Attitude Instrument Flying

**Flight Instruments**
- Gyroscopic Attitude Indicator
- Heading Indicator
- Turn Coordinator

**Instrument Scanning Interpretation**
- Cross check when faulty

**Usage Errors**
- Fixation
- Omission
- Emphasis

**Instrument Errors**
- Blocked Pitot Airspeed Reaction as Altimeter
  - Reaction as Altimeter
- Blocked Static VSI Remains at Zero
  - Remains at Zero
- Alternate Static Airspeed Lowered in Climb, Highered in Descent
  - Lowered in Climb, Highered in Descent
- Alternate Static Altimeter Reads Higher
  - Reads Higher
- VSI Indicates Climb
  - Indicates Climb

**Airspeed**
- IAS on airspeed indicator
- Correction for position installation error
- CAS correction for temp/alt at 200kts or lower
- TAS correction for temp/alt per 1000ft altitude, CAS +2% = TAS

**Altitude**
- Air temperature higher than standard > altimeter indicates lower than true altitude
- Pressure Decrease Cold Air (most)
  - Lowered in Climb, Highered in Descent
- Pressure Setting Warm Air (least)
  - Highered in Climb, Lowered in Descent
- General Twist from Higher > Lower QNH Setting on Altimeter
  - Altitude Indication will be Lowered

**Magnetic Compass**
- West = + (west is best), East = - (east is least)
- LAG = Turns Through Northern Compass Side
- LEAD = Turns Through Southern Compass Side

**Obtain Pressure Altitude**
- Set altimeter to 29.92 inch
- Standard Pressure Lapse Rate = 1 inch per 1000ft

**Reading Altimeter**
- Long Hand = 100’s feet
- Small Hand = 1000’s feet
- Thin Hand = 10,000 feet

**Compass Errors**
- Acceleration ANDS on E/W Heading
  - North Turn Indication
- Deceleration ANDS on E/W Heading
  - South Turn Indication

**Attitude Indicator**
- Error after rollout of
  - 180° Turns Indication of Slight Climb + deviation in opposite direction
  - 180° Skid Turns Indication to Opposite Direction
  - 360° Turns No error

**Error due speed change**
- Acceleration Horizon plane moves Down
- Deceleration Horizon plane moves Up
**Attitude IF**

**Pitch Instruments**  Attitude Indicator / Altimeter / Airspeed Ind / VSI  
**Bank Instruments**  Attitude Indicator / Heading Indicator (DG) / Turn Coordinator  
**Power Instruments**  Manifold Pressure Gauge / Tachometer / Airspeed Ind  

**Primary Instruments**  
During manoeuvres keep instrument on constant indication  

**Supporting Instruments**  
During manoeuvres for helping maintain desired indication  

<table>
<thead>
<tr>
<th>Primary</th>
<th>Supporting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level Flight</strong></td>
<td>Alt / DG / Airspeed</td>
</tr>
<tr>
<td><strong>Standard Turn</strong></td>
<td>Alt / Turn Coord</td>
</tr>
<tr>
<td><strong>Climb</strong></td>
<td>DG / Airspeed</td>
</tr>
<tr>
<td><strong>Descent</strong></td>
<td>DG / VSI</td>
</tr>
<tr>
<td><strong>Speed Change</strong></td>
<td>Alt / DG / Manifold</td>
</tr>
</tbody>
</table>

**Attitude Indicator**  
Primary during Transitions, Supporting during Stability  

**Attitude Correction**  
Correction < 100ft  
Half Bar Pitch on Attitude Ind  

**Instrument Failure**  
Vacuum Pump  
Att/Heading are conflicting  
Other instruments then leading  

**Attitude Indicator**  
Bank + Others are leading  

**Heading Indicator**  
Check with magnetic compass  
Alternative: Timed Turns > 3° p/sec, 45° p/15 sec  

**Control / Performance**  
Attitude Indicator is leading, other instr one by one  
Power set for manoeuvres  

---

**Sector 2C**

**Instrument Navigation**

<table>
<thead>
<tr>
<th>HSI components</th>
<th>Compass Magnetic Heading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Arrow (selector)</td>
<td></td>
</tr>
<tr>
<td>Glide Slope Indicator</td>
<td></td>
</tr>
<tr>
<td>Heading Index (curr heading: lubberline)</td>
<td></td>
</tr>
<tr>
<td>Course Deviation Bar (2° of track / per dot)</td>
<td></td>
</tr>
<tr>
<td>TO / FROM Arrow</td>
<td></td>
</tr>
</tbody>
</table>

**Radial Interception**  
Visualize present position and where to go  
Select heading to intercept  
Tracking Wind Correction, double corr angle (10/20)  

**Time to VOR Station**  
Time (10° passage) x 60 / Degrees bearing change = time (min)  
No more than 5° correction, hold last heading  

<table>
<thead>
<tr>
<th>Cone of Confusion</th>
<th>0.5Nm from station</th>
<th>12sec (at 100kts)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3.0Nm</td>
<td>35sec</td>
</tr>
<tr>
<td></td>
<td>10Nm</td>
<td>140sec</td>
</tr>
</tbody>
</table>

**ADF Navigation**  
L/MF NDB, relative bearing: Nose/Station angle  
Magnetic Bearing TO Station  
MH + RB = MB (TO)  

**Radio Magn Indicator**  
ADF on a slaved compass  
Single and Double Arrow = NDB/VOR switched  

**DME**  
Slant Range Distance till 199Nm at 1000ft min  
Distance 6000ft = 1Nm  
Errors At high altitude above station  
Accuracy Valid From station 1 + Nm for each 1000ft altitude  
Check VORDME DME portion every 30sec identification
**Aantekeningen Theorie IF**

- **DME Arc**
  - Enroute > Approach fase
  - RMI or ADF to wingtip
  - After segment begin inbound approach
  - Windcorrection

- **ILS**
  - **OM** Blue Light, -- -- --
  - **MM (200ft)** Amber Light, -- . -- .
  - **IM** White Light, . . . .

  On Localizer no driftcorrection >2°

  - **GS At OM** 420 feet vertical deflection 2 dots
  - **GS At 1.9Nm** 140 feet vertical deflection 2 dots
  - **LOC At OM** 1550 feet horizontal deflection 2 dots
  - **LOC At 1.9Nm** 710 feet horizontal deflection 2 dots
  - **DME** Channel Information in box

- **VOR/VORTAC**
  - **(T) Terminal** Service Volume Radial of 25Nm
    * 1000 - 12000ft
  - **(L) Low Altitude** Service Volume Radial of 40Nm
    * 1000 - 18000ft, (max 80Nm apart off route)
  - **(H) High Altitude** Service Volumes
    * 1000 - 14500ft Radial of 40Nm
    * 14000-18000ft Radial of 100Nm
    * 18000-45000ft Radial of 130Nm
    (max 200Nm apart off route)

  - **Course Dots on Scale** Per Dot 2° of deviation, Max 5 Dots each side
    Per Nm > 200ft per Dot off track (6000ft = 1Nm)
    1 Dot at 30Nm, 200 x 30 = 6000ft

- **VOR Checks**
  - IFR: tested in last 30 days period
  - VOT: Test facility on ground, on 360 radial with FROM indication
  - Max 4 + 4° error on Ground and Air 2 rcvs, Air with 1 receiver +/- 6°
  - Test: 0° on FROM indication, 180° on TO indication
  - Results in logbook (date/place/error/signed)

- **RNAV**
  - Area Navigation, route via geographical waypoints

- **GPS**
  - Approach: when RAIM (receiver autom integrity monitoring)
  - test is passed, safe operation, if not then other navigation
  - Bearing Track from present pos to wp
  - **TRK** Current track
  - **DTK** Desired track (to intercept)

---

**Sector 3A**

**Airports, Airspace + Flight Information**

- **Runways**
  - *Visual*
  - Only numbers on RW
  - Non Precision Instr
  - No glideslope, visual RW markings (threshhold/aiming)
  - Precision Instr
  - ILS, Visual clues, threshhold/touchdown zone

- **Taxiway**
  - Center
  - Marking by yellow line
  - Holding
  - Line between Ground and Tower responsability
  - Holding Point Types: Standard
  - ILS Holding (signal interference)

- **LAHSO**
  - Landing and Hold-
    Short Operation
  - Clearance to land/hold short
    of intersecting (crossed) runways (pilot responsability)
  - ALD
  - Available Landing Distance (found in Airport Facility Directory)
Approach Lighting System

**Purpose:** Transition from Instrument > Visual Reference

**Types:**
- SFL, Sequenced Flashing Light (travelling light)
- RAIL, Runway Alignment Indicator Light (travelling light)
- REIL, RW End Indentifier Light, strobes at TRHLD

**Red over Red = You're dead**
- VASI, Visual Appr Slope Indicator, 1st white, 2nd red
- VASI, 3-bar/3-light, high or low cockpit (WWR/WRR)
- VASI, 3-Color, Amber/Green/Red, 1-light system
- PLASI, Pulsating Light Appr Slope Ind., red/white low/above
- PAPI, Prec. Appr. Path Ind, 4 red/white lights (hor.)
- LIRL, Low Intensity RW Lights (MIRL/HIRL)
- MALS, Medium Appr Lighting Sys (MALSF, seq flashing lghts)
- ODALS, Omnidir Appr Lighting System

- High Glidepath: > 3.5°
- Slight High Glidepath: 3.2°
- Low Glidepath: < 2.5°

Airspace IF Based

**Class A**
- From 18000ft AGL and above (FL600)
- Altimeter: 29.92 (FL)
- IFR Only, FPL required, ATC Clearance

**Class B**
- Busy airports
- Surface > 10000ft MSL, 2 or 3 layers
- ATC Clearance + Mode C/VOR (30Nm rad)
- VFR Corridors

**Class C**
- 2 Circular layers, outward 5 and 10Nm radius (<4000ft)
- Satellite AP clearances via radio ATC
- Mode C (also above) + radio contact

**Class D**
- 2-Way radio ATC
- Class D when tower is operative
- Max 2500ft MSL (in 100’s of feet)

**Class E**
- 14500ft > 18000ft MSL
- Mode C at 10000ft MSL and above
- VFR till FL180
- Federal Airways (V-Airways), VFR/IFR between navaisds (1200>18000ft)

**Class G**
- Uncontrolled by ATC
- At 700 or 1200ft AGL or 14500ft MSL

Airspace & Visibility

**B-C-D**
- 3 sm (3-152)
- 1000ft above / 500ft below / 2000ft horizontal

**E (<10000ft)**
- 3 sm (3-152)
- 1000ft above / 500ft below / 2000ft horizontal

**E (>10000ft)**
- 5 sm (5-111)
- 1000ft above / 1000ft below / 6000ft (1 sm) horizontal

**G (<1200ft)**
- Day: 1 sm
- Clear of Clouds
- Night: 3 sm (3-152)
- 1000ft above / 500ft below / 2000ft horizontal

**G (>1200ft)**
- Day: 1 sm (1-152)
- 1000ft above / 500ft below / 2000ft horizontal
- Night: 3 sm (3-152)
- 1000ft above / 500ft below / 2000ft horizontal

Special Use Airspace

**Prohibited Area**
- OK

**Restricted Area**
- OK

**Warning Area**
- Potential danger outward coastarea 3Nm

**Alert Area**
- Areal activity

**MI Operations**
- MOA, separate military from IFR traffic (cleared)
- VFR should contact ATC (FSS)

**Controlled Firing**
- Not displayed on chart

**National Security**
- Increased security (NOTAM issued)

**ADIZ**
- Air Defense Identification Zone, FPL for ID when entering US airspace
## JEPPESEN INSTRUMENT/COMMERCIAL MANUAL

### Aantekeningen Theorie IF

<table>
<thead>
<tr>
<th>Flight Information</th>
<th>Regional books with public airports, ATC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>VFR/IFR procedures/services etc</td>
</tr>
<tr>
<td>NOTAM</td>
<td>Time critical; D (distant), L (local) in FSS area</td>
</tr>
<tr>
<td>Intern. Flight Inf. Manual</td>
<td>For flights outside USA</td>
</tr>
<tr>
<td>Advisory Circulars</td>
<td>References for practical operations (tips)</td>
</tr>
</tbody>
</table>

### Sector 3B

#### Air Traffic Control System

**ARTCC**
- Air Route Traffic Con.Ctr Authority for IFR clearances
- Monitoring IFR flights enroute
- Coordination/Seperation
- Safety Alerts
- Emergency Assistance

**Airspace:** Sector Devided, Lateral/Vertical

**Part:** Center Weather Advisory CWA

**Call:** `<NAME>` Center

**Flightplan**
- Submitted at FSS or TWR (via phone/radio)
- At least 30min before departure
- Distributed via ARTCC network
- Clearance by Delivery, if no TWR than phone/radio (1-800-WXBRIEF)

**Terminal Facilities**
- ATIS
- Clearance Delivery
- Control Tower
- Approach/Departure Coordination into ARTCC

**FSS**
- Flight Service Stations IFR/VFR
- Weather/Flightplans
- Local Airport Advisory
- No heading corrections for wind
- Call: `<NAME>` Radio
- Freq: 122.2 / 121.5

**Terminal Radar**
- Separation between IFR and VFR Traffic

**Terminology**
- Resume Own Navigation
- Own navigational responsibility by pilot
- Radar Contact
- Aircraft identified
- flight following provided

**No Alternate on FPL**
- AP With IAP: if on Destination Cloudbase >2000ft, Visibility >3 sm
- 1 hour before / 1 hour after ETA

**Standard Alt Selection**
- Precision Approach: >600ft, 2 s.m.
- Non-Precision Appr: >800ft, 2 s.m.

**Without IAP:** Must allow descent from MEA under VFR

### Sector 3C

#### ATC Clearances

**Elements**
- Clearance Limits like Waypoint restricted
- ShortRange only
- Phrase: `Expect further clearance at TIME`
- Departure Procedure Heading/Altitudes
- Route of Flight Different Routes or FLs
- Altitude Data Cruise clearance
- Holding Instructions When delays are expected
- Special Info
- Freq/Transponder Info
Aantekeningen Theorie IF

VFR on Top
- On pilots request
- VFR conditions with VFR cruising levels
- Not in class A
- VFR Levels based on magentic course:
  - $0^\circ - 179^\circ >$ odd 1000's + 500 (e.g. 9500ft)
  - $180^\circ - 359^\circ >$ even 1000's + 500 (e.g. 10500ft)
- Request by radio or FPL ("VFR on Top" statement)
- IFR (flightplan) + VFR, requested ATC clearances
- See and avoid other aircraft by pilot

Approach Clearance
- Circling Approach Clearance
- Contact Approach, short-cut (on req), min 1 s.m.
- Visual Approach (VMC: 3 s.m. or more)

Cruise Clearance
- ALT
  - Choose any altitude from MEA to ALT
  - On pilots discretion

Climb Clearance
- Use optimum climb to 1000ft under assigned ALT, then climb 500-1500ft/min
- Conversion Table: ft/nm > ft/min (Rate of Climb)

Composite FPL
- IFR with VFR segments
- Contact FSS enroute for activation or closure

Departure Restrictions
- Release Time
  - earliest time for departure (hold for release)
- Clearance Void Time
  - by ATC expected time to be departed

Sector 4A

Departure
- Published by Jeppesen (worldwide)
- National Ocean Service (NOS)
- Atmosperic Administration

TERP
- US Standard for Terminal Instrument Procedures
- Items:
  - Obstacle Clearance
  - Climbrate >200ft/Nm
  - Take Off: at least 35ft above End of Runway

DP
- Instrument Departure Procedure, Transition Airport > Enroute segment
- DP Chart: Check table req Climbrate ft/min related to Groundspeed

DP Charts
- Pilot NAV DP
- Initial instruction to Radar Control
- Navigation by pilot

Sector 4B

Departure Procedures

Take Off Minumums
- Single / Twin Engine
  - VMC: 1 s.m.
  - FAR Part 97
- Twin / More Engine
  - VMC: 1.5 s.m.
  - (1600ft = 1/4 s.m.)

Prevailing Visibility
- Greatest distance of visibility for half the horizon
  - (METAR Info)

Runway Visual Range
- Pilot Visibility on runway
  - Touchdown RVR
  - Mid Runway RVR
  - Roll Out RVR

Runway Visibility Value
- Via transmissometer determined visibility for spec runway

Departure Options
- Graphic Instrument Departure Procedure
- Textual DP (minimal)
- Radar DP
- VFR DP

Choice depending on circumstances/airplane
Sector 5A

En Route + Area Charts

En Route Charts
- Complexity of Airway System
- Displaying Safe Altitude
- Ensure Signal Reception

Area Charts
- Displays Terminal Area in detail
- Usage during Transition Enroute <-> Terminal Area

Low Altitude ER Chart
- Below 18000ft MSL (V-Airways)

High Altitude ER Chart
- 18000ft and up to FL450 (Jetroutes)

Enroute Navaids
- VOR
- TACAN (Civil DME only)
- VORTAC (VORDME)

Victor Airways
- V = VHF Airways
- Via VOR/VORTAC navaids
- Airway East - West = Even Numbered
- Airway North - South = Odd Numbered
- Width: 4 + 4 Nm
- Airspace: Class E

Low Freq Airways
- Via NDB's

Airways General
- Dimensions: Width = 4+4Nm, 1200ft to 18000ft
- Symbols:
  - X = Mileage Breakpoint, Course change
  - ▲ Intersection, Non-Compulsory Position Reporting Point
  - ▲ Intersection, Compulsory Position Reporting Point

Symbols
- 10000 MEA
- *7100 MOCA (with * or T)
- X MCA, must be reached when being crossed, Stated in attached Label
- 7000
- 6500 Direction Related altitudes
- H HIWAS, Hazardous Inflight Weather Adv Services
- 70 Distance (total) between Compulsory Reporting Waypoints
- L Airfield/RW Pilot Controlled Lightning

Altitudes
- MEA Minimum Enroute Altitude
- MSA (airport) Min Safe Altitude
- MOCA Min Obstacle Clear. Alt.
- MORAA Min Off Route Altitude
- MAA Max Authorized Alt.
- MRA Min Reception Altitude
- MCA Min Crossing Altitude
- COP Change Over Point

VOR Signal Reception
- At MOCA within 22Nm from Navaid or is reliable at MEA
- Off Airway max 80Nm between VOR's
**FSS Frequency**

- Normally 122.2 and 121.5
- Other frequency above Box
- VOR Frequency 118.6 = No Voice on frequency

**Communications**

- FSS: Flight Service Station
- EFAS: Enroute Flight Advisory Service (Area) (122.0 Mhz below FL180) Call: <NAME> Flight Watch, (weather info)
- ARTCC: Air Route Traffic Control Center (blokkartel lijnen)
- RCO: Remote Communication Outlet, Controlled by FSS

**Airports**

- With Instrument Appr: Blue and Capital Letters (Jeppesen)
- Non-Instrument: Green and Upper/Lower Case letters

---

**Sector 5B**

**Enroute Procedures**

**Reporting Procedures**

- Non-Radar: Every Enroute Waypoint
- Performance change (Speed 5% or 10kts, >500ft/min)
- Altitude Changes
- ETA Changes (~ 3min)
- Reach Holding Fix
- Leave Holding Fix
- Outer Marker
- Missed Approach
- Approaching Clearance Limit
- Equipment Failure
- Unforcasted Weather

**Compulsory Reports Items**

- Over VOR's and Intersections
- Identification
- Position / Altitude
- IFR / VFR
- ETA next Fix > ETA second Fix
- Remarks

**Radio Failure**

- Leave Fix at EFC or Close to ETA
- En Route: Highest Altitude

**IFR Cruising Altitudes**

- Assigned by ATC
  - Based on magnetic course (0-179 = ODD) (e.g. 9000)
  - Altimeter on QNH below 18000ft (req with FSS <100Nm)
  - Altimeter on 29.92 above 18000ft (FL)

**IFR Descent**

- Clearance: when req, prompt descent with 500-1500ft/min report leaving/maintaining altitude
- On Pilots discretion: Start whenever pilot chooses
- Leaving means no return
### Sector 5C

#### Holding Procedures

<table>
<thead>
<tr>
<th>Standard Pattern</th>
<th>Oval Racetrack</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Turns to Right</strong></td>
<td>Left = Non-Standard</td>
</tr>
<tr>
<td>Below 14000ft MSL</td>
<td>2 x standard rate 180°, 1-minute legs</td>
</tr>
<tr>
<td>Above 14000ft MSL</td>
<td>2 x standard rate 180°, 1.5-minute legs</td>
</tr>
</tbody>
</table>

- **Inbound / Holding Course**: Towards Fix (navaid or DME distance)
- **Holding Side**: Side where holding is flown

<table>
<thead>
<tr>
<th>Wind</th>
<th>Upwind/Downwind corr</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1min / 45sec - 1min / 1.15min</td>
</tr>
<tr>
<td>Crosswind corr</td>
<td>WCA Inbound = 3 x WCA for Outbound</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Speed</th>
<th>6000ft or below</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>200 KIAS Max</td>
</tr>
<tr>
<td>6000-14000ft</td>
<td>230 KIAS</td>
</tr>
<tr>
<td>14000ft and up</td>
<td>265 KIAS</td>
</tr>
</tbody>
</table>

- **Wind Upwind/Downwind corr**: 1min / 45sec - 1min / 1.15min
- **Crosswind corr**: WCA Inbound = 3 x WCA for Outbound

<table>
<thead>
<tr>
<th>Entries</th>
<th>Direct</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sector 180° at Holding Side</td>
</tr>
<tr>
<td>Teardrop</td>
<td>Intercept 30°, 1-minute leg</td>
</tr>
<tr>
<td>Parallel</td>
<td>At non-hold side, left turn</td>
</tr>
</tbody>
</table>

- **Rule for Direct**: When HC is behind at fixposition
- **Rule for Teardrop**: When HC is Ahead and Right
- **Rule for Parallel**: When HC is Ahead and Left

#### Holding ATC

- **Expect Further Clearance at TIME (EFC)**

### Sector 6A

#### Arrival

**Arrival Chart**

<table>
<thead>
<tr>
<th>Approach Plate</th>
<th>Frequency Options</th>
<th>Coming from easterly direction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>119.05 (east)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>125.80 (west)</td>
<td></td>
</tr>
</tbody>
</table>

- **Communications**: ATIS
  - Updated upon receipt of official weather
  - Omitted items, Ceiling > 5000ft, Visibility >5SM

- **Descent Clearance**: On Segment of Published IAP
  - Approach/Localizer only with ATC clearance

**STAR Standard Terminal Arrival Route**

- **Functions**: Enroute segment > Terminal Area and Instr/Visual Approach
- **Simplify complex clearances and freq congestion**
- **Starts at common Navaid or Intersection**
- **Initial Fixes on STAR correspond with Enroute Charts**
- **Routes contain: Course, Distance, MEA, Speeds**

- **Vertical Nav Planning**: Establish efficient descent for High Performance Aircraft
Sector 6B

Arrival Procedures

Functions
Preparation before Approach Phase
STAR filed in FPL or additional Clearance by ATC
No acceptance: NO STAR in Remarks section
MCA is not a part of ATC clearance

Preparation
Listen to ATIS
Monitor AWOS, ASOS, FSS

Review the Approach
ATIS
Radio / Nav Frequencies (identification)
Inbound Course
Descent Minimums
Missed Approach / Time to MAP
Min Safe Altitude
Approach Checklists
Preland Checks
ATC Clears for Altitudes, Airspeed (if comply max 10kts dev), amendments, cancellations

Sector 7A

Approach

Approach Chart

Instr. Appr. Procedure
Precision Approach
Non Precision Appr.

Approach Segments
Initial
Intermediate
Final

Missed Approach

Chart Symbols

T

A

\[\]

\[\]

\[\]

\[\]

Minima not Standard
Departure is Published
Alternate Min Not Standard

Indicates FAF for Precision Approach
Indicates FAF for Non Precision Approach
Aantekeningen Theorie IF

Approach Chart Layout (Jeppesen)

Heading Section
- City + Airportname
- Instrument Approach Title
- Primary Appr Facility
- Comms Frequencies
- Min Safe Altitude (1000ft above Obstruction within 25Nm radius)
- Procedure Title (Type/Req Equipment) (VOR/A = no straight in)
- Chart Index Nr. > XX-X (airpnr in same area/chart type/index chart w/same appr)

Charttype: 0=Area/STAR/DP, 1=ILS/LOC, 3=VOR/DME, 6=NDB

Contents Heading Section
- Communications
  - Approach/Tower/Ground
  - ASOS
  - Radar (y/n) (R)
  - Alternate Frequencies

- Dates
  - Effective date
  - Chart date

- MSA
  - 1000ft Clearance on highest obstacle in 25Nm radius of facility

Contents Plan View
- Overhead Presentation of Approach
- Procedureturns/Pattems/Non-Course reversal
- Highest Reference Point (nr with arrow)
- OM/MM, Outer Compass Locator (LOM)
- Feeder Routes (thin arrow)
- Marker Beacons (lens shaped)
- Missed Approach Track
- Navaid box with DME (D), High Alt DME (H)
- Oval Shape = ILS/LOC/LDA/SDF, Shadowed=Primary

Contents Profile View
- Approach from the side, Height Path
- IAF/FAF, (x)=non-precision FAF (alt)
- TDZE, Touchdown Zone Elevation
- HAT, Height Above Touchdown (real height)
- > DA(H) 489'(200')
- TCH, Treshold Crossing Height, GS height above THD
- FAF, ILS intercept point
- Distances (Nm) OM - MM
- Stepdown Fix
- VDP
- Descent to lower altitude after FAF and MAP
- Visual Desc. Point, by letter "V" for normal landing
- Runway in sight starting form MDA.

Landing Minimums
- Minimal Visibility and Altitude
- Specified for each approach

Aircraft Appr Catagories
- 1.3 x Power Off Stall Speed in Landing Configuration at max grossweight
  - A Up to 90kts (approach speed)
  - B 91-120kts
  - C 121-140kts
  - D 141-165kts
  - E 165+ kts

B-Type (120) + 5kts (inc)= C Catagory (example)
Minimum Descent Req
Section: Landing Minimums
DH: Decision Height (MSL)
DA(H) Decision Altitude (Height) (MSL)
Point in Approach to decide Land or Missed Appr
Visibility Requirements
Stated in s.m. or 100s of feet
Landing Minimums
840/24 MDA / RVR (2400ft)
RVR 24 = 0,5 s.m.
Inoperative Components
Minimums will increase
ILS I/O > Localizer Minimums

Airport Chart
Diagram (sketch)
Ground movements, on reverse side of 1st appr chart
Airport Chart
Heading Section
Location/Elevation/Variations
Comms Frequencies
CTAF Common Traffic Advisory Freq.
Plan View + Add. Info
Overhead View
Runways/Lighting Systems
Airport Ref Point (ARP), geographical centre
Pilot Controlled Lighting Freq.

Take Off and Alternate Minimums
Alternate Airport
On FPL only as on destination:
Ceiling < 2000ft
Visibility < 3 sm
1 Hour before / 1 Hour after ETA
Standard Minimums
Precision Appr
600ft ceiling, 2 s.m.
Non Precision
800ft ceiling, 2 s.m.

New Approach Chart (19/9/97)
Layout
Briefing Strips, Horizontal
Information left > right
Comms: ATIS/Appr/TWR/Gnd
Approach: VOR/CRS/MDA/TDZE
Missed Approach Instructions
Required General Equipment
Plan View
Unchanged
Profile View
Unchanged
Approach Lighting System
Missed Approach Icons for Altitude/Navaid
Minimums
Unchanged
Airport Chart
Unchanged

Sector 7B
Approach Procedures
Straight In Landing
FAC must be within 30° of RW
Straight In Approach
From Fix via DME (arc) or Vectors to FAC
ATC Radar
Radar Vectors to FAC
MVA: Min Vectoring Altitude, Can be lower than MEA/MOCA
at least 300ft above highest obstacle
RADAR Approaches
Airport Surveillance
At Airports with RADAR approach minimums
ASR
Non Precision Approaches
Vectors to FAC, distance, MDA, Altitude
No weather watch
PAR
Precision Approach
Glideslope Guidance
No-Gyro Guidance (start/stop turns)
(on FAC only 1/2 standard rate)
<table>
<thead>
<tr>
<th><strong>Course Reversal</strong></th>
<th>Within 10Nm of primary Fix to FAC (max 200kias)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Procedure Turn / Teardrop Proc</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Timed Approach</strong></th>
<th>From Holding Fix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditions</td>
<td>Control Tower is in operation</td>
</tr>
<tr>
<td></td>
<td>Leave pattern at TIME</td>
</tr>
<tr>
<td></td>
<td>Initial communication with Approach before TWR</td>
</tr>
<tr>
<td></td>
<td>No missed approaches with PT</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Final Approach</strong></th>
<th>When no visual clues, not below MDA/DH (100ft above TDZE)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non Precision: plan prior to MAP</td>
</tr>
<tr>
<td>Chart: Time to MAP</td>
<td>at SPEED / MDA(HAT)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Circling Approach</strong></th>
<th>When IAC is not within 30° of RW</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unfavorable winds or sudden RW closure</td>
</tr>
<tr>
<td>Procedure according</td>
<td>to TERP criteria (aircr appr cat)</td>
</tr>
<tr>
<td>to chart for catagori</td>
<td>RADII on chart for catagori in Nm at MDA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Sidestep Maneuver</strong></th>
<th>Parallel RW approach (&lt;1200ft apart)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missed Approach</td>
<td>Due to</td>
</tr>
<tr>
<td></td>
<td>Low visibility</td>
</tr>
<tr>
<td></td>
<td>Sudden runway closure</td>
</tr>
<tr>
<td></td>
<td>Inadequate separation by ATC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Visual Approach</strong></th>
<th>Separation form IFR and VFR traffic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visibility 3 sm,</td>
<td>Ceiling 500ft above Min Vector Alt</td>
</tr>
<tr>
<td>Airport in Sight</td>
<td>Remaing VFR</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Contact Approach</strong></th>
<th>Expedite traffic procedures (shortcut)</th>
</tr>
</thead>
<tbody>
<tr>
<td>On pilots request,</td>
<td>own responsibility, ATC Separation</td>
</tr>
<tr>
<td>Visibility 1 sm,</td>
<td>Clear of Clouds</td>
</tr>
<tr>
<td>Airport has IAP</td>
<td></td>
</tr>
</tbody>
</table>

P.G. Bokma, 21-9-05 / 019130.xls / 13 van 25
Sector 8A
Instrument Approaches

VOR + NDB Approaches

<table>
<thead>
<tr>
<th>Type</th>
<th>Non Precision</th>
<th>Off Airport Facility</th>
<th>IAF/FAF Navaid</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOR Approach</td>
<td>Off Airport Facility</td>
<td>MDA from 500-1000ft above TDZE</td>
<td>DME not always required</td>
</tr>
<tr>
<td>Procedure</td>
<td>On Airport Facility</td>
<td>Clearance by ATC</td>
<td></td>
</tr>
<tr>
<td>Preparing</td>
<td>Chart, AP Diagram, Missed Appr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Descent to FAF</td>
<td>MEA &gt; MOCA at DME distance or fix</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outbound on Proc Turn</td>
<td>Cross VOR on OB Radial PT</td>
<td>Intercept Radial 45°</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 minutes to PT, 1 min to 180° turn</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inbound to FAF</td>
<td>Landing checks, descent to VOR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final Appro Segment</td>
<td>Report Position (CTAF)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Missed Approach</td>
<td>Not below MDA until Visual References</td>
<td></td>
<td>Remember 1st step (procedure)</td>
</tr>
</tbody>
</table>

Procedure w/DME
Fly the ARC
Intercept radial inbound at Lead Radial

VOR Approach
On Airport Facility
With DME fix
FAP = FAF (no defined FAF)

Without DME fix
Overhead VOR at safe altitude
Outbound > Turn Inbound, descent > MDA

Procedure
Preparing
Via ATIS or UNICOM
Identify VOR
Fly to VOR > Outbound

Clearance
VOR rw 2, maintain alt until outbound

Descent to IAF
MEA > MOCA (MSA)

Outbound on PT
Overhead VOR, rightturn to intercept IB radial
Descent on OB radial, 2 min to PT
PT (45°) 1 min then 180 turn

Inbound Airport
On intercept crs for FAC to VOR on field
Descent to MDA, watch descent rate
MAP at TO/FR change

Missed Approach
Climb to MOCA and fly procedure

VOR/DME procedure
Stepdown fix
Defined by DME distances on QNH

2 min
intercept angle 45°
leaving holding
Aantekeningen Theorie IF

**NDB Approach**

**Preparatory**
- Identify Primary Navaid as a LOM
- Check MOCA and MDA/TDZE
- VOR radial for Stepdown Fix (MOCA>MDA)
- Check Heading Indicator
- Check ATIS on IB

**Clearance**
- Cleared for NDB approach, contact TWR

**Inbound to FAF**
- Landing checklist before FAF
- At ADF needleswing > timed descent

**Final Appr Segment**
- Groundspeed to Time FAF->MAP (table)
- MDA > MAP, RW in sight?

**Missed Approach**
- Turn till ADF needle on the nose, direct to station

**NDB Intercepts & Holdings**

- **180° Bearing TO**
- **240° Bearing TO**

- **240 Bearing Inbound = 060 Radial Outbound**

**Heading Indicator**

- **190 (SOUTH HDG)**
- **100**
- **90**
- **280**
- **10**

**Hold South Bearing 360**

**Leftturns (non-standard)**

**Quadrants (protected areas)**

<table>
<thead>
<tr>
<th>NW / Left</th>
<th>NE / Right</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW / Right</td>
<td>SE / Left</td>
</tr>
</tbody>
</table>

**Where am I**

- Where do they want me

**Which Turns (left/right)**

**Which Entry**
Sector 8B

ILS Approaches

Features
- Precision Approach
- Lower minimums
- Landing on airports with no nonprecision possibilities

ILS Categories

- Cat I
  - Instrument rated pilots only
  - Proper equipment
  - Minimums: RVR 2400ft, DH 200ft at HAT

- Cat II
  - Lower minimums
  - Minimums: RVR 1200ft, DH 100ft at HAT

- Cat III
  - Special certification for pilots/aircraft/operators
  - Minimums: A RVR 700ft, B RVR 150ft, C None

ILS Components

- Localizer
  - Alignment with Front Course and Back Course (ATC auth)
  - Span: 10°, Service: 10-18Nm

- Glideslope
  - Service: 10Nm, 3° Angle, Freq: 108.1 - 111.95 MHz

- DME
  - Distance

- Marker Beacons
  - OM: Glideslope Intercept, 4-7Nm before TRH (blue)
  - MM: 3500ft form TRH (amber)
  - IM: Cat II = DH (white)
  - LOM: Compass Locator Outer Marker, LMM (middle marker)

Inoperative Components

- Glideslope Out > Localizer Minimums
- Localizer Out > No ILS approach
- Minimums Increase (see table)

Straight-In (NoPT) ILS Approach

Procedure

- Preparing: Via IAF (VOR) > Localizer
- ATIS monitoring / Altimeter Reset
- Navaid: Loc + NDB or TWR
- Clearance: Cld for rw 18, maintain alt until established
- Descent prior FAC: From IAF > MOCA, checks
- Inbound to OM: Established ILS, Appr Speed, desc 480ft/m
- Final Appr Segment: Call TWR: IB on ILS approach

ILS Approach with Course Reversal

Procedure

- Preparing: From Intersection > IAF (MEA), contact UNICOM
- ADF/Localizer tuning
- Descent prior IAF: Inbound IAF
- Outbound on PT: IAF > Turn to intercept OB localizer (>MOCA)
- Inbound to LOM: 180 Turn with 45° intercept
- Final Appr Course on Localizer
- Descent to DH

Type ILS Approaches

- Parallel (dependent)
  - Parallel Runway (Centerline >2500ft apart)
  - Separation: 1.5Nm Diagonally, RW 4300-9000ft apart > 2Nm

- Parallel (independent)
  - Dedicated controllers
  - No staggered separation
  - NTZ, No Transgressing Zone between RW's

Localizer Approach

- When Glideslope is I/O
- Non Precision with LOC, descent to MDA

Localizer Back Course

- No Glideslope, be aware for GS signals from Front Course
- On VOR radial, reverse sensing, HSI > FC=BC
Aantekeningen Theorie IF

LDA
- Localizer Type Direction Aid
- Also in combination with GS, Width: 3-6° vertically
- Ident: Ixx (3-letter group)
- Final Appr segment of RW centerline > loc deviates 30° or more

SDF
- Simplified Directional Facility
- Width: 6-12° vertically, 35° horizontally
- Differs from LDA in LOC width
- No Glideslope

Radio Procedures (Practical)

Inbound Airport
- Ft Myers Approach
  - Cessna 172 464TC
  - 15 Nm south of Venice at 3000ft
  - IFR to Ft Myers Pagefield
  - Sq 0145, Cleared as Filed Via Radar Vectors
  - Fly <Heading> at <Altitude>

Approach Clearance
- Cessna 464TC
  - Turn Left 080
  - Maintain 2000ft
  - Until established on Localizer
  - Cleared ILS 05
  - Contact Tower on <Freq>

On the Localizer LOM
- Page Tower
  - Cessna 464TC Established on Loc 05
  - Cleared for the option (Missed Appr / Touch and Go)

Missed Appr
- Cessna 464TC on Missed Approach 05

Air to Air Comm
- On 122.75 and 122.95

Sector 8C

GPS + RNAV Approaches

Approach Design
- Basic T:
  - Routing aircraft to destination
  - Alignment with RW centerline
  - Straight-in procedure
  - Holding at IF/IAF

GPS Approach
- Non-Precision
  - Overlay
    - Phase 1, Existing Non-Precision approaches
    - Phase 2, Using existing appr charts
    - Phase 3, No conventional navigation (or GPS)
  - Stand-Alone
    - Solely GPS approaches
    - More efficient routing (basic T)

GPS Equipment Requirements
- FAA approved, TSO C-129, AC 20-138
- RAIM, reliability of GPS signal, 4 base + 1 integrity sattelite
- GPS RAIM availability from FSS wxbrief

VOR/DME RNAV
- Computer determined position on nearby VORTAC’s (FMS)
- Programmed point-to-point enroute/appr operations
- CLC > Course Line Computer, azimuth and distance to VORTAC (phantom VOR’s)
- Approaches: specific charts, CLC programming
Sector 9A

Weather Factors

**Atmosphere**

- 50Km (160000ft) Thick MSL
  - 18000ft 50% of atmospheric mass
  - 53000ft 90% of atmospheric mass
  - 164000ft 99.9% of atmospheric mass

- Troposphere SFC > 24000/50000ft Decrease of temperature (Av 37000ft)
- Tropopause Top Abrupt Temp Lapse Rate (water vapor)
- Constant temperature

- Stratosphere 36000/160000ft Top > Stratopause
- Stratopause Top Small Temp Changes

- Mesosphere 160000/280000ft

- Thermosphere 280000ft+

**High Altitude**

- Tropopause height is 24000 - 50000ft (at equator)
- Between Troposphere and Stratosphere > Constant temp (-57°C), isolates air mass
- Breaks, between polar and subtropical air mass (30-60° N)
- and subtropical and tropical air mass (25° N) (in winter only)

**Jetstream**

- 60-240kts
  - Winter Southern movement, Increased Strength
  - Summer Northern movement, Decreased Strength

**Atmos. Circulation**

- Uneven heating by Solar radiation in different angles and locations
- North of Tropic of Cancer Northern Hemisphere (21 June)
- South of Tr of Capricorn Southern Hemisphere (21 Dec)

**Pressure/Wind**

- Isobars / Pressure Gradient > change in pressure over distance
  - High Center of high pressure, Ridge, area of high pressure
  - Low Center of low pressure, Trough, area of low pressure
  - Col Neutral zone between 2 highs and 2 lows
  - Wind Airflow from Cool/High to Warm/Low
  - Coriolis Force Deflect airflow to right (northern hem)
    - By earth's friction crossing wind over isobars
    - Up to 2000ft, wind direction shifts

**Moisture**

**Water**

- Solid (ice)
- Liquid
- Gaseous (vapor)

**Water added to air**

- Evaporation Heated water > Gas (vapor)
- Sublimation Ice > water vapor (no liquid state)
- Condensation Vapor > Liquid (from saturated air (verzadigd))
- Deposition Water vapor > Ice
- Precipitation Condensed water in atmosphere (drizzle or Virga)
  - Supercooled water, liquid below freezing level

**Latent heat of Water**

To Vaporate 1 Gram of water takes 540 Calories

- Stability Resistance to vertical motion in atmosphere
  - Air parcel rising or sinking in relation to the air around it
- DALR Dry Adiabatic Lapse Rate, 3°C/5.4°F per 1000ft
- SALR Saturated Adiab. Lapse Rate, (    )
- Stability (DALR) Air is Cold/Dry
- Instability (SALR) Air is Warm/Moist (more water vapor)
<table>
<thead>
<tr>
<th><strong>Ambient Air Lapse Rate</strong></th>
<th>2°C/3.5°F per 1000ft</th>
</tr>
</thead>
</table>

**Fronts**

<table>
<thead>
<tr>
<th>Passage inflight</th>
<th>Change of temperature</th>
<th>Wind direction changes to right</th>
<th>Pressure changes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frontal Cyclone</strong></td>
<td>Counter Clockwise in northern hemisphere</td>
<td>Excessive temp gradient along Polarfront</td>
<td>Orographic lifting in mountainous areas</td>
</tr>
<tr>
<td></td>
<td>Starts with windshear and pressuredrop (wave cyclone)</td>
<td>Cyclone deepens, increase winds around it (occluded)</td>
<td></td>
</tr>
</tbody>
</table>

**Turbulence in A/C**

<table>
<thead>
<tr>
<th>Light</th>
<th>Slight changes in Attitude/Altitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate</td>
<td>Variations in Airspeed</td>
</tr>
<tr>
<td>Severe</td>
<td>Abrupt changes in Attitude/Airspeed, moments out of control</td>
</tr>
<tr>
<td>Extreme</td>
<td>Impossible to Control, Structural Damage</td>
</tr>
</tbody>
</table>

**Thunderstorms**

<table>
<thead>
<tr>
<th>When Penetrating</th>
<th>Watch Instruments, no looking outside</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Don't change power</td>
</tr>
<tr>
<td></td>
<td>Constant Attitude, Ride the Waves</td>
</tr>
<tr>
<td></td>
<td>Don't turn back</td>
</tr>
</tbody>
</table>

**Microburst**

<table>
<thead>
<tr>
<th>Intense Downdraft 6000ft/min, both Sides 45kts Tail/Headwind, total at 90kts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum time is 15 minutes</td>
</tr>
</tbody>
</table>

**Icing**

<table>
<thead>
<tr>
<th>Reduces Lift with 30%, Increases Drag with 40%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freezing Rain indicates higher temps at higher altitude</td>
</tr>
<tr>
<td>Frost is ice sublimed on surface with lower temp than dewpoint (=below freezing)</td>
</tr>
<tr>
<td><strong>Rime Ice</strong></td>
</tr>
<tr>
<td><strong>Clear Ice</strong></td>
</tr>
</tbody>
</table>

**Windshear**

| Change in Wind Direction at Frontal Activity or with strong Temperature Inversions, at any Level |
|------------------------------------------------|-----------------------------|
| **Warm Front** | Before front, Below 5000ft for 6 hrs |
| **Cold Front** | Behind front, Below 5000ft for 3 hrs |
| **Inflight** | Tailwind to Headwind | Lower power then increase of power |
|                  | Pitch decrease and IAS increase |
Sector 9D

Graphical Weather Products

Surface Analysis Chart  Conditions in validated time on chart (3 hours)

- Pressure patterns on surface (isobars)
- Locations of highs and lows, fronts, temp, wind, vmc
- Symbols: Round Station > human observation
  Square Station > Automated observation
- Pressure 147 > 1014.7 hPa
- Precipitation .45 > 0.45 inch
- Temp/Dewpoint 44/42
- Wind Northwest 15kts >
- Clouds > Broken >

Weather Depiction Chrt  General weather sky conditions from METAR (3 hours)

- Symbols: Visibility in s.m. at Left (< 6 s.m.)
  Cloud Height > 100's of Feet AGL
  Cloud Coverage, Ceiling < 3000ft, X = Obscured Sky
  Weather Obstructions > snow etc
  Rain: . = continuous, .. = showers
- IFR Conditions: Shaded Areas, Ceiling < 1000ft, 3 s.m. Visibility

Radar Summary Chrt  Collection of Radar weather reports (SD)

- Precipitation: Intensity/size/trend/direction
  No Cloud/Fog formations
  Thunderstorms (T), Rain Shower (RW), Snow (SN), (+) increasing intensity
- Contours
  1st Line, Intensity 1-2, weak/moderate
  2nd Line, Intensity 3-4, strong/very strong
  3rd Line, Intensity 5-6, intense/extreme
- Cloud Tops
  In 100's of Feet MSL
- Cloud Movements
  5 / 10 / 50 kts (half-whole barb/pennant)

Satellite Weather Pict  Photos with Temp/Humidities/Wind/Watervapor

- Visual and IR observations

Composite Moisture Stability Chart

- Stability Panel
  Areas of stable and unstable airmass
  Temp of lifted airparcel (negative = unstable)
  K-Index for temp/moisture level (<15 = no TS)
- Freezing Level Panel
  Upper Air freezing levels, BF = Surface freezing
- Precipitation Water Pnl
  Condensed Watervapor / Normal Values p. month
  Surface to 500mm level
- Average Rel Humidity Pnl
  Surface to 500mb level
  Air saturation
  Dark station symbol > 50%+

Constant Pressure Analysis Chart

- Upper Air weather map
- Daily at 1200Z and 0000Z. Surface to 850mb level (5000ft), upto 39000ft
- Observed Temp/DP spread, Wind, Pressure, Clouds
- Isotachs: Lines of equal wind velocity
Observed Winds and Temp Aloft Chart

Planning: Cruise Altitude
Wind Direction and Temperature
Depicts winds at 8 levels, 6000/9000/12000/18000/ etc
Daily at 1200Z and 0000Z
Symbols:
- Station with DP spread < 5°C
- Station with DP spread > 5°C

Level Winds Format
Wind 200° at 45kts, temperature -26°C
2045-26 (Temps interpreted Negative at >FL240)

Wind 160° at 115kts, temperature 34°C
16 + 50 = 66
115 - 100 = 15   > 661534

751041 = 250 at 110kts, -41
781842 = 280 at 118kts, -42
9900+00 = light/variable, < 5kts

Graphic Forecasts

Low Level Significant Weather Prognosis Chart

Planning: flight around low visibility areas
Surface to 400mb pressure level (24000ft)
Daily 4 times, 12/24 hours forecast
4 Panels
- 2 Upper Panels > Surface to 24000ft
- 2 Lower Panels > Surface Only
Significant Weather Pnl Turbulence/Freezing levels, Thunderstorms
Surface Prog Panel Pressure center movements, Precipitation

CB coverage
- ISOL = 1/8
- OCNL = 1/8 - 4/8
- FRQ = 5/8 - 8/8

High Level Significant Weather Prognosis Chart

Above 400mb pressure level, up to 70mb (63000ft)
Displays thunderstorms, cyclones, squalls, turbulence, troppause height

Severe Weather Outlook Chart

Advanced Flightplanning, 48-hours outlook (24/48) at 1200Z
General and severe thunderstorm activity

Forecast Winds and Temp Aloft Chart

Daily at 0000Z and 1200Z, 12-hours forecast
Level 6000/9000/12000/18/24/30/34/39ft MSL

Tropopause Data Chart

Daily once at 1200Z
For High Altitude flight, vertical/horizontal windshear/turbulence

Tropopause Winds Panel Streamlines: Parallel to Wind Direction (solid)
- Isotachs: Wind Speed, (Dashed)
Tropopause Height / Vertical Windshear Panel
- Trop Height in Pressure Altitude
- Vertical Windshear in kts / 1000ft
- Turbulance, moderate: at 6 kts or more

PIREP

Pilot (written) Report
- OV / TM Location / Time
- FL / SK Level / Cloud Layers
- UA / UUA Urgent
**Others**

<table>
<thead>
<tr>
<th>HIWAS</th>
<th>Continuous broadcast over VOR’s of SIGMET/AIRMET</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIRMET</td>
<td>For SE and VFR traffic, mod icing, turb, winds &gt;30kts, vis IMC conditions, Issued HR + 15/45 1 hr validation</td>
</tr>
<tr>
<td>SIGMET</td>
<td>All Aircraft, severe icing, turb, vis &lt; 3 sm Issued as AIRMET, Convective for tornados/etc, H+55</td>
</tr>
</tbody>
</table>

**Sector 9E**

**Automated Surface Weather Reporting Systems**

**ASOS**

*Aut. Surface Observation System (METAR)*

Update: When significant change occurs

Installed/Operated by FAA

Frequency with computer synthesized voices (also by tel)

<table>
<thead>
<tr>
<th>At TWR controlled AP</th>
<th>Level A</th>
<th>In B airspace</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Level B/C/D</td>
<td>Human observation</td>
</tr>
</tbody>
</table>

**AWOS**

*Aut. Weather Observation System*

Update: 3 times per hour

At non-TWR airports Also human observation

Types

A. Altimeter Setting only

1. Including Temp/Wind information

2. Including Visibility

3. Including Cloud Information
### Sector 10C

#### IFR Flight Planning

**Flight Overview**
- Decision: Go or No-Go
- Weather General via TV, Internet
- Performance of aircraft
- Equipment for IFR flight
- Available routes
- Instrument proficiency

**Flight Planning**
- Route Listed in Enroute section of Jeppesen Airway Manual
  - Or Airport/Facility Directory (AF/D)
- SID and STAR
  - Jeppesen Approach Charts (or NOS)
  - Departure/Arrival procedures
  - Alternate airports on distance not affected by weather
  - and with comparable instrument facilities
- Publications
  - NOTAM via Jeppesen Airway Manual or AIM
- Weather
  - General Overview before flight
  - Occurring hazards
  - Standard briefing at FSS or DUATS
    - (Direct User Access Terminal System)
  - RADAR and Satellite Images
  - Surface Analysis Chart
  - Low Level Sig. Weather Prognosis Chart for VMC conditions
  - and Freezing levels
  - Weather Depiction Chart, simple VMC indication
  - TAF/METAR of airports
  - Forecast Winds Aloft
- Altitude Selection
  - MEA or designated by ATC according east/west direction
- Considerations: Wind/Ice Level/Turbulence/Cloudbase
- Navigation Log
  - Times (ETA, ATE (enroute), ATA
  - Fuel planning
- Flightplan
  - Type Code: in Aeronautical Inf. Manual
  - Filing: at FSS 30 min before departure time
  - Closing: When landed at TWR AP (automatically)
  - or in VFR condition enroute
  - Non-TWR: at FSS or ATC
  - Transponder: /U, including altitude
  - Transponder: /A, including altitude + DME
Section

IFR Decision Making

DECIDE Model
Detect a Change
Estimate the need for action
Choose the desired outcome
Identify action to take
Do the action
Evaluate the effect

Section

Regulations

IR License
Less than min VFR conditions for a/c category
All Class A airspace (18000-FL6000)
Passengers (hire) <50Nm at night prohibited (CPL)
Passengers at night, cross country >50Nm (IR)
Passengers at night (hire), cross country >50Nm (CPL/IR)
IFR Flightplan

IR Currency
Flight in IFR/IMC Conditions within 6 months with:

> 6 Instrument Approaches/Intercepts/Holdings OR
After 6 Months, with qualified Safety Pilot OR
> 12 Months: IR Competency Check
in an aircraft (rated) or approved trainer/sim

For IFR Flights
Minimal VFR equipment:
Airspeed / Attitude / Magn Compass / Tacho / Oiltemp / Oilpress / Fuel
Plus extra: Radio / Nav 2-Way
Turn Indicator + Ball
Directional Gyro
Sensitive Altimeter
Clock
Alternator

If necessary: Mode C Transponder (>10000ft, A-B-C)
DME (>FL240)

Transponder C
Deviation in Controlled Airspace (B)
Requests 1 Hour before flight

Equipment Inspection
Altimeter / Transponder / Statics Every 24 months (end)
VOR Receivers Within 30 days

Inspection (Aircraft)
100hrs (Rental)
Annual (General)

Oxygen
Night >5000ft
General >12500ft after 30 min (crew)
>14000ft for Flight Duration (crew)
>15000ft after 30 min (occupants)

Logbook
Simulated + actual IR Time, reference by instruments
Instructor Time only in actual IMC

Documents
Airworthiness / Registration / Radio / Operating Manual / W + B
Airworthiness valid as long as Maintenance is performed

IFR Chart Validation
56 Days

Fuel Requirements
Time To Destination, To Alternate, + 45 Minutes
Aantekeningen Theorie IF

Section

Remarks

Latitude  Parallel to the Equator
Longitude  Meridians from North to South Pole
Night     1 hr after SS - 1 hr before SR

Aircraft Categories
Airplane SE/ME - SES/MES
Rotorcraft - Heli/Gyro
Glider
Lighter than Air - Airship/Balloon

Aircraft Class
Complex aircraft  Retractable Gear, Controlles Pitch Prop
High Performance  > 200 BHP

Rating required for
Aircraft > 12500 lbs
Turbojet
Other

Section

FAA Written Test

Test Addendums

Legends
A/F Directory  Description Airport/Legends
Abbreviations  IAP Symbols and Chart Explanation

Rate of Climb Table, ft/Nm > ft/min
Approach Lighting System
Rate of Descent Table, ft/Nm > ft/min, Descent Angle (GS) > ft/min
En Route Chart Legend
Aircraft Equipment Suffixes (FPL)
Air Navigation Aids (VOR Service Volumes)

ETE Calculation
- All given Courses are Magnetic
- Find TAS/ALT/VAR/WIND in Flightplan
Calculate Magnetic Winds (East Variation = -xx)
Distances (from departure field to destination field)
Calculate Groundspeed per leg (pencildot on TAS)
Calculate legtimes

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