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# Interpreting Instrument Approach Procedures: Training for Air Traffic Controllers

Design Document

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# WBI Project Proposal – IAP Chart Interpretation

This project will be designed to address the issue of air traffic controllers being unable to interpret and utilize the information presented in instrument approach procedure charts. Upon completion of the training, learners will be able to identify the various component of an IAP chart, describe the functions of the various components of an IAP chart, and use the information presented to anticipate air craft ground tracks and altitudes.

## Audience

The target learner group is air traffic control personnel. These individuals provide for safe and efficient air travel through separation of aircraft from other aircraft, obstacles, and terrain. The target audience represents a wide range of ages and cultural/ethnic backgrounds. In order to work in air traffic control, the learners will have completed initial air traffic controller qualifications at the FAA academy. The minimum qualifications include the ability to: maintain responsibility for the safe, orderly, and expeditious flow of air traffic, provide radar control to aircraft arriving or departing the primary airport and adjacent airports, and to aircraft transiting the facility's airspace, and operate radar and communication equipment to apply radar separation standards and vectoring procedures. In addition, air traffic controllers detect and adjust malfunctions and interferences in the equipment, issue speed, altitude, and directional instructions to pilots to keep aircraft properly separated, and provide air traffic advisory services to pilots including clearances to operate aircraft, weather and field conditions, and safety and traffic alerts. In order to be successful with the proposed training, learners should be able to access a training module online. Learners should be air traffic controllers, and familiar with what an instrument approach procedure (IAP) is, the role of an IAP in the national airspace system, and the difference between terminal and en route operations.

## Cognitive Characteristics

## General

All learners within the target group are current air traffic control personnel. A few assumptions can be made regarding their general cognitive characteristics. For example, in order to become an air traffic controller, one must earn at least an associate's degree and complete extensive training with the FAA Academy. With this knowledge, I can determine that language is fully developed and reading level is at least at the 12th grade level.

Controllers often need to manage multiple airplanes at the same time and make quick decisions. This information tells me that the target audience has the ability to maintain a high level of focus and concentration, even during the most stressful situations.

### Affective

According to the National Air Traffic Controllers Association, air traffic

controllers "embrace new technology and are eager to use the most efficient and modern procedures available." Safety is the first and foremost responsibility of an air traffic controller. Learning new information that makes their job more efficient and enhances safety is important to the target audience. Air traffic controllers are often required to work evening and weekend shifts, so flexibility of any new training is also appreciated.

## Motivational

Motivational information has not been collected yet.

## Instructional Goal

Learners will learn how to interpret an instrument approach procedure chart and anticipate air traffic behavior while executing an instrument approach procedure.

## Specific Objectives

Given an instrument approach procedure chart, the learner will interpret portions of the chart including the briefing strip, plan view, profile view, and minima with at least 70% accuracy.

Given the interpretation of an instrument approach procedure chart, the learner will be able to anticipate aircraft ground tracks and altitudes with at least 70% accuracy.

## Rationale

Currently, air traffic controllers are unable to interpret instrument approach procedures. This leads to an inefficient use of air space. Development of this project will provide air traffic controllers with the tools and knowledge required to fully optimize the use of respective air space. This training provides the learners with verbal knowledge. The cognitive domain is addressed in this project. The learner is required to recall the meaning and purpose of various areas and symbols on an instrument approach procedure. Recall of this information will allow learners to apply the information in their day-to-day tasks. Being able to apply this information will reduce air traffic controller frustrations and subsequently reduce the number of calls or e-mails made to team leads. Fewer calls implies more time to focus on the primary functions of air traffic controllers: maintaining safe and efficient use of air space.

Since air traffic controllers continuously monitor airspace, their work schedules vary widely. Their job also requires constant monitoring and attention, making completing the training "on the clock" difficult. Making the training available online will allow the learners to complete the training at their own pace and at a time that is convenient to their schedules.

## Description of the Project

Special materials and preparation are not required for this training. Learners simply need access to the program module and the Internet.

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The learner analysis presented a learner who is motivated by maintaining highest safety standards and has high professional standards. Learners will be presented with the problem of frequently changing instrument approach procedures. It is frustrating to air traffic controllers when they have come to be able to anticipate the behavior of an aircraft through frequent observation and the behavior changes. Presenting air traffic controllers with the solution to this frustration (i.e. being able to interpret instrument approach procedures and anticipate the behavior of the aircraft) will motivate the learner to attend to and apply the new information. The use of actual instrument approach procedures and the learners' ability to control the sequence and pace of the training will also increase motivation. In this training, learners will be presented with an instrument approach procedure. Various sections of the chart can be selected to explore in detail. When the learner selects a section of the chart, information explaining the function of this section of the chart will be presented. The implication for behavior of the aircraft will also be explained. Before leaving the selected section, questions will be presented to measure the level of mastery. The FAA requires a minimum of 70% mastery. Deep processing of the information will be facilitated by questions requiring the application of the new information.

In this learning situation, a teacher or facilitator could guide the learner through the information, however this is not necessary and will not be utilized as the training is being designed to be completed online. The program can be accessed and completed independently. A teacher or an administrator should be available to answer any questions that arise. This can be accomplished in person or via e-mail.

## Anticipated Problems

Any potential problems would be related to technological issues. For example, a problem could be a computer not being able to run the program or connect to the Internet. Some problems could arise in the planning and development of this project due to my inexperience and lack of knowledge in the field.

## How will learning be evaluated?

Assessment for this training should be done in context of the work situation. Typically, after publication of an amendment to an approach procedure, a team lead will receive an inquiry from air traffic control regarding a change that previously had been made known to the public through a coordination website. The frequency of these calls can be monitored to determine the effectiveness of the training. If the training is effective and learning has occurred, the frequency of these calls would be expected to decrease. In-program practice and assessment in the form of questions will also be utilized to evaluate the degree to which the learner understands the varying areas and implications of the instrument approach procedure. Immediate feedback can be provided to the learner within the program. The only tangible will be the online program or module.

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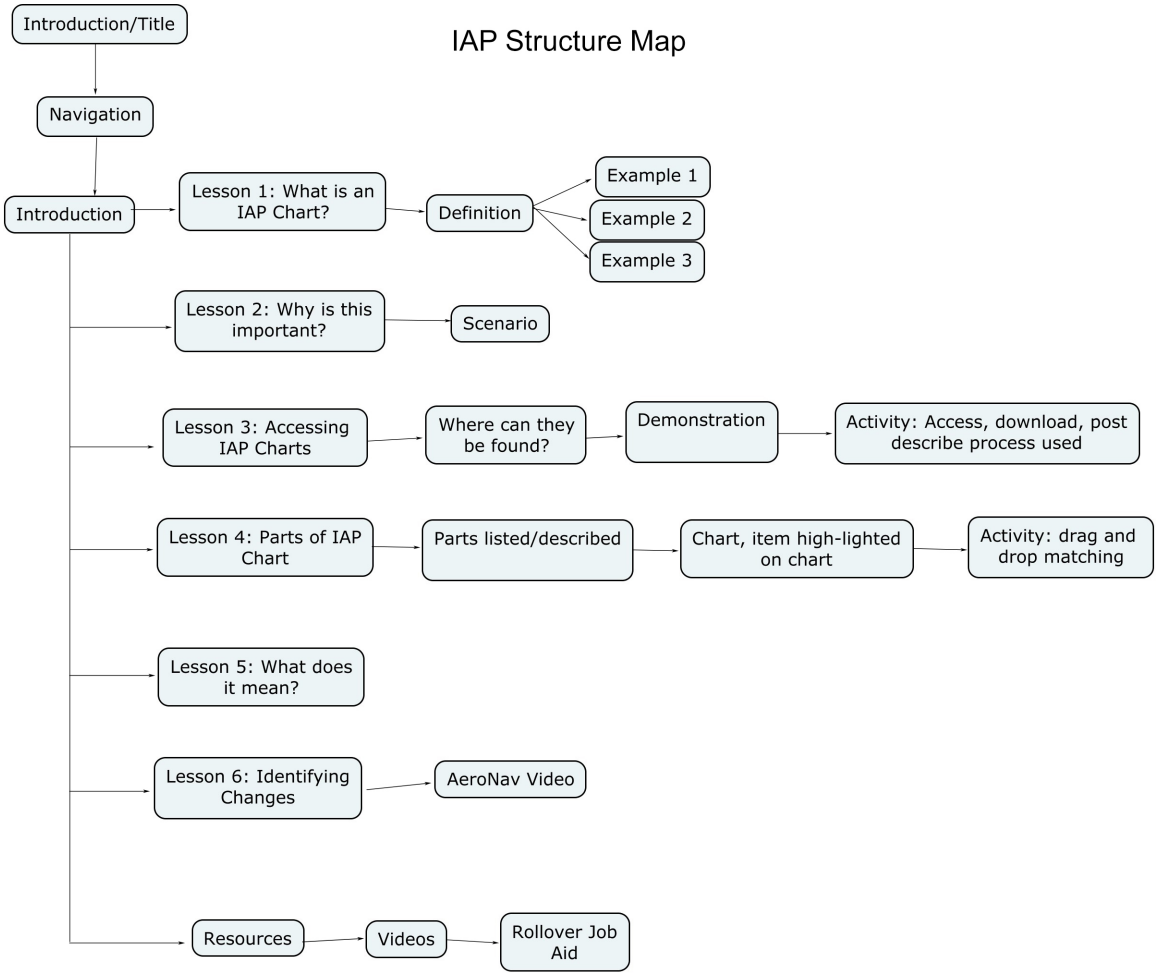
# Structure Map



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# IAP Parts Description

Briefing strip contains:

- Final approach course facility ID, type, and frequency
- Final approach course
- Runway landing length, touchdown zone elevation (TDZE) or threshold elevation (THRe)
- Takeoff minima
    - Negative 'T' inside upside down triangle indicates other than standard minima apply, absence of this symbol indicates takeoff minima are standard
- Required minima for use an alternate
    - Negative 'A' inside upside down triangle indicates other than standard alternate minima apply, Negative 'A' inside upside down triangle followed by "NA" means this approach can't be used as an alternate, absence of any symbol indicates alternate minima are standard
- Whether or not an expanded circling area has been evaluated
    - Negative 'C' inside upside down triangle indicates the expanded circling area was evaluated for this approach
- Procedural notes applying to the final and/or missed approach are found in this section
- Approach lighting system
- Textual missed approach instructions
- Applicable comm frequencies

Planview contains:

1. Procedural ground tracks depicted to scale
    - Conventional procedures will indicate the NAVAID radial to be used identified in the format R-XXX
    - Lead radials are required in certain circumstances and are identified by the format LR-XXX
    - Feeder, initial, course reversal, intermediate, and final segments are depicted with a solid line
    - The missed approach segment is identified by a dashed line
2. Minimum altitudes
    - The corresponding minimum altitude is charted on the line depicting the segment

- **Exception**: Minimum altitudes between the final approach fix (FAF) and missed approach point (MAP) are found in the profile view and minima section

3. Heading and distance for approach segments
    - Conventional procedure: magnetic heading is determined by the facility providing course guidance. For segments that are facility to facility, the NAVAID that the aircraft is navigating from is used to determine the heading.
    - PBN procedure: the magnetic heading is determined by using the airport's magnetic variation of record
4. Fix identification information
    - Radials used to define intersections can be differentiated from approach segments by the lack of an associated altitude
    - DME information will be charted numerically inside a 'D' following the fix name
    - Initial approach fixes will be identified by "IAF" following the fix name
5. Any notes that pertain to procedure entry
6. Navigational Aid names, frequencies, and IDs
7. Minimum safe altitude

Profile view contains:

- Minimum altitudes and course for segments from the course reversal (if applicable) to the missed approach point
- Glideslope (vertically guided procedures) or Vertical Descent Angle and threshold crossing height
- Fix identification data
- Final approach fix identified by Maltese cross
- Course reversal data
- Missed approach instructions
- Notes pertain to descent and/or fix identification within the final approach segment

Minima section contains:

- Decision altitude (DA) for vertically guided procedures or minimum descent altitude (MDA) for non-vertically guided procedures
- Minimum visibility required for applicable minima and aircraft category
- Height above touchdown zone (HAT) or height above threshold (HATh)
- Minimum ceiling required for applicable minima and aircraft category