude. RETD / / LOC TRK / G/S TRK Main gear spin-up; go-around is disarmed, and arm FMAs are blanked. / / LOC TRK / G/S TRK Reverse thrust. ATS disconnects (No lights) and ATS FMAs go blank. / / / / FD switches to OFF.

AUTOLAND



INITIAL CONDITION

SPD 165 | [ ] | HDG SEL | ALT HLD

FD Sws ..... ON
ATS Sw ..... ON
AP Sw ..... AP ON
HDG SEL Mode..... ENGAGED
DH Bug..... SET

MANEUVERING

SPD 165 | ALT | HDG SEL | VERT SPD

ILS frequency tuned and identified and course set.

ALT Readout..... SET/ARM
For initial approach altitude.
Pitch Wheel..... ROTATE
As required for descent.
HDG Select..... AS REQUIRED FOR MANEUVERING

INTERCEPT

SPD 165 | LND | HDG SEL | ALT HLD

Airplane has captured selected altitude.

SPD MACH Readout... SET AS DESIRED
HDG Select..... AS REQUIRED
To intercept localizer.
AUTO/LAND Button ..... PUSH

LOC/CAP

SPD 165 | LND | LOC CAP | ALT HLD

LOC CAP mode engages.

ALT Readout ..... SET
For missed approach altitude.

LOC/TRACK

SPD 135 | LND | LOC TRK | ALT HLD

After localizer track logic is satisfied, LOC TRK is displayed in roll FMA's.

SPD MACH Readout..... SET
Final approach speed.

G/S TRACK

SPD 135 | LND | LOC TRK | G/S TRK

Pitch FMA's will display G/S CAP as airplane maneuvers to get on glideslope centerline.

When glideslope track logic satisfied, pitch FMA's will switch to G/S TRK.

Any airplane or land based malfunction that affects ILS TRK mode will cause respective mode to disengage and FGS will engage into its basic mode.

1500' RADIO ALT.

SPD 135 | AUT GA | AUT LND | AUT LND

Airplane at 1500 feet, flaps in the landing configuration, and autoland logic satisfied, Pitch and Roll FMA's switch to AUT LND and FMA arm annunciator switches to AUT GA.

NOTES:

- If LOC TRK and G/S TRK are annunciated on the FMA's when the airplane reaches 1500 feet but the autoland logic is not satisfied, the FMA LND armed annunciation will flash indicating that autopilot system will not engage in autoland.
- After AUT LND is annunciated in the Roll and Pitch FMA's, if the autopilot go-around logic is not satisfied, the FMA arm annunciator will display FD GA indicating the autopilot will disconnect if an auto go-around is initiated. Flight Director should be used to accomplish go-around maneuver.
- If an autoland failure is detected, or the autopilot has not engaged in the autoland mode by 300 feet radio altitude, the autopilot will disengage, accompanied by a flashing red autopilot warning light and an aural warning. The arm FMA reverts to FD GA and the Pitch and Roll FMA's change to LOC TRK and G/S TRK.

ALIGN 150 RADIO ALT.

SPD 135 | AUT GA | ALN | AUT LND

ALN is displayed indicating yaw and roll channels are performing forward slip maneuver to remove crab if necessary to align with center of localizer.

If ALN does not annunciate, the autopilot will disengage.

RETARD/FLARE 50' RADIO ALT.

RETD | AUT GA | ALN | FLAR

Retard (RETD) mode engages at approximately 50 feet.

Throttles are automatically programmed to retard. Autopilot begins flare maneuver.

If FLAR does not annunciate, the autopilot will disengage.

TOUCHDOWN (WHEELS SPIN-UP)

RETD | FD GA | ROL OUT | ROL OUT

Main gear spin-up ROL OUT (Roll Out) is displayed in the roll and pitch FMA's. Arm FMA reverts to FD GA.

DURING ROLLOUT

[ ] | [ ] | ROL OUT | ROL OUT

Reverse thrust, the autothrottle system disconnects (no lights). ATS FMA's go blank.

20 seconds after wheels spin-up, Arm FMA goes blank.

NOTES:
Following an Autoland approach complete a DC-9 Auto-Approach/Autoland Report form found in back of the SEL book and report it through ACARS.