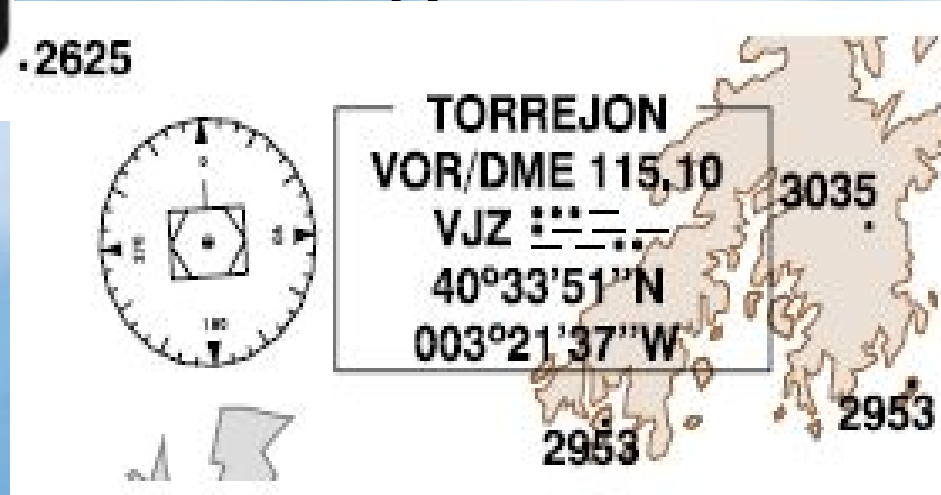


VOR = VHF Omni-directional Radio Range

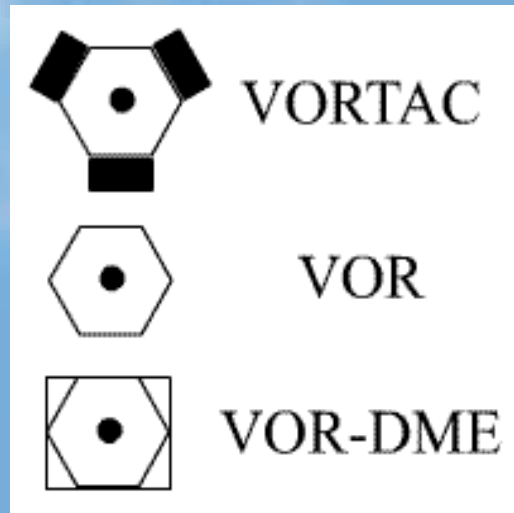
What comes to mind?

◀ Cockpit instrument

▼ Navigation charts

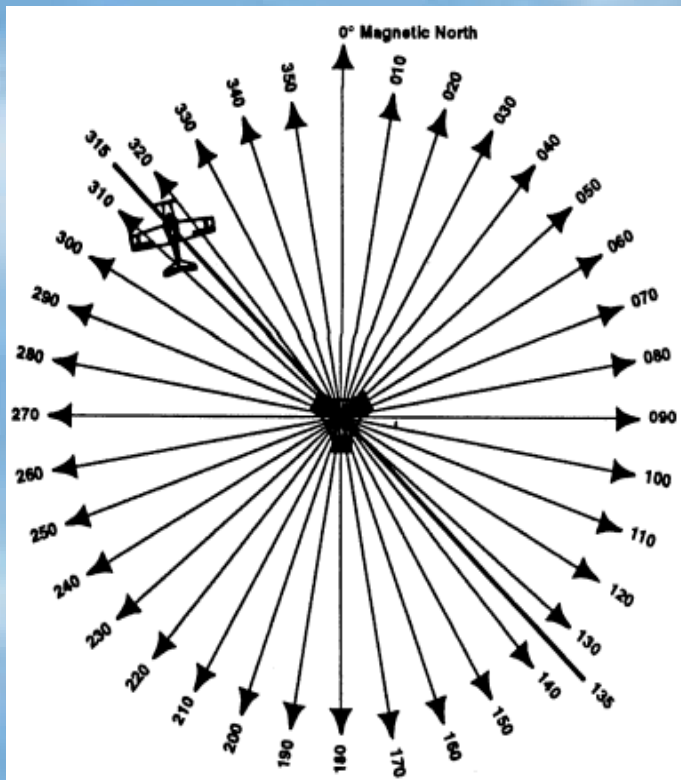


▼ Different types





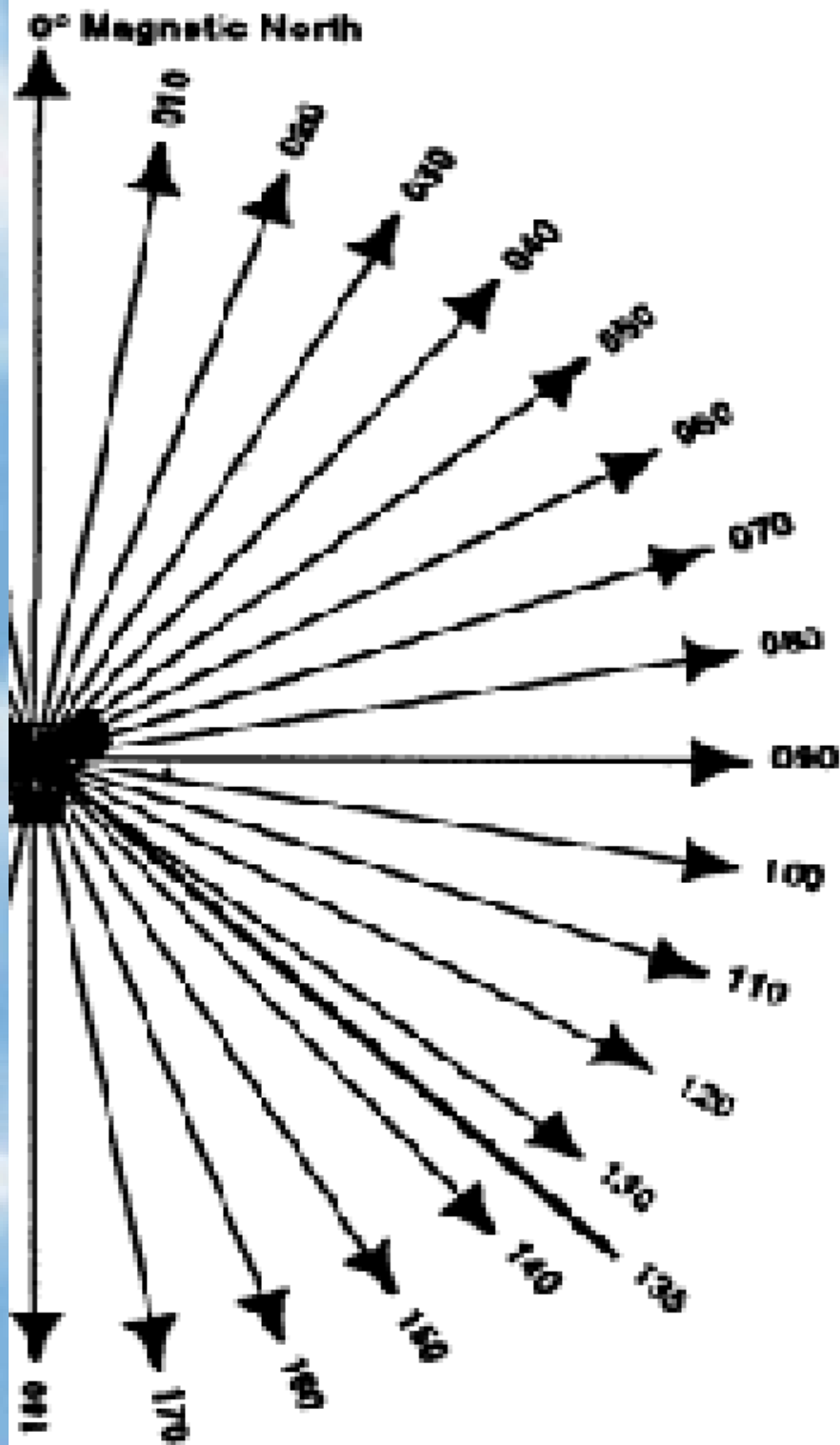
~~FMC~~, does not come to mind, although it could use VOR data, but, in this document VOR is: **direct tuning to the VOR beacon**



VOR radiates beams to all sides

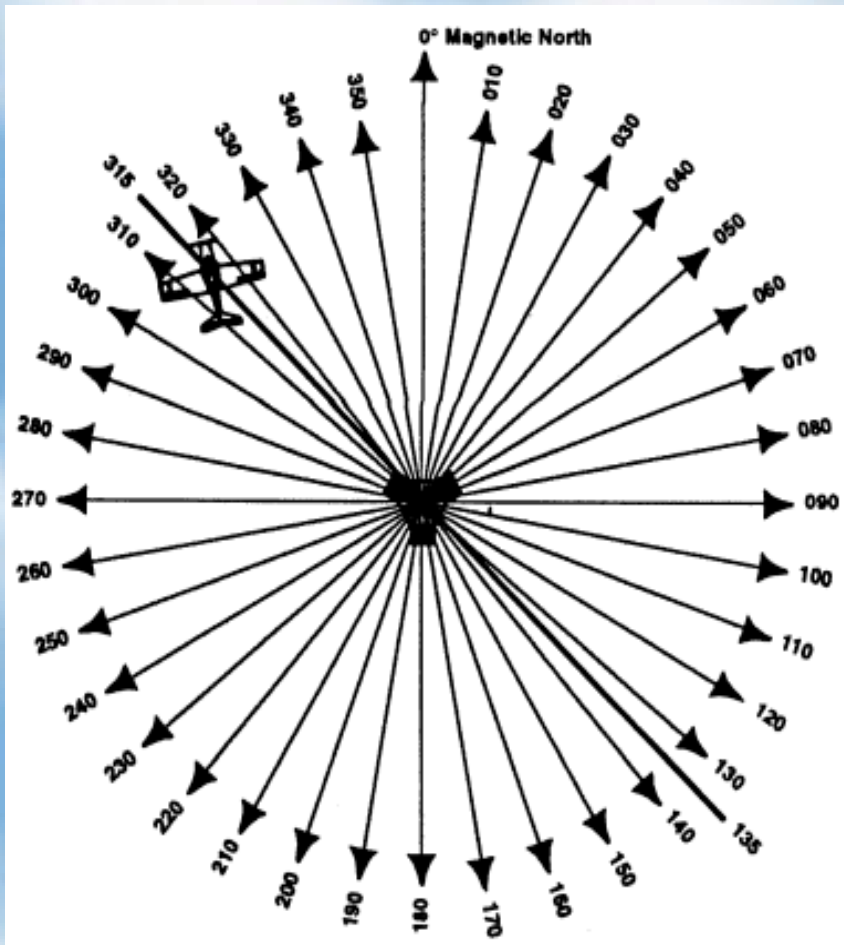
These beams are called: **RADIALS**

Pattern like compass rose
360 degrees



VOR RADIAL
POINTS ALWAYS
away FROM
the BEACON !!

When we say «radial»,
it is the line starting
at the beacon and
pointing away from the beacon



RADIAL gives position
in relation to the beacon

Regardless
the actual heading

Radial = track
Heading = wind

COCKPIT INSTRUMENT READING



COURSE

selected by direction of the needle

HEADING

selected with the compass in mind

RADIAL

selected by choice for navigation



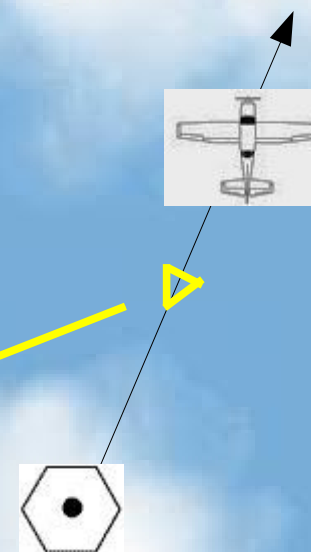
RADIAL

selected by choice for navigation

↑
TO or FROM

IN
FRONT or BEHIND ↓

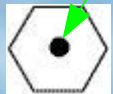
TO/FROM INDICATOR ALWAYS POINTS **TOWARDS** THE BEACON
IT TELLS WHERE THE BEACON IS, SEEN FROM YOUR POSITION



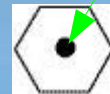
IN THAT DIRECTION
IS THE BEACON

MY COURSE SELECTOR
POINTS HERE AS WELL
TO THE BEACON

DIFFERENCE course pointing inbound or outbound



EQUAL



TO & FROM Always POINTS TOWARDS the BEACON

3 cases of aircraft ON radial 030

heading 355

Radial 030

H 355 R 030

heading 030

Radial 030

H 030 R 030

heading 210

Radial 030

H 210 R 030

DIFFERENCES

- HEADING
- TO & FROM
- FRONT & BEHIND

RADIAL=POSITION in relation to VOR

TRACK ≠ HEADING!



HOLDING: defined by 4 elements:

1. NAVIGATION POINT ('FIX'; VOR, NDB)

2. INBOUND TRACK (!!)

3. DIRECTION

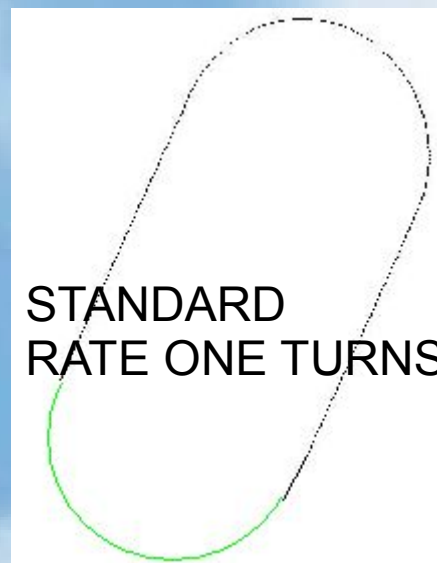
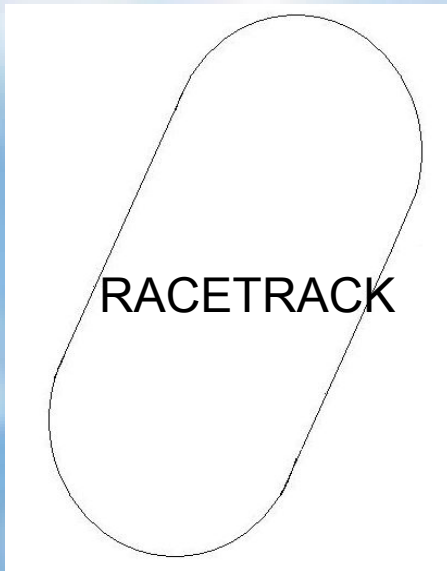
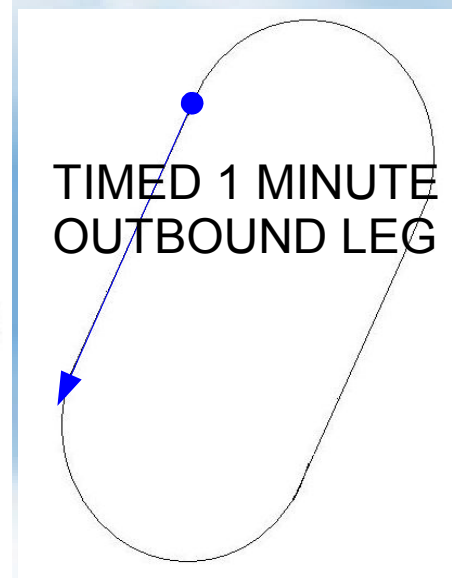
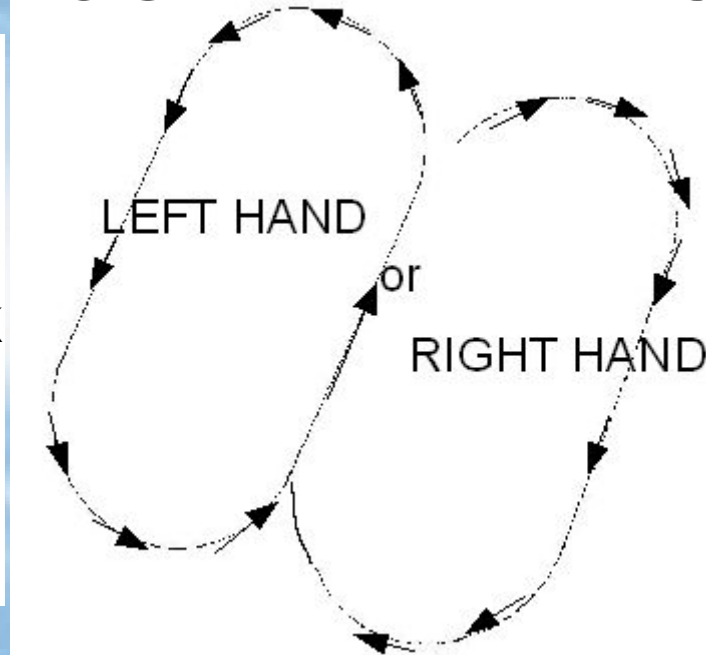
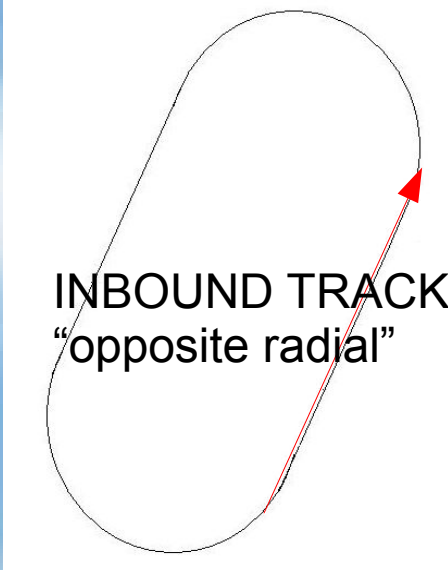
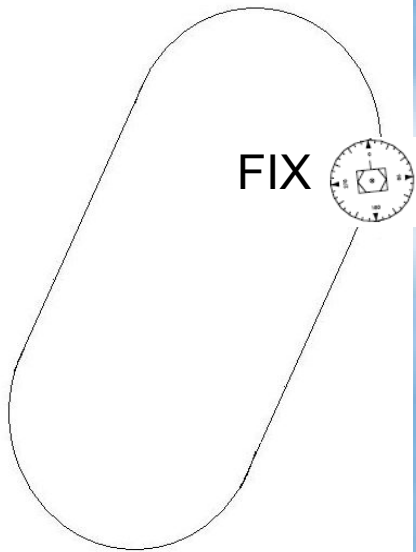
RIGHT_{hand}(=STANDARD) or LEFT_{hand}

4. LEG TIME (in minutes) $1 \leq 14000 ; 1,5 > 14000$

(-SPEED)

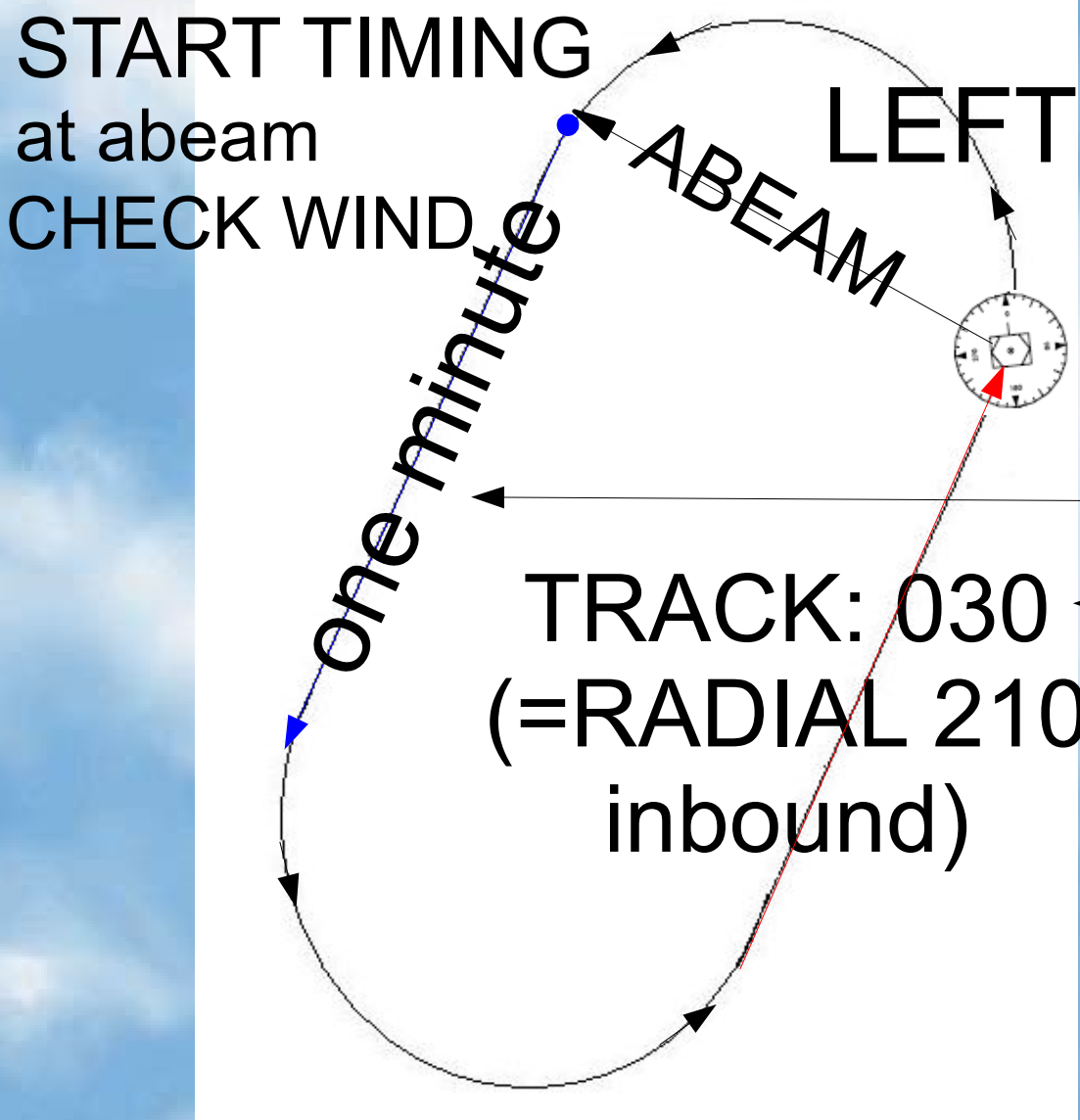
INBOUND TRACK = RADIAL +/- 180
RECIPROCAL

HOLDING = FOUR ELEMENTS



ONE FULL HOLDING TAKES
4 MINUTES

HOLDING: 4 elements:



DIRECTION

POINT (fix)

outbound **LEG**

inbound **TRACK**

Race track pattern

TOTAL TIME = 4 MINS

standard rate turn (3° per second)

ATC PHRASEOLOGY:

"ENTER PUBLISHED HOLDING OVER:
'FLORA' "

Where is my chart ??

or (if no chart)

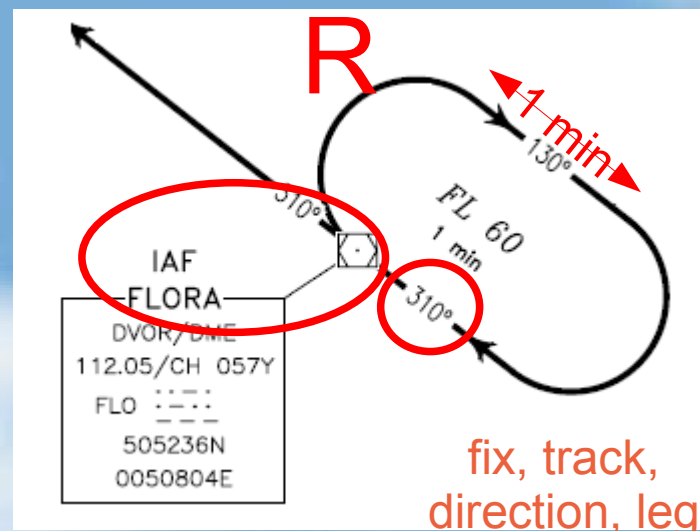
ENTER HOLDING

OVER 'FLORA':

TRACK 310 (INBOUND)

RIGHTHAND 1 MIN LEG

Altitude ALWAYS ATC !!



Inbound track 310, so
radial 130 FLO inbound !

4 elements:

Flora, 310 inb, R-hand, 1 min

ATC PHRASEOLOGY (cont.):

How long shall I hold ??

EAT=Expected
Approach Time TIME or MINUTES

"(CLEAR TO) LEAVE 'x' HOLDING *at 'time'* "

better: in y minutes from now

"LEAVE x HOLDING HEADING yyy"

"LEAVE X HOLDING, CLEARED
PUBLISHED VOR APPROACH RWY 23"

RECAP

VOR gives aircraft position
in relation to the VOR beacon

Aircraft heading sets track to be flown (wind)

Pilot's navigation, by setting heading and
reading radial, determines further flight

Holding pattern is made of 4 elements:
fix, track, direction, leg.

Check speed

READ IT AGAIN!

THERE IS ANOTHER LECTURE
ABOUT:
HOW TO ENTER A HOLDING?



Especially adapted for: ICAO Belgium Training Section