FLY WITH THE CORRECT CHARTS

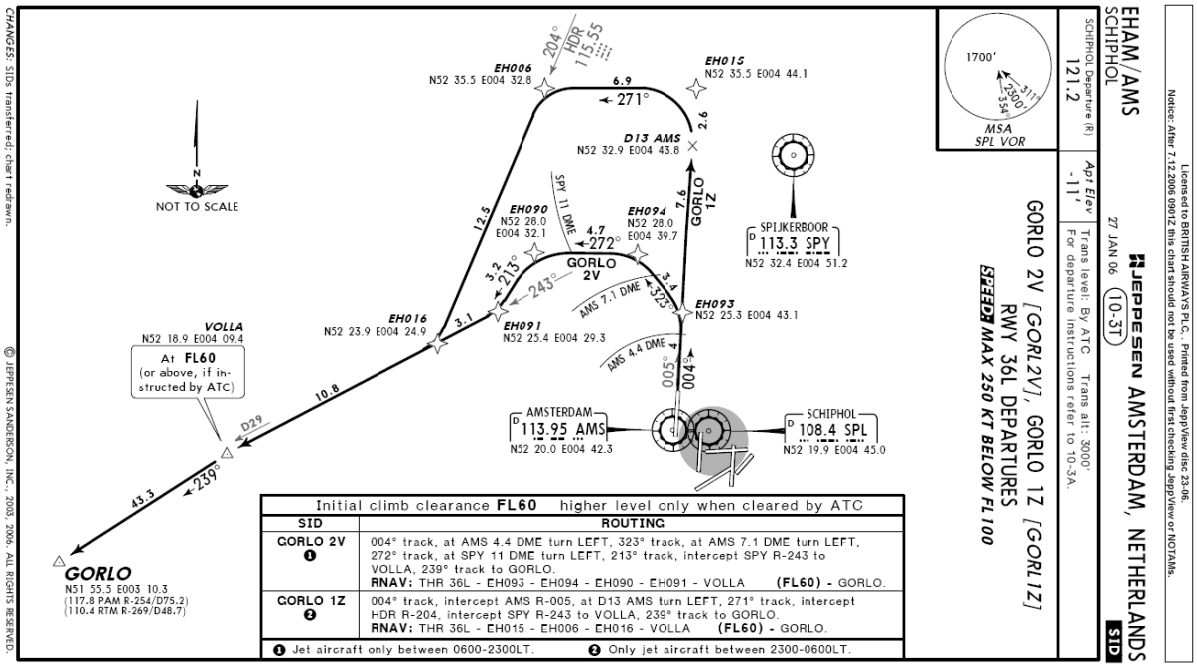
The use of proper and correct charts is essential in the flying world.
For this you would need the most up to date charts available, so that you can see the correct SID's (Standard Instrument Departure) and STAR's (Standard Terminal Arrival) .
Jeppesen are the world leaders when it comes to charts and this is what real pilots use as well.
They are highly detailed yet not cluttered so you can easily and quickly find the correct information.

- SID
- STARS
- NIGHT TRANSITIONS
- AIRPORT
- APROACH
- ENROUTE

SID CHARTS

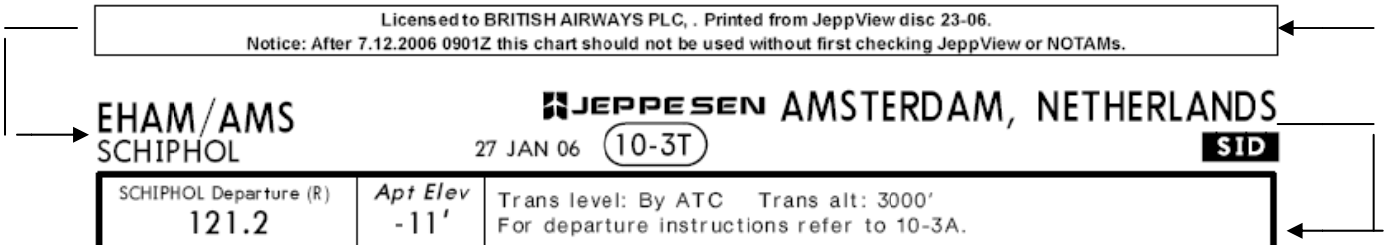
SID charts are necessary for a proper departure procedure. Because it was so different in the old days I would like to give you an example of what a SID is and how they came about.

Imagine you at Schiphol on the Delivery frequency and you get this clearance..
After runway fly heading 004.
At 1.4DME at the AMS VOR turn left to heading 323.
At 7.1DME from the AMS VOR turn left to heading 272.
At 11DME from SPY turn left to heading 213 and intercept the SPY R-243 to VOLLA.
After VOLLA fly heading 239 to GORLO.
You would need a lot of paper and ink to be able to remember all of that, right? and I am sure that mistakes would be made.
To prevent such mistakes they created SID's. In a SID you will find all the relevant information to execute a proper departure.
The text in blue above relates to the GORLO 2V departure route (GORL2V)SID.
You can see that it is a lot easier to just say GORLO 2V instead of all the text noted in blue which are open to mistakes.
Let's have a look at a SID chart.



On this chart we can see how the route should be flown after departing runway 36L.
We see heading, distance, but also frequencies for VOR and NDB's. We also see numerous FIXAIDS, denoted by star symbols. It tells us what altitude we must be when passing VOLLA intersection and the end of the SID in this case that is GORLO, hence why this chart is called the GORLO 2V departure chart.
We will delve a little deeper now by breaking the charts into sections.

Reading a chart is different to reading a book. We have always learned to read from left to right but with charts we start by reading from right to left. At the second line we start reading from the left.



In this upper part we see information that is relevant to the Airport.

Top right, we can see that it is a SID chart pertaining to Amsterdam. In the middle we see the date till when the chart may be used illustrated with an index number. All charts are grouped into indices, so that you can easily and quickly find the correct chart. On the left side you see the four lettered ICAO code and the three lettered country code.
On the second line you see the frequency for SCHIPHOL Departure, which in this case is 121.20. You also see the Airport Elevation (Apt Elev) with a height of

minus 11ft. Further information is the **Transition Level** and **Transition altitude**. You also see references that have to do with your departure. The chart advises you to refer to map 10-3A which indicate departure instructions.

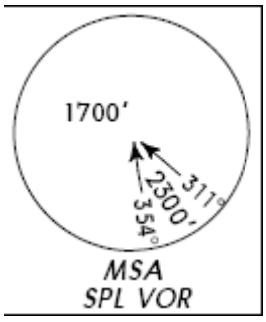
GORLO 2V *[GORL2V]*, GORLO 1Z *[GORL1Z]*
RWY 36L DEPARTURES
SPEED: MAX 250 KT BELOW FL100

In the next line you see the Departures that are depicted on this chart.
GORLO 2V is the name of this departure and is written as GORL2V.
This GORLO 2V departure is only suitable for the 36L.
Below that you see the maximum speed in knots and the maximum Flight Level (FL) which should be maintained without ATC. ATC can always overrule this flight level.

On the right side (it can in some charts also be on the left) we see the Minimum Sector Altitude.

The MSA is always built around a VOR.

This important piece of information shows what altitude you can fly safely and you can not fly lower. In this case, the VOR is SPL. If you are flying between 354 and 311 degrees Heading, you've got a Minimum Sector Altitude of 2.300ft.

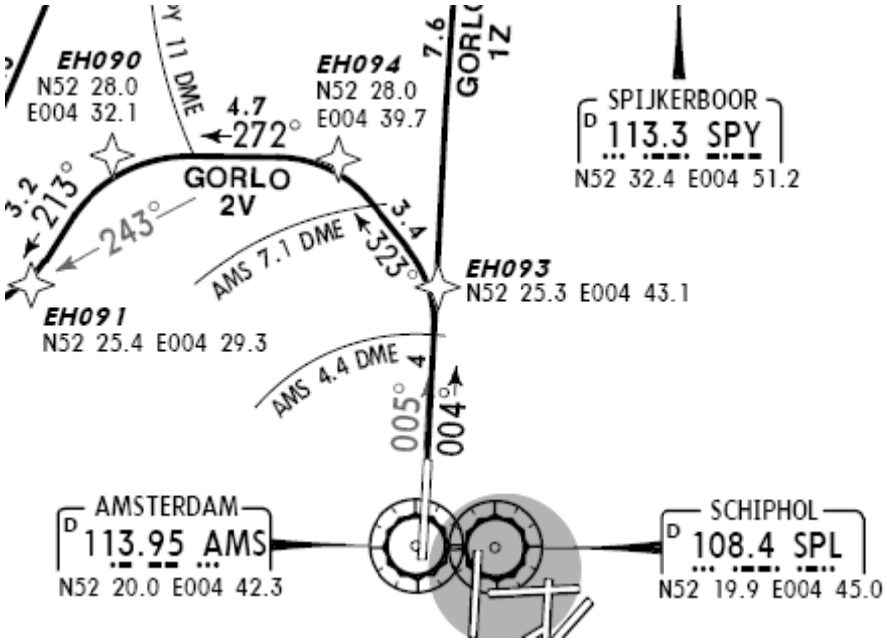


If you are flying between 355 and 310, then you should not proceed any lower than 1.700 ft in order to maintain a safe altitude.

For many charts it is not possible for everything to be displayed to scale, and so we often see the expression NOT TO SCALE.

On map 10-3T we see 2 routes to GORLO departing from the 36L. Both can be used.

Just to clarify the handling of ATC communications.
If ATC gives you a DEPARTURE that you do not know because you do not have these charts, **DO NOT accept the DEPARTURE** and ask for another departure or possibly VECTORS to GORLO.



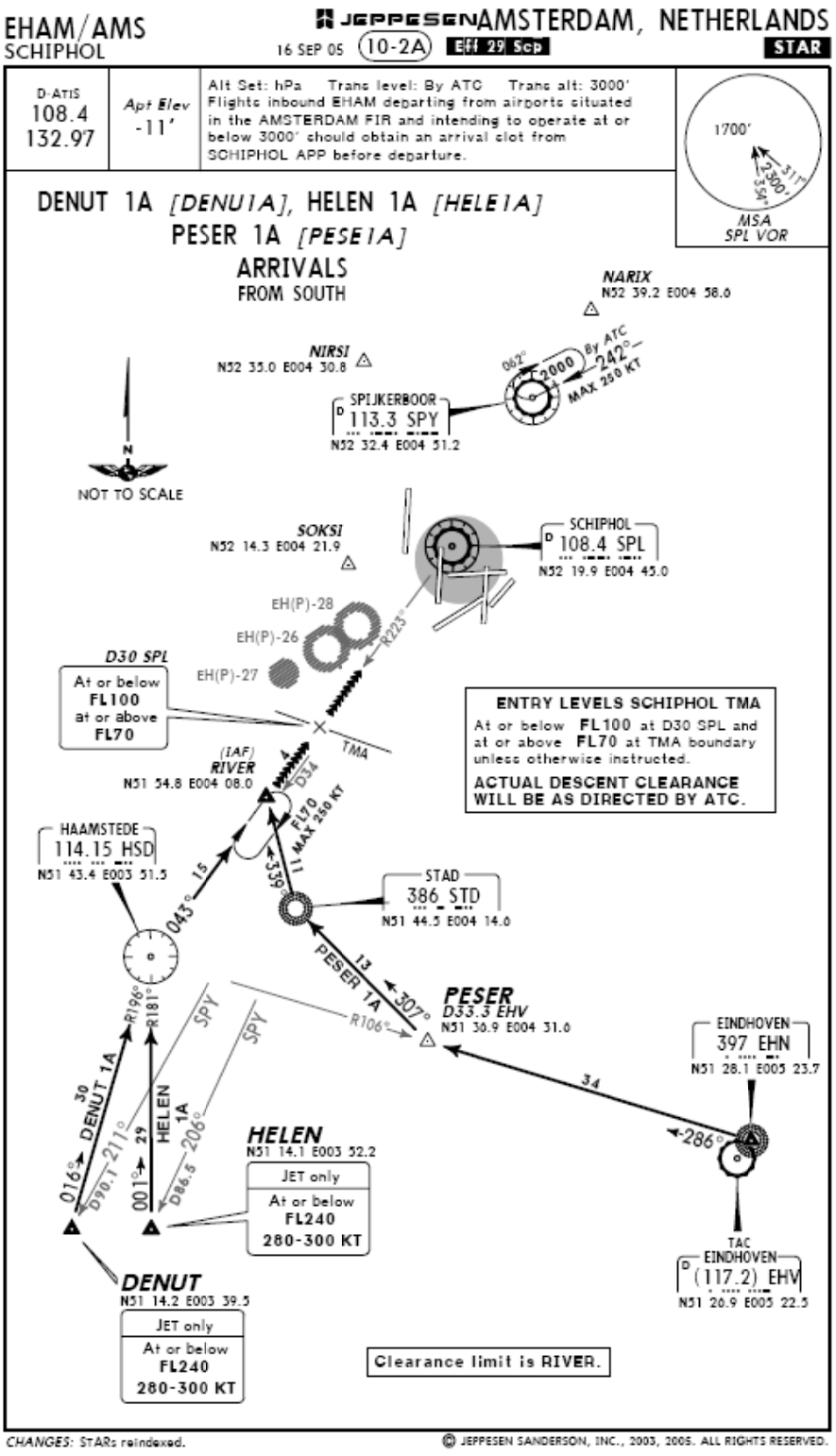
In this diagram, we see the name of a VOR and the frequency of this VOR.
Underneath is the Morse code and it's longitude and latitude.
AMS (AMSTERDAM VOR) has a frequency of 113.95.
The letter "D" indicates that VOR DME equipment is provided.

In the above chart we also see information such as Heading and distances between various FIX s (for example between EH093 and fix EH094 is a distance of 3.4 NM). We also see that a DME ARC from AMS VOR runs between these two fixes at a distance of 7.1 NM.

You can also see that the GORLO 2 V and GORLO 1Z from FIX EH093 go their separate ways and at EH016 merge again to go in the same direction.

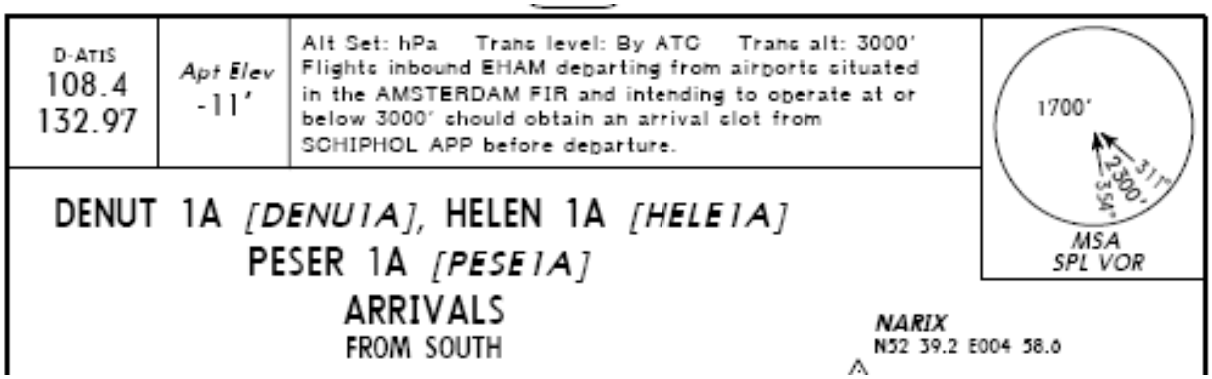
STAR CHARTS

A STAR is always an "Arrival" and never an "Approach" therefore there is a difference.
The main substantive difference is that the "Arrival" charts
end with an IAF (Initial Approach Fix), and the "Approach" begins precisely with this FIX. Keep this in mind.
On these charts are the routes from the IAF (Initial Approach Fix) to follow until you land.



EHAM/AMS
SCHIPHOL
JEPPESEN AMSTERDAM, NETHERLANDS
16 SEP 05 (10-2A) Eff 29 Sep
STAR

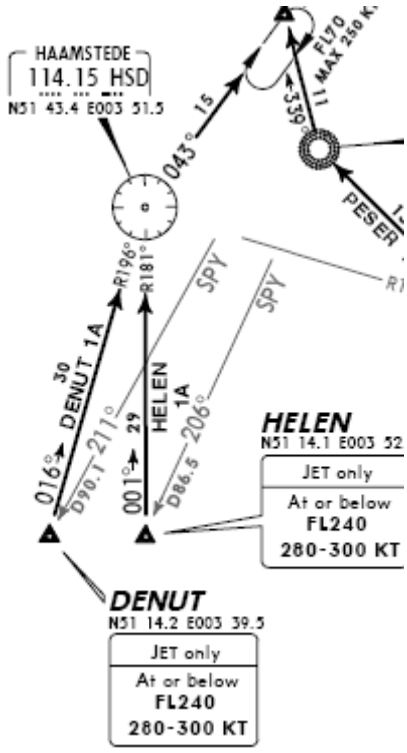
In this part of the chart you see from Right to Left the word STAR (Standard Terminal Arrival Route). Furthermore, we again see the effective date of the chart. Never use this chart beyond this date. The 10-2A is the index number and you also see a date that tells you when the chart was made.



In the second part of the chart we read an ATIS frequency based on the last VOR of your approach, in this case SPL. We see the Airport Elevation of -11ft. That is the height of the airport in relation to the sea, so 11ft below sea level. In the middle section you can read various restrictions associated with the Schiphol TMA. Thus we see that the Transition Level is given by ATC, but that the Transition Altitude is 3.000ft. On the right side we see the MSA again, which is based on the VOR SPL.

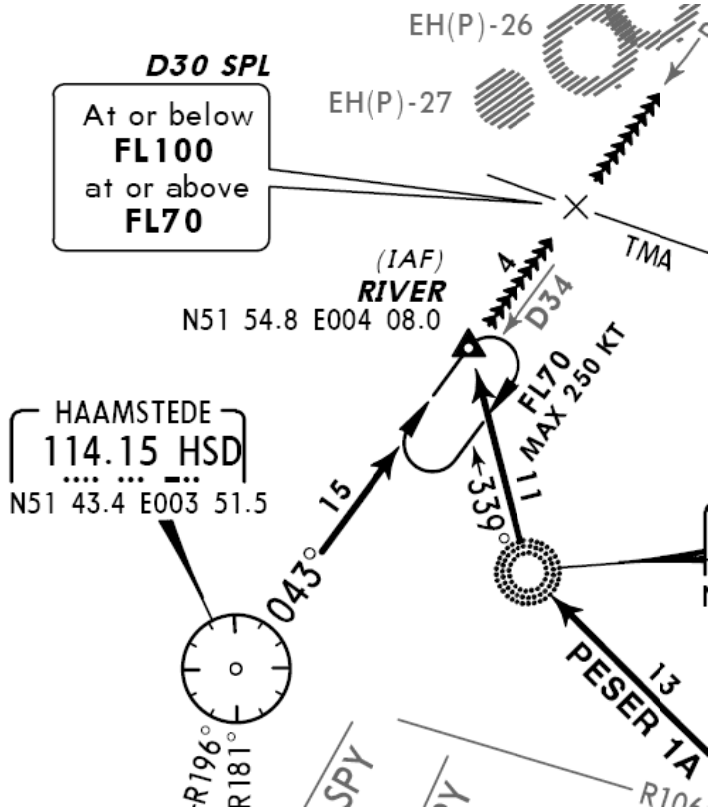
In the middle part we see the correct name of this STAR. In this case it is called the DENUT 1A, and you write it as DENU1A.
These are arrivals from the south. So if you approach from the north then you will certainly not be able to take a DENU1A.

We will work with the HELEN1A arrival here. In this portion of the chart we can see some very important information near HELEN.
For example, you should only approach HELEN if flying a JET aircraft.
Also we can see that you must overfly HELEN with an altitude at or below FL240. And you see that the speed must be between 280 and 300 KIAS.
In a FMC we could easily program in HELEN, but it might be difficult to find HELEN on a chart because it is an intersection.
Therefore we see also a Radial from SPY with an outbound of 206 degrees and 86.6 NM from SPY and a Radial from HSD. With these two points you can easily determine where HELEN is using the, (VOR track method).



Keep in mind that the black arrows show the direction that you have fly and that the grey stripes are only "Guides" that you cannot fly.
The distance between Helen and HSD is 29NM with a HEADING of 001 degrees, or, from an inbound

HSD radial of 181 degrees (inbound radial you always fly in an opposite direction).



After HSD VOR we would fly a heading of 043 degrees for a distance of 15NM in order to reach RIVER. RIVER is also the point where your IAF starts.
At RIVER you see a holding pattern depicted,
and you would need to fly this holding if you have not received clearance from ATC to continue your Approach.
Most charts will have a Holding at the IAF and this also where your arrival segment ends.

You must reach RIVER at an altitude at or below FL100 but not lower than FL70.

In regards to the Holding pattern itself, this must be flown at FL70 with a speed of maximum 250 KIAS.

At the very top you see some areas marked in grey, these are zones where you are strictly prohibited to fly.

You can also that after RIVER you have 4NM before reaching the Schiphol TMA border.
From that point on you would be under the control of Amsterdam Approach, and leave Amsterdam Centre behind you.

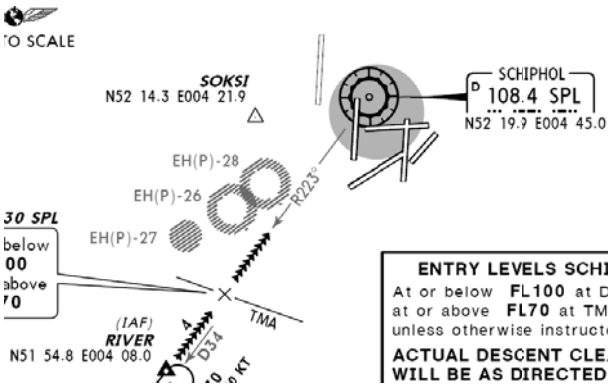
In the next segment we will see information relevant to the TMA.

ENTRY LEVELS SCHIPHOL TMA

At or below **FL100** at D30 SPL and at or above **FL70** at TMA boundary unless otherwise instructed.

ACTUAL DESCENT CLEARANCE WILL BE AS DIRECTED BY ATC.

It is important to know, that you must never of your own accord, descend an aircraft without prior clearance being received, even if your FMC tells you to. This clearance can only be gotten from the ATC with whom you are in contact.



RIVER is on the 223 outbound radial at a distance of 30NM from SPL VOR. SID and STAR charts are therefore very important charts to have, that way you have the correct approach or departure route which you must follow according to certain rules.

Therefore it is important to be well-prepared for your flight.

I personally certainly need about half a hour to properly prepare my flight
With the proper charts, you can easily keep track of your work flow.

APROACH CHARTS

Approach charts begin at the IAF (initial approach fix) and where the STAR ends. This point is important because you are now about to enter the actual TMA.

EHAM/AMS
SCHIPHOL

JEPPESEN
24 MAR 06 (11-8A)

AMSTERDAM, NETHERLANDS
LOMKO 1 Apch &
CAT II ILS DME Rwy 36C

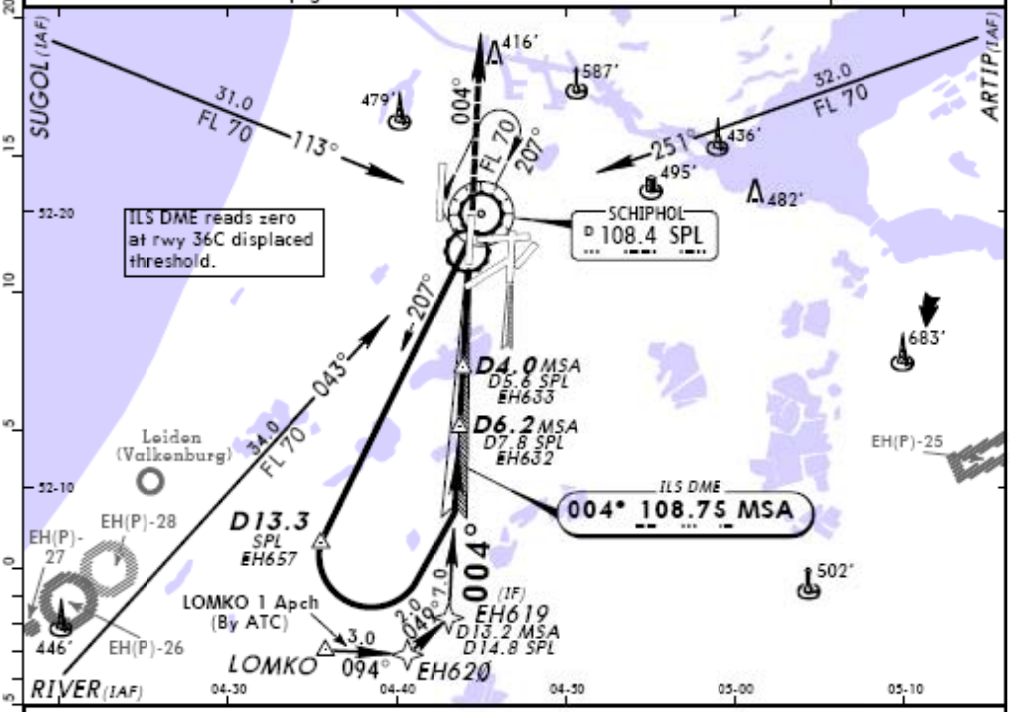
D-ATIS Arrival	SCHIPHOL Approach (R)	SCHIPHOL Arrival (APP/R)	SCHIPHOL Tower	Ground
108.4 132.97	119.05 121.2	118.4 131.15	119.22 118.1 118.27	121.8

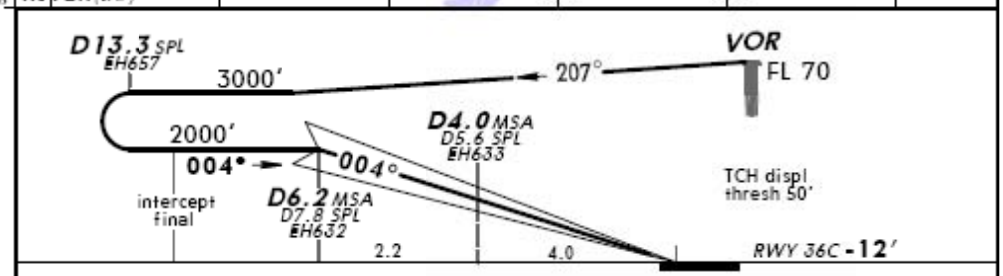
LOC MSA	Final Apch Crs	GS	CAT II ILS	Apt Elev -11′
108.75	004°	No Altitude published	RA 100′ DA(H) 88′(100′)	RWY -12′ (BELOW SEA LEVEL)

MISSED APCH: Climb on track 004° to 2000′. Inform ATC.

Alt Set: hPa Rwy Elev: 0 hPa Trans level: By ATC Trans alt: 3000′

1. Special Aircrew & Aircraft Certification Required. 2. WARNING: CVFR tfc up to 1500′ in the Valkenburg CTR. 3. Simultaneous apchs on rwy 36R may be executed. When established on ILS maintain 160 KT until D4.0 MSA or as directed. 4. For additional info refer to 10-1P pages.





Gnd speed-Kts	70	90	100	120	140	160
GS 3.00°	377	485	539	647	755	862

HIALS-II
PAPI
2000′ on 004°

JAR-OPS

STRAIGHT-IN LANDING RWY 36C
CAT II ILS

ABCD
RA 100′
DA(H) 88′(100′)

RVR 300m [1]

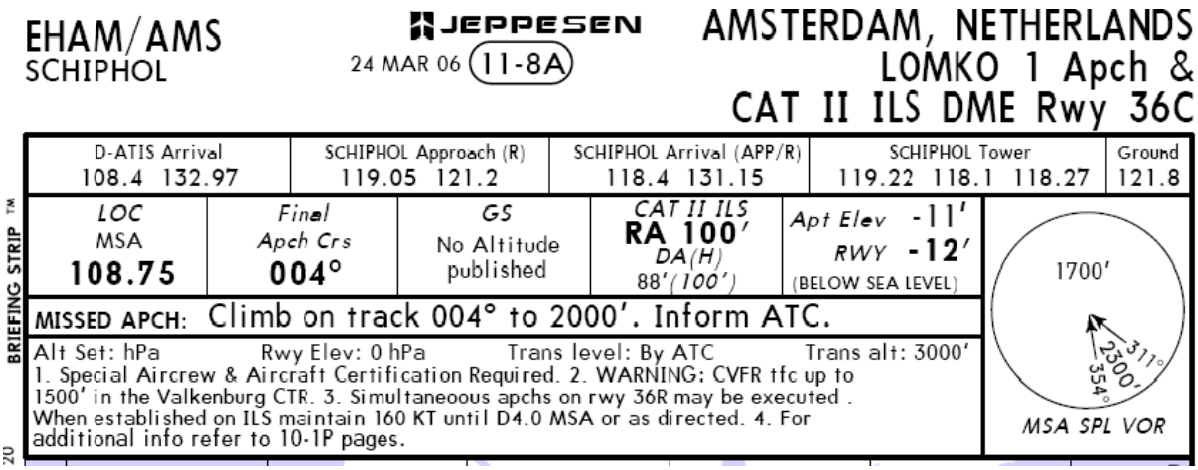
[1] Operators applying U.S. Ops Specs: Autoland or HGS required below RVR 350m.

PANS OPS 4

CHANGES: ILS ident.

The approach chart is divided into four sections.

- Airport information
- Map
- Profile View
- Minimums.



At the far right top we see that this chart relates to runway 36C, that is has an ILS and that it can cater for aircraft up to a CAT 2 (Category).

The categories are divided into:

- ILS Cat. I - A precision instrument approach and landing with a decision height of not less than 60 m (200 ft) and a visibility of not less than 800 m or a runway visual range of not less than 550 m.

- ILS Cat. II - A precision instrument approach and landing with a decision height lower than 60 m (200 ft), but not less than 30 m (100 ft) and with a runway visibility range of not less than 350 m.

- ILS Cat. III is subdivided even further.:
    - ILS Cat. III A - A precision instrument approach and landing with a decision height lower than 30 m (100 ft) and a runway visual range of not less than 200 m.

    - ILS Cat. III B - A precision instrument approach and landing with a decision height lower than 15 m (50 ft) and a runway visual range less than 200 m but not less than 50 m.

    - ILS Cat. III C - A precision instrument approach without a decision height and without a runway visual range limit.

RA (Radar Altitude) is the minimum altitude for a missed approach. So if you are at RA and you do not have the runway in sight, then you have to execute a missed approach as published on the chart. RA is only used for an ILS approach. The RA is based on MSL.

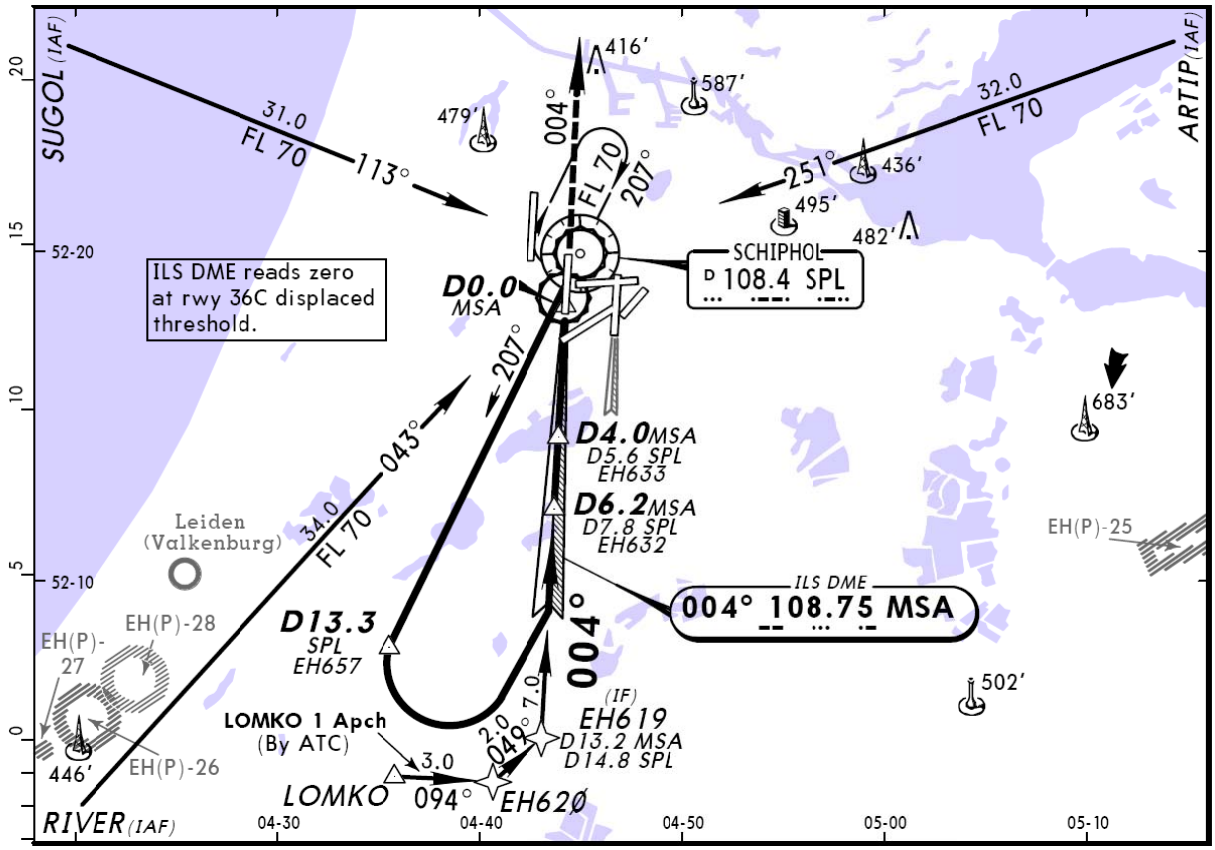
The DA (Descent Altitude) is used during a precision approach and is the minimum altitude before performing a missed approach, should you not have the runway in sight. These altitudes are based on MSL.

The DH (Decision Height) is used during a non precision approach an is based on AGL.

Further to the right we see the height of the runway, and in order to overcome any confusion in brackets we see that it is (BELOW SEA LEVEL).

On the next line we see Missed Approach. Here it tells us how we would perform such a procedure.

The last block tells us at what settings your equipment should be set.
In this case it relates to the HPA barometric pressure settings.
ATC would inform you of the TL and the TA would be 3000ft.
It also advises you about restrictions for your approach. In this case at 4NM from touchdown you may not exceed 160 KIAS (indicated airspeed).

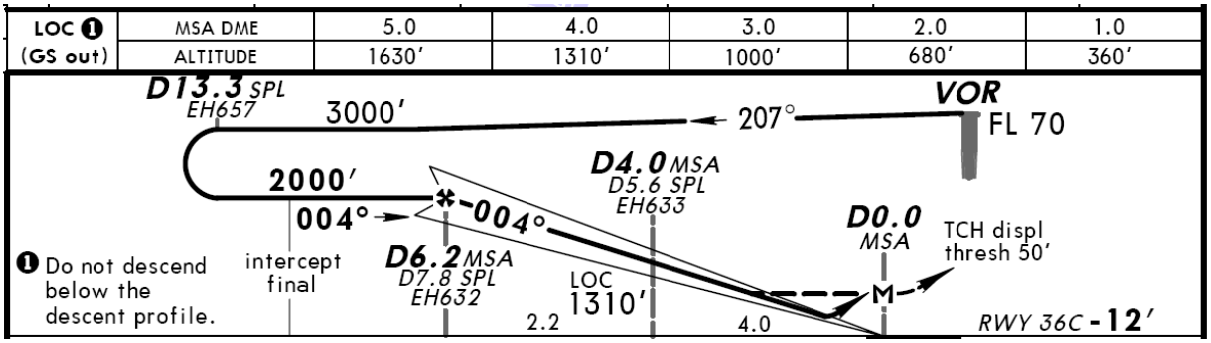


Plan view shows a map. This way you have a quick overview of how the approach route looks, and gives you all the necessary information such as Heading, VOR beacon's and frequencies.

From the IAF you fly direct to the SPL VOR. All IAF points end with a VOR beacon no matter what side you approach from.

On the chart we can also what this approach is called, in this case it is the LOMKO 1 Apch.
The heading you would need to fly from SPL is shown along with the distance. Thus the distance between SPL and fix EH657 is 13.3 NM.

At the far right we see an example of an obstacle at 683ft, at this point you are not allowed to fly any lower than that.
If ATC instructs you to perform your approach as published, then you must follow all instructions on the chart and you must never deviate from that route.

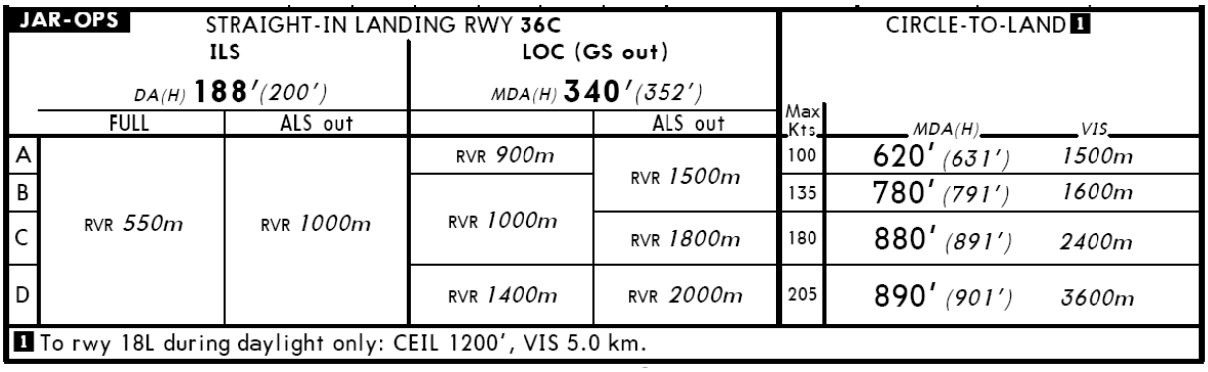


In this section you see the profile view.
On the top we see distances with corresponding altitudes. These are based on the Glide slope or LOC.
On the right you see VOR FL70, this means that at SPL VOR your altitude should be FL70 at standard barometric pressure.
You leave SPL on a heading of 207 degrees to fix EH657 whilst descending from FL70 to 3000ft (at local barometric pressure) because we already know that the Transition Level is 3000ft.
From EH657 you turn to a heading of 004 degrees whilst descending to 2000ft.
At 6.2NM from touchdown or 7.8NM from SPL VOR, is where you would become Fully Established on the LOC, and therefore automatically descend down the glide slope.

You also see two black arrows pointing upwards near the touchdown zone. One has a continuous line and the other a broken line.
The broken line is only used in non precision approaches (No ILS) and it shows the minimum altitude M, where you execute a missed approach should you not have the runway in sight.
The continuous line is only used in a precision approach and in general is lower than the broken line, again this is the minimum altitude where a missed approach would be executed should you not have the runway in sight.

Please note, there may be times when your aircraft is equipped with proper equipment, with which you could fly a CAT-II or CAT-III approach, but that would be associated with other rules such as RVR.

To make the missed approach procedure clearer we need to take a look at the following section.



JAR-OPS	STRAIGHT-IN LANDING RWY 36C				CIRCLE-TO-LAND 1		
	ILS		LOC (GS out)				
	DA(H) 188′(200′)		MDA(H) 340′(352′)				
	FULL	ALS out		ALS out	Max Kts	MDA(H)	VIS
A	RVR 550m	RVR 1000m	RVR 900m	RVR 1500m	100	620′ (631′)	1500m
B			RVR 1000m		135	780′ (791′)	1600m
C				RVR 1800m	180	880′ (891′)	2400m
D			RVR 1400m	RVR 2000m	205	890′ (901′)	3600m

1 To rwy 18L during daylight only: CEIL 1200′, VIS 5.0 km.

We again see the DA and DH but now for Precision Approaches (ILS) and Non Precision Approaches.

Resuming:

In an ILS approach for runway 36C, you would execute a missed approach when reaching 188ft which corresponds to the continuous black line mentioned earlier. In a Non Precision Approach you would execute a missed approach at 340 which corresponds with the broken black line.

RVR (Runway Visual Range) is the distance of visibility along the lenght of the runway.
We can see that the RVR for CAT A, B, C and D is 550 meters and FULL implies that all runway lights are operative.
Should the lights be in-operative (ALS out : Approach Lighting System) then the RVR for these category would be 1000 meters.
With Non precision approaches the category of aircraft does make a difference to the RVR required.

Important note:

We have just seen what kind of information we can find on the charts about approach and the MDA in combination with RVR which must be obeyed before a pilot must decide to execute a missed approach procedure.

Now what if the weather conditions are perfect, the RVR is ok and we have almost reached the MDA but we still have not got our “Cleared to land” instruction. Are we allowed to continue decent below the MDA ????

The answer is YES.....but only under the following conditions:

You are allowed to descent below the DA or MDA if you, the pilot, are convinced that you are in the position that you can safely execute a safe landing and rollout on the runway which you where planning to land.
Furthermore, the aircraft must be established on the approach and enough **visuel reference** must be available, meaning.....

CAT I ILS or a Non-precision approach with at least one of the following conditions:

- Elements of the approach lights
- Threshold markings
- Threshold lights
- Threshold identification lights
- A visual approach slope indicator (e.g. PAPI)
- Touchdown zone or touchdown zone markering
- Touchdown zone lights
- Runway edge lights
- Other authorized visual reference lights specifically mentioned for the approach (non-precision only)
-

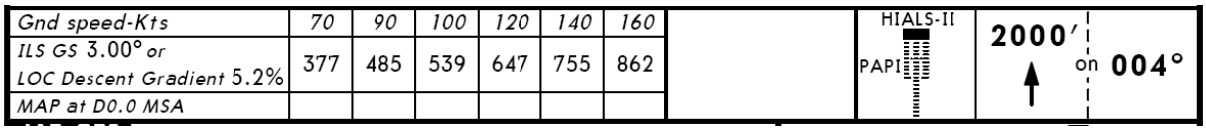
ILS CAT II and CAT III

With a minimum of 3 lights in sequence

- the Centre line of the approach lights
- the touchdown zone lights
- The runway centerline lights
- The runway edge lines
- Or combination of all mentioned above.
- For CAT II a lateral element of the ground pattern

Conclusion:
You are allowed to continue descent below the MDA under certain conditions but remember you do NOT land without landing clearance.

We continue with the circle to land. These are based on maximum approach speeds and MDA or DH.



This block shows you what speed you should maintain to stay on the glide slope. If for example we were flying at 140 knots GROUND SPEED (not Indicated Airspeed) then we should descend with a rate of -755ft per minute from the point of interception.
On the right we see the type of lighting available, in this case PAPI lights and the missed approach, climb to 2000ft on heading of 004.

Next we see some symbols from charts and their meanings

Airports

Civil	Military	
		Airport
		Seaplane Base
		Heliport
		Airport not having a Jeppesen Approach Chart
		LAA Local Airport Advisory
		AFIS (Aerodrome Flight Information Service)
		Airport elevations are in feet AMSL
		Authorized landing Area
		

Airport locations labeled in capital letters indicate a Jeppesen Approach Chart is published for that airport and is indexed by that name.

When the airport name is different, it is shown following the approach chart indexing in small letters. Available terminal communications are provided in the COMMUNICATIONS tabulations. Airport is listed under the name in capital letters - Douglas Mun is listed under CHARLOTTE. When only the airport name is shown, the airport is listed under the airport name - Owens is listed under Owens Apt.

Boundaries

BOUNDARIES

ADIZ, DEWIZ and CADIZ

FIR, UIR, ARTCC or OCA boundary.

International boundary

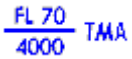
Time zone boundary.

QNH/QNE-boundaries

ALTITUDE LIMITS AND TYPES OF CONTROL

CTR-Control Zone
ATZ-Aerodrome Traffic Zone
TIZ-Traffic Information Zone

UTA-Upper Control Area



TMA-Terminal Control Area
OCTA-Oceanic Control Area

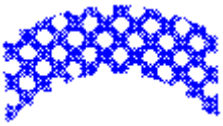
CONTROLLED AIRSPACE

Controlled airspace shown in white.
Uncontrolled airspace shown as a tint.

Controlled airway/route.

Uncontrolled airway or advisory route.

Control Area boundary within controlled airspace (CTA, TMA).



U.S. Class B airspace. Waffle screen shows lateral limits.

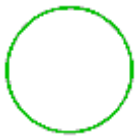
Radio Frequency Sector Boundary.

Radio boundaries of control or service unit.

Boundaries within TMAs or CTAs defining different altitude limits and/or sectorizations.

U.S. special VFR weather minimums for fixed wing aircraft are not authorized within the lateral boundaries of the surface areas of Class B, Class C, Class D, or Class E airspace designated for an airport.
Australia Mandatory Traffic Area. Traffic information is exchanged while operating to or from an airport without an operating control tower within the area.

Control Zone or Aerodrome Traffic Zone (controlled).

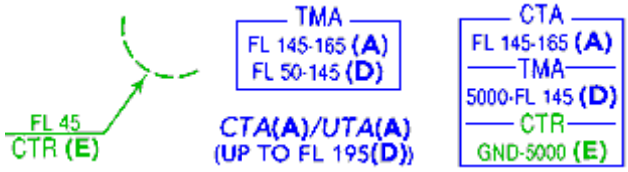


Aerodrome Traffic Zone (no control). Aircraft broadcast intentions on standard enroute frequency, and listen on same when within such zones.
Japan Information Zone (no control) within which special VFR may be cleared by an air-ground station.

U.S. Class C airspace.

Canada Class C airspace.

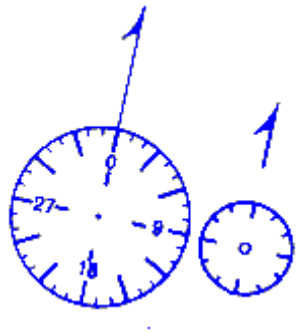
ICAO AIRSPACE CLASSIFICATIONS



Airspace classification is designated by the letters **(A)** thru **(G)**. Classification **(A)** represents the highest level of control and **(G)** represents uncontrolled airspace. The definitions of each classification are found in the Glossary and the Enroute sections and Air Traffic Control section of the airway manual. The airspace classification letter is displayed in association with the airspace type and vertical limits.

Navaids

NAVAID SYMBOLS

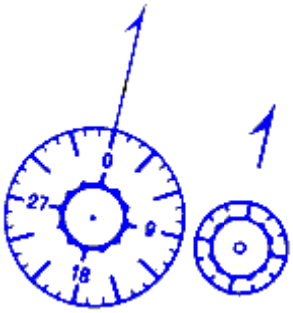


VOR (VHF Omnidirectional Range)

Terminal Class VOR

TACAN (Tactical Air Navigation) or DME (DistanceMeasuring Equipment)

Terminal class TACAN



VORTAC/VORDME

NDB (Nondirectional Radio
Beacon)

Compass Locator (Charted only when providing an enroute function or TWEB); or a SABH
class radio beacon.

Magnetic north ticks on navigational facilities fit compass roses on IFR Enroute Chart Plotters, making it possible to measure the magnetic bearing of any track.

LOC, LDA, or SDF Front Course

LOC Back Course

MLS Course

KRM Course

FAN MARKERS

Elliptical Pattern

Bone Pattern

Fan Marker and NDB

BROADCAST STATION

Commercial

Armed Forces Radio Station

NAVAID IDENTIFICATION

Navaid identification is given in shadow box when navaid is airway or route component, with frequency, identifier, and Morse Code. DME capability is indicated by a small "D" preceding the VOR frequency at frequency paired navaids. VOR and VORTAC navaid operational ranges are identified (when known) within the navaid box except on USA and Canada charts. (T) represents Terminal; (L) represents Low Altitude; and (H) represents High Altitude.

Heavier shadow boxes are gradually replacing existing shadow boxes. There is no difference in meaning.

On HIGH/LOW altitude enroute charts, geographical coordinates (latitude and longitude) are shown for navaids forming high or all altitude airways and routes. On Area charts, geographical coordinates are shown when navaid is airway or route component. Some L/MF navaids are combined in the shadow box even though they are not part of the airway/route structure, except on US and CA charts. They are used for course guidance over lengthy route segments when airway/track is designated into a VOR.

When VOR and TAC/DME antennas are not co-located, a notation "DME not Co-located " is shown below the navaid box.

Off-airway navaids are unboxed on Low and High/Low charts. TACAN/DME channel is shown when VOR navaid has frequency paired DME capability. When an L/MF navaid performs an enroute function, the Morse Code of its identification letters are shown. (Off-airway VORs are boxed except on US and CA charts.)

When TACAN or DME are not frequency paired with the VOR, the TACAN is identified separately. The "Ghost" VOR frequency, shown in parentheses, enables civilian tuning of DME facility.

The navaid frequency and identification are located below the location name of the airport when the navaid name, location name, and airport name are the same.

LOC, SDF, LDA, MLS, and KRM navaids are identified by a round cornered box when they perform an enroute function. Frequency identification and Morse Code are provided. DME is included when navaid and DME are frequency paired.

Fan marker name and code.

There is still much more to tell you but this information is enough for a proper way to read charts.
Perfection can only be obtained through regular exercise. You can always use IVAO to practice a published missed approach, by means of simulation.