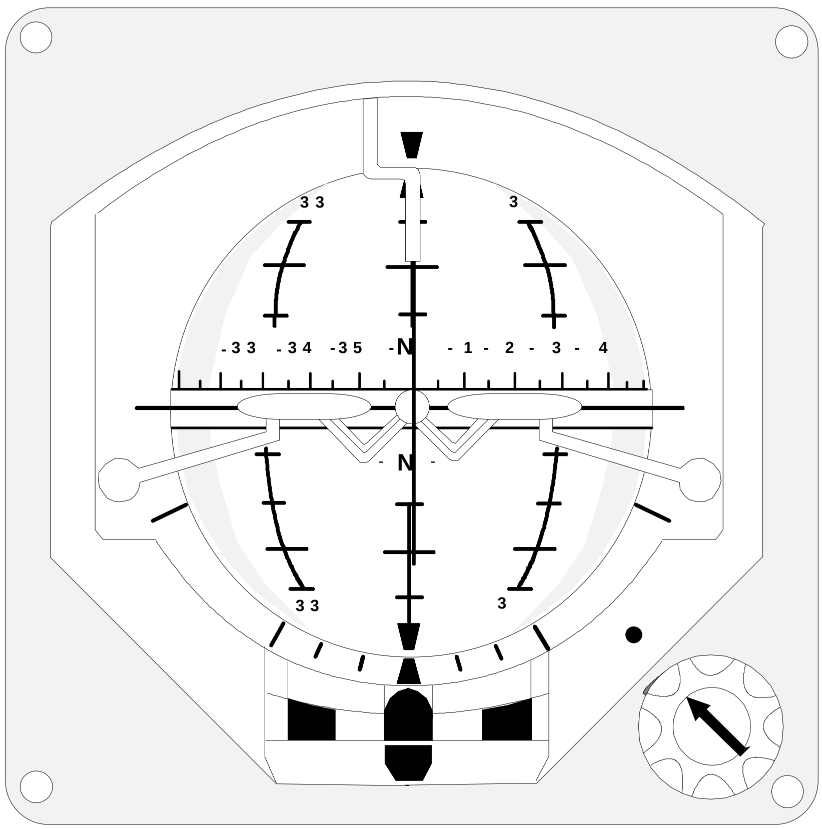
NAVAL AIR TRAINING COMMAND

NAS CORPUS CHRISTI, TEXAS **CNATRA P-1244 (REV. 6-99) PAT**

INSTRUMENT NAVIGATION (INAV)



LESSON GUIDE

1999

T-45A LESSON GUIDE

CHANGE SUMMARY PAGE

CHANGE NUMBER	DATE ENTERED	CHANGE DESCRIPTION	INITIALS
1	3/08/2004	Incorporated	TSC
2	5/26/2004	Incorporated	TSC

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LESSON GUIDE
LIST OF EFFECTIVE PAGES

EFFECTIVE PAGES	PAGE NUMBERS
UJPT & E2-C2 INAV-01	
(6-99) Change 2	1-i thru 1-ii
(6-99) Change 2	1-1
(6-99) Original	1-2
(6-99) Change 2	1-3
(6-99) Original	1-4 thru 1-10
(6-99) Change 2	1-11
(6-99) Original	1-12 thru 1-26
(6-99) Change 2	1-27
(6-99) Original	1-28 thru 1-36
UJPT & E2-C2 INAV-02	
(6-99) Original	2-i thru 2-ii
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UJPT & E2-C2 INAV-05	
(6-99) Original	5-i thru 5-ii
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UJPT & E2-C2 INAV-06	
(6-99) Change 2	6-i thru 6-ii
(6-99) Original	6-1 thru 6-30
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UJPT & E2-C2 INAV-07	
(6-99) Original	7-i thru 7-ii
(6-99) Original	7-1 thru 7-22
UJPT & E2-C2 INAV-08	
(6-99) Original	8-i thru 8-ii
(6-99) Original	8-1 thru 8-24
UJPT & E2-C2 INAV-09	
(6-99) Change 1	9-i thru 9-ii
(6-99) Original	9-1 thru 9-4
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(6-99) Original	9-22
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UJPT & E2-C2 INAV-10	
(6-99) Change 2	10-i thru 10-ii
(6-99) Original	10-1 thru 10-9
(6-99) Change 2	10-10
(6-99) Original	10-11thru 10-17
(6-99) Change 2	10-18 thru 10-19
(6-99) Original	10-20 thru 10-21
(6-99) Change 2	10-22
(6-99) Original	10-23 thru 10-26
UJPT & E2-C2 INAV-11	
(6-99) Original	11-i thru 11-ii
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EFFECTIVE PAGES	PAGE NUMBERS

LESSON GUIDE/LAB

COURSE/STAGE: T-45A UJPT & E2-C2 Instrument Navigation

LESSON TITLE: Review of FLIP and FAA Publications

LESSON IDENTIFIER: T-45A UJPT & E2-C2 INav-01

LEARNING ENVIRONMENT: Classroom

ALLOTTED LESSON TIME: 1.8 hr

STUDY RESOURCES:

* DOD FLIP (GP) General Planning
* DOD FLIP (AP/1) Area Planning, North and South America
* DOD FLIP (AP/1A) Special Use Airspace (NOTAL)
* DOD FLIP (Enroute) Flight Information Handbook (FIH)
* DOD FLIP (Enroute) IFR Supplement, United States
* DOD FLIP (Enroute) VFR Supplement, United States
* DOD FLIP IFR Enroute High Altitude - United States Charts
* FAA Aeronautical Information Manual (AIM)

LESSON PREPARATION:

Read:

* Read FLIP GP Chapter 3 - “FLIP Program”

EXAMINATION:

The objectives in this lesson will be tested in Instrument Navigation 12X.

(6-99) CHANGE 2

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LESSON OBJECTIVES

2.1.8.3.1
Recall the Department of Defense (DOD) flight information publications (FLIPs) and FAA documents required for flight planning.

1.1
To present a general review of that portion of the Department of Defense (DOD) flight information publications (FLIP) and Federal Aviation Administration (FAA) program applicable to flights in tactical jet type aircraft.

1.1.1
List the FLIP publications which would normally be used for three phases of flight: planning, en route operation and terminal operations.

1.1.2
Recall the general scope of information contained in each applicable publication of the FLIP program.

1.1.3
State the method by which each applicable FLIP publication is updated and kept current between issue dates.

1.1.4
List the FLIP publications which have provisions for Special Notices.

2.1.8.6
Recall information and application of the NOTAM system.

1.1.5
State the objective of the NOTAM system.

2.1.8.3.1.1
Recall FLIP usage and application in instrument flight planning for tactical jet aircraft.

1.2
To introduce the DOD FLIP (Enroute) IFR Supplement and DOD FLIP Flight Information Handbook, and aid you in gaining a working knowledge of their contents.

1.2.1
State the criteria for United States airports to be listed in the IFR Supplement.

1.2.2
Extract specific information from the Airport/Facility Directory.

1.2.3
Extract specific information from the flight data and procedures section.

1.2.4
Recall the location of the formats used for position reports, filing, or changing flight plans in flight.

1.2.5
Extract specific information from the Flight Information Handbook.

2.1.8.3.1.2
Recall FLIP symbology, information, navigation detail and application in defining the air traffic instrument navigation system.

1.3
To introduce the DOD FLIP High Altitude Charts-U.S. and aid you in gaining a working knowledge of their contents.

1.3.1
State the condition for a NAVAID to be part of a jet route segment.

1.3.2
State the three types of TACAN changeover points.

1.3.3
Determine which VOR facilities provide HIWAS and/or TWEB.

1.3.4
Identify boundaries of Air Route Traffic Control Centers (ARTCCs).

1.3.5
Determine distances by referring to the mileage indicators on the route segments, or by direct measurement using the nautical mile (nm) scales.

1.3.6
Determine flight routes using Jet Route identifiers.

1.3.7
Determine the applicable MEA/MAA for Jet Route segments.

1.3.8
Select proper cruising altitudes/flight levels when given the magnetic course of flight.

1.3.9
Extract specific information on Special Use Airspace.

1.3.10
Determine the applicable Magnetic Variation and Standard Time Zone information for preflight planning in a particular area.

1.3.11
State the standard units of measurement used on the charts for altitudes, mileage, radials, bearings, and time.

1.3.12
State the specific criteria for airports to be depicted on the High Altitude Charts, how they are depicted, and what determines the availability of instrument approaches.

1.3.13
Interpret identification and communication information for Radio Aids to Navigation/Flight Service Stations.

1.3.14
State the purpose of Preferred Single-Direction Jet Routes.

2.4.4.1
Recall NATOPS General Flight and Operating Instructions (OPNAVINST 3710.7)

HOW TO USE A LESSON GUIDE/LAB

This is a Lesson Guide/Lab that you will complete in group session with an instructor. FLIP publications, charts, and AIM will be available.

MOTIVATION

To successfully complete a mission flight and comply with all the FAA and military procedures and regulations, you, as an instrument pilot, must have necessary information available for the planning, departure, enroute, and terminal phases of our flight. The Department of Defense has developed a system of disseminating this information to you in an updated and organized form. This system is designated as the Department of Defense (DOD) flight information publications (FLIP) program.

OVERVIEW

Separate FLIP program packages are produced for each of four world geographic areas in common with the area of coverage chart on the back cover of all sections of the FLIP Planning publications. Format and content are standardized in each package to the maximum extent practicable, with due consideration given to unique area requirements. The discussions contained in this unit are related directly to United States coverage, which is contained within package number one - “North & South America.”

DOD FLIPs are published with effective dates which coincide with a schedule established by the internationally accepted Aeronautical Information Regulation and Control 00 (AIRAC) system. Under this arrangement, which is associated with the Notices to Airmen (NOTAM) system, changes announced in advance are effected on a 28-day basis. Note that in the following individual product descriptions of DOD FLIPs, the common AIRAC 4-week cycle (or increments thereof) is followed.

The FLIP program was designed using the concept that there are basically three separate phases of flight - planning, enroute operations, and terminal operations. No one document contains all the information which may be required for a flight. The FLIP Planning, supplements, Flight Information Handbook, enroute and arrival charts, instrument approach procedures, and NOTAM files must be consulted prior to flight. In planning for international flights, reference should also be made to the USAF Foreign Clearance Guide.

PRESENTATION

The FLIP program consists of the following publications:

1. Planning

    a. General Planning (GP)

    b. Area Planning (AP/1)

        (1) Area Planning, Special Use Airspace (AP/1A)

        (2) Area Planning, Military Training Routes (AP/1B)

2. Enroute IFR/VFR Supplements, United States

3. Enroute Flight Information Handbook

4. Enroute IFR High/Low Altitude - United States Chart

5. Area Charts

6. Area Arrival Charts Depicting Terrain Data

7. (Terminal) High/Low Altitude United States

8. Civil Standard Instrument Departures/Standard Terminal Arrivals (CIV SIDs/STARs)

9. U.S. Air Force Foreign Clearance Guide

The publications of the FLIP program are updated with revisions, additions, and deletions between issues so that you always obtain current information.

This revision process is by means of:

1. Enroute Change Notices (ECNs)

2. Terminal Change Notices (TCNs)

3. Planning Change Notices (PCNs)

4. Urgent Change Notices (UCNs)

5. Defense Mapping Agency (DMA)

6. Aeronautical Chart Updating Manual (CHUM)

Pilots are kept current on temporary conditions affecting the status of enroute and airport NAVAIDs and facilities, on proposed changes to FAA procedures, and on major military training exercises by:

1. Notices To Airmen (NOTAMs)

2. Special Notices

In addition to the FLIP publications, the following National Ocean Service (Department of Commerce) publications are approved by the DOD for use by military pilots and are normally available in most airport flight planning areas:

1. Sectional Aeronautical Charts

2. VFR Terminal Area Charts (Class B Airspace)

This section will briefly familiarize you with each publication in the DOD FLIP program and the U.S. Government flight publications (Department of Commerce) which together form a part of your tools of the trade. You should be particularly familiar with those publications applicable to flights in tactical jet aircraft.

IFR FLIGHTS IN TACTICAL JET TYPE AIRCRAFT

For every IFR flight outside the local training area, you will carry four FLIP publications in jet-type aircraft.

1. FLIP (Enroute) IFR Supplement

2. FLIP (Enroute) Flight Information Handbook

3. FLIP High Altitude Enroute Charts

4. FLIP (Terminal) High Altitude Instrument Approach Procedures

Also recommended would be the Low Altitude Enroute Chart or Arrival Chart, if applicable, for your destination area and the CIV SIDs/STARs if you are going to a high density area.

Two other FLIP publications are applicable to tactical jet-type aircraft, but are used for preflight planning as a backup to enroute and terminal publications; therefore, they are not carried aboard aircraft.

1. FLIP Planning (GP, AP/1, AP/1A, AP/1B as applicable)

2. U.S. Air Force Foreign Clearance Guide

You should apply two basic rules to the everyday use of these FLIP publications:

1. **Always** use current issues of the applicable publications. Approach procedures and/or airways do change.

2. **Always** obtain the latest FLIP program information by referencing all applicable Change Notices, Special Notices, and NOTAMs.

FLIP UPDATE SYSTEM

The FLIP program publications are maintained in a continual updated status between issues by several means:

1. Enroute Change Notices (ECNs)
2. Terminal Change Notices (TCNs)
3. Planning Change Notices (PCNs)
4. Urgent Change Notices (UCNs)
5. Special Notices
6. Notices to Airmen (NOTAMs)

Enroute Change Notices (ECNs)

Published on a scheduled basis, ECNs disseminate revisions, additions, and deletions to the current issues of enroute charts, supplements, and the Flight Information Handbook.

Terminal Change Notices (TCNs)

Published on a scheduled basis, TCNs disseminate revisions to the current instrument approach procedure booklets, that is, a new instrument approach procedure to an airport to replace the current procedure.

Planning Change Notices (PCNs)

Published on a scheduled basis, PCNs disseminate revisions, additions, and deletions to the current issues of the four sections of the FLIP planning publications.

Urgent Change Notices (UCNs)

ECNs, TCNs, and PCNs are published on a scheduled basis. Safety of flight information requiring an unscheduled amendment to the enroute charts, supplements, Flight Information Handbook, instrument flight procedures, and planning publications is disseminated in the form of an Urgent Change Notice (UCN).

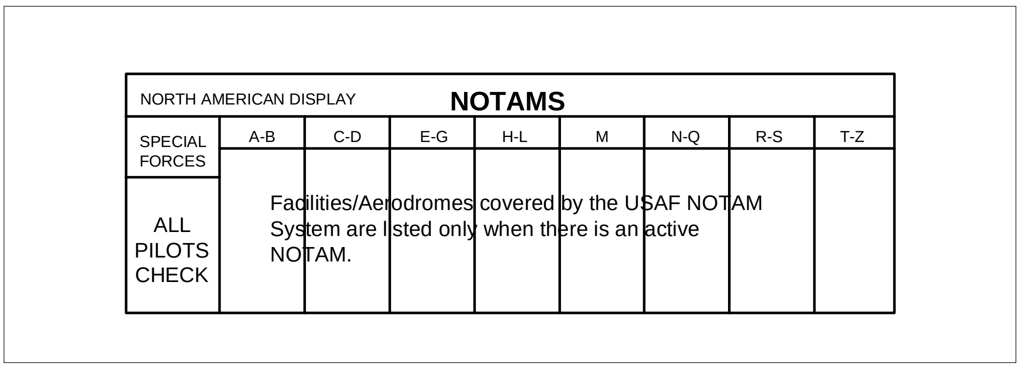
Special Notices

ECNs, TCNs, PCNs, and UCNs are the methods by which publications are actually revised between issues; however, pilots are kept current concerning new FLIP features, modification to the FLIP publications formats, proposed changes to FAA rules, major military training exercises, etc., by Special Notices. They are located on the inside front cover of the Planning Sections, supplements, and Flight Information Handbook.

Notice To Airmen (NOTAM)

Information limited to temporary conditions which may be hazardous to flight affecting navigational aids and terminal facilities is disseminated to pilots in a timely manner by teletype NOTAMs. There are two NOTAM systems - the DOD system and the FAA system.

1. DOD NOTAM System: covers USN, USMC, USAF, USCG, ANG, and most Army facilities, along with civil airports having an approved DOD Instrument Approach Procedure. These teletype notices will be displayed on a large white wall display in the flight planning area of Base Operations.



2. FAA NOTAM system: Covers FAA-operated facilities, that is, public use civil airports and some Army facilities. If your planned flight is to terminate at an airport not covered by the DOD system, request the dispatcher at Base Operations obtain the NOTAMs for you from a Flight Service Station (FSS).

   NOTE: The Dispatcher has a direct telephone line to the “TIE-IN” FSS serving that airport.

NOTES

FLIP Planning

FLIP Planning is, by design, a publication medium for aeronautical information which has been operationally identified as not normally required for in-flight reference. As backup documents for enroute and terminal operations, they contain a wide range of data with which you should be familiar. FLIP planning is used in flight planning areas for preparation of flights.

The scope of the planning documents is worldwide; however, not all sections are required for operations in any one theater. The planning publications for use in the United States are divided into four sections:

1. General Planning (GP)
2. Area Planning, North and South America (AP/1)
3. Area Planning, North and South America, Special Use Airspace (AP/1A)
4. Area Planning, North and South America, Military Training Routes (AP/1B)

   NOTE: The appropriate FLIP Area Planning package for operations in other parts of the world can be determined from the reference map located on the back cover of each planning document.

   NOTE: Changes within regularly scheduled issues of the planning publications are indicated by a vertical line in the left-hand column of the line/paragraph/section that has changed from the previous issue. Upon receipt of a new issue of a planning publication, these changes should be checked for new/changed information.

General Planning (GP)

General Planning (GP), Area Planning North and South America (AP/1), and FLIP (Enroute) Flight Information Handbook (FIH) form the rules and procedures for military pilots. Together, they are the equivalent of, and share much of the information from, the Aeronautical Information Manual (AIM) used by civil pilots. The GP section contains pertinent planning data and procedural information in support of its companion enroute and terminal publications. Every effort is made to confine the content to those items of concern during the preflight planning phase, reducing the need for in-flight reference. You should take a copy of the GP section and follow through it while reading this section so as to be familiar with its contents.

Special Notices/FLIP Changes

Special Notices are located on the inside front cover as a convenient reference. Any significant changes to the DOD FLIP program will be amplified in this section.

Table Of Contents

The General Planning section is divided into chapters, with pages and major paragraphs numbered accordingly to provide easy reference.

Index For Aeronautical Information

Indicates the location by publication, or chapter in GP, of each subject of information in the FLIP program. Cross-references are provided to assist in the location of data.

Explanation of Terms

The Terms with their accompanying definitions are taken from the FAA Pilot/Controller Glossary, plus some ICAO and military terms. The source from which the term is taken is indicated.

FLIP Program

This chapter describes the DOD FLIP program, individual FLIP products, and related publications. Included is a chart indicating the availability of FLIP products by geographic area.

Flight Plans

Contains detailed instructions for completing all types of military and civil flight plans, including international flight plans.

Pilot Procedures

Contains standard pilot procedures while operating under both FAA and international (ICAO) rules. It is divided into preflight, departure, enroute, and arrival phases of flight with some supplementary information. Contains an excellent section on the different NOTAM systems. You should become thoroughly familiar with the contents of this section. Periodically through the year you should review this section as a reminder of proper procedures.

International Civil Aviation Organization

The ICAO is an affiliate of the United Nations which establishes international rules and procedures for civil aviation. U.S. military pilots are expected to conform to these rules to the maximum extent practicable.

Operations And Firings Over The High Seas

Concerns procedures to be used by U.S. military aircraft conducting air operations or gunnery exercises within airspace over the high seas.

Aircraft Codes

Identification codes for U.S. military aircraft.

LORAN/OMEGA Chart Coverage

Revisions/Quality Reports/Requisitions/Distribution/Schedules

A catchall chapter on how the FLIP system is kept current, how to obtain copies, and when to expect the next revision.

General Planning (GP) is published every 32 weeks with Planning Change Notices (PCNs) issued at the 16-week midpoint of the GP book cycle, and Urgent Change Notices (UCNs) issued as required.

FLIP Planning

North and South America Area Planning (AP/1)

AP/1 contains aeronautical data for North and South America and supplements the data in General Planning (GP), and select data in the enroute supplements and Flight Information Handbook. You should take a copy of AP/1 and follow through it while reading this part of the unit.

AP/1 is revised every 24 weeks and is amended by two (2) scheduled Planning Change Notices (PCNs) published 8 and 16 weeks after the effective date of AP/1. Since these PCNs are not cumulative, they must be retained until the new issue of the basic product is received.

Information applicable to the entire North and South American theater is published in Chapter 1. Information for each ICAO region in the theater is published in the subsequent chapters, using a separate chapter for each ICAO region. The remaining chapters provide miscellaneous data that is of interest to DOD aircrews.

The ICAO regional data is normally presented in three sections: A, B, and C. Section A contains supplementary data applicable to the entire ICAO region; Section B contains data for the Flight Information Regions (FIRs) and Upper Flight Information Regions (UIRs) within the ICAO region. Section C provides data for the nations with the ICAO regions. Occasionally, a Section D is added for other significant data. As we are primarily interested in U.S. procedures, turn to the United States section in Chapter 3.

Dimensional Units, Visual Flight Rules, Instrument Flight Rules, Altimeter Setting, Position Reporting, Vertical Separation

Each theater, ICAO region, FIR/UIR, and national listing always include these six entries. They may indicate “Standard” if they comply with ICAO standards.

Flight Planning

Has information on Quota Flow Control used primarily by the airlines to avoid excessive holding at their destination. This has an excellent section on United States Controlled Airspace including a complete list of all Class B and Class C areas, and pilot/equipment requirements for operations in that airspace.

Flight Hazards

Listed by state and areas within the state.

Route And Area Restrictions

Listed by state and/or area. Flight hazards and route and area restrictions are not found elsewhere in the FLIP system.

Supplementary Airport Remarks

Listed alphabetically by airport name as in the enroute supplements. As the name implies, this contains supplementary information of a semipermanent nature too lengthy to be contained in the IFR or VFR Enroute Supplements.

Prior to any cross-country flight and before checking the NOTAM box on the DD-175, Flight Hazards, Route and Area Restrictions, and Supplementary Airport Remarks should be consulted.

Preferred IFR Routes

A system of preferred routes has been established to guide pilots in planning their route of flight, to minimize route changes during the operational phase of flight, and to aid in the efficient orderly management of air traffic, using federal airways. The preferred IFR routes are designed to serve the needs of airspace users and to provide for a systematic flow of air traffic in the major terminal and enroute environments. Cooperation by all pilots in filing preferred routes will result in fewer traffic delays and will better provide for efficient departure, enroute, and arrival air traffic service.

The preferred routes are divided into low and high altitude structures (the division, of course, is 18,000 ft). The high altitude list shows terminal to terminal routes; on some high altitude routes, low altitude airways are included as transitional routes.

VOR Receiver Checkpoints

A listing of facilities that are available for operational checks of airborne VOR equipment. Military bases normally designate a specific ground point for checking the accuracy of aircraft TACAN receivers. The tolerances for the ground check are similar to VOR within plus or minus 4 degrees of the designated radial and within one-half mile or 3 percent of the distance to the facility, whichever is greater. See GP paragraph 5-44 for additional information.

Chapter 4, Caribbean (CAR) Region

Chapter 5, South American (SAM) Region

Chapter 6, Air Defense Identification Zones

Those areas in North and South America that require pre-filing in order to enter, and strict compliance to entry and exit positioning.

NOTE: On the back cover, Boundaries of DOD Flight Information Planning

Area Planning AP/1A
Special Use Airspace
North And South America

AP/1A contains a listing of all prohibited, restricted, danger, warning, and alert areas listed by country. Military operations and known parachute jumping areas are also listed.

AP/1A is published every 48 weeks with PCNs at the 16- and 32-week intervals. UCNs are published as required.

This section is published primarily for preflight planning and much of the same information can be found in an abbreviated form on the FLIP enroute charts.

Area Planning AP/1B
Military Planning Routes
North and South America

AP/1B contains information relative to military routes, including IFR Military Training Routes (IR), VFR Military Training Routes (VR), Slow-Speed, Low-Altitude Training Routes (SR), Refueling Tracks/Anchors/ VFR Helicopter Refueling Tracks (AR), and Avoidance Locations. Charts (8 charts on 4 sheets) containing graphic depictions of the IR, VR, SR, and AR route systems throughout the continental United States and Alaska are also included.

This information is unique to the United States and will only be found in the North and South America Planning package.

AP/1B is published every 8 weeks.

Again, GP, AP/1, AP/1A, and AP/1B comprise the planning documents and are used for reference but not normally carried in tactical aircraft. Now let us look at those documents that should be carried at <u>all</u> times or on <u>all</u> IFR flights.

FLIP (Enroute) Flight Information Handbook

This handbook contains aeronautical information required by DOD aircrews in flight, but which is not subject to frequent change. The handbook is designed for worldwide use in conjunction with DOD FLIP enroute supplements. Publication cycle is every 32 weeks, and if necessary, amended by Urgent Change Notices (UCNs) or NOTAMs.

Section A, Emergency Procedures

Contains both U.S. (FAA) and ICAO procedures. Need to check subheadings to ensure which procedure is being discussed. This section contains two-way radio failure procedures to follow, what to do if lost, if intercepted, and hand signals that can be used. Aircraft witnessing distress, body and paulin signals that can be used to signal aircraft from the ground are also found here.

Section B, National and International Flight Data and Procedures

This section supplements and complements the information found in GP, Chapter 5. Discussion of FAA air/ground communications, transponder codes, position reporting procedures as well as proper procedures for initial call up. Includes a partial listing of mandatory voice calls. Explains the use of Runway Condition Readings (RCR). Shows graphic display of the Approach Lighting Systems in use, as well as Visual Glide Slope Indication systems (VASI).

Section C, Meteorological Information

First part deals with procedures to follow and phone numbers to call (both commercial and autovon) for military pilots departing a location where military weather and NOTAM services are not available. Four maps are provided indicating the location and frequencies of METRO stations as well as which ones have weather RADAR. Information is provided on the FAA Weather Information Services available as well as airborne services. Pilot Weather Reports (PIREP) format as well as turbulence and icing tables are provided.

Section D, Conversion Tables

Useful tables such as Fahrenheit/centigrade, barometric settings in inches vs. millibars, statue to nautical miles, etc.

Section E, Standard Time Signals

Autovon phone numbers for standard time signals, time zones of the world.

Section F, FLIP and NOTAM Abbreviations/Code

The listing provides a ready reference of abbreviations used in the flight information publications (FLIPs) and the DOD NOTAM system. Codes, e.g., POL, Lighting, and JASU, are listed elsewhere in the supplement legends. The abbreviations presented are intended to represent grammatical variations of the basic form. (Example - “trans” may mean ”transmit”, “transmitting”, transmitted”, or ”transmits.”) This listing is the most complete in the FLIP system.

The ICAO NOTAM code is published to enable the coding of information regarding the establishment, condition or change of radio aids, aerodromes and lighting facilities, dangers to aircraft in flight, or search and rescue facilities. Encoding facilitates the dissemination of NOTAMs by reducing the transmission time over telecommunication channels and eliminating translation.

All NOTAM code groups contain a total of five letters. The first letter of the code group is always the letter Q to indicate that it is a code abbreviation for use in the composition of a NOTAM. The letter Q has been chosen to avoid conflict with any assigned radio call sign.

Back Cover, Interception Signals

If you are intercepted by U.S. or foreign aircraft [usually in, or near the edges of an Air Defense Identification Zone (ADIZ) or border], a series of standard signals to be used by the interceptor and intercepted aircraft have been devised, in case radio contact cannot be made.

FLIP (Enroute) Supplements

The FLIP (Enroute) Supplements consist of two books, divided, to provide separate IFR and VFR directories. Together, they form a complete directory of all airports available to military aircraft. The text on the front cover is printed in blue for the IFR Supplement and in brown for the VFR Supplement. This color code corresponds to that used for VFR and IFR aerodrome symbols on the Enroute High and Low Altitude Charts. The VFR Supplement is published every 24 weeks and the IFR Supplement is published every 8 weeks. (The effective date and time is always on a Thursday, at 0901Z so you have the effective issue for your weekend cross-country.)

You will be primarily concerned with the IFR Supplement; however, the VFR Supplement will be useful when planning emergency diverts for low-level ONAV flights. The IFR Supplement is designed for preflight and in-flight reference and a current issue should be aboard your aircraft for every flight.

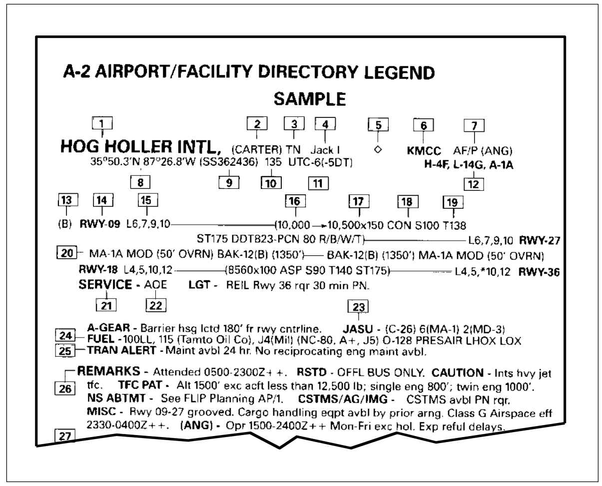
FLIP (Enroute) IFR Supplement

Section A: Airport/Facility Directory Legend

Beginning with a fictitious airport entry on page A-2 which contains typical airport data, the legend consists of several pages (starting on page A-4). The fictitious airport data has reference numbers, and the several pages of legend contain explanations of this referenced data.

All entries use the basic parameters as listed on page A-3.

Of particular note is the indication that "Low Altitude" (below 18,000 ft) frequencies are shown in light type and "High Altitude" frequencies are in bold type. Discrete frequencies, those that are not continuously monitored, are preceded by the small "d."



AIRPORT / FACILITY DIRECTORY LEGEND A-3

LEGEND

1. The following detailed legend is provided to assist users in becoming familiar with the format used in the Airport/Facility Directory. Information which is self-explanatory will not be covered in this legend.

a. All bearings, radials, courses, and tracks are magnetic.

b. All mileages are nautical miles (NM).

c. All times are Coordinated Universal Time (UTC).

d. All elevations are in feet above/below Mean Sea Level (MSL).

2. Section B contains an alphabetical listing of all: Airports (landplane and heliports) which meet one of the below listed criteria; Air Traffic Control Centers; Flight Information Centers; Communications Stations; and Radio Aids to Navigation.

a. Selection criteria for Airports and Facilities (must have at least one):

(1) A published DOD (High/Low Altitude) Instrument Approach Procedure and/or ASR/PAR RADAR approach minima.

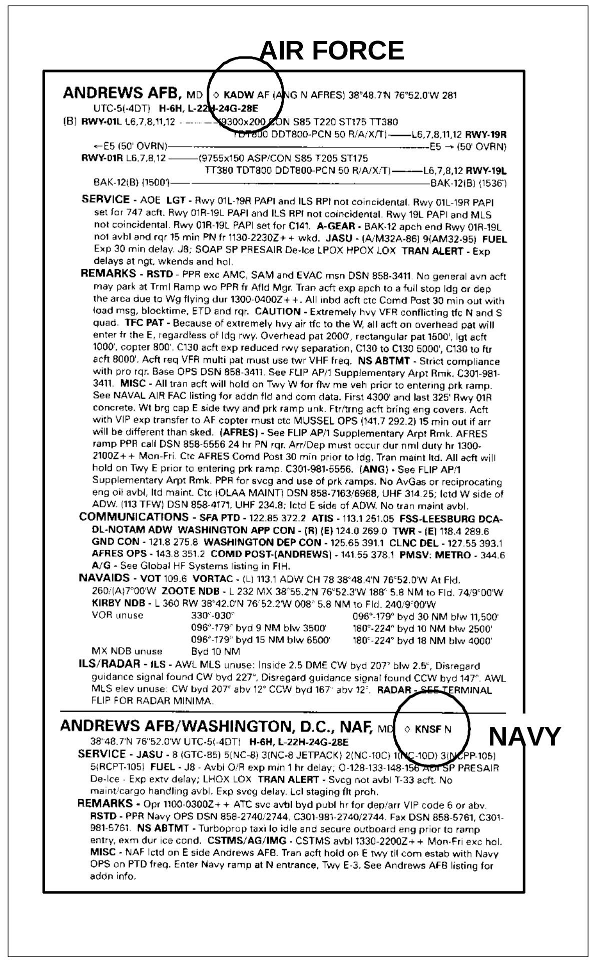
(2) All airports located within Canada and Mexico which are portrayed on U.S. Enroute Charts for emergency use.

(3) Selected airports and heliports not meeting the above criteria when specifically requested by a U.S. military service.

Section B: Airport/Facility Directory

The directory contains an alphabetical listing of airports, Air Route Traffic Control Centers, NAVAIDs, and Flight Service Stations. There are certain entries with which you should be thoroughly familiar and warrant a review.

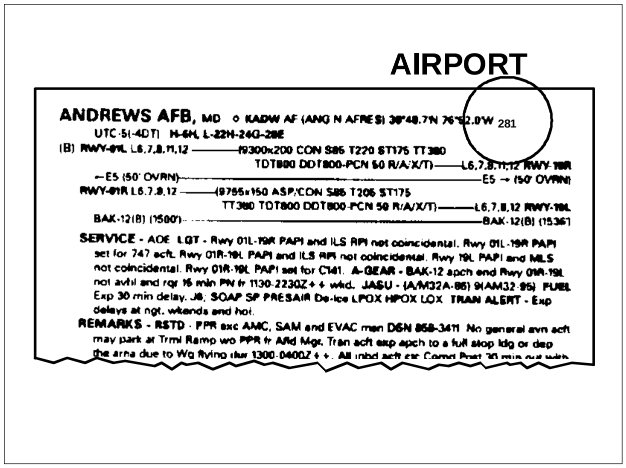
The section begins with a City/Airport Cross-Reference. As the listing of airports is by airport name, this listing provides a cross-reference when the city name is not part of the airport name.



Location Identifier - Airports and NAVAIDs have a 3-letter FAA location identifier or 4-letter ICAO location identifier. These are used for flight plans, charts, and clearances. When flying within the United States on a military flight plan, do not use the first letter of an ICAO identifier. This identifies the country, i.e., "K" for the United States.

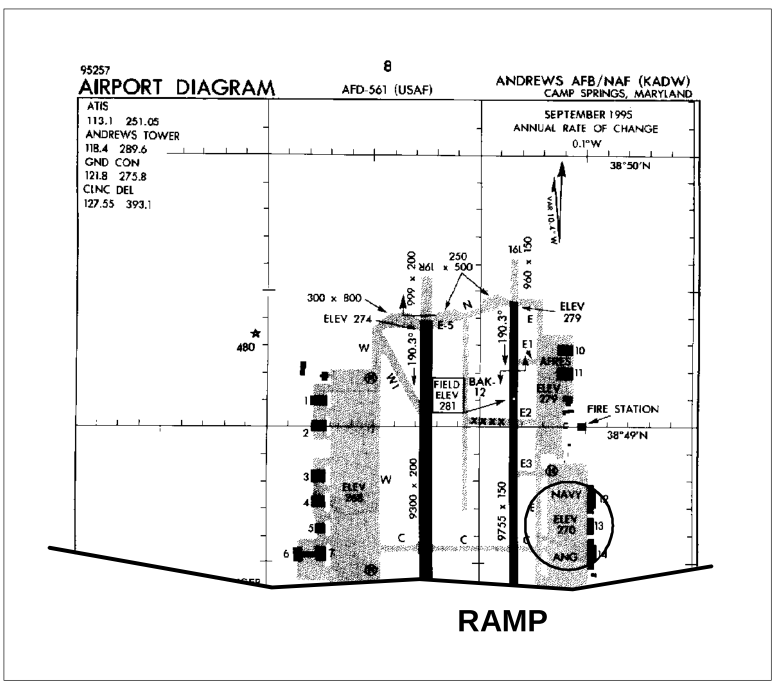
NOTE: METAR weather codes will use the "K" identifier.

CAUTION: Joint use airports such as ATLANTA NAS and WASHINGTON NAF will have an identifier for the Air Force or civilian side of the airport and a separate identifier for the Navy side of the airport.

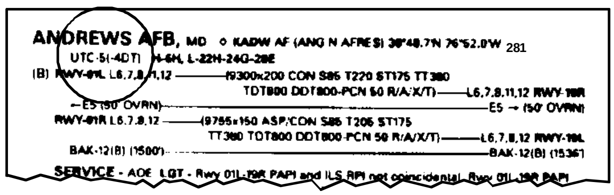

AIRPORT

ANDREWS AFB, MD ○ KADW AF (ANG N AFRES) 38°48.7'N 76°52.0'W 281
UTC-5(-4DT) H-6H, L-22H-24G-28E
(B) RWY-01L L6,7,8,11,12 ——(9300x200 CON S85 T220 ST175 TT380
TDT800 DDT800-PCN 50 R/A/X/T)——L6,7,8,11,12 RWY-19R
←E5 (50' OVRN)——E5 → (50' OVRN)
RWY-01R L6,7,8,12 ——(9755x150 ASP/CON S85 T205 ST175
TT380 TDT800 DDT800-PCN 50 R/A/X/T)——L6,7,8,12 RWY-19L
BAK-12(B) (1500')——BAK-12(B) (1536')
SERVICE - AOE LGT - Rwy 01L-19R PAPI and ILS RPI not coincidental. Rwy 01L-19R PAPI set for 747 acft. Rwy 01R-19L PAPI and ILS RPI not coincidental. Rwy 19L PAPI and MLS not coincidental. Rwy 01R-19L PAPI set for C141. A-GEAR - BAK-12 apch end Rwy 01R-19L not avbl and rqr 16 min PN fr 1130-2230Z++ wkd. JASU - (A/M32A-86) 9(AM32-95) FUEL Exp 30 min delay. J8; SOAP SP PRESAIR De-ice LPOX HPOX LOX TRAN ALERT - Exp delays at ngt, wkends and hol.
REMARKS - RSTD - PPR exc AMC, SAM and EVAC msn DSN 858-3411 No general avn acft may park at Trml Ramp wo PPR fr Afld Mgr. Tran acft exp apch to a full stop ldg or dep the area due to Wg flying dur 1300-0400Z++. All inbd acft ctc Comd Post 30 min out with

<u>Airport Elevation</u> - Airport elevation is the highest elevation on any usable landing surface of the airport. When determining if your altimeter is within operational limits of +/- 75 ft, you should use the ramp elevation off the airport diagram in the FLIP (Terminal) Instrument Approach Procedures booklet.

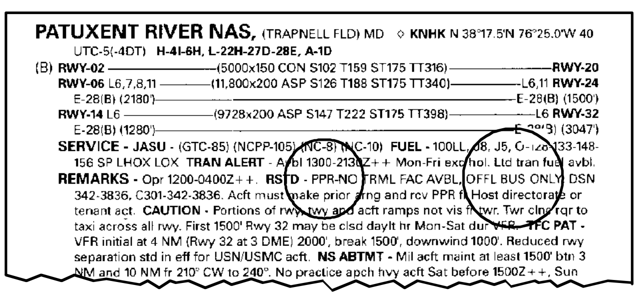


<u>"Z" Time</u> - The Estimated Time of Departure (ETD) entered on the flight plan (DD form 175) is in Universal Coordinated Time (UTC), or "Z" time. This "Z" time is determined by using either local Standard Time or local Daylight Saving Time. Daylight Saving Time is in effect from 0200 local time the first Sunday in April to 0200 local time the last Sunday in October.


ANDREWS AFB, MD ◇ KADW AF (ANG N AFRES) 38°48.7'N 76°52.0'W 281
UTC-5(-4DT) H-6H, L-22H-24G-28E
(B) RWY-01L L6,7,8,11,12 ——(9300x200 CON S85 T220 ST175 TT380
TDT800 DDT800-PCN 50 R/A/X/T)——L6,7,8,11,12 RWY-19R
←E5 (50' OVRN)——E5 → (50' OVRN)
RWY-01R L6,7,8,12 ——(9755x150 ASP/CON S85 T205 ST175
TT380 TDT800 DDT800-PCN 50 R/A/X/T)——L6,7,8,12 RWY-19L
BAK-12(B) (1500')——BAK-12(B) (1536')
SERVICE - AOE LGT - Rwy 01L-19R PAPI and ILS RPI not coincidental. Rwy 01L-19R PAPI

NOTE: A ++ symbol following published operating hours indicates a facility or service is in effect 1 hour earlier during periods of Daylight Saving Time.

<u>Airport Restrictions</u> - Among other things, airport restrictions may include:


PATUXENT RIVER NAS, (TRAPNELL FLD) MD ◇ KNHK N 38°17.5'N 76°25.0'W 40
UTC-5(-4DT) H-4I-6H, L-22H-27D-28E, A-1D
(B) RWY-02 ——(5000x150 CON S102 T159 ST175 TT316)——RWY-20
RWY-06 L6,7,8,11 ——(11,800x200 ASP S126 T188 ST175 TT340)——L6,11 RWY-24
E-28(B) (2180')——E-28(B) (1500')
RWY-14 L6 ——(9728x200 ASP S147 T222 ST175 TT398)——L6 RWY-32
E-28(B) (1280')——E-28(B) (3047')
SERVICE - JASU - (GTC-85) (NCPP-105) (NC-8) (NC-10) FUEL - 100LL, J8, J5, O-128-133-148-156 SP LHOX LOX TRAN ALERT - Avbl 1300-2130Z++ Mon-Fri exc hol. Ltd tran fuel avbl.
REMARKS - Opr 1200-0400Z++. RSTD - PPR-NO TRML FAC AVBL, OFFL BUS ONLY, DSN 342-3836, C301-342-3836. Acft must make prior arng and rcv PPR fr Host directorate or tenant act. CAUTION - Portions of rwy, twy and acft ramps not vis fr twr. Twr clnc rqr to taxi across all rwy. First 1500' Rwy 32 may be clsd daylt hr Mon-Sat dur VFR. TFC PAT - VFR initial at 4 NM (Rwy 32 at 3 DME) 2000', break 1500', downwind 1000'. Reduced rwy separation std in eff for USN/USMC acft. NS ABTMT - Mil acft maint at least 1500' btn 3 NM and 10 NM fr 210° CW to 240°. No practice apch hvy acft Sat before 1500Z++, Sun

1. Prior Permission Required (PPR): To use this airport, you must call Base Operations on the autovon number listed, give your ETA, type of aircraft, name, and business to obtain a PPR number. In the "REMARKS" section of your flight plan (DD-175), enter the airport location identifier and the PPR number assigned to your aircraft. Without other restrictions, a PPR airport can be used as a fuel stop if you obtain a PPR number.

2. Official Business Only (OFFL BUS ONLY): This airport is closed to all military transient aircraft and cannot be used as a fuel stop. You must be going to the airport specifically to contact a person or group of persons on official government business. A cross-country flight requiring a fuel stop is not official business.

   USAF personnel require written orders to use these airports; however, Navy personnel do not.

EXCEPTIONS: OFFL BUS ONLY and PPR airports <u>can</u> be used anytime:

1. In an emergency; or
2. As a weather alternate on the DD-175

A PPR number is not required when listing the airport as a weather alternate.

<u>Communications</u> **-** Single Frequency Approach (SFA): A service provided to single-piloted jet aircraft at night or in instrument conditions which allows the use of a single UHF frequency throughout the approach to landing.

NOTE: For purposes of providing this service, ATC treats any tandem-seated aircraft as if it was single-piloted.

Pilot To Dispatcher: The dispatcher is located in the flight clearance center of Base Operations and is available to file or amend flight plans with ATC and can handle routine non-control communications with pilots. The call sign at Air Force installations is “OPERATIONS,” and the call sign at Naval Air Stations is “BASE OPS.”

EXAMPLES:
Andrews Operations
Navy Washington Base OPS

GRISSOM ARB, IN ◇ **KGUS** AFRES 40°38.9'N 86°09.1'W 812 UTC-5 **H-3H-4H, L-23B**
(B) **RWY-05** L6,7,8,9 ——(12,500x200 ASP S100 T200 ST175
TT450-PCN 100 R/D/X/T)——L6,7,8,9 **RWY-23**
SERVICE - LGT - Rwy 05-23 VASI RRP and ILS RPI not coincident. ACTIVATE-HIRL Rwy 05-23 133.7. **JASU** - (A/M32A-86) (MD-3) (AM32-95) (MA-1A) **FUEL** - J8, O-133-148-156 JOAP SP PRESAIR LPOX **TRAN ALERT** - Opr 1330-2130Z. No priority basis. Fuel not avbl wkend or hol.
REMARKS - Opr 1200-0400Z. **RSTD** - PPR 2130-1330Z, ctc Base OPS DSN 928-2254, C317-688-2254. All inbd PAX/cargo acft must ctc Comd Post no later than 30 min prior to ldg. **MISC** - See FLIP AP/1 Supplementary Arpt Rmk. Wx sec DSN 928-2203. Class G Airspace eff 0400-1200Z.
COMMUNICATIONS - SFA PTD - 372.2 **ATIS** - 271.8 **FSS TERRE HAUTE HUF-NOTAM HUF APP CON - (R)** - Opr 1200-0400Z dly, OT ctc CHICAGO CENTER 120.0 VFR svc. **(E)** 121.05 363.8 **TWR - (E)** 133.7 295.7 **GND CON** - 139.9 275.8 **DEP CON** - After 0400Z ctc CHICAGO CENTER 120.0. - 121.05 351.1 **CLNC DEL** - 324.3 **434 ARW COMD POST** - Call BRICKYARD, fone patch on 321.0 252.1 **PMSV: METRO** - 344.6
NAVAIDS - VORTACW - (T) 116.5 GUS CH 112 40°38.7'N 86°09.1'W At Fld. 810/(A)2°00'W No-NOTAM MP: VORTAC 1300-1500Z Tue. Unmto 0400-1200Z. **VHF/DF**
VORTAC unuse 195°-220° byd 15 NM
ILS/RADAR - ILS - No-NOTAM MP: Rwy 05-23 1100-1500Z Thu. **RADAR** - SEE TERMINAL FLIP FOR RADAR MINIMA.

Automatic Terminal Information Service (ATIS): The continuous broadcast of routine, but essential, non-control information, such as weather, altimeter, runway in use, etc. Absence of a ceiling and visibility indicates that weather of 5,000 ft ceiling and 5-mile visibility or better exists. The primary purpose of ATIS is to reduce frequency congestion on Ground Control and Approach Control frequencies.

DYESS AFB, TX ◇ **KDYS** AF 32°25.2'N 99°51.4'W 1789 UTC-6(-5DT) **H-2E-5B, L-13B-15C**
(B) **RWY-16** L6,7,8,12——(13,500x300 ASP/CON S155 T250 ST175 TT500-PCN 72 R/C/X/T)——L6,7,8,9 **RWY-34**
RWY-161 ——(3500x60 ASP AUW155/C130)——**RWY-341**
SERVICE - JASU - 1(MD-3) 1(MA-1A) 1(M32A-60A) 1(M32-86A) **FUEL** - J8, O-133-148-156 SOAP W SP PRESAIR LPOX LOX HPOX **TRAN ALERT** - Opr 1300-0500Z++.
REMARKS - RSTD - Exp termination of practice apch dur peak periods. Dur lcl trng, tran acft may be ltd to one full stop ldg DSN 461-2523. Use of assault strip rqr prior coord with Comd Post DSN 461-1970 or TACTICS DSN 461-2794. See FLIP AP/1 Supplementary Arpt Rmk. Inbd acft with distinguished visitor code 6 or abv ctc Base OPS 20 min prior to arr. **CAUTION** - Ints trng and formation flt of hvy acft in the immed vcnty. Extv VFR assault strip tfc W of Rwy 16-34. Ruf pavement on both ends of Rwy 16-34 may cause oscillations dur tkof and ldg rolls for acft with tricycle type ldg gear (i.e., B1, T38, KC135). **TFC PAT** - Rectangular 3000', overhead 3500'. **CSTMS/AG/IMG** - CSTMS avbl, ctc Base OPS 24 hr in advance DSN 461-2515/2258. **MISC** - First 1500' Rwy 16-34 non-grooved, middle 10,500' grooved 75' width. No tran launches/recoveries trns dur base acft surges. See FLIP AP/1 Supplementary Arpt Rmk. Base OPS DSN 461-2515/2258.
COMMUNICATIONS - SFA PTD - 372.2 **ATIS** - Opr 1200-0600Z++ Mon-Fri. 385.7 **FSS-FORT WORTH FTW-NOTAM FTW ABILENE APP/DEP CON** - **(R)** Class C Airspace (124.1 338.3 E) (126.5 322.3 W) **(E)** 121.3 **TWR - (E)** 133.0 295.7 236.6 **GND CON** - 119.35 275.8 **ACC COMD POST (RAYMOND 37)** - 311.0 321.0 349.4 **PMSV: METRO** - 344.6 (Call NOAH)
NAVAIDS - TACAN ... 32°25.1'N 99°51.4'W At Fld. 1782/(A)8°00'E No-NOTAM ... (H) 113.7 ABI CH 84 32°28.9'N ... VORW-DME

NOTE: The pilot statement "Have the Numbers" does not indicate receipt of ATIS. Inform Ground Control for taxi or Approach Control on arrival you have "Information Alpha, Bravo, etc." from the ATIS broadcast.

Tie-In Flight Service Station: A Tie-In Flight Service Station is tied-in by direct telephone line (DL) to the Base Operations Dispatcher. It provides services to the airport such as relaying flight plans to ARTCC, relaying clearances back to the airport, providing NOTAM services, etc. It may or may not be located at the airport. All Flight Service Stations monitor 255.4 and UHF/VHF guard frequencies; the call sign is "RADIO."

EXAMPLE: San Angelo Radio

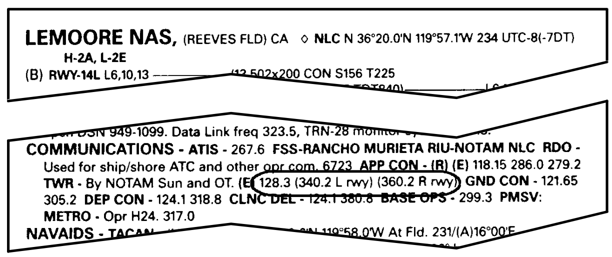
Approach Control: Approach Control facilities and their related function of Departure Control are responsible for coordinating with Air Route Traffic Control Centers and Airport Traffic Control Towers for the control of IFR traffic between the enroute structure and the airport. Absence of a separate name indicates the same name as the airport. If not under ATC control, contact Approach Control on the designated frequency for practice approaches, Special VFR, etc.

In some high density areas, specific Approach Control frequencies will be footnoted for use according to the geographical sector in which your aircraft is located, not according to heading.

MERIDIAN NAS, (MC CAIN FLD) MS ◇ **KNMM** N 32°33.1'N 88°33.3'W 317 UTC-6(-5DT) **H-4H-5D, L-18E**
(B) **RWY-01L** L6,7,8,11 ——(8002x200 CON S173 T300 ST175 TT525)——L6,11 **RWY-19R**
←E5-1 (20' OVRN) E-28(B) (1750')——E-28(B) (1250') E5-1→ (20' OVRN)
RWY-01R L6,11 ——(8002x200 CON S147 T255 ST175 TT445)——L6,7,8,11 **RWY-19L**
←E5-1 (20' OVRN) E-28(B) (1250')——E-28(B) (1750') E5-1→ (20' OVRN)
RWY-10 L4 ——(6401x200 CON S47 T78 ST99 TT228)——L4 **RWY-28**
←E5-1 (20' OVRN) E-28(B) (1250')——E-28(B) (1250')
SERVICE - LGT - Portable OLS avbl Rwy 01L/R, 19L/R and 28. **A-GEAR** - E5-1 RATING-01L, 28-475 HW (DRY), 01R-410 HW (DRY), 19L-630 STD (DRY), 19R-425 STD (DRY). **JASU** - 2(NC-8A) (GTC-85) 1(NCPP-105) **FUEL** - Exp 1 hr reful delays. J5 O-156 SP LOX **TRAN ALERT** - Svc avbl 1300-0500Z++ Mon-Fri. Drag chute repack unavbl.
REMARKS - Opr 1300-0500Z++ Mon-Fri; clsd Sat, Sun and hol. **RSTD** - PPR all tran and NALO Msn ODO DSN 637-2470, C601-679-2470. PPR civ acft OFFL BUS. **CAUTION** - Rwy 19L, 19R have 1 percent down grad first 6000'. Wildlife in vcnty all rwy. Mat and twy S of hgr not vis fr twr. Ints stu jet trng dur fld opr hr. **TFC PAT** - Jet break 1400', pat alt 900'. Tran acft exp visual apch when wx 1900-3 SM or abv. Hi alt apch not nml avbl when Meridian-1 West active. VFR acft ctc Meridian APP CON within 25 NM. **MISC** - Ramp elev 283'. Exp arr/dep delay dur stu flying periods. Class G Airspace eff 0500-1300Z++ Mon-Fri exc hol.
COMMUNICATIONS - SFA ATIS - 273.2 **FSS-GREENWOOD GWO-NOTAM NMM APP CON - (R)** Opr 1300-0500Z++. **(E)** (119.2 374.9 E) (120.5 269.6 S) (120.95 276.4 W) (314.8 N) **MC CAIN TWR - (E)** 126.2 (340.2 L Rwy and Rwy 28) (360.2 R Rwy and Rwy 10) **MC CAIN GND CON** - 336.4 **DEP CON** - Opr 1300-0500Z++. (124.8 S) (343.7 E) **BASE OPS** - 352.2 **CLNC DEL** - 301.0 **PMSV: METRO** - PMSV avbl 1200-0500Z++. 312.4
NAVAIDS - TACAN - (L) NMM CH 56 32°34.7'N 88°32.7'W At Fld. 310/(A)1°00'E Opr dur fld opr hr only.
TACAN unrel 010°-085° byd 21 NM blw 3000'
ILS/RADAR - RADAR - SEE TERMINAL FLIP FOR RADAR MINIMA.

Airport Traffic Control Tower: At controlled airports, the tower has control responsibilities for traffic in its area. It coordinates with Approach/Departure Control for the safe and efficient flow of traffic into and out of that airspace area. Do not taxi onto or across an active runway without tower approval.

NOTE: At some airports, the tower frequencies may be footnoted for a special use such as for arrival or departure, or for use on a specific runway.

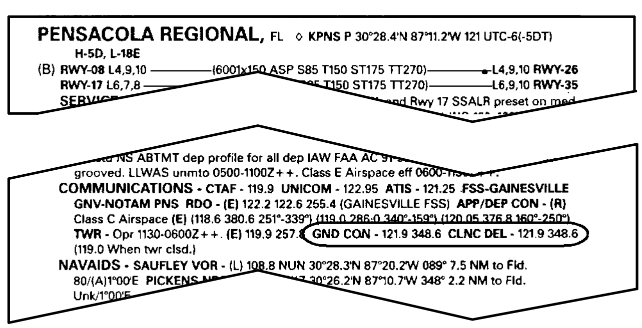


Ground Control: A control branch of the tower responsible for control of all traffic on the ground as the airport except on the active runway.

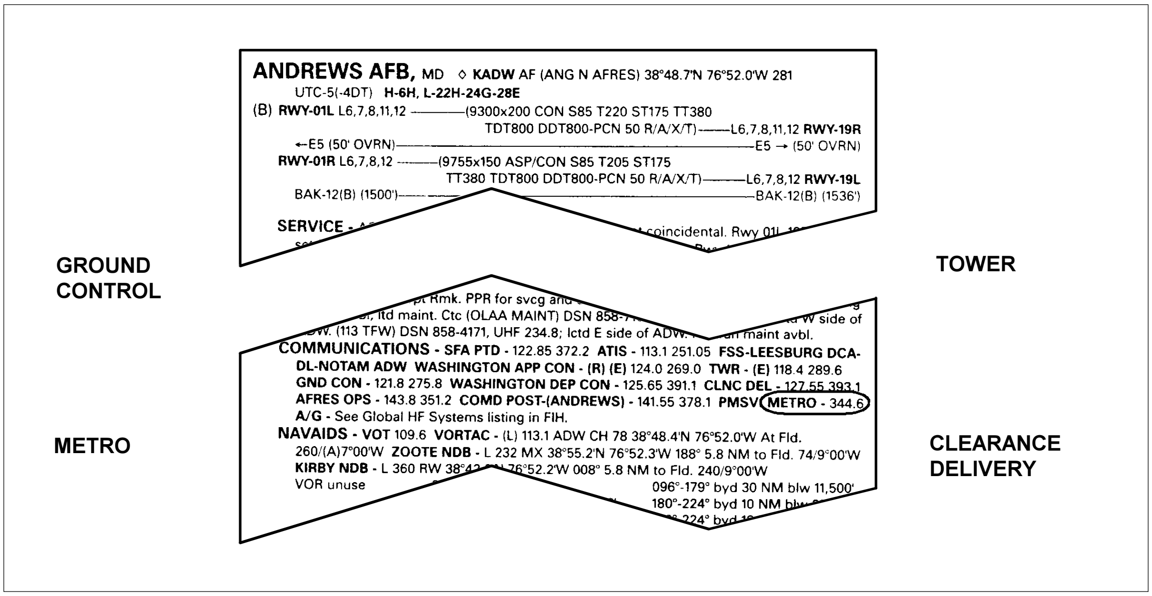
Clearance Delivery: A special non-control branch of the Tower set up to relay clearances to pilots. Its primary purpose is to relieve frequency congestion on Tower and Ground control frequencies. If available, it is the primary frequency for requesting your IFR clearance. If not available, use Ground Control to request your clearance.

NOTE: Some airports may use the same frequency for both Ground Control and Clearance delivery; however, when calling for your clearance, call "—Clearance Delivery" to ensure the right personnel obtain your clearance.

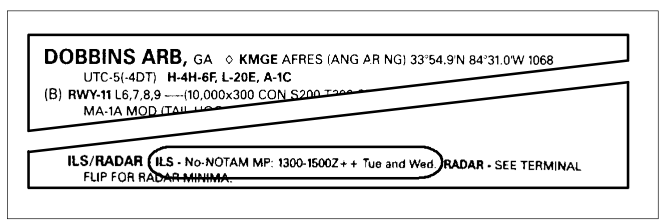
SAME FREQUENCY



Pilot-To-Forecaster: In the Weather Service Office at Base Operations, the forecaster has a radio. When flying in the local area, you can keep up with changes in weather conditions, obtain extensions to your IFR weather briefing (DD-175-1) void time, provide PIREPs, and various other services by calling the forecaster. The call sign is "METRO."

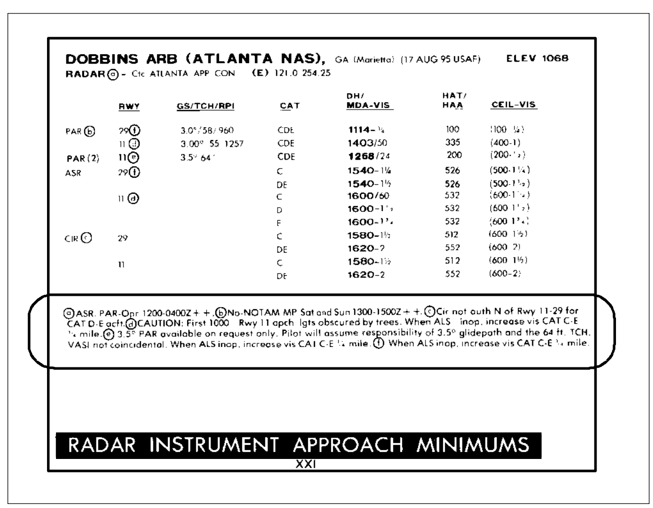


No NOTAM Preventative Maintenance: An airport may remove NAVAIDs and RADAR facilities from service for maintenance during published maintenance periods (MP) without issuing a NOTAM (assuming the weather is acceptable).



For non-precision NAVAIDs and ILS systems, this schedule will be in the NAVAID section of the airport entry in the IFR Supplement.

For RADAR facilities, this schedule will be under the airport name in the RADAR Instrument Approach Minimums section of the FLIP High or Low Altitude (Terminal) booklets.



Section C: Theater Flight Data and Procedures

This section contains:

1. Flight data and procedures for entering certain segments of the airspace.
2. Estimating procedures and penetration tolerances of time, distance, and altitude for penetrating ADIZ.
3. Coordinating activities which you could contact in flight for permission to enter a warning (W) area.
4. No NOTAM preventative procedures.

Back cover

The back cover of the IFR Supplement contains ICAO position reporting and Change of Flight Plan procedures.

The inside back cover of the IFR Supplement contains the FAA procedures for:

1. IFR and VFR position reports
2. Change of Flight Plan
3. Filing Flight Plans in Flight

I. POSITION REPORTS (FAA)

A. INSTRUMENT FLIGHT RULES (IFR) POSITION REPORT

1. Identification
2. Position
3. Time
4. Altitude/FL (include actual altitude/FL when operating on a "VFR Conditions on Top" clearance.)
5. Type of Flight Plan (not required in IFR position reports made direct to ARTCC). State "VFR Conditions on Top" if so cleared.
6. Next reporting point and ETA.
7. Name only of the next succeeding reporting point along the route of flight.
8. Remarks

If entering ADIZ give appropriate ADIZ position reports listed under ADIZ Procedures.

B. VISUAL FLIGHT RULES (VFR) POSITION REPORT

1. Identification
2. Position
3. Time
4. Altitude
5. VFR Flight Plan
6. Destination

If entering ADIZ give appropriate ADIZ position reports listed under ADIZ Procedures.

II. CHANGE OF FLIGHT PLAN

A. CHANGE OF ROUTE OR DESTINATION

1. Type of flight plan
2. Aircraft identification
3. Type of aircraft/TD Code
4. Estimated true airspeed
5. Original destination (if applicable)
6. Departure point
7. Position and time
8. New route and altitude/FL
9. New destination (if applicable)
10. ETE or ETA
11. Fuel endurance
12. Alternate (if required)
13. Station where original flight plan filed

B. CHANGE FROM VFR TO IFR ONLY

1. Aircraft identification and type
2. Position and time
3. Route, altitude, and destination
4. True air speed in knots
5. ETE from point of change to destination and hours of fuel remaining
6. Alternate airport
7. Name, rank, and honors code of VIP if aboard (only if destination is being changed)

C. CHANGE OF ETA BY MORE THAN 30 MIN

1. Aircraft identification
2. Position and time
3. "IFR (or VFR) to (destination)"
4. "New ETA and hours of fuel remaining"

III. FILING FLIGHT PLANS IN FLIGHT

1. Type of flight plan
2. Aircraft identification
3. Type of aircraft/TD code
4. Estimated true airspeed
5. Point of departure
6. Proposed departure time
7. Cruising altitude
8. Route of flight
9. Destination
10. ETE
11. Remarks
12. Fuel endurance
13. Alternate
14. Aircraft Unit of Assignment
15. Number of Persons on Board
16. Color of Aircraft
17. Destination Contact/Telephone Number (Optional)

NOTE: Request available NOTAM and weather information for new route and destinations.

FLIP Enroute Charts

The FLIP enroute charts consist of:

1. Twenty-eight Low Altitude Charts, printed on 14 sheets, for use in the low altitude airways system - 1,200 ft AGL up to (but not including) 18,000 ft MSL.

2. Eleven high altitude charts printed on six sheets for use in the jet route system - 18,000 ft MSL through flight level 450.

The charts are issued every 56 days (eight weeks) effective date (always on a Thursday). These charts are designed for preflight and in-flight reference and a current set of applicable charts should be carried aboard your aircraft for every IFR flight.

Each enroute chart contains a reference map for determining the correct area chart to use. Pilots using the high altitude airway system are encouraged to carry the low altitude chart, or arrival chart for their destination area in case the controller gives a low altitude holding fix. Each sheet contains a complete legend subdivided into categories of:

1. Airports

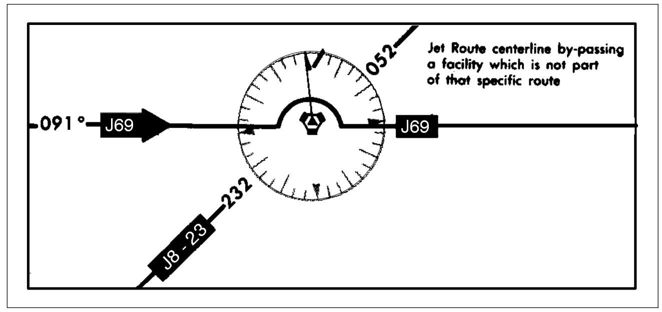
2. NAVAIDs and Communication Boxes

3. Air Traffic Services and Airspace Information

4. Special Use Airspace

Enroute
High Altitude Charts

Application

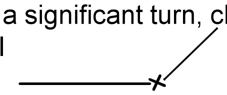
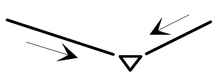


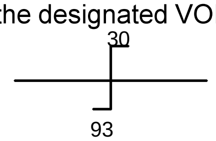
Jet routes, unlike low altitude airways, have no defined width. Their centerlines terminate at the outer edges of the NAVAID compass roses. A jet route extending through a compass rose around a NAVAID indicates the NAVAID is not part of that jet route. It is not used for navigation along the penetrating jet route and would not be indicated in the route-of-flight section of your flight plan unless you were filing "Direct" to that NAVAID. For a NAVAID to be part of a jet route segment, there must be a course depicted on <u>both sides</u> of the compass rose, or the route terminates at the compass rose.

NOTE: The compass rose is oriented to magnetic north of the NAVAID which may not be adjusted to the charted isogonic values.

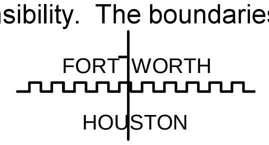
To ensure all pilots fly the centerline of jet routes and achieve maximum navigational signal reception, three types of definite changeover points (COPs) are prescribed by FAR Part 95 where pilots should change VOR frequencies and/or TACAN channels and reset their course selectors to the inbound course for the next NAVAID along each route segment.

1. On a relatively straight leg, change halfway, which is the point of equal signal strength; or,

2. Where the route takes a significant turn, change at the point of turn, which is the DME position depicted by the symbol  or a dogleg at an intersection on the chart  ; or,

3. If the point of equal signal strength is not halfway, at the designated VORTAC changeover point along the route depicted on the chart by the symbol 

.

While proceeding on the enroute portion of your flight, you will be directed to change Air Route Traffic Control Center (ARTCC) frequencies as you proceed from sector to sector and from Center to Center areas of responsibility. The boundaries for ARTCC areas of control responsibility are depicted on charts by the symbol: 

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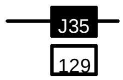
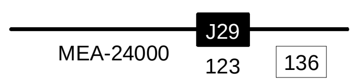
Distance boxes, 

, shown on Jet Routes, depict distances between NAVAIDs and/or between reporting points. Distances between fixes on “Direct” legs, or distances along only a portion of a Jet Route segment, can be measured by using a straight edge, marking off the distance, and applying the marked off distance to the convenient 250-nm scale at either the top or bottom of your particular chart. The scale is divided into 50-nm increments, with one increment subdivided into 5-nm increments. Some mileages are provided between other than reporting points, which are NOT in boxes.

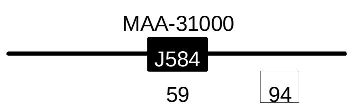
Many times, the paths of two or more jet routes will coincide on the chart with the J being printed only once:

You should file for the jet route which extends farthest along your planned profile of flight.

The High Altitude Charts depict the jet route system - 18,000 ft MSL through flight level 450, which is contained within Class A airspace; therefore, all MINIMUM ENROUTE ALTITUDEs (MEAs) are 18,000 ft MSL unless depicted as higher on a route segment.



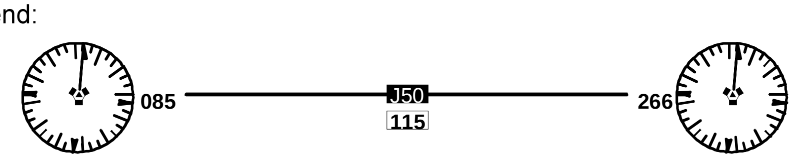
MAXIMUM AUTHORIZED ALTITUDE (MAA) is depicted on a route segment when lower than FL 450.



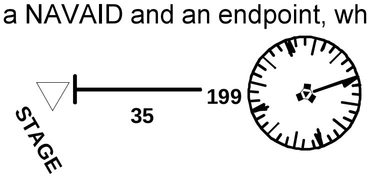
MAA assures adequate NAVAID signal reception for the entire route segment of a designated jet route, that is, it prevents co-channeling interference. Flights above the MAA must be filed as “DIRECT”.

A route “segment” may extend:

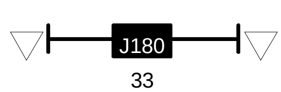
1. Between NAVAIDs



2. Between a NAVAID and an endpoint, which is a DME fix depicted by a vertical black line across the route

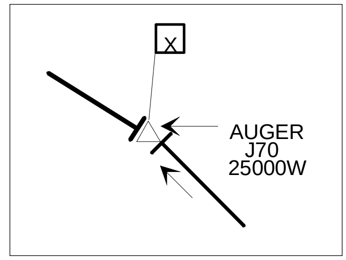


3. Between two endpoints



Unless designated by a MINIMUM CROSSING ALTITUDE (MCA), climbs and descents are commenced where the segment begins or ends with obstruction clearance based on standard climb rates.

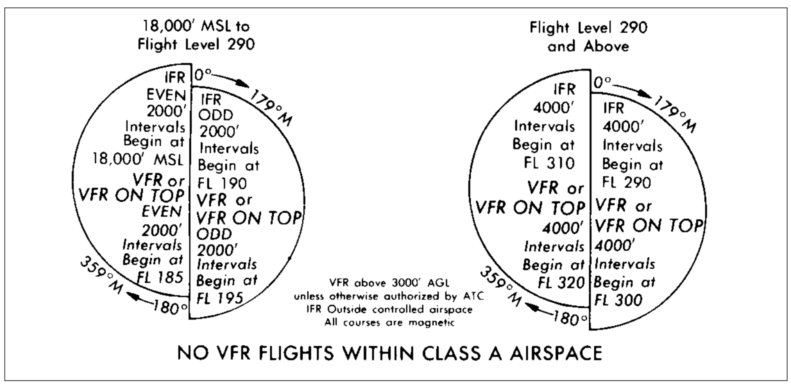
MINIMUM CROSSING ALTITUDE (MCA) is depicted at a fix by a flag box containing an "x." Depicted is the jet route number, crossing altitude, and a direction of flight.



It is the lowest mean sea level altitude at which a fix must be crossed when proceeding in the direction of a higher MEA. In the event of a radio failure when a higher altitude assignment has not been received, climb must be commenced in order to cross the fix at or above the crossing altitude and climb continued to the MEA for that segment.

CAUTION: Climb must be commenced early for obstruction clearance.

You should file at or above the highest MEA and at or below the lowest MAA along your planned route using the international cruising altitude rules legend.



For an IFR flight plan:

- Odd thousands East and Even thousands West to FL 290
- 4,000 ft intervals East beginning at FL 290
- 4,000 ft intervals West beginning at FL 310

NOTE: The legend depicts VFR altitudes above 18,000 ft MSL because they are ICAO rules and the U.S. is a provider state. As indicated in the legend, however, VFR operations are not allowed above 18,000 ft over the continental U.S.

Airspace depicted in WHITE signifies CONTROLLED AIRSPACE, and airspace depicted in BROWN shade signifies UNCONTROLLED AIRSPACE. The only uncontrolled airspace on the High Altitude Charts are Prohibited areas, some warning areas, and some restricted areas - which are of two types:

1. Restricted areas in white indicate "Joint Use" areas and controlled airspace. Permission to enter these areas can be obtained in the air directly from the appropriate ARTCC; and,

2. Restricted areas in brown shade indicate “Non-Joint Use” areas and uncontrolled airspace without communications support (No A/G). Permission to enter these areas must be obtained from the using agency (listed in AP/1A) prior to flight.

Pertinent information concerning special use airspace will be found on the outside panels of the respective charts.

NUMBER	EFFECTIVE ALTITUDE	TIMES USED, UTC			CONTROLLING AGENCY A/G CALL	PANEL LOCATION
		DAYS	HOURS	WEATHER		
R–3202A	To FL 180	Mon–Fri*1	1500–0700Z‡	VFR–IFR	ZLC CNTR/FSS	B
R–3203B	To 22000	By NOTAM	By NOTAM	VFR–IFR	ZLC CNTR/FSS	B
R–4001A	UNLTD	Cont*1	1200–0500Z‡	VFR–IFR	ZDC CNTR/FSS	I
R–4001B	By NOTAM	Intermittent	By NOTAM	VFR–IFR	ZDC CNTR/FSS	I
R–4201A	To 23000	Tue–Sat*1	1300–2100Z‡	VFR–IFR	ZMP CNTR/FSS	H
R–4207	To FL 450	Intermittent By NOTAM	Days	VFR–IFR	ZMP CNTR/FSS	H
R–4301	To 27000	Cont*1	1330–0600Z‡	VFR–IFR	ZMP CNTR/FSS	E
R–4305	To FL 450	Intermittent	By NOTAM	VFR–IFR	ZMP CNTR/FSS	G
R–5201	To 23000 To 20000	4/1–9/30 Cont 10/1–3/31*1	 Cont 1100–2300Z‡	VFR–IFR	ZBW CNTR/FSS	I
R–5203	To FL 500	By NOTAM	By NOTAM	VFR–IFR	ZOB CNTR/FSS	I
R–5502B	To 23000	Tue–Thu*1	1300–2200Z‡	VFR–IFR	ZOB CNTR/FSS	H
R–5701	To FL 200	Mon–Fri*1	1530–0759Z‡	VFR–IFR	ZSE CNTR/FSS	B
R–6402A&B	To FL 580	Cont	Cont	VFR–IFR	ZLC CNTR/FSS	C
R–6404A	To FL 580	Cont	Cont	VFR–IFR	ZLC CNTR/FSS	B,C
R–6404C	To FL 280	Cont	Cont	VFR–IFR	ZLC CNTR/FSS	B
R–6404D	To FL 250	By NOTAM	By NOTAM	VFR–IFR	ZLC CNTR/FSS	B,C
R–6405	To FL 580	Cont	Cont	VFR–IFR	ZLC CNTR/FSS	B
R–6406A	To FL 580	Cont	Cont	VFR–IFR	ZLC CNTR/FSS	B,C
R–6406B						C

NOTE: Only those special use areas that extend up to or above 18,000 ft MSL will be depicted on the FLIP IFR Enroute High Altitude Charts.

Magnetic variation is used in flight planning to align your flight computer to true North in order to obtain an accurate ground speed from the forecast true winds aloft. Variation is depicted every 4 degrees on the charts by North-South oriented thin SOLID GREEN LINES which are labeled along the top and/or bottom edges of the charts. You should interpolate for an approximate variation in a particular area.

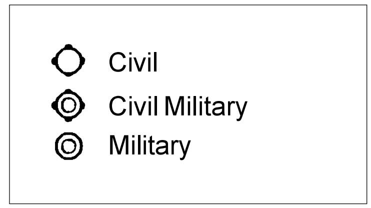
For flight information purposes, official time zones are depicted on the charts by North-South oriented DOTTED GREEN LINES.

Standard units of measurement used on the high altitude charts provide for direct application in the aircraft.

- Altitudes: MSL
- Mileage: Nautical
- Radials/Bearings: Magnetic
- Times: Universal Coordinated (Z)
- Days: Local

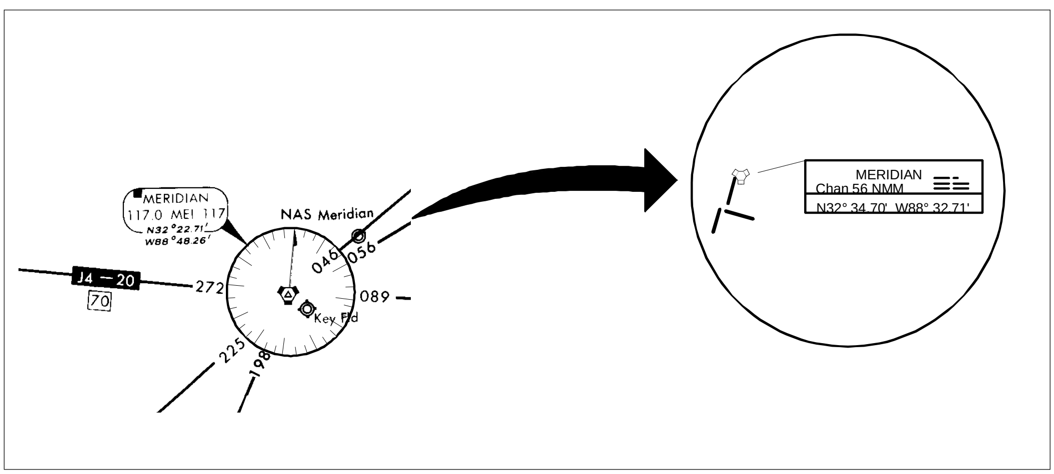
All United States Airports depicted on the high altitude charts have a minimum of 5,000 ft of hard surface runway. The VFR airports do not have an instrument approach procedure and are depicted in BROWN. Airports depicted in GREEN and BLUE have an instrument approach procedure; however, the DOD FLIP (Terminal) High Altitude Instrument Approach Procedure booklets contain approach procedures only for those airports depicted in BLUE.

The airport symbol indicates the type of airport. If the name of that airport is contained with parentheses, it is without military landing rights, i.e., you must have prior coordination to use that airport and you may be charged landing fees. In case of EMERGENCY, however, ALL depicted airfields are available. Airfields may be offset from their actual location to accommodate the location of NAVAIDs.

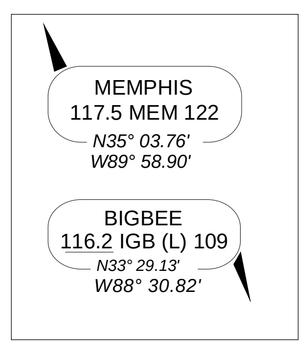


Those NAVAIDs with compass roses are enroute NAVAIDs used to define the jet routes and are not necessarily associated with any airport. An airport may or may not utilize that NAVAID, and you should always refer to the appropriate approach procedure chart to determine the correct NAVAID for an approach.

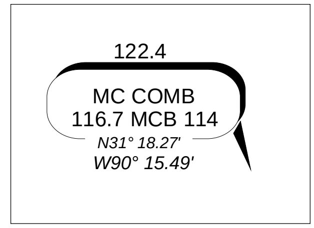
EXAMPLE: On the enroute chart, MERIDIAN VORTAC, Channel 117 is used to define the jet routes; whereas, NAS Meridian uses TACAN Channel 56 for instrument approach procedures and it is not depicted on the enroute chart.



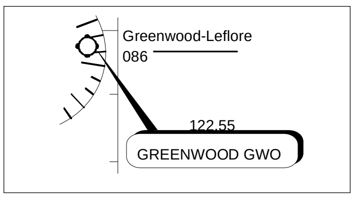
NAVAID communication boxes contain VOR, TACAN, and Radio Beacon data. Some VOR and Radio Beacon facilities have voice capability; however, if the frequency is underlined, this indicates NO VOICE. All TACAN facilities are without voice but are not underlined.



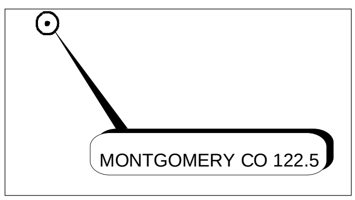
If the facility is bordered with a SHADOW BOX, this indicates that one of the "automated" Flight Service Stations (FSS) is collocated and has the same name as the NAVAID.



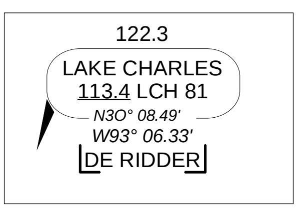
NOTE: Some FSS may not be associated with a NAVAID and are indicated at their location:



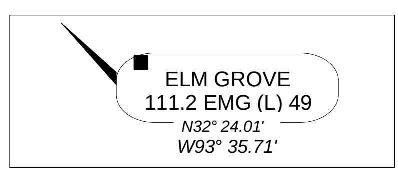
while others may just indicate the location of Remote Communication Outlets (RCO), i.e., remote antennae.



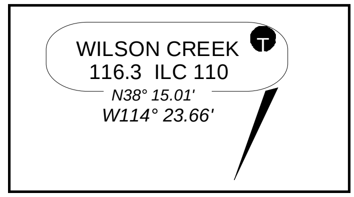
All FSS monitor 255.4, 122.2, other select discrete frequencies (that can be found in the IFR Supplement), and emergency 243.0 and 121.0. The FSS High Altitude VHF discrete frequencies are shown above the box. At facilities that are not FSS, frequencies positioned above the thin line NAVAID box are remote to the NAVAID site. If not indicated in a box below the NAVAID box, the FSS serving a general area can be determined by referring to the NAVAID name in the IFR Supplement.

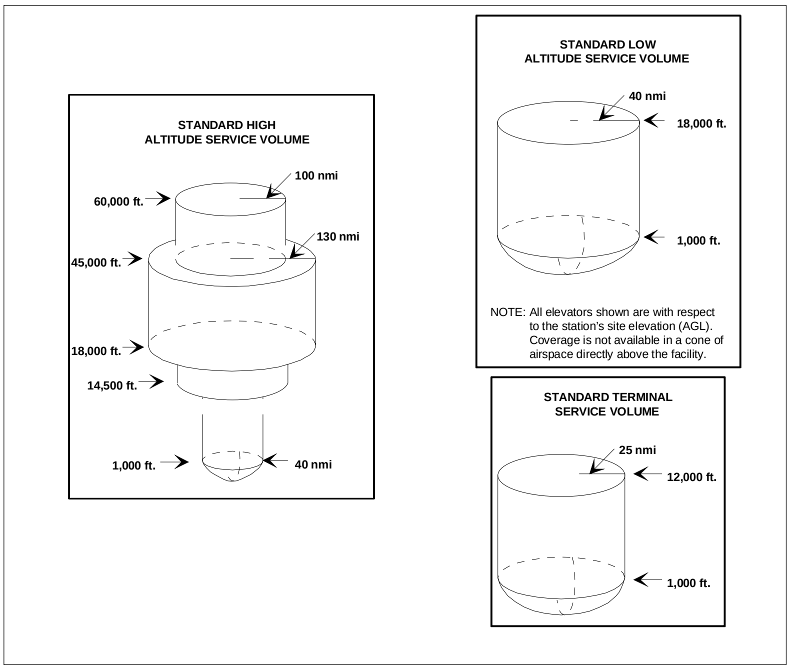


Those NAVAIDs that provide Hazardous In-flight Advisory Service (HIWAS) are indicated by a small black box in the upper left corner of the NAVAID box.



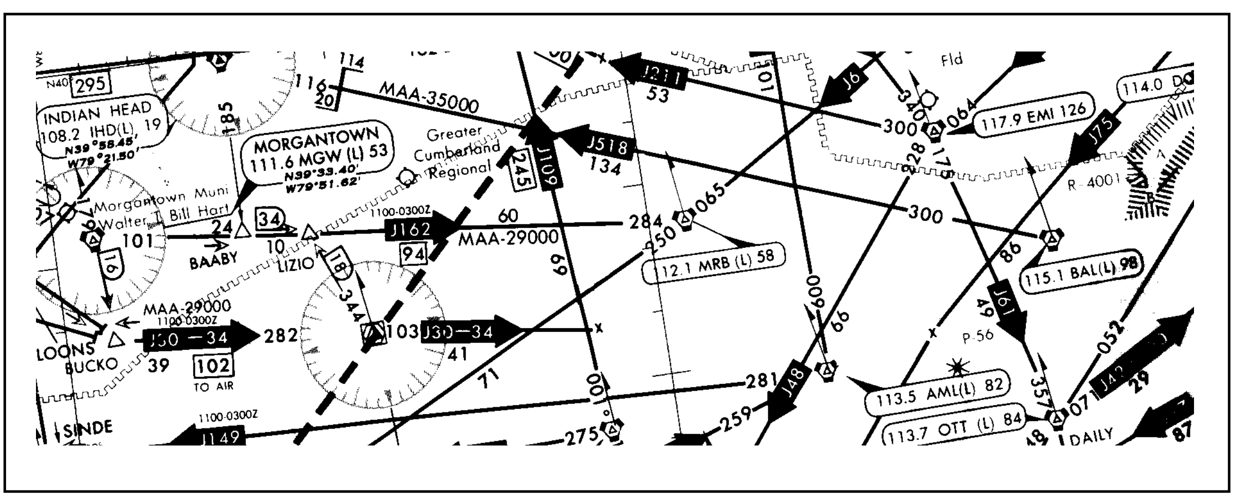
And those that provide Transcribed Weather Broadcasts (TWEB) are indicated by a “T” in a black circle in the upper right corner.





Most air navigation radio aids which provide positive course guidance have a designated standard service volume (SSV). The SSV defines the reception limits of unrestricted NAVAIDs which are usable for random/ unpublished route navigation. Standard service volume limitations do not apply to **published** IFR routes or procedures.

Preferred single-direction jet routes are established for an orderly and expeditious flow of traffic during peak traffic periods and/or in high density areas of the country. Those jet routes should be filed only for the indicated direction of flight during the effective hours indicated adjacent to the jet route identifier.



SUMMARY

This lesson has described the following Department of Defense (DOD) Flight Information Publications (FLIPs).

* General Planning (GP)
* Area Planning (AP/1)
  - Area Planning, Special Use Airspace (AP/1A)
  - Area Planning, Military Training Routes (AP/1B)
* Enroute IFR/VFR Supplements
* Enroute Flight Information Handbook
* Enroute High/Low Altitude Chart
* Area Charts
* Area Arrival Charts Depicting Terrain Data
* (Terminal) High/Low Altitude United States
* Civil Standard Instrument Departures/Standard Terminal Arrivals (CIV SIDs/STARs)
* U.S. Air Force Foreign Clearance Guide

CONCLUSION

In order to conduct a successful flight under Instrument Flight Rules (IFR) in instrument conditions, and comply with all the FAA and military procedures and regulations, you, as an instrument pilot, must utilize all the available information for planning, departure, enroute, and terminal phases of your flight. The DOD FLIP system is designed to provide this information in a useful, logical, updated manner.

NOTES

LESSON GUIDE

COURSE/STAGE: T-45A UJPT & E2-C2 Instrument Navigation

LESSON TITLE: Introduction to INav and Voice Procedures

LESSON IDENTIFIER: T-45A UJPT & E2-C2 INav-02

LEARNING ENVIRONMENT: Classroom

ALLOTTED LESSON TIME: 1.0 hr

TRAINING AIDS: N/A

STUDY RESOURCES:

* NATOPS General Flight and Operating Instructions Manual, OPNAVINST 3710.7
* NATOPS Instrument Flight Manual, NAVAIR 00-80T-112
* DOD FLIP, General Planning (GP), Chapter 5; Flight Information Handbook Section B; IFR Supplement (Back Cover)
* Air Traffic Control, FAA 7110.65C
* Aeronautical Information Manual, FAA (Chapter 4, Section 2)

(6-99) ORIGINAL

LESSON PREPARATION:

Read:

* Aeronautical Information Manual, FAA Chapter 4, “Air Traffic Control”

REINFORCEMENT:

Read:

* Aeronautical Information Manual, FAA Chapter 5 "Air Traffic Procedures”

EXAMINATION:

The objectives in this lesson will be tested in Instrument Navigation 12X.

LESSON OBJECTIVES

1.1.1.9
Recall locations, types, uses, functions of air traffic control facilities

1.1.1.9.8
Recall responsibility of ATC for aircraft separation

2.7.5.3.2
Recall controlling agencies associated with radio instrument communications

1.1.1.9.2
Recall ground control responsibilities

1.1.1.9.3
Recall airport tower responsibilities

1.1.1.9.5.2
Recall departure control responsibilities

1.1.1.9.4
Recall air route traffic control center responsibilities

1.1.1.9.5.1
Recall approach control responsibilities

1.1.1.9.6
Recall services provided by flight service stations

2.7.6.1.1
Recall elements normally contained in an ATC clearance

2.7.6.1.2
Recall proper response to ATC clearance

2.7.5.3.1
Recall voice procedures associated with instrument navigation

1.8.1.10.12.2
Recall emergency communications procedures

MOTIVATION

From departure to destination, one of your chief responsibilities as a Naval aviator is to communicate clearly and concisely with ATC. To respond skillfully and confidently to ATC directions, you must know the rules, practices, and procedures for ATC controls and communications.

OVERVIEW

This lesson will enable you to conduct normal or emergency communication procedures with confidence and precision.

In this lesson, we will be studying:

* Responsibilities of ATC facilities
* Clearances
* Normal communication procedures
* Emergency communication procedures

REFRESHER

This lesson builds on information presented previously. In particular, review:

* Your T-34 training experiences with radio communications
* Local course rules and controlling agencies

PRESENTATION

LESSON NOTES

Use Sg 1, fr 2 graphic throughout section I. You will be able to display the projected image at any time during the session.

I. Responsibilities of ATC facilities **1.1.1.9, 1.1.1.9.8, 2.7.5.3.2**

A. Ground control **1.1.1.9.2**

? **What are some of the functions of ground control?**

ANSWER: Answers follow

1. Provides taxi instructions to and from active runway

2. Issues information

   a. Ramp service

   b. Hazardous ground conditions

   c. Fueling operations

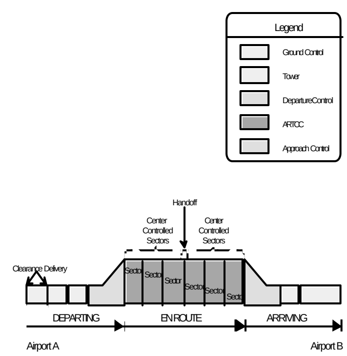
3. Obtains and relays IFR clearance to aircraft if clearance delivery frequency is not available

Sg 1, fr 1: *Lesson Organization*

INTRODUCTION TO INAV AND VOICE PROCEDURES

* Responsibilities of ATC facilities
* Clearances
* Normal communication procedures
* Emergency communications

Sg 1, fr 2 *ATC Facilities*



4. Provides airport advisory information in absence of automatic terminal information service (ATIS)

5. Provides ATIS (normally on a separate discrete frequency)

   a. Uses alphabetical code to identify information transmitted

      NOTE: A new recording is made: (1) upon receipt of any new official weather report regardless of whether there is/is not a change in values, (2) when runway braking action is worse than that which is included in the current ATIS broadcast, or (3) when there is a change in any other pertinent data such as runway change, instrument approach in use, new or cancelled NOTAMs/SIGMETs/CWAs/PIREPs, etc.

   b. Eases congestion on ground, tower, and approach frequencies

   c. Provides weather information

      (1) Ceiling

      (2) Visibility

      (3) Obstructions to visibility

         NOTE: If the ceiling/sky conditions are above 5,000 ft and the visibility is 5 statute miles (sm) or more, inclusion of the ceiling/sky condition, visibility, and obstructions to vision in the ATIS message is optional.

      (4) Temperature (density altitude advisory, when appropriate)

      (5) Dew point

(6) Magnetic surface wind direction/ velocity

(7) Altimeter

(8) Other pertinent weather information, i.e., lightning, cumulonimbus, and towering cumulous, which is always included

d. Provides other information on ATIS such as:

(1) Active special use areas

(2) Active runway and instrument/ visual approaches in use

(3) Special instructions

B. Clearance delivery

1. Separate frequency established at busy airports to relieve clutter on ground control

a. Considered to be an arm of "Tower"

b. Has no control function, used solely as the name implies for the delivery of IFR clearances

2. Pretaxi clearance program set up at certain airports to receive clearance prior to taxiing.

Pilots should file IFR flight plans at least 30 minutes prior to estimated time of departure to preclude possible delay in receiving an immediate departure clearance. A 30-minute delay is not unusual if the flight plan is filed when ready to depart.

NOTE: Nonscheduled operations operating at FL 230 and above are requested by ATC to file IFR flight plans at least 4 hours prior to ETD.

a. Pilot participation may be mandatory

b. Participating pilots call clearance delivery (or ground control) not more than 10 minutes before proposed taxi time

c. IFR clearance (or delay information if clearance cannot be obtained) is issued at the time of this initial call-up

d. After the IFR clearance is received on clearance delivery frequency, pilots call Ground Control when ready for taxi instructions

C. Tower: an arm of air traffic control (ATC) **1.1.1.9.3**

1. Controls runway traffic

   NOTE: Aircraft should remain on Ground Control until ready for takeoff.

2. Issues takeoff clearance

3. Controls all airborne traffic in control area

4. Provides airport advisory information to arriving flights in absence of ATIS

5. Issues landing clearance

D. Departure control **1.1.1.9.5.2**

? **What is departure control's primary responsibility?**

ANSWER: Answer follows

1. Controls aircraft from Class D airspace to enroute traffic control

2. Sequences and separates IFR and participating VFR aircraft

3. Provides radar service (including assistance for VFR traffic)

   a. Basic

      (1) Issues traffic advisory

      (2) Provides limited radar vectoring to VFR traffic (dependent on work load)

   b. Stage II - Radar advisory and sequencing for VFR aircraft: provides, in addition to the basic radar services, vectoring, and sequencing on a full-time basis to arriving VFR aircraft. The purpose is to adjust the flow of arriving IFR and VFR traffic and provide traffic advisories to departing VFR aircraft

c. Stage III - Radar sequencing and separation services for VFR aircraft: provides, in addition to the basic radar service and Stage II, separation between all participating VFR aircraft. Pilot participation is urged but not mandated

E. Air Route Traffic Control Center (ARTCC): central authority for issuing IFR clearances **1.1.1.9.4**

1. Issues route assignment (Air Traffic Control issues clearances, ARTCC coordinates route assignment)

2. Monitors enroute IFR flight

3. Verifies/assigns altitude

4. Provides traffic separation

5. Furnishes vectors (as do other entities, i.e., Departure Control)

6. Issues NOTAMs

7. Provides current weather information (as required)

   a. SIGMET

   b. Center Weather Advisory (CWA)

8. ARTCC IFR control starts at 1,200 ft AGL on airways. Most IFR traffic will be under direct ARTCC radio control, or work through an FSS which relays information to or from the ARTCC. All traffic in Class A airspace, which starts at 18,000 ft MSL, will be under Center's direct control

F. Approach control **1.1.1.9.5.1**

1. Controls all IFR aircraft from ARTCC control to tower control

2. Provides radar service to

   a. Separate and sequence all IFR traffic

   b. Assist VFR traffic

3. Provides arrival information to incoming traffic on initial contact

   a. Expected approach

   b. Runway to be used, if different from approach

   c. Surface magnetic wind direction/ velocity

   d. Ceiling and visibility, if ceiling below 1,000 ft or highest circling minimums or visibility less than 3 sm

   e. Altimeter setting

   f. Known changes in weather

   g. Pertinent airfield information

   NOTE: Arrival information contained in the ATIS broadcast will be omitted if the pilot states the current ATIS code on initial check-in.

   h. Most military fields provide Single Frequency Approach (SFA)

G. Automated Flight Service Station (FSS) **1.1.1.9.6**

1. Most states will have only one FSS. Only a few will have two or more

2. Primary purpose is to provide services to the civilian aviation community; however, military pilots can utilize many valuable services

3. All FSSs

   a. Provide pilot weather and NOTAM briefings (but not “forecast”)

   b. Receive and process IFR/VFR flight plans

   c. Relay IFR clearances

   d. Relay communications between ARTCC and aircraft when communication difficulties are encountered

   e. Assist aircraft in lost and emergency situations (practice steering available on request)

      NOTE: Most automated FSS have direction-finding (DF) steering capabilities.

   f. Assist VFR search and rescue operations

      (1) Initiated 30 minutes after filed ETA if VFR Flight Plan not closed

(2) If not found within one hour, ATC facilities are alerted as well as “Rescue Coordination Center” at Scott AFB

(3) By two hours after ETA, full SAR initiated

g. Originate NOTAMs

h. Provide enroute weather information

(1) Hazardous In-flight Weather Advisory Service (HIWAS)

(a) Continuous broadcast of weather advisories

(b) Broadcast on VOR frequencies

(2) FSS solicits Pilot Weather Reports (PIREPs)

(a) Encouraged for “real time” information, including when weather is <u>better</u> than forecast

(b) Information should include:

(i) Location in relation to NAVAID

(ii) Type of aircraft

(iii) Altitude (particularly important for turbulence or icing reports)

(iv) Condition you are reporting

(v) If reporting cloud bases or tops, include amount and type of cloud cover (i.e., stratus, cumuliform, scattered, broken, overcast, etc.)

(3) Flight watch

(a) Enroute Flight Advisory Service (EFAS) provides in-flight weather advisories (civilian "Metro")

(b) Contact flight watch with "(Station) Flight Watch," your call sign and nearest VOR

(c) Low altitude frequency 122.0, high altitude frequencies vary but are in the VHF range

i Monitor NAVAIDs

j. Monitor aircraft on IR/VR routes

k. Advise U.S. Customs of transborder flights

l. Take weather observations

m. Issue airport advisories

NOTE: When contacting an FSS, include present location and frequency to assist the operator in selecting the proper remote antenna.

PROGRESS CHECK

Question 1 — 1.1.1.9.2
What code identifies ATIS information and how often is the information (usually) updated?

ANSWER: Alphabetic, when a new Aviation Weather Report is issued.

Question 2 — 1.1.1.9.5.2
What is the primary difference in traffic separation between Stage II and Stage III radar service?

ANSWER: Stage II provides information for traffic separation and Stage III ensures traffic separation.

Question 3 — 1.1.1.9.4
Which portion of your IFR flight is directly controlled by ARTCC?

ANSWER: En route

II. Clearances **2.7.6.1.1**

A. Normal elements

? **What are the nine normal elements of an IFR clearance?**

ANSWER: Answers follow

1. Aircraft identification

2. Clearance limit

Sg 2, fr 1: *Lesson Organization*

INTRODUCTION TO INAV AND VOICE PROCEDURES

* Responsibilities of ATC facilities
* Clearances
* Normal communication procedures
* Emergency communications

3. Departure instructions or SID

4. Route of flight

5. Altitude assignment

6. Departure frequency

7. IFF code

8. Any holding instructions

9. Other information as required

B. Clearance communications **2.7.6.1.2**

1. When clearance is exactly as filed

a. Acknowledgment required

b. Readback of route not required by FAR

NOTE: Remember that in the Air Training Command you will read back all clearances.

EXAMPLE:

PILOT: "Kingsville Clearance: Navy Bravo two zero zero, clearance on request, IFR Navy Pensacola."

CLEARANCE DELIVERY: "Navy Bravo two zero zero is cleared to Navy Pensacola as filed. Climb and maintain one zero thousand. Expect flight level two seven zero ten minutes after takeoff; Kingsville Departure three zero five point two. Squawk four seven one zero."

c. Always read back numbers (altitudes, vectors, IFF, etc.) to verify

d. All readbacks should be preceded by aircraft identification/call sign

e. Read back altitudes, altitude restrictions, and vectors in the same sequence as received

f. Altitudes contained in SIDs, instrument approaches, etc., need not be read back unless specifically requested by the controller

2. When clearance acceptably deviates, pilot reads back to indicate acceptance

NOTE: Normally clearance delivery will state the reason for the change if the clearance differs from the one filed.

EXAMPLE:

CLEARANCE DELIVERY: "Navy Bravo two zero zero is cleared to Navy Pensacola, as filed, except after takeoff, direct Palacios, rest of route unchanged. Climb and maintain one zero thousand. Expect flight level two seven zero ten minutes after takeoff; Kingsville Departure three zero five point two. Squawk four seven one zero."

PILOT: "Clearance Delivery: Navy Bravo two zero zero is cleared to Navy Pensacola, as filed, except after takeoff, direct Palacios, rest of route unchanged. Climb and maintain one zero thousand. Expect flight level two seven zero ten minutes after takeoff; Kingsville Departure three zero five point two. Squawk four seven one zero."

3. If clearance delivered is unacceptable, pilot has option to refuse, and new clearance will be issued to pilot

LESSON NOTES

The following example assumes that the aircraft has TACAN equipment only. Eagle Lake was a VOR/DME at the time this lesson was developed.

EXAMPLE:

CLEARANCE DELIVERY: “Navy Bravo two zero zero is cleared to Navy Pensacola. Direct Corpus Christi, Eagle Lake, Humble, then as filed. Maintain runway heading for vectors on course. Climb and maintain one zero thousand. Expect flight level two seven zero ten minutes after takeoff; Kingsville Departure three zero five point two. Squawk four seven one zero. Reason for change of route, line of thunderstorms in the Palacios area. Read back.”

PILOT: “Kingsville Clearance: Navy Bravo two zero zero, unable direct Eagle Lake. TACAN only.”

NOTE: The pilot must relay back what he or she cannot do and the reason for not being able to do it.

PROGRESS CHECK

Question 4 — 2.7.6.1.1
List the nine elements normally contained in an ATC clearance.

ANSWER:
1. Aircraft identification
2. Clearance limit
3. Departure instructions or SID
4. Route of flight
5. Altitude assignment
6. Departure frequency
7. IFF code
8. Any holding instructions
9. Other information as required

Question 5 — 2.7.6.1.2
You have filed an IFR flight plan to NAS New Orleans. En route you receive instructions to deviate from your original plan due to weather conditions. Your new route requires a TACAN arc interception, but your TACAN system is inoperative. (TACAN previously reported inoperative, navigating on VOR.) What must you do in this situation?

ANSWER: You would relay back that you cannot accept the new route because of your inoperative TACAN system and that you therefore require a new route.

Sg 3, fr 1: Lesson Organization

INTRODUCTION TO INAV AND VOICE PROCEDURES

* Responsibilities of ATC facilities
* Clearances
* Normal communication procedures
* Emergency communications

III. Normal communication procedures **2.7.5.3.1**

A. Mandatory voice reports

1. When vacating any previously assigned altitude or flight level for a newly assigned altitude or flight level; military pilots are required to state the altitude they are going to

2. When an altitude change will be made if operating on a clearance specifying “VFR ON TOP” (Below 18,000 MSL or above FL600)

3. When unable to descend or climb at a rate of at least 500 ft per minute

4. When an approach has been missed. (Include a request for specific action i.e., to alternate airport, another approach, etc.)

5. Change in the average true airspeed (at cruising altitude) when it varies by 5% or 10 kts (whichever is greater) from that filed in the flight plan

6. Time and altitude arriving at a holding fix or point which cleared

7. When leaving any holding fix or point

NOTE: The reports in subparagraphs (6) and (7) above may be omitted by pilots or aircraft involved in instrument training at military terminal area facilities when radar service is provided.

8. Any loss of navigation capability such as VOR, TACAN, ADF; complete or partial loss of ILS capability; or impairment of air/ground communications capability. Reports should include aircraft identification, equipment affected, degree to which the capability to operate under IFR in the ATC system is impaired, and the nature and extent of assistance desired from ATC

   NOTE: Other equipment installed in an aircraft that may effectively impair safety and/or the ability to operate under IFR. If such equipment (e.g., airborne weather radar) malfunctions and, in the pilot's judgment, either safety or IFR capabilities are affected, reports should be made.

9. Any information relating to safety of flight

10. Encountering weather conditions which have not been forecast or hazardous conditions which have been forecast are expected to forward a report of such weather to ATC, and time permitting, to FSS or METRO.

    NOTE: The ATC controlling agency should be informed anytime weather conditions on an IFR approach differ from the latest observation or anytime a wind shear (or microburst) is encountered on departure or approach.

11. When not in “radar contact” and (1) leaving the final approach fix inbound on final approach (nonprecision approach) or (2) when leaving the outer marker or fix used in lieu of the outer marker inbound on final approach (precision approach)

12. When not in “radar contact,” provide a corrected estimate at anytime it becomes apparent that an estimate as previously submitted is in error in excess of three minutes

13. Except when in “RADAR CONTACT,” report over designated compulsory reporting points. On a direct route or VFR on TOP, report over each reporting point in the flight plan.

14. When unable to comply with an ATC clearance as given

LESSON NOTES

The following are examples of FAA communication procedures as developed from the FAA manual. Remember that local procedures may deviate occasionally in specifics from FAA procedures and will be IAW course rules.

Sg 3, fr 2: *Introduction*

NOTE: This presentation is designed to provide you with examples and explanations of standardized communications between pilots and controllers that may be encountered on IFR flights. The scenario progresses through the situations normally encountered in the following phases of an IFR flight: GROUND, DEPARTURE, ENROUTE, ARRIVAL, AND MISSED APPROACH.

Some military and civilian facilities will require voice procedures that differ from the following examples. If you have questions following this lesson, discuss them with your instructor.

B. Departure

Sg 3, fr 3: Departure Dialogue Text - Clearance Request

1. Ground control

a. Prior to start engine

(1) Copy ATIS information

(2) Put clearance on request with clearance delivery

NOTE: At Navy Kingsville and most other airdromes, start engines before contacting Clearance Delivery for the IFR clearance. When fuel is critical or delays are expected, delay engine start until after receiving the clearance.

Normally, if the pilot reports "Ready to copy the clearance," Clearance Delivery replies with the clearance. If the clearance has not been received, the controller will inform the pilot of the estimated delay and state the reason.

EXAMPLE:

Sg 3, fr 3 Cont.: Audio & Text - Clearance Request

PILOT:
"Kingsville Clearance Delivery, Navy Bravo two zero zero, ready to copy IFR clearance, Holloman."

CLEARANCE DELIVERY:
"Navy Bravo two zero zero, Kingsville Clearance, clearance on request, no delay expected."

NOTE: The statement "clearance on request" normally indicates the IFR clearance has not been received by ATC. The Clearance Delivery operator will attempt to obtain it manually via computer or direct line. If a long delay is expected, consider shutting down for a period and restart when the clearance is available.

The statement "advise when ready to copy" indicates that IFR clearance is available for the pilot to copy.

Sg 3, fr 4: *Departure - Taxi*

b. Taxi

? **Who will provide you with taxi instructions?**

ANSWER: Ground control

Sg 3, fr 4 Cont.: *Audio & Audio Text - Taxi*

NOTE: Taxi clearance and instructions are normally issued by Ground Control. The request for taxi consists of: aircraft call sign, location on airport, type of operation (IFR or VFR), point of first intended landing, and ATIS letter identifier.

At another airdrome, state location on the field when requesting taxi. Pilot must read back runway to which cleared and any hold short restrictions.

State the "letter identifier" of the ATIS information received. Do not use the statement, "Have the numbers." If the pilot does not report the current ATIS letter or some ATIS information has changed, Ground Control will provide current ATIS information. Altimeter readback is required.

EXAMPLE:

PILOT:
"Kingsville Ground, Navy Bravo two zero zero, taxi IFR, Holloman, information Alpha."

NOTE: It is not necessary to report location at Kingsville.

GROUND CONTROL:
"Navy Bravo two zero zero, Kingsville Ground, taxi to the runway one three left, hold short of one three right."

PILOT:
"Kingsville Ground, Navy Bravo two zero zero, runway one three left, hold short of one three right."

c. Hold short area

Sg 3, fr 5: *Departure - Hold Short Area*

Sg 3, fr 5 Cont.: *Audio & Audio Text - Hold Short Area*

If the IFR clearance was not received prior to arriving in the hold short area, contact Clearance Delivery and report "ready to copy." When tuned to another frequency, always monitor secondary radio or Guard for Ground Control transmissions.

EXAMPLE:

PILOT:
"Kingsville Clearance, Navy Bravo two zero zero, holding short, ready to copy clearance."

CLEARANCE DELIVERY:
"Navy Bravo two zero zero is cleared to Holloman as filed. HOBOZ one departure, Cotulla transition. Maintain one one thousand, expect flight level three one zero ten minutes after departure. Contact Departure Control on two six six point eight. Squawk two one one zero, over."

Sg 3, fr 6: *Departure - Takeoff Clearance*

Sg 3, fr 6 Cont.: *Audio & Audio Text - Takeoff Clearance*

PILOT:
"Navy Bravo two zero zero is cleared to Holloman as filed, HOBOZ one departure, Cotulla transition, maintain one one thousand, expect flight level three one zero ten minutes after departure. Departure Control two six six point eight. Squawk two one one zero."

CLEARANCE DELIVERY:
"Navy Bravo two zero zero, readback is correct, contact ground for taxi."

PILOT:
"Navy Bravo two zero zero, switching."

d. Contact tower for takeoff clearance

EXAMPLE:

PILOT:
"Kingsville Tower, Navy Bravo two zero zero, take off, IFR."

TOWER:
"Navy Bravo two zero zero, Kingsville Tower, runway one three left,
wind one three zero at one five, change to Departure Control, monitor Guard, cleared for takeoff."

PILOT:
"Navy Bravo two zero zero, cleared for takeoff one three left, switching."

NOTE: Pilots should monitor UHF Guard in the event that tower needs to cancel the takeoff clearance. Takeoff on tower frequency is an advantage in the event of an abort but could induce vertigo during the airborne frequency switch to Departure Control.

2. Departure control

a. Standard departure control initial contact

EXAMPLE:

PILOT:
"Kingsville Departure, Navy Bravo two zero zero, airborne Navy Kingsville, climbing one thousand two hundred for one one thousand."

DEPARTURE CONTROL:
"Navy Bravo two zero zero, Kingsville Departure, radar contact."

Sg 3, fr 7: *Departure - Initial ContactAirborne*

Sg 3, fr 7 Cont.: *Audio & Audio Text - Initial Contact Airborne*

LESSON NOTES

Discuss minimum vectoring altitudes regarding early turns.

b. Handoff to center

EXAMPLE:

DEPARTURE CONTROL:
"Navy Bravo two zero zero, contact Houston Center on two niner one point six."

PILOT:
"Navy Bravo two zero zero, switching Houston Center, two niner one point six."

Sg 3, fr 8: *Departure - Handoff to Center*

Sg 3, fr 8 Cont.: *Audio & Audio Text - Handoff to Center*

Sg 3, fr 9: *En Route - Initial Contact With Center*

Sg 3, fr 9 Cont.: *Audio & Audio Text - Initial Contact With Center*

C. En route

1. Initial contact

NOTE: On initial contact with Center, pilots should advise controllers of their exact altitude preceded by “climbing,” “descending,” or “level.” If initiating a climb or descent, the call will include the altitude leaving and the final altitude.

Exact altitude or flight level means to the nearest 100-ft increment. The exact altitude or flight level report on initial contact provides ATC with information required prior to relying on MODE C altitude information for separation purposes.

When not on a published route, SID or LID; such as climb on course, pilots should include present position and exact altitude on initial contact with Air Traffic Control following handoff.

EXAMPLE:

PILOT:
“Houston Center, Navy Bravo two zero zero, Navy Kingsville three one four at four six, climbing flight level two five zero for flight level three one zero.”

CENTER:
“Navy Bravo two zero zero, Houston Center, radar contact. Report level flight level three one zero.”

NOTE: Report level only when requested to do so.

PILOT:
“Navy Bravo two zero zero, Wilco.”

NOTE: For all practical purposes, U.S. airspace has total radar coverage. There is, however, the possibility of equipment failure which would place airborne aircraft in a non-radar environment. Major failures of Center's radar systems have occurred. In those situations, pilots should be prepared to make full non-radar position reports.

If RADAR contact is lost, the controller will advise the pilot, "RADAR service terminated," which normally indicates a transfer from a radar-controlled sector to a non-radar sector. At that time, normally, the controller will request the pilot to report specific fixes along the route of flight. At each location, the pilot will make a courtesy call which only includes the name of the fix. If the controller requires a full report, the reply will be "Go ahead." The pilot must reply with a full non-radar position report. Report position, time, altitude, position, time, position.

EXAMPLE:

CENTER:
"Navy Bravo two zero zero, Houston Center, radar service terminated, contact Houston Center on two niner one point six"

PILOT:
"Navy Bravo two zero zero switching two niner one point six."

PILOT:
"Houston Center, Navy Bravo two zero zero, San Antonio one six zero, at four six, climbing flight level two eight zero for three one zero."

Sg 3, fr 10: *En Route - Initial Contact With Center - Non-radar*

Sg 3, fr 10 Cont.: *Audio & Audio Text - Initial Contact With Center - Non-radar*

Sg 3, fr 11: En Route - Non-radar Position Report

Sg 3, fr 11 cont.: Audio & Audio Text - Non-radar Position Report

2. Non-radar position report (when required by ATC)

   EXAMPLE:

   PILOT:
   “Houston Center, Navy Bravo two zero zero, Junction, over.”

   CENTER:
   “Navy Bravo two zero zero, Houston Center, go ahead.”

   PILOT:
   “Houston Center, Navy Bravo two zero zero, Junction, four seven, flight level three one zero, Wink, one zero, Chisum.”

   CENTER:
   “Navy Bravo two zero zero, Houston Center, Roger.”

Sg 3, fr 12: En Route - File or Change of Flight Plan

Sg 3, fr 12 cont.: Audio & Audio Text - File or Change of Flight Plan

3. File or change of flight plan in flight

   NOTE: When you want to expedite a departure from a destination airport or make a change to an existing flight plan, file a flight plan while airborne. The format and sequence of the items required for changing or filing a flight plan while in-flight are inside the back cover of the IFR Supplement.

   Flight plans or changes are normally filed in-flight with the nearest Flight Service Station. To facilitate the change, request a frequency change to the nearest Flight Service Station and report the sequence of items listed on the back inside cover of the IFR Supplement.

a. IFR Enroute Supplement, inside back cover, contains 13 items

(1) Type of flight plan

(2) Aircraft identification

(3) Type of aircraft/TD code

(4) Estimated true airspeed

(5) Original destination (if applicable) or route

(6) Departure point

(7) Position and time

(8) New route and altitude/FL

(9) New destination (if applicable)

(10) ETE or ETA

(11) Fuel endurance

(12) Alternate (if required)

(13) Station where original flight plan filed

b. To file a change of flight plan

NOTE: When calling Center or the Flight Service Station with a request, make a courtesy call that includes the nature of your request. The controller or operator may be busy or talking on another frequency.

Sg 3, fr 12, p2: *En Route - File or Change of Flight Plan*

Sg 3, fr 12, p2 cont.: *Audio & Audio Text - File or Change of Flight Plan*

EXAMPLE:

PILOT:
"San Angelo radio, Navy Bravo two zero zero, change of IFR flight plan."

FSS:
"Navy Bravo two zero zero, San Angelo, go ahead."

PILOT:
"Navy Bravo two zero zero, IFR, tango four five slash alpha, four zero zero, Holloman, Navy Kingsville, on the Wink, one zero two at eight one, one three zero zero Zulu. Present position direct Fort Stockton, Jay two, El Paso, flight level three one zero. Destination El Paso International, one plus one zero. Fuel two plus zero zero, Roswell Industrial Air Park, Navy Kingsville, over."

FSS:
"Navy Bravo two zero zero, San Angelo. Your flight plan to El Paso International on file."

PILOT:
"Navy Bravo two zero zero, Roger."

NOTE: The pilot would return to the Center frequency

Sg 3, fr 13: *En Route - Change of ETA*

c. To file a change of ETA by more than 30 minutes (VFR or IFR flight plan)

Sg 3, fr 13 Cont.: *Audio & Audio Text - Change of ETA*

EXAMPLE:

NOTE: A flight plan change may be made through Center if the controller is not too busy and the change is not lengthy.

PILOT:
"Houston Center, Navy Bravo two zero zero, ETA change."

CENTER:
"Navy Bravo two zero zero, Houston Center, go ahead."

PILOT:
"Houston Center, Navy Bravo two zero zero Fort Stockton, one zero zero three zero, IFR to El Paso International, one four four five Zulu,
fuel one plus zero zero."

CENTER:
"Navy Bravo two zero zero, Roger."

4. Filing flight plans in-flight (normally handled by FSS)

***Sg 3, fr 14:** En Route - Leaving Assigned Frequency*

a. To leave assigned frequency

EXAMPLE:

***Sg 3, fr 14 Cont.:** Audio & Audio Text - Leaving Assigned Frequency*

NOTE: When requesting a frequency change, state the reason or new station so ATC may contact you if necessary. Center may combine your request with a frequency change or limit your time off frequency.

PILOT:
"Houston Center, Navy Bravo two zero zero, request off frequency to contact San Angelo radio."

CENTER:
"Navy Bravo two zero zero, Houston Center. Frequency change approved, report back on two six five point two, or in two minutes, good day."

PILOT:
"Navy Bravo two zero zero, switching two six five point two."

Sg 3, fr 15: *Arrival - Approach Control Initial Contact*

Sg 3, fr 15 Cont.: *Audio & Audio Text - Approach Control (Initial Contact)*

D. Arrival

1. Approach control (initial contact)

EXAMPLE:

NOTE: Approaching the terminal area and before handoff to Approach Control, a prudent pilot would monitor the destination ATIS on a secondary radio for weather, field conditions, and approach information. Having current ATIS information will enable the pilot to determine the probable landing runway on arrival and select a desired approach.

ATIS:
"El Paso information LIMA, one four three zero ZULU. Measured ceiling: one thousand broken, six thousand overcast. Visibility: Two miles with light rain. Temperature: seven eight. Dew point: six five. Wind: two five zero at one zero. Altimeter: two niner niner one. TACAN runway two six left approach in use. Hazardous flight weather for Southeast New Mexico available on HIWAS Flight Watch or from Flight Service Station. Advise controller on initial contact, you have information LIMA."

Sg 3, fr 15, p2: *Audio Text - Approach Control (Initial Contact)*

CENTER:
"Navy Bravo two zero zero, Albuquerque Center. Turn left heading two five zero, radar vector FANNY. Descend to one seven thousand. Contact El Paso Approach three five three point five."

PILOT:
"Navy Bravo two zero zero, left heading two five zero, radar vector FANNY. Leaving flight level three one zero, descending to one seven thousand. Switching El Paso Approach, three five three point five."

NOTE: Prior to contacting Approach Control, the pilot should have copied ATIS for weather and field information. The initial contact with Approach Control will include: the aircraft identification, altitude, ATIS letter identifier, and request. Location would also be included if not on a published route. This information expedites recovery from the MOAs.

Prior to transmitting a request, an abbreviated courtesy call is appropriate to ensure the approach controller is ready to copy your full report.

Sg 3, fr 15, p3: *Audio Text - Approach Control (Initial Contact)*

PILOT:
"El Paso Approach, Navy Bravo two zero zero, descending flight level two eight zero for one seven thousand."

APPROACH:
"Navy Bravo two zero zero, El Paso Approach, go ahead."

PILOT:
"Navy Bravo two zero zero, on the Wink, two five zero at six one with LIMA. Request TACAN two six left approach."

Sg 3, fr 16: *Arrival - Approach Control*

Sg 3, fr 16 Cont.: *Audio - Approach Control*

2. Approach phraseologies

NOTE: The controller is not required to issue missed approach instructions if the approach being flown has published missed approach procedures. However, if not stated in the published procedures or approach clearance, a prudent pilot would request missed approach instructions from the controller to minimize confusion during a missed approach.

Approach Control may clear aircraft for approach using several different phraseologies, each of which has different meanings and indicates a different specific action on the part of a pilot.

Sg 3, fr 17: *Arrival - Approach Control Phraseologies*

Sg 3, fr 17 Cont.: *Audio & Audio Text - Approach Control Phraseologies*

EXAMPLE:

a. APPROACH CONTROL:
"Cleared for approach."

NOTE: Used by the Controller when there is only one approach published for the airport.

Sg 3, fr 18: *Arrival - Cleared for TACAN Approach*

Sg 3, fr 18 Cont.: *Audio & Audio Text - Cleared for TACAN Approach*

b. APPROACH CONTROL:
"Cleared for TACAN approach."

NOTE: Used by the Controller when there is only one published TACAN approach to the airport.

Sg 3, fr 19: *Arrival - Cleared for Straight-In TACAN Approach*

Sg 3, fr 19 Cont.: *Audio & Audio Text - Cleared for Straight-In TACAN Approach*

c. APPROACH CONTROL:
"Cleared for a straight-in TACAN approach."

NOTE: Execute the published TACAN straight-in procedure to the active runway.

d. APPROACH CONTROL:
"Cleared for TACAN two six left approach."

NOTE: Execute the published TACAN approach procedure for runway two six left and land straight-in on runway two six left.

***Sg 3, fr 20:** Arrival - Cleared for TACAN Two Six Left Approach*

***Sg 3, fr 20 Cont.:** Audio & Audio Text - Cleared for TACAN Two Six Left Approach*

e. APPROACH CONTROL:
"Cleared for TACAN two six left approach, sidestep to runway two six right."

NOTE: Execute the published TACAN approach procedure for runway two six left and when in sight, sidestep and land two six right. (May require higher minimums.)

***Sg 3, fr 21:** Arrival - Cleared for Sidestep*

***Sg 3, fr 21 Cont.:** Audio & Audio Text - Cleared for Sidestep*

f. APPROACH CONTROL:
"Cleared for TACAN two six left approach, circle to land, runway two zero."

NOTE: Execute the published TACAN approach procedure for runway two six left, obtain the runway environment, and visually circle to land on runway two zero. If IFR conditions encountered persist, execute the missed approach procedures for the original approach performed.

***Sg 3, fr 22:** Arrival - Circle to Land*

***Sg 3, fr 22 Cont.:** Audio & Audio Text - Circle to Land*

Sg 3, fr 23: *Arrival - Initial Approach Clearance*

Sg 3, fr 23 Cont.: *Audio & Audio Text - Initial Approach Clearance*

g. APPROACH CONTROL:
"Navy Bravo two zero zero, El Paso Approach, radar contact. Cleared for TACAN two six left approach. Continue descent to one six thousand, report FANNY."

PILOT:
"Navy Bravo two zero zero, Wilco. Cleared for a TACAN two six left approach, descending to one six thousand."

NOTE: Upon arrival at the Initial Approach Fix, report commencing the approach.

Sg 3, fr 24: *Arrival - Commencing Approach*

Sg 3, fr 24 Cont.: *Audio & Audio Text - Commencing Approach*

h. PILOT:
"El Paso Approach, Navy Bravo two zero zero, FANNY, leaving one six thousand, commencing."

APPROACH CONTROL:
"Navy Bravo two zero zero, El Paso Approach. Report final approach fix."

PILOT:
"Navy Bravo two zero zero, Wilco."

NOTE: If the aircraft is in RADAR contact, the final approach fix report is not mandatory unless requested. However, in a non-precision approach, the final approach fix is the point where military aircraft should report the gear down. A civilian controller will not remind you of a gear-down report.

Remember, "Tower" must clear you to land. The tower controls the duty runway and surrounding airspace.

i. PILOT:
"El Paso Approach, Navy Bravo two zero zero, final approach fix, gear down."

APPROACH CONTROL:
"Roger, Navy Bravo two zero zero. Tower clears you to land, two six left, wind two five zero at one zero. Report field in sight."

PILOT:
"Navy Bravo two zero zero, Wilco."

Sg 3, fr 25: *Arrival - Final Approach Fix*

Sg 3, fr 25 Cont.: *Audio & Audio Text - Final Approach Fix*

E. Missed Approach

1. Missed Approach in actual weather conditions

NOTE: If a missed approach due to bad weather is likely, consider filing a flight plan to the alternate before penetrating. This simplifies the workload during missed approach. If a missed approach is made for any reason, a missed approach call is mandatory. The call consists of the following:

* "Missed Approach,"
* "[the reason for the missed approach]"
* and "[your intentions]." If another approach is desired, fuel and/or weather permitting, another approach is "your intentions."

Sg 3, fr 26: *Missed Approach - Actual Weather Conditions*

Sg 3, fr 26 Cont.: *Audio & Audio Text - Actual Weather Conditions*

If a decision has been made to divert to the alternate, utilize the "DRAFT" report in conjunction with the missed approach call. The acronym, "DRAFT," is used to help you recall, in sequence, the five essential items needed to file an abbreviated flight plan: Destination, Route of flight, Altitude, Fuel remaining, and Time en route.

Sg 3, fr 27: Missed Approach - Simulated Instrument Conditions

Sg 3, fr 27 Cont.: Audio & Audio Text - Simulated Instrument Conditions

Do not use the acronym, "DRAFT," in your call as it is an unofficial phrase and may not be understood by a civilian controller.

PILOT:
"El Paso Approach, Navy Bravo two zero zero, missed approach. Field not in sight, request clearance to Roswell, via direct SUMMY, 'Jay' two six Roswell, flight level one niner, zero plus two zero, fuel zero plus five five. Over."

APPROACH CONTROL:
"Navy Bravo two zero zero is cleared to Roswell Industrial Air Park as filed. Climb to and maintain flight level one niner zero. Turn right heading zero eight five, radar vectors SUMMY."

PILOT:
"Navy Bravo two zero zero, right zero eight five to SUMMY. Cleared to Roswell, climbing two thousand one hundred for flight level one niner zero."

2. Missed approach in simulated instrument conditions

NOTE: On an instrument approach, in visual weather conditions, you need not state your reason for the missed approach. Also, you should have previously stated your intentions to Approach Control prior to the missed approach and therefore the missed approach call can be shortened as follows:

PILOT:
"El Paso Approach, Navy Bravo two zero zero, missed approach."

APPROACH:
"Navy Bravo two zero zero, cleared to Roswell Industrial Park, climb and maintain one five thousand."

PILOT:
"Navy Bravo two zero zero, cleared to Roswell, climbing one thousand, one hundred, for one five thousand."

Narrator:
This concludes this audio segment. If you have questions, ask your instructor.

IV. Emergency Communications **1.8.1.10.12.2**

A. Two-way radio failure (FAA Procedures)

1. During two-way radio communications failure, when confronted with a situation not covered in the regulations, pilots are expected to exercise good judgement in whatever action they elect to take. Should the situation so dictate, they should not be reluctant to use the emergency actions contained in flying regulations

2. Squawk Mode 3/a, code 7600

3. Pilots can expect ATC to attempt to communicate by transmitting on guard frequencies and available frequencies of NAVAIDs

Sg 4, fr 1: *Lesson Organization*

INTRODUCTION TO INAV AND VOICE PROCEDURES

- Responsibilities of ATC facilities
- Clearances
- Normal communication procedures
- Emergency communications

4. VMC - If able to maintain flight in VMC, continue flight under VFR and land as soon as practical and notify ATC. It is not intended that the requirement to “land as soon as practical” be construed to mean “as soon as possible.” The pilot retains his prerogative of exercising his best judgement and is not required to land at an unauthorized airport, at an airport unsuitable for the type of aircraft flown, or to land only minutes short of his destination. The primary objective of this provision is to preclude extended IFR operation in the air traffic control system in VMC. When operating “on top” and unable to descend in VMC prior to destination, the procedures contained in paragraph 5 apply

5. IMC - If VMC is not encountered, continue the flight according to the following:

   a. Route

      (1) By the route assigned in the last ATC clearance received

      (2) If being RADAR vectored, by the direct route from the point of radio failure to the fix, or airway specified in the vector clearance

      (3) In the absence of an assigned route, by the route that ATC has advised may be expected in a further clearance

      (4) In the absence of an assigned route or a route that ATC has advised may be expected in a further clearance, by the route filed in the flight plan

b. Altitude - At the highest of the following altitudes or flight levels for the route segment being flown:

(1) The altitude or flight level assigned in the last ATC clearance received

(2) The minimum altitude (converted, if appropriate, to minimum flight level) for IFR operations

(3) The altitude of flight level ATC has advised may be expected in a further clearance

NOTE: The intent of the rule is that a pilot who has experienced a two-way radio failure should select the appropriate altitude for the particular route segment being flown and make the necessary altitude adjustments for subsequent route segments. If the pilot received an "expect further clearance" containing an altitude to expect at a specified time or fix, he should maintain the highest of the following altitudes until that time/ fix: (1) his last assigned altitude, or (2) the minimum altitude/flight level for IFR operations. Upon reaching the time/fix specified, the pilot should commence his climb or descent to that altitude he was advised to expect. If the radio failure occurs after the time/fix specified, the altitude to be expected is not applicable and the pilot should maintain an altitude consistent with (1) or (2) above.

c. Leave Clearance Limit

(1) When the clearance limit is a fix from which an approach begins, commence descent, or descent and approach, as close as possible to the expected further clearance (EFC) time if one has been received, or if one has not been received, as close as possible to the expected time of arrival (ETA) calculated from the filed or amended (with ATC) estimated time en route

(2) If the clearance limit is not a fix from which the approach begins, leave the clearance limit at the expected further clearance time (EFC) if one has been received, or if none has been received, upon arrival over the clearance limit, and proceed to a fix from which an approach begins and commence descent or descent and approach as close as possible to the estimated time of arrival as calculated from the filed or amended (with ATC) estimated time en route

Sg 4, fr 2: *In-Flight Emergency Communication Procedures*

ATC EMERGENCY COMMUNICATION PROCEDURES

A. Set transponder to 7700 / MODE C, transmit distress/urgency message consisting of as many of the following as necessary.

1. If distress; MAYDAY, MAYDAY, MAYDAY.
   If urgency; PAN-PAN, PAN-PAN, PAN-PAN
2. Name of station addressed
3. Aircraft identification and type
4. Nature of distress or urgency
5. Weather
6. Pilot's intentions or request
7. Present position and heading or if lost, last known position, time, and heading since that position
8. Altitude or flight level
9. Fuel remaining in minutes
10. Number of people on-board
11. Any other useful information

B. When bailout, crash landing or ditching is imminent, and time permits, transmit as many as necessary of the above items plus any of the following that you think might be helpful.

1. ELT status (emergency locator transmitter)
2. Visible landmarks
3. Aircraft color
4. Number of people on-board
5. Emergency equipment on-board

B. In-flight emergency communication procedures

1. Distress transmission - after setting transponder to 7700/MODE C, transmit a distress or urgency message consisting of as many as necessary of the following elements, preferably in the order listed.

a. If distress; MAYDAY, MAYDAY, MAYDAY. If urgency; PAN-PAN, PAN-PAN, PAN-PAN

b. Name of station addressed

c. Aircraft identification and type

d. Nature of distress or urgency

e. Weather

f. Pilot's intentions or request

g. Present position and heading or if lost, last known position, time, and heading since that position

h. Altitude or flight level

i. Fuel remaining in minutes

j. Number of people on-board

k. Any other useful information

2. When in a distress condition with bailout, crash landing or ditching imminent, take time if circumstances permit, to transmit as many as necessary of the items above and any of the following that you think might be helpful.

   a. ELT status (emergency locator transmitter)

   b. Visible landmarks

   c. Aircraft color

   d. Number of people on board

   e. Emergency equipment on-board

C. Emergency communication procedures

? **What is the emergency transponder squawk code?**

ANSWER: Code 7700

1. Squawk 7700 on IFF transponder

2. Transmit to agency on frequency in use at the time

    a. Distress: "MAYDAY" (3 times)

    b. Urgency: "PAN PAN" (3 times)

    EXAMPLE:

    PILOT: "Houston Center: MAYDAY, MAYDAY, MAYDAY: Navy Bravo two zero zero..."

3. If not in direct contact with controlling agency: transmit in the blind to any agency or aircraft available on a Guard frequency

    a. UHF 243.0 MHz

    b. VHF 121.5 MHz

    EXAMPLE:

    PILOT: "MAYDAY MAYDAY MAYDAY: Navy Bravo two zero zero, transmitting on Guard..."

PROGRESS CHECK

Question 6 -- 1.8.1.10.12.2
List the two steps of the procedure for lost communications.

ANSWER:
1. Squawk 7600
2. Continue to transmit all calls "in the blind"

Question 7 — 1.8.1.10.12.2
To what agency should you transmit a "MAYDAY" or "PAN" call?

ANSWER: The agency to whose frequency you are tuned or, if not in contact, any agency or aircraft on a Guard frequency

Sg 5, fr 1: Review Menu

INTRODUCTION TO INAV AND
VOICE PROCEDURES
REVIEW OPTIONS

1. Entire lesson
2. Responsibilities of ATC facilities
3. Normal communication procedures
4. Emergency communications
5. End this lesson

Please select

SUMMARY

This lesson has focused on the following topics:

* Responsibilities of ATC facilities
* Clearances
* Normal communication procedures
* Emergency communication procedures

CONCLUSION

Having reviewed the ATC procedures and phraseology required to communicate with any ATC facility in the United States, you are now prepared to exercise your best judgment if you encounter situations that we have not covered in this lesson.

LESSON GUIDE

COURSE/STAGE: T-45A UJPT & E2-C2 Instrument Navigation

LESSON TITLE: Use and Operation of TACAN, VOR, VOR/DME

LESSON IDENTIFIER: T-45A UJPT & E2-C2 INav-03

LEARNING ENVIRONMENT: CAI

ALLOTTED LESSON TIME: .8 hr

TRAINING AIDS:

* Figures:
  - Fig 1: Operating Characteristics of TACAN and VOR
  - Fig 2: Standard Service Volume (SSV)
  - Fig 3: VOR Frequency Overlap
  - Fig 4: Cones of Confusion
  - Fig 5: COMM/NAV Transfer Panel
  - Fig 6: Communication Control Panel
  - Fig 7: TACAN Control Panel
  - Fig 8: HSI Display/TACAN Operation
  - Fig 9: VOR/ILS Control Panel
  - Fig 10: HSI Display/VOR Operation

STUDY RESOURCES:

* NATOPS Instrument Flight Manual, NAVAIR 00-80T-112
* T-45A NATOPS Flight Manual, A1-T45AB-NFM-000
* T-45A Instrument FTI

(6-99) ORIGINAL

LESSON PREPARATION:

Read from Part V in the NATOPS Instrument Flight Manual,
NAVAIR 00-80T-112:
* Paragraphs 20.1 -- 20.2.2.1
* Paragraphs 21.1 -- 21.2.3.1

Review Lesson Guides
* Eng-19, Flight Instruments
* Eng-20, Flight Instruments Malfunctions
* Eng-21, CNI System
* Eng-22, CNI System Malfunctions

REINFORCEMENT: N/A

EXAMINATION:

The objectives in this lesson will be tested in Instrument Navigation 12X.

LESSON OBJECTIVES

2.7.5.1.1.2
Recall operating characteristics of the TACAN, VOR, VOR/DME

2.7.5.1.1.2.3
Recognize TACAN/VOR cone of confusion

2.7.5.1.1.1
Recall the function and use of TACAN, VOR, VOR/DME controls and indicators

2.7.5.1.1.1.2
Recall procedure for tuning/identifying TACAN, VOR, VOR/DME stations

2.7.4.2.1
Recall definition of 40-degree TACAN lock-on

2.7.5.1.1
Recall procedures for mission cockpit management

MOTIVATION

Precise flying is critical in Naval aviation. Whether you're navigating cross-country or back to the carrier, knowing the operating characteristics of your aircraft's navigational equipment will help you to complete your mission successfully.

OVERVIEW

After this lesson, you will know how to use equipment controls to receive and use navigation information for TACAN, VOR, and VOR/DME.

This lesson consists of:

* Operating characteristics of TACAN and VOR
* TACAN
* VOR
* VOR/DME
* Cockpit management

REFRESHER

Recall your T-34C training in navigation systems.

PRESENTATION

I. Operating characteristics of TACAN and VOR **2.7.5.1.1.2, 2.7.5.1.1.2.3**

Fig 1: Operating Characteristics of TACAN and VOR

NOTE: This section is provided to give you additional information on the Operating Characteristics Table.

A. TACAN

1. Unaffected by weather

2. 360 magnetic radials emitted from station

3. Operates in UHF (L band)

   a. 252 channels

      (1) X-mode incorporates 126 channels

      (2) Y-mode incorporates 126 channels

   b. 1025-1150 MHz (1-MHz intervals)

      NOTE: Frequency not necessarily tied to channel number; tune by channel, not frequency.

4. Information provided

   a. Continuous slant range distance from aircraft to station (DME) in nautical miles

   b. Magnetic bearing from station

5. Limitations

   a. Line of sight

   b. DME to 399.9 nm

   c. Standard Service Volume (SSV)

      Fig 2: Standard Service Volume (SSV)

      NOTE: SSV defines the interference free reception limits of unrestricted NAVAIDs which are usable for random/ unpublished route navigation. Reception may be possible beyond (T), (L), and (H) reception ranges; however, interference from other stations on the same frequency may cause adjacent channel interference.

      NOTE: All elevations are with respect to the station's site elevation (AGL).

OPERATING CHARACTERISTIC	TACAN	VOR
Affected by weather	No	No
Emits 360 radials about station	Yes	Yes
Voice communications	None	Transmits voice occasionally
Limited by line-of-sight	Yes	Yes
Operates in	UHF 252 channels (126 T-45)	VHF 108.0-117.95 MHz
Provides	Magnetic bearing Slant range	Magnetic bearing
Identified by 3-letter Morse Code	Yes--every 35 seconds	Yes--and/or recorded voice

Figure 1: OPERATING CHARACTERISTICS OF TACAN AND VOR

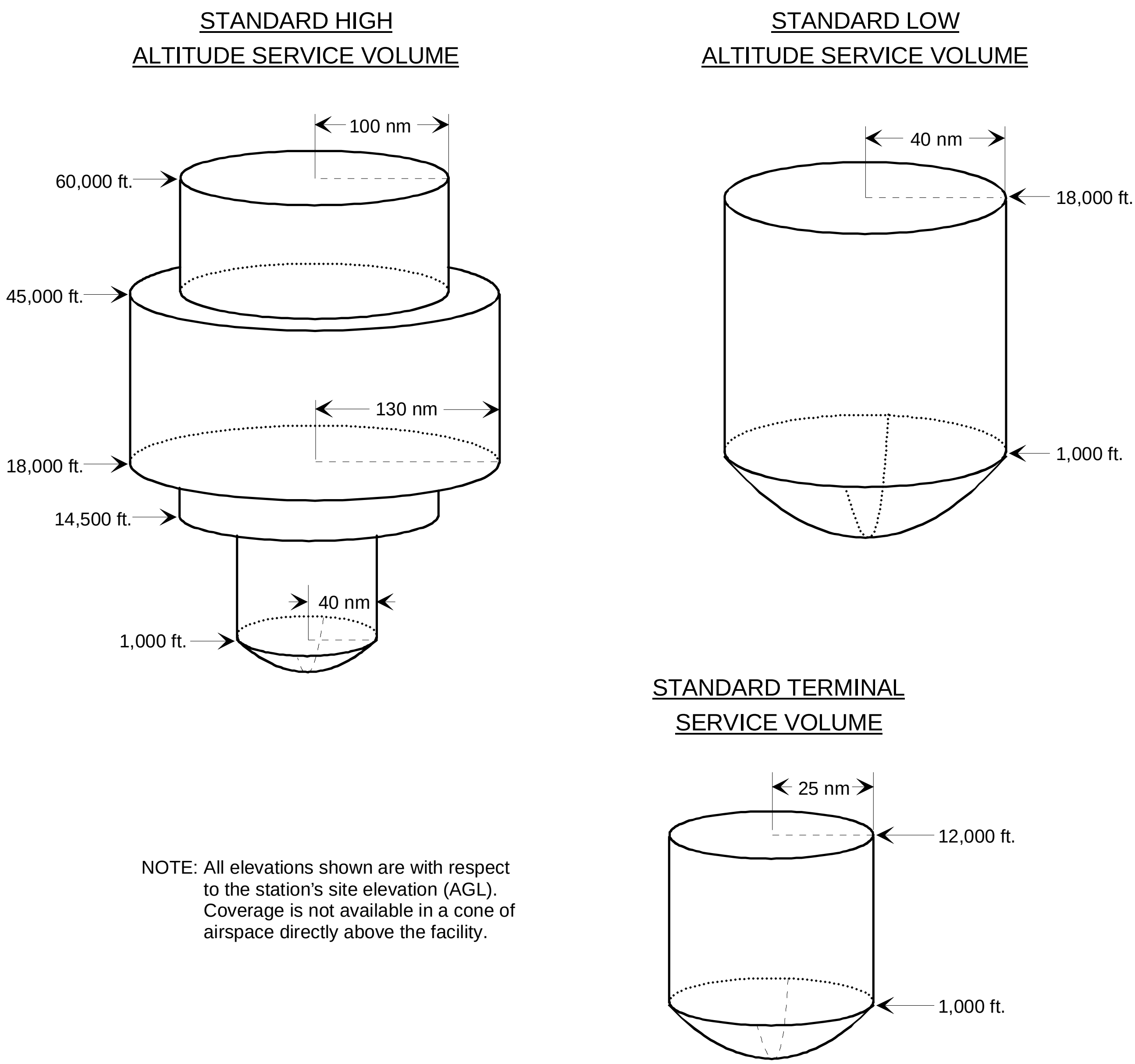


Figure 2: STANDARD SERVICE VOLUME (SSV)

(1) T (Terminal): from 1,000 ft AGL up to and including 12,000 ft AGL at radial distances out to 25 nm (will not appear on high altitude charts)

(2) L (Low): from 1,000 ft AGL up to and including 18,000 ft AGL at radial distances out to 40 nm

(3) H (High)

(a) From 1,000 ft AGL up to and including 14,500 ft AGL at radial distances out to 40 nm

(b) From 14,500 ft AGL up to and including 60,000 ft AGL at radial distances out to 100 nm

(c) From 18,000 ft AGL up to and including 45,000 ft AGL at radial distances out to 130 nm

NOTE: Standard Service Volume limitations do not apply to published IFR routes or procedures, i.e., some published routes may exceed these limitations, but have been flight tested and can be used with confidence.

d. Erroneous TACAN indications

(1) 40-degree azimuth error lock-on may occur, caused by a weak airborne receiver. Azimuth indications will be 40 degrees or some multiple of 40 degrees in error. Rechanneling causes the aircraft receiver to attempt to relock

(2) Adjacent channel interference occurs when an aircraft receives signals from more than one ground station. Normally, this occurs at high altitude when the ground stations are too close together. DME, azimuth, or ID for either ground station may be received. Location of ground station, not equipment functioning, is the problem

(3) False or incorrect lock-on is an airborne equipment malfunction caused by older crystal-controlled TACAN equipment. The T-45A should not experience this problem

6. Identified by aural 3-letter Morse code repeating every 35 seconds

7. Neither transmits nor receives voice communications

8. Cone of Confusion - A "cone of confusion," where TACAN azimuth information is not available, exists over TACAN stations. The "cone" varies from 60 degrees to 110 degrees wide. TACAN DME and I.D. signal will be received and station passage will be noted by minimum DME. Although narrow at low altitudes, this "cone" expands to about 18 nm across at 30,000 ft. Because of the size of the TACAN "cone of confusion," TACAN holding patterns will always be established using DME

B. VOR

1. Unaffected by weather

2. 360 radials emitted from station

3. Provides magnetic radial

4. Operates in the VHF band (108.0-117.95 MHz) - fifty-nine (59) available frequencies

5. Limitations

   a. Line of sight

   b. Standard Service Volume (SSV)

   NOTE: SSV defines the reception limits of unrestricted NAVAIDs which are usable for random/unpublished route navigation.

   The reason why federal airways are limited to a maximum altitude of FL 450 is due to the service volume of VORs. The service volume is predicated on the limited number of available VOR frequencies for airway navigation (total of 59). Present FCC and FAA standards permit as many as 20 VORs to use the same frequency. The problem with this is that the usable range of VOR decreases with altitude due to overlapping signals from VORs using the same frequency.

   Fig 3: *VOR Frequency Overlap*

   c. From 18,000 ft AGL up to and including 45,000 ft AGL at radial distances out to 130 nm

   NOTE: Standard Service Volume limitations do not apply to published IFR routes or procedures.

6. Identified by 3-letter aural Morse code identifier or recorded automatic voice alternating with Morse code identifier

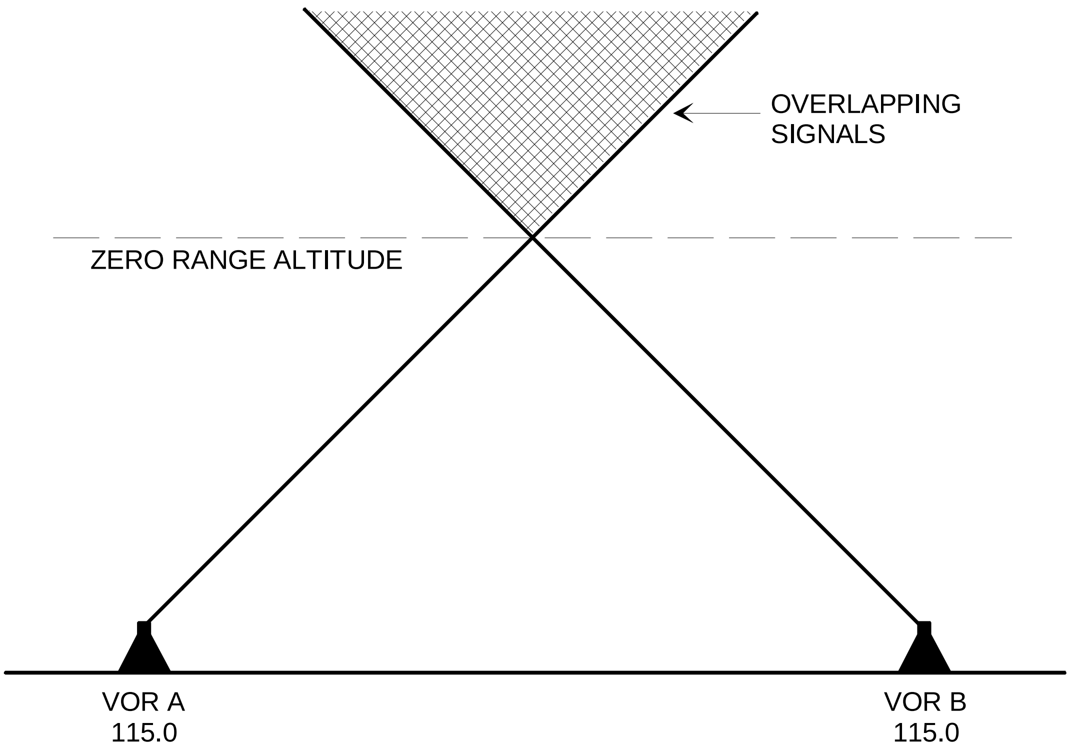


Figure 3: VOR FREQUENCY OVERLAP

7. Most can be used to transmit voice communications to aircraft as well as scheduled and/or urgent weather information. An example is Hazardous In-flight Weather Advisory Service/HIWAS, a program for broadcasting hazardous weather information (Significant Meteorological Information, convective Significant Meteorological Information, Center Weather Advisories, Airman's Meteorological Information, Severe Weather Forecast Alerts, and urgent Pilot Weather Reports) on a continuous basis over selected VORs.

8. There is a negligible "cone of confusion" over a VOR antenna. Due to its size, station passage over a VOR is a recognized fix. Therefore, "over the station holding" can be conducted directly over a VOR station.

Fig 4: *Cones of Confusion*

C. VOR/DME

NOTE: The acronym VORTAC describes a facility in which a VOR and a TACAN station are collocated. Operating characteristics are the same as VOR/DME.

1. Same as VOR plus DME information

2. <u>Differences</u> from TACAN

   a. Frequency band

      (1) TACAN: 1025-1150 MHz, UHF (252 channels, X and Y)

      (2) VOR/DME: 108.0-117.95 MHz, VHF (channel designator for DME only)

   b. Range data

      (1) TACAN: DME a component of system

      (2) VOR/DME: DME separate system providing range only

      NOTE: DME information for the T-45A can only be received on the TACAN. The aircraft's VOR receiver configuration does not include DME capability.

   c. Identifier

      (1) TACAN: Morse code only

      (2) VOR/DME: Morse code and possibly voice

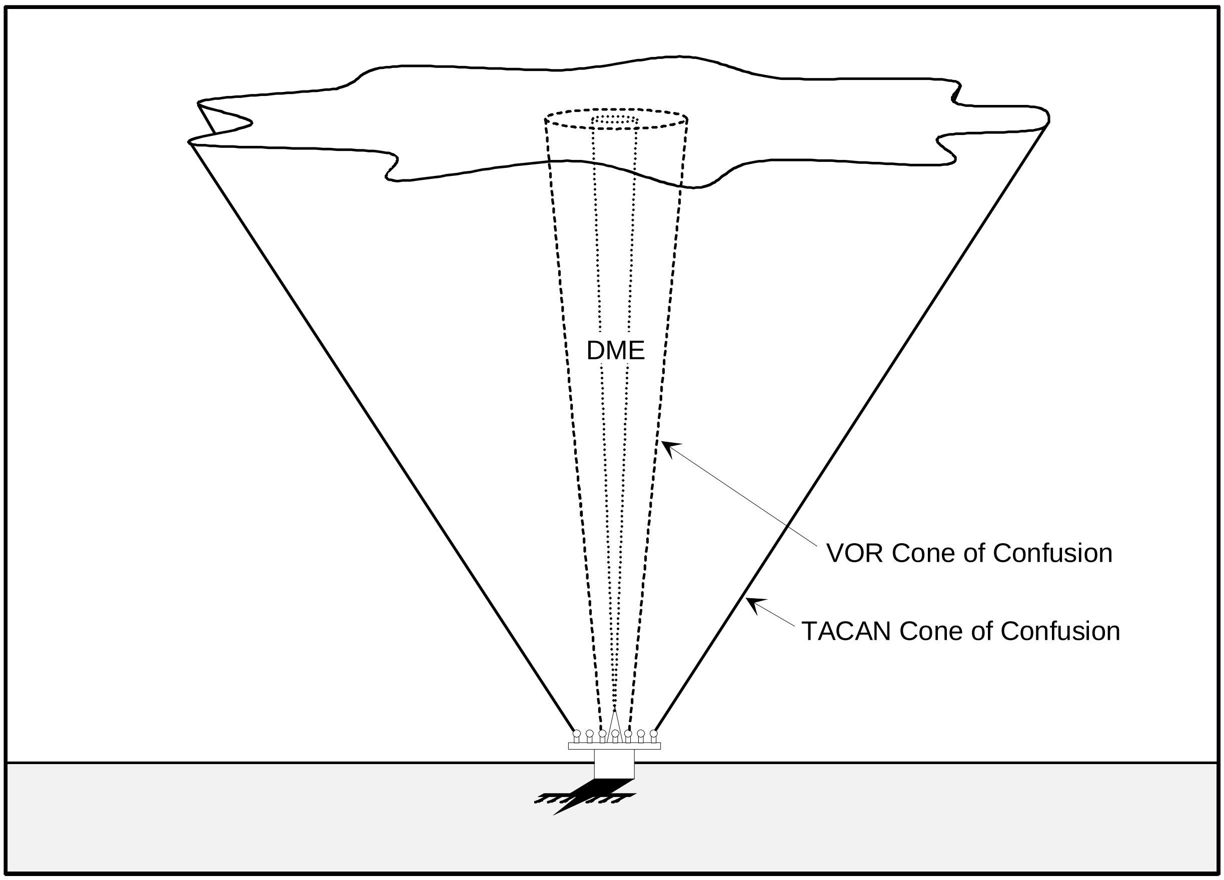


Figure 4: CONES OF CONFUSION

d. Voice communications (receive only)

(1) TACAN: none

(2) VOR/DME: possible, depending upon facilities

e. Errors

(1) TACAN: locks on in increments of 40 degrees from actual azimuth

(2) VOR/DME: N/A

II. TACAN

A. Location and use of TACAN equipment controls and indicators for tuning/identifying **2.7.5.1.1.1**

1. COMM/NAV control transfer panel: CDI TACAN switch/light provides switching logic to route navigational information to the HSI CDI

2. Communication control panel: TACAN toggle switch provides routing and volume control of Morse code identifier through intercommunication system (ICS) to pilot's headset

3. TACAN control panel

a. Power switch controls power to system. Allow 5-second warmup

b. Option select switch

(1) Position X or Y allows normal selection of a TACAN channel for bearing and DME information for that X or Y mode only

(2) Position XA/A, commonly referred to as the air-to-air mode, permits 2-5 aircraft to receive DME only from one aircraft with the TACAN set 63 channels apart

c. Test button initiates system BIT

(1) Select TACAN position on CDI switch

(2) Set 180 on HSI course selector window

(3) Press and hold TEST button for a minimum of 5 seconds

Fig 5: *COMM/NAV Transfer Panel*

Fig 6: *Communication Control Panel*

Fig 7: *TACAN Control Panel*

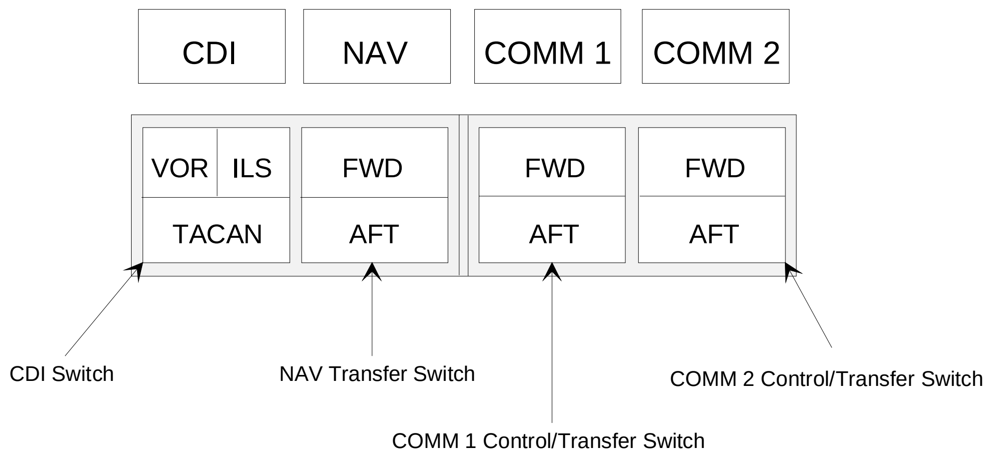


Figure 5: COMM/NAV TRANSFER PANEL

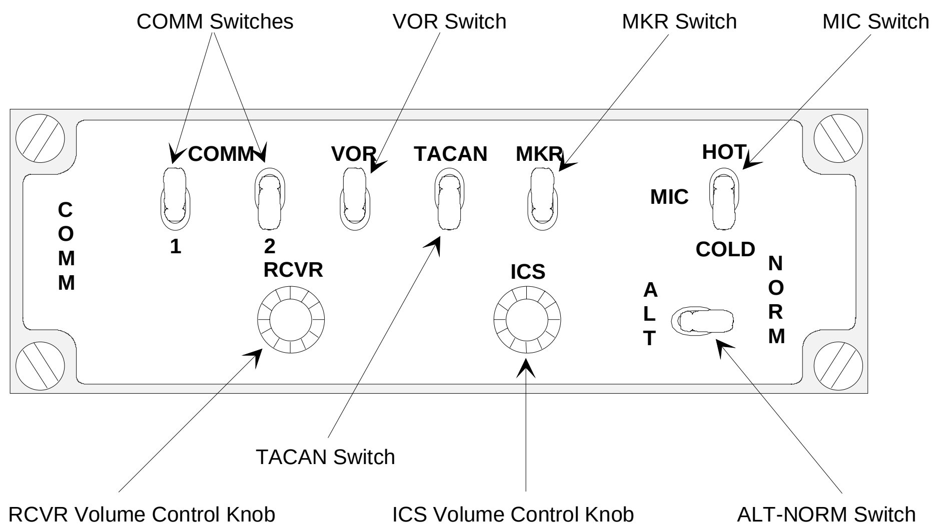


Figure 6: COMMUNICATION CONTROL PANEL PANEL

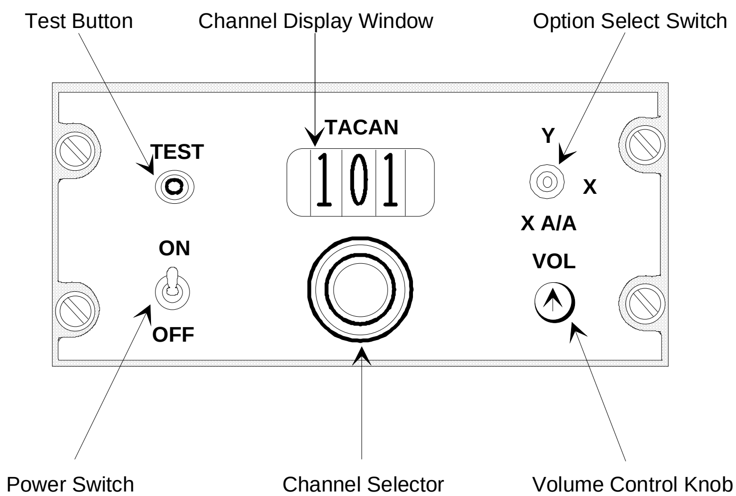


Figure 7: TACAN CONTROL PANEL

(4) A successful BIT shows these HSI indications:

(a) NAV flag masked

(b) No. 2 bearing pointer at 180 +/- 2.5 degrees

(c) Range reads 0 +/- 1 nm

(d) CDI bar centered

(e) TO indication displayed

d. Volume control knob varies audio signal level

e. Channel selector used to select desired channel

f. Channel display window displays TACAN channel in use

4. Horizontal situation indicator (HSI)

a. TACAN range counter

(1) Indicates line-of-sight (slant range) distance: maximum 399.9 nm

(2) Warning flag (TACAN range flag) in view

(a) System power off

(b) Invalid or absent signal

(c) DME greater than 399.9 nm

b. No. 2 bearing pointer (TACAN relative bearing pointer) indicates magnetic bearing to a tuned and valid TACAN station

c. Red NAV flag in view

(1) System power off

(2) Invalid or absent signal

d. TO/FROM indicator displays TO or FROM depending on No. 2 pointer position in relation to selected course

e. Course deviation bar indicates up to 10 degrees of deviation left or right from selected TACAN course

B. Tuning/identifying

1. Correct information **2.7.5.1.1.1.2**

   a. Find channel on approach plates/charts

   b. Verify TACAN control panel is on, and volume is turned all the way up. Select channel on TACAN control panel.

   c. Select TACAN on communication control panel to route TACAN identification signal to your headset

   d. Verify 3-letter Morse code identifier of selected station

***Fig 8:** HSI Display/ TACAN Operation*

C. HSI indications

1. No. 2 pointer indicates magnetic bearing to station

2. Range counter displays distance

3. Red NAV flag not in view

4. TO or FROM displayed

5. CDI indicates deviation from selected course

D. Erroneous information

1. Cone of confusion **2.7.5.1.1.2.3**

   a. HSI

      (1) No. 2 pointer hunts or rotates

      (2) CDI oscillates from side to side

      (3) TO/FROM indicator shifts back and forth

      (4) Red NAV flag in view

   b. DME and identifier signal not affected

2. TACAN azimuth error lock-on in locking multiples of 40-degrees from the desired azimuth. Solid-state electronics in the T-45A should preclude this problem from occurring. **2.7.4.2.1**

3. Co-channel interference: receiving signals (DME, azimuth, identifier) from more than one TACAN station due to the relationship at high altitude between the aircraft and station locations

RECEIVER OUTPUTS TO DISPLAY	TACAN MODES		
	OPERATE	FAIL	OFF*
RANGE	Digital display	Range warning flag in view	Range warning flag in view
BEARING TO STATION	Displayed on bearing pointer #2	Bearing pointer #2 searches at 25 degrees sec CCW	Bearing pointer #2 locked at last position
DEVIATION	CDI displayed deviation	CDI goes to random positions or rests in the center if signal is lost	CDI goes to rest position in the center
TO/FROM	TO/FROM indicator displayed	TO/FROM indicator out of view	TO/FROM indicator out of view
TACAN SIGNAL VALID:	Nav flag out of view	Nav flag in view	Nav flag in view
TACAN SIGNAL NOT VALID:	Nav flag in view		

* *OFF refers to the TACAN receiver/transmitter turned off*

Figure 8: HSI DISPLAY/TACAN OPERATION

III. VOR

A. Location and use of VOR equipment controls and indicators for tuning/ identifying **2.7.5.1.1.1**

1. COMM/NAV control transfer panel: CDI VOR switch/light provides switching logic to route navigational information to the HSI and CDI

Fig 5: COMM/NAV Transfer Panel

2. Communication control panel: VOR toggle switch provides routing of Morse code and possible recorded information through inter-communication system (ICS) to pilot's headset

Fig 6: Communication Control Panel

3. VOR/ILS control panel

Fig 9: VOR/ILS Control Panel

a. Power selector controls power to system and initiates system BIT when in TEST position (5-sec warm-up is required)

(1) Select the VOR/ILS position on the CDI switch

(2) Set 000 in HSI course selector window

(3) Set and hold the power/frequency knob in the TEST position on the VOR/ILS control panel

(4) Good BIT check results in the following HSI indications

(a) Glideslope pointer, NAV, and GS flags not visible

(b) Range flag in view

(c) No. 1 pointer 315 +/- 2.5 degrees

(d) CDI moves left maximum 2.5 dots

(e) TO/FROM showing TO

(f) Marker beacon lights on

b. Frequency selector adjusts frequency from 108.00 to 117 MHz

(1) Left inner knob used to select frequencies in 1 MHz steps

(2) Right inner knob used to select frequencies from .00 to .95 steps

c. Frequency display window displays tuned frequency

d. Volume control knob varies audio signal level

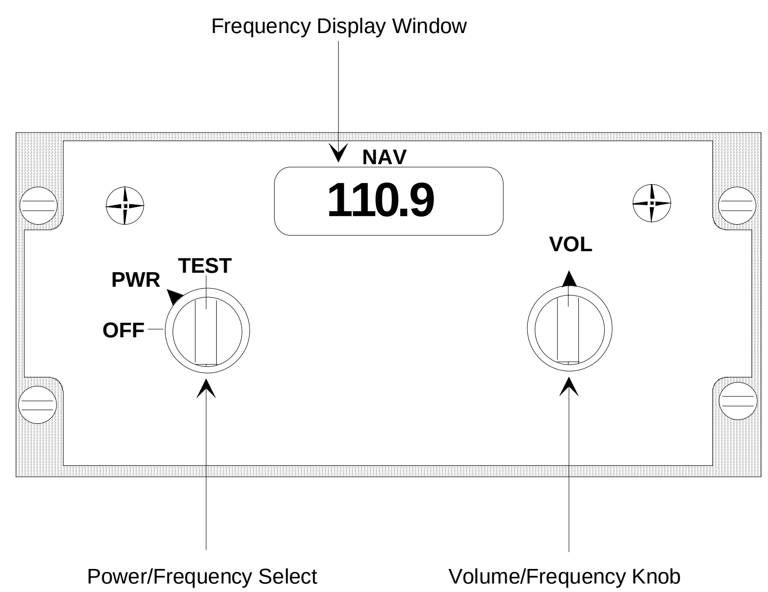


Figure 9: VOR/ILS CONTROL PANEL

4. HSI

    a. No. 1 pointer (VOR relative bearing pointer) indicates magnetic bearing to tuned VOR station

    b. Red NAV flag in view

        (1) System power off

        (2) Invalid or absent signal

    c. TO/FROM indicator displays TO or FROM depending on No. 1 pointer's position in relation to selected course

    d. Course deviation bar indicates up to 10-degrees of deviation from selected VOR course

B. Tuning/identifying **2.7.5.1.1.1.2**

Fig 10: HSI Display/ VOR Operation

1. Find frequency on approach plates/charts

2. Verify VOR/ILS control panel is on, volume is turned all the way up, and select frequency on the VOR/ILS control panel

3. Select VOR on communication control panel to route VOR identification signal to your headset

4. Verify 3-letter Morse code identifier and/or recorded voice of selected station

C. HSI indications

1. No. 1 pointer indicates magnetic bearing to station

2. Red NAV flag not in view

3. TO or FROM displayed

4. CDI indicates deviation from selected course

D. Erroneous information: minimal cone of confusion **2.7.5.1.1.2.3**

1. HSI

    a. No. 1 pointer hunts or rotates

    b. CDI oscillates from side to side

    c. TO/FROM indicator shifts back and forth

    d. Red NAV flag in view

2. Identifier signal not affected

RECEIVER OUTPUTS TO DISPLAY	VOR MODES		
	OPERATE	FAIL	OFF*
BEARING TO STATION	Displayed on bearing pointer #1 (1)	Bearing pointer #1 parked at 3 o'clock (right wing)	Bearing pointer #1 parked at 3 o'clock (right wing)
COURSE DEVIATION INDICATOR (CDI)	CDI displays deviation	CDI goes to center NAV flag in view	CDI reverts to TACAN display; displays TACAN deviation (2)
TO/FROM	TO/FROM indicator displayed	TO/FROM indicator out of view	Indicator reverts to TACAN display; displays TACAN TO/FROM (3)
TACAN SIGNAL VALID:	Nav flag out of view	Nav flag in view	Nav flag reverts to TACAN display; displays TACAN TO/FROM
TACAN SIGNAL NOT VALID:	Nav flag in view	Nav flag in view	

* *OFF refers to the TACAN receiver/transmitter turned off*

NOTES:

(1) If receiver does not sense a valid signal from station, pointer will park at 3 o'clock (right wing).

(2) If TACAN is on. If TACAN is off, the CDI will center.

(3) If TACAN is on. If TACAN is off, the indicator is out of view.

Figure 10: HSI DISPLAY/VOR OPERATION

IV. VOR/DME

A. Location and use of VOR/DME equipment controls and indicators for tuning/identifying **2.7.5.1.1.1**

1. COMM/NAV control transfer panel: CDI VOR switch/light must be selected to route VOR navigation information to the HSI and CDI

Fig 5: COMM/NAV Transfer Panel

2. Communication control panel: VOR and TACAN toggle switches provide routing of Morse code information through intercommunication system (ICS) to pilot's headset

Fig 6: Communication Control Panel

3. VOR/ILS control panel: same as VOR controls and indicators (ref. III.A.3)

Fig 9: VOR/ILS Control Panel

4. TACAN control panel: same as TACAN controls and indicators (ref. II.A.3)

Fig 7: TACAN Control Panel

5. HSI

a. Includes VOR controls and indicators (ref. III.A.4)

b. Includes TACAN range counter information (ref. II.A.4)

NOTE: The TACAN pointer will continue to search if the station is not a VORTAC.

B. Tuning/identifying

1. This procedure begins just as in TACAN and VOR above: (Sections II.A.3. and III.A.3.)

a. Find VOR station frequency and TACAN station channel (or VORTAC frequency/channel) on approach plates/charts

b. Ensure COMM/NAV transfer panel is set up for VOR control and CDI display

c. Verify VOR/ILS control panel is on with volume turned up and select frequency for bearing information

d. Verify TACAN control panel is on with volume turned up and select channel for DME information

e. Position communication panel VOR toggle switch ON. Verify the 3-letter Morse code and/or recorded voice identifier of selected station

f. Position communication panel TACAN toggle switch ON and verify 3-letter Morse code of selected station

C. HSI

1. No. 1 pointer indicates magnetic bearing to VOR station

2. Range counter displays distance

3. Red NAV flag not in view

4. TO/FROM displayed

5. CDI indicates deviation from selected VOR course

D. Erroneous information: cone of confusion **2.7.5.1.1.2.3**

1. HSI indications

a. No. 1 and No. 2 pointers hunt or rotate

b. CDI oscillates from side to side

c. TO/FROM indicator shifts back and forth

d. Red NAV flag in view

2. Identifier signal not affected

V. Cockpit management **2.7.5.1.1**

A. Stay ahead of the aircraft through anticipation (especially when faced with heavy workloads)

B. Ensure COMM/NAV equipment is tuned to the proper frequencies and TACAN/VOR stations are identified before using them

C. Suggested sequence for setting up your navigation equipment (your procedures may differ):

1. Determine frequency or channel and station ID

2. Ensure you have NAV control in your cockpit

3. Tune and identify station

4. Set desired course in course set window on HSI

5. Tune and identify backup navigation aid

D. Select a backup navigation aid

E. “Think ahead” in your flight and anticipate the navigation aids you will need

SUMMARY

This lesson has covered the following topics:

* Operating characteristics of TACAN and VOR
* TACAN
* VOR
* VOR/DME
* Cockpit management

CONCLUSION

The safe and precise conduct of a flight depends on your thorough knowledge of navigational equipment, its limitations and uses. You must be able to recognize possibly erroneous navigational information either to correct the problem or to obtain an alternate solution.

NOTES

LESSON GUIDE

COURSE/STAGE: T-45A UJPT & E2-C2 Instrument Navigation

LESSON TITLE: Components and Characteristics of the Instrument Landing System (ILS)

LESSON IDENTIFIER: T-45A UJPT & E2-C2 INav-04

LEARNING ENVIRONMENT: CAI

ALLOTTED LESSON TIME: 0.8 hr

TRAINING AIDS:

* Figures
  - Fig 1: FAA Instrument Landing System (ILS)
  - Fig 2: Localizer Signal Aquisition Limits
  - Fig 3: Marker Beacon Code/Color Identification Table
  - Fig 4: Instrument Runway Lighting
  - Fig 5: ILS Cockpit Instruments
  - Fig 6: ILS Navigation Instrument Controls
  - Fig 7: Marker Beacon Test and Illumination Controls
  - Fig 8: ILS Critical Area Taxiway Position Markings

STUDY RESOURCES:

* NATOPS Instrument Flight Manual, NAVAIR 00-80T-112
* T-45A NATOPS Flight Manual, A1-T45AB-NFM-000

(6-99) ORIGINAL

LESSON PREPARATION:

Read:

* Chapter 23, NATOPS Instrument Flight Manual, NAVAIR 00-80T-112
* Part VII, 21.4, "VOR/ILS System," T-45A NATOPS Flight Manual, A1-T45AB-NFM-000

REINFORCEMENT: N/A

EXAMINATION:

The objectives in this lesson will be tested in Instrument Navigation 12X.

LESSON OBJECTIVES

2.9.4.6.5
Recall function and use of ILS ground equipment

2.9.4.6.5.1
Recall function of localizer transmitter

2.9.4.6.5.2
Recall function of glideslope transmitter

2.9.4.6.5.4
Recall range (position) systems used during ILS/LOC approach

2.9.4.6.5.3
Recall function and use of ILS marker beacons

2.9.4.6.3
Recall function and use of ILS controls and indicators

2.9.5.5.1
Recall configuration and operating characteristics of visual information system

2.9.4.6.2.1
Recall procedures for using ILS equipment

1.8.1.9.11.3
Recall indications and procedures for ILS component failure

MOTIVATION

Learning ILS and then practicing in the simulator and aircraft are important because you will be flying ILS-type approaches regularly at the ship.

The ILS precision approach system provides azimuth and glideslope information that enables precision landings under low ceiling and visibility conditions. Your understanding of the instrument indications generated in the aircraft from ILS ground equipment is vital to your execution of the smooth and immediate course corrections required on a precision approach. This lesson will review the function and use of ILS ground equipment as well as identify ILS instruments and controls within the aircraft.

OVERVIEW

At the end of this lesson, you will know the functions of ILS ground equipment, the instrument indications generated by ILS localizer and glideslope signals, and aircraft position in relation to the localizer and glideslope beams.

This lesson covers the:

* ILS guidance information
* ILS range information
* ILS visual information
* ILS controls and instruments

REFRESHER

Review:

* Your Engineering Lesson Guide for “CNI” System

PRESENTATION

Instrument Landing System (ILS)

NOTE: The ILS information approach system is made up of three functional components; the guidance systems, the range systems, and the visual systems. This lesson discusses each of the systems in detail. See Figure 1 for an ILS pictorial.

Fig 1: *FAA Instrument Landing System (ILS)*

I. Guidance Systems

NOTE: The guidance system of the ILS is made up of two parts, the localizer transmitter (azimuth information) and the glideslope transmitter (glidepath information).

A. Localizer - azimuth beacon transmitter is the first half of the ILS guidance system

1. Provides precise horizontal (course) guidance information to the runway centerline by way of a localized navigational beacon to localizer equipped aircraft within the sensing area of the localizer beacon signal

2. Localizer frequency is identified by international Morse code consisting of a four-letter identifier with the first letter of the sequence beginning with the letter “I” (••)

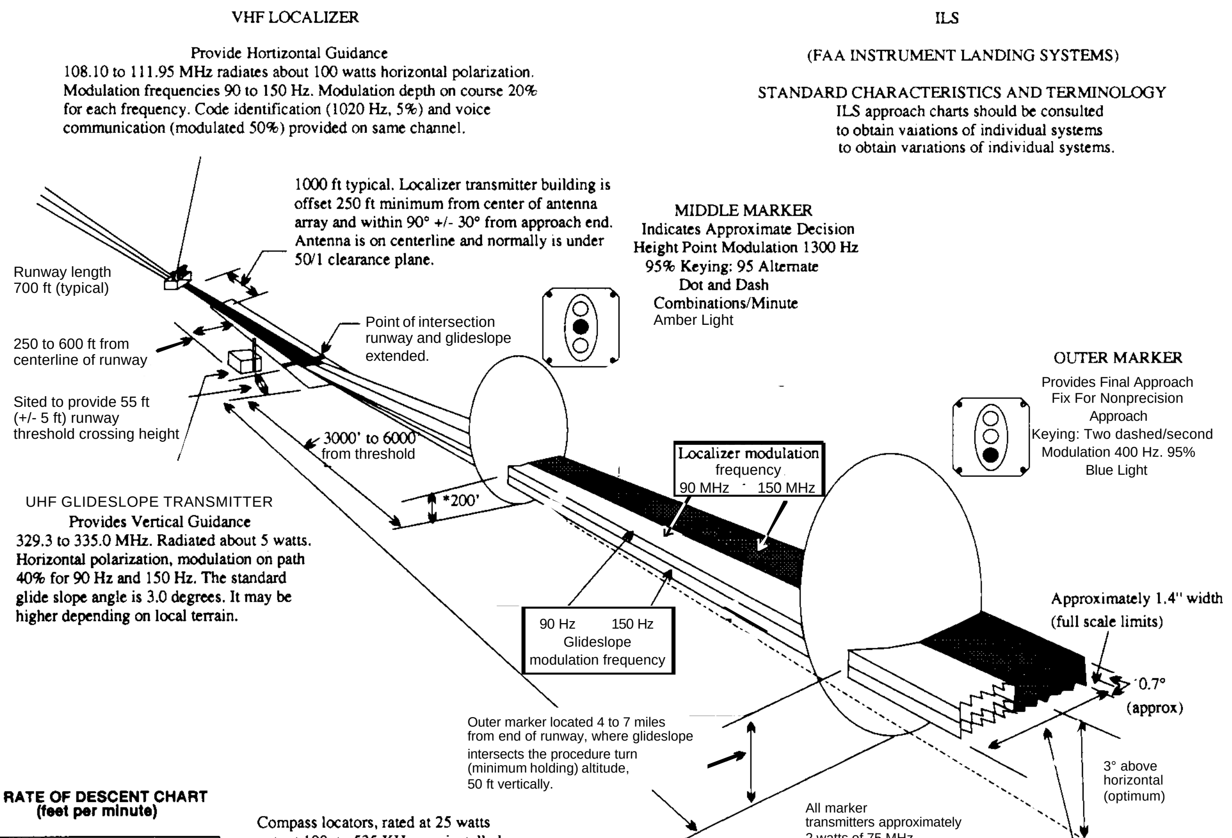
3. Transmitter operates on one of 40 channels specifically set aside for ILS/LOC

4. Frequency range is 108.10 to 111.95 MHz (lower end of the VOR frequency range)

5. Beacon beam is 5 degrees wide as seen on cockpit instruments and is approximately 4 times as sensitive as conventional VOR or TACAN navigation signals

6. Beam is produced by two overlapping modulated frequencies

a. Left side of inbound course is a 90-Hz signal and the right side is a 150-Hz signal



RATE OF DESCENT CHART
(feet per minute)

Speed (Knots)	Angle 2.5°	2.75°	3°
90	400	440	475
110	485	535	585
130	575	630	690
150	665	730	795
160	707	778	849

Compass locators, rated at 25 watts output 190 to 535 KHz, are installed at many outer and some middle markers. A 400 Hz or a 1020 Hz tone, modulating the carrier about 95%, is keyed with the first two letters of the ILS identification on the outer locator and the last two letters on the middle locator. At some locations, simultaneous voice transmissions from the control tower are provided, with appropriate reduction in identification percentage.

* Figures marked with asterisk are typical. Actual figures vary with deviations in distances to markers, glide angles and localizer widths.

Figure 1: FAA INSTRUMENT LANDING SYSTEM (ILS)

b. Point of equal overlap is the center of the extended centerline of the runway indicating on course

7. Shielded localizer array (antenna) is normally located 1,000 ft beyond downwind end of the runway centerline

a. Actual signal generated by transmitter from a building that is offset a minimum of 250 ft from center of antenna array

b. Optimum signal strength and minimum possible signal interference dictate placement of transmitter

8. Primary approach to a localizer is called “Front Course”

NOTE: Localizer front course beam is adjusted at the antenna array for a 700-ft width at the runway threshold. The beam, as displayed on the aircraft instruments, has a width of 5 degrees allowing for 2-1/2 degrees left-full deflection and 2-1/2 degrees right-full deflection. A full deflection of the CDI at runway threshold would place the aircraft 350 ft left or right of the runway centerline while tracking on the localizer.

a. The localizer provides course guidance for descent path:

(1) 18 nm from the antenna

(2) 1,000 ft above the highest terrain along course line

(3) 4,500 ft above antenna elevation site

(4) Signal acquisition and off-course indications are provided through angular areas of the operational service volume:

Fig 2: *Localizer Signal Acquisition Limits*

(a) To 10 degrees either side of the course along a radius of 18 nm from the antenna

(b) To 35 degrees either side of the course along a radius of 10 nm from the antenna

NOTE: After the missed approach point, any localizer signal indication received should be disregarded unless it is designated part of the published missed approach procedure. Any signal that is not part of the procedure should be considered unreliable and disregarded. Some fields will have functional back course localizers (BAC LOC) and are designated as such.

NOTE: Loss of the localizer information during the approach will render the approach procedure unusable. The approach should be terminated or another type of an approach should be selected, weather permitting.

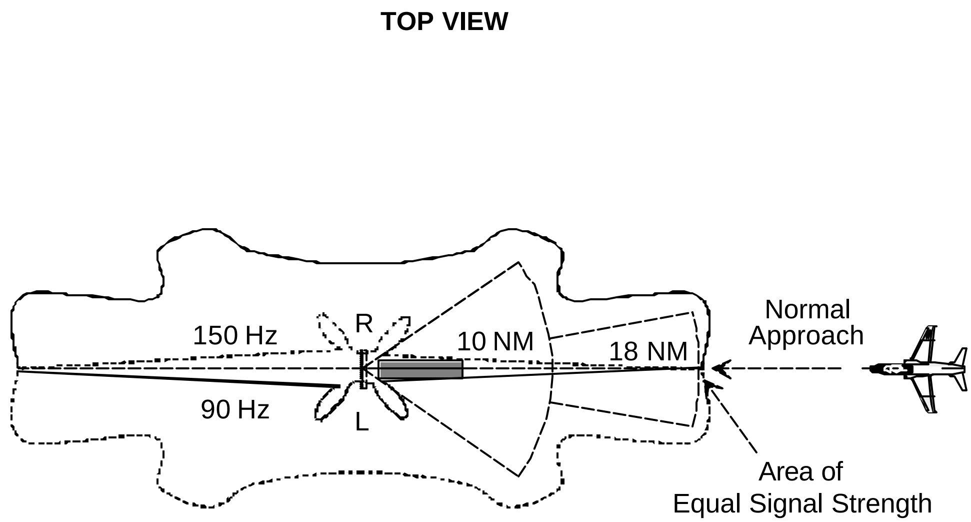


Figure 2: LOCALIZER SIGNAL ACQUISITION LIMITS

B. Glideslope - glideslope beam transmitter is the second half of the ILS approach guidance equipment

1. Provides vertical guidance to decision height for ILS categories I, II, and IIIA when approach is equipped

   NOTE: The T-45A is Category I equipped.

2. Reclassifies the localizer non-precision approach to precision ILS approach. The lowest authorized ILS minimums, with all required ground and airborne systems components operative, are:

   a. Category I - Decision Height (DH) 200 ft and Runway Visual Range (RVR) 2,400 ft (with touchdown zone and centerline lighting, RVR 1800 Category A, B, C; RVR 2000 Category D)

   b. Category II - DH 100 ft and RVR 1,200 ft

   c. Category IIIA - RVR 700 ft

      NOTE: Special authorization and equipment are required for Category II and IIIA.

3. When aircraft is ILS equipped, provides option of precision approach to a field with no PAR facility

   NOTE: Glideslope is often confused with the term "Glidepath." These terms are not synonymous. It is important that you clearly understand the definition of these two terms.

   Glideslope: "The vertical reference provided an aircraft during approach and landing. The glideslope reference may be any of the following: an electronic signal (ILS or MLS), visual ground aid (such as VASI), or glideslope information provided by ATC during a surveillance approach."

   Glidepath: "That portion of the glideslope reference signal that intersects the localizer on an ILS approach or is provided by ATC when established on the FAC during a PAR approach."

4. The glideslope (highly directional, shielded antenna) signal is radiated in the direction of the localizer front course

   a. Located 750 to 1,250 ft down the designated ILS runway

   b. Beam width is 55 ft (+/- 5 ft) at runway threshold crossing height

   c. Building location is normally located 250 to 600 ft from runway centerline

Fig 1: *FAA Instrument Landing System (ILS)*

d. Standard ILS glideslope is 2.5 to 3.0 degrees (may be higher or lower depending on local terrain)

e. Glideslope utilizes two signal lobes projected one above the other. Upper lobe is modulated with 90 Hz and the lower lobe at 150 Hz at an equal signal strength

f. Each lobe is approximately 0.7 degrees wide with a total beam width of approximately 1.4 degrees wide

g. The point of equal signal modulation sets the center of the glideslope beam

NOTE: The signal provides descent information for navigation down to the lowest authorized decision height (DH) specified in the approved ILS approach procedure. The glidepath may not be suitable for navigation below the lowest authorized DH and any reference to glidepath indications below that height must be supplemented by visual reference to the runway environment.

NOTE: Glidepaths with no published DH are usable to runway threshold. Pilots of T-45A aircraft will execute a missed approach at the MM or 200 ft AGL whichever occurs first.

NOTE: ILS installations that share the same frequency can exist at each end of a given runway or at other runways on an airport but cannot be in operation at the same time. However, fields can have ILS approaches to different runways that do not share the same frequency and can operate simultaneously.

5. The glideslope transmitter operates on one of 40 dedicated ILS channels

   a. Generates within the UHF frequency range of 329.15 and 335.00 MHz.

   b. Dedicated glideslope UHF frequencies are paired with dedicated localizer VHF frequencies and are automatically tuned upon selection of a localizer frequency

   CAUTION: Pilots should be aware that false glide-slope signals may exist. This can cause the glideslope warning flag to disappear and a glideslope indication to appear on your navigation instruments. Always disregard any glideslope indication when the aircraft is not on a published portion of an ILS approach at a published approach altitude where the glideslope interception is indicated and anticipated.

CAUTION: Pilots should be aware that vehicular traffic not subject to ATC may cause momentary deviation in ILS course or glideslope signals. Also, critical areas around the ILS equipment-shielded antennas are not protected at uncontrolled airports or at airports with an operating control tower when weather or visibility conditions are above those requiring protective measures.

6. Usable range is 10 nm, provided aircraft is on localizer course

   a. Intersects inner marker beacon (if installed) approximately 100 ft above runway elevation

   b. Intersects middle marker beacon approximately 200 ft above runway elevation

   c. Intersects outer marker beacon approximately 1,400 ft above runway elevation

   d. Pilots must be alert when approaching the glidepath interception. False courses and reverse sensing will occur at angles considerably greater than the published path

   e. Make every effort to remain on the indicated glidepath (reference: FAR 91.129(d)(2)). Exercise caution; avoid flying below the glidepath to assure obstacle/terrain clearance is maintained.

   f. The published glideslope threshold crossing height (TCH) DOES NOT represent the height of the actual glidepath on course indication above the runway threshold. It is used as a reference for planning purposes which represents the height above the runway threshold that an aircraft's glide-slope antenna should be, if that aircraft remained on a trajectory formed by the four-mile-to-middle marker glide-path segment.

   g. Pilots must be aware of the vertical height between the aircraft's glideslope antenna and the main gear in the landing configuration. At the DH, plan to adjust the descent angle accordingly if the published TCH indicates the wheel crossing height over the runway threshold may not be satisfactory. Tests indicate a comfortable wheel crossing height is approximately 20 to 30 feet, depending on the type of aircraft.

Fig 1: *FAA Instrument Landing System (ILS)*

II. Range (position) Systems

The following systems are commonly used to identify range (position) when flying an ILS/LOC approach.

* Marker beacons
* Distance Measuring Equipment (DME)
* Cross Radial
* Compass Locator

The position of the aircraft on ILS/LOC approaches is very important due to the precise nature of the approach, lower minimums, and obstacle clearances associated with them. The pilot relies on this information to execute specific portions of the approach and for position in relation to the glidepath.

A. Marker beacons

1. Low power transmitters (3 watts, 75 Mhz)

2. Produces a signal in an elliptical pattern

   a. 1,000 ft above the antenna

   b. 2,400 ft in width and 4,200 ft in length

3. Elliptical pattern (fan pattern) placement is centered and perpendicular to the FAC

4. Normally, two marker beacons are associated with an ILS approach, Outer Marker (OM) and Middle Marker (MM). However, Category II and III ILS approaches may also have an Inner Marker (IM) beacon

   a. Outer Marker (OM)

      (1) Indicates aircraft, if at appropriate altitude, will intercept the glidepath

      (2) Identified by a coded audio tone (continuous dashes) and flashing blue cockpit marker light

   b. Middle Marker (MM)

      (1) Intersects the glidepath at approximately 200 ft AGL and identifies the <u>approximate</u> missed approach point for Category I approaches

(2) indicates a position approximately 3,500 ft from the landing threshold and approximately 200 ft AGL above the touch-down zone

(3) Identification is a coded audio tone (continuous alternating dots and dashes) and flashing amber cockpit marker light

c. Inner Marker (IM)

(1) Indicates a point that an aircraft flying a Category II or III ILS approach is at the designated decision height (DH) on glidepath between the MM and the landing threshold

(2) Aircraft is approximately 100 ft AGL at IM if on glidepath and FAC

(3) Identified by a coded audio tone (continuous dots) and a flashing white cockpit marker beacon light

d. Back Course (BC)

(1) A BC marker beacon normally indicates an LOC BC final approach fix (FAF) where the approach glideslope is intercepted and the descent is commenced

(2) Identified by a coded audio tone (two dots continuously repeating) and a flashing white cockpit marker light

5. Marker beacon tones

Fig 3: *Marker Beacon Code/Color Identification Table*

a. Marker beacons emit specific coded tones, at different pitches, which the pilot of an ILS/LOC equipped aircraft can monitor when on the final approach course

b. In the T-45A, marker beacon tones may be monitored by placing the “MKR” switch on the communications control panel to the “ON” position

c. MKR audio tone volume in the T-45A is preset and cannot be controlled by the RCVR volume control knob on the communications control panel

B. Distance Measuring Equipment (DME)

1. When DME is automatically coupled to the ILS frequency and specified in the approach procedure, DME may be used:

a. In lieu of the OM

b. As a BC final approach fix (FAF)

c. To establish other fixes on the localizer course

MARKER	CODE	LIGHT	FREQUENCY
OM	— — —	BLUE	2 DASHES/SEC
MM	• — • —	AMBER	95 DOT/DASH COMBINATION/MIN
IM	• • • •	WHITE	6 DOTS/SEC
BC	• • • •	WHITE	2 DOTS CONTINUOUSLY REPEATING

Figure 3: MARKER BEACON CODE/COLOR IDENTIFICATION TABLE

2. DME from a separate facility may be used within Terminal Instrument Procedures (TERPs) limitations:

   a. To provide ARC initial approach segments

   b. As a FAF for BC approaches

   c. As a substitute for the OM

   NOTE: The DME of a separate facility is not, by FAA (AIM) definition, authorized for use inside the outer marker inbound on an ILS approach.

C. Cross Radials

1. May be generated by VOR or TACAN stations

2. No difference in the procedures used on ILS/LOC approaches than any of the other types of approaches. However, the cross radial generated from a VOR station would require the ILS to be off tuned on final

   NOTE: Off-tuning the ILS frequency for VOR cross radial fix identification after final <u>is not</u> an acceptable option. TACAN cross radial identification poses no problem.

3. If DME is associated with ILS/LOC approach, use the DME as the method to identify the aircraft position along the FAC

D. Compass Locator

Although the T-45A is not equipped to use a compass locator, the following information is provided to give you a basic understanding of the system.

1. Low power transmitter which emits an omnidirectional signal in the ADF range

2. Most often situated at MM or OM sites

3. Most transmitters have less than 25 watts of power and a range of at least 15 nm. Some locations have up to 400 watts, and are used as OM compass locators and may carry Terminal Weather Broadcast (TWEB) information

4. If used as a Locator Outer Marker (LOM), the beacon will transmit the first two letters of the localizer identifier. If used as the Middle Marker (MM), the beacon will transmit the last two letters of the localizer identifier

Fig 4: *Instrument Runway Lighting*

III. Visual Information System

* Approach lights
* Runway centerline lights
* Touchdown zone lights
* Runway lights

A. Approach Lighting System (ALS)

1. Provides main visual system used to transition from instrument flight to visual flight for landing

2. Precision approaches, such as the ILS approach, require the configuration of the ALS to start at the landing threshold and to extend into the approach area for a distance of 2,400 to 3,000 ft

3. Non-precision approach runway lights would only run 1,400 to 1,500 ft from runway threshold

4. Some ALS use sequenced lights running toward the runway at high speed (twice a second). These lights are Runway Alignment Indicator Lights (RAILs), more commonly referred to as “rabbit lights”

5. When ALS is in operation, the approach minimums may be increased.

NOTE: The example of approach lighting systems provided in this lesson is not unique. Examples of each configuration and publication identification code can be found in the Flight Information Handbook. Additionally, the code identifying the type of ALS for an approach to a given runway is provided on the bottom right corner of the instrument approach plate in the airfield layout box.

B. Runway Centerline Lights & Touchdown Zone Lights

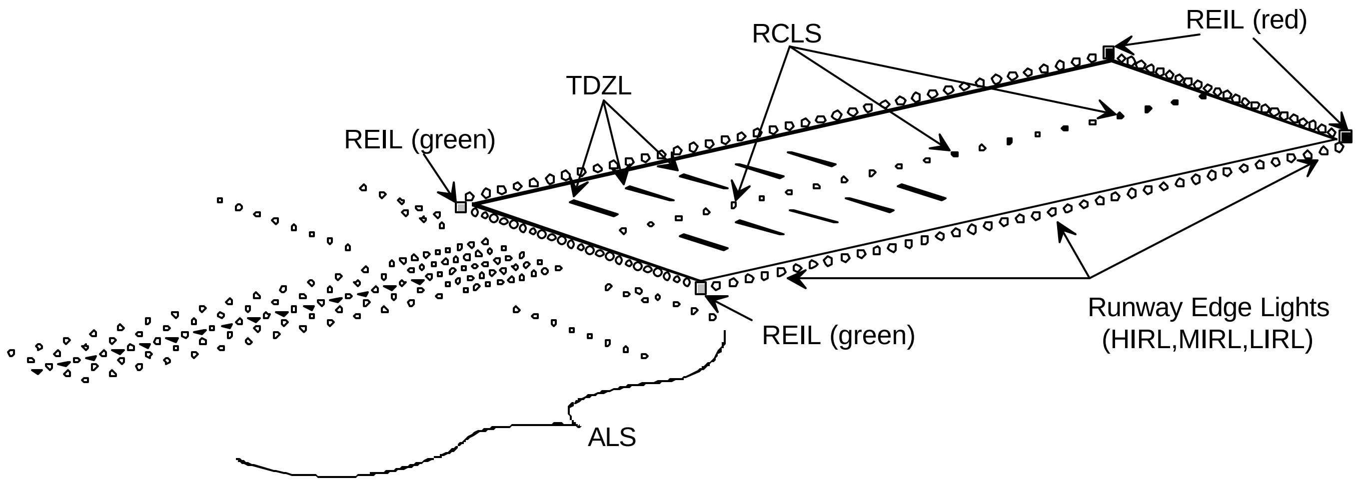
1. Runway Centerline Lights (RCLs) and Touchdown Zone Lights (TDZLs) are a category of lighting known as “In-runway lights”

2. Runway Centerline Lights (RCLs)

   a. Inset flush into the runway

   b. Spaced at 50 ft intervals

   c. White until the last 3,000 ft of runway. From 3,000 ft to 1,000 ft from end of runway, the lights alternate red and white. The last 1,000 ft, they are all red



ALS	Precision Instrument Runway Nonprecision Instrument Runway	2,400'-3,000' 1,400'-1,500'
RCLS	White to Last 3,000' Red and White Next 2,000' Red Last 1,000'	
Runway Edge Lights	White Until Last 2,000' Yellow Last 2,000'	

Figure 4: INSTRUMENT RUNWAY LIGHTING

3. Touchdown Zone Lights (TDZLs)

   a. Incorporate two rows of transverse light bars disposed symmetrically about the runway centerline in the runway touchdown zone.

   b. Spaced at 100-ft intervals

   c. System starts 100 ft from landing threshold and extends to 3,000 ft from the threshold or the midpoint of the runway, whichever is less

C. Runway Lights

1. Runway End Identifier Lights (REILs)

   a. Provide rapid and positive ID of the approach end of a runway

   b. Consist of a pair of synchronized flashing lights laterally located on each side of the runway threshold

   c. May be either omnidirectional or unidirectional facing the approach area

2. Runway Edge Light System

   a. Identifies a runway:

      (1) Surrounded by a large concentration of other lighting

      (2) That lacks contrast with surrounding terrain

      (3) During reduced visibility

   b. Physical characteristics:

      (1) Normally white except for instrument runways where yellow lights replace the white edge lights for the last 2,000 ft of the runway or half the runway length, whichever is less. This forms a caution zone for landings

      (2) Lights emit green outward from the runway approach end to indicate the threshold to landing aircraft

      (3) Lights marking the ends of the runway emit red light toward the runway to indicate the end of the runway to departing aircraft

c. Classification is according to intensity or brightness

(1) High Intensity Runway Lights (HIRLs)

(2) Medium Intensity Runway Lights (MIRLs)

(3) Low Intensity Runway Lights (LIRLs)

HIRLs and MIRLs are variable in intensity, whereas LIRLs normally have only one intensity setting.

Pilots may request approach control to vary intensity of the lights to help identify runway when ground lights make it difficult to pick out. Some airports have lights controlled from the air by the pilot by keying the VHF radio on a predetermined frequency

IV. T-45A instruments and controls associated with the ILS approach

A. Controls

Fig 5: ILS Cockpit Controls

1. Communication Control Panel

2. TACAN Control Panel

3. VOR/ILS Control Panel

4. COMM/NAV Control Transfer Panel

B. Instruments

Fig 6: ILS Navigation Instruments

1. ADI

2. HSI

3. Marker Beacon Lights

C. Procedure

1. Controls:

a. Tune ILS approach frequency on VOR/ILS Control Panel

(1) ILS operates on odd decimal frequencies (108.10 to 111.95)

(2) VOR operates on even frequencies (108.15 to 111.85 and 112.00 to 117.95)

b. Check COMM/NAV Control Transfer Panel for VOR/ILS illumination and that NAV, COMM 1, and COMM 2 are selected (FWD)

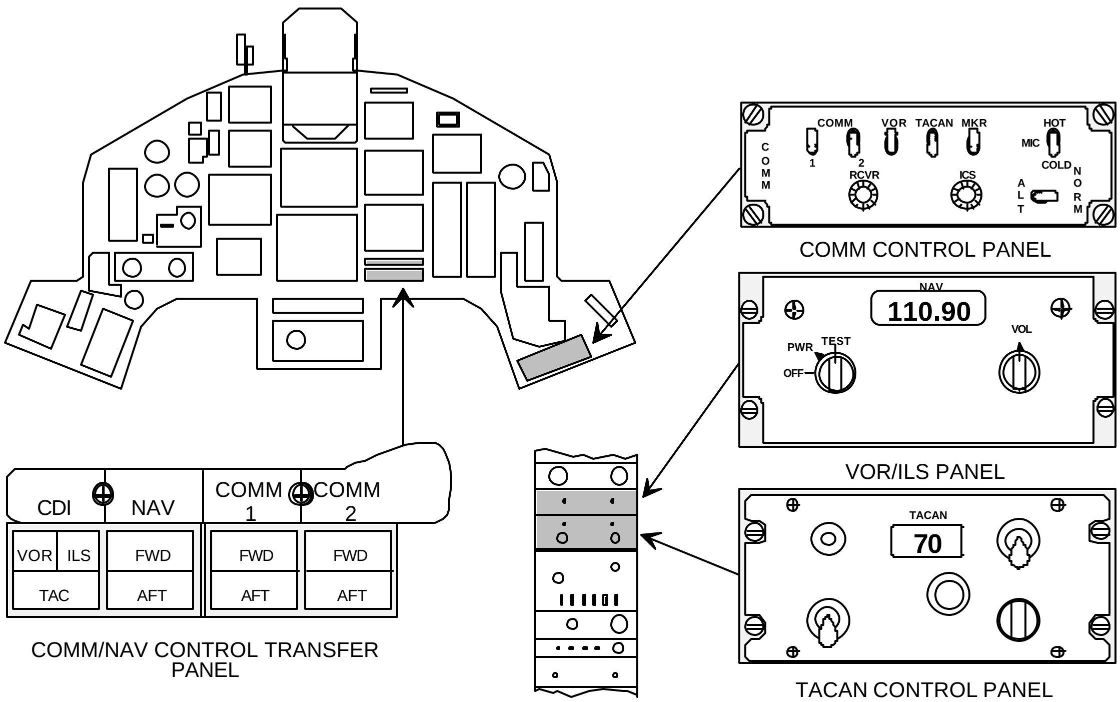


Figure 5: ILS COCKPIT INSTRUMENTS

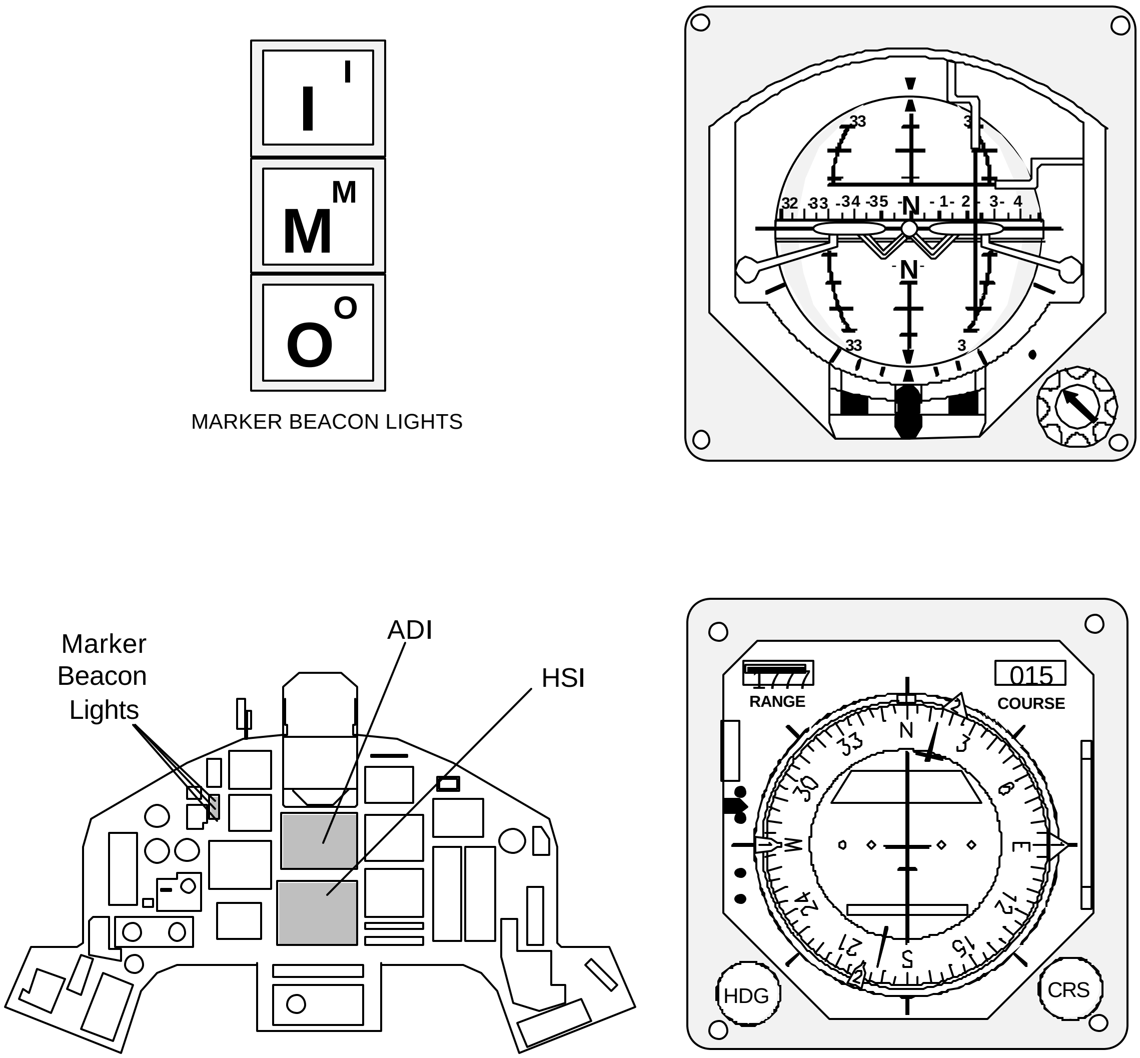


Figure 6: ILS NAVIGATION INSTRUMENT CONTROLS

c. Select VOR to the ON position on Communication Control Panel for localizer audio identifier signal

NOTE: An ILS/LOC frequency will always have a four-letter identifier beginning with the letter “I” **(••)**

d. Adjust volume by using the RCVR knob on the Communication Control Panel

e. Marker beacon aural tones may be monitored by switching the MKR toggle switch to the ON position

NOTE: The RCVR knob will have no effect on the volume of the marker beacon aural tones received through the pilot's headset.

2. Instruments

a. ADI

(1) ADI provides ILS course and glideslope information when the VOR is tuned to ILS frequency, within range of beacon, and is in a position relative to the FAC to receive the signal

(2) Note that glideslope (GS) and localizer (LOC) flags are in view indicating the aircraft is not within sensing range of either of the shielded navigational signals

(3) When aircraft is within the sensing area, the ADI LOC flag is no longer visible and the LOC deviation pointer comes into view

(4) When the aircraft is below the sensing area for both LOC and glideslope signals, the GS flag is out of view and the glideslope deviation pointer is visible and functional

b. HSI

(1) The HSI also provides the pilot with LOC and glideslope information. NAV and GS flags are in view on the HSI when the aircraft is outside the sensing range of the shielded signals of the localizer and glideslope

NOTE: HSI also provides the pilot with continuous range (DME) information throughout the approach. An independent transmitter associated with the ILS equipment may be providing DME. It also may be provided indirectly by a stand-alone TACAN station in close proximity to the field. Tune the TACAN to the appropriate TACAN station to receive DME.

(2) The CDI is four times as sensitive when flying a localizer vs. a VOR or TACAN approach

(a) Localizer beam is a total of 5 degrees wide

(b) The CDI scale now represents 2.5 degrees on each side of center or 1.25 degrees for each dot

NOTE: As the aircraft continues inbound on course, both the glideslope and course indicator will become increasingly sensitive as the shielded navigational signals become narrower.

c. Marker Beacon Lights

Fig 7: *Marker Beacon Test and Illumination Controls*

(1) Located on the front instrument panel in both cockpits

(2) Lights flash blue, amber, and white as aircraft passes over corresponding marker beacon transmitter

(3) VOR transmitter does not have to be selected ON (so don't be surprised)

(4) Lights are considered advisory

(5) Light switch on INTERIOR/EXTERIOR LIGHTS PANEL sets illumination intensity (dim to bright) - Also will change the NAV/COMM Transfer Control illumination intensity

(6) Each marker beacon transmitter emits a unique modulated frequency which is amplified by the marker beacon receiver and then routed to pilot's headset as an aural tone. Volume cannot not be adjusted

(7) Test the lights and tone circuits by placing the MASTER TEST SWITCH to LAMP or TONE

Pilots should remember the following warnings associated with the ILS approach system.

Fig 8: *ILS Critical Area Taxiway Position Markings*

CAUTION: Vehicles and aircraft passing in close proximity to the LOC and GS antennas can cause deviation in the projection of the localizer and glideslope information. Should you observe sudden or intermittent changes in course information displayed on the ADI and HSI once established on the FAC and not due to heading deviations, inform ATC immediately and take appropriate action.

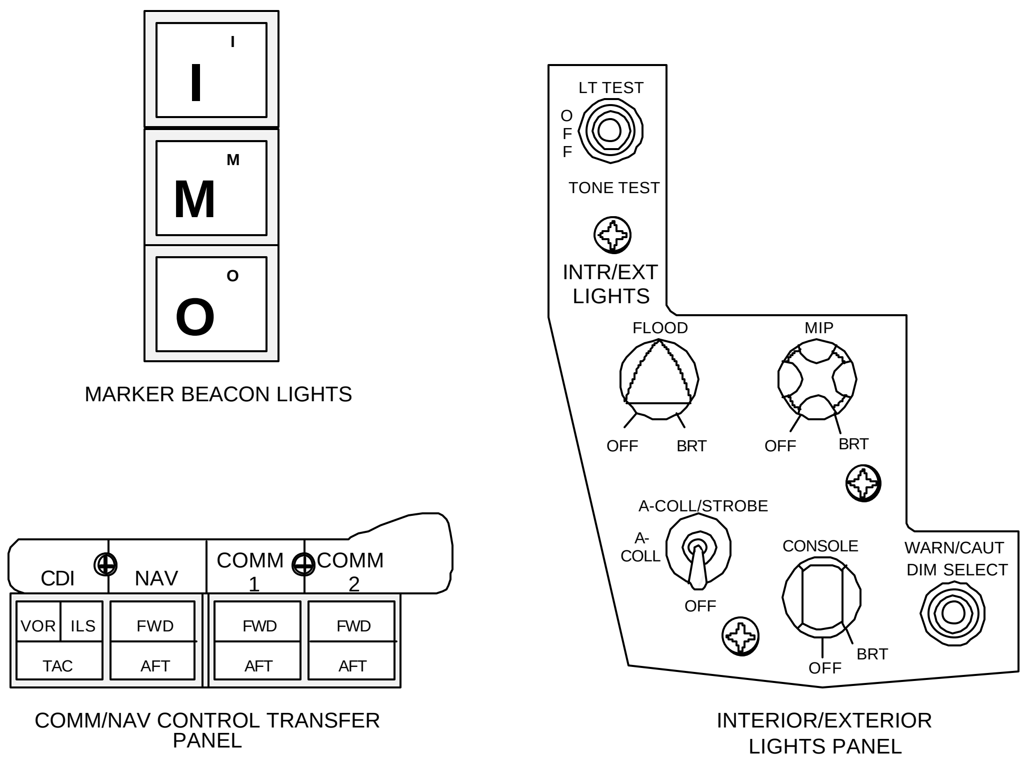


Figure 7: MARKER BEACON TEST AND ILLUMINATION CONTROLS

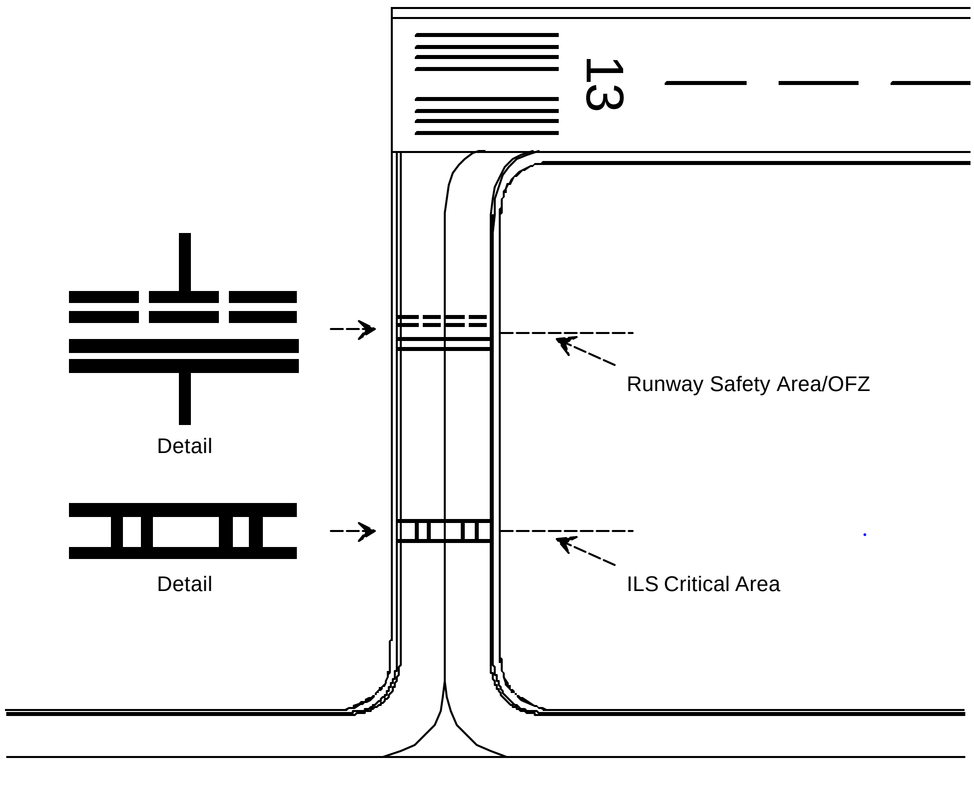


Figure 8: ILS CRITICAL AREA TAXIWAY POSITION MARKINGS

Fig 7: Marker Beacon Test and Illumination Controls

CAUTION: Do not taxi beyond the ILS Critical Area Hold Short markers on the taxiways when the instrument runway is active for ILS approaches without tower/ground control clearance. Positioning your aircraft beyond the markers during an approach could disrupt and affect the reliability of the ILS guidance beacons. See Figure 8.

At fields where no authority exists, such as a tower or ground control, remain behind the critical area hold short line if an approach is known to be in progress.

CAUTION: Remember that invalid (phantom) glideslope signals can be inadvertently projected in the area of the glideslope beam and in an area behind the antenna (back course).

Do not accept a glideslope indication as valid when you are not on a published portion of the approach and at an altitude and position where you anticipate intercepting the glideslope.

V. Inoperative ILS components

A. Inoperative localizer: When the localizer fails, an ILS approach is not authorized

B. Inoperative glideslope: When the glideslope fails, the ILS reverts to a non-precision localizer approach.

NOTE: If the glideslope is inoperative, higher minimums will apply to the approach. See the appropriate approach plate for the higher minimums.

REVIEW QUESTIONS

1. The ILS system is made up of three parts. Those parts are the________ systems, the _________ systems, and the _________ systems.

2. The _________ system is made up of _______ elements, the ___________ and the ___________ transmitters. The __________ provides azimuth information, ________ guidance and the __________ provides glideslope information ,________ guidance.

3. The localizer provides course guidance to 35 degrees out to _______ nm and to 10 degrees out to ________nm . The addition of a _________ to a localizer approach reclassifies the approach from a __________ to a ___________ approach.

4. The standard ILS __________ beam angle is _______ to _______ degrees.

5. The definition off “glidepath” is that portion of the ________ reference signal that intersects the localizer on an _________ approach or is provided by ________ when established on the FAC of a PAR approach.

6. The ________ system is a component of the ILS/LOC approach system and is used to determine “position” along the FAC. The systems are the following: _________, _________, __________, and ___________.

7. The _________ are the most common and are _______ _______ transmitters that produce an _________ pattern that is placed so that it is __________ to and centered on the FAC of an ILS/LOC approach.

8. The _______ is the _________ associated with the DH of a single-piloted Navy aircraft and is placed so that it crosses the FAC glidepath at approximately 200 ft AGL.

9. On the ILS front course, the ______ is associated with a blue _____ _____ light in the cockpit. The ______ is associated with ______ and the _______ is associated with a white light indication in the cockpit.

10. To monitor the tone associated with the _______ ________, toggle the switch on the communication control panel to MKR. The aural tone volume ________ (can/cannot) be controlled with the RCVR knob. The lights associated with the ______ _______ can be dimmed or brightened by manipulating the PANEL light switch on the INTERIOR/ EXTERIOR LIGHTS PANEL.

11. DME may be used in place of the _______ _______ . DME, if coupled to the ILS, will be tuned _________ to one of ________ UHF frequencies when the ILS frequency is initially set up.

12. Cross radial fixes from a ______ are not ________ in the T-45A because that would require the pilot to _______ the primary navigation indication when on the FAC.

13. The ________ _________ is a low power navigation beacon used as the OM or MM and operates in the ______ frequency range. This NAVAID is not available in the T-45A.

14. Sequenced running lights are known also as ________ lights. These lights are associated with the ________ _______ system.

15. Runway centerline lights and touchdown zone lights are in a category of lights known as __-______ lights. Centerline lights are white until the last _______ ft of runway and ______ & ______ to _______ ft from the end of the runway and ________ for the last ________ ft.

16. REILs are installed at ends of runways to provide _______ and _______ identification of the _________ end of a particular runway.

17. Runway edge lights are normally white except on runways that are designated "___________" runways where ________ lights replace the white lights for the last ________ ft of the runway or half the runway length, whichever is less, to form a __________ zone.

18. The ________ and ________ runway lights are variable in intensity which may be increased or decreased at the pilot's request to the controlling agency or, at some airports, by keying his _______ radio on a preset frequency.

19. ILS/LOC frequencies are tuned on the _______ control panel. ILS/LOC frequencies can be identified by those ending with _______ decimals between 108.10 and 111.95. The coded identifier is a ______ letter identifier beginning with the letter "__."

20. The NAV/COMM control transfer panel controls which cockpit has navigation and communication control of the radios. It also dictates and identifies which navigation radio information is displayed on the _______ by the illumination of the ____/____ or the _____ letters on the indicator.

21. To receive DME on an ILS approach where the DME feature is not coupled with the ILS VHF frequency, the pilot will have to tune the _______ on the ________ ______ ________ manually.

22. If an ILS approach is tuned and the aircraft is within the sensing range of the beams produced by the shielded antennas, the ADI _______ and ________ warning flags will be out of view.

23. If an ILS approach frequency is tuned, the HSI has been selected for ILS, and the aircraft is outside the sensing range of the beams produced by the shielded antennas, the HSI CDI will be _________ and the GS flag will be _______ view.

24. Marker beacon lights and tone circuits are checked by placing the _______ _______ ______ to _______ or ________.

SUMMARY

This lesson has focused on the following topics:

* ILS guidance information
* ILS range information
* ILS visual information
* ILS controls and instruments

CONCLUSION

You must understand the operations of ground and airborne ILS components and recognize their indications in the aircraft to execute safe and correct ILS approaches.

NOTES

LESSON GUIDE

COURSE/STAGE: T-45A UJPT & E2-C2 Instrument Navigation

LESSON TITLE: TACAN/VOR Navigation Procedures, TACAN/VOR Holding

LESSON IDENTIFIER: T-45A UJPT & E2-C2 INav-05

LEARNING ENVIRONMENT: CAI

ALLOTTED LESSON TIME: .8 hr

TRAINING AIDS:

* Figures:
  Fig 1: Lead Point Identifier
  Fig 2: Radial Width List
  Fig 3: Holding Pattern Entry Diagram

STUDY RESOURCES:

* NATOPS Instrument Flight Manual, NAVAIR 00-80T-112, 1984
* T-45A NATOPS Flight Manual, A1-T45AB-NFM-000, 15 JAN 97
* T-45A Instrument FTI

LESSON PREPARATION:

N/A

REINFORCEMENT: N/A

EXAMINATION:

The objectives in this lesson will be tested in Instrument Navigation 12X.

LESSON OBJECTIVES

2.7.7.3.3.2
Recall VOR navigation procedures

2.7.7.3.3.1
Recall TACAN navigation procedures

2.7.5.1.8.2
Recall navigational procedures to compensate for wind drift

2.7.5.1.6.1.1
Recall entry procedures for TACAN/VOR/VOR DME holding

2.7.5.2.4.1.2
Recall wind correction procedures for holding

MOTIVATION

Instrument navigation around the ship is critical when you consider that you are separated from other aircraft by only 1 minute and 1,000 ft when you commence your approach from holding. Your thorough knowledge of the aircraft's navigation equipment and the procedures for using that equipment is paramount given that a mistake of only a few feet or a few seconds may result in disaster. Once proficient with the material in this lesson, you will aviate more precisely and adjust more adeptly to changes in routing and clearances.

OVERVIEW

After this lesson, you will know TACAN and VOR navigation procedures and proper techniques for entry into and maintenance of holding patterns.

This lesson consists of:

* Navigation procedures
    - VOR/TACAN intercepts
    - TACAN
    - Wind corrections (crabbing)
* Holding
    - Entry determination
    - Entry procedures
    - Maintaining

REFRESHER

* The T-45A HSI takes the place of the RMI, CDI, and RNAV remote display indicators of the T-34C.
* Because the T-45A cruises about three times as fast as the T-34C, you have a third of the time to anticipate changes.
* Lead point calculation (LPC) is the distance, in nautical miles or radials, that you must start (lead) a turn in advance of intercepting a new course, radial, or arc. Your lead point calculation must recognize both the aircraft's speed and distance from the station. Distance between radials decreases proportionally as you head towards the VOR/ TACAN station and increases proportionally as you head away from the station.
* The T-45A requires more distance to turn than does the T-34C.
* Holding is performed at max endurance airspeed.

PRESENTATION

I. Navigation procedures

A. VOR/TACAN intercepts **2.7.7.3.3.2 2.7.7.3.3.1**

NOTE: The following intercept procedures refer only to VOR. For TACAN intercept procedures, replace the No. 1 bearing pointer with the No. 2 bearing pointer.

1. Proceeding direct to station (inbound radial)

a. Tune and identify station

b. Turn aircraft in shortest direction to place No. 1 (VOR) bearing pointer under HSI upper lubber line (heading index)

c. Rotate course set knob (CRS) to center CDI on course pointer with a TO indication

d. Note and maintain selected course to station

COMMON ERROR: Not correcting for wind drift and homing instead of proceeding direct to the station.

2. 30-degree inbound radial intercept

a. Tune and identify station

b. Set desired course in course selection window

c. Look from desired course to head of the bearing pointer used and 30 degrees beyond to determine intercept heading

d. Turn aircraft to the intercept heading

e. Maintain intercept heading until lead point is reached

f. Complete intercept

COMMON ERROR: Looking from the head of the No. 1 bearing pointer to the desired course and 30 degrees beyond (instead of looking from the course to the bearing pointer and 30 degrees beyond).

3. Double angle off the bow inbound method

   a. Tune and identify station

   b. Set desired course in course selection window

   c. Look from desired course to the head of the bearing pointer selected and an equal number of degrees beyond to determine intercept heading (max 45 degrees)

   d. Turn aircraft to the intercept heading

   e. Maintain intercept heading until lead point is reached

   f. Complete intercept

   COMMON ERROR: Looking from the head of the No. 1 bearing pointer to the desired course and an equal number of degrees beyond to determine the intercept heading.

4. Radial intercept immediately after passage

   a. Tune and identify station

   b. After station passage, turn to parallel desired course

   c. Set desired course in course selection window

   d. Look from tail of the bearing pointer used to desired course and an equal number of degrees beyond desired course, but not more than 45 degrees

   e. Turn aircraft to the intercept heading

   f. Maintain intercept heading until lead point is reached

g. Complete intercept

5. 45-degree outbound radial intercept

a. Tune and identify station

b. Set desired course in course selection window

c. Look from tail of the bearing pointer used to desired course and 45 degrees beyond to determine intercept heading

d. Turn aircraft to the intercept heading

e. Maintain intercept heading until lead point is reached

f. Complete intercept

COMMON ERROR: Looking from the desired course to the tail of the No. 1 bearing pointer and 45 degrees beyond to determine the intercept heading.

B. TACAN **2.7.7.3.3.1**

Fig 1: Lead Point Identifier

1. Lead point calculations (LPC)

a. Approximately 1percent of ground speed for a 90-degree intercept

NOTE: When ground speed is not available, approximate this value using KIAS adjusted for wind.

b. Use a reasonable distance lead point for intercepts of less than 90 degrees

Fig 2: Radial Width List

2. Intercepting and maintaining a TACAN arc around a station

NOTE: The distance between radials at 60 nm from the station is 1 nm and decreases/increases proportionally to/from the station.

a. Chord method (usually used when farther than 12 miles DME from station)

(1) Tune and identify station

(2) Determine direction to turn

(3) Determine desired lead point

NOTE: Add lead when tracking to the station; subtract lead when tracking from the station.

(4) Monitor No. 2 bearing pointer and DME to determine roll-out

COMMON ERROR: Not monitoring DME and rolling out at the wrong time and on the wrong DME arc.

(5) Fly a straight short leg, allowing head of No. 2 bearing pointer to reposition between 5 and 10 degrees behind wingtip position

(6) Turn aircraft to reposition No. 2 bearing pointer from behind to between 5 and 10 degrees ahead of wingtip position

(7) Continue sequence of alternating ahead/behind wingtip until you turn inbound or outbound on your new radial

b. AOB method (usually used when within 12 miles DME of station)

(1) Tune and identify station

(2) Determine direction to turn

(3) Determine desired lead point

(4) Initiate 90-degree intercept when DME equals radius of arc plus or minus desired lead

For a 90° intercept:

Lead point (nm) = 1% of ground speed

Lead point (radials) = $\frac{60}{\text{DME of arc}}$ X 1% of ground speed

Approximate ground speed if not known by correcting IAS with head wind component.

Figure 1: LEAD POINT IDENTIFIER

Formula to compute number of radials crossed in each mile at a given distance from a station:

$$\textbf{Radials/mile} = \frac{\textbf{60}}{\textbf{DME from station}}$$

DISTANCE FROM STATION	# RADIALS CROSSED IN 1 nm
60 nm	1
30 nm	2
20 nm	3
15 nm	4
10 nm	6
5 nm	12

Figure 2: RADIAL WIDTH LIST

NOTE: Add lead when you're tracking to the station; subtract lead when you're tracking from the station.

(5) Adjust AOB to maintain proper distance by keeping No. 2 bearing pointer on wingtip position

NOTE: You may combine the AOB and chord methods to maintain the arc and aircraft control. The two methods are normally distinguished according to DME limits; however, outside of 12 DME the AOB required to maintain an arc will probably be too small to hold accurately.

COMMON ERROR: Not monitoring DME and rolling out at the wrong time and on the wrong DME arc.

3. Intercepting a radial from an arc

a. Set desired course in course selection window

b. Determine lead point - divide DME of arc into 60 and multiply the product by 1 percent of groundspeed.

$$\frac{60}{\text{Arc DME}} \times 1\%\ \text{GS} = \text{LPC}$$

=

$\frac{60}{15}$ = 4 radials;
250 x 1% = 2.5 groundspeed;
4 x 2.5 = 10 radial lead

c. When lead point is reached, turn to intercept selected course

NOTE: The CDI may not have started to move at lead point because it is not active until you are within 10 degrees of the course.

d. Track inbound on radial

4. Performing a ground speed check

   NOTE: For a reliable ground speed check, the DME from the station should be greater than aircraft altitude in thousands of feet.

   EXAMPLE: Altitude is 30,000 ft (FL 300), so DME should be 30 nm or greater.

   a. Start timing when DME indicator displays a whole number

   b. After predetermined time (in minutes), check and note DME

   c. Determine distance flown and multiply that number by multiplier corresponding to time flown

      EXAMPLE: Your distance flown is 6 on the DME indicator. The elapsed time is 1 minute, so 6 times 60 equals 360. Ground speed is 360 kt (6 nm/min times 60 min/hr equals 360 nm/hr).

      NOTE: Track either inbound or outbound on a given radial when making a ground speed check.

      NOTE: Every 1/10 nm equals 6 kt.

      NOTE: Checking ground speed for more than 1 minute increases the accuracy of this method.

5. Proceeding direct between TACAN fixes (point to point)

   a. Tune and identify station if not already done

   b. Visualize compass card as compass rose with station at center

   c. Picture fix having greater distance from station on its radial at outside edge of compass card

   d. Visualize second fix at proportional distance from center of compass card on its radial

e. Connect two fixes with an imaginary line

f. Move line to center of compass card parallel to original line and read course to the new fix off compass card

g. Turn to new course (plus wind correction if known); top of imaginary line where it crosses compass card

h. Update course and make corrections periodically to point-to-point heading

C. Wind correction (crabbing) **2.7.5.1.8.2**

NOTE: Tail winds and head winds affect ground speed only.

1. Used to maintain radial/bearing via tracking into wind (maintaining a constant track over the ground)

2. Crab angle (heading differential)

a. Correct: aircraft maintains desired course

b. Insufficient: aircraft continues to drift with wind

c. Too large: aircraft crosses radial

3. Procedure

a. Confirm drift due to crosswind by referencing CDI

b. Compensate by turning aircraft back to reintercept your inbound radial

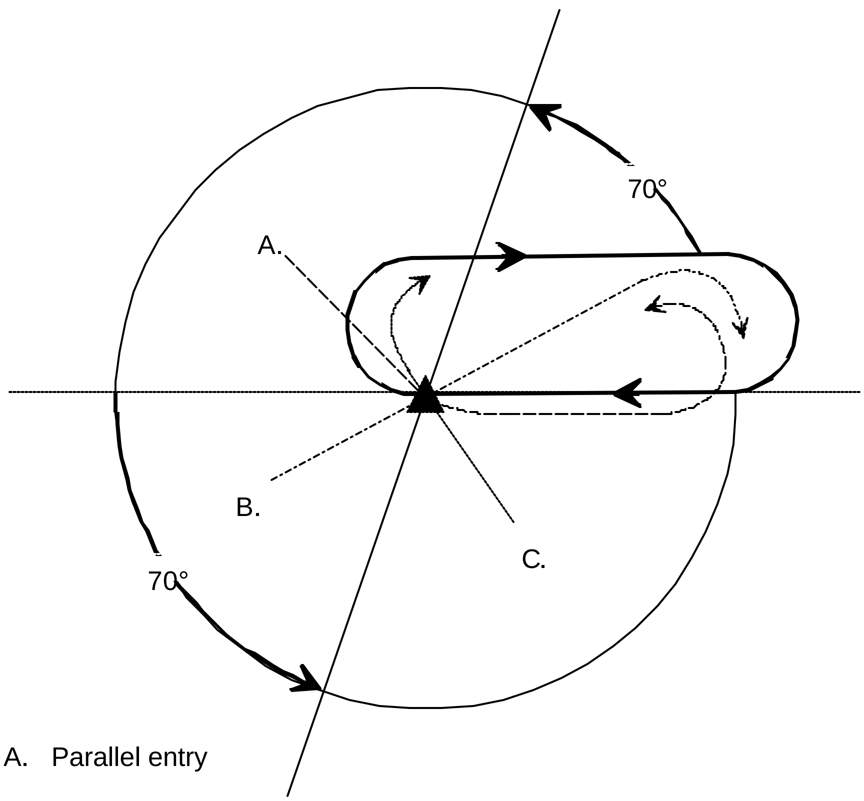
c. Maintain crab angle to keep CDI centered

COMMON ERROR: Making too small a correction to return to the radial.

II. Holding

Fig 3: Holding Pattern Entry Diagram

A. Entry determination: referencing the HSI



A. Parallel entry

B. Teardrop entry

C. Direct entry

Figure 3: HOLDING PATTERN ENTRY DIAGRAM

NOTE: The following procedures govern a standard (right-hand) holding pattern. For a nonstandard (left-hand) pattern, the directions are reversed.

1. Visualize a straight line on HSI from aircraft heading to bottom of instrument

2. Visualize a straight line on HSI from 70 degrees to right of aircraft heading to 110 degrees left of aircraft heading

   COMMON ERROR: Forgetting to reverse the layout of entry patterns on the HSI for nonstandard holding.

   COMMON ERROR: Not using heading for arrival at fix in relation to holding radial to determine type of entry.

3. Determine entry type by angular difference between holding radial and heading as it crosses holding fix

   a. Parallel entry--perform parallel if holding radial is within 110 degrees left of heading

   b. Teardrop entry--perform if holding radial is within 70 degrees right of heading

   c. Direct entry--perform if holding radial is outside an area of 110 degrees to the left and 70 degrees to the right of heading

      COMMON ERROR: Determining the type of entry from your initial heading to the fix and not your heading at the fix. (Also dependent on holding radial and direction to hold from the fix.)

B. Entry procedures TACAN, VOR, VOR/DME **2.7.5.1.6.1.1**

1. Parallel

   a. Cross holding fix

   b. Turn in shortest direction to parallel holding radial

c. After desired time or DME is reached, turn in direction of holding side of pattern

COMMON ERROR: Turning in the wrong direction after paralleling course. Even though this is a standard pattern that requires you to make right-hand turns, you will first make a left-hand turn.

d. Return to holding fix or intercept the holding course inbound

NOTE: Do not correct for wind until established on the inbound course.

COMMON ERROR: Do not make large corrections in heading while close to the station (holding fix). You should already be at wings level.

e. After fix passage, turn right into holding pattern, and begin timing for outbound leg when wings level and bearing pointer on or past wingtip

2. Teardrop

a. Cross holding fix

b. Proceed outbound on heading 30 degrees from reciprocal of holding course

c. After desired time or DME reached, turn in direction of holding pattern to intercept holding course

3. Direct

a. Turn in direction of holding

b. Fly the pattern

C. Maintaining

1. Distance: TACAN and VOR/DME

a. As published

b. As specified by controller

c. As requested by pilot

2. Timing: non-DME

a. Inbound leg (length)

(1) 1 minute maximum: at or below 14,000 ft MSL

(2) 1-1/2 minutes maximum: above 14,000 ft MSL: 1-1/2 minutes maximum

NOTE: Timing is based on inbound leg. Outbound leg is adjusted as required.

b. Outbound leg (whichever occurs last)

(1) Wings level

(2) Abeam fix

COMMON ERROR: Failing to start/stop timing abeam station or after first turn inbound to determine wind effects.

3. Speeds: regardless of altitude, maximum of 230 KIAS for T-45A unless ATC authorized higher holding airspeed for turbulence. Should a higher holding airspeed be required, notify ATC prior to entering holding

When higher holding airspeeds are no longer necessary, return to normal holding airspeed and notify ATC

NOTE: T-45A NATOPS turbulence penetration airspeed is 250 KIAS.

NOTE: Normally, holding airspeed is based on maximum endurance. Airspeed is adjusted for altitude. A max endurance airspeed would be appropriate when conserving fuel.

4. Wind correction **2.7.5.2.4.1.2**

   a. Crosswind correction

      (1) Used while in holding pattern

      (2) Apply wind correction crab angle on outbound leg that is 2 to 3 times the angle that holds the aircraft on course inbound

      (3) Use SRT in pattern

   b. Head winds and tail winds

      (1) Affect only timed holding patterns

      (2) Adjust outbound time for correct inbound time

NOTE: Head and tail winds affect only non-DME holding patterns.

COMMON ERROR: Failing to keep track of time inbound and outbound.

COMMON ERROR: Failing to make wind corrections large or soon enough prior to turns.

NOTE: Turns should not exceed standard rate or 30 degrees whichever occurs first.

SUMMARY

This lesson has covered:

* Navigation procedures
    - VOR/TACAN intercepts
    - TACAN
    - Wind corrections (crabbing)
* Holding
    - Entry determination
    - Entry procedures
    - Maintaining

CONCLUSION

This lesson provided you with techniques to ease your instrument navigation workload. In addition, the navigation procedures addressed are established methods for navigating and maneuvering in the air traffic control system.

LESSON GUIDE

COURSE/STAGE: T-45A UJPT & E2-C2 Instrument Navigation

LESSON TITLE: Departure and Terminal Procedures

LESSON IDENTIFIER: T-45A UJPT & E2-C2 INav-06

LEARNING ENVIRONMENT: Classroom

ALLOTTED LESSON TIME: 1.0 hr

TRAINING AIDS: None

STUDY RESOURCES:

* NATOPS General Flight and Operating Instructions Manual, OPNAVINST 3710.7 (Current series)
* NATOPS Instrument Flight Manual, NAVAIR 00-80T-112
* Aeronautical Information Manual, FAA (current issue)
* FLIP (Terminal) High Altitude, United States
* FLIP (Terminal) Low Altitude, United States

LESSON PREPARATION:

Read:

* Chapter 9, "Aeronautical Charts and Related Publications," Aeronautical Information Manual, FAA (current issue)
* FLIP General Planning (GP), Chapter 3, "FLIP Program" and Chapter 5, "Pilot Procedures"

(6-99) CHANGE 2

EXAMINATION:

The objectives in this lesson will be tested in Instrument Navigation 12X.

LESSON OBJECTIVES

1.1.1.8.4
State airspeed restrictions as defined in current regulations

1.1.1.8.2
Recall fuel requirements for filing DD-175

2.5.12.2
Recall takeoff minimums as defined in OPNAVINST 3710.7

2.6.6.4
Recall procedures for performing an instrument departure

2.6.6.1
Recall standard instrument departure (SID) procedures

2.7.6.1.2
Recall proper response to ATC clearance

2.9.4.1.2.3
Recall standard terminal arrival (STAR) procedures

2.9.4.1.1
Recall criteria which influence type of instrument approach

2.9.4.2.3
Recall communications requirements and procedures for approach

2.9.4.1.2
Recall procedures for performing an enroute descent

1.9.1.3.1.1
Recall procedures and reasons for terminating an IFR flight in a visual approach

LESSON OBJECTIVES (Cont)

1.9.1.3.1.2
Recall procedures/reasons for terminating an IFR approach in a contact approach

2.9.5.4.1
Recall procedures/reasons for performing a circling approach

2.9.4.5.2.4
Recall factors associated with performing radar vectors and approaches

2.9.4.9.2
Recall constraints and guidelines for performing a missed approach

2.9.4.5.1.2
Recall procedures and constraints associated with performing instrument approaches

2.9.6.1
Recall instrument postflight requirements and procedures

1.1.8.7.1
State requirements for instrument rating and renewal procedures

MOTIVATION

The time to study a high altitude approach plate is in the planning room and not in the aircraft. Inadequate preparation for your departure and arrival may result in potentially dangerous situations for you and an increased workload for the controllers. Preflight preparation will enable you to perform with professionalism during the flight.

OVERVIEW

This lesson provides you with the procedures, requirements, and criteria to prepare for departure and arrival. The underlying principle of this lesson is <u>thorough preflight preparation</u>. Understanding and attending to preparation will take most of the uncertainties out of your flight.

In this lesson we will be studying:

* Airspeed restrictions
* Fuel requirements for filing DD-175
* Departure point minimums for takeoff
* Types of IFR departures
  - Standard Instrument Departure
  - RADAR
  - VFR climb on course
* Standard instrument departure (SID)
* Published approaches
  - Criteria determining type of approach
  - Differences between high and low altitude approaches
* Other approaches
  - Visual approach
  - Contact approach
  - Circling approach

OVERVIEW (Cont)

* Closing a flight plan
* Instrument rating requirements, renewal and expiration
* Log Book entries

REFRESHER

Recall:

* ATC procedures and phraseology required to communicate with any ATC facility in the United States

PRESENTATION

I. Airspeed restrictions (FAR 91.117) **1.1.1.8.4**

NOTE: You will have to make a conscious effort to exercise speed control in the T-45A, which can easily exceed desired speeds as well as legal speed restrictions. The reason for airspeed restrictions is to allow for see-and-avoid response times as well as ATC sequencing and handling.

A. Above 10,000 ft MSL

1. ATC specifies no absolute upper airspeed limitation

2. OPNAVINST 3710.7 limits supersonic flight over land or within 30 miles offshore to specifically designated areas to ensure minimum possibility of disturbance. As a general policy, sonic booms shall not be intentionally generated below 30,000 ft of altitude unless over water and more than 30 miles from inhabited land areas or islands.

NOTE: Deviations may be authorized only when supersonic speeds are required by:

a. Tactical missions
b. Formal training syllabus flight
c. Research test and operational suitability test flights
d. A CNO-authorized flight demonstration.

B. Below 10,000 ft MSL: airspeed limited to 250 KIAS unless otherwise authorized by the administrator (or ATC in case of operations in Class B airspace)

C. Within Class B airspace: 250 KIAS

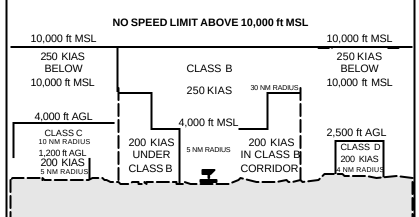
Sg 1, fr 1: Lesson Organization

DEPARTURE AND TERMINAL PROCEDURES

* Airspeed restrictions (FAR 91.117)
* Fuel requirements for filing DD-175
* Takeoff weather minimums
* Types of IFR departures
* Standard instrument departure (SID)
* Approaches
* Closing flight plan
* Instrument rating requirements, renewal & expiration
* Log book entries

Sg 1, fr 2: Airspeed Restrictions

NOT TO SCALE



MAXIMUM AIRSPEED BY CLASS OF AIRSPACE

D. Within 4 nm of a primary airport of Class airspace, at or below 4,000 ft AGL: airspeed limited to 200 KIAS

E. Within 4 nm of Class D airspace at or below 2,500 ft AGL: airspeed limited to 200 KIAS

F. Under Class B airspace or in VFR corridor designated through Class B airspace: 200 KIAS

G. Exceptions (OPNAVINST 3710.7): FAA has authorized the DOD to exceed the above speed restrictions under the following conditions

1. When operating within restricted airspace or the MOA

2. When operating on a low-level military training route

3. When operating on special missions approved by appropriate authority

4. If airspeed required or recommended in aircraft's NATOPS manual to maintain safe maneuverability exceeds speeds described in FAR 91.117

II. Fuel requirements for filing DD-175 **1.1.1.8.2**

A. Fuel reserve is required for all flights

1. OPNAV 3710 (series) requires a fuel reserve of 10 percent of planned requirements or 20 minutes of flight computed at 10,000 ft MSL maximum endurance operation (whichever is greater)

2. Fuel reserve for the T-45 is always 300 lb which is the 20-minute maximum endurance figure at 10,000 ft MSL

Sg 2, fr 1: *Lesson Organization*

DEPARTURE AND TERMINAL PROCEDURES

* Airspeed restrictions (FAR 91.117)
* Fuel requirements for filing DD-175
* Takeoff weather minimums
* Types of IFR departures
* Standard instrument departure (SID)
* Approaches
* Closing flight plan
* Instrument rating requirements, renewal & expiration
* Log book entries

3. When computing fuel reserves, include any known or expected delay in your estimated enroute time

4. If the route or altitude assigned by ATC renders the planned fuel reserves inadequate, you must inform ATC of the circumstances. If unable to obtain a satisfactory altitude or routing, alter your destination accordingly

B. Alternate required

1. Fuel to the destination initial approach fix (IAF) and then to the alternate IAF at filed cruising altitude

2. Include fuel for start, taxi, and takeoff which is 200 lb for the T-45

3. Include fuel for one approach. The TW-2 In-Flight Guide allows 200 lb for a penetration and 250 lb for a GCA. The pilot must evaluate the expected handling at every destination, but an enroute descent to the final approach fix should require about 200 lb

4. Fuel reserve for the T-45 is always 300 lb

5. CNATRA requires an alternate on all cross-country flights. The fleet squadrons may not

C. Alternate not required

1. Fuel to fly to destination airfield (to IAF plus one approach satisfies)

2. Fuel reserve for the T-45 is always 300 lb

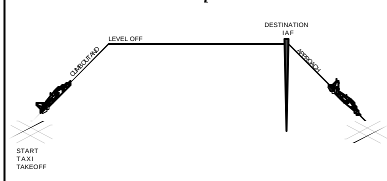
Sg 2, fr 2: *DD-175 Fuel Plan - Alternate Required*

FUEL PLAN

1.	CLIMB/ROUTE DEST IAF	1500	6.	START/TAXI	200
2.	ROUTE ALT IAF (If required)	500	7.	TOTAL REQUIRED (4,5,&6)	2750
3.	APPROACHES	250	8.	TOTAL ABOARD	2900
4.	TOTAL (1,2,&3)	2250	9.	SPARE FUEL (8-7)	150
5.	RES 10% of 4 (Min 20 mins)	300			

EMERGENCY "BINGO" TO ALTERNATE

Sg 2, fr 3: *DD-175 Fuel Plan - Alternate Not Required*



FUEL PLAN

1.	CLIMB/ROUTE DEST IAF	1500	6	START/TAXI	200
2.	ROUTE ALT IAF (If required)		7	TOTAL REQUIRED (4,5,&6)	2350
3.	APPROACHES	250	8	TOTAL ABOARD	2900
4.	TOTAL (1,2,&3)	1750	9	SPARE FUEL (8-7)	650
5.	RES 10% of 4 (Min 20 mins)	300			

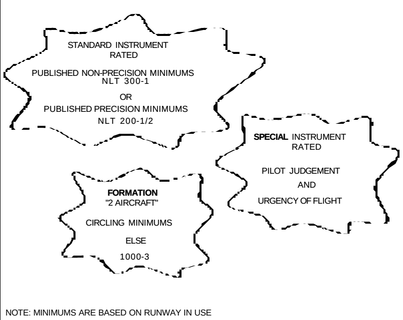
EMERGENCY "BINGO" TO ALTERNATE

Sg 3, fr 1: *Lesson Organization*

DEPARTURE AND TERMINAL PROCEDURES

* Airspeed restrictions (FAR 91.117)
* Fuel requirements for filing DD-175
* Takeoff weather minimums
* Types of IFR departures
* Standard instrument departure (SID)
* Approaches
* Closing flight plan
* Instrument rating requirements, renewal & expiration
* Log book entries

Sg 3, fr 2: *Instrument Ratings*



PROGRESS CHECK

Question 1 — 1.1.1.8.2
In all cases, what are the minimum reserve fuel requirements?

ANSWER: 10 percent of planned requirements or 20 minutes of flight computed at 10,000 ft MSL based on maximum endurance operation, whichever is greater. The T-45 reserve is always 300 lb.

III. Takeoff weather minimums depend on the instrument rating of the pilot-in-command **2.5.12.2**

A. Special instrument rating

1. No takeoff ceiling or visibility limits apply

2. Takeoff dependent upon

a. Judgment of pilot

b. Urgency of flight

NOTE: Good judgement dictates an adequate departure alternate be available.

B. Standard instrument rating

1. Standard minimums

a. Ceiling: 300 ft

b. Visibility: 1 sm

NOTE: Published minimums for the available nonprecision approach, but not less than 300 ft ceiling and 1 sm visibility, e.g., if lowest nonprecision minimums were

400 /1 1/2, the takeoff minimums would be 400 /1 1/2, not 300/1.

EXCEPTION: When a precision approach compatible with installed and operable aircraft equipment is available, with published minimums less than 300/1, takeoff is authorized provided the weather is at least equal to the precision approach minimums for the landing runway in use, but in no case shall takeoff occur when the weather is less than a 200-ft ceiling and 1/2 sm visibility/2,400 ft runway visual range (RVR).

C. Formations

1. Independent of pilots' instrument ratings

2. Only when a valid requirement exists

3. Restricted to two aircraft's similar performance whose military missions require formation flying including essential pilot training, Lead shall be on downwind side and safe separation maintained

4. Weather must be equal to, or above published circling minimums for runway in use, if circling approach not authorized for runway in use, formation takeoff minimums must be at least VFR of 1,000/3

PROGRESS CHECK

Question 2 — 2.5.12.2
When is takeoff permitted with a ceiling of less than 300 ft and visibility of less than 1 sm for a standard instrument-rated pilot?

ANSWER: When a precision approach is available to the runway in use with minimums of less than 300-1. Absolute takeoff minimums are 200-1/2.

Sg 4, fr 1: *Lesson Organization*
DEPARTURE AND TERMINAL PROCEDURES

* Airspeed restrictions (FAR 91.117)
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* Standard instrument departure (SID)
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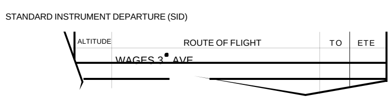
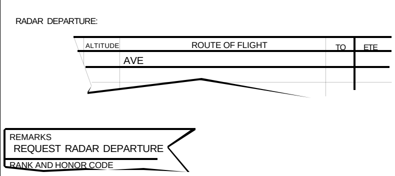
* Log book entries

Sg 4, fr 2: *DD-175 Standard Instrument Departure (SID)*



Sg 4, fr 3: *DD-175 Radar Departure*



IV. Types of IFR Departures **2.6.6.4**

A. There are three basic types of IFR departures from military airports:

1. Standard Instrument Departure (SID)

2. Radar Departure

3. VFR Climb on Course

B. Standard Instrument Departure (SID)

1. Enter the name of the coded identifier of the SID as the first entry in the route of flight section of the DD-175

2. Enter a dot (•)

3. Enter the SID transition point which will establish you on your route

4. This type of entry is the same for both “Pilot Nav” and “Vector” SIDs

5. SID requires pilot possession of at least the textual description of the SID procedures

C. Radar Departure

1. This type of departure is used where there is no published SID, or pilot desires to proceed directly to first point on route of flight

2. Enter the NAVAID or intersection that will establish you on your route as the first entry in the “ROUTE-OF-FLIGHT” section of the DD-175

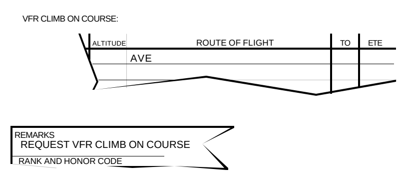
3. Enter “REQUEST RADAR DEPARTURE” in the “REMARKS” section

NOTE: You are only requesting flight advisory service from ATC. You are not requesting VECTORS, but ATC can provide vectors if desired.

4. “Radar Contact” from the controller does not relieve the pilot of terrain and obstruction clearance

D. VFR Climb on Course

Sg 4, fr 4: DD-175 VFR Climb On Course



1. Enter the NAVAID or intersection which will establish you on your route as the first entry in the “ROUTE-OF-FLIGHT” section

2. ATC will issue instructions as to when to contact ARTCC for your IFR clearance

3. Enter “REQUEST VFR CLIMB ON COURSE” in the “REMARKS” section

CAUTION: Remain below CLASS A airspace and fly VFR cruising altitudes until issued an IFR clearance.

V. Standard Instrument Departure (SID) **2.6.6.1**

Sg 5, fr 1: Lesson Organization

DEPARTURE AND TERMINAL PROCEDURES

* Airspeed restrictions (FAR 91.117)
* Fuel requirements for filing DD-175
* Takeoff weather minimums
* Types of IFR departures
* Standard instrument departure (SID)
* Approaches
* Closing flight plan
* Instrument rating requirements, renewal & expiration
* Log book entries

A. General

1. A preplanned IFR ATC departure procedure is printed for the pilot in graphic and/or textual form. SIDs provide transit from the terminal to the appropriate enroute structure

2. SIDs are located in the DOD FLIP (Terminal) Military Standard Instrument Departures and Standard Terminal Arrivals booklets. Departures are published with the (Terminal) Low and High Instrument Approach Procedures

3. Use is not mandatory by OPNAV, but use is encouraged provided no unacceptable flight degradation will ensue

4. Use can be made mandatory by a local airport, but a pilot can reject SID if safety of flight dictates

5. Pilot responsibility is to ensure all climb and crossing restrictions can be met

B. Purpose: provides airspace management and simplifies clearance delivery procedures

1. Expedites traffic from high density airport environment into enroute structure with less impact on controllers

a. There may be several SIDs from an airfield and several transitions from each SID

b. There may be several aircraft on any one SID at same time, subject to the aircraft separation requirements of ATC

2. Ensures adequate horizontal and vertical separation of aircraft via:

a. Prepublished or preselected routes

b. Radar monitoring of position

c. Traffic advisories

3. Provides terrain clearance for aircraft operating in instrument conditions when aircraft climbs above the minimum vectoring altitude for that airport

4. Provides transition from takeoff to enroute structure

NOTE: “RADAR CONTACT” when used by the controller during departure does not relieve the pilot of responsibility to maintain terrain and obstruction clearance. Terrain and obstruction clearance begins when the controller provides radar vectors.

LESSON NOTES

Be sure your students are aware of the differences between pilot nav and vector SIDs.

Sg 5, fr 2-3: *Lemoore NAS Fleet Eight Departure (2 pages)*

Graphic enlargement follows

C. Types of SIDs:

1. Pilot nav SIDs

a. Pilot is primarily responsible for navigation on the SID route

b. SIDs may be in Terminal publications or SIDs and STARS

c. Departure plate describes aircraft's vertical and horizontal flight path

(1) Top of departure plate: pictorial description

(2) Bottom section of departure plate: textual description

(3) Minimal communication with pilot

d. Provides published instructions

(1) You will normally receive SID as part of your clearance

(2) You may be given an initial vector instruction to join the SID

(3) You will normally receive no further departure instructions

Sg 5, fr 2-3: *Lemoore NAS Fleet Eight Departure*

FLEET-EIGHT DEPARTURE
(FLEET 8•)

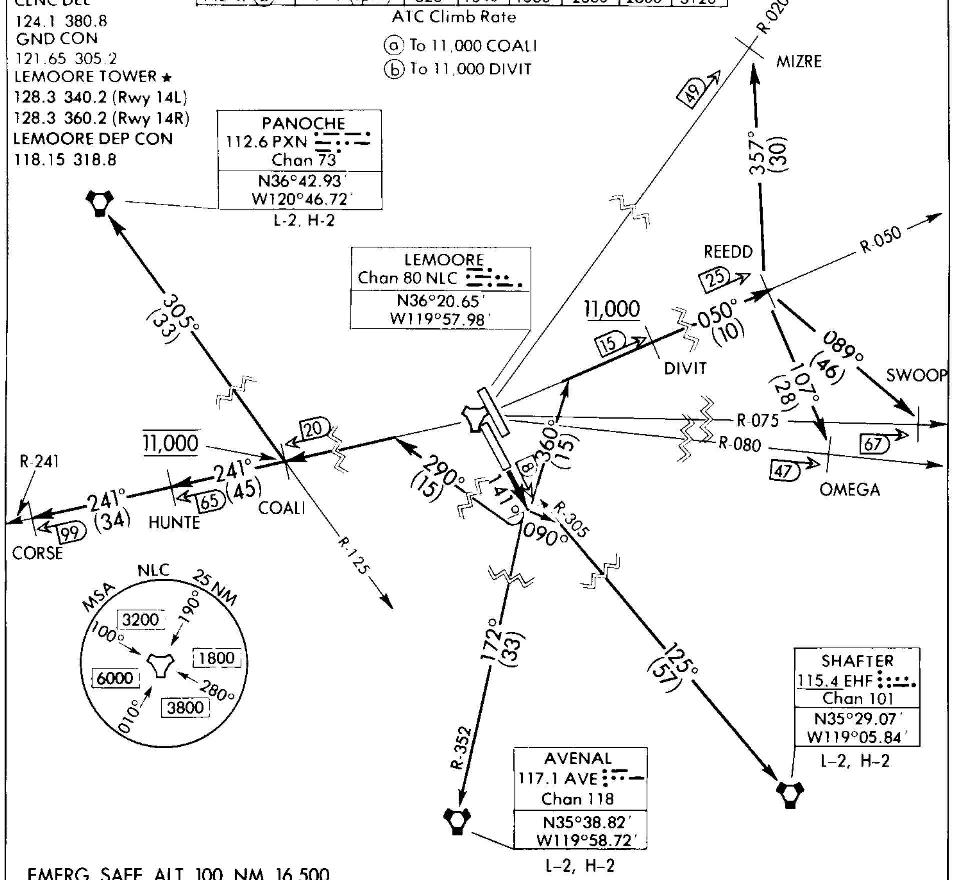
SHL-5067.02 (USN)

LEMOORE NAS (REEVES FIELD)
LEMOORE, CALIFORNIA

Rwy	Knots	60	120	180	240	300	360
14L R (a)	V V (fpm)	400	800	1200	1600	2000	2400
14L R (b)	V V (fpm)	520	1040	1560	2080	2600	3120

ATC Climb Rate

(a) To 11,000 COALI
(b) To 11,000 DIVIT



DEPARTURE ROUTE DESCRIPTION

TAKE-OFF RWY 14 L/R: Climb on runway heading to 8 DME maintain 11,000 or assigned altitude, thence:

AVENAL TRANSITION: Turn right to join and fly AVE R-352 to AVENAL.

CORSE TRANSITION: Turn right heading 290° to join and fly NLC R-241 to CORSE. Cross COALI at 11,000 mand.

HUNTE TRANSITION: Turn right heading 290° to join and fly NLC R-241 to HUNTE. Cross COALI at 11,000 mand.

(Continued on next page)

FLEET-EIGHT DEPARTURE
(FLEET 8•)

135

LEMOORE, CALIFORNIA
LEMOORE NAS (REEVES FIELD)

Sg 5, fr 3: *Lemoore NAS Fleet Eight Departure (cont)*

FLEET-EIGHT DEPARTURE
(FLEET 8•)

136
SHL-5067.03(USN)

LEMOORE NAS (REEVES FIELD)
LEMOORE, CALIFORNIA

DEPARTURE ROUTE DESCRIPTION

(Continued)

MIZRE TRANSITION: Turn left heading 360° to join and fly NLC R-050 to REEDD, direct MIZRE. Cross DIVIT at or above 11,000.

OMEGA TRANSITION: Turn left heading 360° to join and fly NLC R-050 to REEDD, direct OMEGA. Cross DIVIT at or above 11,000.

PANOCHE TRANSITION: Turn right heading 290° to join and fly NLC R-241 to PXN R-125 to PANOCHE. Cross COALI at 11,000 mand.

SHAFTER TRANSITION: Turn left heading 090° to join and fly EHF R-305 to SHAFTER.

SWOOP TRANSITION: Turn left heading 360° to join and fly NLC R-050 to REEDD, direct SWOOP. Cross DIVIT at or above 11,000.

FLEET-EIGHT DEPARTURE
(FLEET 8•)

LEMOORE, CALIFORNIA
LEMOORE NAS (REEVES FIELD)

Sg 5, fr 4-5: *Norfolk Three Departure (VECTOR) Oceana NAS*

Graphic enlargement follows

e. Requires minimum controller time

(1) Initial vectoring may be required

(2) Controller only monitors departing aircraft

(3) Minimal communication with pilot

f. Sorts aircraft by initial route for efficiency

(1) Leave departure (heavy line) route at assigned transition points

(2) Depart transitions (lighter line) at assigned route

2. Vector SID

NOTE: At fields that do not have a "published" vector SID, you can request radar departure and receive the same services as a "VECTOR" SID

a. ATC provides navigational guidance by ground radar to filed/assigned route or fix on SID

(1) Top of departure plate: pictorial description

(2) Bottom section of departure plate: textual description

b. Requires departure control to provide instructions

(1) Altitudes

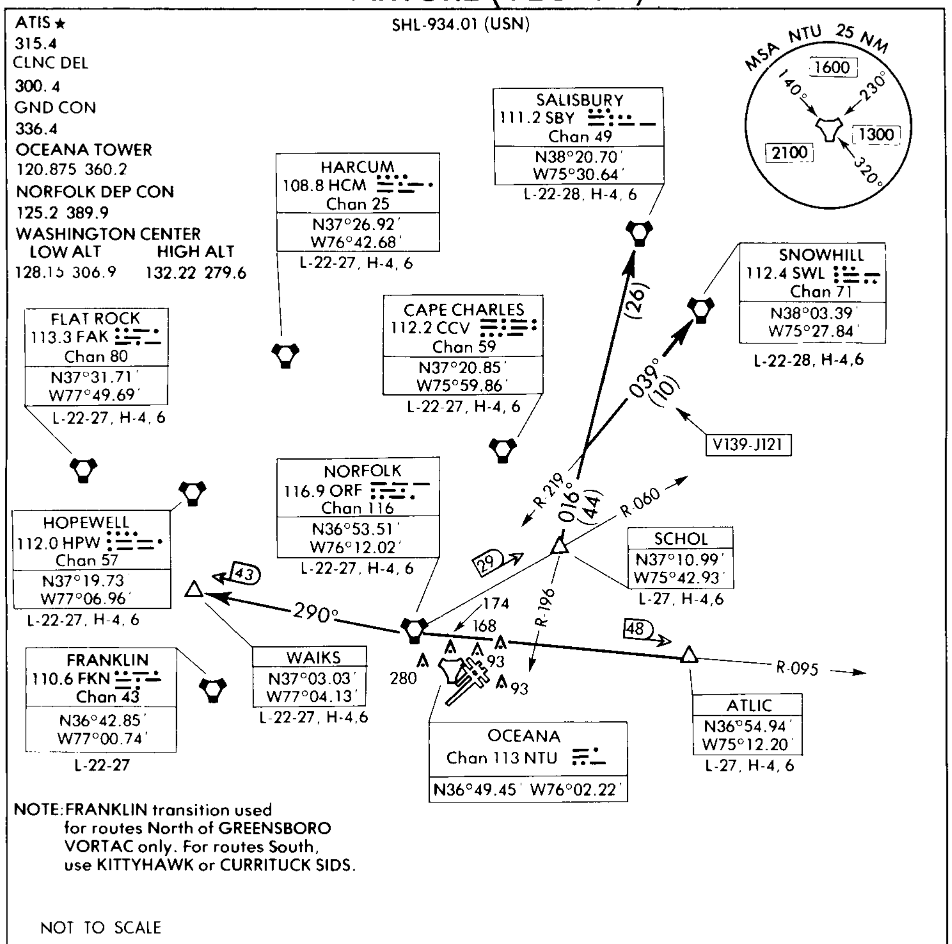
(2) Turns

Sg 5, fr 4-5: *Norfolk Three Departure (VECTOR) Oceana NAS*

98001
OCEANA NAS (APOLLO SOUCEK FIELD)

NORFOLK-THREE DEPARTURE (VECTOR)

VIRGINIA BEACH, VIRGINIA



DEPARTURE ROUTE DESCRIPTION

TAKE-OFF ALL RWYS: Maintain runway heading until 1500, expect radar vectors to appropriate transition/fix.

Maintain 4000 or assigned lower altitude. Expect clearance to requested altitude/flight level 10 minutes after departure.

ATLIC TRANSITION (NTU•ATLIC): Via vectors to ATLIC.

CAPE CHARLES TRANSITION (NTU•CCV): Via vectors to CCV. (NOTE: For altitudes 5000 and below).

FLAT ROCK TRANSITION (NTU•FAK): Via vectors to FAK.

FRANKLIN TRANSITION (NTU•FKN): Via vectors to FKN.

(Continued on next page)

NORFOLK-THREE DEPARTURE (VECTOR) VIRGINIA BEACH, VIRGINIA
123 OCEANA NAS (APOLLO SOUCEK FIELD)

Sg 5, fr 5: *Norfolk Three Departure (VECTOR) Oceana NAS (cont)*

95229 124 OCEANA NAS (APOLLO SOUCEK FIELD)

NORFOLK-THREE DEPARTURE (VECTOR) VIRGINIA BEACH, VIRGINIA

SHL-934.02 (USN)

DEPARTURE ROUTE DESCRIPTION
(Continued)

HARCUM TRANSITION (NTU•HCM): Via vectors to HCM.

HOPEWELL TRANSITION (NTU•HPW): Via vectors to HPW. (NOTE: For altitudes 17,000 and below).

SALISBURY TRANSITION (NTU•SBY): Via vectors to SCHOL, thence SBY R-196 to SBY.

SNOW HILL TRANSITION (NTU•SWL): Via vectors to SCHOL, thence SBY R-196 and V139 or J121 to SWL.

WAIKS TRANSITION (NTU• WAIKS): Via vectors to WAIKS.

NORFOLK-THREE DEPARTURE (VECTOR) VIRGINIA BEACH, VIRGINIA
OCEANA NAS (APOLLO SOUCEK FIELD)

(3) Courses

(4) DME

(5) Traffic separation

c. Increases controller time

(1) Controller must continuously monitor radar to make judgments based on radar information

(2) Requires increased communication

(a) Controller provides you with flight profile information for navigation to route or fix

(b) You must repeat headings, altitudes, and altimeter settings and acknowledge all radio calls in the order received. Always include your call sign in acknowledging

NOTE: You must comply promptly with instructions.

d. Allows controller flexibility to deal with changing flight conditions

(1) Weather

(2) Air traffic

(3) Temporary restrictions such as inoperable NAVAIDs

D. Changes to clearance **2.7.6.1.2**

1. Amendments to initial clearance will be issued any time ATC deems such action

necessary to avoid possible conflict between aircraft

a. If you accept a SID as part of your clearance, comply with all specified routings, altitudes, and specific restrictions. SIDs must be followed unless a deviation is approved by ATC or the pilot exercises his authority in a bona fide emergency

b. Consider SID canceled if aircraft is vectored or cleared off SID-specified course, unless ATC adds "expect to resume SID" or otherwise indicates deviation is temporary

c. If an altitude to maintain is <u>changed or restated</u>, either prior to or after departure, you can climb immediately to that altitude unless ATC states that altitude restrictions remain in effect. In this event they would only be changing your ultimate altitude. The SID path-over-the-ground must still be followed even though a climb to higher altitude was approved by ATC

2. Cancellation of SID is avoided if:

a. Departure control indicates portion of SID routing that still applies

b. Departure control restates altitude restrictions

3. Scenarios

LESSON NOTES

For the following scenarios, consider asking students to role-play the dialogue between departure control and pilot.

a. Departure control vectors you around severe weather but does not cancel SID

EXAMPLE:

DEPARTURE CONTROL: "Navy Bravo two zero zero: turn left to zero niner zero for vectors around weather. Expect to resume the SID when clear of weather."

PILOT: "Navy Bravo two zero zero, left zero niner zero for vectors."

b. Shortly after departure, SID is canceled and you are vectored to where enroute phase of flight will resume

EXAMPLE:

DEPARTURE CONTROL: "Navy Bravo two zero zero: turn left to two seven zero for vectors to TRADR."

PILOT: "Navy Bravo two zero zero, left two seven zero, vectors to TRADR."

c. Because SID is cancelled, controller must now provide assigned altitudes

EXAMPLE:

DEPARTURE CONTROL: "Navy Bravo two zero zero: cross seven DME at nine

Sg 5, fr 6-7: Lemig ONE Arrival San Antonio, Texas

Graphic enlargement follows

thousand and two six DME at one one thousand."

PILOT: "Navy Bravo two zero zero, cross seven DME at nine thousand and two six DME at one one thousand."

E. STAR **2.9.4.1.2.3**

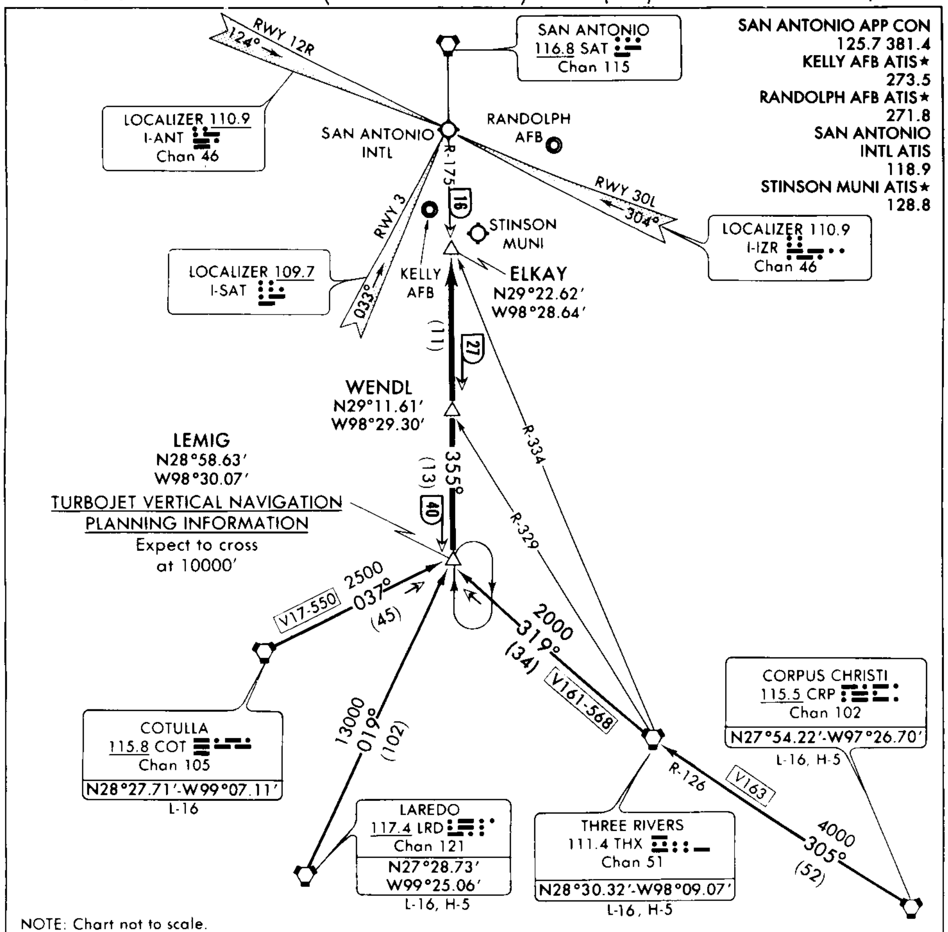
1. Standard Terminal Arrival (STAR) is a pre-planned instrument flight rule (IFR) Air Traffic Control arrival procedure published for pilot use in graphical and/or textual form. STARs provide transition from the enroute structure to an outer fix or an Instrument Approach Fix/arrival waypoint in the terminal area. Its purpose is to simplify clearance delivery procedures.

2. Until the military fully distributes STAR publications, STARs will be issued to military pilots only when requested in the flight plan or orally by the pilot. Still, some of the "preferred" routes in the A/P1 contain STARs. Use of STARs requires pilot possession of at least the APPROVED textual description. As with any ATC clearance or portion thereof, it is the responsibility of each pilot to accept or refuse an issued STAR. Pilots should notify ATC if they do not wish to use a STAR by placing "NO STAR" in the remarks section of the flight plan or by the less desirable method of orally stating the same to ATC. Remember, this option may result in terminal delays and holding, and "standby to copy."

Sg 5, fr 6-7: *Lemig ONE Arrival San Antonio, Texas*

97196

LEMIG ONE ARRIVAL (LEMIG.LEMIG1) ST-369 (FAA) A-290 SAN ANTONIO, TEXAS



CORPUS CHRISTI TRANSITION (CRP.LEMIG1): From over CRP VORTAC via CRP R-305 and THX R-126 to THX VORTAC, then via THX R-319 to LEMIG INT. Thence . .. .

COTULLA TRANSITION (COT.LEMIG1): From over COT VORTAC via COT R-037 to LEMIG INT. Thence . . . .

LAREDO TRANSITION (LRD.LEMIG1): From over LRD VORTAC via LRD R-019 to LEMIG INT. Thence . . . .

THREE RIVERS TRANSITION (THX.LEMIG1): From over THX VORTAC via THX R-319 to LEMIG INT. Thence . . . .

. . . . ALL AIRPORTS: From over LEMIG INT via SAT R-175 to ELKAY INT. Expect radar vectors to final approach course.

LEMIG ONE ARRIVAL (LEMIG.LEMIG1) SAN ANTONIO, TEXAS

Sg 6, fr 1: *Lesson Organization*

DEPARTURE AND TERMINAL PROCEDURES

* Airspeed restrictions (FAR 91.117)
* Fuel requirements for filing DD-175
* Takeoff weather minimums
* Types of IFR departures
* Standard instrument departure (SID)
* Approaches
* Closing flight plan
* Instrument rating requirements, renewal & expiration
* Log book entries

VI. Approaches

A. Published approaches

1. Criteria determining type of approach **2.9.4.1.1**

? **What are some factors that affect your choice of an approach?**

ANSWER: Answers follow

a. Duty runway at destination

b. Weather

c. Navigational equipment on aircraft

d. Approaches available at destination

2. Minimums for approach

a. Pilot may not commence an approach to the destination airfield when the weather is reported below minimums

b. Once commenced, if the airfield goes below minimums, pilots may, at their discretion, continue the approach to the approved published minimums for the type of approach being conducted.

c. Single-piloted aircraft can commence practice approaches at <u>enroute</u> airports regardless of reported weather, even if below minimums, and descend to published MDA or single-piloted decision height (DH) if fuel is planned for, and available for these approaches. However, you <u>cannot</u> make a "practice" approach at your filed destination or alternate.

d. Single-Piloted Aircraft - Published minimums for the type of approach, but not less than 200 ft ceiling and not less than 1/2 mile visibility, or 2,400 ft RVR if available

e. Multi-Piloted Aircraft - When reported weather is at or below published landing minimums for the approach to be conducted, an approach shall not be commenced in multi-piloted aircraft unless the aircraft has the capability to proceed to a suitable alternate in the event of a missed approach

f. Formations - Restricted to two aircraft in instrument conditions and the reported weather must be at least published circling minimums (or 1000 ft/3) to commence the approach. Once commenced, the leader may, at the leader's discretion, continue the approach in formation to the minimums prescribed for the type aircraft being flown. If a circling approach is not authorized for the runway in use, basic VFR minimums of 1,000 ft and 3 sm apply for an approach

3. Sample approach clearances **2.9.4.2.3**

a. "Cleared for approach" - Execute any published approach procedure to the airfield but state your intentions

b. "Cleared for TACAN approach" - Execute any published TACAN approach procedure to the airfield but state your intentions.

c. "Cleared for straight-in TACAN approach" - Execute any published TACAN approach procedure to the active runway which has straight-in minimums authorized, but state your intentions

d. "Cleared for Hi-TACAN runway 24 approach" - Execute the published TACAN approach procedure for Runway 24 and land straight-in on Runway 24

e. "Cleared for Hi-TACAN runway 24 approach, circle to land Runway 6" - Execute the published TACAN approach procedure for Runway 24, obtain the runway environment, and visually circle and land on Runway 6 (landing minimums to the adjacent runway will be higher than to the primary runway)

f. "Cleared for ILS runway 7 left approach, side-step to runway 7 right" - Pilots are expected to commence the side-step maneuver as soon as possible after the runway or runway environment is in sight (landing minimums to the adjacent runway will be higher than the minimums to the primary runway, but will normally be lower than the published circling minimums)

g. First aircraft estimated over the IAF will be the first to receive approach clearance

   (1) Succeeding aircraft will be cleared on basis of their estimated or actual times over the IAF

(2) In lieu of an enroute descent, pilot is expected to execute the entire IAP unless visual contact is made and a visual or contact approach is requested and approved, or if the pilot cancels his IFR flight plan

(a) It is solely the pilot's prerogative to cancel his IFR clearance

(b) Retention of the IFR clearance does not afford priority over VFR traffic, i.e., pilot of arriving IFR aircraft may have to adjust his flight path as necessary to enter traffic pattern in sequence with arriving VFR traffic

h. After receiving a revised clearance, or an approach clearance, prior to the final approach descent, all military pilots will report the newly assigned/ designated altitude when they report vacating the previously assigned altitude/flight level

B. Enroute Descent **2.9.4.1.2**

1. Definition - A descent from an enroute altitude to the final approach of an established procedure without execution of the entire instrument approach procedure prescribed in the FLIP (Terminal) publication. The descent takes place along the route of flight

2. Type of final approach to be flown (PAR, TACAN, ILS, etc.) should be understood by both the pilot and controller prior to commencing the descent

3. Clearance **2.7.6.1.2**

   a. Pilot request: “Request enroute descent to (destination airport)”

   b. Can be initiated by the controller after advising pilot of intentions

      (1) Pilot can refuse enroute descent in favor of full published approach

   c. Controller cannot authorize if other than normal vectoring delays are anticipated

   d. Once commenced, controller cannot terminate unless

      (1) Consent of the pilot

      (2) RADAR outage

      (3) Other emergency situations

   e. Prior to issuance of a descent clearance below the highest initial approach fix altitude established for <u>any</u> high altitude instrument procedure for the destination airport (i.e., that point that the “approach” is considered to commence), the controller will inform the pilot:

      (1) The type of final approach to expect

      (2) RADAR vectors will be provided to the final course

      (3) Current weather whenever the ceiling is below either 1,000 ft (1,500 ft for Air Force controllers) or the highest circling minimum (whichever is greater) or when the visibility is less than 3 miles

C. SFA - UHF Single Frequency Approach
2.9.4.2.3

1. Provided to single-piloted turbojet aircraft on an IFR flight plan during the hours of darkness or when the aircraft is in instrument weather conditions

2. The abbreviation “SFA” will be shown after the heading “COMMUNICATIONS” in the FLIP IFR Enroute Supplement when procedures have been implemented at that station. For those military fields that do not indicate “SFA,” check the RADAR section of the FLIP (Terminal) for that airfield. If they have numerous UHF frequencies available, you might receive an SFA if you request it

3. Pilots receiving this service will not be required to change frequency from beginning of penetration to touchdown, except that pilots conducting an enroute descent are required to change frequency when control is transferred from the Air Route Traffic Center to the Terminal Facility

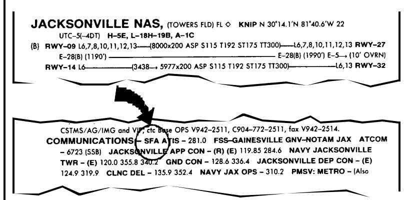
4. Controllers may discontinue the service to all pilots who cancel IFR Flight Plans during daylight hours and to those pilots in level flight who cancel IFR Flight Plans at night

PROGRESS CHECK

Question 3 - 2.9.4.1.1
What are the absolute minimums for a single-piloted aircraft executing a precision approach

ANSWER: 200-ft ceiling and 1/2-sm visibility

Sg 6, fr 2: *Single Frequency Approach*



D. Approach Modifications

1. Purposes

a. Authorized by ATC to reduce pilot/ controller workload

b. Expedite traffic by shortening flight paths to airport

NOTE: Authorization to conduct a visual/contact approach is an IFR authorization and does not alter IFR flight plan cancellation responsibility.

c. Provide for landing on other than instrument runway due to crosswinds, etc.

d. Radar service is automatically terminated, without advising the pilot, when the aircraft is instructed to change to advisory or tower frequency

2. Visual Approach **1.9.1.3.1.1**

a. Definition: An approach conducted on an instrument flight rules (IFR) flight plan and procedures which authorize the pilot to proceed visually and clear of clouds to the airport

b. Procedures:

(1) The pilot must have either the airport or the preceding aircraft in sight and maintain a safe interval

(2) This approach must be authorized and under the control of the appropriate Air Traffic Control facility

(3) Visual approaches can be requested by the pilot, initiated by ATC, or rejected by the pilot in favor of the full instrument approach

(4) If preceding traffic in sight, pilot assumes responsibility for maintaining a safe interval and adequate wake turbulence separation. If airport is in sight but not aircraft to be followed, ATC retains both separation and wake vortex separation responsibility

(5) Reported weather at the airport must be ceiling at or above 1,000 ft and visibility of 3 sm or greater. Compliance with cloud clearance requirements are not applicable

(6) A visual approach is an IFR procedure conducted under IFR in visual meteorological conditions

(7) A visual approach is <u>not</u> an instrument approach procedure and therefore has no missed approach segment. If a go around is necessary for any reason, aircraft operating at controlled airports will be issued appropriate instructions by the tower at that time. At uncontrolled airports, remain clear of clouds and contact ATC as soon as possible for further clearance

3. Contact Approach **1.9.1.3.1.2**

a. Definition - An approach wherein an aircraft on an IFR flight plan, having an air traffic authorization, operating clear of clouds with at least 1 statute mile flight visibility and a reasonable expectation of continuing to the destination airport in those conditions, may deviate from the instrument approach procedure and proceed to the destination airport by visual reference to the surface

(1) This approach will only be authorized when requested by the pilot. ATC cannot initiate this approach

(2) The reported ground visibility at the destination airport must be at least 1 sm

b. The destination airport must have a standard or special instrument approach procedure

c. Approved separation is applied between aircraft and other IFR or special VFR aircraft

d. A contact approach is an approach procedure that may be used by the pilot (with prior authorization from ATC) in lieu of conducting a standard or special IAP to the airport. It is not:

(1) intended for use by a pilot on an IFR flight clearance to operate to an airport not having an authorized IAP

(2) intended for an aircraft to conduct an instrument approach to one airport and then, when "in the clear," to discontinue that approach and proceed to another airport

e. In the execution of a contact approach, the pilot assumes the responsibility for obstruction clearance

f. If RADAR service is being received, it will automatically terminate when the pilot is told to contact the tower

4. Circling Approach **2.9.5.4.1**

a. Definition: a maneuver initiated by the pilot to align the aircraft with a runway for landing when a straight-in landing from an instrument approach is not possible or is not desirable

b. Use the circling minimums on the approach procedure, or path-over-the-ground, for which you were cleared

EXAMPLE: "Cleared for the High TACAN runway six approach, circle to land runway two four."

c. With the runway environment in sight state your intentions to Approach Control and visually circle to land on the intended runway by any safe method

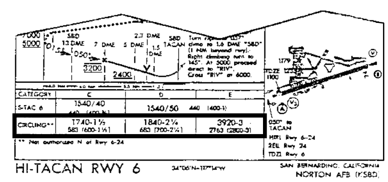
EXCEPTION: 1. When a circling maneuver is specified by Approach Control; or, 2. There is a circling restriction on the Approach Procedure Chart, e.g., "Maneuvering East of Rwy 16L - 34R centerline not authorized"

d. Maintain the circling MDA until in a position from which to make a safe landing on the intended runway

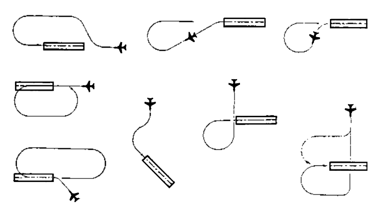
e. Do <u>not</u> descend below the MDA to remain clear of clouds

f. If loss of visual reference to the surface occurs, execute a missed approach procedure for the original approach as specified on the approach plate or as specified by Approach Control

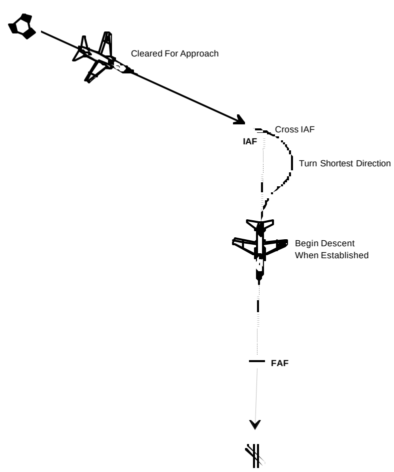
Sg 6, fr 3 *Circling Approach*



Sg 6, fr 3, p2 *Circling Approach*



Sg 6, fr 4: Radar Vectored or Cleared Direct



5. Leaving IAF altitude

   If being RADAR vectored or cleared "Direct" to an Initial Approach Fix, you will normally be assigned an altitude to maintain which will be close to published IAF altitude. If subsequently cleared for an approach prior to reaching the IAF, you cannot leave the assigned altitude until you are established on a segment of the published instrument approach procedure.

   NOTE: It is the pilot's prerogative to request anything deemed necessary to best accomplish a more suitable course alignment, such as an offset entry, a turn in holding, or a 360-degree turn.

6. Missed Approach **2.9.4.5.2.4**

   a. Definition - a maneuver conducted by a pilot when an instrument approach cannot be completed to a landing

   b. When executing a missed approach prior to the missed approach point (MAP), continue along the final approach to the MAP

   c. Execute the missed approach procedure if the required visual reference does not exist when reaching the MAP

   d. Mandatory to inform ATC, "executing missed approach"

   e. Climb immediately to the missed approach procedure altitude

   f. The routes of flight and altitudes are shown on instrument approach procedure charts

g. Adhere to radar vectors provided by ATC in lieu of the published missed approach procedure

h. If marginal weather conditions exist at destination (and especially if low on fuel), file a flight plan to your alternate prior to penetration using the preface "in the event of missed approach . . ." File with FSS or Approach Control using the DRAFT format or that inside the back cover of the IFR Supplement. Obtain an expected altitude that permits climb to the bingo profile altitude. In the event of lost communications, you are cleared at the most fuel efficient altitude

7. NORDO Missed Approach to Alternate **2.9.4.9.2**

a. In case of lost communications during the approach and subsequently you take a missed approach due to weather conditions

(1) Squawk 7600

(2) Follow the published missed approach instructions to ensure adequate obstruction clearance

(3) Proceed to alternate IAF as filed and immediately commence an approach

CAUTION: A filed flight plan, or DRAFT, before commencing an approach at destination constitutes a ROUTE clearance in event of NORDO; however, it does not constitute an altitude clearance since you have not received an ATC clearance.

b. Altitude to Alternate

(1) The expected altitude if given one after filing a DRAFT; otherwise,

(2) Your option of

(a) The highest of the two EMERGENCY SAFE ALTITUDES depicted on the destination and alternate approach procedure charts if fields are within 200 nm of each other or,

(b) At flight level equivalent to 18,000 ft MSL

(i) Destination altimeter 29.92 inches or higher; fly Flight Level 180

(ii) Destination Altimeter less than 29.92 inches; fly Flight Level 190

8. Visual Descent Point (VDP)

a. Incorporated in selected nonprecision approach procedures. The VDP is a defined point on the final approach course of a nonprecision straight-in approach procedure from which normal descent from the MDA to the runway touchdown point may be commenced, provided visual reference to the landing environment has been established. The VDP will normally be identified by DME on VOR, TACAN, or LOC procedures. The VDP is identified on the profile view of the approach chart by the symbol: V

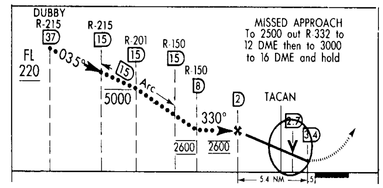
(1) VDPs are intended to provide additional guidance where they are implemented. No special technique is required to fly a procedure with a VDP. The pilot should not descend below the MDA prior to reaching the VDP and acquiring the necessary visual reference. The VDP normally will give a 3-degree glideslope

(2) Pilots not equipped to receive the VDP (no DME) should fly the approach procedure as though no VDP had been provided

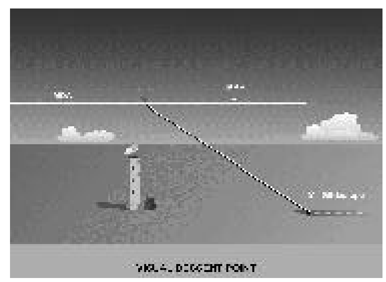
(3) Although not normally authorized to descend prior to the VDP, if you did, your approach will be shallow, and possibly conflict with unknown obstacles

(4) If the runway is not in sight at the VDP, you can continue at the MDA to the MAP. If you subsequently

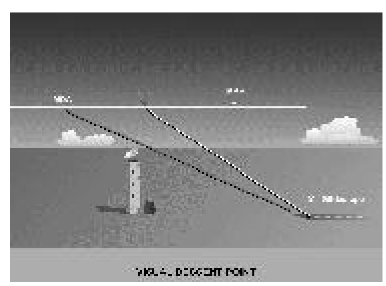
Sg 6, fr 5: *Visual Descent Point (Approach Chart)*



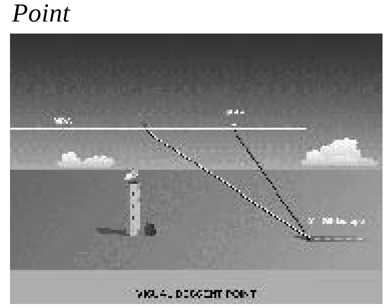
Sg 6, fr 6, p1: *Visual Descent Point*



Sg 6, fr 6, p2: *Visual Descent Point*



Sg 6, fr 6 , p3: *Visual Descent Point*



sight the runway, you risk a steep rate of descent and possibly a hard or long landing

9. Landing Criteria from an IFR Approach **2.9.4.5.1.2**

a. Landing minimums and criteria for continuing an instrument approach below the DH or MDA are different for the civil and military pilot. Landing criteria for Navy pilots are stated in OPNAV 3710.7 para 5.3.3.4 as follows:

"Pilots shall not descend below the prescribed MDA or continue an approach below the DH unless they have the runway environment in sight, and, in their judgement, a safe landing can be executed, either straight-in or from a circling approach, whichever is specified in their clearance."

Although we are not civilian pilots, we may gain some insights into instrument approach techniques by looking at the civilian rules which are more specific than OPNAV 3710.7

b. Criteria for the civil pilot continuing an approach are stated in FAR part 91.175 in much more detail:

(1) "Where a DH or MDA is applicable, no pilot may operate an aircraft, except a military aircraft of the United States, at any airport below the authorized MDA or continue an approach below the authorized DH unless:

(a) The aircraft is continuously in a position from which a descent to a landing on the intended runway can be made at a normal rate of descent using normal maneuvers, and for operations conducted under part 121 or part 135 unless that descent rate will allow touchdown to occur within the touchdown zone of the runway of intended landing;

(b) The flight visibility is not less than the visibility prescribed in the standard instrument approach being used; and

(c) Except for Category II or Category III approach where any necessary visual reference requirements are specified by the Administrator, at least one of the following visual references for the intended runway is distinctly visible and identifiable to the pilot:

(i) The approach light system, except that the pilot may not descend below 100 ft above the touchdown zone elevation using the approach lights as a reference unless the red terminating bars or red side row bars are also distinctly visible and identifiable

(ii) The threshold

(iii) The threshold markings

(iv) The threshold lights

(v) The runway end identifier lights

(vi) The visual approach slope indicator

(vii) The touchdown zone or the touchdown zone markings

(viii) The touchdown zone lights

(ix) The runway, or runway markings

(x) The runway lights

(2) No pilot operating an aircraft, except a military aircraft of the United States, may land that aircraft when the flight visibility is less than the visibility prescribed in the standard instrument approach procedure being used."

Sg 7, fr 1: *Lesson Organization*

DEPARTURE AND TERMINAL PROCEDURES

* Airspeed restrictions (FAR 91.117)
* Fuel requirements for filing DD-175
* Takeoff weather minimums
* Types of IFR departures
* Standard instrument departure (SID)
* Approaches
* Closing flight plan
* Instrument rating requirements, renewal & expiration
* Log book entries

VII. Closing Flight Plan **2.9.6.1**

A. It is the responsibility of the pilot-in-command/ formation leader to ensure that the proper agency is notified of flight termination

1. Canceling an IFR flight plan in flight does not close out your military flight plan

2. For safety, and accountability of its aircraft, the Navy requires verbal closing of flight plans with

a. Tower or,

b. Base Operations personnel or delivering a copy of the DD-175 to base operations

3. At nonmilitary installations, the pilot shall close the flight plan with flight service through any means available

a. Call flight service collect; long distance telephone service may be used if required with a flight service station (FSS) (Identify yourself as a pilot)

b. When appropriate communication links are known or suspected not to exist at point of intended landing, a predicted landing time in lieu of the actual landing shall be reported to an appropriate aeronautical facility while airborne

4. “Closing” your flight plan will ensure a proper arrival report will be sent to ATC and your aircraft will be accounted for

VIII. Instrument rating/requirements, renewal, expiration **1.1.8.7.1**

A. Requirements

NOTE: CNO-approved flight simulators may be utilized to meet one-half the minimum instrument rating and recurrency requirements.

1. 50 hrs of instrument time under actual or simulated conditions

2. Successfully complete a NATOPS instrument evaluation

Sg 8, fr 1: *Lesson Organization*

DEPARTURE AND TERMINAL PROCEDURES

* Airspeed restrictions (FAR 91.117)
* Fuel requirements for filing DD-175
* Takeoff weather minimums
* Types of IFR departures
* Standard instrument departure (SID)
* Approaches
* Closing flight plan
* Instrument rating requirements, renewal & expiration
* Log book entries

3. Within 6 months preceding the date of the instrument flight, obtain:

   a. 6 hrs as pilot under actual or simulated instrument conditions

   b. 12 final approaches under actual or simulated conditions of which:

      (1) 6 are precision approaches

      (2) 6 are nonprecision approaches

4. Within the 12 months preceding the date of the instrument evaluation flight

   a. 12 hrs as pilot under actual or simulated instrument conditions

   b. 18 final approaches of which

      (1) 12 are precision approaches

      (2) 6 are nonprecision approaches

      NOTE: CNATRA is authorized to issue an initial standard instrument rating following the successful completion of the Naval Air Training Command instrument-rating syllabus.

B. Renewal

1. Renewal of NATOPS instrument ratings shall be accomplished annually

2. Attend formal TYCOM-approved instrument ground school if one is available

3. Successful completion of approved NATOPS instrument written exams IAW NATOPS Instrument Flight Manual and OPNAVINST 3710.7

4. Evaluation flight IAW NATOPS Instrument Flight Manual

C. Expiration of instrument rating

1. Expiration will be last day of month of issue plus one year

IX. Log Book Entries

A. Approaches

1. Log only the approach executed to a missed approach or landing

EXAMPLE: For a TACAN approach to a PAR final approach, log only the PAR approach.

2. If actual instrument conditions on the approach are encountered at less than 1,000 ft AGL, log an ACTUAL approach

3. In actual instrument conditions, both the student and instructor will log the ACTUAL approach

4. If the airport is operating under VMC, you would log a SIMULATED approach

5. In a formation approach, only the formation leader will log the approach

6. Only the pilot physically controlling the aircraft will log a landing

B. Instrument Time

1. In actual instrument conditions, both pilots in an aircraft will log ACTUAL instrument time

Sg 9, fr 1: *Lesson Organization*

DEPARTURE AND TERMINAL PROCEDURES

* Airspeed restrictions (FAR 91.117)
* Fuel requirements for filing DD-175
* Takeoff weather minimums
* Types of IFR departures
* Standard instrument departure (SID)
* Approaches
* Closing flight plan
* Instrument rating requirements, renewal & expiration
* Log book entries

2. Only the pilot physically controlling the aircraft will log SIMULATED instrument time

3. If a student is under the instrument “hood” and actual instrument conditions exist outside the aircraft, the student will log ACTUAL instrument time

C. Night Time

1. Flight from official sunset to official sunrise regardless if VMC or IMC

PROGRESS CHECK

Question 4 — 1.9.1.3.1.1
What are the criteria for a visual approach?

ANSWER: 1,000 ft ceiling visibility of 3 sm, with the field and/or preceding aircraft in sight

Question 5 — 1.9.1.3.1.2
What are the criteria for a contact approach?

ANSWER: Operating clear of the clouds with at least 1-sm visibility at the pilot’s request

SUMMARY

This lesson has focused on the following topics:

* Airspeed restrictions
* Fuel requirements for filing DD-175
* Departure point minimums for takeoff
* Types of IFR departures
  - Standard Instrument Departure
  - RADAR departure
  - VFR climb on course
* Standard instrument departure (SID)
* Published approaches
  - Criteria determining type of approach
  - Differences between high and low altitude approaches
* Other approaches
  - Visual approach
  - Contact approach
  - Circling approach
* Closing a flight plan
* Instrument rating requirements, renewal, and expiration
* Log Book entries

CONCLUSION

As your flight planning experience increases, you will become more efficient in arranging the details of your flight. Determining what type of approach to use at destination or what departure minimums apply to your takeoff is critical. The more you examine these details, the better prepared you will be for the unexpected.

Sg 10, fr 1: *Review Menu*

DEPARTURE AND TERMINAL PROCEDURES
REVIEW OPTIONS

1. Entire Lesson
2. Airspeed restrictions (FAR 91.117)
3. Fuel requirements for filing DD-175
4. Takeoff weather minimums
5. Types of IFR departures
6. Standard instrument departure (SID)
7. Approaches
8. End this lesson

Please select

NOTES

LESSON GUIDE

COURSE/STAGE: T-45A UJPT & E2-C2 Instrument Navigation

LESSON TITLE: Interpretation of High Altitude Instrument Approach Plates

LESSON IDENTIFIER: T-45A UJPT & E2-C2 INav-07

LEARNING ENVIRONMENT: CAI

ALLOTTED LESSON TIME: 0.8 hr

TRAINING AIDS:

* Figures
  - Fig 1: Basic Penetration Patterns
  - Fig 2: Altitude Restrictions (Profile View)
  - Fig 3: Glideslope Indicator (PAPI)
  - Fig 4: Full-page Airport Diagram - Oceana NAS
  - Fig 5: HI-TACAN RWY 27 Jacksonville NAS
  - Fig 6: HI-VOR RWY 19 Pensacola NAS
  - Fig 7: HI-TACAN or ILS RWY 8 LANGLEY AFB
  - Fig 8: HI-ILS RWY 22 Houston/Ellington Field

STUDY RESOURCES:

* Aeronautical Information Manual
* NATOPS Instrument Flight Manual, NAVAIR 00-80T-112 (1 April 1986)
* DOD FLIP (Terminal) High Altitude United States Instrument Approach Procedures

LESSON PREPARATION:

Review:

* Key sections from a DOD FLIP (Terminal) High Altitude United States
* Instrument Approach Procedures plate

REINFORCEMENT:

Review:

* Chapter 29, NATOPS Instrument Flight Manual, NAVAIR 00-80T-112

EXAMINATION:

The objectives in this lesson will be tested in Instrument Navigation 12X.

LESSON OBJECTIVES

2.1.8.3.1.1
Recall FLIP usage and application in instrument flight planning for tactical jet aircraft

2.9.5.5.2
Interpret visual information system indications provided for approach and landing

2.9.4.1.1
Recall criteria which influence type of instrument approach

2.9.4.2.1
Interpret TACAN/VOR DME approach plates

2.9.4.3.1
Interpret VOR approach plates

2.9.4.6.1
Interpret ILS approach plates

MOTIVATION

The takeoff, departure, approach, and landing phases are the most critical in each flight. By thoroughly studying the FLIP Standard Instrument Departures (SIDs), STARs and Terminal High Altitude United States Approach plates beforehand, the pilot can devote more time to flying the aircraft and less to interpreting the procedures in the air. Misinterpreting the information could have serious consequences.

This lesson will provide you with the organization and content of the FLIP (Terminal) High Altitude United States.

OVERVIEW

After this lesson you will be better able to utilize the FLIP (Terminal) High Altitude - United States and accurately interpret the information contained therein.

In this lesson you will be studying:

* Organization and description of the contents of the FLIP (Terminal) High Altitude - United States
  - Front cover of FLIP (Terminal) indicates geographical area of coverage
  - Effective time and date of publication
  - High Altitude Terminal Charts indicated by a "barber pole" border
  - Back cover indicates the geographical coverage of all four books in the High Altitude (Terminal) series
  - Page 1 - General information and abbreviations
  - Table of contents and index of instrument approach procedure charts
* Features common to high altitude instrument approach plates
  - Planview and profile symbols and elements
  - Airport diagrams/sketches
  - Instrument approach minimums section
  - Final Approach Fix (FAF) to Missed Approach (MAP) details
* Elements specific to types of high altitude approaches
  - HI-TACAN and VOR/DME
  - VOR
  - ILS
* Practical scenario - Use Figure 8

REFRESHER

* Recall your experience using low altitude plates during your primary training.

PRESENTATION

I. Organization and description of the contents of the FLIP (Terminal) High Altitude United States **2.1.8.3.1.1**

A. Front cover of FLIP (Terminal) indicates geographical area of coverage

1. Southwest

2. Southeast

3. Northwest

4. Northeast

B. Effective time and date of publication

1. Issued every eight weeks

2. Effective time 0901Z or 0401 CST

3. Date of next issue indicated

4. NOTAMs and unscheduled urgent change notices issued as necessary

NOTE: Do not use an out-of-date procedure chart

C. High Altitude Terminal Charts indicated by a “barber pole” border

D. Back cover indicates the geographical coverage of all four books in the High Altitude (Terminal) series

E. Page 1 - General information and abbreviations

NOTE: Most complete list of abbreviations found in the Flight Information Handbook (FIH).

F. Table of contents and index of instrument approach procedure charts

1. Contains procedures for those airfields depicted in BLUE color on the FLIP (Enroute) High Altitude Charts

2. Does not contain all terminal instrument procedures in the area of coverage. Coverage is determined by military requirements

3. Cross references - city to airfield

4. Indexes approaches, SIDs, RADAR minimums, ASLAR, and airport diagrams

NOTE: Navy pilots are not authorized to utilize ASLAR (Aircraft Surge Launch and Recovery) procedures. Special aircrew certification is required.

II. Features common to high altitude instrument approach plates

A. Planview and profile symbols and elements

1. Overhead and cross-sectional view of approach track

a. Penetration track

(1) Begins at initial approach fix (IAF) to the final approach fix

(2) Depicted by a bold dotted line

(3) Accent lines across the track refer to altitude restrictions depicted in profile view

b. Procedure track

(1) Begins at FAF to the MAP

(2) Depicted by a thick solid line

CAUTION: Approach procedures are not to be varied, even if in VMC, unless clearance has been received for a contact approach, a visual approach, or you cancel IFR.

Fig 1: *Basic Penetration Patterns*

c. Four basic penetration patterns are used to allow a pilot to lose altitude while proceeding from the IAF to the final approach course

(1) Straight-in

(2) Offset

(3) Arcing

(4) Teardrop

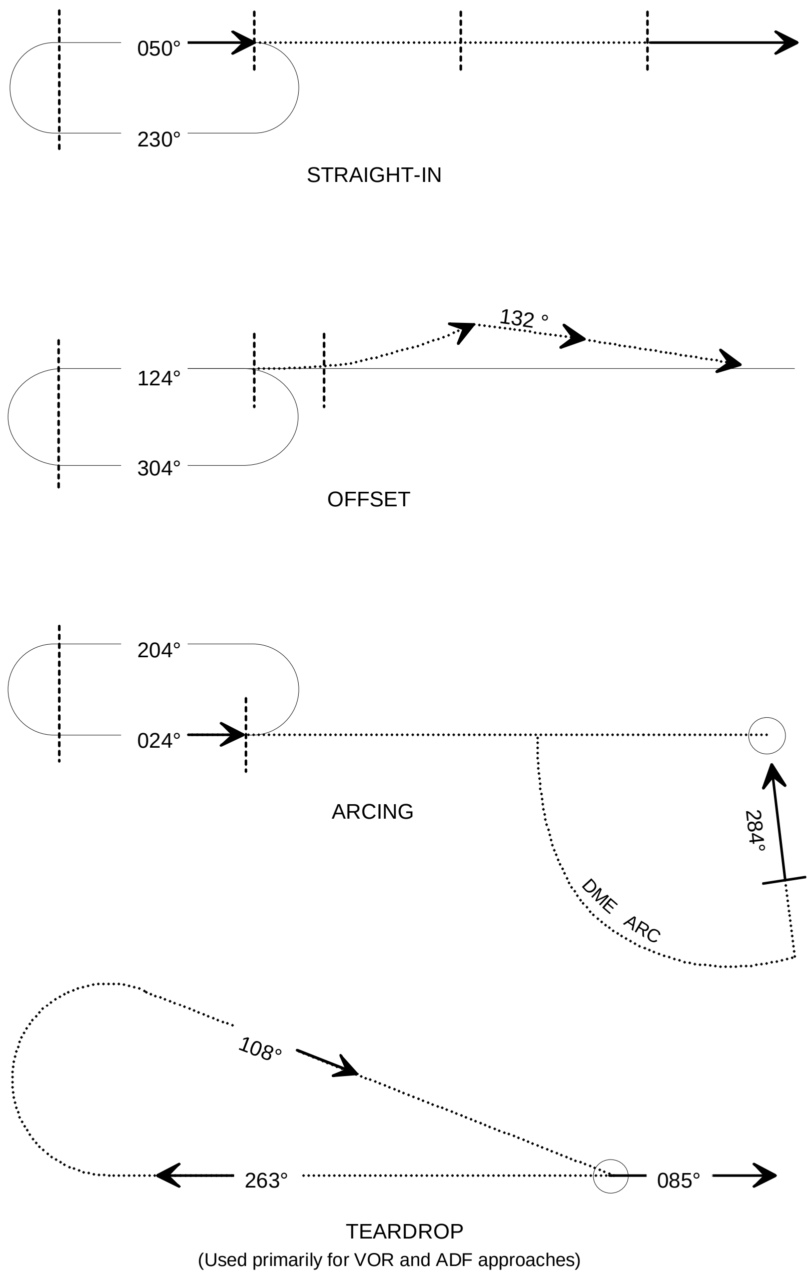


Figure 1: BASIC PENETRATION PATTERNS

d. Missed approach route

(1) Printed instructions in profile view box

(a) Headings

(b) Altitudes

(c) Holding instructions

(d) Distance limitations

(2) Pictorial representation of track: vertically spaced dashed line

(a) Begins at MAP

(b) Indicates radials/bearings

(c) Holding

Fig 2: *Altitude Restrictions (Profile View)*

2. Altitude restrictions

NOTE: Altitude restrictions are depicted prior to the specified fix in the direction of flight in the profile view.

a. Mandatory altitude

(1) Numeric value with a line above and below number

(2) You must fly this section of the approach at this altitude

b. Minimum altitude

(1) Numeric value with a line below it

(2) You must fly this section of the approach at or above this altitude

c. Maximum altitude

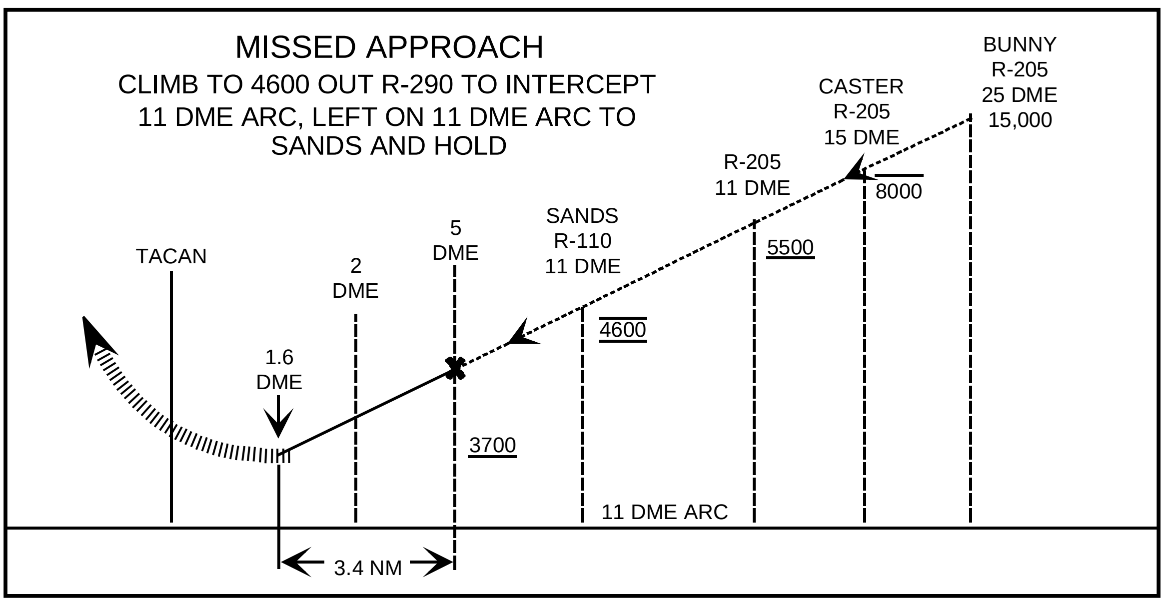
(1) Numeric value with a line above it

(2) You must fly this section of the approach at or below this altitude

d. Recommended altitude

(1) Numeric value without lines

(2) Recommended, but not required, that you fly at this altitude



ALTITUDES

$\overline{\underline{4600}}$	MANDATORY ALTITUDE
$\underline{5500}$	MINIMUM ALTITUDE
$\overline{8000}$	MAXIMUM ALTITUDE
15,000	RECOMMENDED ALTITUDE

Figure 2: ALTITUDE RESTRICTIONS (PROFILE VIEW)

3. Holding patterns

   a. Arrival holding pattern

      (1) Use until you are cleared to proceed beyond IAF onto approach

      (2) Thin solid line with notations indicates inbound/outbound headings and direction of pattern (clockwise or counter-clockwise); clockwise turns are a standard pattern

      (3) Provides DME limits for TACAN, VORTAC, and VOR/DME approach, otherwise standard holding limits apply (separate VOR and TACAN holding may be depicted on the same plate)

      (4) Entry diagram found in upper right corner of planview

         (a) Use for transitioning from route or feeder facility to arrival holding pattern

         (b) Same pattern as depicted on planview

         (c) Headings given on diagram are inbound headings to the IAF

         NOTE: "Holding in lieu of procedure turn" pattern normally <u>not</u> used on high altitude approach plates.

   b. Missed approach holding pattern

      (1) Use after executing a missed approach

      (2) Dashed line with notations indicates inbound/outbound headings and direction of pattern (clockwise or counter-clockwise)

      (3) Limits will be specified only if pattern nonstandard, or DME fixes may be shown

4. Concentric circles on planview

   a. Within 20-mile radius circle around navigation facility: features encircled by bold print line are to scale

   b. Feeder and high altitude facilities--NAVAIDs

      (1) Orientation to approach pattern

         (a) Distance/course to IAF

         (b) May show bearing/distance to transitional or holding fixes

(2) Usually not to scale

(3) Orientation of one remote NAVAID to another

5. Types of NAVAIDs

a. Azimuth information only

(1) VHF omnirange (VOR)

(2) Localizer

b. Bearing and distance information

(1) Tactical air navigation (TACAN)

(2) VOR combined with distance measuring equipment (VOR/DME)

(3) VOR combined with TACAN (VORTAC)

6. Obstacles and spot elevations

a. Obstacles--man-made obstructions

(1) Single: inverted V over dot with elevation in feet

(2) Group: two overlapping inverted V's over dot with elevation in feet

(3) Highest: large inverted V with elevation in feet

b. Spot elevation--natural obstructions

(1) Indicated by a dot with elevation in feet

(2) Highest: bold dot with elevation in feet

NOTE: Elevations for obstacles and elevation points are given in feet mean sea level (MSL).

7. Airport communications frequencies and radar coverage information

a. Radio frequencies both UHF and VHF frequencies given, additional applicable frequencies also found in IFR Supplement

(1) Approach control

(2) Tower

(3) Ground control

(4) Clearance delivery

(5) Automatic terminal information service (ATIS)

b. Type(s) of radar coverage available at airport

(1) ASR--bearing and distance

(2) PAR--bearing, distance, and glideslope

8. Safe altitudes minimum and emergency:

a. Minimum safe given for radius of 25 nm from approach NAVAID (may be divided into sectors of at least 90 degrees with different altitudes)

b. Emergency safe given for radius of 100 nm from approach NAVAID. In FAA-designated mountainous areas, it will provide 2,000-ft obstruction clearance

B. Airport diagrams/sketches **2.9.5.5.2**

1. Sketch on approach plate

a. Oriented to magnetic North

b. Runway dimensions

c. Location/type of arresting gear/barriers

d. Field elevation/touchdown zone elevation (TDZE) - first 3,000 ft of straight-in instrument runway, starting at the threshold

e. Location of airport tower/rotating beacon - When control tower and rotating beacon are co-located, beacon symbol will be used and further identified as TWR

f. Position/height of obstacles - Positional accuracy within +/- 600 ft unless otherwise noted on the chart

g. Position of airport NAVAID

h. Type of runway/approach lighting available

(1) Approach lighting symbols/pictorials are shown in the Flight Information Handbook

(2) Visual glideslope indicators

(a) Visual approach slope indicator (VASI) V

i. Both sides of runway

ii. Visible 5 miles daytime, 15-20 miles at night

iii. WHITE over WHITE -- Too high
RED over WHITE -- On glideslope
RED over RED -- Too low

(b) Precision approach path indicator (PAPI) P

Fig 3: Precision Approach Path Indicator (PAPI)

i. New international system replacing VASI

ii. Bar of four lights, usually on left side of runway

iii. 4 WHITE lights -- Too high
2 WHITE, 2 RED lights -- On glideslope
4 RED lights -- Too low

2. Full-page airport diagram

Fig 4: Full-page Airport Diagram - Oceana NAS

a. Scope - Airport diagrams are specifically designed to assist in the movement of ground traffic at locations with complex runway/taxiway configurations and to provide information for updating computer-based navigation systems (i.e., INS, GPS) aboard aircraft. Airport diagrams are not intended to be used for approach and landing or departure operations.

b. Runway dimensions, elevations, and gradient (if greater than 0.3 degrees up or down)

c. Airport diagram scales are variable

d. Runway heading to the nearest tenth of a degree

e. Dimension of runway overruns

f. Runway identification number

g. Location of arresting gear, barriers, and displaced thresholds

h. Position and identification of taxiways, ramps, and parking areas

i. Type of runway surface

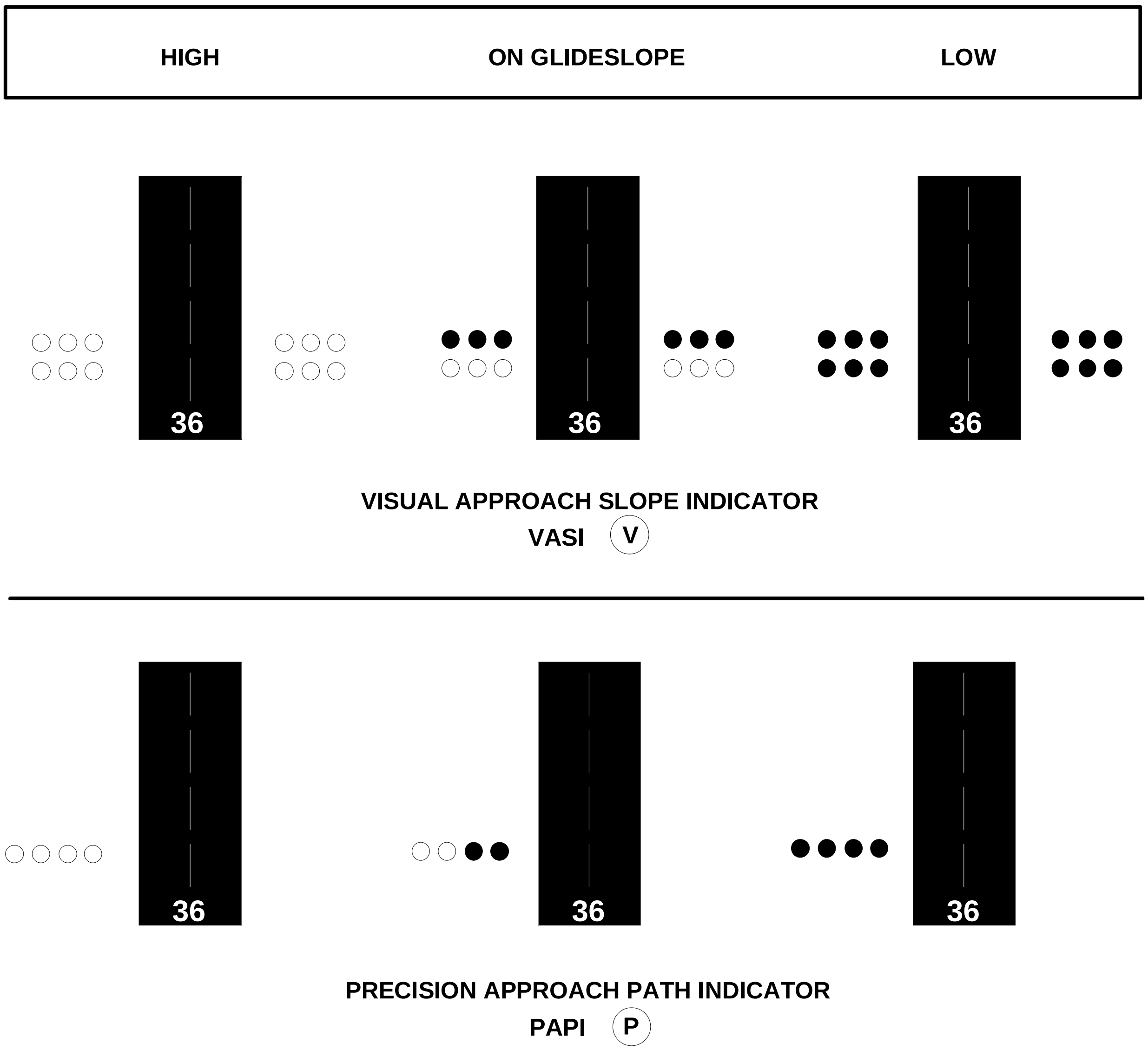


Figure 3: GLIDESLOPE INDICATOR

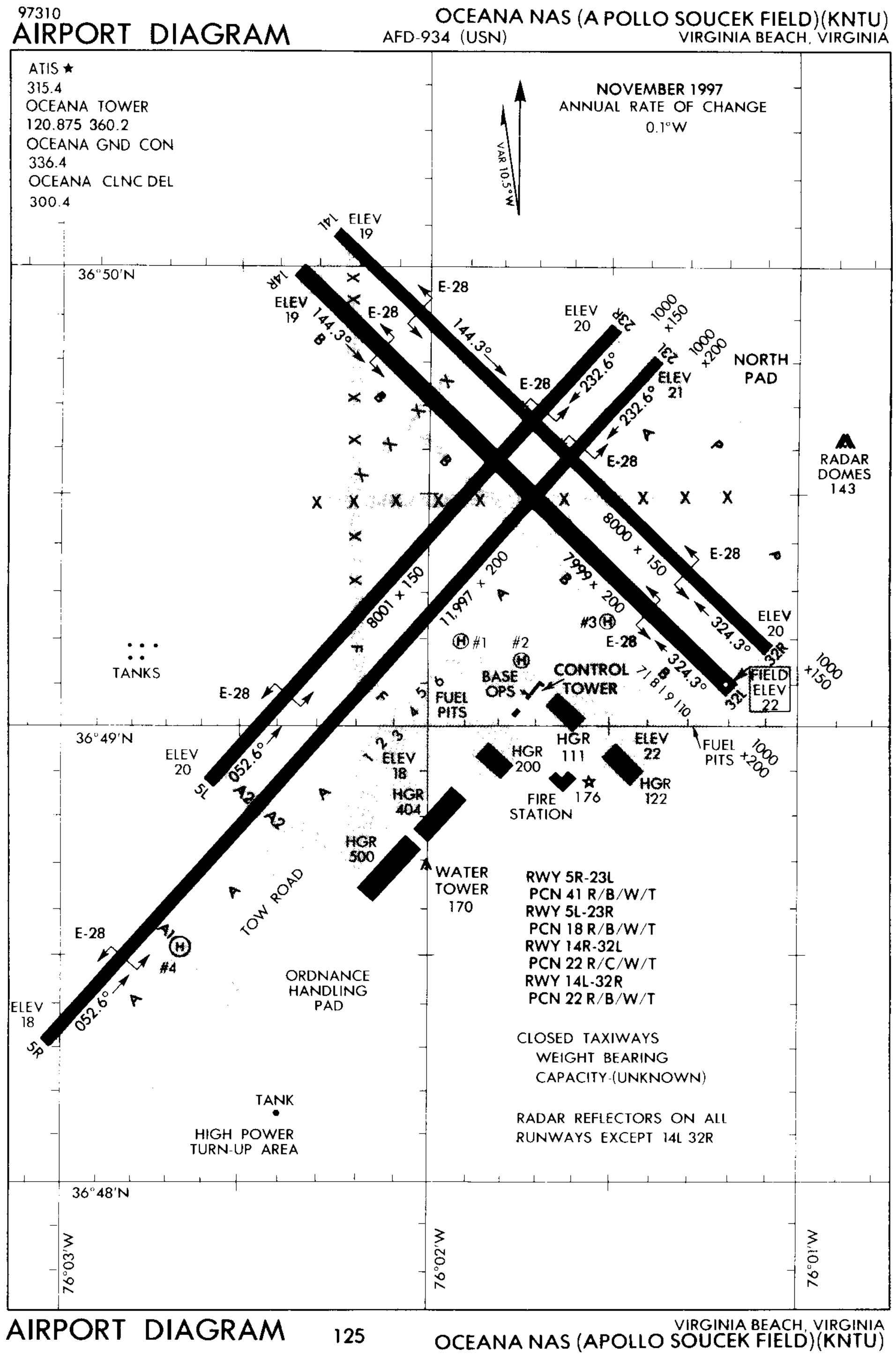


Figure 4: FULL-PAGE AIRPORT DIAGRAM - OCEANA NAS

j. Closed runways/taxiways

k. Location/identification of buildings, control tower, airport beacon, and other structures

l. True/magnetic north orientation, date, and annual rate of change - True/magnetic North orientation may vary from diagram to diagram, i.e., North may <u>not</u> be at the top of the page

m. Location/elevation of obstructions

n. Geographical coordinate grid - Coordinate values are shown in 1- or 1/2-minute increments. They are further broken down into 6-second ticks, within each 1-minute increment

o. Runway weight-bearing capacity

C. Instrument approach minimums section 2.9.4.1.1

1. Type of approach

   a. Straight-in/circling/side-step

   b. Precision/nonprecision

2. Aircraft approach speed determines the aircraft's category

   a.. A,B,C,D,E, and copter

   b. Generally, only categories C, D, and E are listed in high altitude terminal approach plates (T-45A falls under C). Occasionally category B is listed

3. Ceiling and visibility requirements - criteria used for IFR destination and alternate filing purposes. Also establishes takeoff criteria

   a. Ceiling in feet above ground level (AGL)

   b. Prevailing visibility in statute miles (sm)

   c. Runway Visual Range (RVR) in hundreds of feet (if airport is so equipped)

   NOTE: To convert RVR values to mile or metric equivalents, refer to the METAR Conversion Chart near the front of each FLIP (Terminal) high altitude approach publication.

4. Instrument approach minimums

   a. Decision Height (DH) is the mean sea level (MSL) height in feet above the highest elevation in the touchdown zone (first 3,000 ft of the runway), specified for a glideslope approach, at which a missed approach procedure must be initiated if the required visual reference has not been established

   b. Minimum Decision Altitude (MDA) is the lowest mean sea level (MSL) altitude in feet to which descent shall be authorized in procedures not using a glideslope, until the required reference has been established

   c. Height Above Touchdown (HAT) is the AGL height of the DH or MDA above the highest runway elevation in the touchdown zone; HAT is published in conjunction with all straight-in minimums

   d. Height Above Airport (HAA) is the AGL height of the MDA above the published airport elevation; HAA is published in conjunction with circling minimums

5. Glideslope angle information for PAR approaches

   COMMON ERROR: Not looking up meaning of asterisks/symbols that pertain to modifications of minimums.

   NOTE: Use rate-of-climb/descent table on inside back cover.

6. FAF to MAP chart - used on nonprecision approaches when DME unavailable and radio facility not located at field

   a. Gives distance from FAF to MAP in nm

   b. Gives time to traverse distance at a given ground speed in minutes and seconds

      COMMON ERROR: Not reading cautions and warnings on approach plate.

      COMMON ERROR: Missing some details by not studying/ reviewing plate thoroughly.

III. Elements specific to types of high altitude approach plates

A. HI-TACAN and VOR/DME **2.9.4.2.1**

Fig 5: HI-TACAN RWY 27 Jacksonville NAS

1. Bearing and distance information

2. DME used to determine

   a. Limits of crossing altitude restrictions

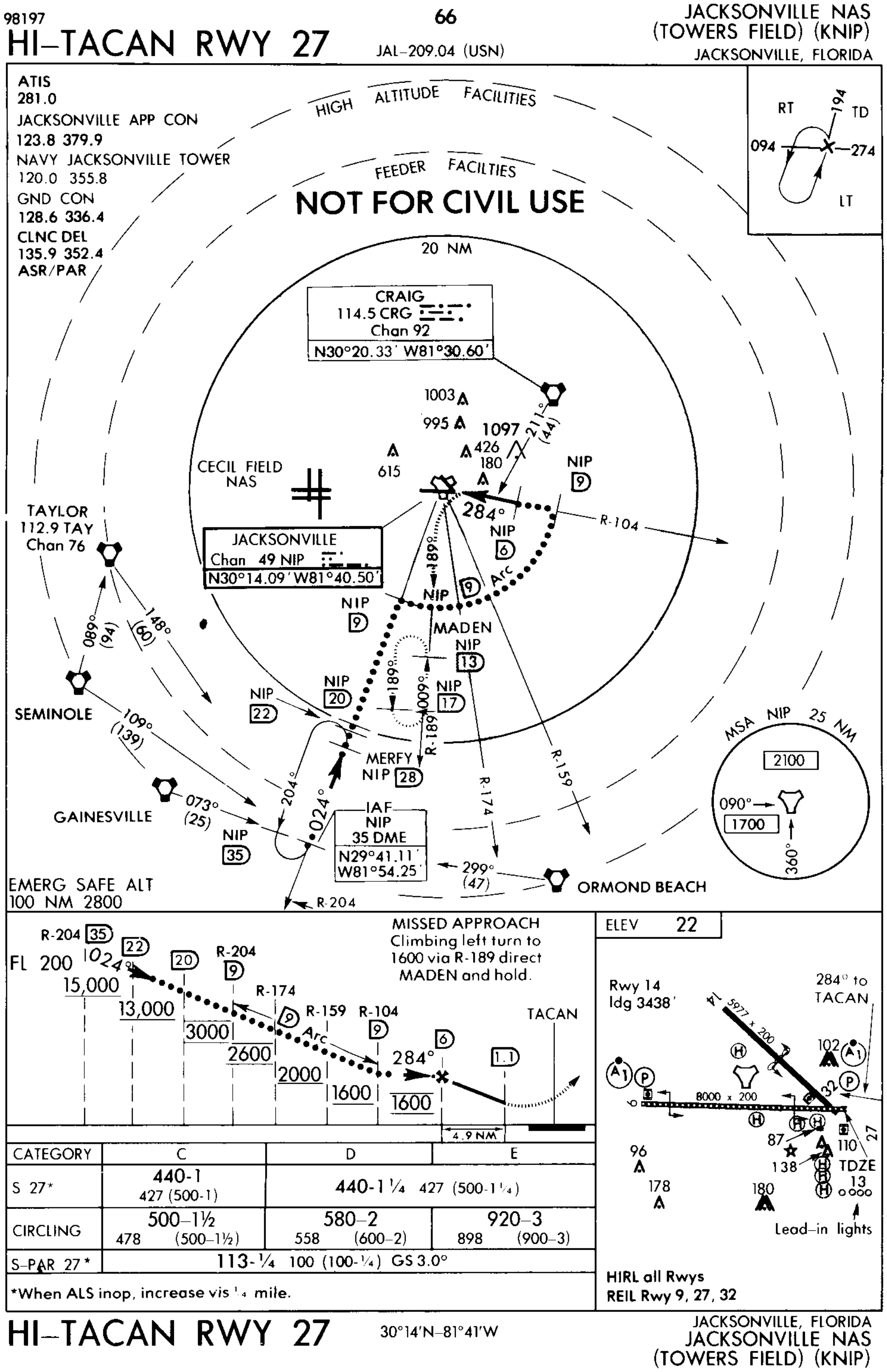


Figure 5: HI-TACAN RWY 27 JACKSONVILLE NAS

b. Arc

c. FAF

d. Missed approach point (MAP)

B. VOR **2.9.4.3.1**

Fig 6: HI-VOR RWY 19 Pensacola NAS

1. Bearing information only

2. Penetration turn altitude listed in profile section

   a. If not published, start turn after one-half total altitude between IAF and FAF

3. MAP determined by:

   a. Station passage, VOR at field

   b. Timing, VOR not at field

C. ILS **2.9.4.6.1**

Fig 7: HI-TACAN or ILS RWY 8 Langley AFB

1. Localizer depicted on planview

2. Lead radial (LR-260) identifies turn point to intercept ILS final approach course

3. Glideslope depicted on profile view

4. Glideslope angle and threshold crossing height (TCH) depicted on profile view

5. Glideslope intercept altitude depicted on profile view (1,600 ft)

6. Localizer intercept altitude

7. Bold "V" in profile view marks visual descent point

8. MAP determined by decision height (DH)

D. ILS **2.9.4.6.1**

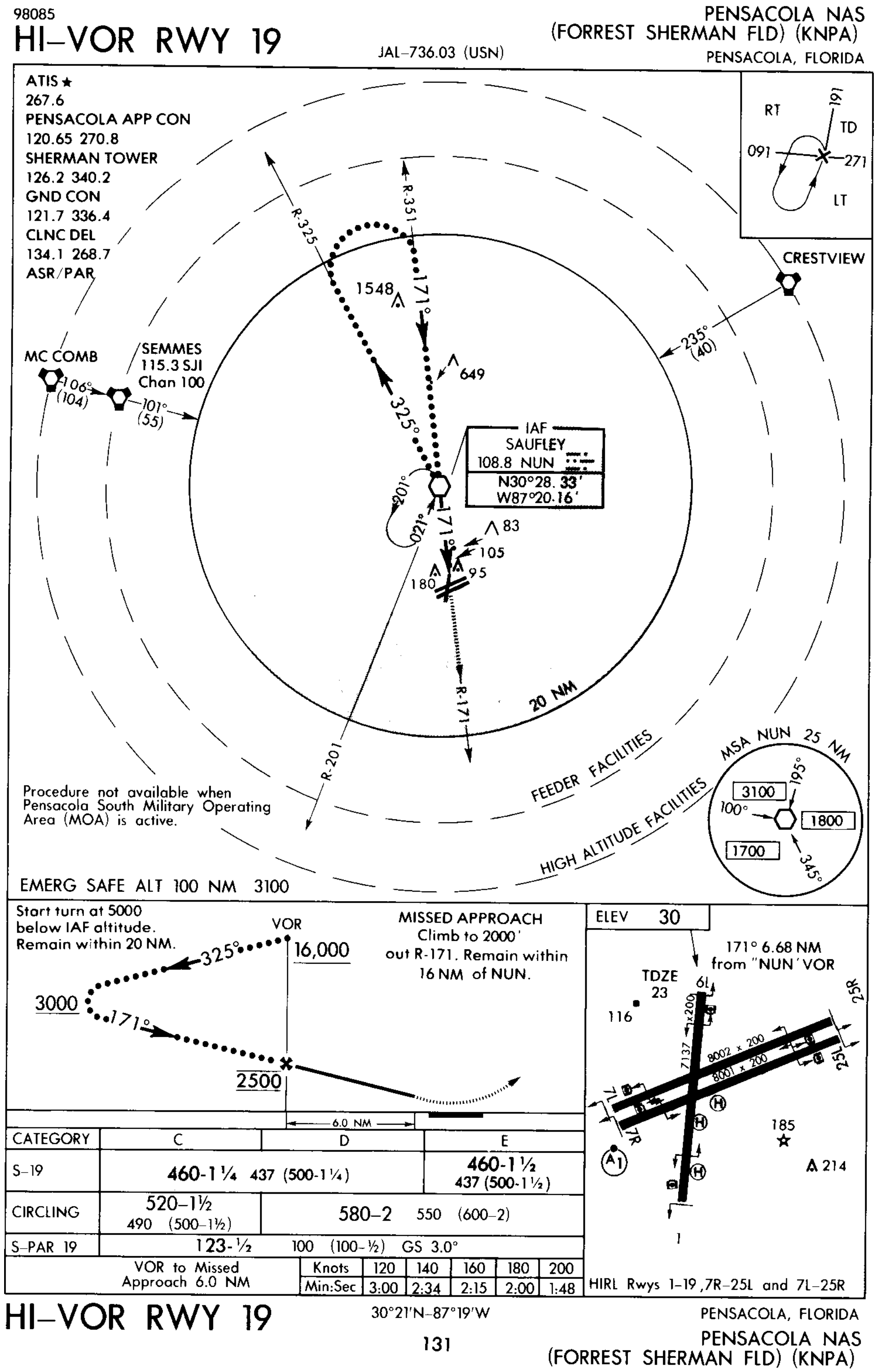
Fig 8: HI-ILS RWY 22 Houston/Ellington Field

1. Outer marker (markers being eliminated)

2. Middle marker near your 200-1/2 minimums; fly to DH

3. Pass overhead the TACAN between 12,000 and 14,000 ft

4. Depends on DME but DME not in name



CATEGORY	C	D	E
S-19	460-1¼ 437 (500-1¼)		460-1½ 437 (500-1½)
CIRCLING	520-1½ 490 (500-1½)	580-2 550 (600-2)	
S-PAR 19	123-½ 100 (100-½) GS 3.0°		

VOR to Missed Approach 6.0 NM

Knots	120	140	160	180	200
Min:Sec	3:00	2:34	2:15	2:00	1:48

Figure 6: HI-VOR RWY 19 PENSACOLA NAS

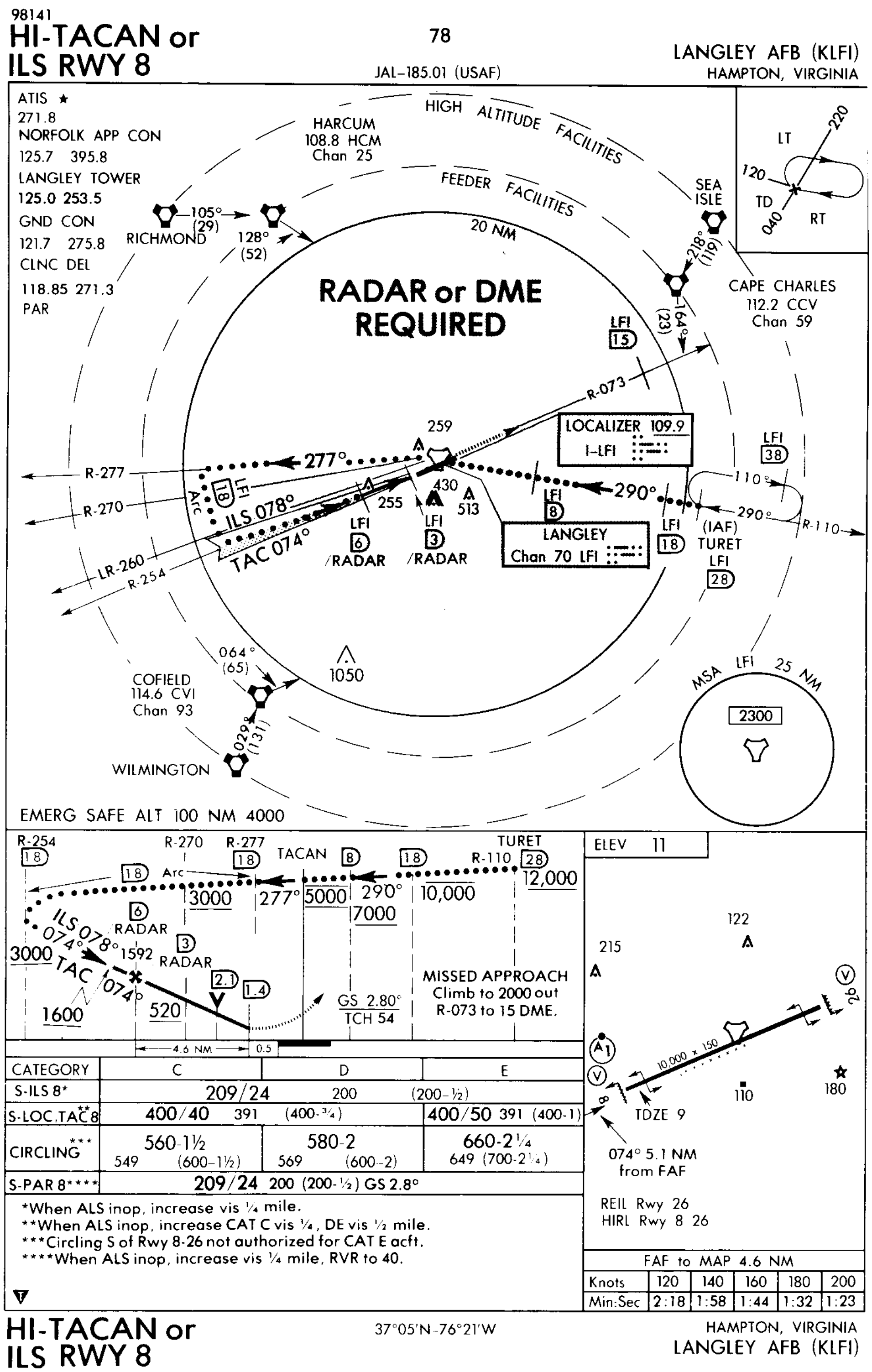


Figure 7: HI-TACAN OR ILS RWY 8 LANGLEY AFB

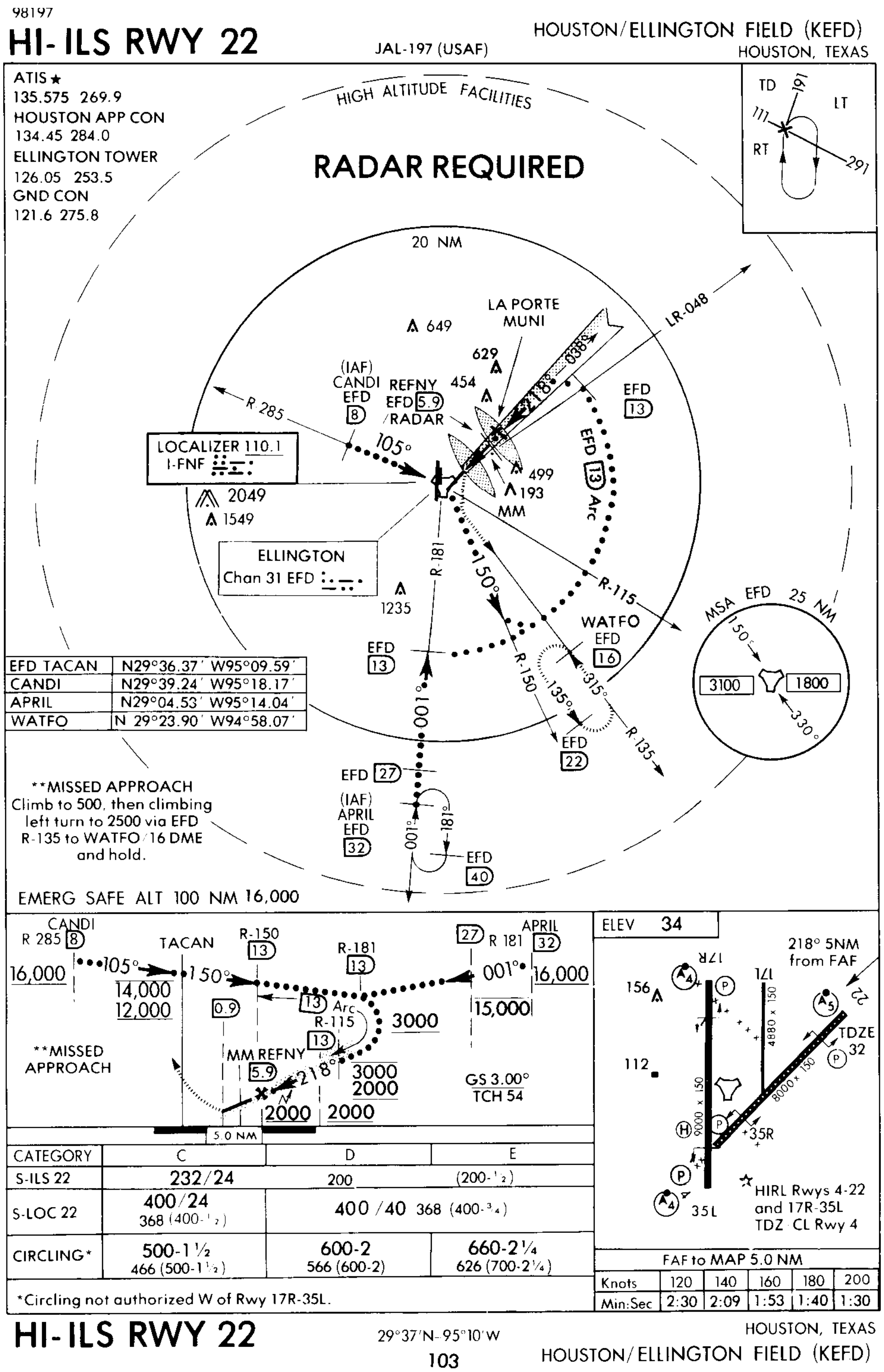


Figure 8: HI-ILS RWY 22 HOUSTON/ELLINGTON FIELD

SUMMARY

This lesson has focused on the following topics:

* Organization and description of the contents of the FLIP (Terminal) High Altitude - United States
  - Front cover of FLIP (Terminal) indicates geographical area of coverage
  - Effective time and date of publication
  - High Altitude Terminal Charts indicated by a "barber pole" border
  - Back cover indicates the geographical coverage of all four books in the High Altitude (Terminal) series
  - Page 1 - General information and abbreviations
  - Table of contents and index of instrument approach procedure charts
* Features common to high altitude instrument approach plates
  - Planview and profile symbols and elements
  - Airport diagrams/sketches
  - Instrument approach minima section
  - Final Approach Fix (FAF) to Missed Approach (MAP) details
* Elements specific to types of high altitude approaches
  - HI-TACAN and VOR/DME
  - VOR
  - ILS
* Practical scenario

CONCLUSION

Having reviewed the content and organization of high altitude approach plates, you are now better prepared to plan and execute precise instrument approaches.

NOTES

LESSON GUIDE (LAB)

COURSE/STAGE: T-45A UJPT & E2-C2 Instrument Navigation

LESSON TITLE: Fuel, Weather, and Alternate Airfield Planning

LESSON IDENTIFIER: T-45A UJPT & E2-C2 INav-08

LEARNING ENVIRONMENT: Classroom

ALLOTTED TIME: 1.2 hr

FIGURES:

STUDY RESOURCES:

* NATOPS General Flight and Operating Instructions, OPNAVINST 3710.7
* T-45A NATOPS Flight Manual, A1-T45AB-NFM-000
* Operating Instructions for APN-91 Computer

(6-99) ORIGINAL

LESSON PREPARATION:

Read:

* Sections 4.6.3 and 4.6.4 in NATOPS General Flight and Operation Instructions, OPNAVINST 3710.7 (Series)

Bring to Class:

* TRAWING TWO In-Flight Guide
* Personal circular navigation computer
* FLIP publications

REINFORCEMENT:

Review as necessary:

* Operating Instructions for APN-91 Computer

EXAMINATION:

The objectives in this lesson will be tested in Instrument Navigation 12X.

LESSON OBJECTIVES

1.1.1.1
Determine weather minimums

2.1.8.2
Determine alternate routes/airfields

2.1.8.1
Determine fuel requirements for route of flight

2.1.10
Recall use and function of the circular navigation (flight) computer

HOW TO USE A WORKBOOK

1. This is a workbook/lab that you will complete in group session with an instructor. You will bring FLIP publications and the TW-2 In-Flight Guide.

2. The lesson contains information accompanied by exercises and/or questions to measure your understanding of the subject matter. Answers are provided in the back of the workbook to allow you to monitor your progress through the lesson.

MOTIVATION

During preflight planning, you must know the weather and fuel requirements. When airborne, you must be prepared to execute contingency plans in the event that conditions change.

OVERVIEW

The more experience you have flying, the more evident it becomes that proper planning and preparation play a major role in the safe and effective accomplishment of your mission.

As you prepare for an IFR mission, you must consider, in your preflight planning, the types of approaches and weather minimums associated with your aircraft's compatible NAVAIDs for both destination and alternate airfields.

Another critical aspect in preparing for your flight is fuel planning. Your fuel plan must include provisions for departure to destination and destination to an alternate, plus your required reserve.

When you have completed this lesson, you will be able to use the appropriate criteria for determining weather minimums and fuel requirements for your destination and alternate airfields.

This lesson consists of:

* Weather minimums
* Alternate routes/airfields
* Fuel requirements for route of flight
* Navigation computer
  - Point-to-point

REFRESHER

Be prepared to combine your knowledge of regulations and your meteorological data interpretation skills in order to solve flight planning problems. In particular, recall:

* METAR code used in Terminal Aerodrome Forecast printouts
* OPNAVINST 3710.7 regulations from your T-34 training

PRESENTATION

DETERMINING WEATHER MINIMUMS AND ALTERNATE ROUTES/AIRFIELDS 1.1.1.1, 2.1.8.2

As part of your flight planning activities, you need to prepare yourself to make early and rapid decisions in the event that emergency situations arise or weather conditions change while you are in flight. To be prepared, you should examine the forecast weather conditions at your proposed destination and possible alternate and use the OPNAVINST 3710.7 (series) weather criteria governing your selection of a destination and alternate to develop a plan of action.

To file your IFR flight plan, you must ascertain that the actual and the forecast weather meet the minimums required for flight.

Existing Weather

The plan you file must be based on the existing weather at the point of departure at the time of clearance and the existing and forecast weather for the entire route of flight.

Forecast Weather

You obtain this information by reviewing the Flight Weather Briefing (DD Form 175-1) and Terminal Aerodrome Forecasts (TAF) for both your destination and probable alternate. Remember to consider forecast surface winds so that you may employ your best judgment to determine the runway in use on arrival. (See OPNAVINST 3710.7, para 4.6.3.2.)

Your destination forecast is based on the Terminal Aerodrome Forecast at civilian and military airfields. From these reports you can determine the forecast ceiling and visibility for your ETA +/- 1 hour. This teletype information will aid in planning for an IFR flight, identifying the type of approach required, determining if an alternate is required, and selecting the best alternate, if one is required. (A reminder, CNATRA requires an alternate on all Training Command cross-country flights.)

Both your destination and alternate weather terminal forecast periods extend from one hour before your estimated time of arrival (ETA) at each airfield until one hour after ETA. Since your ETA will be different at your destination and your alternate, you will have different time blocks for examining your forecast weather. For example, if your ETA at your destination is 0900, your weather forecast period is from 0800 to 1000. If your ETA at your alternate is 0930, you will use a weather forecast period of 0830 to 1030. The DD form 175-1 provided by the forecaster on the day of flight is the final arbiter of the forecast weather.

PROGRESS CHECK

Question 1 — 1.1.1.1
You need to check existing weather for the time of your clearance at your point of departure and for your _____.

ANSWER:

Question 2 — 1.1.1.1
Your forecast weather is for what period of time?

ANSWER:

Filing Criteria Rules for Minimums

The rationale for planning your flight according to stringent weather minimums is to ascertain that the meteorological conditions at your destination meet the weather minimum criteria. OPNAVINST 3710.7 series dictates the weather criteria to determine whether or not you may file for a destination and whether or not you must select an alternate. If an alternate is required, these criteria aid you in choosing one that is satisfactory.

These weather criteria describe the ceiling in feet AGL and the visibility in sm. For example, minimums of 3,000-3 mean that your ceiling is 3,000 ft and your visibility is 3 sm.

Refer to the following chart (Figure 1) from OPNAVINST 3710.7 to review the criteria for filing an IFR flight plan.

Remember to comply with the following IFR filing criteria:

* Observe your absolute minimums of 200-1/2 at the destination for single-piloted aircraft.
  NOTE: The T-45A is considered “single-piloted” by the FAA because of its tandem seating, regardless of how many pilots are in the aircraft.
* Use minimums for instrument approach to the probable duty runway based on forecast surface winds.
* Use lowest minimums for any published approach to that probable duty runway you are qualified for and your aircraft is equipped to make.

COMMON ERROR: Don’t confuse your pilot minimums with approach minimums. Remember that all Naval aviators in a single-piloted aircraft must observe the absolute minimums of 200-1/2 regardless of the published approach minimums, i.e., published minimums may be 100-1/4, <u>your</u> minimums are 200-1/2.

COMMON ERROR: Your planning minimums on the card below relate destination and alternate weather. After you are airborne, your minimums are 200-1/2 or better, depending on published minimums.

<table>
<tr><td>DESTINATION WEATHER
ETA plus and minus one (1) hour</td><td colspan="3">ALTERNATE WEATHER
ETA plus and minus one (1) hour</td></tr>
<tr><td>0-0 up to but not including published minimums</td><td colspan="3">3,000-3 or better</td></tr>
<tr><td rowspan="3">Published minimums up to but not including 3,000-3 (single-piloted absolute minimums 200-1/2)</td><td rowspan="2">NON-PRECISION</td><td colspan="2">PRECISION</td></tr>
<tr><td>ILS</td><td>PAR</td></tr>
<tr><td>* Published minimums plus 300-1</td><td>Published minimums plus 200-1/2</td><td>* Published minimums plus 200-1/2</td></tr>
<tr><td>3,000-3 or better</td><td colspan="3">No alternate required</td></tr>
<tr><td colspan="4">*In the case of single-piloted or other aircraft with only one operable UHF/VHF transceiver, radar approach minimums may not be used as the basis for selection of an alternate airfield.</td></tr>
</table>

Figure 1: IFR FILING CRITERIA

PROGRESS CHECK

Question 3 — 1.1.1.1
What are your absolute minimums in a single-piloted aircraft?

ANSWER:

CHOOSING ALTERNATE AIRFIELDS 2.1.8.2

For each flight, you must determine whether or not an alternate is required. To make this determination, refer to the forecast weather at your destination and the OPNAVINST 3710.7 criteria.

NOTE: CNATRA requires an alternate for all IFR flights.

Planning for an Alternate

If your destination weather does not meet minimal criteria, you are required to select an appropriate alternate in your flight preparation so that you will have a safe alternate in case you need one. First, carefully apply OPNAVINST 3710.7 weather minimum rules to your destination weather.

1. If the ceiling and visibility are between 0-0 and published minimums (NLT 200-1/2), you require an alternate that must be 3,000-3 or better at ETA +/- 1 hour.

2. If the ceiling and visibility are between published minimums up to but not including 3,000-3, you again require an alternate. The weather for a non-precision approach at your alternate must be the non-precision's published minimums plus 300-1. The weather for a precision approach at your alternate must be the precision's published minimums plus 200-1/2. (For a single-piloted aircraft, this will be ILS only; PAR does not qualify.)

Examine the following two situations, each depicting one of the above rules.

First, let's look at Situation 1, in which your destination forecast is below published minimums.

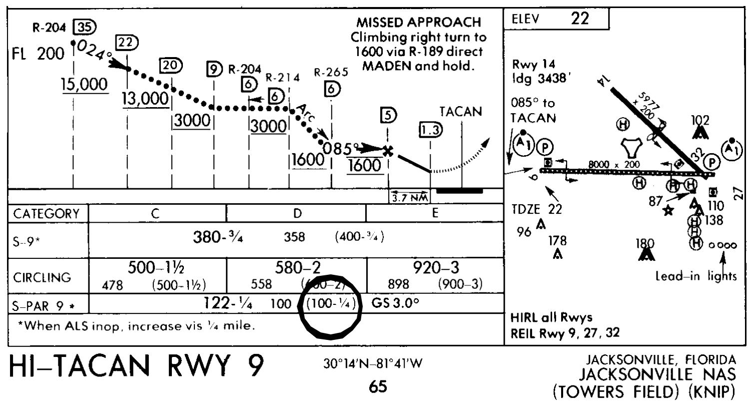
SITUATION 1- DESTINATION FORECASTING BELOW PUBLISHED MINIMUMS:

Assume NAS Jacksonville is forecasting weather of a 100-ft ceiling and 1/2-sm visibility during the period one hour before until one hour after your planned ETA, with surface winds 090 degrees at 5 kts. You can see from Example A that the published minimums for a PAR runway 9 approach are 100-1/4.

When evaluating your destination weather, you can use the lowest minimums for any approach you are equipped to make; therefore, if available, look first at ILS or PAR minimums.

After evaluating the IFR filing criteria (Example B) and approach plate (Example A), fill in the following information:

* Forecast weather for NAS Jacksonville is __________.
* Your absolute single-piloted minimums are __________.
* Your suitable alternate airfield must have forecast weather of __________ ceiling and ___________ miles visibility.



Example A

IFR Filing Criteria

DESTINATION WEATHER ETA plus and minus one (1) hour	ALTERNATE WEATHER ETA plus and minus one (1) hour		
0-0 up to but not including published minimums	3,000-3 or better		
Published minimums up to but not including 3,000-3 (single-piloted absolute minimums 200-1/2)	NON-PRECISION	PRECISION	
		ILS	PAR
	* Published minimums plus 300-1	Published minimums plus 200-1/2	* Published minimums plus 200-1/2
3,000-3 or better	No alternate required		
*In the case of single-piloted or other aircraft with only one operable UHF/VHF transceiver, radar approach minimums may not be used as the basis for selection of an alternate airfield.			

Example B

As you have noted, NAS Jacksonville is forecasting weather of 100-1/2, which is above published minimums for a precision approach (100-1/4) at this airfield, however, below the single-piloted minimums of 200-1/2. For this situation, you must select a suitable alternate having forecast weather of 3,000-3 or better during the period of one hour before to one hour after your ETA at alternate.

Figure 2: DESTINATION/ALTERNATE WEATHER EXAMPLES--SITUATION 1

Next, study Situation 2, in which your destination forecast is above published minimums but below 3,000-3.

NOTE: When planning for an alternate with more than one published approach to the probable duty runway, use the lowest of the approach minimums for which you qualify.

Naturally, you will not want to select just any aerodrome as your alternate. Exercising foresight and judgment, choose an alternate suitable for your aircraft and mission requirement. Do you have sufficient fuel to fly to the alternate given some delays? Does your alternate have NAVAIDs that are operable and are compatible with your equipment? Also, are radar facilities available should you experience NAVAID equipment failure? Is your alternate far enough away from your destination to be unaffected by the same weather systems? Get in the habit of raising and answering these kinds of questions as part of your flight planning for an alternate airfield.

After choosing an alternate, you must determine the most suitable approach to your alternate considering crosswinds and T-45A requirements. Remember that although the maximum crosswind for the aircraft is 20 kts (15 kts on a wet runway), your maximum crosswind as a student pilot is 10 kts. This may require that you utilize a circling approach with higher minimums.

Next, calculate that you have an adequate fuel supply to your alternate plus your required reserve of 300 pounds.

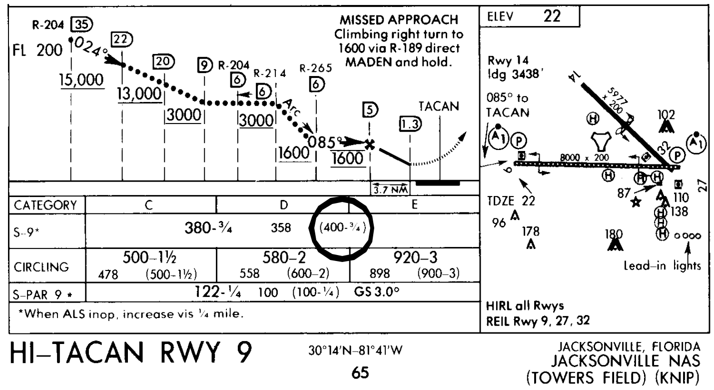
Finally, it is critical that you check NOTAMs to make sure that your alternate is available during the time that you may need it. Your “best” alternate is best only if it is open, and runways may be closed for a variety of reasons.

SITUATION 2 - DESTINATION FORECASTING
ABOVE PUBLISHED MINIMUMS BUT BELOW 3,000-3:

Assume you are single-piloted and NAS Pensacola is forecasting weather of 300 ft and 1 sm for the period one hour before until one hour after your planned ETA with surface winds of 090 degrees at 5 kts. The forecast weather is above the published PAR minimums of 100-1/4 but below 3,000-3; therefore, you must plan an alternate destination. You have selected NAS Jacksonville as your alternate with forecast winds of 090 degrees at 5 kts. Due to a mechanical failure, you do not have the option of using an ILS approach; however, TACAN and VOR/DME are available.

The PAR minimums are 100-1/4 and your absolute minimums of 200-1/2 are within the forecast range of 300-1. The ILS criteria do not apply in this situation for two reasons: 1) ILS is not available at NAS Jacksonville, 2) your ILS equipment is inoperable. You need to examine the criteria for available non-precision and precision approaches at your alternate airfield.

Also remember that should there be more than one published approach to the probable duty runway at your alternate, you would use the non-precision approach with the lowest minimums for planning purposes. In this situation your most suitable approach for planning purposes is HI-TACAN RWY 9 with minimums of 400-3/4. Therefore, NAS Jacksonville must have forecast weather of 700-1 3/4 (400-3/4 plus 300-1) to be an acceptable alternate.



Example C

IFR Filing Criteria

DESTINATION WEATHER ETA plus and minus one (1) hour	ALTERNATE WEATHER ETA plus and minus one (1) hour		
0-0 up to but not including published minimums	3,000-3 or better		
Published minimums up to but not including 3,000-3 (single-piloted absolute minimums 200-1/2)	NON-PRECISION	PRECISION	
		ILS	PAR
	*Published minimums plus 300-1	Published minimums plus 200-1/2	*Published minimums plus 200-1/2
3,000-3 or better	No alternate required		

*In the case of single-piloted or other aircraft with only one operable UHF/VHF transceiver, radar approach minimums may not be used as the basis for selection of an alternate airfield.

Example D

Figure 3: DESTINATION/ALTERNATE WEATHER EXAMPLES--SITUATION 2

PROGRESS CHECK

Question 4 — 2.1.8.2
For planning purposes, if your destination weather is at or above published minimums but below 3,000-3, forecast weather must be __________ , for a non-precision approach at your alternate.

ANSWER:

EXCEPTIONS TO BASIC FILING CRITERIA

For reasons of safety, previous editions of OPNAVINST 3710.7 added two requirements to the basic filing criteria to provide for the exceptional event that you 1) experience total radio failure when flying IFR to a “radar only” airfield or one without a TACAN, VOR, or ILS approach, or 2) you must execute a missed approach with radio failure at your destination and proceed at minimum enroute altitude to an alternate that does not have a published TACAN, VOR, or ILS approach.

The current edition of OPNAVINST 3710.7 does not include these requirements, but good headwork and safety considerations would indicate these “rules” should be adhered to.

* Regardless of weather conditions, if you are filing to a destination without aircraft compatible NAVAIDs, a suitable alternate must have a published approach that you can fly without the use of two-way radio communications.

* If the alternate does not have a published approach compatible with your aircraft equipment, the forecast weather must allow for descent and landing in visual meteorological conditions (VMC) from the lowest minimum enroute altitude.

PROGRESS CHECK

Question 5 — 2.1.8.2
Do OPNAVINST 3710.7 filing minimums apply after a missed approach at your destination?

ANSWER:

DETERMINING FUEL REQUIREMENTS FOR ROUTE OF FLIGHT 2.1.8.1

To determine the fuel requirements for each stage of flight, apply OPNAVINST 3710.7 minimum fuel criteria. These criteria ensure that you will have sufficient usable fuel (and a margin for safety) to execute your flight plan. The following excerpt from OPNAVINST 3710.7, paragraph 4.6.4, fully states the minimum fuel requirements for naval aircraft.

MINIMUM FUEL REQUIREMENTS

FUEL PLANNING. All aircraft shall carry sufficient usable fuel, considering all meteorological factors and mission requirements, to ensure:

(1) If alternate is not required, fly from takeoff to destination airfield plus a reserve of ten (10) percent of planned fuel requirements.

(2) If alternate is required, fly from takeoff to the approach fix serving destination and thence to an alternate airfield plus a reserve of ten (10) percent planned fuel requirements.

(3) In no case shall the planned fuel reserve after final landing at destination or alternate airfield, if one is required, be less than that needed for 20 minutes flight, computed for turbine-powered, fixed-wing aircraft based on maximum endurance operation at 10,000 ft.

(4) Minimum fuel reserve requirements are contained in the appropriate NATOPS manual.

T-45 NATOPS Performance Data, Section XI

The NATOPS performance data section provides charts to compute your fuel data. For convenience, this information is consolidated in the Trawing Two In-Flight Guide.

NAVIGATION COMPUTER 2.1.10

INTRODUCTION

The circular navigation computer has been designed to aid pilots in the solution of problems involving flight, and primarily to compute time enroute and fuel required for a flight. The Navy uses various makes and models, primarily the CR-2, 3 or 4 or the APN-91, but whether it be Jeppesen, Telex, Allegheny, or one of several other makes, they are all either identical or similar in design. You have already been exposed to this type of computer during the Schools Command and Primary phases of training.

CALCULATOR SIDE

You should be fairly familiar with the calculator side, basically it's a circular slide rule that can be used for time/distance/fuel computations (see your primary CR-2 workbook for review) but there is one more item that it can be used for that has not been introduced up to now.

WIND SIDE

The primary use of the Wind Side of the Air Navigation Computer is to calculate the forecast ground speed, which of course is utilized to determine time enroute and fuel required for each leg of the flight.

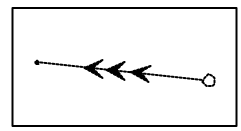
Another important use is a point-to-point calculation to determine a course and distance from destination Initial Approach Fix (IAF) to the alternate Initial Approach Fix.

To solve these problems on any model of the circular computer consists of a simple arrangement for setting up vector triangles.

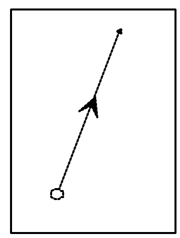
The Wind Triangle

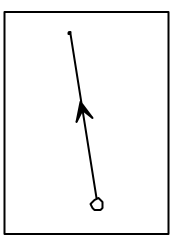
The wind triangle consists of:

The Wind Vector, made up of wind direction and velocity. Plotted on the wind side starting at the grommet in the direction of the wind, its length represents the velocity. On a plotting board it would be a solid line with three arrowheads.



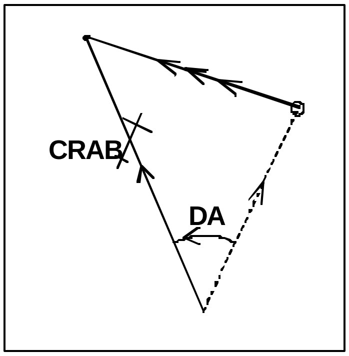
The "AIR" vector, comprised of the TRUE heading (TH) and the TRUE airspeed (TAS). The air vector always ends at the beginning of the wind vector (the grommet on the computer) and represents the path assuming no wind. On a plotting board it would be depicted as a dashed line, with a single arrowhead.





The "GROUND" vector is made up of COURSE (CUS) and GROUND SPEED (GS) and represents the path of the aircraft caused by the wind. Its origin is the same as the air vector, and ends at the head of the wind vector (or wind dot). On a plotting board it would be depicted as a solid line, with a single arrowhead.

You will note that the ground and air vectors have a common point of origin and the angle between the two, from TH/TAS to CUS/GS is the DRIFT ANGLE. The angle from CUS/GS to TH/TAS is CRAB ANGLE.

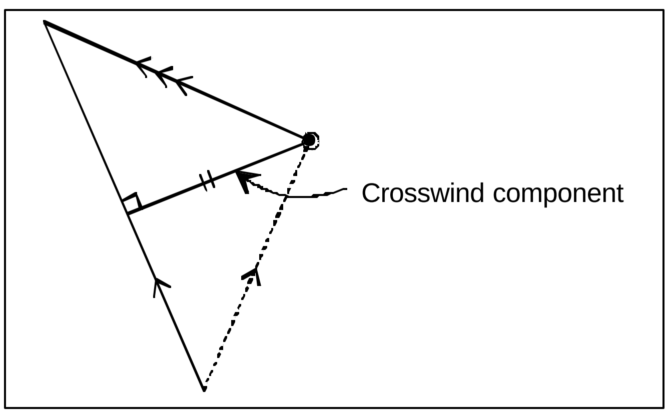


As a side note: a course (CUS) is predicted path over the ground. TRACK is your actual path over the ground.

Drift angle is important because it represents the angle at which the aircraft will drift away from the desired course if you don't put any correction into the wind.

The crab angle is the correction that must be used into the wind to maintain a desired course. Crab angle corrects for drift angle.

Due to the limited size of the navigation computer, only a portion of the wind triangle is plotted on the wind side as a graphic display. The rest is solved trigonometrically. Without going much into the higher mathematics of the computer, what we are setting up is top part of the wind triangle on the grid face.



By definition, the sine of an acute angle in the right triangle is equal to the side opposite the angle divided by the hypotenuse (side opposite the right angle). Therefore:

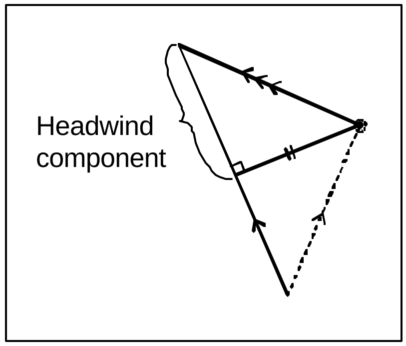
$$\text{SINE of the Drift Angle} = \frac{\text{Crosswind Component}}{\text{True Air Speed}}$$

If we rearrange the equation: $$\text{True Air Speed} = \frac{\text{Crosswind Component}}{\text{Sine of the Drift Angle}}$$

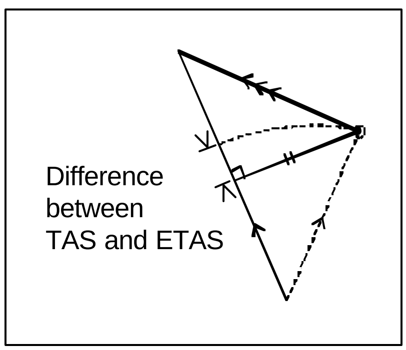
The computer puts the crosswind component on the outside scale of the wind side, and the Sine, which you read as an angle, on the white middle scale which gives you the drift angle.

EFFECTIVE TRUE AIRSPEED

That portion of the wind triangle on the computer above or below the midline represents the headwind or tailwind component respectively that has to be added or subtracted to/from the TAS to solve for ground speed.



Now, as we are adding or subtracting this component from the TAS, we, in essence, have to swing the length of the TAS line to the CUS/GS to subtract to get ground speed.



When the drift angle is less than 10 degrees, you get an error of less than 1/2 of 1% (.005), but with a drift angle greater than 10 degrees the error climbs to 1 1/2% or greater, so we have to compensate for it in some way. We use the "Cosign" of the drift angle. The designers of the Air Navigation Computer have provided a handy "Cosign" scale just to the left of the TAS index. To find the "Effective True Airspeed," find the drift angle to the left of the TAS index on the black cosign scale; directly above, read the "Effective True Airspeed." Use this ETAS with headwind or tailwind to get the effective ground speed for that particular leg. The drift angle correction needs only to be used if the drift angle is 10 degrees or greater.

GROUNDSPEED

There are two types of winds associated with flying operations, TRUE and MAGNETIC. The surface winds you receive from Approach/Departure Control and Airport Traffic Control Towers are MAGNETIC winds, which coincide with the magnetic direction of runways. The enroute winds you receive from the forecaster are TRUE winds, and are taken from the teletype Winds Aloft Forecast (FD).

You will be primarily working with the FLIP Enroute High Altitude Charts which depict radials (courses) in degrees magnetic. These are the radials you set in the course selector of the HSI. You will fly a magnetic heading on your HSI to make good the course, or track-over-the-ground, you have selected. In flight planning, therefore, if you are faced with TRUE WINDS and MAGNETIC COURSES, it is obvious something has to be done to make them compatible.

The circular computer solves this by providing a magnetic-true conversion scale on either side of the True Course (TC) index. From the FLIP Enroute Charts, you obtain your desired Magnetic Course and also the Magnetic Variation in the area. By setting the Magnetic Course on the "Degree Scale" over the Variation (East or West), the wind dot is automatically aligned to use the True Winds Aloft which you received from the forecaster. You use this method for each leg to compute groundspeeds for each leg of flight.

NOTE: Lines of Magnetic Variation are depicted at 4-degree intervals. You should interpolate between lines to obtain the approximate variation in your area of flight. An alternate method would be to look at a field diagram in the area of flight.

Examples:

1. **Computing ground speed with crab angle less than 10 degrees** - You obtain the following information to complete one leg of flight on the Jet Flight Log:

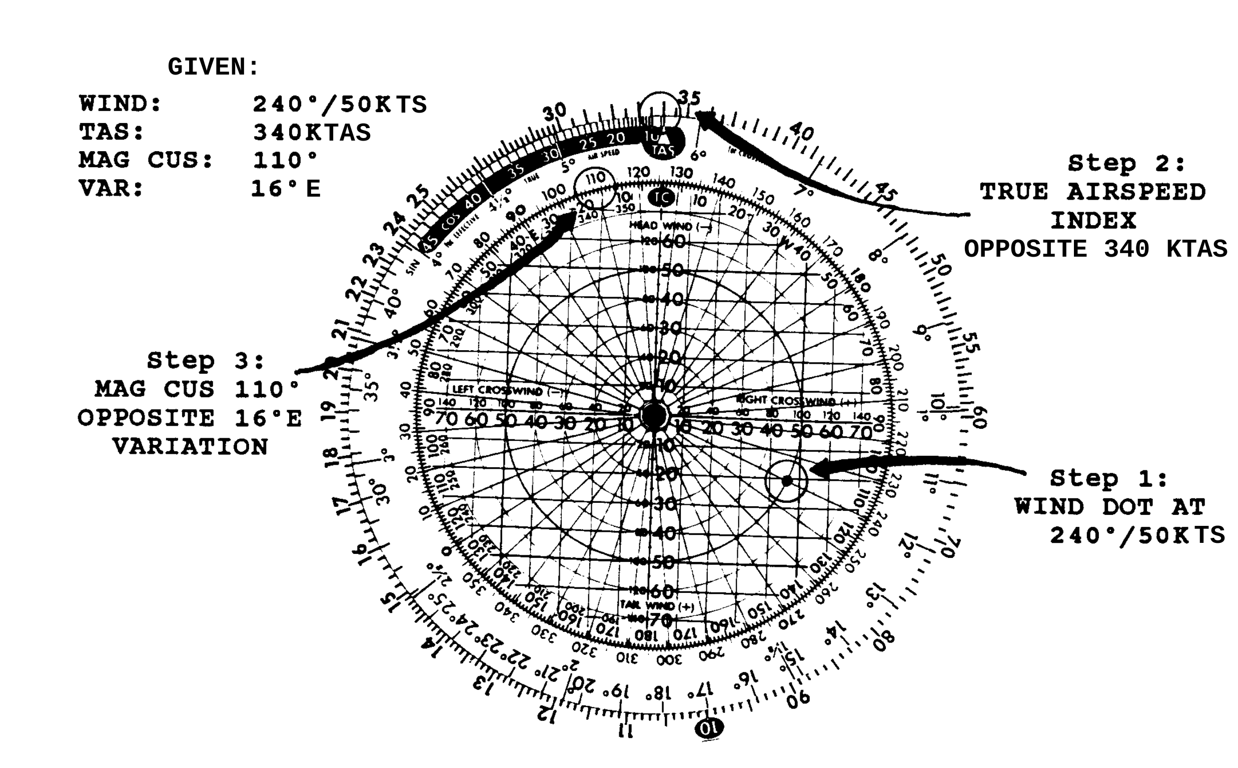


Figure 4 (Part 1): COMPUTING GROUND SPEED WITH CRAB ANGLE LESS THAN 10 DEGREES

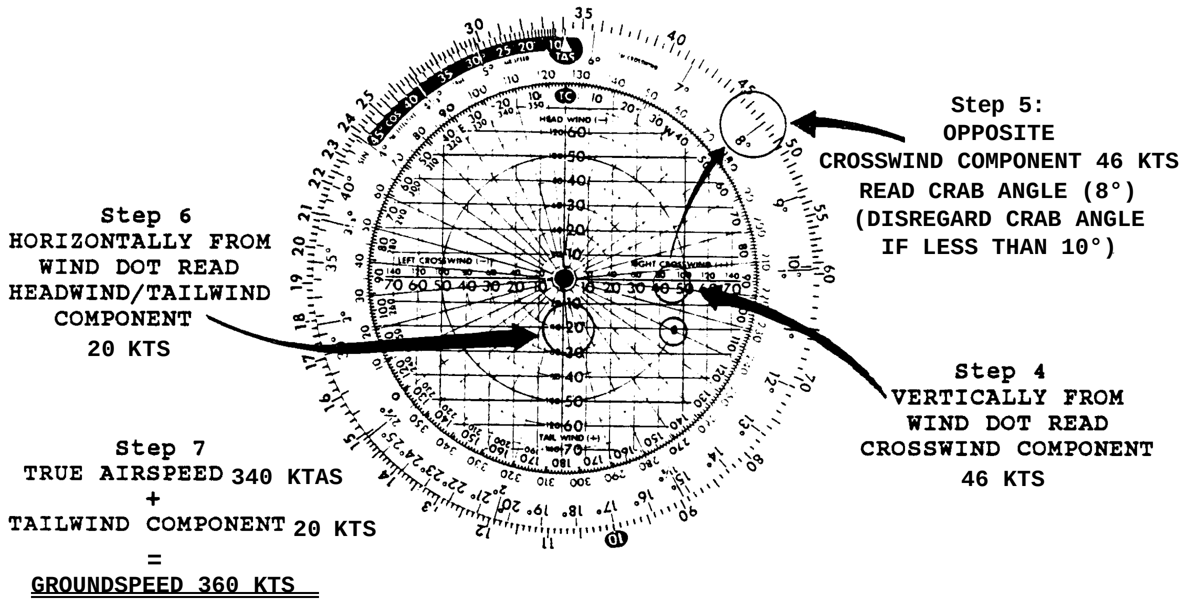


Figure 4 (Part 2): COMPUTING GROUND SPEED WITH CRAB ANGLE LESS THAN 10 DEGREES

2. **Computing groundspeed with crab angle 10 degrees or greater -** You obtain the following information to complete one leg of flight on the Jet Flight Log:

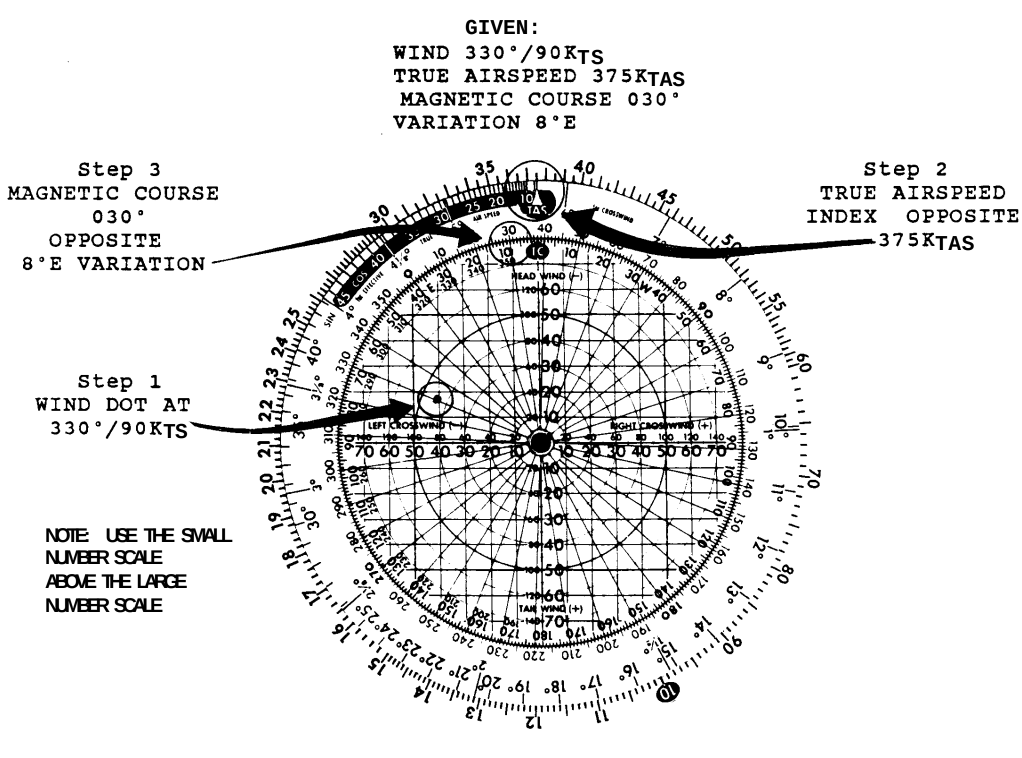


Figure 5 (Part 1): COMPUTING GROUND SPEED WITH CRAB ANGLE 10 DEGREES OR GREATER

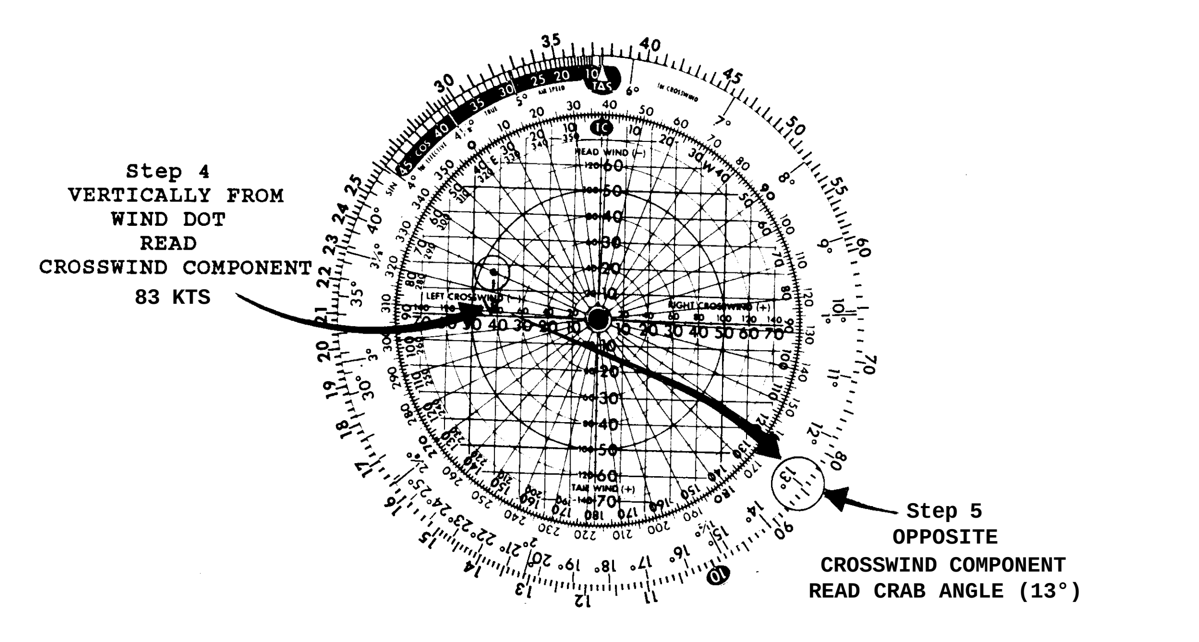


Figure 5 (Part 2): COMPUTING GROUND SPEED WITH CRAB ANGLE 10 DEGREES OR GREATER

As previously stated, for wind problems where the crab angle is less than 10 degrees, the headwind or tailwind component is simply applied to the true airspeed to obtain groundspeed. With small crab angles, this is very close to being accurate, any inaccuracy being too small to be concerned about. With crab angles of 10 degrees or more, however, the error is large enough to require the use of the **EFFECTIVE TRUE AIRSPEED (ETAS)** (Cosign Scale) for obtaining more precise groundspeeds.

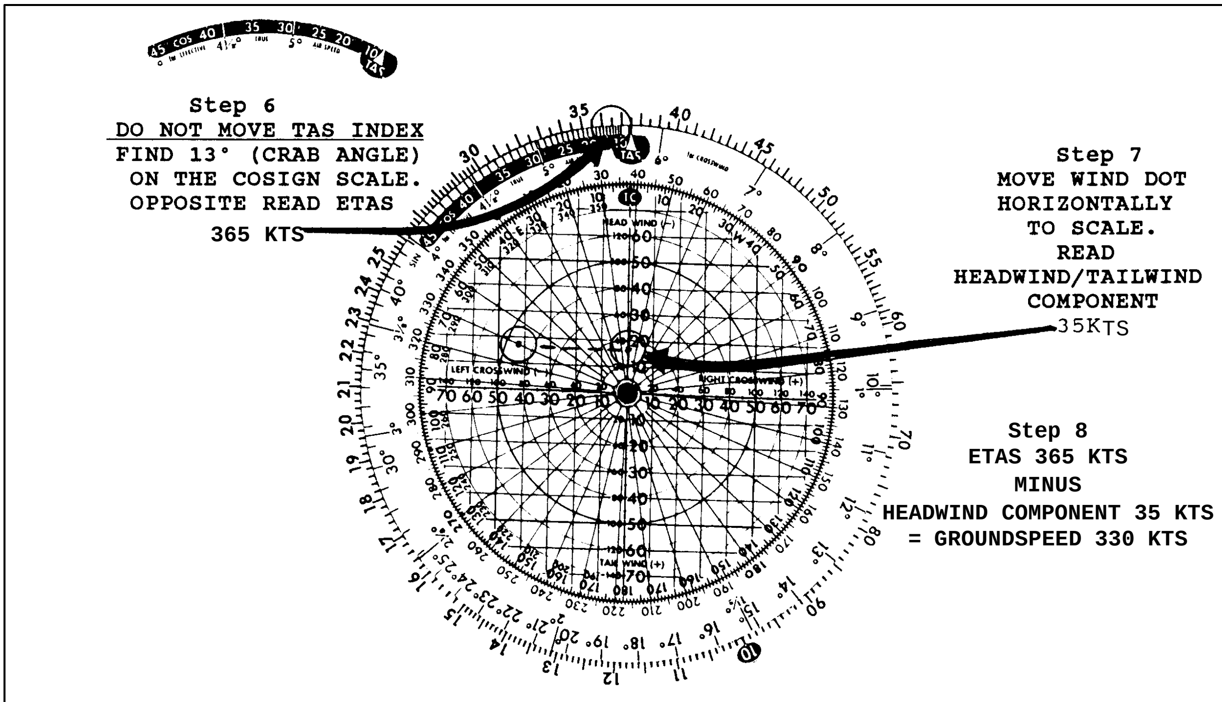


Figure 5 (Part 3): COMPUTING GROUND SPEED WITH CRAB ANGLE 10 DEGREES OR GREATER

3. Point-to-Point

The navigation computer wind side can be used for TACAN point-to-point problems. In essence we are going to use it as a plotting board.

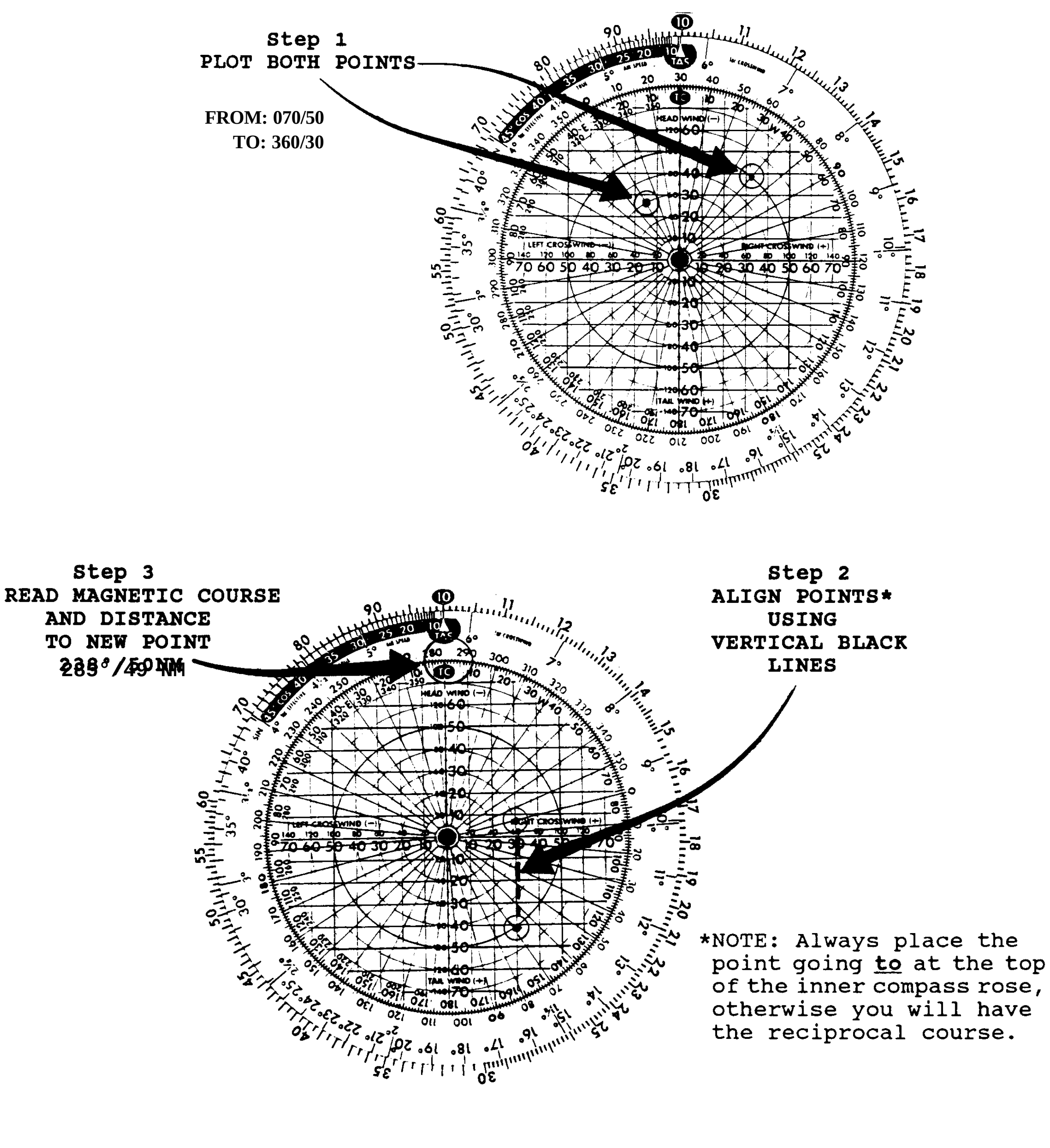


Figure 6: POINT-TO-POINT

One may use a pencil laid on the HSI to approximate the computer's output. The computer can be used to determine the course and distance from the IAF at your destination to the IAF at the alternate as follows.

Point-To-Point (IAF to IAF)

On the front side, lower portion of the Jet Flight Log are spaces for cruising from destination Initial Approach Fix (IAF) to the alternate Initial Approach Fix. The “Wind Side” of the Navigation Computer can be used to determine magnetic course and distance for this leg of the flight using a common feeder facility for the two IAF navigation facilities.

Step 1

Using forecast winds, determine appropriate Approach Procedure Charts for the probable runways in use at destination and alternate, based on forecast surface winds.

EXAMPLE:

Destination: New Orleans NAS

Alternate: Pensacola NAS

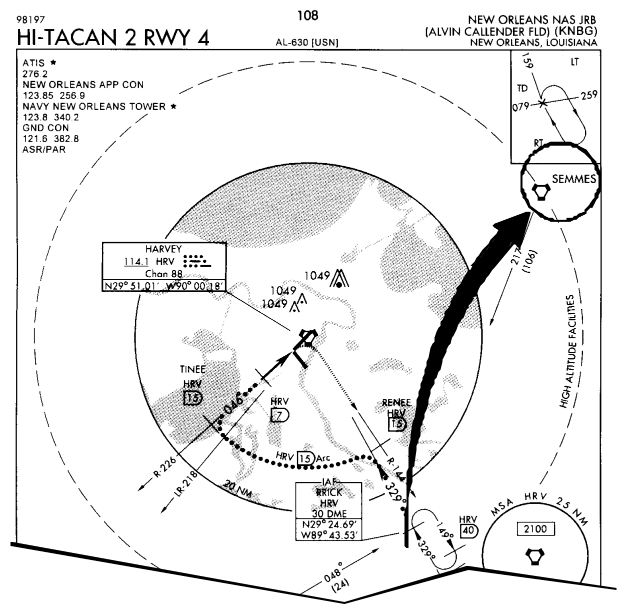


Figure 7: NAS NEW ORLEANS APPROACH

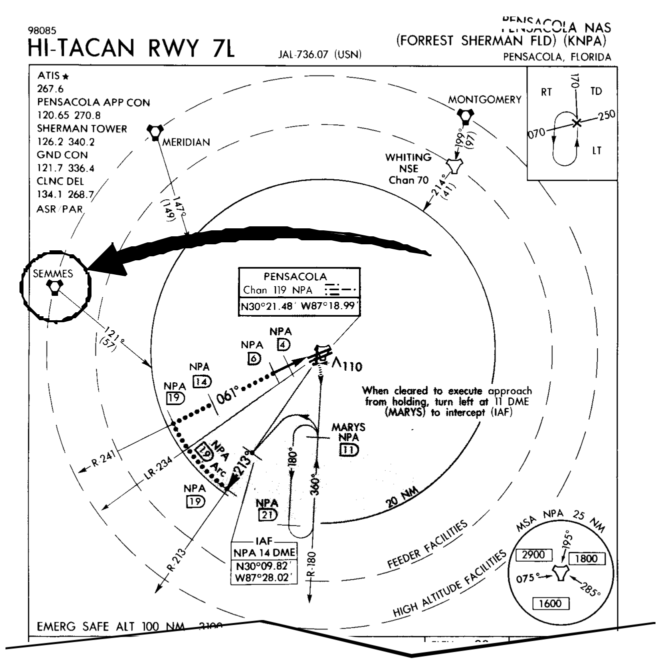


Figure 8: NAS PENSACOLA APPROACH

Step 2

Locate a NAVAID common to both Approach Procedure Charts which have “Feeder Routes” to the two IAFs.

EXAMPLE:

Semmes VORTAC is depicted on both charts with ”Feeder Routes” to the Pensacola and New Orleans IAFs.

Note: “Feeder Routes” bearing and range are to the IAF, <u>NOT</u> the holding fix or the NAVAID.

Step 3

With the center of the computer being the common NAVAID, Semmes VORTAC, plot the IAF for New Orleans NAS and the IAF for Pensacola NAS by using the bearing and range of the “Feeder Routes” on the Approach Procedure Charts.

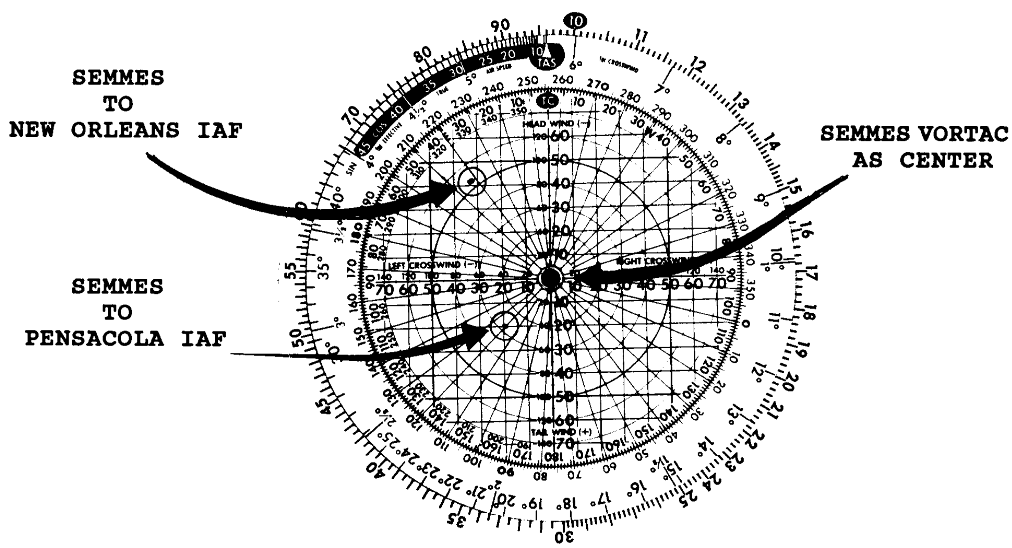


Figure 9 (Part 1): POINT-TO-POINT SOLUTION

The “Feeder Routes” give two sides of the triangle from the center. Solution of the third side will be the Magnetic Course and distance from IAF to IAF.

Step 4

Align the two IAF plots parallel to one of the black vertical lines and read MAGNETIC COURSE and DISTANCE.

CAUTION: Alternate plot (Pensacola IAF) must be at the top to prevent reading reciprocal course.

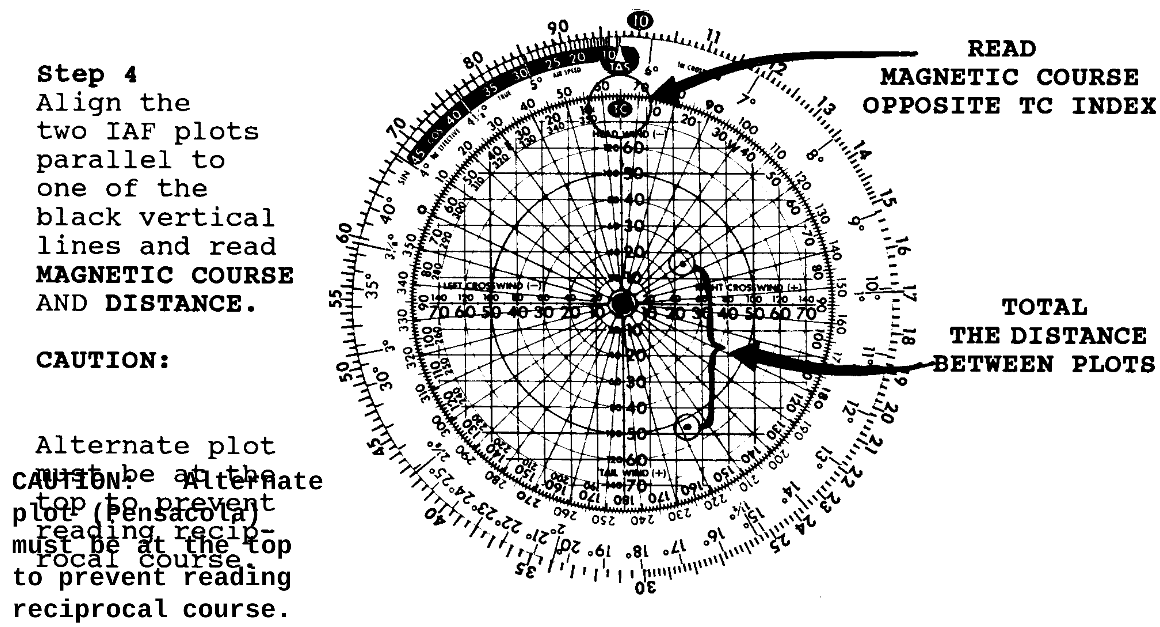


Figure 9 (Part 2): POINT-TO-POINT SOLUTION

SUMMARY

Remember that you must consider three factors prior to beginning any flight:

* Weather minimums
* Alternate airfields
* Fuel requirements for route of flight

Navigation computer assists in preflight planning and airborne changes.

* Point-to-point

CONCLUSION

One of the most important facets of flight is planning. Planning flights accurately and completely will demonstrate your professionalism and help you complete every mission safely.

ANSWER KEY

Question 1
You need to check existing weather for the time of your clearance at your point of departure and for your __________.

ANSWER: route of flight

Question 2
Your forecast weather is for what period of time?

ANSWER: ETA +/- 1 hour

Question 3
What are your absolute minimums in a single-piloted aircraft?

ANSWER: 200-1/2

Question 4
For planning purposes, if your destination weather is at or above published minimums but below 3,000-3, forecast weather must be _________, for a non-precision approach at your alternate.

ANSWER: 300-1 above the published minimums.

Question 5
Do OPNAVINST 3710.7 filing minimums apply after missed approach at your destination?

ANSWER: No. Filing minimums are good for filing a DD-175. After you are in the air, your minimums are NLT 200-1/2 or the appropriate published minimums if higher.

NOTES

LESSON GUIDE (LAB)

COURSE/STAGE: T-45A UJPT, E2-C2 Instrument Navigation

LESSON TITLE: Flight Planning (Departure)

LESSON IDENTIFIER: T-45A UJPT, E2-C2 INav-09

LEARNING ENVIRONMENT: Classroom

ALLOTTED LESSON TIME: .8 hr

FIGURES:

(6-99) CHANGE 1

FIGURES:

STUDY RESOURCES:

* T-45A NATOPS Flight Manual, A1-T45AB-NFM-000
* NATOPS General Flight and Operating Instructions, OPNAVINST 3710.7
* DOD FLIP General Planning (GP)
* DOD FLIP Area Planning (AP/1, AP/1A)
* DOD FLIP (Enroute) Flight Information Handbook
* DOD FLIP (Enroute) IFR Supplement United States
* U.S. Enroute Low Altitude Charts
* U.S. Enroute High Altitude Charts
* DOD FLIP (Terminal) Low Altitude United States
* DOD FLIP (Terminal) High Altitude United States
* Operating Instructions for APN-91 Computer

LESSON PREPARATION:

Read:

* Chapter 25 in NATOPS Instrument Flight Manual, NAVAIR 00-80T-112

REINFORCEMENT:

Review:

* Procedures for completing the Single-Engine Jet Flight Log
* Operating Instructions for APN-91 Computer

EXAMINATION:

The objectives in this lesson will be tested in Instrument Navigation 12X.

LESSON OBJECTIVES

2.1.8.5
Recall instrument equipment requirements for IFR flight

2.1.8.3
Recall FLIPs required for flight planning

2.1.8.6
Recall information provided by NOTAM system

2.1.8.7
Recall items to be checked for destination airfield

2.1.8.8
Recall items to be checked during route/altitude selection

1.1.2.1
Plan route of flight

2.1.8
Prepare Single-Engine Jet Log

2.1.8.4.1
Recall procedures for planning and performing a BINGO profile

HOW TO USE A WORKBOOK

1. This is a workbook/lab that you will complete in group session with an instructor. You will provide FLIP publications, charts, and the TW2 In-flight Guide.

2. The lesson contains information accompanied by exercises and/or questions to measure your understanding of the subject matter. Answers are provided in the back of the workbook to allow you to monitor your progress through the lesson.

MOTIVATION

The primary ingredient to any successful flight, whether it be IFR or VFR, is preflight planning (this lesson concerns only IFR flights). To ensure a safe and successful flight, it is imperative that you understand the flight planning process along with the associated documents needed to manage a long distance flight.

OVERVIEW

After this lesson you will be better able to accurately plan a cross-country flight and complete a single-engine jet flight log.

This lesson consists of:

* Information required for the preparation of a flight plan
* Planning a flight
* Preparing a single-engine jet flight log

REFRESHER

Recall:

* Your prior experiences with flight planning during T-34C training

PRESENTATION

PREPARING FOR FLIGHT PLANNING

The previous workbook lesson on fuel, weather, and alternate airfield planning should have provided you a plan of action for undertaking any IFR flight. This includes selecting a suitable destination, determining a suitable alternate if required, and making certain that you have enough fuel to execute your plan safely.

To plan a flight properly, you must also know your aircraft's capabilities/limitations and understand the regulations, procedures, and general information available in various publications.

Basic Instrument Requirements for IFR Flight 2.1.8.5

One important element of all flight planning is to ensure that your aircraft is properly equipped for an IFR flight. The following instruments, in operating condition, are required by OPNAVINST 3710.7 for instrument flight:

* Mach/airspeed indicator
* Altimeter
* Turn and slip indicator
* Clock with sweep second hand or digital readout
* Attitude indicator
* Magnetic compass with current calibration card
* Heading indicator or gyro-stabilized magnetic compass
* Vertical speed indicator

Figure 1 depicts the required instruments on the T-45A instrument panel for an IFR flight.

In addition to these instruments, you will need two-way radios, an IFF transponder with mode C, and on-board navigation equipment for IFR navigation flights.

NOTE: Additionally, aircraft shall be equipped with deicing or icing control equipment for sustained or continuous flight in known or forecast icing conditions. Navigation lights shall operate satisfactorily.

NAVAID CHECKS

Some civil and/or military airfields have facilities for operational checks of airborne VOR equipment. You may obtain information concerning these facilities from the tower, FSS, FLIPs, or at military base operations. Some VOR test signals are available airborne and others on the ground only. Airborne tolerances are +/- 6 degrees and ground check +/- 4 degrees.

A TACAN reference point for checking your equipment is usually displayed on a placard at the takeoff end of the runway at military bases. Tolerances for the ground check are +/- 4 degrees of the designated radial, and within 1/2 mile or 3 percent of the distance to the facility, whichever is greater.

Prior to takeoff, you must of course perform thorough checks of your flight instruments and navigation systems. You should also have navigational equipment tuned to appropriate NAVAIDs for the departure.

IFR REQUIRED INSTRUMENTS (Items 1-8) AND REQUIRED AVIONICS (Items 9-11)

1. Mach/airspeed indicator
2. Altimeter
3. Turn and slip indicator
4. Clock with sweep second hand
5. Attitude indicator
6. Magnetic compass with current calibration card
7. Heading indicator
8. Vertical speed indicator
9. Transponder (IFF) -- not shown
10. Two-way radios -- UHF/VHF # 2 not shown
11. On-board navigation equipment -- not shown (TACAN/VOR)

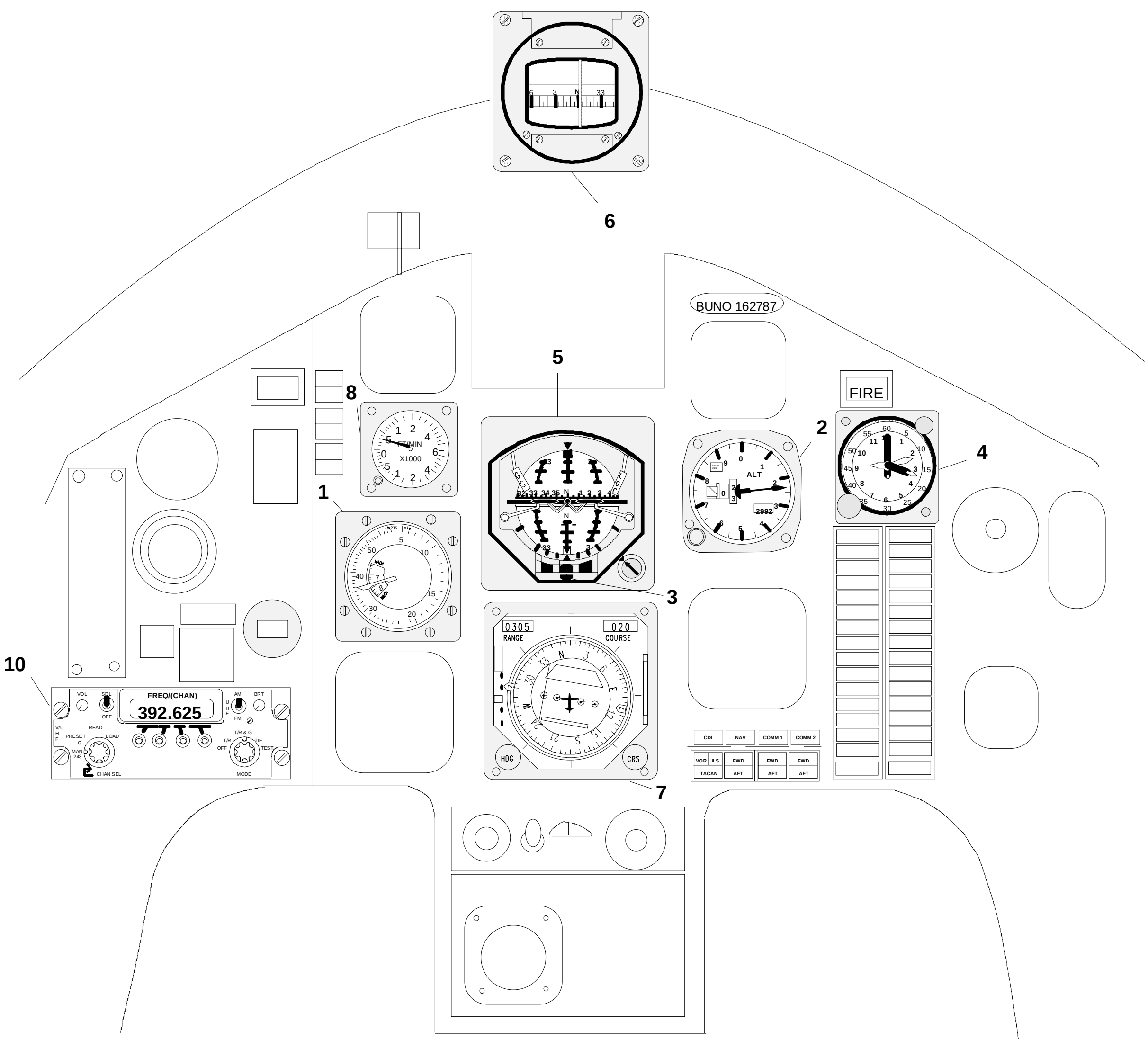


Figure 1: T-45A REQUIREMENTS FOR IFR FLIGHT

NOTE: As a safety precaution, TACAN and/or VOR should be set on the departure field channel/frequency in case an immediate return is required after takeoff.

FLIPs Required for Flight Planning 2.1.8.3

An important element of flight preparation is gathering and familiarizing yourself with data that will help you plan a successful flight.

You will find this information in the following directives and documents, especially DOD Flight Information Publications (FLIPs). Before commencing any flight, review the most frequently used FLIPs:

* FLIP Enroute High Altitude Chart, which depicts the airway system and related data required for IFR operations at and above 18,000 ft MSL

  NOTE: Pilots are also encouraged to carry the Low Altitude FLIP Chart and Arrival Chart (if appropriate) for the area of arrival, in case ATC assigns a low altitude holding fix.

* FLIP Enroute IFR Supplement contains a directory of airport/facilities available for military aircraft

* FLIP Enroute Flight Information Handbook provides information on emergency procedures and explains meteorological terms and how to access weather information worldwide. It contains conversion tables, time signals, the NOTAM code, and ICAO air defense interception signals

* FLIP General Planning provides and explains general information on all FLIPs, terms and abbreviations, flight plans and codes, common pilot procedures, and meteorological data. Use the index in the front of GP as the locator for a new topic in FLIP

* FLIP Area Planning (AP/1 and AP/1A) provides planning and procedural information for a specific geographic area (section 1) and a tabulation of all prohibited, restricted, danger, warning and alert areas, military operations areas, and known parachute jumping areas (section 1A). Section 1 is considered to contain “PERMANENT NOTAMs” which must be checked prior to flight

* FLIP Terminal High and Low Approach Procedures provide Standard Instrument Departures (SIDs), instrument approach procedures for high-performance aircraft, airport sketches, airport diagrams, and radar instrument approach minimums

* FLIP Terminal Civil Standard Instrument Departure (SID) contains Profile Descent Procedures and Standard Terminal Arrivals (STARs). As this publication is in short supply, copy civil SIDs and STARs for your flight prior to departure

Information provided by the Notices To Airmen (NOTAM) System 2.1.8.6

A NOTAM is a notice containing information (not known sufficiently in advance to publicize by other means) concerning the establishment, condition, or change in any component (facility, service, or procedure of, or hazard) in the National Space System the timely knowledge of which is essential to personnel concerned with flight operations. Dissemination is immediate via the National NOTAM system. It is always incumbent upon the pilot to check the FLIP publications and, shortly before flight, the NOTAMs for the destination, possible alternates, and route of flight.

Aircrews clearing from locations that do not maintain DOD NOTAM summaries can obtain a NOTAM briefing by contacting one of the installations listed in the FLIP, Flight Information Handbook, Section C, or the nearest aeronautical information service.

The NOTAM system is in process of being modernized. Pilots may encounter the older telecommunications-based (teletype) systems and the new computer-based systems, both of which are described in the following text.

"PERMANENT NOTAMS"

FLIP publications, especially AP/1, contain necessary information to consider in preflight planning. AP/1 and the FAA NOTAM publication contain NOTAMs in effect for long periods, varying from four weeks to six months. Although not part of the telecommunications/electronic NOTAM system, some refer to these notifications as "permanent NOTAMs" due to their content and longer duration.

Telecommunications or computers transmit NOTAMs of up to 90 days' duration that update the printed NOTAM publications.

FAA NOTAMS ("CIVILIAN NOTAMS")

If a flight will terminate at a civil airport, aircrews should obtain FAA "D" and "L" series NOTAMs and check the FAA's "NOTICES TO AIRMEN" booklet which should be on the NOTAM board in base ops. (Figure 2). The limited Civil NOTAM coverage by the Military NOTAM system necessitates this additional research. The FSS can research NOTAMs if they are unavailable.

A brief description of the FAA telecommunications-based types of NOTAMs follows:

NOTAM TYPE	DESCRIPTION
L (local)	L NOTAMs are not attached to hourly weather reports but are given local dissemination by voice and other means, such as teleautograph and telephone, to satisfy local user requirements. NOTAM L information includes such data as taxiway closures, personnel and equipment near or crossing runways, airport rotating beacon outages, and airport lighting aids that do not affect instrument approach criteria, such as VASI. The local FSS is the only facility that maintains a file of local NOTAMS in its area.
D (distant)	D NOTAMs are given (in addition to local dissemination) distant dissemination beyond the FSS's area of responsibility. Service A telecommunication system automatically distributes NOTAM D information. FSSs have access to the entire NOTAM D file which contains information on all navigational facilities and public use airports in the Airport/Facility Directory (AFD). D NOTAMs will be stored and available at the FSS until canceled.

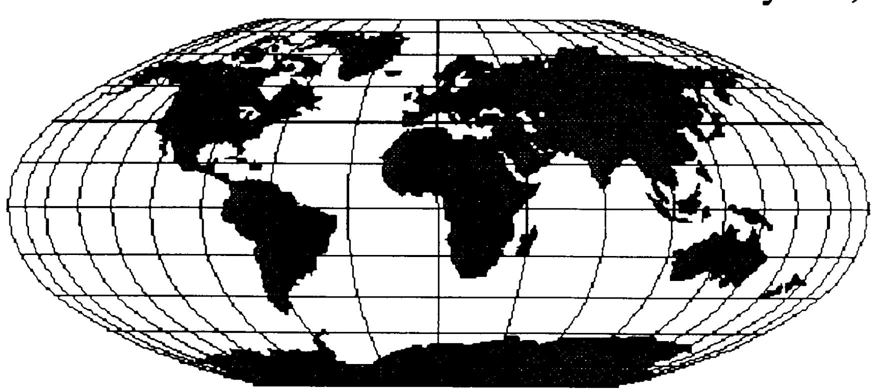
U.S. Department
of Transportation
Federal Aviation Administration

NOTICES TO AIRMEN

Domestic/International

December 31, 1998

Next Issue
January 28, 1999



Notices to Airmen included in this publication are NOT given during pilot briefings unless specifically requested by the pilot.

Air Traffic Publications (ATA-10)

Figure 2: CIVILIAN NOTICES TO AIRMEN

FDC (Flight Data Center)

FDC NOTAMs, transmitted by the National Flight Data Center (NFCD), are regulatory in nature and given system-wide dissemination via Service A only once but are kept on file at the FSS until published or canceled. Contents are amendments to published instrument approach procedures (IAPS) and other current aeronautical charts. They are also used to advertise temporary flight restrictions caused by such situations as natural disasters or large scale public events that may generate a congestion of air traffic over a site.

DOD NOTAMS

The DOD NOTAM Distribution System is a part of the National NOTAM System (NNS). In FLIP, locations displaying the (◇) symbol receive FULL NOTAM coverage and transmit/report all (FLIP and facility) NOTAMs to U.S. Military. Locations displaying the (◆) symbol receive PARTIAL NOTAM coverage, have published approach procedures in the FLIP and only changes to those procedures are reported as changes to the U.S. Military. Locations having no NOTAM coverage symbols displayed do not transmit/ report NOTAMs to the NNS and therefore are not available on the military NOTAM summaries. NOTAM coverage is provided according to geographical areas using daily summaries. (Summaries are updated hourly.)

The military NOTAM system covers all NOTAMs for military bases as well as FAA distant dissemination (D) and Flight Data Center (FDC) category NOTAMs for selected civilian airports.

COMPUTER-BASED

DOD recently introduced computer-based military NOTAMs. A trip to NAS Kingsville's base ops to view the military NOTAMs is not a requirement if the local Intranet-compatible computer is working or the Internet is available. By connecting to the Intranet at Kingsville (http://intranet) and selecting “Download NOTAMs” from Quicklink, one is connected to the Military NOTAM System provided by the FAA Control System Command. If direct access to the Internet is available, the same military NOTAMs are available using the following address:

http://www.notams.jcs.mil

Type in up to 10 aerodrome identifiers beginning with “K” for U.S. and then print their current NOTAMs. Figure 3 represents an actual list of NOTAMs obtained from the Internet. These are military NOTAMs only; obtain civilian NOTAMs, as before, from the FAA’s NOTICES TO AIRMEN booklet, Teletype reports and contact with FSS. Computerizing civilian NOTAMs seems to be in development but is some years away.

NOTE: Any clearance issued by an ATC agency NOTAMed “Not Authorized” would not be valid for DOD FLIP users. The NOTAM code is in the Flight Information Handbook (FIH).

OBTAINING NOTAMs

Flying from one military base to another:
Check AP/1 and the military NOTAMs.

Flying to a civilian field:
Call the FSS serving the civilian field and obtain D, FDC and L NOTAMs <u>OR</u> if the field is covered by the Military NOTAM System D and FDC, call base ops and then obtain the L NOTAMs by calling the civilian field directly.

Flying from a civilian field to a military base:
Call the local FSS for the civilian field for departure NOTAMs. Check AP/1 and call destination base operations for its NOTAMs.

Flying from a civilian field:
Call the local FSS for the departure NOTAMs.

CONCLUSION

NOTAM data may not always be current due to the changeable nature of national airspace system components, delays inherent in processing information, and temporary outages of the United States NOTAM System. While en route, pilots should contact FSSs and obtain updated information for their route of flight and destination. A thorough check immediately prior to takeoff reduces the risk of non-receipt of a vital NOTAM.

The Aeronautical Information Manual (AIM) and General Planning (GP) contain more information regarding NOTAMs.

Military Summary Reports and Updates

(Selected Locations)

KNGP KEFD KNFW KELP KSKF

Summary Source: NAMSUM Dated: 04 JAN at Time: 07:05 (Z)
Update Source: NAMSUM UPDATE 07 Dated: 04 JAN at Time: 14:05 (Z)
VALID ON RECEIPT. EXPIRES WITH UPDATE 08 OR AT 1520.

KNGP CORPUS CHRISTI NAS
PAR HR SER SAT, SUN, HOLIDAYS 1500-0500
ILS GP 13R GS RESTRICTED BEYOND 3 DEGREES RIGHT/7 DEGREES LEFT TIL 13 FEB 1600
SEQUENCED FLG LGT NOT AVBL TIL 10 FEB 2030
13R APCH LGT NOT AVBL TIL 10 MAR 1300
AD HR SER 19-21 DEC 1500-2300, 22 DEC 1900-0300, 23-24 DEC 1500-2300, 25-26 DEC CLSD, 27 DEC 1800-0000, 28 DEC 1500-2300, 29 DEC 1900-0300, 30-31 DEC 1500-2300, 01-02 JAN CLSD, 03 JAN 1800-0000, 04 JAN 1300-0500 TIL 05 JAN 0500

KEFD ELLINGTON FLD
FI/P ELLINGTON FIELD, HOUSTON, TX GPS RWY 22, ORIG . . . . CIRCLING MDA CAT A 500/HAA 466. THIS IS GPS RWY 22, ORIG-A.
FI/P ELLINGTON FIELD, HOUSTON, TX ILS RWY 35L, AMDT 4 . . . . CIRCLING MDA CAT A 500/HAA 466. THIS IS ILS RWY 35L, AMDT 4A.
FI/P ELLINGTON FIELD, HOUSTON, TX ILS RWY 17R, AMDT 4 . . . . CIRCLING MDA CAT A 500/HAA 466. THIS IS ILS RWY 17R, AMDT 4A.
FI/P ELLINGTON FIELD, HOUSTON, TX ILS RWY 22, AMDT 2 . . . . CIRCLING MDA CAT A 500/HAA 466. THIS IS ILS RWY 22, AMDT 2A.

KNFW FORT WORTH NAS
- TO SCHEDULE THE FOLLOWING EXCLUSIVE AIRSPACE: BROWNWOOD AND BRADY MOA=S, IR-103, IR-105, VR-118, CONTACT NAS JRB FT WORTH , TX SUA SCHEDULING OFFICE AT DSN 739-6903/04/05, 0700L-2200L, MON-SUN TIL 31 JAN 2359
RWY END ID LGT NOT AVBL REILS RY17 OTS TIL 01 FEB 1400

KSKF KELLY AFB
RWY ARST GEAR NOT AVBL BAK9 DEP END RWY 15; TIL 27 FEB 2359
HI TACAN RWY 15, HI ILS RWY 15, HI TACAN RWY33, HI ILS RWY33 INST APCH PROC CHANGED APCHS NOT AUTHORIZED; TIL 27 FEB 2359

KELP - EL PASO INTL
NO ACTIVE NOTAMS

This site is sponsored by the DoD NOTAM Division (AFFSA/XON)
Comments or Suggestions: email to michael.williams@faa.gov or eddie.johnson@faa.gov

The U.S. NOTAM Office can be reached at 1-888-USNOTAM or 703-904-4557
http:/www.notams.jcs.mil/cgi/milsum.cgi 01/04/1999

Figure 3: SAMPLE MILITARY NOTAM FROM INTERNET

Figure 3 represents an actual list of Military NOTAMs as delivered on the internet.

Items to Check for Destination Airfield 2.1.8.7

Use the back side of the jet log to determine if the selected destination meets your requirements. Check the following information in various publications, including FLIPs and NOTAMs for your destination airfield:

* Status of runways, NAVAIDs, and emergency equipment (NOTAMs, FLIP Enroute IFR Supplement, and AP/1)
* Hours of operation/landing restrictions (FLIP Enroute IFR Supplement, NOTAMs, and AP/1)
* Length of runway (FLIP Enroute IFR Supplement and FLIP Terminal High Altitude Approach Procedures)
* Types of approaches available and minimums (FLIP Terminal High Altitude Approach Procedures)
* Runway lighting (FLIP Enroute IFR Supplement and FLIP Terminal Low and High Altitude Approach Procedures)
* Field elevation (FLIP Enroute IFR Supplement or FLIP Terminal High Altitude Approach Procedures)
* Obstructions (FLIP Enroute IFR Supplement and FLIP Terminal High Altitude Approach Procedures)
* Communications/NAVAID frequencies (FLIP Enroute IFR Supplement and FLIP Terminal High Altitude Approach Procedures)
* Availability of arresting gear and/or jet barrier (FLIP Enroute IFR Supplement and FLIP Terminal High Altitude Approach Procedures)
* Availability of aircraft servicing and contract fuel (FLIP Enroute IFR Supplement)
* Forecast weather at ETA +/- 1 hour (weather briefing)
* Miscellaneous information concerning your destination (FLIP Enroute IFR Supplement and FLIP Area Planning AP/1)

Items to Check for Route/Altitude Selection 2.1.8.8

In order to select your route and altitude and to prepare a flight log, you should consider the suitability of your selections by checking them against the following items:

* Preferred IFR routes from AP/1
* NOTAMs (flight planning area)
* Availability of usable NAVAIDs (NOTAMs and FLIP Enroute High Altitude Chart)
* Enroute weather (weather briefing)
* Forecast winds (weather briefing) (request OPARS data as far in advance as possible)
* Minimum enroute altitudes (FLIP Enroute High Altitude Chart)
* Special use airspace (FLIP Area Planning AP1/1A)
* Cruising altitude rules (FLIP Enroute High Altitude Chart)
* Fuel usage (NATOPS and TW2 In-flight Guide)
* Minimum safe and emergency safe altitudes (FLIP Terminal High Altitude Approach Procedures)

PROGRESS CHECK

Question 1 — 2.1.8.5
In addition to the basic instrument requirements, what three items are necessary for IFR navigation flights?

ANSWER:

Question 2 — 2.1.8.3
Which FLIP publication provides a directory of airport facilities for military aircraft?

ANSWER:

Question 3 — 2.1.8.6
If you are planning to fly from a civilian field to a military base, which NOTAMs are you required to check?

ANSWER:

Question 4 — 2.1.8.7
Where would you obtain information on the availability of aircraft servicing at your destination airfield?

ANSWER:

Question 5 — 2.1.8.8
Where would you find information on special use airspace for your selected route/altitude?

ANSWER:

FLIGHT PLANNING

Now that you have looked at the aircraft requirements and textual materials relevant to planning an IFR flight, you will want to establish a definite set of procedures to prepare for your flight. Once you are comfortable with a pattern of accomplishment, make it habitual. Consider the following suggested sequence:

1. Select your destination and route of flight
2. Obtain an initial weather briefing and request OPARS flight data
3. Determine most favorable altitude/flight level
4. Consult FLIPs and NOTAMs
5. Select a suitable alternate
6. Determine if a SID is available
7. Familiarize yourself with the Terminal Approach Charts
8. Complete a single-engine jet flight log
9. Complete a military flight plan (DD Form 175)
10. Obtain a final weather briefing (DD Form 175-1)
11. File a military flight plan (DD Form 175)

We will address all but the last three items in this workbook. A later workbook (INav-10) deals solely with preparing the military flight plan (DD Form 175).

Select Destination and Route of Flight 1.1.2.1

First, tentatively select your destination and route of flight. OPNAVINST 3710.7 encourages the use of military airfields and requires destination airfields be in the Aerodrome/Facility Directory of the current DOD FLIP. Takeoff and landing at civil airfields are prohibited except when:

- Military units operate at the civil airfield
- A weather alternate is required and a military airfield is not available
- Official business is conducted nearby. Written orders are not required.
- Ferry and test missions
- Turboprop training command aircraft (VP and VR also)
- Civil airfields may be used for instrument approach and low approach training

Aircraft fuel and oil are made available to military users through military, Government contract, and commercial sources. There is no economical justification for pilots to purchase fuel/oil from commercial sources. Fuel must be purchased from military or contract sources unless:

- Flight is official business
- Previous flight terminated as a bona fide emergency
- Flight terminated at alternate
- Aircraft's limited range necessitates commercial purchase to complete an assigned mission

Using your tentative destination, conduct a thorough examination of the available NAVAIDS, winds, MEAs, terrain, special use airspace, enroute weather, cruising altitude rules, fuel endurance, and NOTAMs to confirm the suitability of your selection. Also check AP/1 for possible Preferred Routes.

Obtain Initial Weather Briefing

Next, obtain an initial weather briefing to include takeoff, enroute, and destination weather. From this information you can determine the route that offers acceptable weather, the altitude/flight level of the most favorable winds, the need for an alternate, and the expected active runway.

You should also record the forecast surface winds for your destination and possible alternates and the required data for computing takeoff performance. The takeoff performance data include departure base pressure altitude, winds, and temperature. Request OPARS flight data.

Consult Required FLIP Publications and NOTAMs

Consult Special Notices in the FLIP Flight Information Handbook, FLIP General Planning (GP), FLIP IFR Enroute Supplement, FLIP Area Planning AP/1, and the teletype NOTAM display board for information pertinent to your departure, route, destination, and possible alternates. NOTAMs may also be available through the internet, intranet at Kingsville, or the flight service station.

From this information, select a suitable alternate and familiarize yourself with the terminal approach charts for both your destination and alternate.

Review standard instrument departure procedures if a SID is available for your departure.

PREPARING THE SINGLE-ENGINE JET FLIGHT LOG 2.1.8

Prior to all IFR flights, you should have in your possession these three completed documents:

1. Single-Engine Jet Flight Log
2. Military Flight Plan (DD Form 175)
3. Flight Weather Briefing (DD Form 175-1)

Remember that developing a preflight plan of action includes selecting a destination, determining a suitable alternate and making certain that you have enough fuel to execute your plan safely according to OPNAVINST 3710.7. You will conclude your preflight planning in the written form of a single-engine jet flight log and a military flight plan (DD Form 175).

The Single-Engine Jet Flight Log represents your written plan of action, and you will use it throughout your flight to monitor your progress. The log is also an invaluable tool in helping you make rapid decisions should you experience excessive fuel consumption, changes in weather conditions, or any emergency.

Keep in mind that there is no one correct method of completing a flight log, which simply is a tool for organizing all the information you will need in order to complete your planned flight in a safe and efficient manner.

Refer to **Figure 4** for a sample single-engine jet flight log that is a two-sided card. You will be examining this log in future sections of this workbook.

For demonstration purposes, a flight from NAS Kingsville to Dyess AFB with an alternate of NAS Fort Worth (NFW) has been used. The flight plan will be: NAS Kingsville, Texas (NQI) to Dyess AFB (DYS) via HOBOZ1 departure, J65 to ABILENE, then direct to HOGES for the HI-ILS RWY 16 approach. Flight Level will be FL350. Flight Level winds will be 230 degrees (true) at 40 knots, Initial Approach Fix winds will be 270 degrees (true) at 30 knots.

SINGLE–ENGINE JET FLIGHT LOG
CNATRA–GEN 3760/1 (REV. 7–78) S/N0197LLCF19482

DEP ELEV	CLNC DELIV	GND CONT	TOWER
ALT CORR	TIME OFF	TAS	LBS PH/PMIN

CLEARANCE

DEPARTURE

DEST ELEV	APC CONT	TOWER	GND CONT

ROUTE / TO	IDENT / CHAN	CUS	DIST	ETE	ETA / ATA	LEG FUEL	EFR / AFR	NOTES
								FRCST ALT

ALTERNATE	ROUTE	ALTITUDE	TIME	FUEL
ALT ELEV	APC CONT	TOWER	GND CONT	

(Over)

Figure 4: SINGLE-ENGINE JET FLIGHT LOG (Front) (1 of 2)

FUEL PLAN

1. CLIMB/ROUTE DEST IAF		6. START/TAXI	
2. ROUTE ALT IAF (If required)		7. TOTAL REQUIRED (4, 5 & 6)	
3. APPROACHES		8. TOTAL ABOARD	
4. TOTAL (1, 2 & 3)		9. SPARE FUEL (8–7)	
5. RES 10% of 4 (Min 20 mins)			

EMERGENCY "BINGO" TO ALTERNATE

	REQUIRED		APPROACH		RES		TOTAL
LAST CRUSING ALT		+		+		=	
INITIAL APP ALT		+		+		=	
EMER SAFE ALT		+		+		=	

CHECK LIST	DESTINATION	ALTERNATE	EMER FIELDS
RWY LENGTH			
LIGHTING			ID
FUEL/JASU/LOX			CH PAGE NO.
~~UHF/ADF~~ ILS			
~~UHF/DF~~ LOC			
~~RAPCON~~ ASR			
PAR MINS			
TAC MINS			
ARR GEAR			
PUBS			
NOTAMS			
FUEL PACKET			
FLASHLIGHT, WALLET, ETC.			

CNATRA–GEN 3760/1 (REV. 7–78) S/N0197LLCF19482(BACK)

*U.S.GPO:1987-530-016/61134

Figure 4: SINGLE-ENGINE JET FLIGHT LOG
(Back) (2 OF 2)

Complete DEP ELEV Block

At the top of the flight log, fill in the spaces for the departure field's elevation in mean sea level (MSL). You can find the elevation in the FLIP Enroute IFR Supplement or the FLIP Terminal High Altitude Approach Procedures. Due to the possible differences between field elevation in the ramp area and on the takeoff runway (sometimes in excess of 75 ft), this difference should be noted, if significant.

Complete CLNC DELIV, GND CONT, and TOWER Blocks

Enter the appropriate frequencies in each block as found in the FLIP Enroute IFR Supplement. If it is available, find the Automatic Terminal Information Service (ATIS) and METRO frequencies in the IFR Supplement. Note any differences in call sign used to call tower, ground, etc.

Complete ALT CORR Block

In this block, enter the altimeter correction (which is not commonly used in the Training Command for flight into Class A airspace where 29.92 is used). To arrive at this information, dial in the current altimeter setting and compare the MSL reading with the posted elevation on the airfield. An altimeter discrepancy exceeding 75 ft is unacceptable for an IFR flight.

Complete TIME OFF Block

Complete this block by entering the time (GMT) at takeoff; you will use this time to compute the approach time (ETA) at destination in the event that you experience communication failure.

Complete TAS Block

Enter your planned enroute true airspeed after level off.

Complete LBS PH/PMIN Block

Extract the fuel flow at cruise altitude/flight level from the TRAWING TWO In-flight Guide based on the NATOPS performance charts, using the entry values of true airspeed (TAS) and altitude (ALT) for 35,000 feet (used in this example), and fill in the block.

The following example (**Figure 5**) illustrates types of entries found in the top section of the jet log.

ATIS and METRO frequencies: Just under the LBS PH block, enter the ATIS and METRO frequencies.

SINGLE-ENGINE JET FLIGHT LOG KDYS
CNATRA-GEN 3760/1 (REV. 7-78) S/N0197LLCF19482

DEP ELEV 50'	CLNC DELIV 328.4	GND CONT 352.4	TOWER 124.1/346.0
ALT CORR	TIME OFF	TAS 380	LBS PH/PMIN 997/16.6

ATIS: 276.2 METRO: 344.6

Figure 5: TOP SECTION

Complete CLEARANCE Section

You have a choice as to when to fill in this section. Prior to manup you can enter your expected clearance with the call sign of your aircraft, your clearance limit (usually the destination airfield), and your route of flight and assigned altitude/flight level—and you may want to include your expected higher altitude/flight level. Remember to leave room for copying the actual clearance as it is delivered to check against your expected clearance and to note any changes.

Alternately you can leave the clearance section blank (**Figure 6**) and copy the actual clearance as it is delivered.

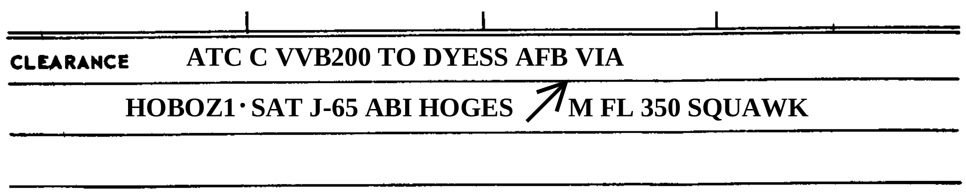

CLEARANCE ATC C VVB200 TO DYESS AFB VIA
HOBOZ1·SAT J-65 ABI HOGES M FL 350 SQUAWK

Figure 6: CLEARANCE SECTION

Complete DEPARTURE Section

Record the local instructions for departing the field, such as headings, altitudes, routes, and frequencies from the SID, if one is available. Also record here the IFF transponder code (when you receive it). If no SID is available, enter your departure instructions when received.

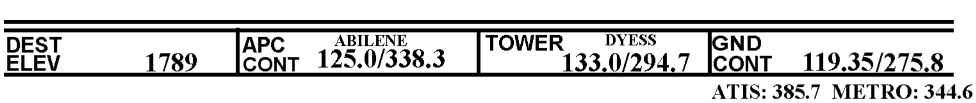
Complete DEST ELEV Block

Record your destination's elevation (from FLIP Enroute IFR Supplement or the FLIP Terminal High Altitude Approach Procedures) in this block.

Complete APC CONT, TOWER, GND CONT Blocks

Enter the appropriate frequencies from the FLIP Enroute IFR Supplement and the FLIP Terminal High Altitude Approach Procedures—and do not forget the ATIS frequency and METRO, if available. Again, note any differences in call sign.

Figure 7 represents a completed destination/elevation block.



DEST ELEV	APC CONT	TOWER	GND CONT
1789	ABILENE 125.0/338.3	DYESS 133.0/294.7	119.35/275.8

ATIS: 385.7 METRO: 344.6

Figure 7: DESTINATION SECTION

Complete Navigation and Fuel Information Section

Utilize the top line for "start/taxi/takeoff" fuel. This section of the log contains spaces to record navigation and fuel information for each leg of flight, plus notes.

Before filling in this section, identify your legs of flight. If there is not sufficient space on your form to put in all the legs, indicate the NAVAID changeover point (COP) in the NOTES block or use two logs.

Typically, a "leg" on the flight log is defined as where the jet route turns from one NAVAID to another or has a heading change of more than 5 degrees. This point is generally indicated on enroute charts by an "x" or occurs where a jet route intersects a NAVAID.

Figure 8 shows the entire navigation and fuel information section, which we will now look at a block at a time.

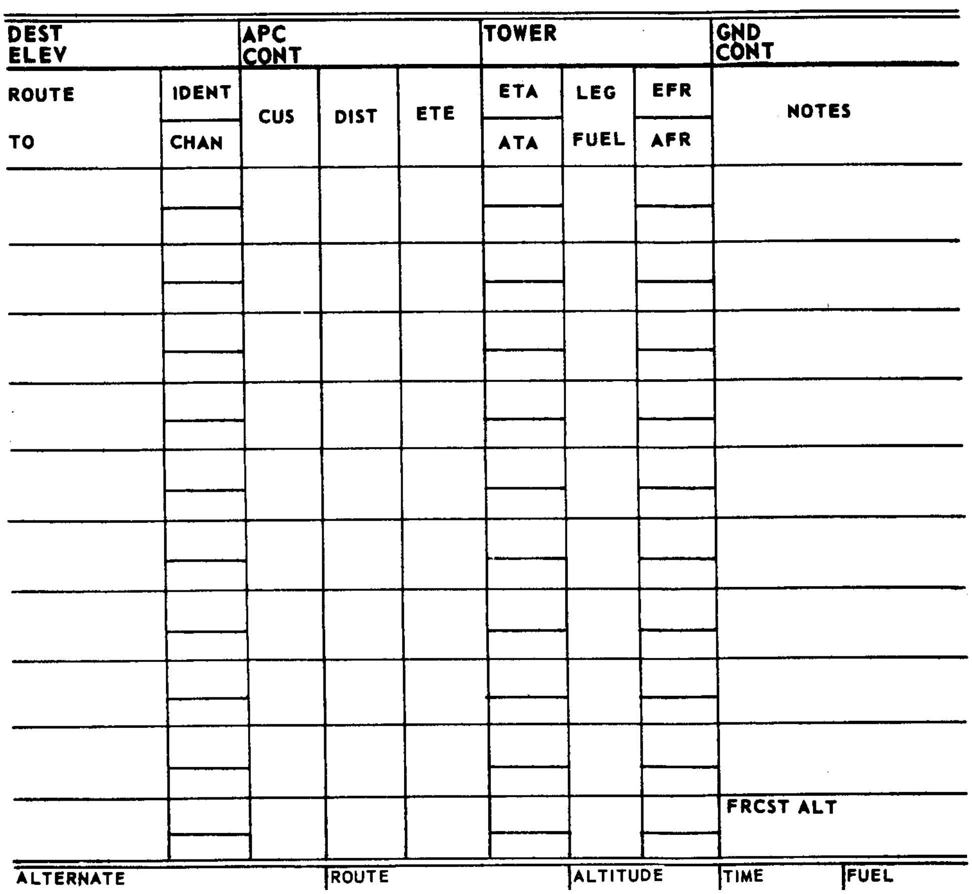

DEST ELEV
APC CONT
TOWER
GND CONT
ROUTE TO
IDENT CHAN
CUS
DIST
ETE
ETA ATA
LEG FUEL
EFR AFR
NOTES
FRCST ALT
ALTERNATE
ROUTE
ALTITUDE
TIME
FUEL

Figure 8: NAVIGATION AND FUEL INFORMATION SECTION

Complete ROUTE TO Block

Begin by entering your intended jet route identifiers (e.g., J22) or the symbol/abbreviation indicating a direct flight. You can find this information on your FLIP Enroute High Altitude Chart. The first one or two blocks may be part of the SID.

Be sure to include each point along the intended route. Finish the block by entering the 3-letter VORTAC identifier or the full name--for example, “CRP” for the Corpus Christi VORTAC. If you use an identifier on your log, be sure that you are thoroughly familiar with the full name of the fix.

Remember to note your level off point as a fix because your ground speed/fuel flow will change for the cruise portion of your flight.

Figure 9 is an example of a filled in ROUTE-TO block.

Complete IDENT/CHAN Block

Use the identification/channel block to enter the TACAN/VOR 3-letter identifier and channel/frequency for the NAVAID located at the fix. If a NAVAID is not located at the fix, insert the information for the facility being used for navigation at that fix. For example, an intersection may be determined by a radial and DME from a distant VORTAC facility. The information for completing this block is located on the FLIP Enroute High Altitude Chart.

Figure 10 shows you an example of a completed IDENT/CHAN block.

Complete CUS Block

In the course block, enter either the magnetic course to the fix as obtained from the SID or the course information depicted along the jet routes on the FLIP Enroute Chart or on approach procedure charts. Enter the magnetic course to the first fix for a SID.

Pilots differ in how they complete this block. You may wish to split the box with a horizontal line and use the outbound magnetic course from one fix and the inbound magnetic course to the next fix, or you may wish to use the inbound and outbound magnetic courses of a fix. For preflight planning purposes, if the heading varies from outbound to inbound heading (due to the magnetic variation and/or misalignment of the radials) of 5 degrees or less, the heading can be averaged for the wind calculations. Over 5 degrees, consideration of logging two legs split at the change-over-point (COP) should be used.

Use the method that suits you best, since you are the one who must decide by referencing your jet log when to change TACAN channels and what to set in your course selector.

Figure 11 illustrates a completed course block.

Complete DIST Block

Use this block to enter the number of miles to a fix. You may obtain this information from the FLIP Enroute High Altitude Chart or by measuring between points and using the miles scale at the bottom of the chart. Two other sources of distance information are SIDs and approach procedure charts.

Figure 12 shows a completed distance block.

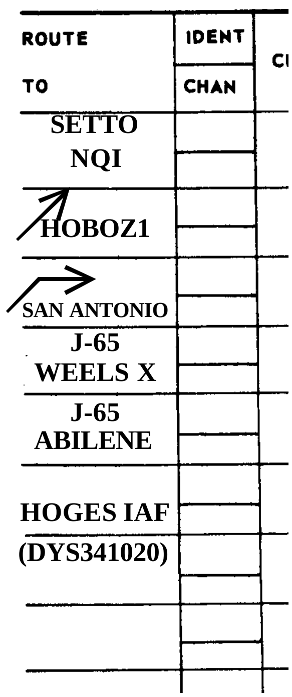


Figure 9: ROUTE-TO BLOCK

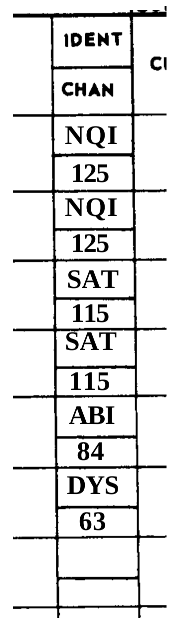


Figure 10: IDENT/CHAN BLOCK

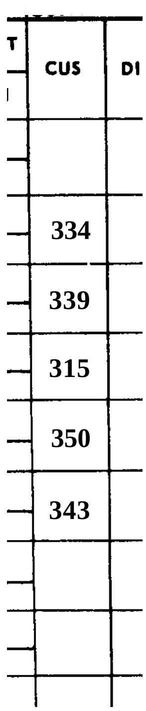


Figure 11: CUS BLOCK

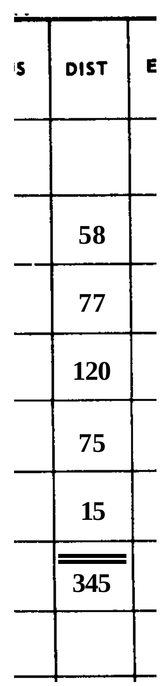


Figure 12: DIST BLOCK

Complete ETE Block

Enter your estimated time en route to the fix (normally to the nearest whole minute), using your expected ground speed and distance.

The training squadrons do not use climb winds in jet aircraft. Refer to the T-45A Fuel Planning Data Card in your In-flight Guide to read distance, time, and fuel required for the climb to altitude. Interpolate for intermediate altitudes. Ground speed is computed utilizing the expected TAS from the fuel card, and forecast winds aloft from your DD-175-1 as computed on your navigation computer.

NOTE: More precise computation will be required for those missions requiring target times or when fuel is critical.

Figure 13 shows a completed ETE block.

Complete ETA/ATA Block During Flight

Enter your estimated time of arrival and log your actual time of arrival at a fix or checkpoint. Use these numbers to compare your actual flight progress to your planned flight progress as you pass each fix.

Figure 14 shows an incomplete ETA/ATA block.

Complete LEG FUEL Block

Enter your estimated fuel required to fly each leg, using fuel flow and estimated time en route.
Fuel flow is derived from the fuel card, and interpolated for your cruising altitude. Always round UP to the next higher ten pounds (e.g., 192# would become 200#).

Figure 15 shows a completed LEG FUEL block.

PROGRESS CHECK

Question 6 — 2.1.8
Your fuel flow at a cruise altitude of FL270 is 1052 pph and your true airspeed is 352 KTAS. Your FLIP Enroute High Altitude Chart indicates 76 miles from one fix to the next. This leg of your flight will take you _____ minutes and you will use _____ lb of fuel. For computations, assume no wind condition. Round to the nearest whole minute and up to the next 10-pound increment of fuel.

ANSWER:

Complete EFR/AFR Block

Enter your estimated fuel remaining during planning and log the actual fuel remaining during your flight. Use this information to compare your actual fuel consumed to your planned fuel use as you pass each fix.

Figure 16 shows a completed EFR/AFR block.

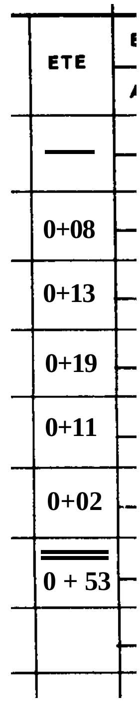


Figure 13: ETE BLOCK

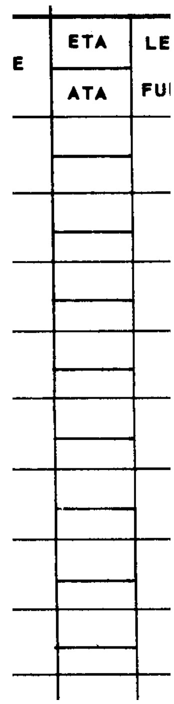


Figure 14: ETA/ATA BLOCK

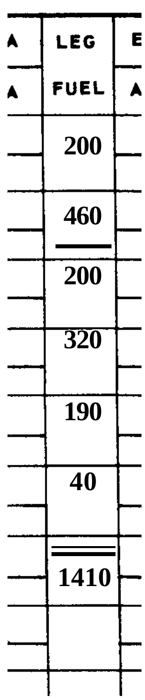


Figure 15: LEG FUEL BLOCK

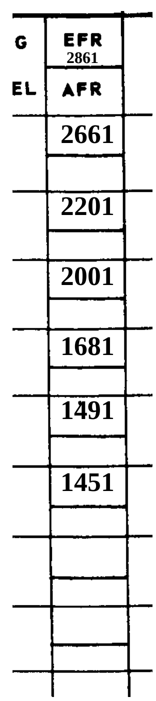


Figure 16: EFR/AFR BLOCK

Complete NOTES Block

Use this section to include any additional information that you may need. The NOTES block gives you an opportunity to enter the estimated ground speed, maintain a running log of your assigned frequencies in flight, enter your anticipated pertinent frequencies, and enter your divert information. VOR and/or ILS frequencies might be useful.

Figure 17 shows a partially completed NOTES block.

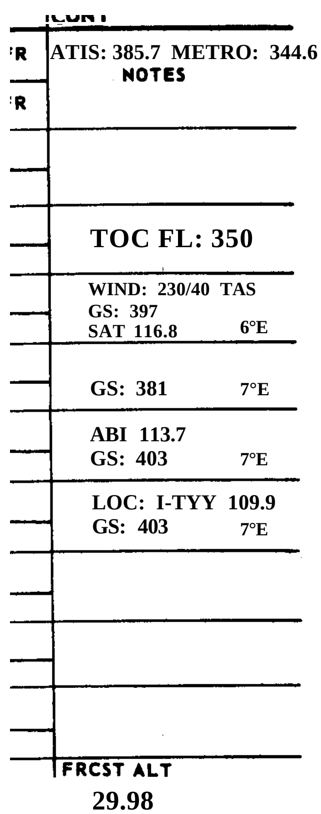


Figure 17: NOTES BLOCK

Add Up the DIST, ETE, and LEG FUEL Columns

After entering all the legs of your flight in the log, add up the DIST column, ETE column, and LEG FUEL column. Next, enter your estimated fuel remaining and the forecast altimeter setting in the space provided. Take your final EFR and convert it back to “time” using the estimated fuel flow. Enter this “time” in the alternate fuel block.

See **Figure 18** for a completed totals section and **Figure 19** for a completed navigation and fuel information section.

ROUTE TO	IDENT / CHAN	CUS	DIST	ETE	ETA / ATA	LEG FUEL	EFR / AFR	NOTES
D→ HOGES IAF (DYS341020)	DYS / 63	343	15	0+02		40	1451	GS: 403 7°E LOC: I-TYY 109.9
			345	0+53		1410		
								FRCST ALT 29.98

Figure 18: TOTALS SECTION

DEST ELEV 1789'		APC CONT ABILENE 125.0/338.3			TOWER DYESS 133.0/294.7			GND CONT 119.35/275.8
ROUTE TO	IDENT / CHAN	CUS	DIST	ETE	ETA / ATA	LEG FUEL	EFR 2861 / AFR	ATIS: 385.7 METRO: 344.6 NOTES
SETTO NQI	NQI / 125					200	2661	
↗ HOBOZ1	NQI / 125	334	58	0+08		460	2201	TOC FL350
↗ SAN ANTONIO	SAT / 115	339	77	0+13		200	2001	WIND: 230/40 GS: 397 SAT 116.8 6°E
J-65 WEELS X	SAT / 115	315	120	0+19		320	1681	GS: 381 7°E
J-65 ABILENE	ABI / 84	350	75	0+11		190	1491	GS: 403 ABI 113.7 7°E
D→ HOGES IAF (DYS341020)	DYS / 63	343	15	0+02		40	1451	GS: 403 7°E LOC: I-TYY 109.9
			345	0+53		1410		
								FRCST ALT 29.98
ALTERNATE		ROUTE			ALTITUDE		TIME	FUEL

Figure 19: COMPLETED NAVIGATION AND FUEL INFORMATION SECTION

Complete Information Section for Alternate from Planned Destination to Alternate

Use the lower part of the jet log to enter flight information from your planned destination to your planned alternate.

Figure 20 exemplifies data appropriate to the flight information section.

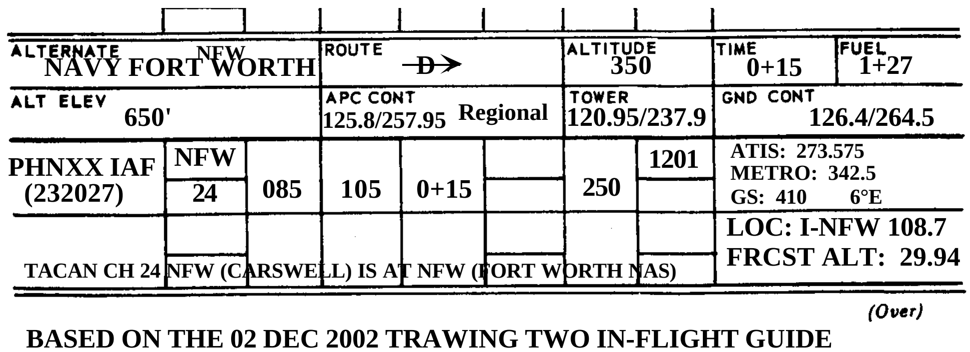


Figure 20: COMPLETED ALTERNATE FLIGHT INFORMATION SECTION

Complete ALTERNATE Block

Enter the full name and 3-letter identifier for your alternate in the first block. Find this information in the FLIP Enroute High Altitude Chart and/or FLIP Terminal, High Altitude.

Complete ROUTE Block

Next, enter your planned (normally direct) route from destination IAF to alternate IAF (normally requested prior to penetration if your destination is reported below minimums upon your arrival). Find this information in the FLIP Enroute Low or High Altitude Charts.

Complete ALTITUDE Block

In this block record your cruise altitude/flight level from destination IAF to alternate IAF. For the lower part of the jet log, this altitude is the same cruising altitude as to destination.

Complete TIME Block

Compute and enter your planned time en route from destination IAF to alternate IAF.

Complete FUEL Block

Enter the fuel available in hours and minutes to proceed to your alternate. Divide the EFR at destination by LBS PH computed from EFR at destination IAF converted back to time at the top of the jet log which yields the hours of fuel available. Multiplying by 60 yields the minutes of fuel available.

Complete ALT ELEV Block

Enter the elevation of your alternate as found in the FLIP Enroute IFR Supplement or the FLIP Terminal Low or High Altitude Approach Procedures.

Complete APC CONT, TOWER, and GND CONT Blocks

Enter the appropriate frequencies in each block as found in the FLIP Enroute IFR Supplement and the FLIP Terminal Low or High Altitude Approach Procedures.

Complete navigation and fuel information to alternate

This section is completed just as you did for the flight to destination. In the notes column, enter ATIS, Metro, ILS, LOC frequencies, ground speed, and forecast altimeter.

Complete FUEL PLAN Section

Use this portion of the backside of the jet log to compare your total fuel requirements with your usable fuel load and to compute your spare fuel, which is the fuel aboard after landing and exceeds the total OPNAV flight planning requirements. The first nine items relate only to cruising altitude to destination IAF which will be continued to the alternate IAF.

Figure 21 shows a completed version of the FUEL PLAN section.

FUEL PLAN

1. CLIMB/ROUTE DEST IAF	1210	6. START/TAXI	200
2. ROUTE ALT IAF (If required)	250	7. TOTAL REQUIRED (4, 5 & 6)	2160
3. APPROACHES	200	8. TOTAL ABOARD	2861
4. TOTAL (1, 2 & 3)	1660	9. SPARE FUEL (8–7)	701
5. RES 10% of 4 (Min 20 mins)	300		

Figure 21: COMPLETED FUEL PLAN SECTION

Complete CLIMB/ROUTE DEST IAF Line 1

Compute the total fuel required, after takeoff, to climb to your planned altitude/flight level, and then the fuel to cruise to destination IAF, using the fuel figures as entered on the front side of the jet log under the navigation and fuel information section. Enter the sum of the LEG FUEL column, less the 200 # start/taxi/takeoff fuel, in line 1.

Complete ROUTE ALT IAF Line 2

On the route to alternate IAF line, enter your planned fuel required to cruise from your destination IAF to the alternate IAF. This is the required fuel (sum of the leg fuels) you computed in the alternate information section at the bottom of the front side of your flight log.

Complete APPROACHES Line 3

To complete the APPROACHES line, enter the total fuel required to execute a high altitude penetration, approach, and landing, as recommended in your NATOPS manual. Normally fuel for only one approach is required; however, be sure to include any planned “enroute delay” practice approaches en route to destination.

Complete TOTAL Line 4

On the TOTAL line, enter (the sum of lines 1 through 3) your total planned fuel required from takeoff to landing at your alternate (or your destination).

Complete RES Line 5

Fill in the reserve line by following the OPNAVINST 3710.7 reserve requirements of 10 percent of the total planned fuel required from takeoff to landing or 20 minutes at 10,000 ft (maximum endurance), whichever is greater. For the T-45, this fuel is always 300#, 20 minutes at 10,000 ft (maximum endurance).

Complete START/TAXI Line 6

Enter 200# total fuel required for starting, taxiing, and takeoff from your fuel card on the START/TAXI line.

Complete TOTAL REQUIRED Line 7

Next, compute your total planned fuel requirements from starting the engine to landing at your destination or your alternate.

Complete TOTAL ABOARD Line 8

To complete the TOTAL ABOARD line, enter your prestart fuel load in pounds (from the TRAWING TWO In-Flight Guide).

Complete SPARE FUEL Line 9

To figure your spare fuel, enter your total planned fuel on board after landing that exceeds the <u>total</u> OPNAV flight planning requirements (total aboard line 8 minus total required, line 7).

Use **Figure 22** to answer Question 7.

PROGRESS CHECK

Question 7 — 2.1.8
Using the data in Example A of Figure 22, what would you enter on the CLIMB/ROUTE DEST IAF line?

ANSWER:

FUEL PLAN

1. CLIMB/ROUTE DEST IAF		6. START/TAXI	
2. ROUTE ALT IAF (If required)		7. TOTAL REQUIRED (4, 5 & 6)	
3. APPROACHES		8. TOTAL ABOARD	

EXAMPLE A

ELEV		CONT						CONT
ROUTE / TO	IDENT / CHAN	CUS	DIST	ETE	ETA / ATA	LEG / FUEL	EFR 2861 / AFR	NOTES
		START-TAXI-TAKEOFF				200	2661	FL 390
D → WILMINGTON	NTU 113	223	80	15		590	2071	
D → WILMINGTON	ILM 117	223	69	11		210	1861	
J-174 CHARLSTON	CHS 82	236	139	22		420	1441	
J-174 CRAIG	CRG 92	217	172	27		500	941	
D → NAS CECIL CULME IAF	NZC 88	205	37	6		110	831	
(173028)			497	1 + 21		2030	831	
								FRCST ALT 29.92
ALTERNATE			ROUTE		ALTITUDE		TIME	FUEL

EXAMPLE B

Figure 22: NAVIGATION AND FUEL PLAN PROGRESS CHECK

Complete EMERGENCY “BINGO” TO ALTERNATE Section 2.1.8.4.1

This section of the jet flight log contains spaces for computing your total fuel required to the alternate IAF—that is, for the total fuel required to cruise from destination to alternate, execute an approach, land, and comply with OPNAVINST 3710.7 fuel reserve planning requirements.

We compute this section using three different scenarios on the lines provided:

The first assumes that the ARTCC clears you to contact your destination Approach Control without clearing you to descend. Prior to switching to Approach, you dial in ATIS and discover your destination has gone below minimums. You check your fuel gauge against the fuel required on your fuel plan and determine that you have sufficient fuel to go to your alternate at your cruising altitude.

The second scenario has the ARTCC clearing you to contact Approach Control and descend to the IAF altitude. Again, dialing in ATIS, you discover your destination has gone below minimums. At the IAF altitude, you check your fuel available against the fuel plan, determine that you have sufficient fuel to proceed to your alternate at the IAF altitude, and ask for the appropriate clearance without climbing back to altitude. In computing this fuel, remember to use the appropriate TAS and Fuel Flow at your IAF altitude. This also may require using different winds.

Finally, at your destination, the weather is marginal but still above minimums. Having sufficient fuel, you file to your alternate in the event of missed approach and shoot the approach. Due to variable conditions, you do not break out and decide to proceed to your alternate. Using your Bingo profile kneeboard card, you determine the amount of fuel required (and the appropriate altitude) from the missed approach point to the alternate IAF (or directly to the alternate airfield if in extremes). As the bingo card fuel card **INCLUDES** reserve but not approach fuel, this need not be added to this figure. This computation is done without wind as you will be climbing and/or descending most of the way.

Complete LAST CRUISING ALT Line

The first line corresponds to fuel from destination IAF to alternate IAF at flight-planned cruising altitude.

Complete INITIAL ALT Line

The second line corresponds to fuel from destination IAF to alternate IAF at the altitude/flight level depicted for the destination IAF on the appropriate instrument approach procedure chart.

Complete EMER SAFE ALT Line

The third line corresponds to fuel from destination missed approach point (MAP) to alternate airfield using a bingo profile as specified by the T-45A NATOPS Flight Manual.

Figure 23 shows a completed EMERGENCY “BINGO” TO ALTERNATE block.

EMERGENCY "BINGO" TO ALTERNATE

	REQUIRED		APPROACH		RES		TOTAL
FL 350 LAST CRUSING ALT	250	+	200	+	300	=	750
10,000' TAS: 262 WIND: 270/30	410	+	200	+	300	=	910
GS 292 ETE 20 1138 PPH EMER SAFE ALT 114 NM 23,000	760	+	200	+	—	=	960

Figure 23: COMPLETED EMERGENCY BINGO TO ALTERNATE BLOCK

PROGRESS CHECK

Question 8 -- 2.1.8.4.1
Using the information from Figure 24, list in order the data that you would enter on the LAST CRUISING ALT line in the EMERGENCY "BINGO" TO ALTERNATE section.

ANSWER:

SINGLE-ENGINE JET FLIGHT LOG
CNATRA-GEN 3760/1 (REV. 7-78) S/N0197LLCF19482

DEP ELEV	CLNC DELIV	GND CONT	TOWER
50	328.4	352	126.2/346.0
ALT CORR	TIME OFF	TAS	LBS PH/PMIN
		385	1100/2.88

				FRCST ALT 29.98	
ALTERNATE SHEPPARD AFB	ROUTE D->	ALTITUDE 370	TIME 0 + 21	FUEL 0 + 47	
ALT ELEV 1015	APC CONT 118.2/308.1	TOWER 122.1/272.6	GND CONT 121.9/289.4		

1. CLIMB/ROUTE DEST IAF	1650	6. START/TAXI	200
2. ROUTE ALT IAF (If required)	340	7. TOTAL REQUIRED (4, 5 & 6)	2690
3. APPROACHES	200	8. TOTAL ABOARD	2861
4. TOTAL (1, 2 & 3)	2190	9. SPARE FUEL (8-7)	171
5. RES 10% of 4 (Min 20 mins)	300		

EMERGENCY "BINGO" TO ALTERNATE

	REQUIRED		APPROACH		RES		TOTAL
LAST CRUSING ALT		+		+		=	
INITIAL APP ALT		+		+		=	
EMER SAFE ALT		+		+		=	

Figure 24: EMERGENCY BINGO TO ALTERNATE PROGRESS CHECK

Complete CHECK LIST, DESTINATION, ALTERNATE, and EMER FIELDS Section of Jet Flight Log

The last section of the jet flight log is a series of preflight reminders for you to check that your destination and alternate airfields will have adequate facilities and servicing available for your aircraft. This section also ensures that you have all the necessary publications and documents for your flight.

Figure 25 exemplifies entries for the last section of the flight log.

CHECK LIST	DESTINATION	ALTERNATE NFW	EMER FIELDS
RWY LENGTH	16/34 13,500'/300	17/35 12,000/300	KELLY AFB
LIGHTING	16/34 HIRL PAPI A1 HI INT APP/SEQ FL	17 HIRL REIL PAPI 35 HIRL PAPI A1 HI INT APP/SEQ FL	ID KSY
			CH 57
FUEL/JASU/LOX	J8	J8	PAGE NO. 113-117
ILS	200 1/2	17/35-200-3/4	ABILENE REGIONAL
LOC	400 3/4	17-600-1 1/2 35-500-3/4	ID ABI 113.7 CH 84 104/10 TO ABI
ASR	500-3/4	17-500-1 1/4 35-600-1	PAGE NO: NO APPROACH PUB
PAR MINS	NA	17-100-1/2 35-200-3/4	
TAC MINS	17-500-3/4 34-400-3/4	17-500-1 1/4 35-600-1	
ARR GEAR	NONE	1300' BOTH ENDS	
PUBS	✓	✓	
NOTAMS	✓	✓	
FUEL PACKET	✓	✓	
FLASHLIGHT, WALLET, ETC.	✓	✓	

CNATRA-GEN 3760/1 (REV. 7-78) S/N0197LLCF19482(BACK) *U.S.GPO:1987-530-016/61134

Figure 25: COMPLETED LAST SECTION

NOTE: If block not applicable, use block for useful information for your aircraft. Enter information in a systematic manner that it will convey meaning to you when under pressure.

Complete RWY LENGTH Block

Enter the length and width of the runway as found in your FLIP Enroute IFR Supplement and FLIP Terminal Low and High Altitude Approach Procedures.

Complete LIGHTING Block

Enter the available runway lighting as found in your FLIP Enroute IFR Supplement and FLIP Terminal Low and High Altitude Approach Procedures.

Complete FUEL/JASU/LOX Block

Enter the available fuel, jet aircraft starting units, and liquid oxygen servicing information found in your FLIP Enroute IFR Supplement.

Complete UHF/ADF Block

Enter available ADF frequency in this block as found in your FLIP Enroute IFR Supplement (if your aircraft is ADF equipped).

Complete UHF/DF Block (convert to ILS)

Enter available ILS minima as found in FLIP (TERMINAL) Low or High Altitude Approach Procedures FLIP Enroute IFR Supplement.

Complete RAPCON Block (convert to LOC)

Enter available localizer minima as found in your FLIP (Terminal) Low and High Altitude Approach Procedures.

Complete PAR MINS Block

Enter available precision approach radar minimums as found in your FLIP Terminal High Altitude Approach Procedures (remember, your T-45A single-pilot minimums are 200 1/2).

Complete TAC MINS Block

Enter available TACAN minimums as found in your FLIP (Terminal) Low and High Altitude Approach Procedures.

Complete ARR GEAR Block

Enter arresting gear availability and location as found in your FLIP Enroute IFR Supplement.

Complete PUBS Block

Have you checked that the necessary publications are current and on board?

Complete NOTAMs Block

Have you checked the appropriate NOTAMs? This should prompt you to check AP/1, FLIP Special Notices, TCNs, etc.

Complete FUEL PACKET Block

Have you checked to make sure that you have your fuel packet?

Complete FLASHLIGHT, WALLET, ETC. Block

Have you checked to make sure that you have these items and anything else appropriate in your navigation bag?

Complete EMER FIELDS Column

Enter the name of the emergency fields in the block below EMER FIELDS. An emergency field is any suitable runway along your route of flight to which you could divert in the event of an in-flight emergency. These fields are generally predetermined in the local area by the Training Wing. The more you have studied the availability of an emergency field, the better prepared you will be for an unexpected emergency.

Complete ID Block

Enter the 3-letter identifier of your emergency field that you find in your FLIP Enroute IFR Supplement and FLIP (Terminal) Low and High Altitude Approach Procedures.

Complete CH Block

Enter the TACAN channel or VOR frequency of your emergency field that you find in your FLIP Enroute IFR Supplement and FLIP (Terminal) Low and High Altitude Approach Procedures.

Complete PAGE NO. Block

Enter the page number of the FLIP (Terminal) Low and High Altitude Approach Procedures publication for your emergency field in this block.

Figure 26 puts all the preceding blocks and sections together to form the single-engine jet flight log created in this lesson.

SINGLE–ENGINE JET FLIGHT LOG
CNATRA–GEN 3760/1 (REV. 7–78) S/N0197LLCF19482

KDYS

DEP ELEV	CLNC DELIV	GND CONT	TOWER
50'	328.4	352.4	124.1/346.0
ALT CORR	**TIME OFF**	**TAS**	**LBS PH/PMIN**
		380	997/16.6

CLEARANCE ATC C VVB200 TO DYESS AFB ‖ ATIS: 276.3 METRO: 344.6

VIA HOBOZ1 • SAT J65 ABI HOGES ↗ M FL350

DEPARTURE

DEST ELEV	APC CONT (ABILENE)	TOWER (DYESS)	GND CONT
1789'	125.0/338.3	133.0/294.7	119.35/275.8

ROUTE / TO	IDENT / CHAN	CUS	DIST	ETE	ETA / ATA	LEG FUEL	EFR 2861 / AFR	ATIS: 385.7 METRO 344.6 NOTES
SETTO NQI	NQI / 125	—	—	—		200	2661	
↗HOBOZ1	NQI / 125	334	58	0+08		460	2201	TOC FL350
SAN ANTONIO	SAT / 115	339	77	0+13		200	2001	WIND: 230/40 GS: 397 SAT 116.8 6°E
J-65 WEELS X	SAT / 115	315	120	0+19		320	1681	GS: 381 7°E
J-65 ABILENE	ABI / 84	350	75	0+11		190	1491	GS: 403 ABI 113.7 7°E
D→ HOGES IAF (DYS341020)	DYS / 63	343	15	0+02		40	1451	GS: 403 7°E LOC: I-TYY 109.9
			345	0 + 53		1410		
								FRCST ALT 29.98

ALTERNATE	ROUTE	ALTITUDE	TIME	FUEL
NFW NAVY FORT WORTH	D→	390	0 + 15	1 + 27
ALT ELEV	**APC CONT**	**TOWER**	**GND CONT**	
650	Regional 125.8/257.95	120.95/237.9	126.4/264.5	

ROUTE / TO	IDENT / CHAN	CUS	DIST	ETE	ETA / ATA	LEG FUEL	EFR / AFR	NOTES
PHNXX IAF (232027)	NFW / 24	085	105	0+15		250	1201	ATIS: 273.575/METRO: 342.5 GS: 410 6°E
TACAN CH 24 FWH (CARSWELL) IS AT NFW (FORT WORTH NAS)								LOC: I-NFW 108.7 FRCST ALT 29.94

BASED ON 02 DEC 2002 TRAWING TWO IN-FLIGHT GUIDE (Over)

Figure 26: COMPLETED SINGLE-ENGINE JET FLIGHT LOG (1 OF 2)

FUEL PLAN

1. CLIMB/ROUTE DEST IAF	1210	6. START/TAXI	200
2. ROUTE ALT IAF (If required)	250	7. TOTAL REQUIRED (4, 5 & 6)	2160
3. APPROACHES	200	8. TOTAL ABOARD	2861
4. TOTAL (1, 2 & 3)	1660	9. SPARE FUEL (8–7)	701
5. RES 10% of 4 (Min 20 mins)	300		

EMERGENCY "BINGO" TO ALTERNATE

	REQUIRED		APPROACH		RES		TOTAL
FL 350 LAST CRUSING ALT	250	+	200	+	300	=	750
10,000' TAS: 262 WIND: 270/30	410	+	200	+	300	=	910
GS 292 ETE 20 1138 PPH EMER SAFE ALT 114 NM 23,000	760	+	200	+	—	=	960

CHECK LIST	DESTINATION DYS	ALTERNATE NFW
RWY LENGTH	16/34 13,500'/300	17/35 12,000/300
LIGHTING	16/34 HIRL PAPI A1 HI INT APP/SEQ FL	17 HIRL REIL PAPI 35 HIRL PAPI A1 HI INT APP/SEQ FL
FUEL/JASU/LOX	J8	J8
	200 1/2	17/35-200-3/4
	400 3/4	17-600-1 1/2 35-500-3/4
	500-3/4	17-500-1 1/4 35-600-1
PAR MINS	NA	17-100-1/2 35-200-3/4
TAC MINS	17-500-3/4 34-400-3/4	17-500-1 1/4 35-600-1
ARR GEAR	NONE	1300' BOTH ENDS
PUBS	✓	✓
NOTAMS	✓	✓
FUEL PACKET	✓	✓
FLASHLIGHT, WALLET, ETC.	✓	✓

EMER FIELDS
KELLY AFB
ID KSY
CH 57
PAGE NO. 113-117
ABILENE REGIONAL
ID ABI 113.7
CH 84 104/10 TO ABI
PAGE NO: NO APPROACH PUB

CNATRA–GEN 3760/1 (REV. 7–78) S/N0197LLCF19482(BACK)

*U.S.GPO:1987–530–016/61134

Figure 26: COMPLETED SINGLE-ENGINE JET FLIGHT LOG (2 OF 2)

SUMMARY

Remember the three key elements of the flight planning process:

* Assembling the information required for the preparation of a flight plan
* Planning the flight
* Preparing the single-engine jet flight log

CONCLUSION

Having reviewed the materials and procedures involved in flight planning, you are now better prepared to plan and execute an instrument flight.

PROGRESS CHECK ANSWER KEY

Question 1
In addition to the basic instrument requirements, what three items are necessary for IFR navigation flights?

ANSWER:
1. Two-way radios
2. IFF transponder
3. On-board navigation equipment

Question 2
Which FLIP publication provides a directory of airport facilities for military aircraft?

ANSWER: FLIP Enroute IFR Supplement

Question 3
If you are planning to fly from a civilian field to a military base, which NOTAMs are you required to check?

ANSWER: Call the local FSS for the civilian field for departure NOTAMs. Check AP/1 and call destination base operations for its NOTAMs.

Question 4
Where would you obtain information on the availability of aircraft servicing at your destination airfield?

ANSWER: FLIP Enroute IFR Supplement

Question 5
Where would you find information on special use airspace for your selected route/altitude?

ANSWER: FLIP Area Planning AP/1A

Question 6
Your fuel flow at a cruise altitude of FL 270 is 1052 pph and your true airspeed is 352 KTAS. Your FLIP Enroute High Altitude Chart indicates 76 miles from one fix to the next. This leg of your flight will take you _____ minutes and you will use _____ lb of fuel. For computations, assume no wind condition.

ANSWER: 13 min (nearest whole minute) and 230 lb (round 227.5 up to the next 10-pound increment of fuel)

Question 7
Using the data in Example A of Figure 22, what would you enter on the CLIMB/ROUTE DEST IAF line?

ANSWER: 1830

Question 8
Using the information from Figure 24, list in order the data that you would enter on the LAST CRUISING ALT line in the EMERGENCY “BINGO” to ALTERNATE section.

ANSWER: 340+200+300=840

LESSON GUIDE

COURSE/STAGE: T-45A UJPT & E2-C2 Instrument Navigation

LESSON TITLE: Flight Planning (En Route)

LESSON IDENTIFIER: T-45A UJPT & E2-C2 INav-10

LEARNING ENVIRONMENT: Classroom

ALLOTTED TIME: 1.0 hr

FIGURES:

(6-99) CHANGE 2

Fig 20: VFR Flight Plan
Fig 21: Composite Flight Plan
Fig 22: Formation Flight Plan
Fig 23: Completed DD Form 175

STUDY RESOURCES:

* T-45A NATOPs Flight Manual, A1-T45AB-NFM-000
* DOD FLIP General Planning (GP)
* DOD FLIP (Terminal) High Altitude United States, SE
* U. S. Enroute High Altitude Chart H5

LESSON PREPARATION:

Read:

* Chapter 4-3, “Flight Plan VIP Codes,” DOD FLIP General Planning (GP)

REINFORCEMENT:

Review:

* Chapter 4, “Flight Planning,” DOD FLIP General Planning (GP)

LESSON EXAMINATION:

The objectives in this lesson will be tested in Instrument Navigation 12X.

LESSON OBJECTIVES

2.1.7
Complete DD-175 for route of flight

2.1.7.1
Recall procedures for completing DD-175

2.1.9
Select appropriate publications/items for navigation bag

HOW TO USE A WORKBOOK

1. This is a workbook/lab that you will complete after an introduction by your instructor. You will provide your own FLIP publications, charts, and the T-45A NATOPS.

2. The lesson information is accompanied by exercises and/or questions to measure your understanding of the subject matter. Answers are provided in the back of the chapter to allow you to monitor your progress through the lesson.

MOTIVATION

Every month articles appear in Approach and Naval Aviation News about experienced fleet aviators who get into serious trouble or become accident statistics on “routine” flights. The proper filing of a DD-175 should never be approached as just placing the checks in the boxes. Filling out a flight plan correctly serves as a checklist to ensure that prior to takeoff you have the best information available on items such as weather, NAVAIDs, and fuel on board.

OVERVIEW

This workbook reviews how to complete the DD-175 and addresses the selection of items to be included in the navigation bag for cross-country flights.

This lesson consists of:

* Military Flight Plan, DD Form 175
* Navigation bag contents for cross-country flights

REFRESHER

Recall:

* INav-09, Flight Planning (Departure)
* Your previous experiences with T-34 flight planning

PRESENTATION

COMPLETING DD-175 FOR ROUTE OF FLIGHT 2.1.7, 2.1.7.1

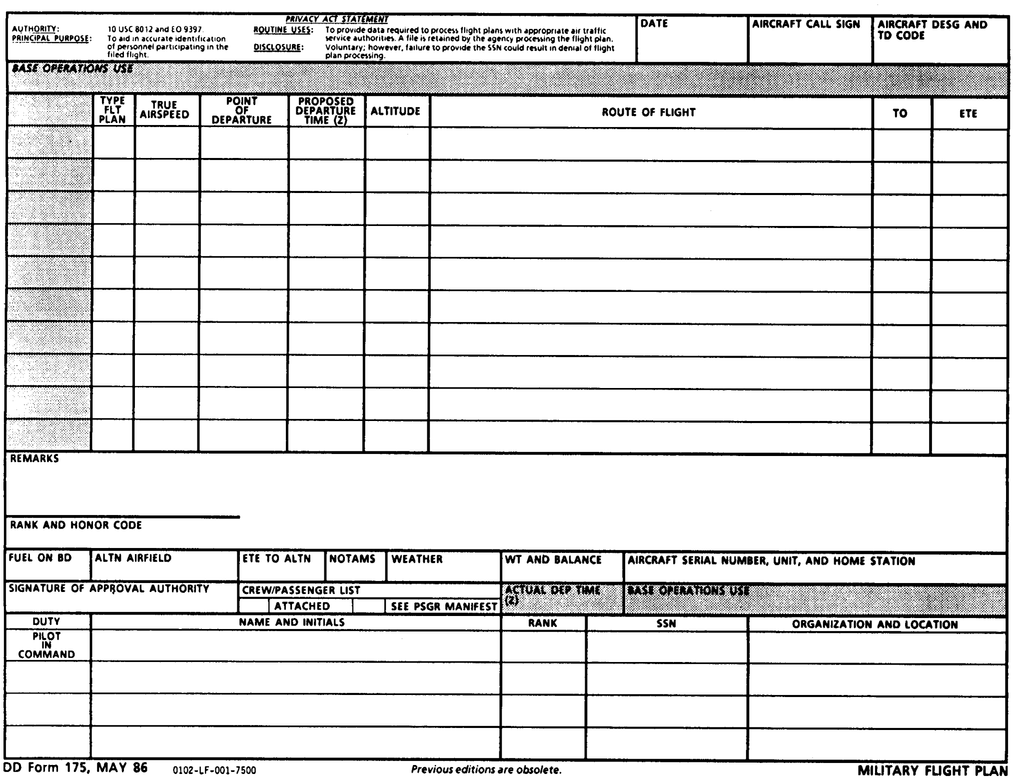
As mentioned in the previous workbook lesson, a completed DD Form 175 is one of three documents required before any IFR flight. The other two are the Single-Engine Jet Flight Log and the Flight Weather Briefing (DD Form 175-1).

The flight plan serves two purposes. It informs ATC of your desires so an IFR clearance may be issued and provides search and rescue facilities necessary information in case of an emergency. Emergency information can include such facts as your route, fuel on board, and identification of personnel.

The Military Flight Plan, DD Form 175, is used for military flights within the contiguous United States, within the Honolulu, Alaskan, and San Juan Domestic Control Areas, and between the contiguous United States and Canada.

The information you need to include in your flight plan varies for each type of flight. Requirements for filling out a DD Form 175 are found in DOD FLIP General Planning (GP), Chapter 4. In the pages that follow, the item number corresponds to the item numbers used in the GP.

Figure 1 is a portion of a DD Form 175.



PRIVACY ACT STATEMENT
AUTHORITY: 10 USC 8012 and EO 9397.
PRINCIPAL PURPOSE: To aid in accurate identification of personnel participating in the filed flight.
ROUTINE USES: To provide data required to process flight plans with appropriate air traffic service authorities. A file is retained by the agency processing the flight plan.
DISCLOSURE: Voluntary; however, failure to provide the SSN could result in denial of flight plan processing.

DATE | AIRCRAFT CALL SIGN | AIRCRAFT DESG AND TD CODE

BASE OPERATIONS USE

	TYPE FLT PLAN	TRUE AIRSPEED	POINT OF DEPARTURE	PROPOSED DEPARTURE TIME (Z)	ALTITUDE	ROUTE OF FLIGHT	TO	ETE

REMARKS

RANK AND HONOR CODE

FUEL ON BD | ALTN AIRFIELD | ETE TO ALTN | NOTAMS | WEATHER | WT AND BALANCE | AIRCRAFT SERIAL NUMBER, UNIT, AND HOME STATION

SIGNATURE OF APPROVAL AUTHORITY | CREW/PASSENGER LIST ATTACHED SEE PSGR MANIFEST | ACTUAL DEP TIME (Z) | BASE OPERATIONS USE

DUTY	NAME AND INITIALS	RANK	SSN	ORGANIZATION AND LOCATION
PILOT IN COMMAND				

DD Form 175, MAY 86 0102-LF-001-7500 *Previous editions are obsolete.* MILITARY FLIGHT PLAN

Figure 1: MILITARY FLIGHT PLAN, DD FORM 175

Complete Section I

The item numbers that follow come from DOD FLIP General Planning (GP), chapter 4 and are used here to help you relate to that document.

ITEM 1 - Enter the DATE of the flight based on local time.

ITEM 2 - Enter the AIRCRAFT CALL SIGN, which is limited to 7 characters. The Navy/Marine Corps Fleet and Training Command may use an aircraft call sign (radio call) consisting of service code (VV for Navy, VM for Marine Corps), plus assigned letter(s)/digits painted on the aircraft's tail plus a side number of not less than two, but no more than three, digits that is painted on the nose of the aircraft.

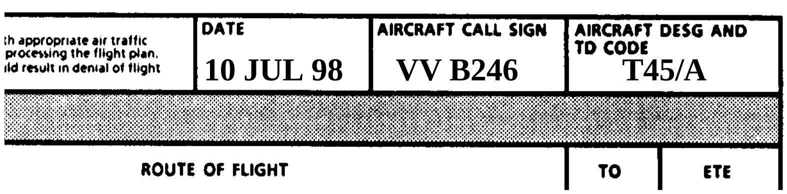
EXAMPLE (Training command): Since the TW2 tail marking is "B" and if the aircraft side number on the nose is 246, then the call sign would be written "VVB246" and is spoken "Navy Bravo two four six."

EXAMPLE (Fleet Squadron): If an F-14 squadron's tail marking is "AC" and the side number on the nose is 104, the call sign would be written "VVAC104" and spoken "Navy Alpha Charlie one zero four." The "A" on the tail and in the call sign identifies an Atlantic Fleet air wing, whereas an "N" would indicate a Pacific Fleet air wing. Each air wing in each fleet has a different second letter. The "C" in "AC" might be assigned Carrier Air Wing Three (CVW-3). All squadrons in the same air wing will display the same tail markings, i.e., "AC" on CVW-3 F-18s, S-3s, E2s and helos.

One of the following suffixes will be added to aircraft designation to denote Transponder/Navigational Aids available	Transponder Only	Area Nav Equipment	TACAN Only	DME
No Transponder		W	M	D
Transponder W/No Mode C	T	C	N	B
Transponder W/Mode C	U	R	P	A

Figure 2: TD CODE TABLE (ASSUMES ALL AIRCRAFT VOR EQUIPPED)

ITEM 3 - Enter the AIRCRAFT DESG AND TD CODE in two parts. First, enter "T45" for the aircraft military designation and a slash (/). Second, enter the T-45's TD code "A" for mode C and TACAN. The TD code denotes the transponder and navigation aid capability of your aircraft and is provided in DOD FLIP General Planning (GP), Chapter 4. (See **Figure 2**.)


th appropriate air traffic processing the flight plan. ild result in denial of flight

DATE	AIRCRAFT CALL SIGN	AIRCRAFT DESG AND TD CODE
10 JUL 98	VV B246	T45/A

ROUTE OF FLIGHT | TO | ETE

Figure 3: DD-175 SECTION I

Figure 3 shows the first section of the DD Form 175.

The FAA “assumes” that all aircraft have VOR as their primary navigation means. Therefore, if the aircraft VOR was inoperative, the T-45 would revert to a /P. However, if VOR and IFF were both inoperative, the T-45 could revert to /M. “DME” indicates that the aircraft can receive VOR and the VOR DME at those VOR stations that are not “VORTACs” but do have DME.

NOTE: Do not use a letter after the aircraft designation to denote the aircraft model. The aircraft model could be confused for the transponder code.

PROGRESS CHECK

Question 1 — 2.1.7
What three completed documents are you required to have in your possession before commencing any IFR flight?

ANSWER:

Question 2 — 2.1.7
What document provides the TD codes that you will need in order to fill in the block, AIRCRAFT DESG AND TD CODE?

ANSWER:

Complete Section II

Figure 4 is a portion of the second section of the DD Form 175.

of personnel participating in the filed flight. DISCLOSURE: Voluntary; however, failure to provide the SSN could result in denial of flight plan processing.

BASE OPERATIONS USE

	TYPE FLT PLAN	TRUE AIRSPEED	POINT OF DEPARTURE	PROPOSED DEPARTURE TIME (Z)	ALTITUDE	ROUTE OF FLIGHT	TO	ETE

Figure 4: DD-175 SECTION II

ITEM 4 - Enter “I” for instrument flight rules (IFR) in TYPE FLT PLAN. DOD FLIP General Planning (GP), Chapter 4, provides the other codes, “V” (VFR) and “D” (DVFR).

NOTE: Do not combine IFR and VFR route segments on the same line.

ITEM 5 - Enter your TAS at initial cruising altitude. This figure is in the TAS block of your completed single-engine jet flight log, but was determined from NATOPS. (TAS is not required for VFR flights.)

If you intend to change TAS on subsequent legs of the flight, you must notify ATC while airborne, but you will make only one entry on the DD Form 175.

ITEM 6 - Enter the location identifier for the POINT OF DEPARTURE (departure airport) or the point (NAVAID or fix) where IFR begins. Enter the installation name if there is no location identifier. For a location identifier with four letters (an international identifier), use only the last three letters, i.e., Meridian NAS (KNMM) will be “NMM.” You can find this information in the ROUTE/TO block of your completed single-engine jet flight log.

Figure 5 is an example of completed TYPE FLT PLAN, TRUE AIRSPEED, and POINT OF DEPARTURE blocks.

TYPE FLT PLAN	TRUE AIRSPEED	POINT OF DEPARTURE	PROPOS DEPARTU TIME (
I	335	NBG	

Figure 5: DD-175 SECTION II -
TYPE FLT PLAN, TRUE AIRSPEED, AND POINT OF DEPARTURE

ITEM 7 - Enter your PROPOSED DEPARTURE TIME (Z) in Coordinated Universal Time (UTC), known as Zulu time. Allow sufficient time (at least 30 minutes) for ATC to process your flight plan.

For activation of an airborne segment (after an enroute delay), enter the proposed time for beginning that segment in Zulu time.

Should your actual departure time be delayed one hour or more beyond the filed proposed departure time, advise Base Operations or the tie-in FSS serving the departure, stopover, or enroute delay airport of your updated proposed departure time. You must also update your weather brief (DD-175-1). If this delay occurs when departing a nonmilitary base, ensure that the actual departure time is passed to the tie-in FSS.

ITEM 8 - Enter the initial cruising ALTITUDE/flight level in hundreds of feet. Use data from the weather briefing and enroute chart to determine this figure.

EXAMPLE: Enter 6,000 ft as 60; 15,000 ft as 150; and FL300 as 300. (Do not enter the letters "FL.")

If a subsequent enroute altitude/flight level is planned, enter the requested altitude/flight level and the location of the change in the REMARKS block.

If an altitude block is desired, enter the lower altitude/flight level of the requested block, the letter "B," and then the higher altitude (top of the block).

EXAMPLE: 240B270

Figure 6 presents examples of completed proposed departure time and altitude blocks.

...INT OF ...RTURE	PROPOSED DEPARTURE TIME (Z)	ALTITUDE	
	1355	250	

Figure 6: DD-175 SECTION II - PROPOSED DEPARTURE TIME AND ALTITUDE

ITEM 9 - Enter enough information to indicate the proposed ROUTE OF FLIGHT clearly. You will find this information in the ROUTE/TO block of your jet log.

If you are using a standard instrument departure (SID), enter the coded identifier or name and transition fix for the SID. Place a "dot" between the SID name and the transition.

EXAMPLE: HOBOZ1•SAT

For a radar departure or VFR climb, indicate the planned NAVAID, TACAN/DME fix, or named intersection within the jet route structure, as the first point in the route.

Clearly define the route of flight by using NAVAID identifiers or radial/DME fixes (use 6 digits), jet route identifiers, or named intersections. The absence of route identifiers between NAVAIDs/fixes indicates direct flight.

To transition from one jet route to another at an unnamed intersection, enter the designations of the two routes separated by a space.

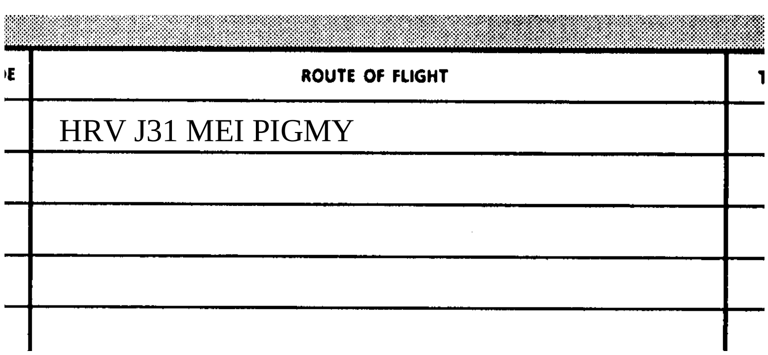
For IFR flight plans, the last fix entered is one of the following:

1. The nearest appropriate IAF, i.e., PIGMY or NMM325028
2. NAVAID
3. First point of intended landing
4. Published fix which most clearly establishes the route of flight to the destination or the point where the IFR portion of the flight will end.
5. The coded identifier of a Standard Terminal Arrival (STAR), i.e., BOIDS9 placed after the transition fix.

If a fix is collocated with a NAVAID, ILS (instrument landing system) marker, or other fix, the 5-letter name/ name-code applies to both. You may also file for fixes using fix radial and distance, which consists of NAVAID identifier, 3 characters for azimuth, and 3 characters for distance in nautical miles (nm), or by listing the latitude and longitude.

EXAMPLE: MCC220017

Figure 7 shows a completed ROUTE OF FLIGHT.


ROUTE OF FLIGHT

HRV J31 MEI PIGMY

Figure 7: DD-175 SECTION II - ROUTE OF FLIGHT

ITEM 10 - In the TO block, enter the 3-letter FAA location identifier or last 3 letters of the international identifier of the final destination airport. If there is no location identifier, enter the airport name.

ITEM 11 - Enter your estimated time en route (ETE) using the hours + minutes format. For IFR flights, enter the time from takeoff (from the airport) or departure from a delay fix to the last fix shown in the ROUTE OF FLIGHT exclusive of planned enroute delays. (For VFR flights, the ETE is from takeoff to overhead the destination airport, including known or preplanned enroute delays.)

Figure 8 provides examples of completed TO and ETE blocks.

TO	ETE
NMM	0 + 38

Figure 8: DD-175 SECTION II - TO AND ETE BLOCKS

Figure 9 provides a completed example of Section II of the DD Form 175.

of personnel participating in the filed flight. DISCLOSURE: Voluntary; however, failure to provide the SSN could result in denial of flight plan processing.

BASE OPERATIONS USE

	TYPE FLT PLAN	TRUE AIRSPEED	POINT OF DEPARTURE	PROPOSED DEPARTURE TIME (Z)	ALTITUDE	ROUTE OF FLIGHT	TO	ETE
	I	335	NBG	1355	250	HRV J31 MEI PIGMY	NMM	0 + 38

Figure 9: DD-175 SECTION II - COMPLETED EXAMPLE

PROGRESS CHECK

Question 3 — 2.1.7
To complete the ALTITUDE block, enter your altitude/flight level in _______ of feet.

ANSWER:

Complete Section III

Figure 10 shows a completed REMARKS and RANK AND HONOR CODE blocks.

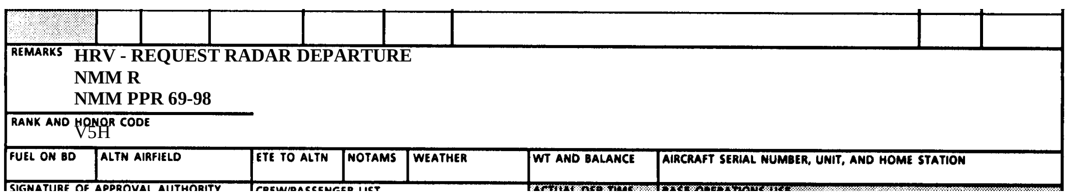

REMARKS HRV - REQUEST RADAR DEPARTURE
NMM R
NMM PPR 69-98
RANK AND HONOR CODE V5H
FUEL ON BD | ALTN AIRFIELD | ETE TO ALTN | NOTAMS | WEATHER | WT AND BALANCE | AIRCRAFT SERIAL NUMBER, UNIT, AND HOME STATION
SIGNATURE OF APPROVAL AUTHORITY | CREW/PASSENGER LIST | ACTUAL DEP TIME | BASE OPERATIONS USE

Figure 10: DD-175 SECTION III

ITEM 12 - In the REMARKS block, enter information that is essential to safe and efficient control of air traffic.

Entries in the REMARKS section include:

REQ RADAR DEP --- When a radar departure is desired

REQ VFR CLIMB --- When requesting a VFR climb to pick up an IFR clearance

R (Ident) --- if you plan on remaining overnight

S (Ident) --- for servicing on arrival. Particularly useful on stopover flight plans

If you have a **PPR** (Prior Permission Required) number, enter: (Ident) PPR + #.

ADF ONLY --- if so equipped

VFR/OT ABOVE FL600 --- if you can fly that high

HAZARDOUS CARGO or **INERT DEVICES** if applicable

Anything else, use plain English, e.g., “Static display for Blue Angel air show.”

ITEM 13 - For the RANK AND HONOR CODE block, use the Flight Plan VIP Codes in DOD FLIP General Planning (GP), Paragraph 4-3, to indicate branch of service, highest rank/grade aboard, and honors desired. For a stopover flight plan, enter pickup and dropoff points.

Enter the service category designator letter, the number code for highest rank/grade aboard, and the honors code letter.

EXAMPLE: V5H: VIP, Rear Admiral, accord honors

EXAMPLE: R50: VIP, Army Major General, request nothing

Complete Section IV

Figure 11 illustrates Section IV of the DD Form 175.

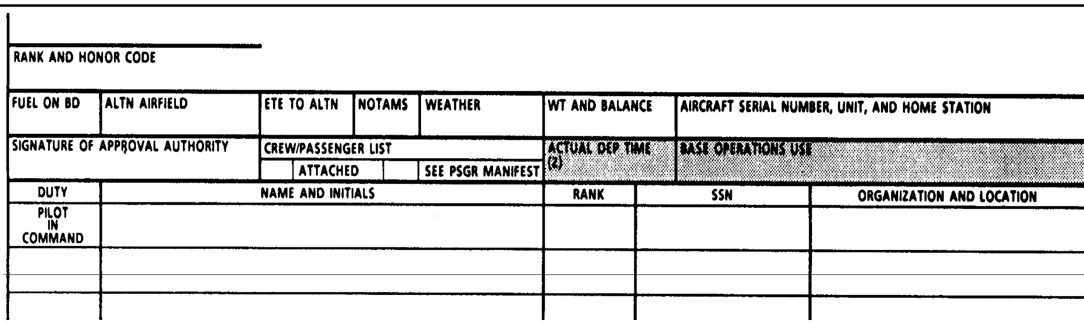

RANK AND HONOR CODE
FUEL ON BD | ALTN AIRFIELD | ETE TO ALTN | NOTAMS | WEATHER | WT AND BALANCE | AIRCRAFT SERIAL NUMBER, UNIT, AND HOME STATION
SIGNATURE OF APPROVAL AUTHORITY | CREW/PASSENGER LIST | ATTACHED | SEE PSGR MANIFEST | ACTUAL DEP TIME (Z) | BASE OPERATIONS USE
DUTY | NAME AND INITIALS | RANK | SSN | ORGANIZATION AND LOCATION
PILOT IN COMMAND

Figure 11: DD-175 SECTION IV

ITEM 14 - For FUEL ON BD, enter the total time (using the hours + minutes format) that your aircraft can stay aloft while flying the planned profile with the fuel available at initial takeoff using the procedures recommended in NATOPS.

There is a specific method for computing Required Reserve Fuel, but there is no specific method for computing Fuel-On-Board. This will vary according to squadron procedures and type of aircraft, as well as planned flight altitude.

FOR GROUND SCHOOL PURPOSES ONLY, use cruise altitude fuel flow to determine the time to burn the fuel remaining at the destination IAF and add that time to the ETE at the destination IAF.

EXAMPLE: 1+48

Additional time groups will be entered in brackets to show the amount of additional flight time possible when in-flight refueling is planned.

EXAMPLE: 2+30 [3+10]

ITEM 15 - Should you require an ALTN AIRFIELD, select it on the basis of the criteria defined in OPNAVINST 3710.7.

Enter the 3-letter identifier obtained from the IFR Enroute Supplement to identify the alternate airfield (use the airport's name if there is no location identifier). Your alternate is also listed on your jet log in the ALTERNATE block.

ITEM 16 - In the ETE TO ALTN (estimated time en route to alternate) block, enter your planned time to fly from your original destination to your planned alternate, at your planned altitude/flight level. Obtain this time from your computations on the bottom of the front side of your jet log for a flight at cruising altitude/ flight level from destination IAF to alternate IAF.

ITEM 17 - The N0TAMs block is a preflight reminder to consult all NOTAMs relevant to your flight. This includes appropriate "Supplementary Aerodrome Remarks" from AP/1. If the date time group at the top of the hourly update and summary section has expired, obtain updated NOTAM information through Base Ops. Enter a check mark to indicate compliance with this responsibility.

ITEM 18 - The WEATHER block is another preflight reminder to indicate that you have obtained an adequate briefing on all weather conditions pertinent to your flight. Enter a check mark or the briefer's initials if you received the brief by radio or telephone or the weather briefing number if you were given one. Normal procedure at many bases has the forecaster entering the "Flimsy Number" from the DD-175-1 and his initials.

ITEM 19 - The WT AND BALANCE block does not pertain to tactical jet aircraft (only to aircraft transporting passengers and/or cargo).

Enter "N/A" for not applicable.

ITEM 20 - In the AIRCRAFT SERIAL NUMBER, UNIT, AND HOME STATION block, enter the aircraft bureau number followed by a slash (/), the unit of assignment followed by a slash (/), and the aircraft home station 3-letter location identifier. You can obtain this information from maintenance.

EXAMPLE: 163610/TW2/NQI

Figure 12 shows a completed Section IV.

ITEM 21 - For the SIGNATURE OF APPROVAL AUTHORITY block, OPNAVINST 3710.7 authorizes the pilot-in-command of a Naval aircraft or formation leader to approve the proposed flight plan.

ITEM 22 - Enter "N/R" in the CREW/PASSENGER LIST block because this list does not apply to tactical jet aircraft.

ITEM 23 - Do not make an entry in the ACTUAL DEP TIME and BASE OPERATIONS USE blocks.

RANK AND HONOR CODE						
FUEL ON BD 1 + 45	ALTN AIRFIELD NBG	ETE TO ALTN 0 + 15	NOTAMS ✓	WEATHER 103-3 js	WT AND BALANCE N/A	AIRCRAFT SERIAL NUMBER, UNIT, AND HOME STATION 163610/TW2/NQI
SIGNATURE OF APPROVAL AUTHORITY I. M. SMART		CREW/PASSENGER LIST N/R ATTACHED		SEE PSGR MANIFEST	ACTUAL DEP TIME (2)	BASE OPERATIONS USE

DUTY	NAME AND INITIALS	RANK	SSN	ORGANIZATION AND LOCATION
PILOT IN COMMAND				

Figure 12: DD-175 SECTION IV - COMPLETED EXAMPLE

PROGRESS CHECK

Question 4--2.1.9
What format is used to enter the total time for the FUEL ON BD block?

ANSWER:

Complete Section V

ITEM 24 - Enter the symbol for the DUTY to be performed by each member listed, as defined by appropriate service directives. For formation flights, identify the crew duty symbol and position of the aircraft in formation.

EXAMPLE: CP—Copilot; P/2—Pilot of the number two aircraft in formation; CP/2—Copilot of the number two aircraft in formation

ITEM 25 - For NAME AND INITIALS, the name of the pilot-in-command must appear in the first block of the crew list; names of all crew members may be listed separately and attached to the flight plan.

ITEM 26 - Enter the appropriate military rank or suitable civilian classification in the RANK block.

ITEM 27 - Next, enter the SSN (social security number) for each crew member (optional).

ITEM 28 - Last, in the ORGANIZATION AND LOCATION block, enter the organization of each individual crew member and the location of his/her organization, using a 3-letter location identifier. Enter the installation name if there is no location identifier.

NOTE: If the crew is composed of members from different military services, identify the branch in parentheses after the location, i.e., (USMC) or (USN).

Figure 13 is an example of a completed Section V.

SIGNATURE OF APPROVAL AUTHORITY	CREW/PASSENGER LIST ATTACHED / SEE PSGR MANIFEST	ACTUAL DEP TIME (Z)	BASE OPERATIONS USE

DUTY	NAME AND INITIALS	RANK	SSN	ORGANIZATION AND LOCATION
PILOT IN COMMAND	Queek, P. D.	LT	565-42-6681	VT21/NQI (USN)
CP	Slow, I. M.	Capt	428-91-6340	VT21/NQI (USMC)

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Figure 13: DD-175 SECTION V

SELECTING THE APPROPRIATE PUBLICATIONS/ITEMS FOR NAVIGATION BAG 2.1.9

The contents of the navigation bag for cross-country flights, based on your flight plan, should include the following:

* U.S. Enroute High Altitude Charts (if you plan to operate in the low altitude structure, you should also carry the Low Altitude/Terminal Chart for your destination area)
* DOD FLIP (Enroute) IFR Supplement, United States
* DOD FLIP (Enroute) Flight Information Handbook
* DOD FLIP (Terminal) High Altitude United States (and Low Altitude if appropriate)
* Fuel packet
* Navigation computer (required by OPNAVINST 3710.7)
* Navigation flight log forms
* TRAWING Two In-Flight Guide
* Flashlight for night flights
* Copy and carry SIDs and STARs that might be necessary for your destination.

Figures 14 and 15 depict the flight log providing the information for the completed DD Form 175 (See **Figure 23** that you will find at the conclusion of this lesson.)

SINGLE–ENGINE JET FLIGHT LOG
CNATRA-GEN 3760/1 (REV. 7-78) S/N0197LLCF19482

DEP ELEV	CLNC DELIV (GROUND)	GND CONT (NAVY NO.)	TOWER (NAVY NO.)
3'	121.6/382.8	121.6/382.6	123.8/340.2
ALT CORR	TIME OFF	TAS 335	LBS PH/PMIN 1055/17.6

ATIS: 276.2
METRO: 265.8
BASE OPS: 384.25

CLEARANCE ATC CLEARS VVB246 NMM
VIA HRV J-31 MEI PIGMY
FL250 SQUAWK

DEPARTURE

DEST ELEV	APC CONT	TOWER	GND CONT
317'	MERIDIAN 119.2/276.4	NAVY MCCAIN 126.2/340.2	336.4

ROUTE / TO	IDENT VOR / CHAN	CUS	DIST	ETE	ETA / ATA	LEG FUEL	EFR 2861 / AFR	NOTES
HRV	114.1 / 88	START-TAXI-T.O				200	2661	ATIS: 273.2 METRO: 312.4 1200-0500 Z VAR 0°
D→ HRV HARVEY	114.1 / 88	VAR	6					
J-31 MEI MERIDIAN	117.0 / 117	020	26	5		320	2341	TOC FL250
J-31 MEI MERIDIAN	117.0 / 117	018	131	26		460	1881	WIND 340/50 TAS 340 GS 301
D→ NMM PIGMY	56	353	36	7		130	1751	GS 292
(NMM 328028)			199	0+38		1110		
								FRCST ALT

ALTERNATE	ROUTE	ALTITUDE	TIME	FUEL
MAXWELL MXF	D→ CLUBB	250	0+18	1+45
ALT ELEV 172'	APC CONT Montgomery 121.2/369.2	TOWER 118.15/253.5	GND CONT 127.15/289.4	

D→ MXF CLUBB	ILS 109.3 / 97	085	110	18		320	1431	WIND 340/50 TAS 340 GS 360
(MAX 330035)								I-MXF 109.3 ATIS 134.7 269.9

VAR=0

(Over)

Figure 14: COMPLETED FLIGHT LOG (1 OF 2)

FUEL PLAN

1. CLIMB/ROUTE DEST IAF	910	6. START/TAXI	200
2. ROUTE ALT IAF (If required)	320	7. TOTAL REQUIRED (4, 5 & 6)	1930
3. APPROACHES	200	8. TOTAL ABOARD	2861
4. TOTAL (1, 2 & 3)	1430	9. SPARE FUEL (8–7)	931
5. RES 10% of 4 (Min 20 mins)	300		

EMERGENCY "BINGO" TO ALTERNATE

	REQUIRED		APPROACH		RES		TOTAL
FL 250 LAST CRUSING ALT	320	+	200	+	300	=	820
14,000' INITIAL APP ALT TAS 278	450	+	200	+	300	=	950
WIND 010/30 GS 270 FUEL 1109/18.5 24 MIN BINGO ~~EMER SAFE ALT~~ 114 MI DRAG INDEX 0	760	+	200	+		=	960

CHECK LIST	DESTINATION NMM	ALTERNATE	EMER FIELDS
RWY LENGTH	19 L/R 8,000 01/28 6,400	8,000'	GULFPORT BILOXI REG.
LIGHTING	19 L (A) HIRL 01L (A1) HIAPP SEQ FL CL	APP. HIRL SEQ FL PAPI	ID GBT
FUEL/JASU/LOX	J5	J8	CH 27 109.0
UHF/ADF	NO	NO	PAGE NO. 47-51
~~UHF/DF~~ ILS	NO	200-3/4	
~~RAPCON~~ LOC/DME MINS	NO	NO	
PAR MINS	01L/ 19L 200 - 1/2	ASR 15 400-1	
TAC MINS	01L 500 - 1 19L 500 - 3/4	15 400-1	
ARR GEAR	ALL RUNWAYS	ALL RUNWAYS	
PUBS	✓	✓	
NOTAMS	✓	✓	
FUEL PACKET	✓	✓	
FLASHLIGHT, WALLET, ETC.	✓	✓	

CNATRA–GEN 3760/1 (REV. 7–78) S/N0197LLCF19482(BACK) *U.S.GPO:1987–530–016/61134

Figure 15: COMPLETED FLIGHT LOG (2 OF 2)

So far we have primarily discussed a one-leg flight plan which also could be used for a Round-Robin flight returning to your point of origin (See **Figure 16**). Other formats that you might utilize while undergoing flight training are discussed below, and are explained in great detail in Chapter 4 of the FLIP General Planning (GP).

1. One-Leg (Round Robin) Flight Plan
2. Stop-Over Flight Plan
3. Terminal Delay Flight Plan
4. Enroute Delay Flight Plan

There are variations that you will be using such as composite VFR-IFR flight plans, those involving formation flights, and Operational Navigation Routes (ONAV).

PRIVACY ACT STATEMENT

AUTHORITY: 10 USC 8012 and EO 9397.
PRINCIPAL PURPOSE: To aid in accurate identification of personnel participating in the filed flight.
ROUTINE USES: To provide data required to process flight plans with appropriate air traffic service authorities. A file is retained by the agency processing the flight plan.
DISCLOSURE: Voluntary; however, failure to provide the SSN could result in denial of flight plan processing.

DATE	AIRCRAFT CALL SIGN	AIRCRAFT DESG AND TD CODE
29 JUL 98	VVB243	T45/A

BASE OPERATIONS USE

TYPE FLT PLAN	TRUE AIRSPEED	POINT OF DEPARTURE	PROPOSED DEPARTURE TIME (Z)	ALTITUDE	ROUTE OF FLIGHT	TO	ETE
1	375	NQI	1400	330	PSX3-PSX J29 IAH J2 SAT		
					J21 LRD RVERA	NQI	1+30

REMARKS
NZC-S

RANK AND HONOR CODE

FUEL ON BD	ALTN AIRFIELD	ETE TO ALTN	NOTAMS	WEATHER	WT AND BALANCE	AIRCRAFT SERIAL NUMBER, UNIT, AND HOME STATION
2+20	NGP	0+10	✓	4-129 RR	N/A	163543/TW2/NQI

SIGNATURE OF APPROVAL AUTHORITY: R.U. Ready
CREW/PASSENGER LIST: ATTACHED / SEE PSGR MANIFEST
ACTUAL DEP TIME (Z)
BASE OPERATIONS USE

DUTY	NAME AND INITIALS	RANK	SSN	ORGANIZATION AND LOCATION
PILOT IN COMMAND	READY, R.U.	LTJG	450-44-4433	VT-21/NQI

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Figure 16: ONE-LEG (ROUND ROBIN) FLIGHT PLAN

PRIVACY ACT STATEMENT	DATE	AIRCRAFT CALL SIGN	AIRCRAFT DESG AND TD CODE
AUTHORITY: 10 USC 8012 and EO 9397. PRINCIPAL PURPOSE: To aid in accurate identification of personnel participating in the filed flight. ROUTINE USES: To provide data required to process flight plans with appropriate air traffic service authorities. A file is retained by the agency processing the flight plan. DISCLOSURE: Voluntary; however, failure to provide the SSN could result in denial of flight plan processing.	29 JUL 98	VVB243	T45/A

BASE OPERATIONS USE

	TYPE FLT PLAN	TRUE AIRSPEED	POINT OF DEPARTURE	PROPOSED DEPARTURE TIME (Z)	ALTITUDE	ROUTE OF FLIGHT	TO	ETE
	1	395	NZC	1230	350	SZW J2 SJI RRICK	NBG	1+15
	1	395	NBG	1430	350	LCH J22 CRP WAADE	NQI	1+25
						(2+10 NGP 0+10)		

REMARKS

SZW, LCH REQ RADAR DEP
NBG-S
NBG PPR - 48-98

RANK AND HONOR CODE

FUEL ON BD	ALTN AIRFIELD	ETE TO ALTN	NOTAMS	WEATHER	WT AND BALANCE	AIRCRAFT SERIAL NUMBER, UNIT, AND HOME STATION
2+25	NMM	0+20	✓	4-131 *id*	N/A	163624/TW2/NQI

SIGNATURE OF APPROVAL AUTHORITY	CREW/PASSENGER LIST	ACTUAL DEP TIME (Z)	BASE OPERATIONS USE
J.J. Doe	N/R — ATTACHED / SEE PSGR MANIFEST		

DUTY	NAME AND INITIALS	RANK	SSN	ORGANIZATION AND LOCATION
PILOT IN COMMAND	DOE, J.J.	ENS	217-51-1176	VT-22/NQI

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Figure 17: STOP-OVER FLIGHT PLAN

NOTES: The last entry in the "Route of Flight" section should be the IAF which most clearly establishes the route of flight to destination, since this is the point at which ATC anticipates you will begin a penetration at your ETA in the event of enroute radio failure. Enter the IAF five-letter name or NAVAID three-letter identifier and a six-digit radial and DME from the Approach Procedure Chart.

For a "RADAR Only" airport, enter the last NAVAID along your route of flight.

Use as many lines as necessary for the route of flight, but ensure destination identifier in the "TO" block is entered on the <u>last line</u> of the route of flight.

PRIVACY ACT STATEMENT

AUTHORITY: 10 USC 8012 and EO 9397.
PRINCIPAL PURPOSE: To aid in accurate identification of personnel participating in the filed flight.
ROUTINE USES: To provide data required to process flight plans with appropriate air traffic service authorities. A file is retained by the agency processing the flight plan.
DISCLOSURE: Voluntary; however, failure to provide the SSN could result in denial of flight plan processing.

DATE	AIRCRAFT CALL SIGN	AIRCRAFT DESG AND TD CODE
29 JUL 98	VVB291	T45/A

BASE OPERATIONS USE

TYPE FLT PLAN	TRUE AIRSPEED	POINT OF DEPARTURE	PROPOSED DEPARTURE TIME (Z)	ALTITUDE	ROUTE OF FLIGHT	TO	ETE
1	395	NQI	1245	350	HOBOZ1 . SAT BRYGS		0+32
					R D 0+25 BSM BAD		
1	395	BSM	1340	350	LFK J29 EMG BARGS	BAD	0+33
1	381	BAD	1500	330	LFK J29 CRP NQI 270026	NQI	1+05
					(2+45 NGP 0+10)		

REMARKS
LFK-REQ RADAR DEP
BAD-S

RANK AND HONOR CODE
R5N SPEED BAD TO NQI

FUEL ON BD	ALTN AIRFIELD	ETE TO ALTN	NOTAMS	WEATHER	WT AND BALANCE	AIRCRAFT SERIAL NUMBER, UNIT, AND HOME STATION
2+25	NBG	0+22	✓	4-113 is	N/A	163601/TW2/NQI

SIGNATURE OF APPROVAL AUTHORITY	CREW/PASSENGER LIST	ACTUAL DEP TIME (Z)	BASE OPERATIONS USE
J.G. Smith	ATTACHED / SEE PSGR MANIFEST		

DUTY	NAME AND INITIALS	RANK	SSN	ORGANIZATION AND LOCATION
PILOT IN COMMAND	SMITH, J.G.	LT	444-55-6666	VT-21/NQI

DD Form 175, MAY 86 0102-LF-001-7500 *Previous editions are obsolete.* MILITARY FLIGHT PLAN

Figure 18: TERMINAL DELAY FLIGHT PLAN

NOTE: On a Terminal Delay Flight Plan, you are not landing. ARTCC will turn you over to Approach Control to make your delay request, i.e., practice approaches or holding.

ENROUTE DELAY FLIGHT PLAN

PRIVACY ACT STATEMENT
AUTHORITY: 10 USC 8012 and EO 9397
PRINCIPAL PURPOSE: To aid in accurate identification of personnel participating in the filed flight
ROUTINE USES: To provide data required to process flight plans with appropriate air traffic service authorities. A file is retained by the agency processing the flight plan
DISCLOSURE: Voluntary. However, failure to provide the SSN could result in denial of flight plan processing

DATE	AIRCRAFT CALL SIGN	AIRCRAFT DESG AND TO CODE
29 JUL 98	VV82∅1	T45/A

BASE OPERATIONS USE

	TYPE FLT PLAN	TRUE AIRSPEED	POINT OF DEPARTURE	PROPOSED DEPARTURE TIME (Z)	ALTITUDE	ROUTE OF FLIGHT	TO	ETE
	I	387	NMM	1345	39∅	MEI J4 STAGE/D ∅+1∅ J4 DFW BOBIN	NFW	1+14

Figure 19: DD-175 - ENROUTE DELAY FLIGHT PLAN

NOTE: On an Enroute Delay Flight Plan, you will remain on ARTCC frequency to make your delay request, such as practice holding.

MISCELLANEOUS EXAMPLES:

VFR FLIGHT PLAN

PRIVACY ACT STATEMENT
AUTHORITY: 10 USC 8012 and EO 9397
PRINCIPAL PURPOSE: To aid in accurate identification of personnel participating in the filed flight
ROUTINE USES: To provide data required to process flight plans with appropriate air traffic service authorities. A file is retained by the agency processing the flight plan
DISCLOSURE: Voluntary. However, failure to provide the SSN could result in denial of flight plan processing

DATE	AIRCRAFT CALL SIGN	AIRCRAFT DESG AND TO CODE
29 JUL 98	VV 8213	T45/A

BASE OPERATIONS USE

	TYPE FLT PLAN	TRUE AIRSPEED	POINT OF DEPARTURE	PROPOSED DEPARTURE TIME (Z)	ALTITUDE	ROUTE OF FLIGHT	TO	ETE
	V	315	NPA	13∅∅	175	CEW MCN VAN ILM	NKT	1+35

Figure 20: VFR FLIGHT PLAN

COMPOSITE FLIGHT PLAN

PRIVACY ACT STATEMENT
AUTHORITY: 10 USC 8012 and EO 9397
PRINCIPAL PURPOSE: To aid in accurate identification of personnel participating in the filed flight
ROUTINE USES: To provide data required to process flight plans with appropriate air traffic service authorities. A file is retained by the agency processing the flight plan
DISCLOSURE: Voluntary. However, failure to provide the SSN could result in denial of flight plan processing

DATE	AIRCRAFT CALL SIGN	AIRCRAFT DESG AND TO CODE
29 JUL 98	VV 8241	T45/A

BASE OPERATIONS USE

	TYPE FLT PLAN	TRUE AIRSPEED	POINT OF DEPARTURE	PROPOSED DEPARTURE TIME (Z)	ALTITUDE	ROUTE OF FLIGHT	TO	ETE
	I	387	NQI	14∅∅	39∅	HOBOZ 1•COT FST122∅43		∅+45
	V					VR-196 (A-G)		∅+28
	I	31∅	SFL∅58∅15	1514	18∅	FANNY	ELP	∅+1∅

Figure 21: COMPOSITE FLIGHT PLAN

NOTE: An IFR ETE excludes all planned delays.
A VFR ETE includes all planned delays.

FORMATION FLIGHT

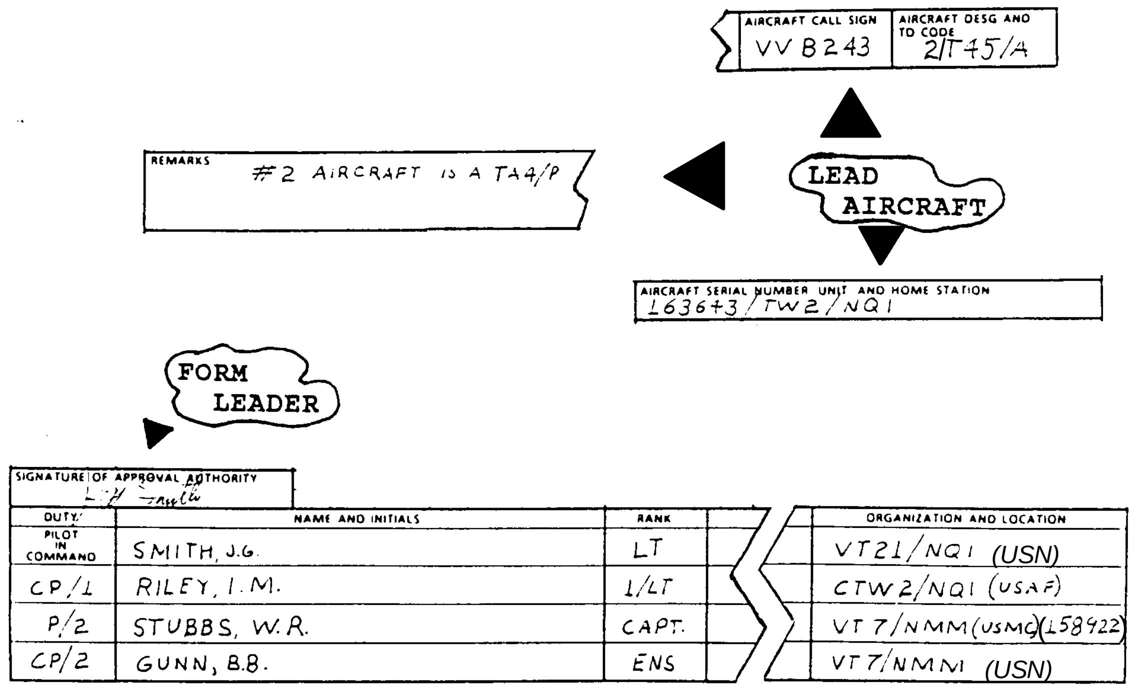

Figure 22: FORMATION FLIGHT PLAN

REVIEW:

IFR flight plans should be filed at least 30 minutes prior to planned departure time. This allows ATC time to process the flight plan and work your flight into the traffic system. Flight plans should be filed with the Base Operations having a communication link with ARTCC or by commercial telephone with an FSS. Flight plans can be filed in flight with an FSS, provided visual flight conditions can be maintained (and you stay below Class A airspace) until an IFR clearance is received.

Prior to every IFR flight outside the local training area, a pilot should have three documents in his possession:

* A copy of the Flight Weather Briefing (DD Form 175-1)
* A copy of the Flight Plan (DD Form 175)
* A completed Jet Flight Log with essential information to complete the assigned mission.

Figure 23 is a completed DD Form 175 reflecting the typical entries discussed throughout this lesson.

PRIVACY ACT STATEMENT

AUTHORITY: 10 USC 8012 and EO 9397.
PRINCIPAL PURPOSE: To aid in accurate identification of personnel participating in the filed flight.
ROUTINE USES: To provide data required to process flight plans with appropriate air traffic service authorities. A file is retained by the agency processing the flight plan.
DISCLOSURE: Voluntary; however, failure to provide the SSN could result in denial of flight plan processing.

DATE	AIRCRAFT CALL SIGN	AIRCRAFT DESG AND TD CODE
29 JUL 98	VVB246	T45/A

BASE OPERATIONS USE

	TYPE FLT PLAN	TRUE AIRSPEED	POINT OF DEPARTURE	PROPOSED DEPARTURE TIME (Z)	ALTITUDE	ROUTE OF FLIGHT	TO	ETE
	I	335	NBG	1355	250	HRV J31 MEI PIGMY	NMM	0+38

REMARKS

HRV-REQ RADAR DEP
NMM R
NMM PPR 69-98

RANK AND HONOR CODE

FUEL ON BD	ALTN AIRFIELD	ETE TO ALTN	NOTAMS	WEATHER	WT AND BALANCE	AIRCRAFT SERIAL NUMBER, UNIT, AND HOME STATION
2+23	MXF	0+18	✓	29 IS	N/A	163610/TW2/NQI

SIGNATURE OF APPROVAL AUTHORITY	CREW/PASSENGER LIST	ACTUAL DEP TIME (Z)	BASE OPERATIONS USE
I.M. Smart	ATTACHED / SEE PSGR MANIFEST		

DUTY	NAME AND INITIALS	RANK	SSN	ORGANIZATION AND LOCATION
PILOT IN COMMAND	SMART, I.M.	LTJG		VT-21/NQI

DD Form 175, MAY 86 0102-LF-001-7500 *Previous editions are obsolete.* **MILITARY FLIGHT PLAN**

Figure 23: COMPLETED DD FORM 175

PROGRESS CHECK

Question 5 — 2.1.9
Select from the following list the items that you should include in your navigation bag.

a) Navigation computer
b) T-45A NATOPS Flight Manual
c) DOD FLIP (Enroute) High Altitude Chart(s)
d) Fuel packet

ANSWER:

SUMMARY

This lesson has focused on the following topics:

* Military Flight Plan, DD Form 175
* Navigation bag contents for cross-country flights

CONCLUSION

By completing the DD Form 175 fully, accurately, and neatly, you efficiently communicate your flight plans to the controlling agency, thus expediting your clearance. Further, you ensure that search and rescue efforts have enough information to track your flight. As for the contents of your navigation bag, include resources necessary for any in-flight changes.

PROGRESS CHECK ANSWER KEY

Question 1
What three completed documents are you required to have in your possession before commencing any IFR flight?

ANSWER:
1. DD Form 175
2. Single-Engine Jet Flight Log
3. Flight Weather Briefing (DD Form 175-1)

Question 2
What document provides the TD codes that you will need in order to fill in the block, AIRCRAFT DESG AND TD CODE?

ANSWER: DOD FLIP General Planning (GP), Chapter 4

Question 3
To complete the ALTITUDE block, enter your altitude/flight level in _______ of feet.

ANSWER: hundreds

Question 4
What format is used to enter the total time for the FUEL ON BD block?

ANSWER: Hours + minutes

Question 5
Select from the following list the items that you should include in your navigation bag.

a) Navigation computer
b) T-45A NATOPS Flight Manual
c) DOD FLIP (Enroute) High Altitude Chart(s)
d) Fuel packet

ANSWER: a, c, d

NOTES

LESSON GUIDE/WORKBOOK LESSON (LAB)

COURSE/STAGE: T-45A UJPT, E2-C2 Instrument Navigation

LESSON TITLE: Practice Problems

LESSON IDENTIFIER: T-45A UJPT, E2-C2 INav-11

LEARNING ENVIRONMENT: Classroom/Homework

ALLOTTED CLASSROOM TIME: 1.0 hr

FIGURES:

STUDY RESOURCES:

* T-45A NATOPS Flight Manual, A1-T45AB-NFM-000
* TRAWING TWO IN-FLIGHT GUIDE
* FLIP General Planning (GP)

(6-99) ORIGINAL

LESSON PREPARATION:

Review:
* INav-08, “Fuel, Weather, and Alternate Airfield Planning”
* INav-09, “Flight Planning (Departure)”
* INav-10, “Flight Planning (En route)”

REINFORCEMENT: N/A

EXAMINATION: This subject matter will be tested in Instrument Navigation 12X

LESSON OBJECTIVES

1.1.1.1
Determine weather minimums

2.1.8.7
Recall items to be checked for destination airfield

2.1.8.2
Determine alternate routes/airfields

2.1.8.8
Recall items to be checked during route/altitude selection

1.1.2.1
Plan route of flight

2.1.8
Prepare single-engine jet log

2.1.8.1
Determine fuel requirements for route of flight

2.1.7.1
Recall procedures for completing DD-175

2.1.7
Complete DD-175 for route of flight

HOW TO USE A WORKBOOK

For the purposes of standardization, round the time to the nearest minute and fuel to the next higher 10-pound increment. Interpolate charts where necessary. Include variation and winds in your ground speed calculations. Training Squadrons do not use climb winds for tactical jet aircraft.

INSTRUCTIONAL MATERIAL REQUIRED FOR PROBLEMS

FLIP Enroute IFR Supplement
FLIP Enroute Flight Information Handbook
FLIP General Planning (GP)
Air navigation computer
Calculator (optional)
Plotter
FLIP Enroute High Altitude Chart #5
FLIP Terminal SE
FLIP Area Planning (AP/1)
TW-2 Standard T-45A Fuel Planning Data (Figure 1)
Bingo charts (Figure 2)

MOTIVATION

Proficiency in preparing jet logs and DD-175s only comes with practice. Speed and accuracy are essential in the preparation for and the flying of navigation flights.

OVERVIEW

This lesson consists of a one-leg navigation problem conducted in class under the instructor's supervision and a two-leg navigation problem that the student is encouraged to work outside class. The problem statement and solution are contained in this lesson for the two-leg navigation problem.

PRESENTATION

TWO-LEG NAVIGATION PROBLEM

ASSIGNMENT: Prepare a Jet Log and DD-175 for a stopover IFR flight using the data below and appropriate references.

DEPARTURE POINT: NAS Cecil Field, FL

ETD: 0830 EST on the present date

DESTINATION: NAS Kingsville, TX following a 45-minute refueling stop at NAS New Orleans for which PPR #14-98 was obtained from the ODO at NAS New Orleans

ROUTE: Radar vectors to Seminole, J2 to Semmes, direct to the IAF at NAS New Orleans

N29° 37.38', W92° 55.44', HEIGH, J22 CRP, NQI 270026

AIRCRAFT: T-45A BUNO 163610, side number 210
Assigned to TW-2, NAS Kingsville
Zero fuel weight 10,500 pounds
Drag index: 0 from NZC TO NBG
25 from NBG TO NQI

PILOT-IN-COMMAND: Yourself in VT-21 or 22, NAS Kingsville

FORMATION AIRCRAFT:

Pilot: Ens I. M. Wingman, no SSN given
Instructor Pilot: Capt U. T. Instructor, USMC 111-21-7615

T-45A side number 200, bureau number 163020

DD-175-1 WEATHER BRIEF:

Present NZC weather: BKN004 6 3512 29.89

Winds aloft are most favorable at FL350 from Cecil to New Orleans and FL310 from New Orleans to Kingsville:

Cecil Field to New Orleans	270/40
New Orleans to Gulfport at IAF altitude	350/20
New Orleans to Kingsville	300/70
At Kingsville IAF altitude	260/40

TERMINAL FORECASTS

AIRDROME	CLOUD LAYERS	VSBY/WEA	SFC WIND	ALTIMETER
Dest. NBG	BKN001	5	0210	29.90
Alt. GPT	SCT020	4	3303	29.88
Alt. NMM	BKN060	2 FG RA	3312	29.92
Dest. NQI	OVC007	2 DU	3407	29.87
Alt. NGP	BKN007	7	3512	29.86

NOTAMS: NMM RWY 01L QCPAC
GPT QLBAS
NGP RWY 13R OLS QLAAC

ANSWERS: Completed Jet Logs and a DD-175 are in Figures 3, 4, 5, 6 & 7

SUMMARY

This lesson has focused on the following topics:

* Fuel, weather, and alternate airfield planning
* Flight planning (departure)
* Flight planning (enroute)

CONCLUSION

Use the flight planning problem in this chapter to hone your navigational skills. The greater your preflight preparation, the better your airborne performance will be.

NOTES

FIGURES

TRAWING TWO STANDARD T-45A FUEL PLANNING DATA

Based on T-45A NATOPS flight manual, 15 January 1997
Actual performance will vary with prevailing temperature, winds, drag index and varying gross weight.

For <u>initial</u> planning only.

Total usable fuel (JP-8/JET A+) .... 2,861 LB
Start/ Taxi/Take off 200
Penetration 200
GCA 250
Reserve (20 min @ 10,000 ft MSL) 300
Low level (360 KGS, 12K GW=6.6 LB/NM=2,375 PPH//300 KGS=5.0 LB/NM=1,500 PPH)

JP-4 6.5 LB/GAL **JP-5 6.8 LB/GAL** **JP-8 6.7 LB/GAL ALSO JET A +**

Climb Out (13K GW, 250 KIAS to 10K, 300 KIAS to .75 IMN)

Altitude	KIAS	NM	Time	Fuel Used
5,000	250	04	0+01	60 lb
10,000	250	08	0+02	110
15,000	300	14	0+03	180
20,000	300	22	0+04	240
25,000	300	32	0+05	320
30,000	283/.75	44	0+07	380
35,000	253/.75	60	0+09	460
40,000	225/.75	91	0+13	570

En route (Optimum Cruise @ 12K GW)

Altitude	#/NM	IMN	CAS	#/HR	TAS
5,000	4.76	.38	230	1,195	250
10,000	4.35	.42	230	1,138	262
15,000	3.88	.46	230	1,102	282
20,000	3.42	.51	230	1,073	310
25,000	3.09	.56	230	1,055	340
30,000	2.82	.61	230	1,047	370
35,000	2.58	.68	230	997	380

Normal descent (12K GW IDLE W/SPD BRAKES IN)

Altitude	IAS	NM	Time	Fuel Used
5,000	250	10	2+30	19 lb
10,000	250	20	4+30	36
15,000	250	31	6+30	57
20,000	250	41	8+30	66
25,000	250	52	10+30	79
30,000	250	64	12+15	90
35,000	235	74	14+00	100
40,000	209	84	15+30	108

Figure 1: TW-2 FUEL PLANNING DATA

SAMPLE FOR TRAINING PURPOSES ONLY

BINGO

GEAR UP - FLAPS UP
ZERO FUEL WEIGHT -10,500 POUNDS

REMARKS

DATE: JUNE 1995
DATA BASIS: **FLIGHT TEST**

ENGINE: F405-RR-401
U.S. STANDARD DAY, 1962

FUEL GRADE: JP-5
FUEL DENSITY: 6.8 LBS/GAL

	MAXIMUM RANGE CRUISE										SEA LEVEL CRUISE		
		FUEL REQD			CRUISE			DESCEND			FUEL REQD		
									DISTANCE				
	DIST TO BASE	NO WIND	100 KT HEAD WIND	CLIMB SPEED	ALT	SPEED		SPEED	NO WIND	100 KT HEAD WIND	NO WIND	100 KT HEAD WIND	CRUISE SPEED
	NM	LB	LB	KCAS	FEET	KCAS	MIN	KCAS	NM	NM	LB	LB	KCAS
DRAG INDEX = 0	25	421	516		5,000	217	.36		14	6	429	535	220
	50	529	683		10,000	219	.40		27	13	559	771	221
	75	626	814		15,000	217	.43		40	20	690	1,006	221
	100	714	918	300	20,000	217	.48		54	28	820	1,240	222
	125	796	1,000	Knots/	25,000	223	.54	180	67	36	952	1,474	222
	150	871	1,077	0.75	30,000	220	.59		80	44	1,083	1,707	223
	175	938	1,144	Mach	35,000	218	.65		93	53	1,216	1,940	224
	200	1,002	1,231		35,000	218	.65		93	53	1,349	2,172	224
	225	1,066	1,318		35,000	218	.65		93	53	1,482	2,404	225
	250	1,128	1,383		40,000	211	.71		107	62	1,616	2,635	226
DRAG INDEX = 50	25	434	543		5,000	212	.35		12	5	441	562	214
	50	553	733		10,000	211	.38		24	11	582	823	215
	75	658	875		15,000	212	.42		36	17	724	1,085	216
	100	753	989	265	20,000	212	.47		48	24	867	1,348	216
	125	841	1,084	Knots/	25,000	211	.51	170	60	30	1,010	1,610	216
	150	926	1,209	0.70	25,000	212	.51		60	30	1,153	1,872	217
	175	1,003	1,249	Mach	35,000	208	.63		83	45	1,297	2,135	217
	200	1,075	1,349		35,000	208	.63		83	45	1,442	2,398	218
	225	1,148	1,450		35,000	209	.63		83	45	1,587	2,661	218
	250	1,221	1,552		35,000	209	.63		83	45	1,733	-	219
DRAG INDEX = 100	25	445	568		5,000	207	.34		11	5	452	589	209
	50	574	775		10,000	205	.37		22	9	604	877	209
	75	687	931		15,000	207	.41		32	15	757	1,165	210
	100	789	1056	245	20,000	206	.45		43	20	911	1,454	211
	125	883	1,131	Knots/	30,000	196	.53	165	64	33	1,066	1,742	211
	150	969	1,256	0.60	30,000	197	.53		64	33	1,221	2,030	212
	175	1,051	1,344	Mach	35,000	195	.59		75	40	1,377	2,318	212
	200	1,132	1,460		35,000	196	.59		75	40	1,533	2,606	213
	225	1,212	1,577		35,000	196	.59		75	40	1,690	2,893	213
	250	1,294	1,695		35,000	196	.59		75	40	1,848	-	214
DRAG INDEX = 150	25	455	590		5,000	203	.34		10	4	462	614	204
	50	592	814		10,000	201	.36		20	8	624	927	205
	75	712	946		20,000	199	.44		39	18	787	1,240	205
	100	820	1,077	235	25,000	197	.48		49	23	951	1,553	206
	125	917	1,196	Knots/	30,000	189	.51	160	59	29	1,116	1,866	207
	150	1,009	1,334	0.55	30,000	189	.51		59	29	1,281	2,179	207
	175	1,101	1,474	Mach	30,000	189	.51		59	29	1,447	2,491	208
	200	1,191	1,575		35,000	187	.56		68	35	1,615	2,803	208
	225	1,281	1,707		35,000	187	.57		68	35	1,783	-	209
	250	1,372	1,841		35,000	188	.57		68	35	1,952	-	210

NOTES:
1. FUEL REQUIRED INCLUDES 300 LB RESERVE FUEL
2. INITIAL ALTITUDE IS SEA LEVEL
3. MAXIMUM THRUST CLIMB TO CRUISE ALTITUDE
4. IDLE THRUST MAXIMUM RANGE DESCENT TO SEA LEVEL (SPEEDBRAKES RETRACTED)

Figure 29-11. Bingo - Gear Up, Flaps Up, 10,500 Pounds

Figure 2: T-45A BINGO CHART

SINGLE-ENGINE JET FLIGHT LOG
CNATRA-GEN 3760/1 (REV. 7-78) S/N0197LLCF19482. NZC-NBG

DEP ELEV	CLNC DELIV	GND CONT	TOWER
81	268.7	118.35/384.4	126.1/360.2
ALT CORR	**TIME OFF**	**TAS**	**LBS PH/PMIN**
		380	997/16.6

CLEARANCE ATC clears VVB200 to NBG via D> Seminole SZW J2 Semmes SJI D> RRICK
FL350 SQUAWK

ATIS: 276.2
METRO: 317.0

DEPARTURE

DEST ELEV	APC CONT	TOWER	GND CONT
3'	NEW ORLEANS 123.85/256.9	NAVY N.O. 123.8/340.2	NAVY N.O. 121.6/382.8

ROUTE / TO	IDENT / CHAN	CUS	DIST	ETE	ETA / ATA	LEG / FUEL	EFR / AFR	NOTES
							2861	ATIS 276.2 METRO 265.8 / BASE OPS 384.25
VQQ / NZC	117.9 / 88	START-TAXI-T.O.				200	2661	VAR 4°W TO 2°E
NZC / D> SEMINOLE	117.9 / 88	278	60	9		460	2201	TOC FL350
D> SZW / SEMINOLE	117.5 / 122	278	73	12		200	2001	WIND: 270/40 TAS 380 GS: 340
J2 SZW / X	117.5 / 122	288	42	7		120	1881	GS: 340
J2 CEW / CRESTVIEW	115.9 / 106	268	80	14		240	1641	GS: 340
J2 SJI / SEMMES	115.3 / 100	263	87	15		250	1391	GS: 340
D> HRV / RRICK	114.1 / 88	217	106	17		290	1101	GS: 357
(HRV149030)			448	1 + 14		1760		
								FRCST ALT 29.90

ALTERNATE	ROUTE	ALTITUDE	TIME	FUEL
GPT GULFPORT-BILOXI REG	D>	350	0 + 07	1 + 06
ALT ELEV	**APC CONT**	**TOWER**	**GND CONT**	
28'	GULFPORT 124.6/354.1	123.7/339.8	120.4/348.6	

ROUTE / TO	IDENT / CHAN	CUS	DIST	ETE	ETA / ATA	LEG / FUEL	EFR / AFR	NOTES
D> GPT / HACHA IAF	109.0 / 27	033	50	7		120	981	WIND: 270/40 GS: 402 I-UXI 108.3
(GPT 193018) HI-ILS/TAC 32 16,000'								ATIS: 119.45 NO METRO TACAN AZ O/S UFN 3/99 FRCST ALT 29.88

(Over)

Figure 3: COMPLETED JET FLIGHT LOG (NZC-NBG)

FUEL PLAN

1. CLIMB/ROUTE DEST IAF	1560	6. START/TAXI	200
2. ROUTE ALT IAF (If required)	120	7. TOTAL REQUIRED (4, 5 & 6)	2380
3. APPROACHES	200	8. TOTAL ABOARD	2861
4. TOTAL (1, 2 & 3)	1880	9. SPARE FUEL (8-7)	481
5. RES 10% of 4 (Min 20 mins)	300		

EMERGENCY "BINGO" TO ALTERNATE

	REQUIRED		APPROACH		RES		TOTAL
FL 350 LAST CRUSING ALT	120	+	200	+	300	=	620
16,000' INITIAL APP ALT TAS: 288 WIND: 350/20 GS: 273 11 MIN PPH 1096	210	+	200	+	300	=	710
~~MAP-ALT~~ (055/60) DRAG INDEX: 0	593	+	200	+	—	=	787

CHECK LIST	DESTINATION NBG	ALTERNATE GPT	EMER FIELDS
RWY LENGTH	8000	9002	TALLAHASSEE REGIONAL
LIGHTING	04 A1 22 A2 HIRL	14-PCL A3 32-PCL A5	ID SZW 187/9.6 TO FIELD
FUEL/JASU/LOX	YES	AVG	CH 122 117.5 110.3 I-TLH
VOR	114.1	109.0 GPT	PAGE NO. 168-170
ILS	NO	108.3 1-UXI	
RAPCON	—	—	
PAR MINS	100 1/4	ASR-32 400-1 14 500-1	
TAC MINS	04-500 3/4 22-500/1	14-400 1/2 32-500 3/4	
ARR GEAR	BOTH ENDS	14/32	
PUBS	✓	—	
NOTAMS	✓	—	
FUEL PACKET	✓	—	
FLASHLIGHT, WALLET, ETC.	✓	—	

CNATRA-GEN 3760/1 (REV. 7-78) S/N0197LLCF19482(BACK) *U.S.GPO:1987-530-016/61134

Figure 4: COMPLETED JET FLIGHT LOG FUEL PLAN (NZC-NBG)

SINGLE-ENGINE JET FLIGHT LOG
CNATRA-GEN 3760/1 (REV. 7-78) S/N0197LLCF19482

NBG-NQI

DEP ELEV	CLNC DELIV (GROUND)	GND CONT NAVY N.O.	TOWER NAVY N.O.
3'	121.6/382.8	121.6/382.8	123.8/340.2/360.2
ALT CORR	**TIME OFF**	**TAS**	**LBS PH/PMIN**
		372	1037/17.3

CLEARANCE ATC CLEARS VVB200 NQI
VIA J37 HEIGH J22 CRP RVERA
FL310 SQUAWK

ATIS: 276.2
METRO: 265.8
BASE OPS: 384.25

DEPARTURE

DEST ELEV	APC CONT	TOWER	GND CONT
50	119.9/300.4	124.1/346.0	352.4

ROUTE TO	IDENT CHAN	CUS	DIST	ETE	ETA ATA	LEG FUEL	EFR 2861 AFR	ATIS: 276.2 METRO: 344.6 NOTES
DEPART HRV NAS NEW ORLEANS	114.1 88	START-TAXI-T.O.				200	2661	VAR 2°E TO 6°E
J37 HRV PEKON X	114.1 88	264	47	8		396	2265	TOC FL310
J37 HRV PEKON X	114.1 88	264	106	20		350	1915	WIND: 300/70 TAS 372 GS: 311
J37 HUB HEIGH X	117.6 123	264	71	13		230	1685	GS: 311
J22 PSX PALACIOS	117.3 120	235	119	21		370	1315	GS: 337
J22 CRP CORPUS CHRISTI	115.5 102	222	79	13		230	1085	GS: 351
N. KINGSVILLE RVERA IAF (NQI002031)	NQI 125	196	60	9		160	925	I-NQI 110.9 GS: 382
			482	1 + 24		1936		
								FRCST ALT 29.87

ALTERNATE NGP	ROUTE	ALTITUDE	TIME	FUEL
NAS CORPUS CHRISTI	D	310	0 + 10	0 + 55
ALT ELEV	**APC CONT** CORPUS CHRISTI	**TOWER** NAVY CORPUS	**GND CONT** NAVY CORPUS	
19'	120.9/363.1	134.85/340.2	135.3/348.0	

ROUTE TO	IDENT CHAN	CUS	DIST	ETE	ETA ATA	LEG FUEL	EFR AFR	NOTES
D NGP NGP IAF (NGP113022)	114.0 87	055	60	9		160	765	WIND: 300/70 GS: 407 ATIS: 114.0/268.4 METRO: 344.6 FRCST ALT: 29.86

(Over)

Figure 5: COMPLETED JET FLIGHT LOG (NBG-NQI)

FUEL PLAN

1.	CLIMB/ROUTE DEST IAF	1716	6.	START/TAXI	200
2.	ROUTE ALT IAF (If required)	160	7.	TOTAL REQUIRED (4, 5 & 6)	2576
3.	APPROACHES	200	8.	TOTAL ABOARD	2861
4.	TOTAL (1, 2 & 3)	2076	9.	SPARE FUEL (8–7)	285
5.	RES 10% of 4 (Min 20 mins)	300			

EMERGENCY "BINGO" TO ALTERNATE

	REQUIRED		APPROACH		RES		TOTAL
FL: 310 LAST CRUSING ALT	180	+	200	+	300	=	680
15,000' INITIAL APP ALT TAS 282	120	+	200	+	300	=	620
WINDS 260/40 GS 320 6 MIN PPH 1102/18.4 MAP-ALT (060/30) DRAG INDEX 25	401	+	200	+	—	=	830

CHECK LIST	DESTINATION NQI	ALTERNATE NGP
RWY LENGTH	8000	8000 13R-31L
LIGHTING	35R A1 HIRL ALL RNWY	13R A2 HIRL ALL REIL 13R-31L
FUEL/JASU/LOX	YES	YES
~~UHF/ADF~~ ~~ILS MIN~~	13R 200 - 3/4	NO
UHF/DF	NO	NO
~~RAPCON~~ ~~LOC MINS~~	400-1	NO
PAR MINS	100-1/2 (200-1/2)	31L 100-1/2 13R 100-1/4 (200-1/2)
TAC MINS	35R 400-3/4 13R/35L 400-1	400 3/4
ARR GEAR	ALL RNWYS	13R-31L
PUBS	✓	✓
NOTAMS	✓	✓
FUEL PACKET	✓	✓
FLASHLIGHT, WALLET, ETC.	✓	✓

EMER FIELDS	
HOUSTON-ELLINGTON	
ID EFD	I-LPV
CH 31	110.3
PAGE NO. 103-111	

CNATRA-GEN 3760/1 (REV. 7-78) S/N0197LLCF19482(BACK)

*U.S.GPO:1987-530-016/61134

Figure 6: COMPLETED JET FLIGHT LOG FUEL PLAN (NBG-NQI)

PRIVACY ACT STATEMENT

AUTHORITY: 10 USC 8012 and EO 9397.
PRINCIPAL PURPOSE: To aid in accurate identification of personnel participating in the filed flight.
ROUTINE USES: To provide data required to process flight plans with appropriate air traffic service authorities. A file is retained by the agency processing the flight plan.
DISCLOSURE: Voluntary; however, failure to provide the SSN could result in denial of flight plan processing.

DATE	AIRCRAFT CALL SIGN	AIRCRAFT DESG AND TD CODE
17 APR 99	VVB200	2/T45/A

BASE OPERATIONS USE

	TYPE FLT PLAN	TRUE AIRSPEED	POINT OF DEPARTURE	PROPOSED DEPARTURE TIME (Z)	ALTITUDE	ROUTE OF FLIGHT	TO	ETE
	I	380	NZC	1330	350	SZW J2 SJI RRICK	NBG	1 + 14
	I	372	NBG	1530	310	HRV J37 HEIGH J22 CRP RVERA	NQI	1 + 24
						(2 + 18 NGP 0 +10)		

REMARKS
NZC, NBG REQ RADAR DEPARTURE
NBG-S
NBG PPR 21-98

RANK AND HONOR CODE

VOID 4 + 00

FUEL ON BD	ALTN AIRFIELD	ETE TO ALTN	NOTAMS	WEATHER	WT AND BALANCE	AIRCRAFT SERIAL NUMBER, UNIT, AND HOME STATION
2 + 20	GPT	0 + 07	✓	4-203	N/A	163600/TW-2/NQI

SIGNATURE OF APPROVAL AUTHORITY	CREW/PASSENGER LIST	ACTUAL DEP TIME (Z)	BASE OPERATIONS USE
UR Yourself	ATTACHED / SEE PSGR MANIFEST		

DUTY	NAME AND INITIALS		RANK	SSN	ORGANIZATION AND LOCATION
PILOT IN COMMAND	IP/1	YOURSELF, U.R.	LT	222-33-4444	VT-21/NQI
P/2		WINGMAN, I.M.	ENS		VT-21/NQI/163020 (USN)
IP/2		INSTRUCTOR, U. T.	CAPT	111-21-7615	VT-21/NQI/163020 (USMC)

DD Form 175, MAY 86 0102-LF-001-7500 *Previous editions are obsolete.* MILITARY FLIGHT PLAN

Figure 7: COMPLETED FORMATION STOPOVER DD-175 (NZC-NBG-NQI)