MIKE BECKER

IIMC Course

75 minute presentation

1

A quick walk through

A presentation by Mike Becker

Your Instructor

Captain Mike Becker

- Flying helicopters since 1984
- Over 16,500 helicopter hours in more than 20 types.
- Head of Training at Becker Helicopters Pilot Academy
- Experience in Day, Night, NVG, IFR, single and Multi Engine
- Operations include high altitude long line and exploration work, cattle mustering, instructing, fire fighting, charter, utility, rescue, and everything else in between in multiple countries including PNG (6 years).
- Author of more than 40 titles in helicopter training

IIMC Introduction Video

- This video is graphic and may be unsettling
- It shows helicopters crashing and people dying.
- If you do not want to watch it, please speak up or leave the room for 10 minutes

Death by Cloud video

https://www.youtube.com/watch?v=0rpj-eeXkvM

Presentation objectives

By the end of the 75 minutes, you will be able to:

- Discuss within the group the terms VFR and IFR, VMC and IMC.
- State why a pilot needs to have distance estimating skills while in flight
- Recall the performance equation and be able to explain, as if to an interested 15-year-old, the principles of basic instrument flying in a helicopter and recall the PABAAH acronym
- Recall the Vmin for your helicopter
- List some components required to create an IIMC recovery plan

VAI VFR best Practices

The Visual Flight Rules (VFR) can vary between countries

The VAI Training and Operations Industry Advisory Council has produced a VFR Best Practice white paper that is available online at

https://verticalavi.org/safety/estimating-distance/

Know Your Definitions

What is VFR?

The Visual Flight Rules (VFR) are the rules set forth by the local aviation authority (DGCA, CAM, CASAPNG, FAA, TC, EASA, CASA, CAA, etc.) to ensure a pilot's ability to safely conduct operations in VMC.

Know Your Definitions

What is VMC?

Visual Meteorological Conditions (VMC) are the **minimum prescribed** weather conditions that form part of the VFR, specifically relating to:

- In-flight **visibility**
- Distance from **clouds**
- Forecast **Wind**
- When **at or above** a **minimum prescribed height** above the ground.

Intended to safely control an aircraft using only what you can see outside the cockpit.

Know Your Definitions

What is IFR?

The **Instrument Flight Rules (IFR)** are the **rules** set forth by the local aviation authority to ensure a pilot's ability to safely conduct operations in IMC.

Know Your Definitions

What is IMC?

Instrument Meteorological Conditions (IMC)

Any meteorological conditions that

DO NOT meet the VMC minimums

for the airspace, irrespective of the category of flight (VFR or IFR) in which the operation is conducted or

Any prescribed minimum documented in an instrument procedure.

Know Your Definitions

There is a common misconception that:

- being in clouds and
- not being able to see the ground outside the window

is the simple definition of IMC.

The reality is

any visibility below the minimum VMC under the VFR, **even with the ground in sight,** is IMC.

Prescriptive Minimums

Regulators (DGCA, CAM, CASAPNG, FAA, EASA, CAA, CASA, TC etc) list prescriptive VMC minimums with regards to

- *Visibility*
- *Distance from cloud*
- *Height AGL*
- *Wind and*
- *Distances from obstacles*

that a VFR pilot must maintain to operate a flight under the VFR.

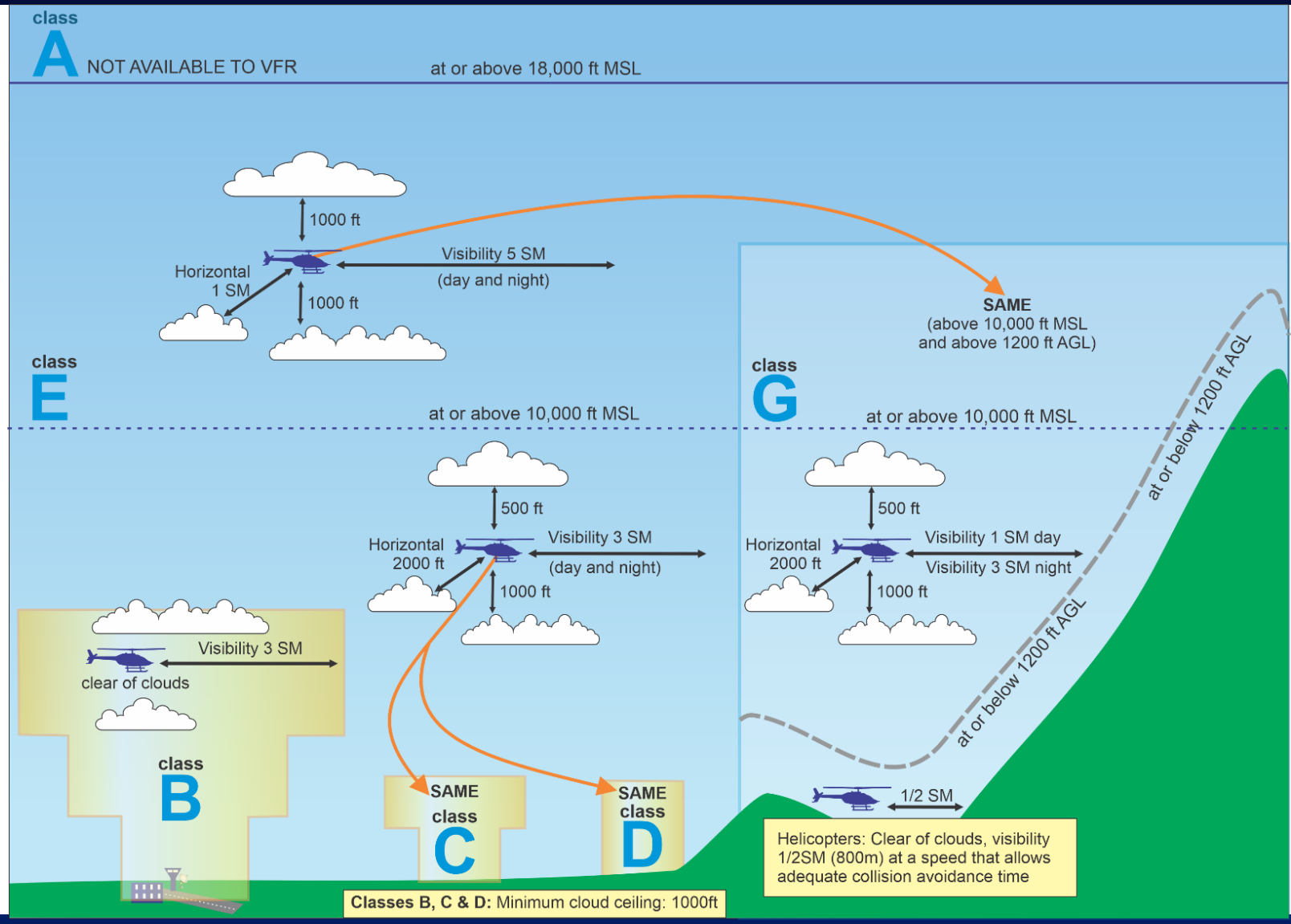
What is not taught is how to determine these prescriptive minimums as a pilot while in flight

Purpose of Prescriptive Minimums

- The purpose of the prescriptive minimums is to:
  - give pilots and crew **time** (based on distance and speed)
  - to be able to **see** an obstacle and then
  - **avoid** it.
- It is up to the pilot to make a ***judgment*** based on the prevailing conditions and their experience

VMC for the airspace

- Regulators assume VFR pilots have memorised the VMC minimums and can apply them
- All while flying close to the ground at 100 miles an hour in a dynamically changing environment



Helicopter Pilots ignore the signs

Rules, generally, have been made for fixed wing passenger carrying operations

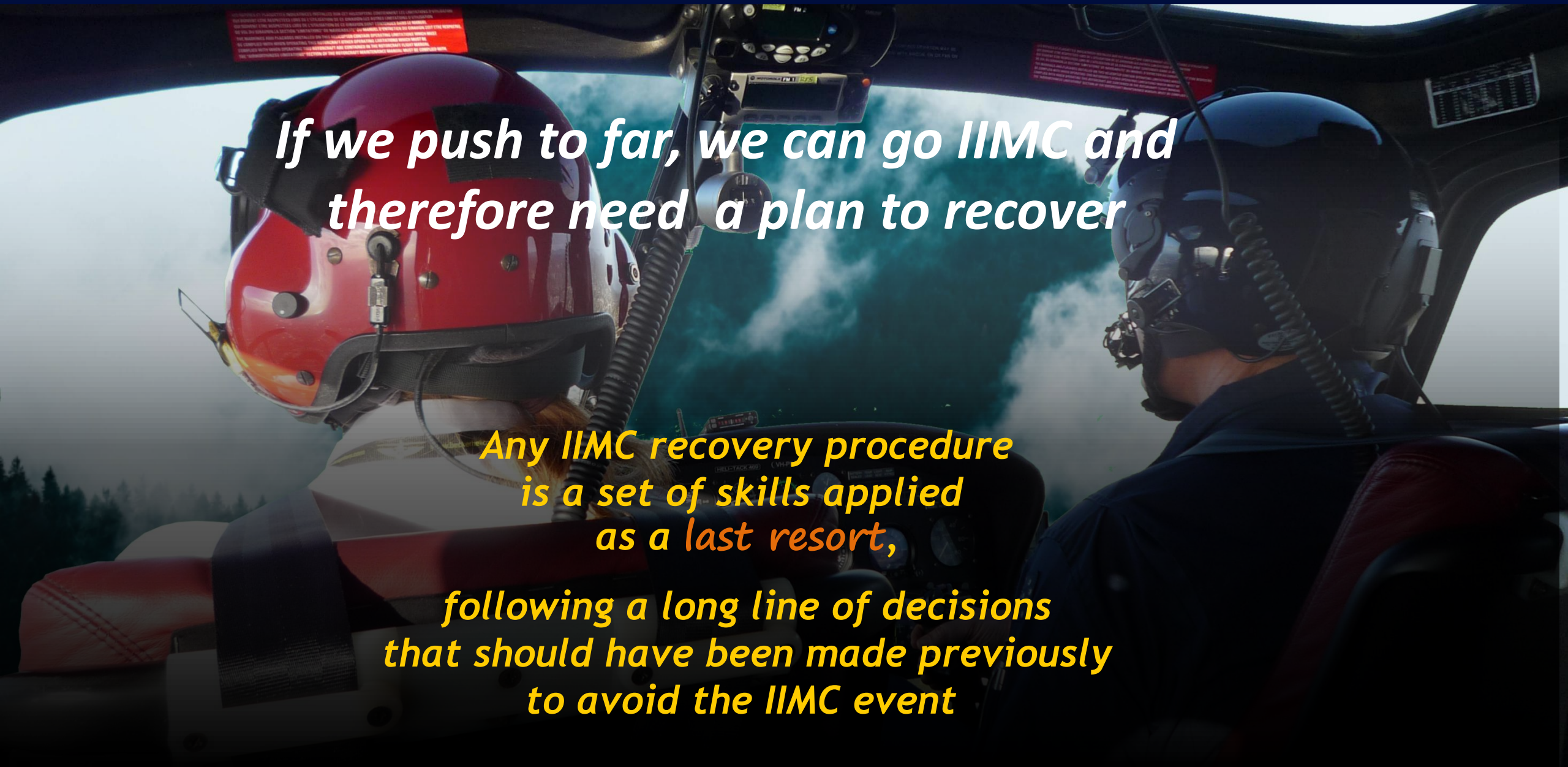
Flying a helicopter puts us in very unpredictable environments relying on the pilot to make decisions

Consequence

A consequence is helicopter pilots tend to bend the rules to get the job done.

And sometimes we push to far

IIMC Recovery



If we push to far, we can go IIMC and therefore need a plan to recover

Any IIMC recovery procedure is a set of skills applied as a last resort,

following a long line of decisions that should have been made previously to avoid the IIMC event

VAI Estimating Distances

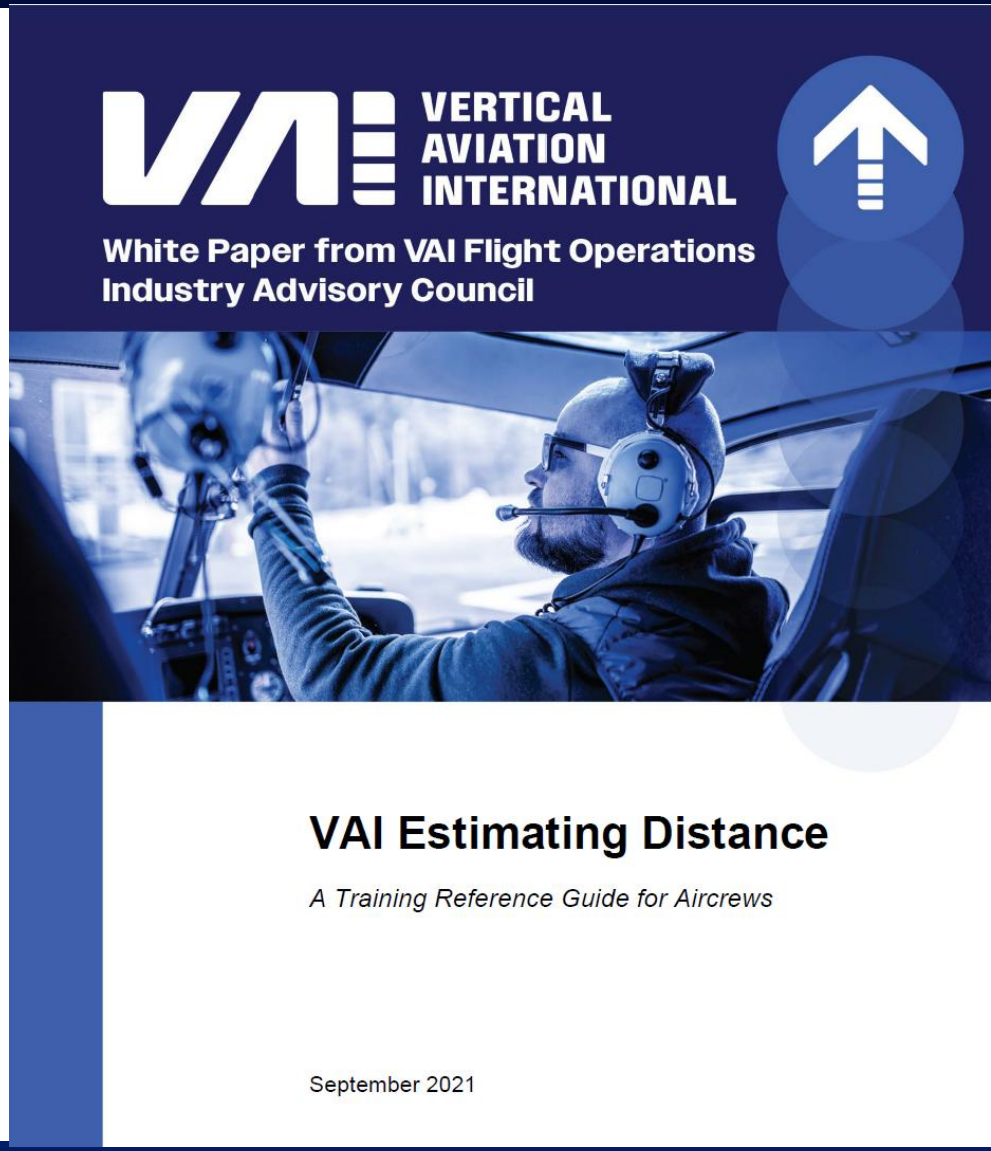
Why does a pilot need to have distance estimating skills?

To be able to operate within a VFR prescriptive minimum to maintain VMC within the applicable airspace.

This is a skill that is not widely taught or discussed during training.

The VAI Training and Operations Industry Advisory Council has put some of these techniques into a training reference for aircrew's document that is available online at

https://verticalavi.org/safety/estimating-distance/



5 key Anchors to experience

Anchors to assist in estimating distance include a working knowledge of:

1. **Speed** across the ground (including wind appreciation)
2. **Distance** and time to a feature, object, or obstacle (including clouds)
3. **Height AGL**
4. **Visibility** (how far can I see?)
5. **Cloud base**

For more detailed information refer to the VAI document

Instrument skills

If a pilot does inadvertently enter IMC (IIMC)

Then they better have some instrument skills and a plan

VAI Decision Making and IIMC Recovery

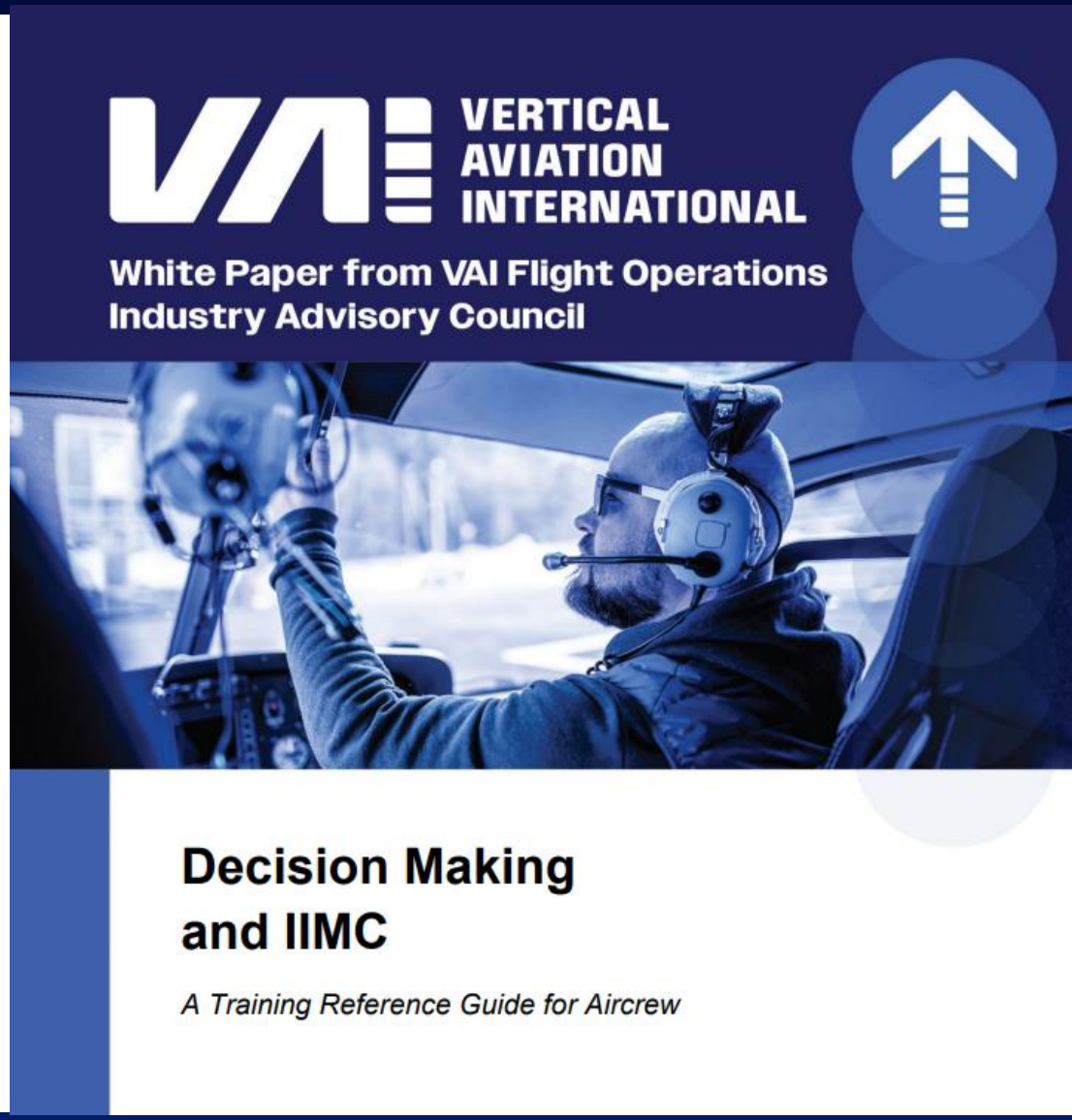
Why does a pilot need to have basic instrument skills and understand how to create an IIMC Recovery Plan?

To be able to operate a helicopter in IMC and survive an IIMC event.

This is a skill that is not consistently taught or discussed during training.

The VAI Training and Operations Industry Advisory Council has created a training reference for aircrew's document that is available online at

https://verticalavi.org/safety/decision-making-and-iimc/



Basic Instrument Flying

- Flying by day and in sight of the ground or water, you are primarily using **visual cues** to ensure your aircraft is flying at the height, speed and in the direction that you want.

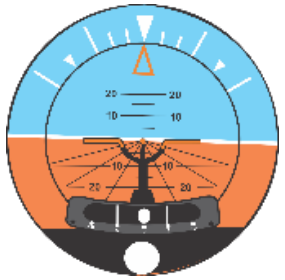
- Operating in IMC, NVFR, or in marginal weather, the **attitude information**, normally obtainable by looking outside, will be that **much harder to perceive** and obtain.

The Instrument Cockpit

What is the most important or primary instrument?

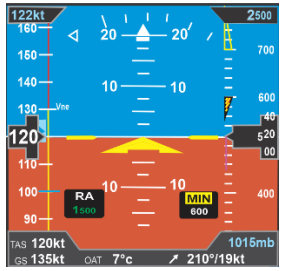
Artificial Horizon (AH)

A gyroscopic instrument mounted on gimbals so the aircraft can move around it in three directions.



Attitude Indicator (AI)

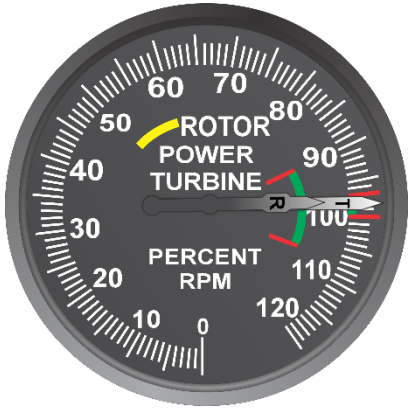
An electronic instrument relying on smart electronic and programmed systems.



Control Instruments

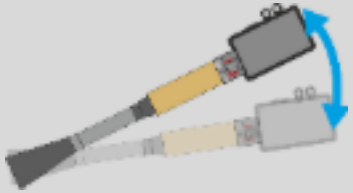
What is a control instrument?

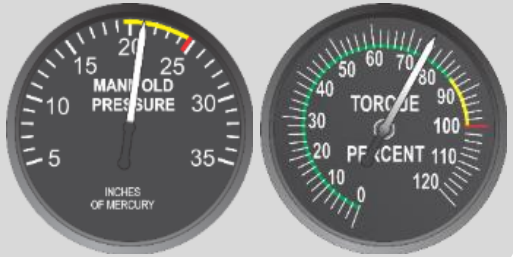
These are the instruments that tell you what input has been made by the flight controls



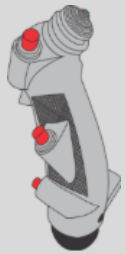
Let's not forget the RRPM

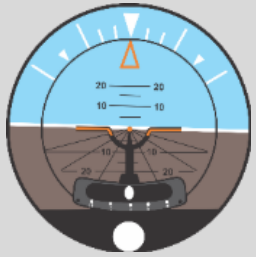
POWER



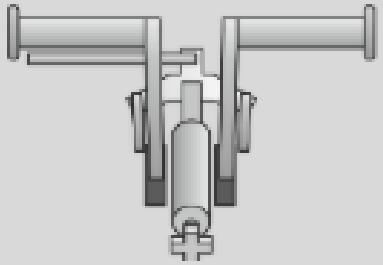


ATTITUDE





BALANCE

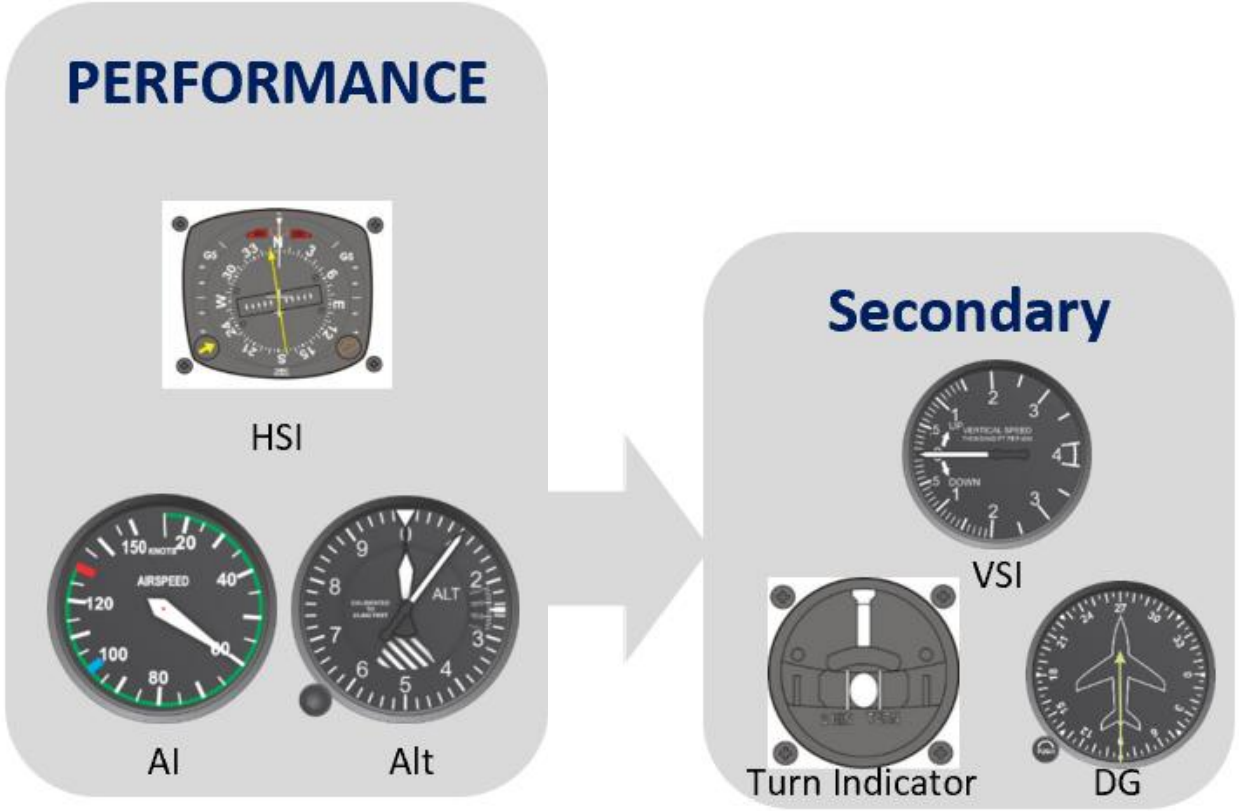


Performance Instruments

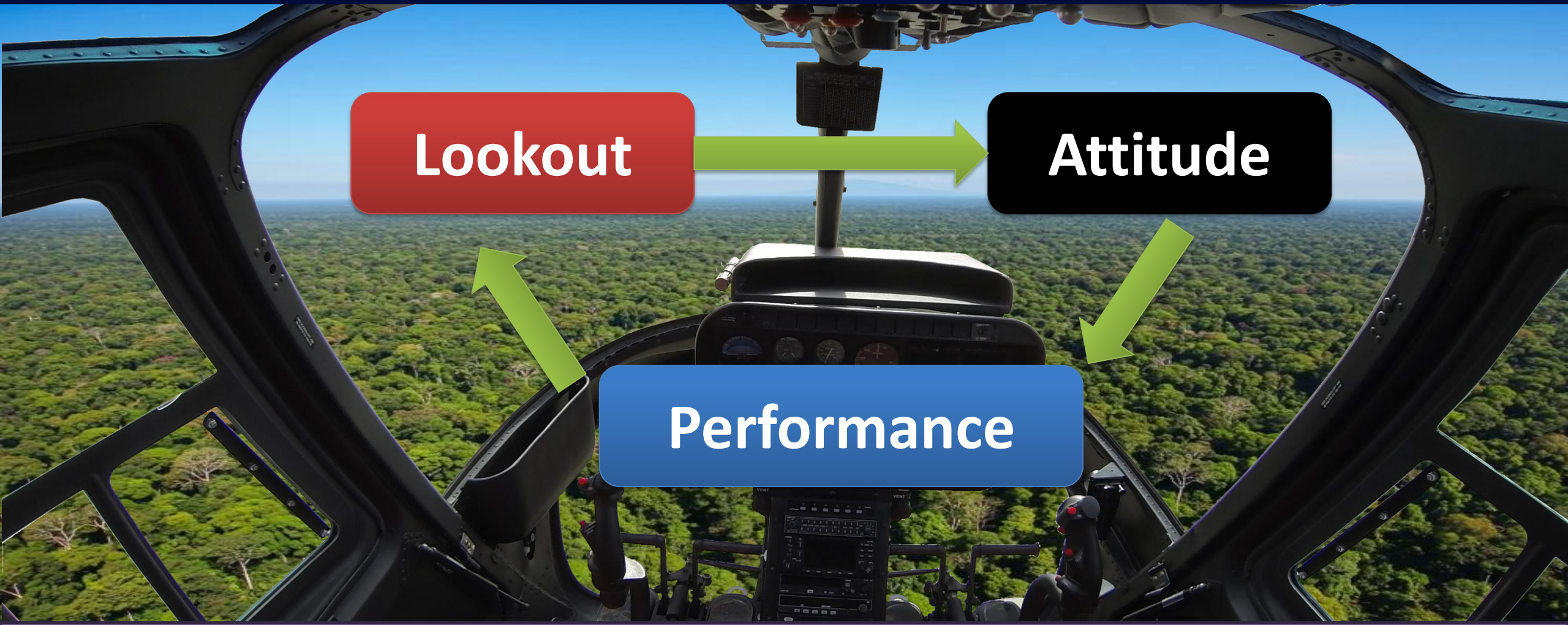
What is a performance instrument?

These are the instruments that tell you what the helicopter is currently doing (performing) based on those same control movements

Let's not forget the compass



The work cycle

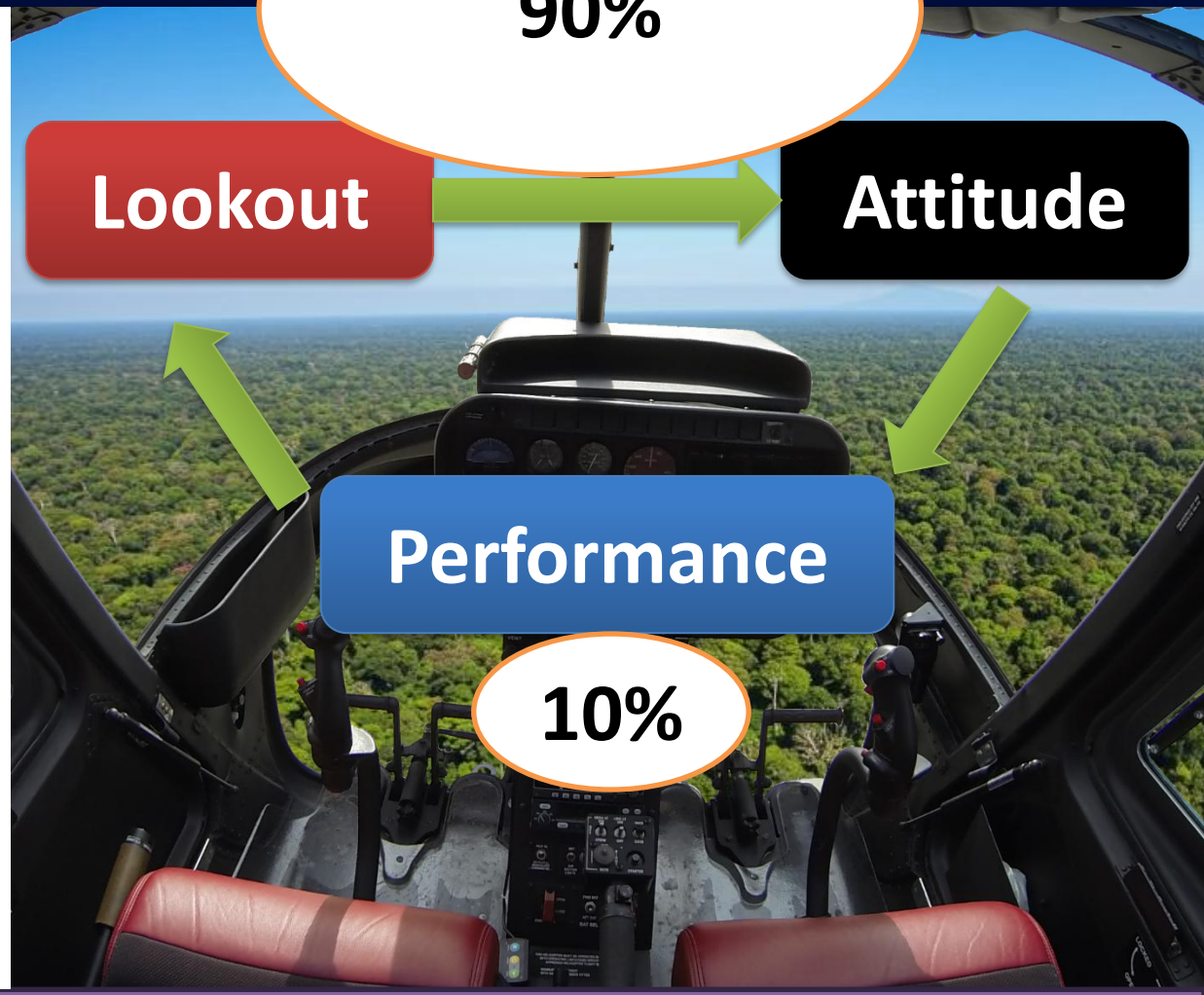


The Work Cycle describes a system of scanning

The work cycle

When flying Visually

- **90%** of our effort is focused **outside** looking out for other traffic and obstacles and controlling the helicopters attitude
- **10%** of our effort is focused **inside** confirming with the instruments that what we are seeing is what we are doing

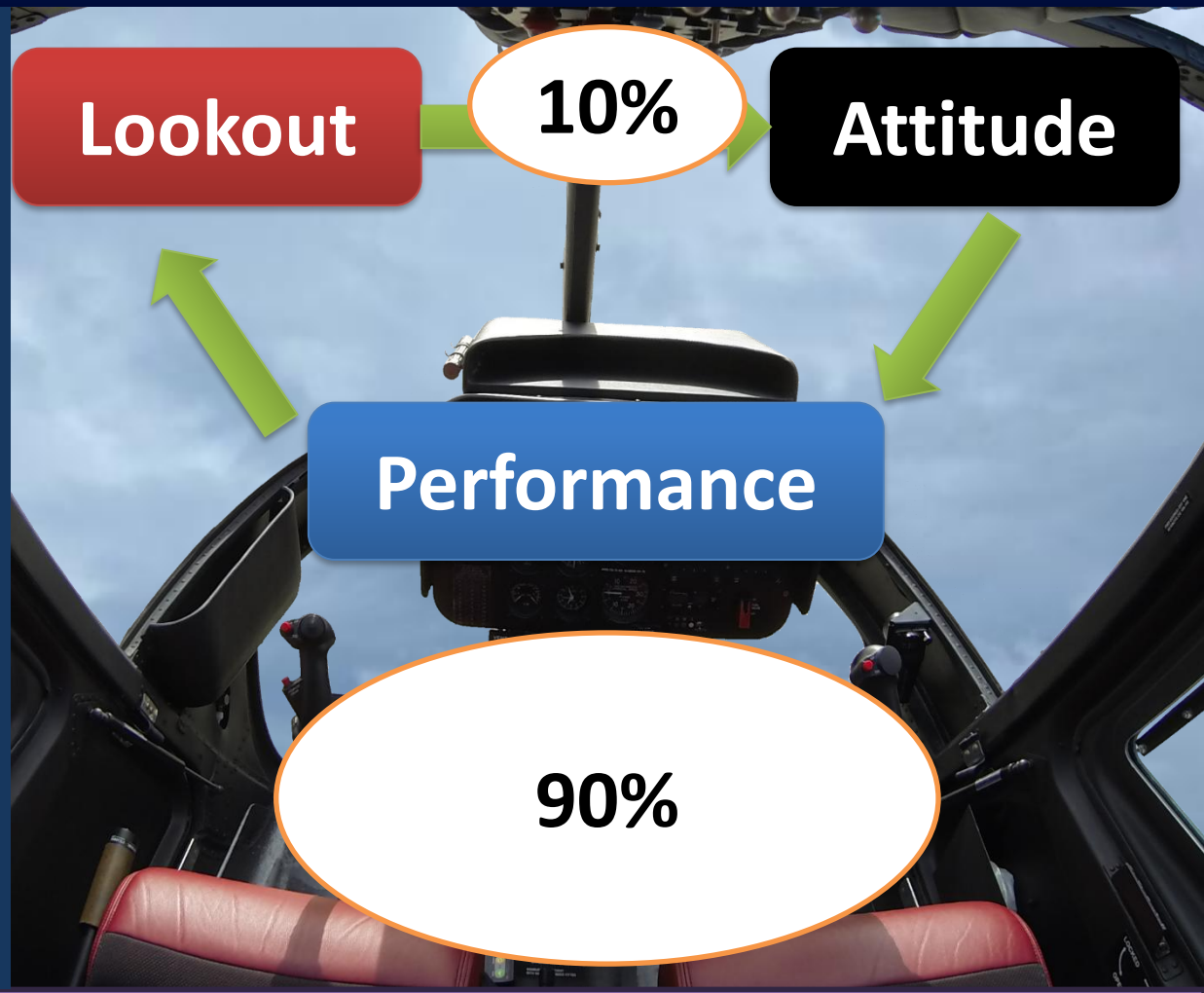


The Work Cycle describes a system of scanning

The work cycle

When instrument flying

- 10% or less of our effort maybe outside
- 90% or more of our effort is focused inside controlling the helicopters attitude and performance with the instruments



The Work Cycle describes a system of scanning

Aircraft Control

Aircraft control is the term used to describe the:

- **sequence,**
- **magnitude** and
- **rate**

at which a pilot moves the flight controls to achieve a desired performance.

The control movement will be based on how a pilot interprets the instruments.

Performance (or Desired Performance) refers to the desired state you want the helicopter to be in, that is:

- **Straight & Level**
- **Climbing**
- **Descending**
- **Turning or**
- **A combination of the above**

Aircraft control

It is up to the pilot to look inside at the appropriate instruments and set the desired:

POWER and **ATTITUDE**

while in **BALANCE**

to achieve the desired

PERFORMANCE

Aircraft Control Acronym

When transitioning from VMC to IMC to maintain control,

the pilot must set:

A POWER and an ATTITUDE while in BALANCE

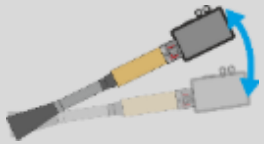
to maintain a desired Airspeed, Altitude and Heading

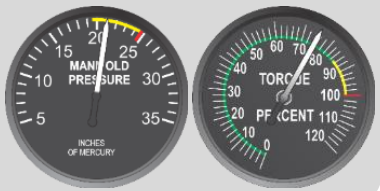
PABAAH

The Performance Equation

POWER + ATTITUDE / BALANCE = PERFORMANCE

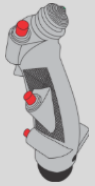
POWER

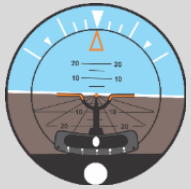




MP or TQ

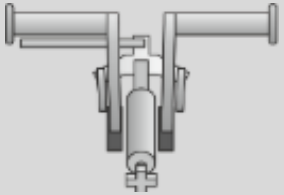
ATTITUDE

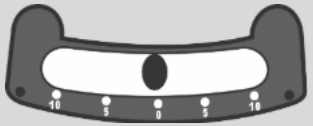




AH

BALANCE





Balance Ball

PERFORMANCE

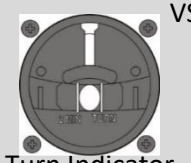
HSI

AI

Alt

Secondary

VSI



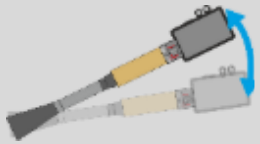
Turn Indicator

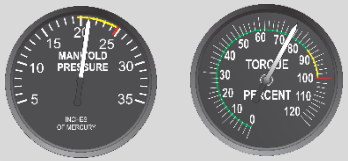
DG

Power-Attitude-Balance = Airspeed-Altitude-Heading

To maintain *straight and level* using the instruments

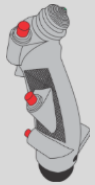
POWER

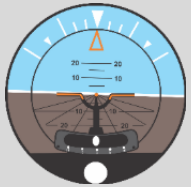




Set cruise power for the helicopter

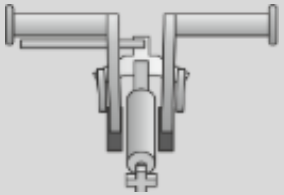
ATTITUDE

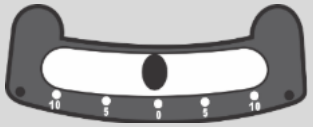




Set the wings level on the horizon line

BALANCE





Maintain balance

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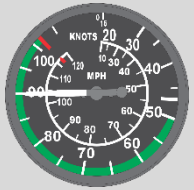
DESIRED PERFORMANCE



ASI constant

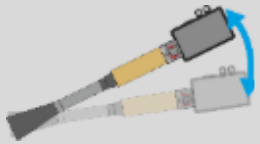
Altitude constant

Heading constant

Power-Attitude-Balance = Airspeed-Altitude-Heading

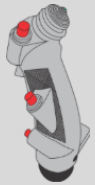
To commence a *climb* using the instruments

POWER



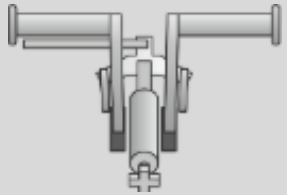
Set climb power for the helicopter

ATTITUDE



Set the wings level and pitch up to the +5 degree line to initiate a climb

BALANCE



Maintain balance

=

DESIRED PERFORMANCE

ASI = 60 KIAS

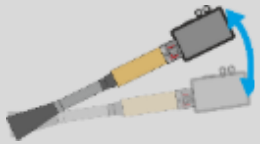
Altitude increasing

Heading constant

Power-Attitude-Balance = Airspeed-Altitude-Heading

To initiate a ***descent***, use the cruise descent method for better control during instrument flight.

POWER

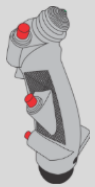


Set descent power for 500 ft/minute

Piston: 2” reduction in MP

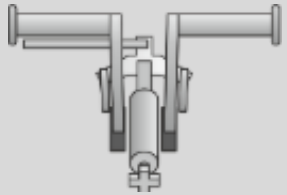
Turbine: 10% reduction in Torque

ATTITUDE



Maintain the wings level and on the horizon line

BALANCE



Maintain balance

=

DESIRED PERFORMANCE

ASI = 80 KIAS

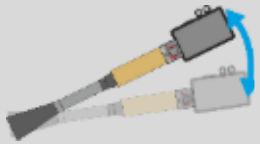
Heading CONSTANT

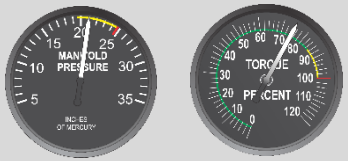
Altitude Decreasing

Power-Attitude-Balance = Airspeed-Altitude-Heading

To level out from a *climb* or a *descent*

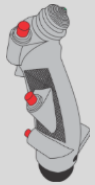
POWER





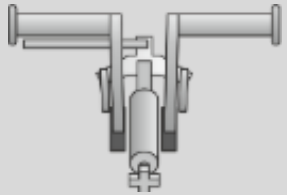
Set cruise power for the helicopter

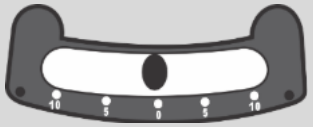
ATTITUDE



Set the wings level and on the horizon line

BALANCE





Maintain balance

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DESIRED PERFORMANCE

ASI = 80 KIAS

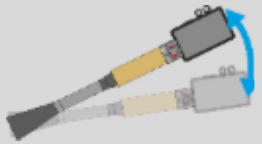
Heading CONSTANT

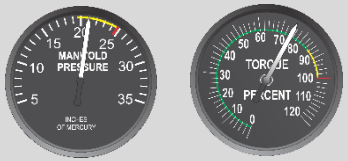
Altitude at Correct level

Power-Attitude-Balance = Airspeed-Altitude-Heading

To initiate a *turn*

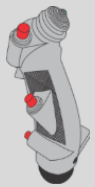
POWER





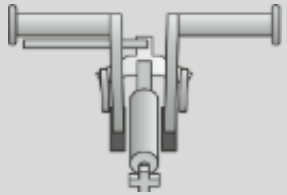
Maintain cruise power for the helicopter

ATTITUDE



Maintain the centre dot of the AI wings on the horizon line. With cyclic, roll the helicopter until achieving and then maintaining a 10° angle of bank

BALANCE



Maintain balance

=

DESIRED PERFORMANCE

ASI = 80 KIAS

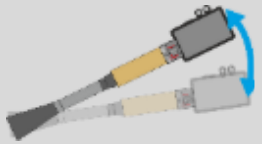
Heading TURNING

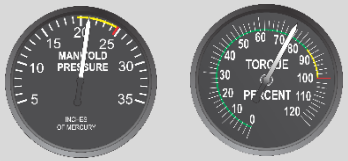
Altitude CONSTANT

Power-Attitude-Balance = Airspeed-Altitude-Heading

To *level* out from a turn

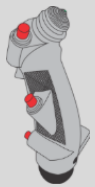
POWER





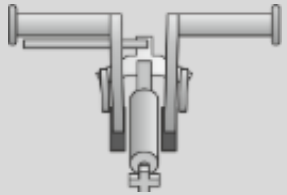
Maintain cruise power for the helicopter

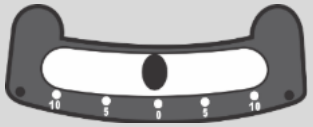
ATTITUDE



Roll wings level on the horizon line

BALANCE





Maintain balance

=

DESIRED PERFORMANCE

ASI = 80 KIAS

Heading CONSTANT

Altitude CONSTANT

Airspeed: V_{min}

After the helicopter transitions into forward flight and as speed increases, the helicopter becomes more stable and easier to fly.

Maintaining a minimum speed is critical to helicopter stability and control in IMC

This speed is referred to as the minimum safety speed or Vmin

Airspeed: V_{min}

- Vmin is well documented for fixed-wing

- For helicopters only introduced
  - during multi-engine training
  - During an instrument rating because the autopilot relies on a minimum speed to operate.
  - It is then referred to as **Vmini** (Velocity minimum control speed for instrument).

Any flight into IMC requires a pilot to maintain a minimum forward speed for controllability

This speed is ***not*** *commonly (if ever) documented* for a VFR-certified helicopter

Some typical Vmin speeds for various helicopters

Helicopter Type	Nominated VMIN
R22	55
R44	55
R66	55

Helicopter Type	Nominated VMIN
B206	55
B407	55
B205	55

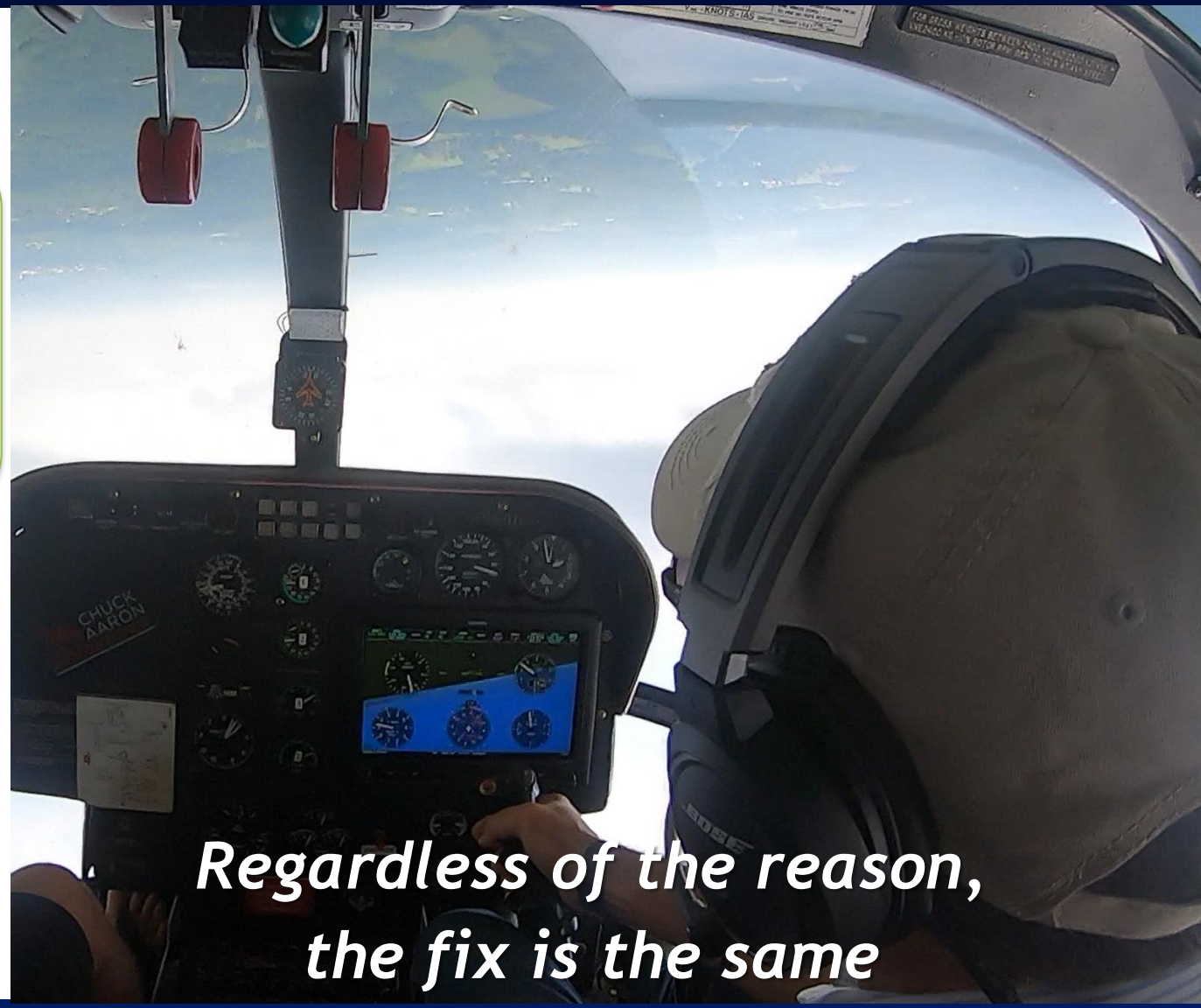
Helicopter Type	Nominated VMIN
B212	55
B412	60
H125	60

Recovery from an Unusual Attitude

What is an unusual attitude?

Unusual Attitude: Any time the helicopter's pitch, roll, yaw or airspeed is **unexpected** or **not intended** by the pilot

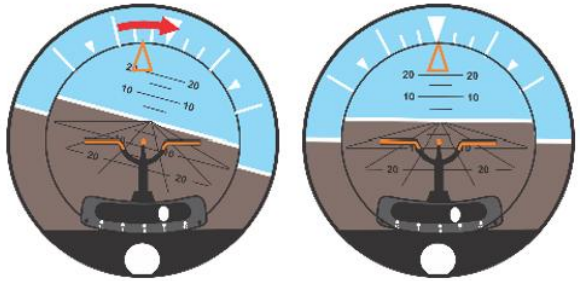
- *It could be small and minor, or it could be large and major*
- *It could be caused by a temporary lapse of concentration or by full-on spatial disorientation*



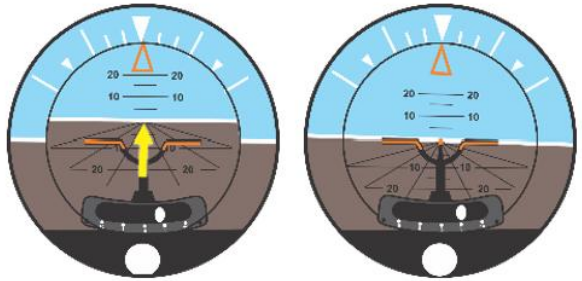
Recovery from and Unusual Attitude

Immediate actions

1. *Eyes inside* to the Attitude Indicator
2. *Fix roll* to **level wings,** then



3. *Fix pitch* so the wings are **on the horizon bar**

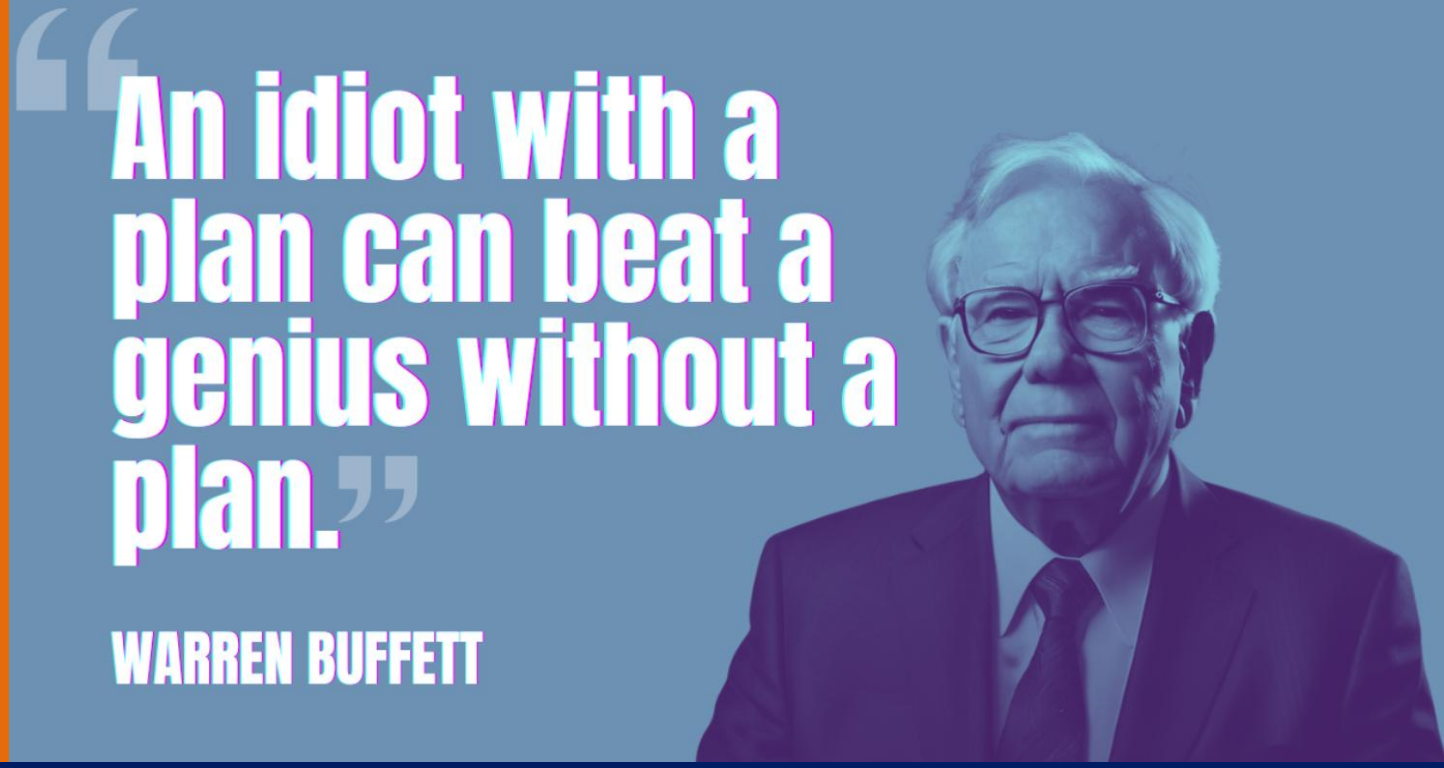


This is a cyclic fix.

4. *Check the power.* It should remain steady at the cruise setting, only adjust if too high or too low.
5. *Check the balance,* normally co-located with the AI
6. *Then PAB-AAH* to return to normal straight and level flight before PAB-AAH again to return to the original parameters

The 7 Ps

Prior Preparation and Planning will Prevent Piss Poor Performance



IIMC Recovery Plan

The 7 Ps

Prior Preparation and Planning will Prevent Piss Poor Performance

Prior preparation is assisted by 5 key elements:

1. *Understanding the rules, regulations and best practice recommendations*
2. *Nominating your own personal limits and Enroute Decision Triggers*
3. *Preparing an IIMC Recovery Plan prior to the flight*
4. *Maintaining basic instrument flying skills*
5. *Knowing when and how to activate and complete the IIMC recovery plan*

Personal Minimums and Enroute Decision Triggers (EDT)

Enroute Decision Triggers (EDT) are:

- a set of personal minimums that you will not go below
- decided on prior to the flight
- to assist in decision making.

Personal Minimums and Enroute Decision Triggers (EDT)

Based on a minimum nominated:

- Airspeed
- Height AGL
- Distance from cloud and
- Visibility
- Wind strength
- Fuel state

Each separate item is a *trigger*
for *decision-making* while enroute

Personal Minimums and Enroute Decision Triggers (EDT)

Pilots (operating within the guidance of a company) may establish their own **personal minimums** based on:

- *their own experience*
- *local conditions*
- *comfort levels*

which could be **higher** than the legal, VAI or Company recommended minimums, **but never lower**.

Personal Minimums and Enroute Decision Triggers (EDT)

What happens when you reach one of these personal minimums in flight?

It must trigger a response by the pilot to
make a decision and alter the current flight activity

Regardless of the personal preference of the pilot, crew or passengers!

May require:

- **Diversion**
- **Unplanned landing**
- **Change to IFR**

Components of an IIMC Recovery Plan

- Use checklists to ensure consistency and structure in your planning and preparation
- Obtain and interpret the weather incl. last light and freezing level.
- Assess the route and airspace. Note relevant radio frequencies.
- Calculate a **L**owest **S**afe **Alt**itude (LSALT) or a **M**inimum **S**afe **A**ltitude (MSA)
- Plan your fuel including operational requirements (holding/alternate) and reserves
- Consider options if you experience adverse conditions
- Draw a mud map: capture important information about the flight
- File a flight plan
- Brief your crew and passengers

Activating the IIMC Recovery Plan

*When there is an emergency or abnormal situation revert to the **AANCA** acronym for structure. This is very relevant to an IIMC event*

A	**Announce**	Identify, announce, and acknowledge the situation to yourself and the crew.
A	**Aviate**	Maintain/restore control of the helicopter. Fly the helicopter first!!!!
N	**Navigate**	Maneuver and navigate the helicopter to a suitable safe altitude, safe heading, or safe landing area.
C	**Communicate**	Communicate with ATC, Declare an Emergency and notify them of the situation. Potentially seeking assistance to recover from the situation.
A	**Activate**	Activate the IIMC recovery plan and/or checklist items to recover the helicopter back to VMC.

Composure

- **First**, the **crew's primary responsibility** is to maintain/restore control of the helicopter
- There is no advantage in starting the checklist actions or making radio calls when the flying pilot cannot control the helicopter. Radio calls and checklists come after the helicopter is stable.
- Concentrate on flying the helicopter first and maintaining control.
- If IMC is unavoidable, then transition from VMC to IMC using basic instrument skills
- Use the **PAB - AAH** acronym, and the radial instrument scan to recover from an unusual attitude or spatial disorientation

Restore/Maintain control

Composure Composure Composure

Options

These will vary based on your environment and facilities available

Options include

- ATC assistance
- Fly to a known clear area
- Climb, descend or turn
- Conduct a no aid let down
- Conduct a full instrument approach (if that is an option)

Review the Objectives

- What are the differences between VFR and IFR, VMC and IMC.
- Why does a pilot need to have distance estimating skills while in flight
- Recall the performance equation and explain, as if to an interested 15-year-old, the principles of basic instrument flying in a helicopter and recall the PABAAH acronym
- Recall the Vmin for your helicopter
- List some components required to create an IIMC recovery plan

Do a full IIMC course

Book Mike Becker for a full 2-day

IIMC Recovery and Decision-Making Course

Email: Mb@beckerheliopters.com

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Pricing on application.

Mike Becker Helicopetr Handbooks volume 1 and 2

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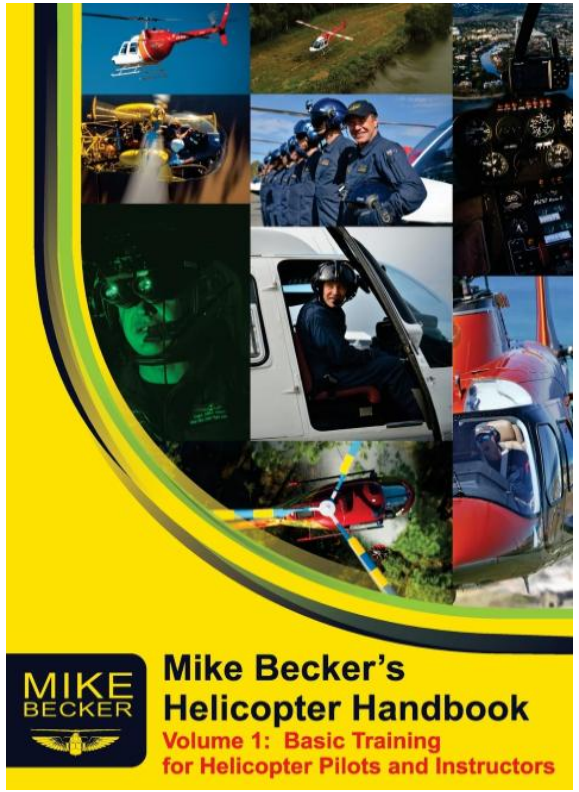

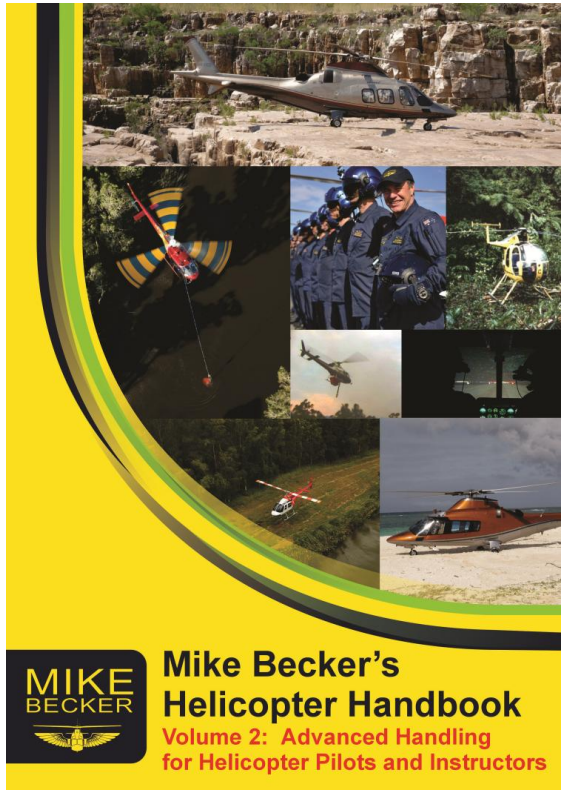

MIKE BECKER

IIMC Course

75 minute presentation

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Thank You