# YSFLIGHT ATC

## Relevant Information

* Approach course (waypoints, destination)
* Final guidance facility (ILS, VOR, NDB)

## Set up

* User calls the ATC (Radio-Comm option)
* Set programmatically or by YFS

## ATC Needs to know....

* Which airplanes are in a same formation to avoid giving traffic alerts for the airplanes in a same formation

## Various Cases

Given final guidance facility directly (eg., ILS28\_MISAWA)

1. Check if approach course for the approach is defined in the scenery
2. If not, calculate the approach course
3. Direct the airplane

Given destination

1. List all the final-guidance facilities for the destination.
2. Check and select head-wind approach if available
3. Check if approach course for the approach is defined in the scenery.
4. If not, calculate the approach course
5. Direct the airplane

Altitude Alert:

If the airplane may fly into terrain within 1 minute, give warning every 5 seconds.

Traffic Alert:

If the airplane come close to another traffic (Don’t care the traffic in the same formation)

## Classes

class FsAirTrafficControllerStore Remembers all ATCs in the field

class FsAirTrafficController Individual ATC.

* Private unsigned int searchKey;
* Public unsigned int SearchKey(void) const;
* Jurisdiction: Approach, Tower, Ground, or Default
* Default air traffic controller deals with a region where ATC is not defined.
* Location, Radius

class FsAirTrafficInfo <- This should be a member of FsAirplane

* Search key for the FsAirTrafficController
* State: Enroute, Approach, Final
* Destination
* Expected approach type: ILS
* Search key for the guidance facility search key
* Assigned heading
* Assigned altitude
* Assigned speed
* Next fix
* ATC-planned route

Make sure to delete FsAirTraffic as soon as FsAirplane is deleted

FsSimulation::ConnectAirAndATC(FsAirplane \*air,FsAirTrafficController \*atc)

If airplane is already connected to an ATC, remove connection

Then connect FsAirplane object and FsAirTrafficController object

## Automatic Course Calculation

Calculating course - Air speed and 20 degree bank -> turn radius R.

Lfinal

Pgs: Glide-slope intercept

Lgsi : Distance before glide-slope intercept (1 minutes)

Pbasedown: Downwind-leg Intercept

Ldown : Downwind-leg distance (3 minutes)

Ploc: Localizer Intercept

Ldog : Dog-leg distance (1.5 minutes)

Pbase: Base-leg Intercept

Lbase : Base-leg distance (2minutes)

Pdog: Dog-leg Intercept

1500ft (or designated altitude by the approach)

3deg

Lfinal

## Guidance

1. If the airplane is farther than 20nm of downwind intercept, give heading to the downwind intercept, give max alt+2000ft or greater for the next 10km.
2. If the airplane comes within 20nm, reduce speed to Vbase, maintain 1000ft+maxElv between current position and downwind intercept

If messed up within vicinity of the airport,

1. Fly straight runway heading, reduce speed to Vbase until downwind intercept is twice the turn radius. Give altitude 1000ft above tallest for the next 5 minutes. Then direct to downwind intercept.

Fvertical=mG, F=Fvertical/cos(bank), Flateral=Fsin(bank)=sin(bank)\*Fvertical/cos(bank)=mGtan(bank)

a=Gtan(bank)=vw, w=Gtan(bank)/v, v=rw,

R=v/w=v2/Gtan(bank)

Next leg

Rsin(θ)

θ

θ

When to direct turn

Vair

Pintercept

Pair

V1=Vcw rotatedby -θ

*Rturn*

Vcw

θ

*d*

Pwaypoint

Cturn

V2=Vcw rotatedby +θ

(Pintercept-Pwaypoint)\*(Pintercept-Cturn)=0

*d*=|Cturn-Pwaypoint|

θ=asin(*Rturn/d*)

|Pintercept-Pwaypoint|=*d*cos(θ)

V1 or V2? ((Pintercept-Cturn)^Vn)\*(Vair^(Cturn-Pair))>0

(xi-xw)\*(xi-xc)+(yi-yw)\*(yi-yc)+(zi-zw)\*(zi-zc)=0

Next Leg

## Description in .YFS

.YSF

In AIRPLANE block:

CNTCTATC “ATC-Name” (No name -> Default ATC)

FLTSTAGE NEEDCALC/ENROUTE/APPROACH/FINAL