

Instrument Refresher

An IPC Simulator

Pilot's Operating Handbook



an ASA Interactive product

*Instrument Refresher: An IPC Simulator
Pilot's Operating Handbook*

First Printing

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Quick Start Guide

If you are familiar with Windows-based graphics programs and want to get started as quickly as possible, the following will assist you to get up and running.

Connecting the Flight Controls

Before running the installation routine, please ensure that the flight controls you plan to use with the program are attached to the computer and the current drivers from the manufacturer are installed (please do not use manufacturer's configuration utilities). If your flight controls in the present configuration work with ASA's IP Trainer Version 6.5 or On Top 8.0, they should work with the IPC Simulator. This program supports a variety of commercially available joysticks or yokes, as well as custom-made flight controls such as consoles and avionics panels in Free Flight (the lessons use yoke or joystick control inputs only).

Installing IPC

You may install the IPC Simulator in a subdirectory of your own choosing. A message will appear in the installation routine suggesting a path and permitting change. We recommend C:\ASA\IPC1.0. Please note that the main programs and world database must reside at the same level of the file folder structure. If you have previously installed and modified the database of an ASA simulator product, you might want to preserve your changes and not overwrite the database, or you might want to use one database for all three programs.

Calibration Screen

After starting the program and going through the introduction (you can skip this introduction by pressing your left mouse button), first-time users will be prompted, "Flight controls require calibration. Press CALIBRATE."

Once in the main Calibration screen, you will have the opportunity to perform a "quick calibration." Select the FLIGHT CONTROLS button. In the Flight Controls menu, you should see your controls on the list. Choose the flight controls you wish to activate by pressing the leftmost box of the two boxes on the right side of the screen until an asterisk appears in the box.

Once you have selected the flight controls to be used with the program, press the LIMITS button and perform a quick calibration by fully articulating the pitch, roll and yaw axes as well as throttle, propeller, mixture, and rudder, as installed. Note that the first controls you actuate will be the controls calibrated. For example, if you have a throttle on the yoke, as well as a throttle quadrant, the first throttle selected will be the one that is calibrated. If you choose incorrectly, you may reset the limits and start again.

When finished with the limits, press the box marked BUTTONS. Press and hold the flight control button (e.g., the trim up) while simultaneously clicking the left mouse button with the mouse arrow pointing to the on-screen "up trim" triangle. Once

activated, the mouse arrow will turn into a “crosshair.” When correctly assigned, the triangle will turn green when the trim button is depressed.

You may now press the DONE button and enjoy flying the IPC Simulator.

If you cannot calibrate the flight controls in the quick-start calibration, you might have to use the Advanced Mode, which requires a more detailed understanding of the calibration routine as explained in the **Calibrating Your Flight Controls** section on Page 18. If you still have difficulty with your flight controls, ASA has many resources available, including online and telephone technical support.

The IPC Simulator Overview

Desktop Simulators 101

If you are an old pro at instrument flying, but relatively new to “flying” simulators, get ready for an extraordinary experience. While not exactly like flying the real thing, simulators afford the opportunity to tax your flying skills at a low per-flight-hour cost, without safety concerns.

To get the most out of the IPC Simulator, we recommend you practice in the Free Flight mode until you feel comfortable with how the simulator “handles.” This is like transitioning to a complex aircraft or establishing the instrument configuration numbers for your aircraft.

In the same manner, we suggest a flight “around the patch” in Free Flight “Fly Anywhere” to get the feel of the IPC Cessna 172. Take off from the initial starting point of Boeing Field (BFI) and climb at 500 feet per minute to 3,000 feet. Fly to the outer marker, which is already tuned, and after passing the marker, make a standard-rate turn to 270. After rolling out of the turn, start the panel timer and head out for two minutes. Descend to 2,000 feet at 500 feet per minute and note the power required to maintain 90 KIAS (about 1,500 RPM). After the time elapses, make a standard-rate right turn to 90 degrees and transition to approach level (about 2,000 RPM and 90 KIAS). You will now be on an inbound heading to intercept the final approach course for BFI ILS Runway 13. Select the MAP button by pressing the **Menu** button at the lower right side of the screen and check it out. The radios are all tuned and ready for you to slide down the glide slope.

If you find the above exercise to be a piece of cake, you are ready to jump in and start the challenging IPC Simulator course. On the other hand, if you are like many new to this kind of “flying,” you might want to raise the ceiling, broaden the visibility and go to your home base to become more familiar with the differences associated with flying the simulator versus your airplane.

Course Overview

The IPC Simulator contains 24 lessons divided into four “blocks” of learning: **Radio Navigation, Airwork, Enroute Procedures, and Instrument Approaches.** A

fifth block, **IPC Flight**, is one long lesson that simulates a comprehensive instrument proficiency check flight. A sixth block, called **Free Flight**, allows you to leave the instructional environment and fly on your own, with no guidance or prompts.

The purpose of IPC Simulator is not to teach you how to fly instrument procedures. It is assumed you already have performed the skills necessary to obtain an instrument rating. If you have not, ASA's **IP Trainer** might be the better choice for you. The primary purpose of the IPC Simulator is review—to take off a little of the rust on your instrument skills and prepare for the instrument currency maneuvers mandated by the FAA.

Included in the IPC Simulator is a built-in instructor, "Stan," who teaches a consistent and approved method of instruction for each lesson in the syllabus. (Stan's tips are included in the lessons as well as in Appendix 1.) While there are many correct ways to teach any given instrument procedure, the IPC Simulator teaches only one method. You can feel confident that an acceptable teaching methodology is used for each procedure taught. If you need a more in-depth explanation of a procedure, try one of ASA's books on instrument flying, or an hour or two with your individual flight instructor, to expand upon and fine-tune your technique.

Taking the Course

To receive the maximum training value from your investment in **Instrument Refresher: An IPC Simulator**, you will want to approach it from a professional standpoint. Do not use it as you would a "game." Fly the simulator as closely as possible to the real aircraft.

Proceed directly to the lessons or areas you feel might be weak from lack of recent experience. For example, in typical instrument flights, holding patterns are not frequently encountered. Consequently, you might want to go directly to **Radio Navigation** to brush up on the more difficult holding entries.

Suggested Road Map

Take the following steps:

1. Calibrate your yoke or joystick; it is helpful to program one of your buttons to PROCEED.
2. Select NEW LESSON; press BRIEFING; read the lesson briefing and study the appropriate charts and diagrams.
3. Press TRAINING to begin the flight lesson.
4. Select the EXPLAIN mode and study the IPC's simulated CFII executing the procedure. Make sure you understand each step.
5. Select the EASY mode and have the IPC-CFII prompt you through the procedure until you think you can execute it without prompts.
6. Select the MODERATE mode and practice the procedure without prompts until you can complete the procedure without making errors.

7. Select the DIFFICULT mode and practice with little margin for error. When you can practice the procedure to your satisfaction, you are ready to proceed to the next lesson. If you have successfully completed the EASY or MODERATE mode and are satisfied with your performance, you may proceed to the next lesson from that point. Take a look at the EVALUATION and if you feel you have performed to your satisfaction, and the errors are more related to the computer program than your flying skills, go on to the next lesson.
8. Press MENU to select a New Lesson, Evaluate, or Quit the program and return to your desktop.

If you notice you are making consistent errors, or are having difficulty with lesson modes, then your concentration on the new procedure may be interfering with your execution of a previously taught procedure. Since you've already learned the previous procedures, you can generally execute them during the learning of a new procedure with a great deal of success. However, if too much time elapses between computer sessions, then your instrument knowledge may deteriorate—as it can for all pilots who don't fly as frequently as they'd like. Conversely, if you are proceeding through the course too rapidly, then you may not have mastered certain procedural elements as well as you had thought. What do you do?

First, relax. It is only a simulator, and you are in the privacy of your own home—no TFRs here to worry about. Remember, the computer program is without intuition or a sense of humor. As a result, try to decipher what it is the simulator is responding to. The best and easiest way to discover IPC's expectation is to watch the Explain mode carefully. What sequence is used? Does "Stan" Time, Turn and Talk or Turn, Time and Talk? In real flying, as long as you accomplish the tasks smoothly and completely, it makes little difference. But to Stan, who only understands 0's and 1's, it's "my way or the skyway."

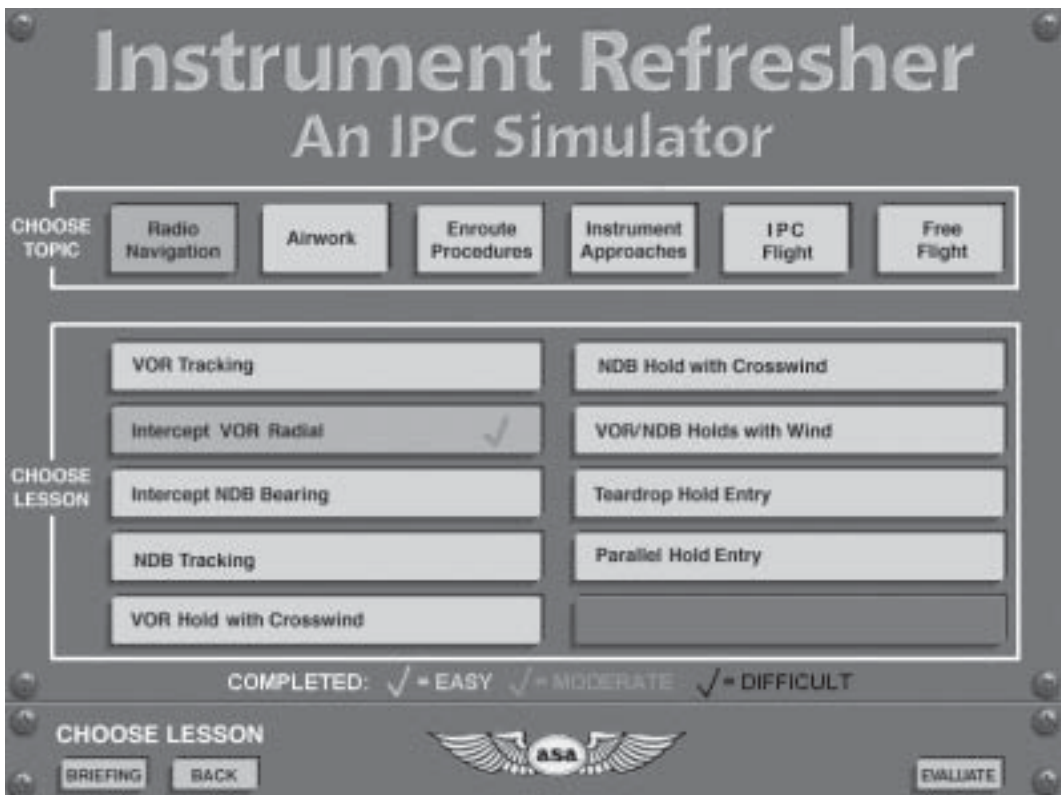
An example of a common problem concerns the panel timer. You might find yourself crisply rolling out of a perfect standard-rate turn and hitting the panel timer exactly as the wings roll level. Well, in actual flying, that would work fine, but the IPC Simulator might warn or stop you. Why? The reason is logical for the computer. It is waiting for you to roll the wings level, wait one second to confirm the criterion has been met, and only then starting the panel timer. If you press the timer button too early, the program believes you have not completed a step. If you are having difficulty, the idea is to try to think like the computer.

One tip may help you master a procedure: as you execute the procedure in question, constantly ask yourself: what are the next three things the program expects me to do? If you are unsure, consult the built-in CFII Tips. Just as in flying your aircraft, you want to stay "ahead of the PC aircraft."

A series of streaming, onscreen warning messages are signaling that you made an error in a procedure. Depending on the mode, after a number of warnings, IPC Simulator might stop you. At this juncture, you may press the Continue button or

the Backup button. Press the Continue button if you feel you can quickly rectify the problem and continue on from your present position, and the lesson will resume. Note that if you have deviated too far from the simulator's lesson plan, you will be stopped again. Press the MENU button at the lower right portion of the screen and the CFII TIPS button to learn more about the lesson parameters and possible reasons for the repeated stops. If you press Backup, IPC Simulator might "back you up" to a previous part of the lesson, so you can try again. You will be given the choice of backing up to a spot near to where the error occurred, or to a spot farther back. Choose the former if you know what your error was and are confident you can correct it easily; choose the spot further back if you'd like a little more time to correct the error.

When you complete an Easy, Moderate or Difficult lesson mode, a color-coded check mark is inserted into the Main Menu for the lesson. The color code legend is printed at the bottom of the screen. A **yellow** check mark indicates you have completed the Easy mode, a **blue-green** check mark indicates a Moderate mode completion, and a **black** check mark, a Difficult mode.



Occasionally, after a series of repeated “back ups,” you might find the program stopping you before you can correct the error. If this situation occurs, your best bet might be to repeat the lesson mode, noting precisely the sequence of events and checking the CFII Tips.

Performance Evaluation

Your performance on a procedure is evaluated with respect to standards set by our CFII staff members in accordance with the FAA Practical Test Standards. The EVALU-ATE button on the panel may be pressed at any time to display the Performance Evaluation for the current lesson. The “?” button next to each performance category gives more information on that category. At the most detailed level, the standards for a category are shown.

Get Ready for a Challenge

The IPC Simulator is a demanding and challenging software program. But instrument flying takes the same type of focus and concentration. Going through this review may test your skills to the fullest; we hope you will agree that the course helped sharpen those skills more effectively and economically than would otherwise be possible.

IPC Simulator is difficult because the *Instrument Rating Practical Test Standards* are difficult. This is the foundation from which Stan, the simulated CFII, evaluates you. You will be guided to keep your aircraft within a narrow band of tolerances that have been set forth by the FAA. Just like your real flight instructor, IPC Simulator knows how the procedure should be flown, and compares your execution with this knowledge.

Only by warning or stopping you every time you stray outside the parameters, can a computer program do what an instructor does to keep your skills sharp. So don't get frustrated—Stan is only applying the FAA standards. And unlike your actual CFII, who may be limited by time, money, airspace or weather, IPC Simulator will let you repeatedly practice a procedure until *you* are satisfied.

Free Flight

When you're not taking a lesson, you can use Free Flight to practice instrument procedures on your own. You may either fly the trainer from its initial location, or click SETUP to change the trainer's location, configuration and the current weather conditions. The Free Flight database provides worldwide coverage and may be edited to move NAVAIDS, change frequencies, or add other database components.

The IPC Simulator's instrument approaches are included in the Free Flight mode. In this phase, you may practice the approaches without the CFII's comments or warnings. You are set up at the initial point of flight and then left on your own to practice the approaches. You may also use the built-in Scan Manager (see Page 37) to hone your scan in various flight regimens.

In the Free Flight, Fly Anywhere mode, you have the option of covering up the faces of the flight instruments. To practice partial panel, for example, you can cover the attitude indicator and the heading indicator by placing the mouse pointer on the instrument faces and clicking. The instruments can be uncovered by clicking on the faces again.

If you want to look left and right in the out-the-window display, press and hold the mouse button in the out-the-window display, and slide the mouse left or right and up or down to change the direction of the view. When you release the mouse button, the view returns to the straight-ahead view.

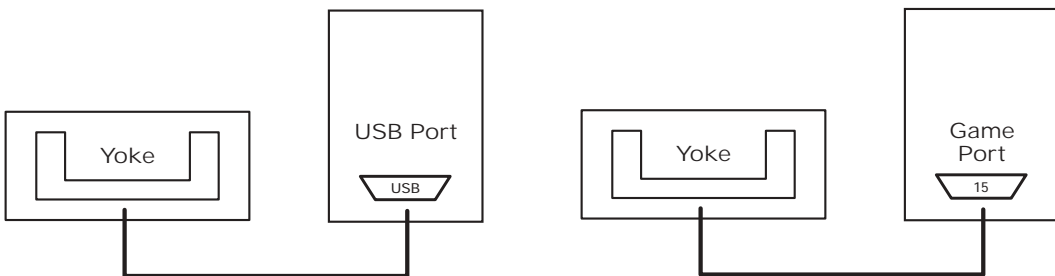
Connecting Your Flight Controls

The IPC Simulator supports a variety of commercially available joysticks or yokes, as well as custom-made flight controls such as consoles and avionics panels in Free Flight (the lessons use yoke or joystick control inputs only). Before installing IPC Simulator, connect the flight controls you will be using for your IFR flight simulation.

Use the following diagrams to connect your flight controls. Find the heading below that best describes the controls you have, and follow the accompanying instructions and diagrams.

Yoke or Joystick

1. Connect your yoke or joystick to the game port on your computer using the 15-pin cable.
2. Follow manufacturers' instructions for setting up drivers for your specific controls.
3. For USB hardware, plug yoke into an available computer USB port.



PFC Cirrus Yoke

1. Connect your yoke to the game port on your computer using the 15-pin cable.
2. Install the drivers for the yoke as described below.

Installing drivers for the PFC Cirrus Yoke

Win98/98SE/ME:

1. From the "Start" menu go to *Settings*, then *Control Panel*.
2. Click on *Gaming Options* or *Game Controllers*.
3. Remove any existing drivers for controllers that are NOT physically attached to your computer by removing the controller listing shown under the column labeled "Controller" (highlight and click *Remove*). After the controller and its associated drivers have been removed, click *Add*.
4. Scroll through the listed drivers and click on *4-button flight yoke w/throttle*. If you do not use other gameport devices, most commonly rudder pedals, click on *OK*. Skip to Step #6.
5. If you do use rudder pedals, make sure "Rudders/Pedals" is checked if you are connecting the yoke through your rudder pedals, and that the rudder pedals are connected to your computer's gameport; then click on *OK*. If you use PFC's throttle quadrant, and have the rudder pedals connected to your throttle quadrant, leave the "rudder pedals" option *unchecked*; IPC Simulator will see the pedals through the rudder pedal connection within the throttle quadrant. When using PFC's throttle quadrant with the rudder pedals connected to it, we recommend you connect the yoke directly to the computer's gameport.
6. The controller status should show as "OK." Click on *Properties* to verify its proper operation in Windows, and calibrate the controllers, if desired.

Note: Calibration in Windows is optional; IPC Simulator requires its own calibration routine. We have found it advisable to perform a complete calibration in Windows. If you choose not to calibrate at this time and have a problem calibrating your controllers within IPC Simulator, then calibrate in Windows to ensure that your controllers are being seen properly.

Win2000/XP:

1. Follow Steps #1–3 above. For Windows XP users using XP's standard desktop view, select *Start/Control Panel/Printers and Other Hardware/Game Controllers*. If you have Windows XP set to "Windows Classic," then go to *Start/Settings/Control Panel/Game Controllers*.
2. Scroll through the listed drivers and click on *6-button flight yoke w/two POVs and throttle*. Click on *OK*.
3. Follow Steps #5–6 above.

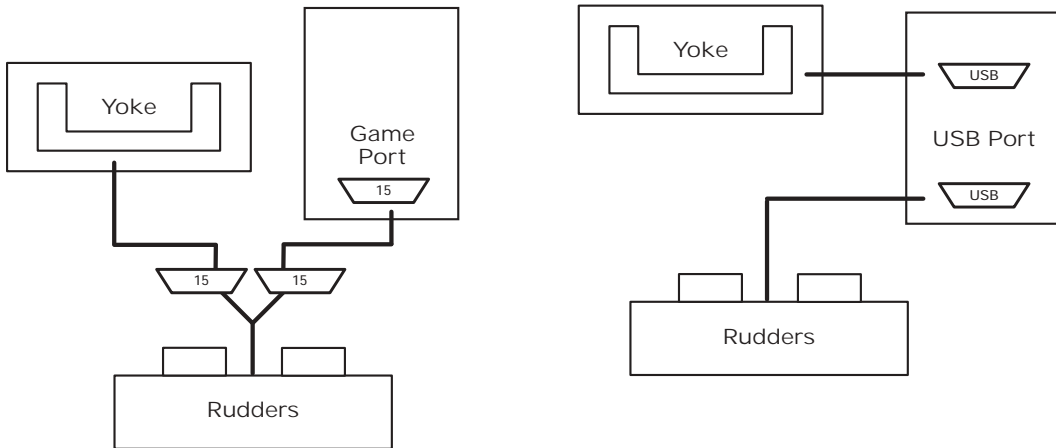
Note: For Win98/98SE/ME users, if you are using PFC's newer 6-button yoke, in the Game Controllers "Properties" box, you will notice there are only four buttons

listed, even though your yoke might have six buttons or switches (as on the newer PFC yoke). This is called “multiplexing.” When you press one of the switches, several buttons light up on the screen. The user must tell IPC Simulator that the switches are multiplexed. To do so, start IPC Simulator and go to the Calibration screen (calibration details start on Page 18 of this manual). To select the multiplexed option in IPC Simulator, go to the Calibration screen (CAL from the main menu) and select Flight Controls. There are two columns of buttons on the right side of the page. Select the rightmost of the two buttons on the line listing the “4-button flight yoke w/throttle.” A box will appear with radio buttons, labeled Normal, Multiplexed, “CH pro.” Select Multiplexed. (If the button will not “change,” press Reset Calibration and try the same procedure again.) Now select the leftmost box and configure as detailed in the **Calibrating Your Flight Controls** section.

Yoke or Joystick With Rudders

1. Connect your yoke or joystick to the Y connector on the pedals.
2. Connect the cable from the pedals to the game port on your computer using the 15-pin cable.
3. For USB hardware, plug yoke and rudders into separate computer USB ports. If your computer has only one available USB port, you will need to purchase a separate USB hub. Connect this hub to your available USB port. Connect the yoke and rudder pedals to the USB hub.

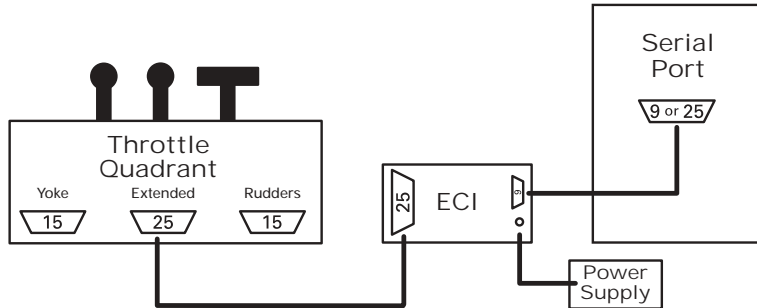
If you use a USB hub, you must ensure that the yoke is shown as device #1, and the rudder pedals are displayed as device #2, within “game controllers” found in Windows Control Panel.



Adding the PFC Cirrus Throttle Quadrant

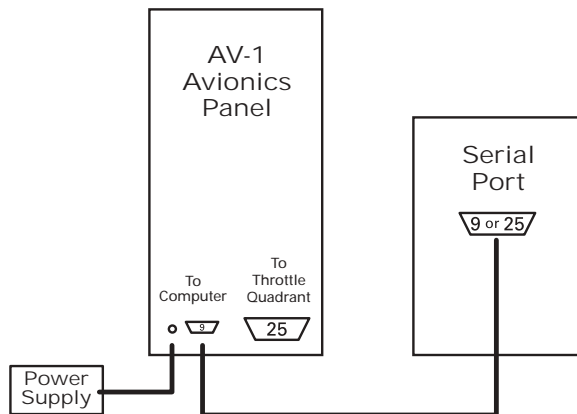
1. Connect the throttle quadrant to the ECI using the 25-pin cable.
2. Connect the ECI to the serial port on your computer using the 9-pin cable.

Note: If you do not have a 9-pin serial port, use the 9-to-25 pin adapter supplied with your ECI.



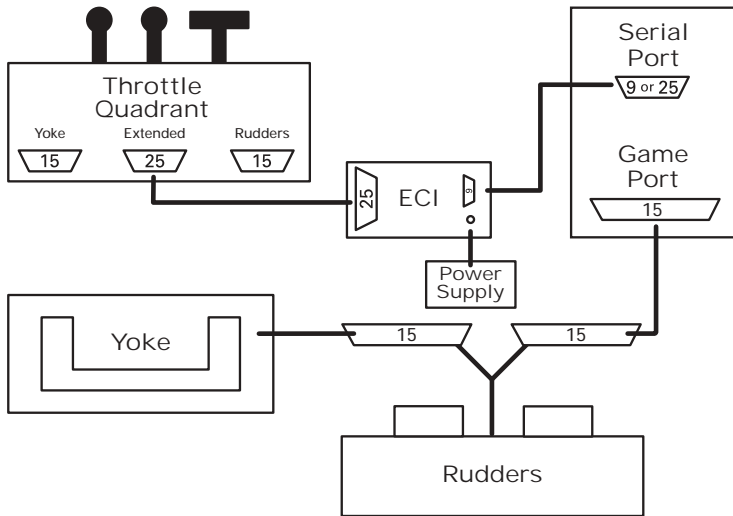
AV-1 Avionics Panel

1. Connect the AV-1 (using the port labeled "computer") to the serial port on your computer using the 9-pin cable.
2. Connect the power supply to the AV-1 with the 16-mm jack plug. Plug adapter into wall outlet. Ensure red light on the AV-1 is illuminated.



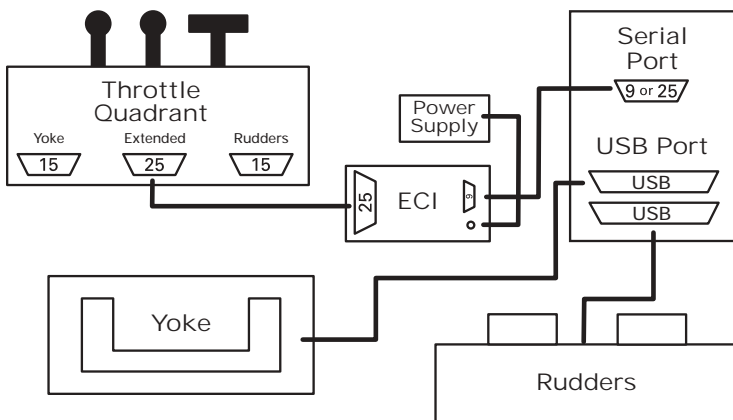
Yoke or Joystick, Rudders and Throttle Quadrant

1. Connect your yoke or joystick to the Y-connector on the pedals.
2. Connect the cable from the pedals to the game port on your computer.



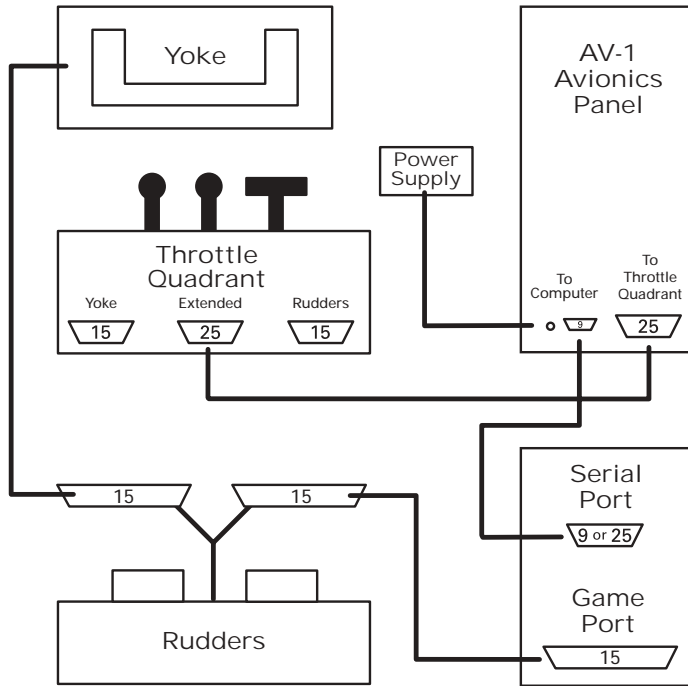
3. Connect the throttle quadrant to the ECI using the 25-pin cable.
4. Connect the ECI to the serial port on your computer using the 9-pin cable.
5. Connect power supply to ECI with 16-mm jack. Connect power supply to wall outlet.
6. For USB hardware, plug yoke and rudders into separate computer USB ports (see figure below). Or use a USB hub.

Note: If you do not have a 9-pin serial port, use the 9-to-25 pin adapter supplied with your ECI.

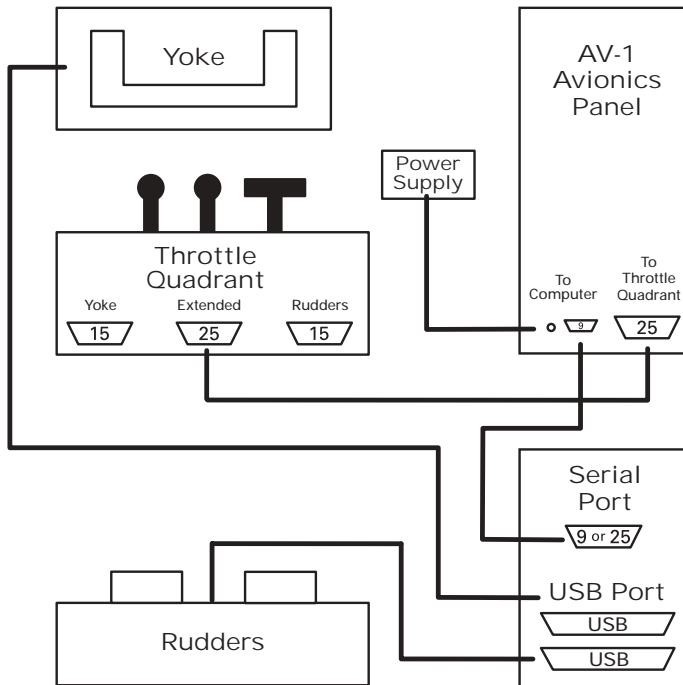


Yoke or Joystick, Rudders, Throttle Quadrant and AV-1 Avionics Panel

1. Connect your yoke or joystick to the Y-connector on the pedals.
2. Connect the cable from the pedals to the game port on your computer.
3. Connect the throttle quadrant to the AV-1 using the 25-pin cable. Use right-hand port labeled "to throttle quadrant."
4. Connect the AV-1 (use left-hand port labeled "to computer") to the serial port on your computer using the 9-pin cable. If you do not have a 9-pin serial port, use the 9-to-25 pin adapter.
5. Connect the 16mm connector that came with your Avionics Panel into the 16mm jack on the back of the AV-1. Plug the power supply into an available wall outlet. Make sure that the red light on the AV-1's front panel illuminates.



6. For USB hardware, plug yoke and rudders into separate computer USB ports (see figure below). Or use a USB hub.



Note: When you are finished flying and would like to power down the system or if you need to move/remove the AV-1, unplug the power adapter from the wall outlet to remove power from the AV-1. Do not simply unplug the power supply jack from the AV-1. This is a hot lead, and should not be left disconnected. Power should not be restored in this manner either.

Installing and Running IPC Simulator

Minimum Requirements

Before installing IPC Simulator, make sure your computer system conforms to the basic minimum requirements needed for smooth and steady flight simulation at all times.

- Pentium-class processor, 200 MHz or faster (Win98/ME), 300 MHz or faster (Win2000/XP)
- Windows 98, ME, XP, or 2000 operating system
- 64 MB (WIN98/ME), or 128 MB (Win2000/XP)
- 120 MB available hard drive space
- CD-ROM drive (4x or faster)
- 800x600 SVGA video adapter and monitor
- Windows DirectX-compatible sound card and speakers
- DirectX 8.1 or newer
- Mouse
- Joystick or yoke

When you install IPC Simulator with the “typical” installation option, at first you will have four program executables loaded onto your computer: one version uses a 32-bit color mode, one a 16-bit color mode, one a 15-bit color mode, and another an 8-bit color mode. The differences between these modes are primarily in IPC Simulator’s Out-the-Window views, with the 8-bit version providing a more traditional cloud base and visibility image. However, if your computer supports the 16- or 32-bit versions, you will see terrain texturing, enhanced haze modeling, and more realistic cloud base and visibility graphics.

If the program detects that your system does not support HiColor, a “compact” installation is done. “Compact” includes only the 8-bit graphics executable and graphics library file; therefore it requires one-third less space. When you run IPC Simulator for the first time, it will automatically detect which of the versions your computer and video adapter can support and will run that version. You may not know until starting the program whether you’ve got 8-, 16-, or 32-bit color. To detect which IPC Simulator version you are running:

1. Right-click on the IPC Simulator shortcut.
2. Select “Properties.”
3. Look at the command line on the “target” line. This is where you can edit the program executable if necessary.

Note: There are a total of 4 .exe files that can be used to start the program: 8-, 15-, 16-, and 32-bit. Each higher number designates a higher graphic capability.

Installation

1. Be certain your computer meets the minimum system requirements.
2. Connect the hardware components (yoke, joystick, etc.) you will be using with the simulation.
3. Place the IPC Simulator CD-ROM in your computer's CD-ROM drive.
4. The installation process will begin automatically. If it does not, then click on your "Start" button. Select "Run." In this box, enter your CD-ROM drive letter followed by "setup.exe"; i.e., "D:\setup.exe". Or, select "Browse" to locate the file and your CD-ROM. Then select "setup.exe."
5. Select "OK" in the "Run" box.
6. The IPC Simulator installer will prompt you through the rest of the installation process.
7. The default drive for installation is "C" and the path C:\ASA\IPC1.0, but you may change the drive and path. Please note that the main program and world database must reside at the same level of the file folder structure. If you have previously installed and modified the database of an ASA simulator product, you might want to preserve your changes and not overwrite the database, or you might want to use one database for all the ASA simulator programs.
8. After installation, a new group will appear in your START menu called "ASA Interactive." Click Start, select ASA Interactive, and then "Instrument Refresher IPC" to run the program. Or simply double-click the IPC Simulator icon which has been placed on your desktop.

A custom installation allows for the IPC speech files to be stored on your computer's hard drive. Storing the files on the computer will allow the IPC Simulator to run more smoothly, and is necessary for use with MS Windows XP or 2000.

Calibrating Your Flight Controls

When starting IPC Simulator for the first time, you are automatically taken to the Calibration menu. This is where IPC Simulator evaluates the input of your flight controls, and where you tell the program what kind of physical control equipment you have attached (i.e., yoke, rudder pedals, throttle quadrant, etc.).

After using IPC Simulator for some time, or if you experience erratic control response in later flight, you might want to return to the Calibration menu. Similar to readjusting your heading indicator to match your compass reading, returning to the Calibration menu ensures that any changes on your physical controls, such as

loosening springs or manually altered trim settings, can be compensated for by the program. To return to the calibration screen from the IPC Simulator cockpit, click menu and then CALIBRATE at the bottom right corner of the cockpit screen.

Note: Any time you press LIMITS, you must calibrate the controls before returning to the cockpit. The remainder of the calibration process (assigning BUTTONs, etc.) will remain intact, but LIMITS must be established each time.

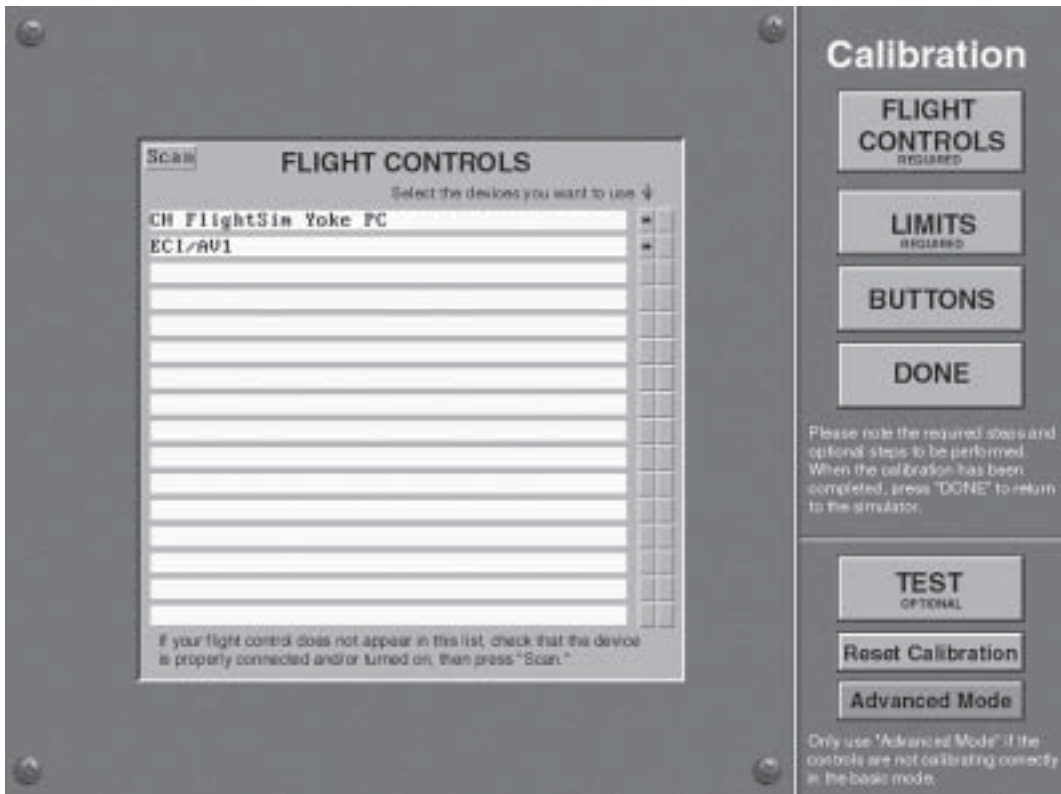
The Calibration menu consists of several different screens:

1. FLIGHT CONTROLS, where you identify the flight controls you wish to use with IPC Simulator.
2. LIMITS, which evaluates and adjusts the complete range of motion for the control axes.
3. BUTTONS, which allows a range of cockpit functions to be assigned to the joystick or yoke.
4. DONE, which saves the settings and returns you to the IPC Simulator cockpit.
5. TEST, which permits you to verify the action/reaction of the flight controls to ensure functionality.
6. RESET CALIBRATION, which erases the data file storing the settings and clears the control settings.
7. ADVANCED MODE, which is for experienced users to permit the use of non-standard controls.

When you first enter the Calibration screen, you see a column of buttons from which the calibration sequence begins.

Flight Controls

The first required calibration screen to select is the Flight Controls screen. It is important for IPC Simulator to know what kinds of flight controls are being used, and this list allows you to select them. By selecting the FLIGHT CONTROLS button from the main calibration screen, you will have the opportunity to perform a "quick calibration." In the Flight Controls menu, a list is displayed of the flight controls that your computer "sees." If your screen does not list the controls you have physically connected, check to ensure that they are connected, and the manufacturer's drivers are installed. Then press the "Scan" button in the upper left portion of the screen or Reset Calibration from the column of buttons on the right side of the screen. Additionally, ensure that you have only the control manufacturer's drivers installed but not other utilities (for example, CH Manager).

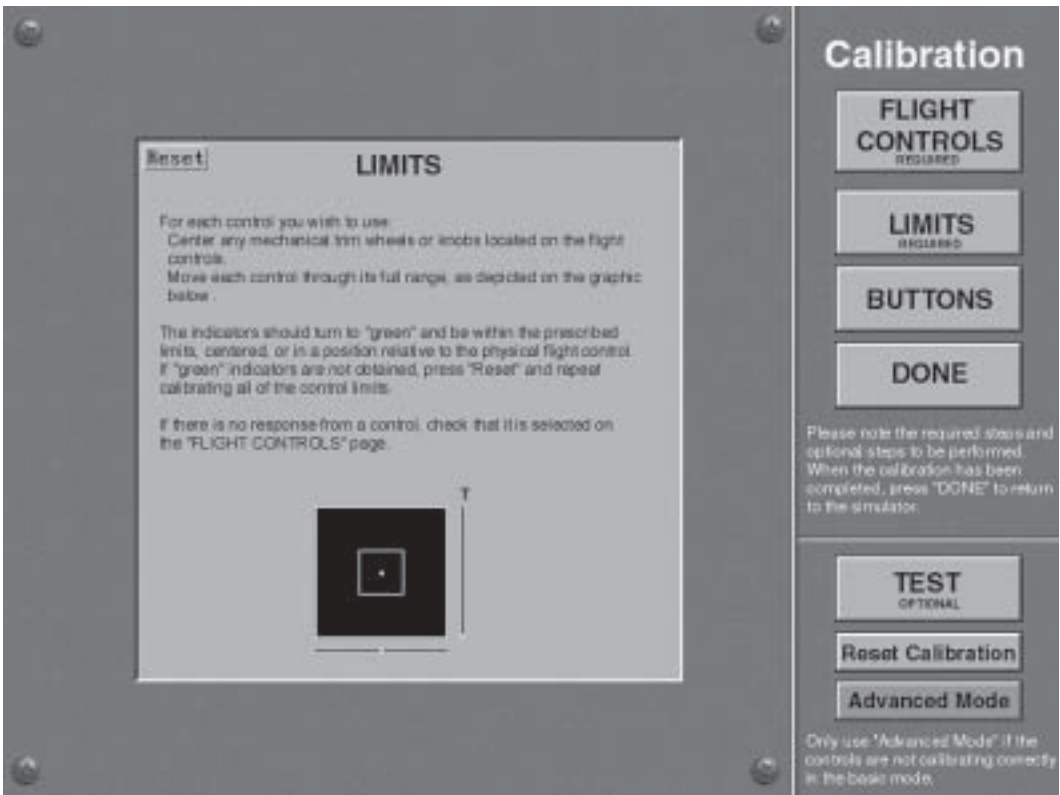


Choose the flight controls you wish to activate by using the mouse to click on the leftmost of the two small boxes on the right side of the screen until an asterisk appears in the box.

Note: In the Flight Controls screen, two columns of buttons appear to the right of the listed flight controls. If you noticed in Windows' Properties when calibrating the flight controls that there were only four buttons listed, even though your yoke or stick might have six buttons or switches, the buttons are "multiplexed." When you press one of the switches, several buttons light up on the screen (this will also be noticeable in the Buttons section below). The user must tell IPC Simulator that the switches are multiplexed, so they may be correctly programmed. To select the multiplexed option in IPC Simulator, press the rightmost of the two button boxes on the line listing the yoke or stick you wish to use. A box will appear with radio buttons, labeled Normal, Multiplexed, "CH pro." Select Multiplexed. (If the button will not "change," press Reset Calibration and try the same procedure again. If the button does not change, it is likely due to the fact that USB devices are "locking" this selection.) Now select the leftmost box and configure as explained below.

Limits

After selecting the flight controls to be used with IPC Simulator, click the LIMITS button to proceed with the calibration process. On this screen you must fully cycle all the flight controls you wish to use—yoke, rudders, and throttle quadrant, as applicable—through their full range of motion. It is important for IPC Simulator to know how much travel is available in the physical controls. If the yoke or joystick has manual trim control wheels or levers, center them before continuing. The limits must be set every time you enter the LIMITS menu.



Cycling the Controls

Move your selected yoke or joystick full forward, full aft, full left and full right. Release it, and verify that the dot representing the center position is within the central green box. It need not be in the exact center of the box, just within it. Verify that the dot has turned from red to green.

Note: You must move the controls in both the pitch and roll axis before the dot will turn green. If attached, apply full left and full right rudder pedal deflection. Verify

that the dot representing rudder position is near the center of the horizontal rudder scale bar at the bottom of the display, and the dot is green.

If you have an external throttle quadrant or built-in throttle on your yoke or joystick (and you wish to use it), cycle the levers full forward and full aft. Verify that the levers show full deflection, and the green dot has traveled to the full top and full bottom of the vertical scale. If this is not the case, reset the limits and cycle your controls again.

Note that the first controls you actuate will be the controls that are calibrated. For example, if you have a throttle on the yoke, as well as a throttle quadrant, the first throttle selected will be the one that is calibrated. If you choose incorrectly, you may reset the limits and start again by pressing Reset, then pressing Limits again. When each control is fully articulated, the red dot will turn to green to indicate satisfactory calibration. (If the controls are not calibrating properly, an Advanced Mode calibration might be required.)

Note: Should you decide not to use the throttle on your yoke or joystick, do not cycle the throttle control. Leave the throttle dot red, and the mouse will actuate the throttle lever.

Considerations for Configuring the Flight Controls

While it might seem you would want every physical control option to be used, consider the throttle function of the mouse or the yoke/joystick. If the throttle is calibrated on the joystick, the mouse-controlling features of the throttle are not available.

The Precision Flight Controls (PFC) throttle quadrants shipped from ASA are typically 6-lever quadrants. If you own this unit, it will function in a limited manner with IPC Simulator. For example, the leftmost throttle and mixture levers will control the Cessna 172 in IPC. You may fully advance or retard the rightmost levers to keep them out of your way. You may also keep the levers together when simulating the 172, and treat the pair as a single lever.

Buttons

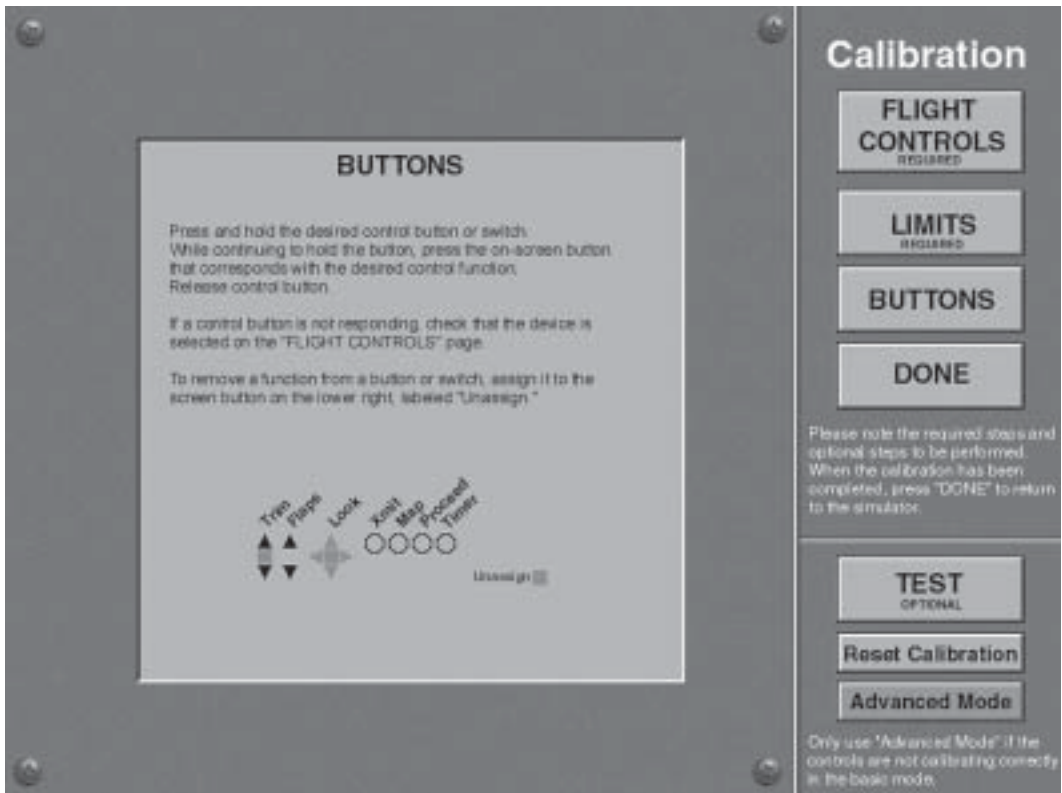
IPC Simulator lets you assign functions to the buttons and knobs that appear on your joystick or yoke, making the simulation easier and more realistic. You can then perform cockpit functions without ever taking your hand off the control. The trim can be actuated; the proceed button pressed, the map toggled; the timer, an all-important tool in precision and nonprecision approaches, can be started without ever reaching for the mouse. All this is accomplished through the Buttons screen in a simple and straightforward one-time setup.

When finished with the limits, press the box marked **BUTTONS**.

1. On the Buttons screen you'll see the labels and symbols of the cockpit functions that can be assigned to joystick or yoke buttons (trim, look, transmit, map,

proceed, timer). To assign one of the buttons a cockpit task or duty, press and hold the desired flight control button while simultaneously clicking the left mouse button with the mouse arrow. Once activated, the mouse arrow will turn into a "crosshair." Release the button on your controller and the function has now been assigned. When correctly assigned, the triangle, square or circle associated with the function will turn from gray to black with green filling the symbol when the control button is depressed.

2. If you wish to change button assignments, depress the button on the control and at the same time left-click the mouse pointer in the "Unassign" square in the lower right area of the screen. Then reassign the button as desired. You may also repeat the process in Step 1 above, and the new assignment will override the previous one.



3. If you press a button on the yoke or joystick and multiple switches light on the Buttons screen, the switches are "multiplexed." To correct this condition so the buttons may be correctly assigned, return to the Flight Controls screen and change the selection from "Normal" to "Multiplexed." Detailed directions for this procedure are found on Page 27 under "Device Configuration Window."

Done

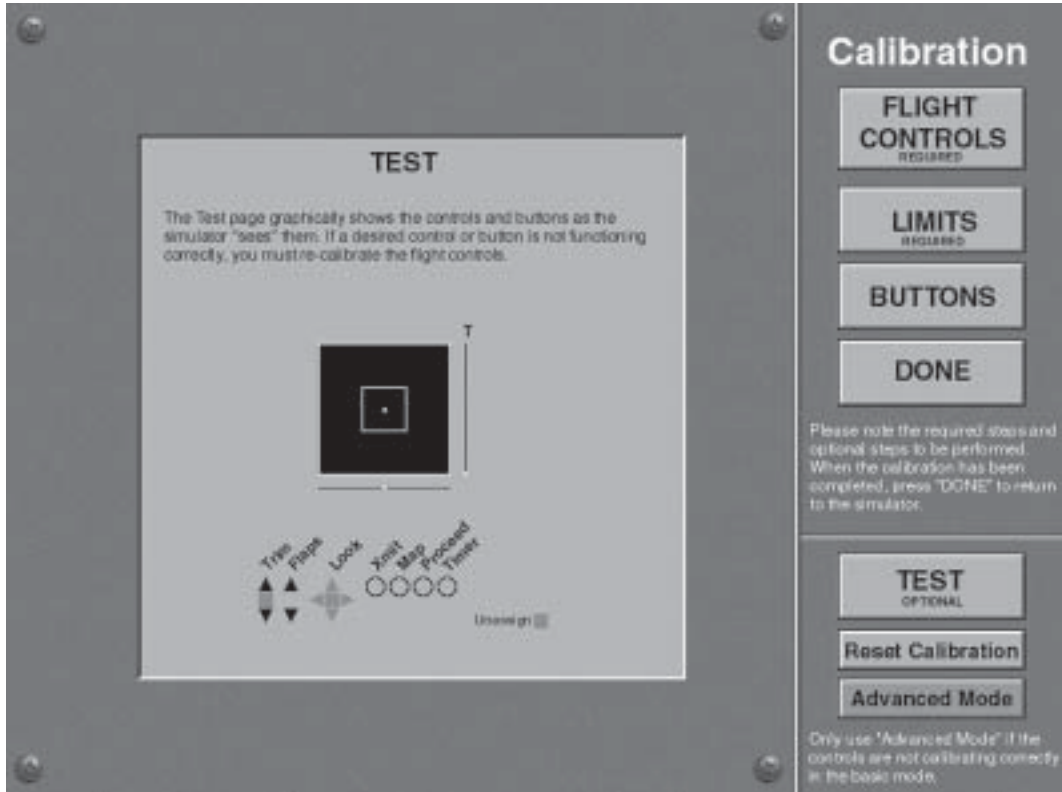
When you are satisfied with the button assignments, press the DONE button and return to the IPC Simulator cockpit to fly the simulator.

Test

The test page appears as a graphic compilation of the Limits and Buttons screens. When the flight axes, throttle or buttons are actuated, the respective green dot or symbol will appear.

Reset Calibration

At any time in the calibration routine, you may choose to press the Reset Calibration button to start the calibration routine over. You would start by selecting the Flight Controls and proceed as outlined in the previous steps.



Advanced Mode

If you are unable to properly calibrate the flight controls in the basic calibration, and you are an experienced computer user, you might choose to use the Advanced mode. The Advanced mode is more powerful, and therefore requires a more detailed understanding of the calibration process. First, check to make sure that a flight control utility, such as CH Manager, is not installed. Additionally, if no dot appears, red or otherwise, when a flight control is configured, the flight control is likely not "seen" by the simulator. This condition cannot be rectified through the use of the advanced mode. Unless you are confident of your abilities, we recommend you call ASA (800-ASA-2FLY) or check for support updates at www.asa2fly.com.

The calibration interface model has been developed to permit new flight control devices to work in conjunction with IPC Simulator. When fully implemented, ASA will produce DLLs as new flight control hardware is developed for the simulation market. For the present, flight controls that have been successfully used in the past will work without requiring special accommodation. However, flight controls previously not used, or incompatible, with IPC Simulator will require either the use of the Advanced Mode calibration or development of the new drivers.

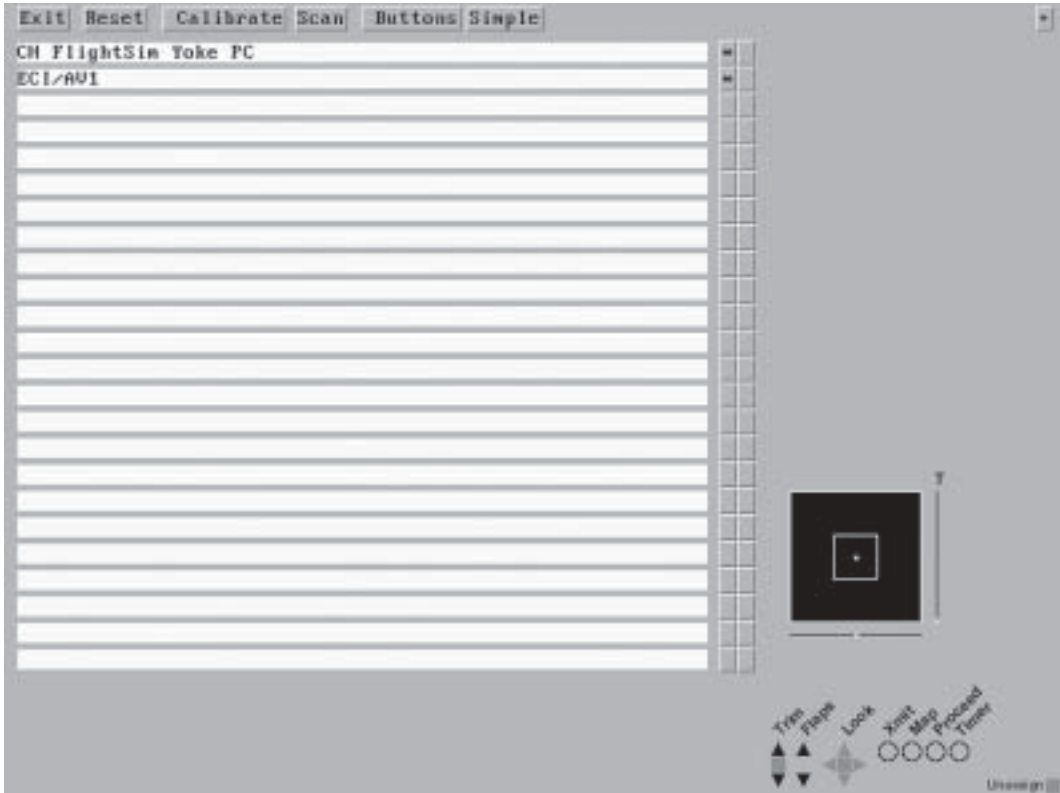
When you enter the Advanced Mode, you have command of the majority of calibration settings. Across the top of the Advanced Mode screen, you will find buttons labeled, Exit, Reset, Calibrate, Scan, Buttons and Simple.

The top row buttons function as follows:

1. The "Exit" button returns the user to the IPC Simulator cockpit and saves the current settings.
2. The "Reset" button functions in the same manner as the "Reset Calibration" button in the basic calibration mode, which erases the data file storing the settings and clears the calibration data.
3. The "Calibrate" button performs a quick calibration on the enabled devices asterisked on the list (functions similarly to the basic calibration mode). When the calibration is in progress, an asterisk is visible in the Calibrate button box at the top of the screen.
4. The "Scan" button forces a poll of the devices attached to serial, game and USB ports.
5. The "Buttons" box permits buttons to be assigned as in the basic calibration. When the Buttons box is pressed, an asterisk appears to indicate that assignments may be made or changed.
6. "Simple" returns the user to the basic calibration screen.

The main portion of the screen displays a listing of the Human Interface Devices (HIDs) reported by Windows, as well as specific DLLs written for known flight controls that interface with IPC Simulator (such as the CH FlightStick Pro). HID is

Microsoft Corporation's term for their built-in USB drivers that vendors such as CH Products use to activate the yokes/joysticks in Windows. A listed item is therefore either automatically detected or the program is "told" (by a DLL) that the device is present. At the lower right portion of the screen is a graphic depiction of how the simulator "sees" the inputs (Controls As Seen by the Simulator or CASS), similar to the Limits and Test screens in the basic calibration.

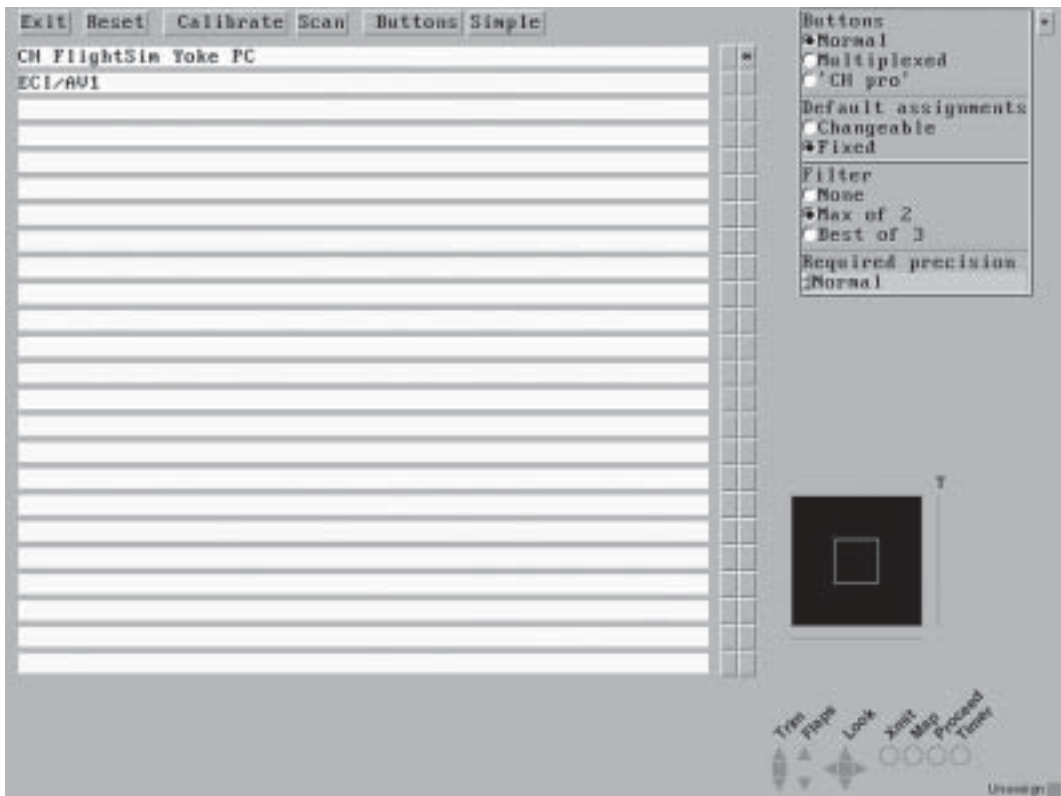


To the right of the list are pairs of box buttons. When asterisked, the leftmost button on each line indicates that the device listed on the line is enabled (such as, the simulator is actively using the device). The rightmost button has two possible functions depending upon whether the left box is asterisked. If the right box is selected when the left box is not enabled, a device configuration window appears. If the left box is asterisked, or enabled, and the right box is also selected, an individual calibration box appears for the flight control listed.

Device Configuration Window

The configuration window varies by type of device. Most yokes and joysticks will have a configuration box with four sections shown: Buttons, Default assignments, Filter and Required precision.

In the Buttons section, there are three “radio-button” choices. “Normal” indicates it is a HID device using the typical default settings. “Multiplexed” indicates the device has up to 15 buttons, which are encoded into a standard four-button sequence. If a device uses this setting, and is set to Normal, a button pressed on the physical control, will cause two or more buttons to appear to be pressed on the screen. By selecting Multiplexed, IPC Simulator will be able to interpret the signal so each of the 15 control buttons may be individually assigned. “CH Pro” is the name given to the older multi-button flight controls that used the standard six-button and two 4-way switch protocols. Examples of such controls are the CH FlightStick Pro and the CH Virtual Pilot Pro yoke. The default setting is Normal.



The Default assignments section permits changeable or fixed channel assignments. "Fixed" assignments are the default channel assignments predicated on the intended usage being known. For example, the hardware and software would read the gear switch on the throttle quadrant as fixed. Reassignment of this function is not allowed in the calibration window. However, if "Changeable" is selected, the default assignments would again be used, but reassignment of the function would be permitted. By clicking the mouse cursor first on the control line then on the CASS, you can change the channel assignments. The default setting is Fixed.

The Filter reads the signal being transmitted from the flight control as the IPC Simulator software recognizes it. Since the signal from USB devices is strong, a setting of None will often suffice. Max of 2 indicates that a minimum of two software reads will occur to sample the signal (many errors are caused by dust on a resistor, causing a momentary "open circuit" condition, which will produce an artificially high reading). The Best of 3 selection will poll the device and discard the poorest reading while averaging the remaining two. The default setting is Max of 2.

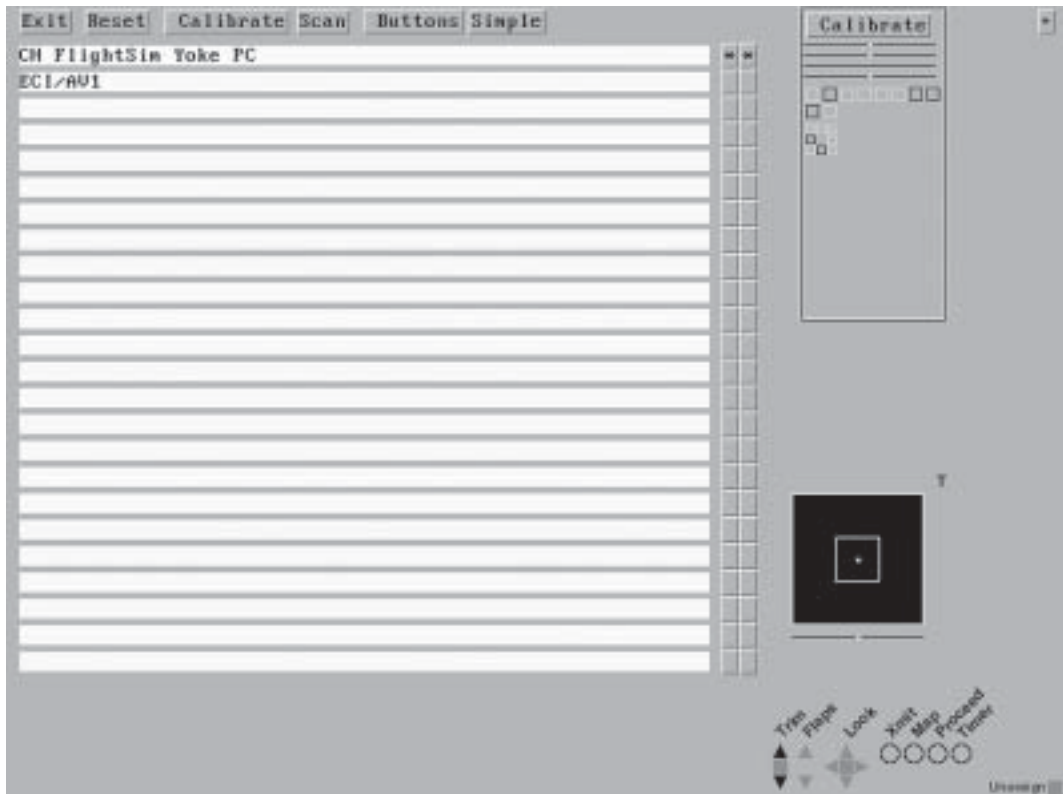
The Required Precision section allows for controls of lower resolution quality to function with the simulator. If flight control is not capable of turning the red dot to green, it could be due to inadequate resolution. There are three choices for gauging the precision, Normal, Low and Very Low; these variables are self-explanatory. The default precision setting is Normal.

Individual Device Calibration Windows

The individual calibration window is potentially different for each device. It has been designed so future development in flight controls may be adopted to make the simulation more realistic.

When both boxes are associated with a single flight control asterisked, the individual calibration window will appear. At the top of the box is a Calibrate button. When pressed, the button will display an asterisk to indicate the listed flight control is ready to be calibrated. A series of horizontal lines and boxes will appear within the box. Before Calibrate is pressed, the CASS area will first display orange highlights to indicate the anticipated functions to be calibrated. When Calibrate is actuated, the orange will disappear and other color combinations will come into play (see below for color-coding explanation).

You may now proceed to calibrate the controls as you normally would. Fully deflect and articulate the controls, until the lines are black and the dots are green. Then configure the buttons by simultaneously holding down a flight control button or switch, and pressing the left mouse button with the arrow on either a box in the calibrate window or a button symbol at the bottom of the screen. The crosshair will appear, and the highlighted corresponding button (in either the calibrate window or the button symbol) may now be pressed to complete the assignment. The order does not matter, but the button must be "linked" from one part of the screen to the other to complete the assignment.



Calibrate each flight control device separately (by placing an asterisk and removing it after calibration), and when completed, asterisk the left box of the flight controls to be used. To resolve conflicts, you may alternately asterisk the right boxes of the controls to determine which functions are double assigned (see the color-coded section below).

The calibration is depicted by lines with dots that move within the limits of the line. A line may represent any control input. For example, on a typical control yoke, the lines represent pitch, bank and yaw axes. The calibration box is active when both the left and right buttons associated with a flight control are asterisked.

All of the calibration modes are color-coded:

- A black line with a green dot indicates the line is active, assigned, and has “good” data. If the dot remains red, “bad” data is indicated and the input is not reliable (for yokes and joysticks both the pitch and bank axes must be calibrated before either will turn green in the CASS area).

- A gray line indicates that the line has not been assigned, and no dot will appear on the line. A gray line with a yellow dot indicates the input has a fixed assignment and is presently disabled.
- If the line is red, more than one function has been assigned. For example, a throttle that is assigned from a yoke as well as a throttle quadrant will show a red line in two calibration windows. For IPC Simulator to function correctly in this case, one of the assignments must be unassigned.
- In the lower right corner of the screen is the control box that depicts how the simulator “sees” the controls (CASS). When a control is selected for calibration, orange lines depict which functions the simulator expects to calibrate.
- Dark gray indicates that the channel has a fixed assignment, but is presently disabled.
- Cyan indicates that an assignment has not been made, but the function is “assignable.” Cyan can appear as a dot on a line or filler for a button symbol and might appear on a white, gray, or black background, depending on its status.

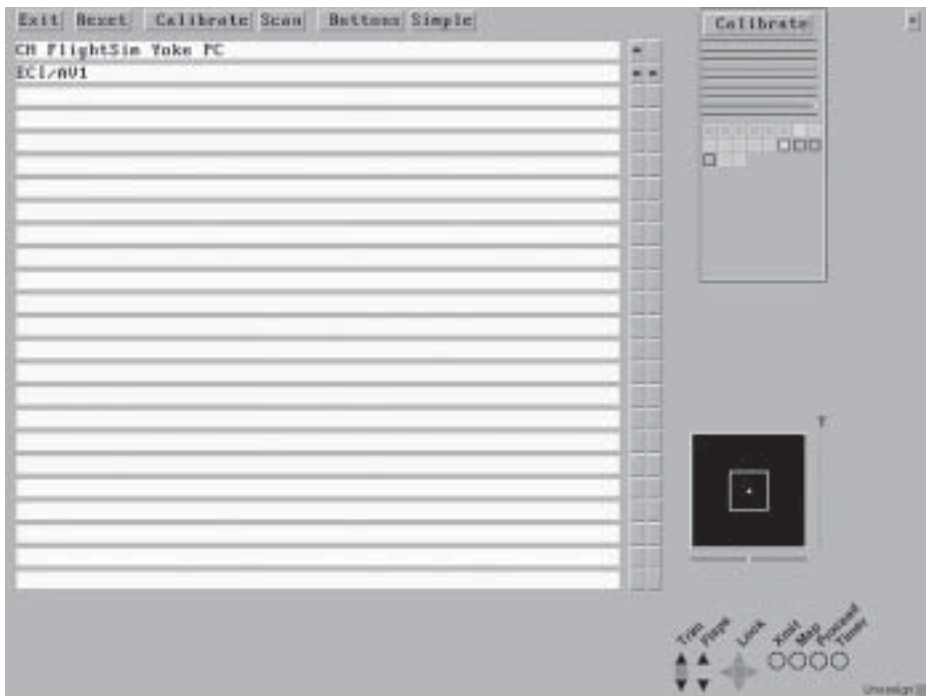
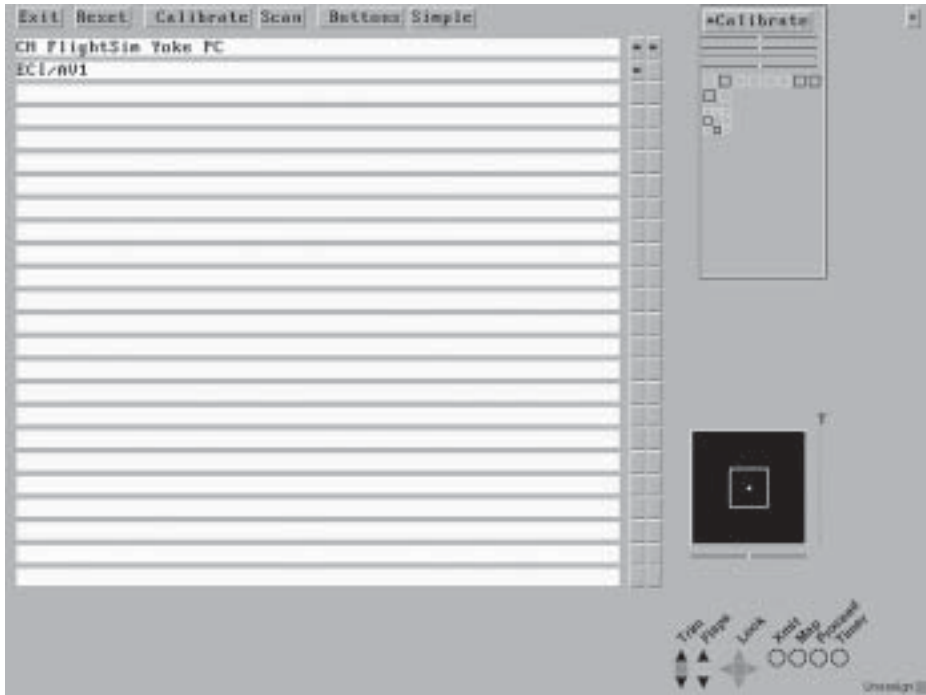
Altering Channel Assignments

A channel is assigned during a calibration routine. Once calibrated, you may assign a control function, or remove the assignment, as you wish. To do so, place the mouse pointer on the line or button and click the left mouse button. For example, if the throttle on the yoke and the throttle on the quadrant are both assigned, first bring up the Calibrate window associated with the flight control function to be removed (in this case, the yoke/joystick). Move the mouse pointer to the line that is red, depicting the throttle, and click on it. The line will turn gray with a yellow dot. (It is assumed in this example that you want to use the throttle quadrant.)

Button States

A button can indicate four states:

1. Inactive—If a button is inactive, control hardware has not been assigned to this function. The button or symbol would indicate a gray outline (circle) or solid gray (square or triangle).
2. Off—The hardware has been assigned but is not actuated at this time. The button or symbol would indicate a black outline (circle) or solid black (square or triangle).
3. On—The hardware has been assigned and the flight control button is actuated. The button or symbol would indicate a black outline, filled with solid green.
4. Error—More than one button has been assigned. The button or symbol would indicate a red outline and/or red fill.



Calibration Data Files

IPC Simulator creates two files that determine the control settings. The plugins.dat file is a machine-readable-only file, which automatically saves the calibration settings. It was developed so ASA might better support complex configurations. The user cannot alter or modify this file. In some instances in which the user cannot acquire proper flight control configuration, this file may be deleted. When the simulator is launched, it will read basic information from the plugins.txt file (see below) and start with a fresh configuration.

The other file is one that the user generates, called a plugins.txt file. In the Advanced Mode, the small "plus" sign in the upper right portion of the screen generates this text file. This file can be viewed with a text viewer and will also be used to troubleshoot calibration routines. If there is no plugins.dat in the IPC directory, the simulator will read the information from the plugins.txt file, thereby initiating a fresh calibration. Should the user alter the original plugins.txt file by pressing the plus sign in the advanced configuration, it would be advisable to use the shipped version that is available on the installation CD. As new controls become available, ASA will post plugins.txt files on the website (www.asa2fly.com). Moreover, ASA technical support may request that one or both of the files be transmitted to help determine the most effective manner in which to resolve unusual control configurations.

Flying the IPC Simulator

Flying Tips

If you are new to flying simulators, your first experience might be somewhat daunting. As you become more accustomed to flying the IPC Simulator, you'll not only become more comfortable with it, but will be amazed at how easy it is to fly like the real thing.

The first thing you learn in instrument flying is to ignore your sensory perceptions or "seat of the pants" feel. The truth is that you cannot completely disregard the sensations felt in the aircraft; however, in the simulator you have no choice. As a result, when robbed of about 20% of your perceptual abilities, you must rely solely on what you see on the instrument panel to maintain the aircraft's attitude. In this case, what you see is what you get, literally.

see if you are fixating on any one instrument. If so, be certain to keep your eyes moving. Soon you'll find that the instrument behavior is exactly like that experienced in actual flight, and you'll be far ahead of the learning curve.

Speaking of trim, notice the difference between trimming a simulator and a real aircraft. In a real aircraft, to pitch up, you pull the stick or yoke back the proper amount and trim off the pressure. The control stays in the same position. However, most PC flight controls return to a center position. So, to perform the same action in the simulator, you pull back and trim as before, and release the yoke or joystick to the center position and notice the result. If you need more pitch up, pull back again and trim, then release. You repeat the procedure until you can fly "hands off."

One additional pointer: to get the most out of the IPC simulator, fly it as you would the real aircraft. If you take procedural shortcuts, sooner or later they will likely transfer to the aircraft cockpit environment.

Ultimately, the objective of the IPC simulator is to make you so comfortable flying instruments that you will be able to read the instrument panel like a book, which will keep you ahead of the aircraft at all times.

Adjusting Power

Power in the IPC Simulator can be controlled by the mouse or by a joystick or yoke with a built-in throttle. See the "Calibrating Your Flight Controls" section (Page 18) to learn more about setting your system for mouse or joystick control of throttle.



When using a mouse to control power, simply click on the throttle handle image on your simulated instrument panel.

Hold the left mouse button in, and move the mouse slowly up or down across your mouse pad or desktop. The throttle will be "grabbed" by the mouse, and move up and down with your mouse.

There is another, even easier method of mouse control—click the **RIGHT** mouse button anywhere on the IPC Simulator cockpit screen, and the throttle will be actuated. Move the mouse up and down, and the throttle will be cycled in and out. This method is easier because you don't have to look for the throttle to grab it—it activates the throttle from anywhere your mouse cursor rests on the screen.

When using a joystick to control power, simply slide the lever or knob on your joystick (or yoke) forward and back—or up and down, depending on the device. You'll see the on-screen throttle move in relation to the movement of your physical control. When using a joystick for throttle control, mouse control of the throttle is inoperative.

IMPORTANT NOTE ON THROTTLE CONTROL USING YOUR JOYSTICK!

In IPC Simulator's Free Flight mode, controlling throttle with the method described above for a joystick is very straightforward and simple. But in the actual course

blocks themselves, each lesson must begin with a pre-set throttle condition, or RPM setting.

At the beginning of each lesson, you'll see a yellow circle overlying the throttle, representing the position your throttle needs to be in at the start of the lesson. At simulation start, you must overlay the yellow circle image with the actual on-screen throttle by moving your physical throttle control. When the two overlap and the yellow circle disappears, you've caged the throttle and can click **Proceed** to continue your lesson. If you've chosen to disable the joystick throttle and use the mouse for throttle control, you will not see the yellow circle overlay.

Adjusting Pitch Trim

There are four correct ways to control pitch trim in IPC Simulator, and one absolutely wrong way.

The first way: When established at the pitch attitude and airspeed you want, click on the on-screen trim wheel and slowly slide your mouse forward or back. Any excessive control forces you've been exerting on your joystick will seem to disappear, as the simulated aircraft enters a trimmed condition. Think of it as extending a trim tab into the relative wind—that's exactly how the software sees it.



The second way: Use the "Fast Trim" button below the trim wheel.

1. Establish and hold the pitch attitude and airspeed you're looking for;
2. CLICK AND HOLD the "Fast Trim" button down;
3. While holding the button down with your mouse, release the pressure you've been holding on your yoke or joystick;
4. Release the "Fast Trim" switch, and the simulator will have automatically trimmed itself for the new flight condition.

The third way is to program, from the Calibration screen, two of your controller's buttons to act as "trim up" and "trim down." When this switch is activated on your controller, you'll see the on-screen trim wheel move, and "feel" the control forces needed to establish your configuration disappear. See Pages 18–32 "Calibrating Your Flight Controls" for more detail.


The fourth way is to program one of your joystick buttons to engage the "Fast Trim" function. See "Buttons" on Page 22.

The WRONG way is to use the elevator and aileron trim sliders or knobs on the side or back of your joystick or yoke, if so equipped. As far as the software is concerned, using these controls does



not extend that “virtual trim tab” into the relative wind. The program will seem to fly OK, but your actual control response will be severely limited, just as it would be if you were in an aircraft and refused to use the trim controls. Not only would your arms get tired, but when you need full deflection of elevator or aileron, it wouldn’t be there—you’re using too much of the deflection to maintain your pitch attitude and airspeed.

Using the Control Menu

In the IPC Simulator cockpit, the Control Menu occupies the lower right part of the panel. Clicking the **Menu** button  brings up the Control Menu.

The Control Menu has two areas: **Lesson Mode**, which is covered in the “Taking Lessons from IPC Simulator” (Page 39), and **Control**.

Control will let you go to any of these areas or functions from within the IPC Simulator cockpit.

New Lesson: Choose any new lesson or enter Free Flight mode.

Evaluate: See the IPC Simulator CFI’s evaluation of your lesson.

Calibrate: Return to IPC Simulator’s Calibration screen.

Quit: Exit IPC Simulator and return to Windows.



Tuning and Identifying the Radios

Each on-screen radio knob has an inner and outer ring. Clicking either the left or right side of either ring will rotate the knob in the chosen direction, with the digits being displayed in the frequency windows on-screen. Click once, and the digits move one integer. Hold your mouse button down, and the knob will rotate through all appropriate frequencies.

To **identify** a station, left-click that radio’s rotating **IDENT** knob. To transmit on the COMM radio, click the **XMT** button.



Setting the DG, OBS and ADF Cards

To rotate any of these cards, click the left or right side of that function’s on-screen adjustment knob. Holding the mouse button down will rapidly rotate the selected card through 360 degrees.



Setting the Timer

The timer is located at the lower left of the instrument panel. Click Start to begin the timer function, and click **Reset** to reset the timer.



Marker Beacons

The marker beacon receiver indicator lights are found in the instrument panel's upper right corner above the radio stack. To turn the beacon receiver on or off, click the MB button.



Engine Sounds

A button next to the marker beacon on/off switch is marked ANR, and stands for "automatic noise reduction." Clicking this button turns off engine sounds (don't worry, it doesn't kill the engine itself!) and turns them back on again.



Scan Manager

Built into the IPC Simulator's lesson structure is a device to help focus and tighten your instrument scan pattern. Scan Manager is a unique system that helps to train the eye to focus on the primary instruments during each phase of flight. By lighting the bezel ring around each instrument in a sequential pattern, Scan Manager helps instrument pilots refresh and sharpen their scan.

To activate Scan Manager, press numbers 1–7 on the computer keyboard to start the scan patterns as follows:

1. Press the "1" on the keyboard and the instrument bezels will light in a general circular pattern.
2. Press the "2" on the keyboard and the instrument bezels will light the "standard six" flight instruments plus the tachometer in a radial pattern.
3. Press the "3" on the keyboard and the instrument bezels will light for a straight and level pattern.
4. Press the "4" on the keyboard and the instrument bezels will light for a level turn pattern.
5. Press the "5" on the keyboard and the instrument bezels will light for a straight-ahead climb or descent pattern.
6. Press the "6" on the keyboard and the instrument bezels will light for a straight-ahead climb or descent at a constant rate pattern.
7. Press the "7" on the keyboard and the instrument bezels will light for a turning climb or descent pattern.

To stop a scan pattern, simply press the "0" key.

IFR Configurations

Power Settings and Speeds

These are the configurations, or specific settings of pitch, power and bank that result in specific airspeeds and rates of climb or descent, that should be used during the lessons (these are also placarded on the bottom center of the cockpit):

Cruise Level:	0 degrees pitch 2400 RPM 105 KIAS
Cruise Climb:	2 degrees nose up Full power 90 KIAS 500 FPM
Approach Level:	1 degree nose up 2000 RPM 90 KIAS
Cruise Descent:	1 degree nose down 2000 RPM 105 KIAS 500 FPM
Precision Descent:	0 degree nose down 1500 RPM 90 KIAS 500 FPM
Nonprecision Descent:	2–3 degrees nose down 1200 RPM 90 KIAS 1000 FPM
Missed Approach Climb:	5–8 degrees nose up Full power 75 KIAS 800 FPM

Taking Lessons from IPC Simulator

The IPC Simulator Cockpit

The starting point for IPC Simulator is the cockpit. Click **Menu** at the **bottom right corner of the screen** to bring up the Control Menu and Information buttons.

Included in the information box are four buttons. The MAP button will display your current position. The BRIEFING button will bring up the lesson briefing text. The CFI TIPS button will display Stan's tips for flying the lesson his way. The HELP button will bring up the program's ReadMe document to provide general information.



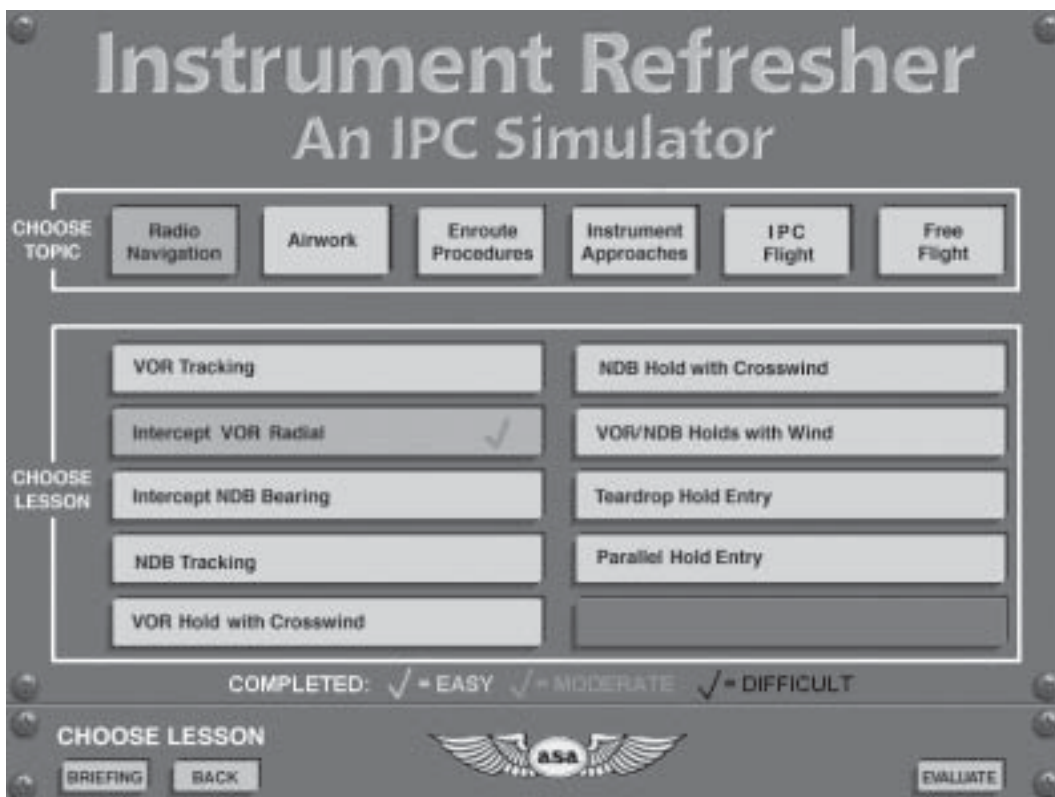
Below the Information box is the Control Menu. Click **New Lesson** to choose a Lesson or to enter Free Flight mode.



The Lesson Menu

At the top of the Lesson Menu you'll see an array of lesson blocks (topics), along with the IPC Flight block and Free Flight selection. Free Flight instructions are covered in their own section (see Page 48).

When you complete an Easy, Moderate or Difficult lesson mode, a color-coded check mark is inserted into the Main Menu for the lesson. The color code legend is printed at the bottom of the screen. A **yellow** check mark indicates that you have completed the Easy mode; a **blue-green** check mark indicates a Moderate mode completion; and a **black** check mark, a Difficult mode. Notice in the figure when you finish a lesson mode, a colored check mark indicates which mode has been completed. In the figure below, a blue-green check mark indicates that the Moderate mode has been completed.



Clicking any of the **blocks** (TOPICS) will bring up the lessons associated with that block. Clicking a **lesson** will select that particular lesson.

mode you wish to practice (EXPLAIN, EASY, MODERATE, DIFFICULT), then click on the **Proceed** button on the lower left of your cockpit screen, which begins the lesson.

The Lesson Mode Buttons

Explain, Easy, Moderate and Difficult are the different modes IPC Simulator uses to demonstrate, teach, and let you practice a lesson.

Explain

Stan, the IPC Simulator CFII, will fly the selected lesson, explaining his actions to you as the lesson progresses. This is like watching your actual CFII perform a maneuver or procedure in your training aircraft. Frequently, problems experienced with the program may be remedied by closely watching the virtual CFII, noting each step in the order in which it is performed and mimicking the procedure precisely.

Easy

In this mode, you get to fly the lesson. Stan gives you voice prompts as you fly, instructing you on the next step throughout the procedure. If you make a mistake, you will have approximately 15 seconds to rectify the problem. A streaming warning message in red letters will scroll across the screen. If you deviate from the program's parameters long enough, the CFII stops the simulation and explains the error.

To gain further insight into the instructor's intention when flying the simulator, click on the MENU button on the bottom of the screen to pause the simulation and then one of the INFORMATION buttons to bring up the Briefing, CFII Tips or Help (see figure on facing page).

Moderate

This mode lets you practice without prompts. The lesson objective is the same as the previous two modes, but there is no voice prompting from your IPC Simulator CFII. In Moderate, after a brief delay of only 7 seconds, the streaming message appears. If you do not correct your actions quickly enough, you will be stopped and may continue or go back a step without having to re-fly the entire lesson.

Difficult

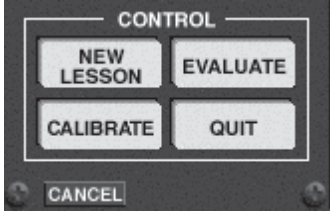
Finally, you must complete the lesson with few warnings and within IPC Simulator's FAA Practical Test Standard tolerances.

In general, you'll want to use the **Easy** mode until you know it, **Moderate** until it's refined, **Difficult** when you've practiced to a high standard, and **Explain** if you're confused.



The Evaluation Screen

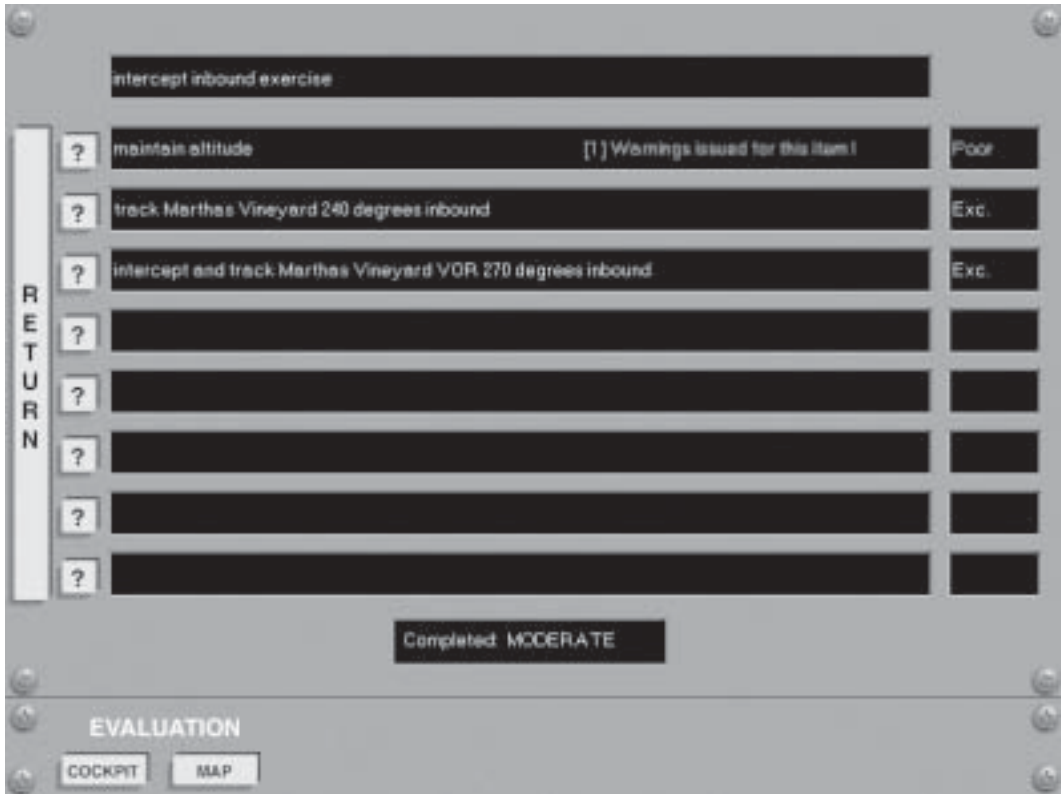
Once you've completed a lesson—whether it's an easy, moderate or difficult mode—you'll be prompted to look at your Evaluation for that lesson. Click **Evaluate** in the Control Menu to proceed.



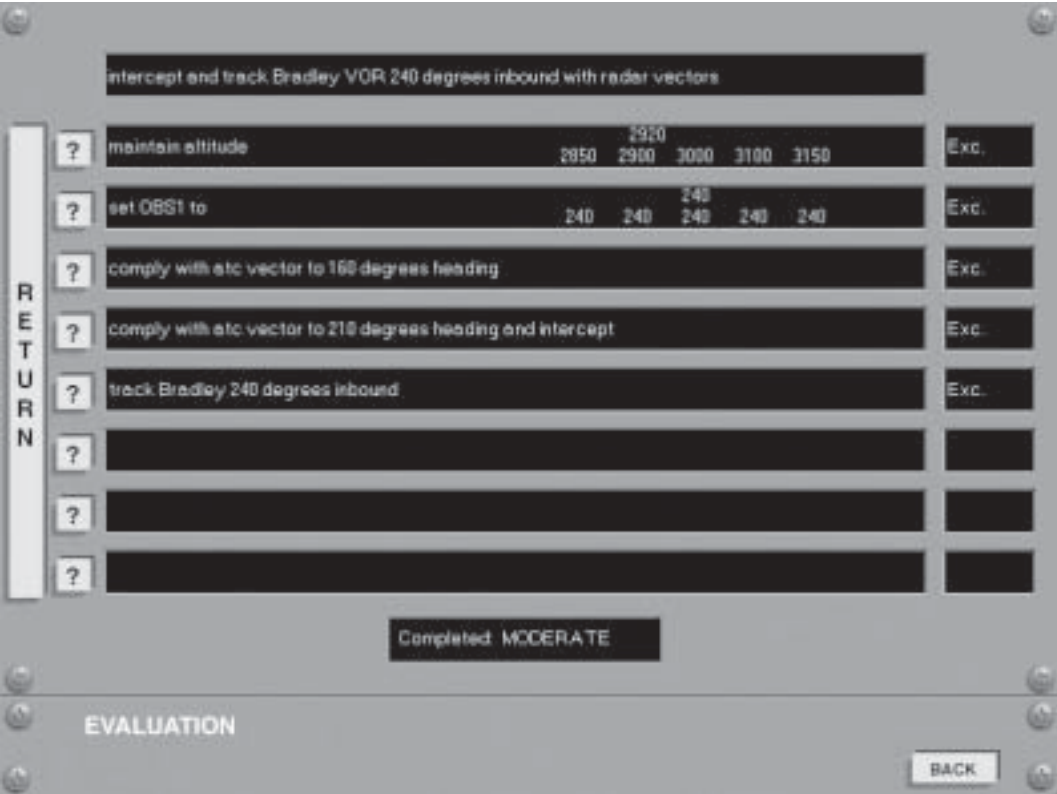
There are several "layers" to any lesson. Each instruction you've received from the IPC Simulator CFII is listed here and graded from Poor to Excellent. The lowest level of scoring on any one part carries to the highest level of evaluation for that particular lesson or segment. If you had a warning flashing across the screen, you will see the warning in Evaluation and receive a grade of Poor. If you corrected the mistake, such as losing and regaining altitude, and flew the remaining tasks of

the lesson well, you might decide to proceed to the next lesson where you can pay closer attention to altitude deviations.

(Note that at the bottom of the Evaluation menu, IPC Simulator tells you which mode you have completed.)



Clicking any of the ? buttons next to this task list takes you to the second layer of elements. Where the first list may have said simply "Climb to 4,000," this second list breaks that task down into its separate elements: Increase power, increase pitch attitude, maintain constant rate of ascent, etc.



Clicking any of the ? buttons next to these elements reveals the third layer—the Practical Test Standards that you must comply with. In the example above, a scale will show how long it took you to maintain altitude, comply with ATC vectors and track a VOR course. These are the numbers IPC Simulator uses to determine whether your lesson was Poor, Good or Excellent.

If you score outside of the *FAA Practical Test Standard* limits, the evaluation scores a 'Poor,' and notes the number of warnings that were issued for the task.

Using the Map Option in the Evaluation Screen

Clicking **Map** will take you to the IPC Simulator map screen.



Flight Review acts like a VCR, letting you Play, Fast Forward, or Rewind your flight.



Plan View adjusts your overhead view by moving North, South, East or West with the **Arrows**, or zooming **In** or **Out** to increase or decrease the area the map review covers. Clicking the **Airplane** symbol centers your map on the IPC Simulator aircraft.



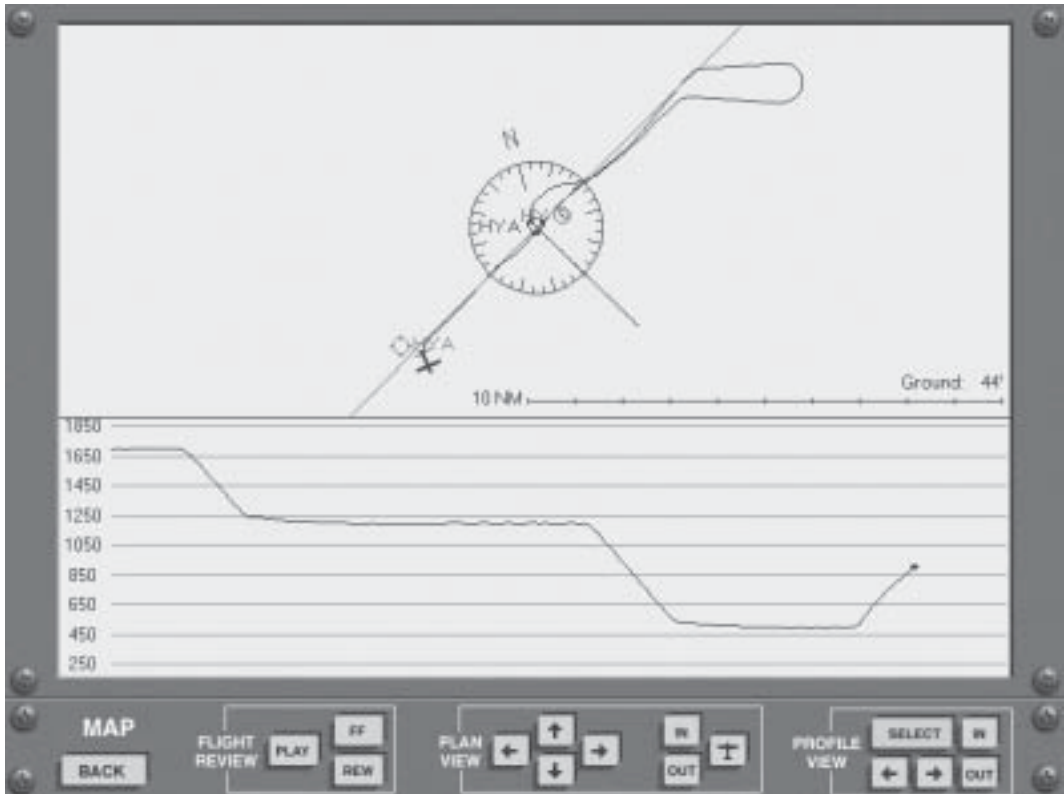
Profile View. Turn on or off the vertical view of your flight with the **Select** button, and use the **Arrows** and **In** or **Out** just as you do in the Plan View.



Click **Evaluation** to return to the Evaluation screen.

Returning to the Cockpit

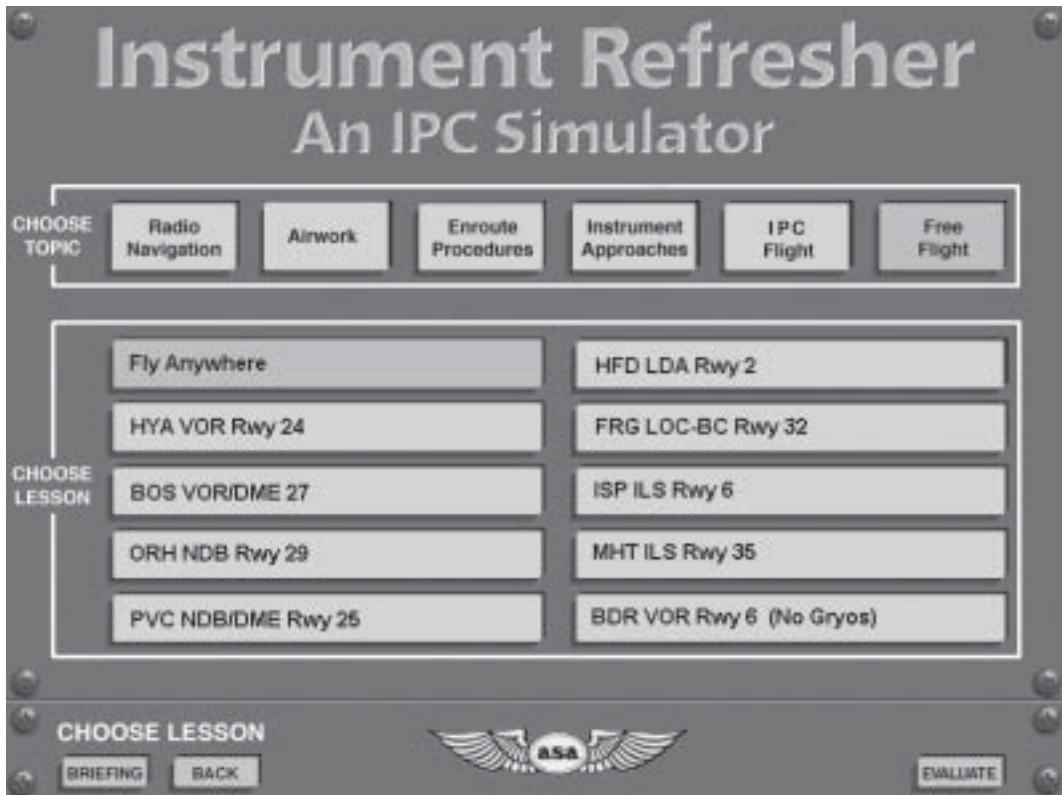
From the Evaluation screen you can click **Cockpit** to return to your starting point. From there you can change your lesson mode, choose a New Lesson or Exit the program.




Free Flight in IPC Simulator

Free Flight

Free Flight has two kinds of simulation experiences. The first is the Fly Anywhere mode, which allows you to take what you've learned from the Lessons and practice in your home airspace. The other Free Flight mode includes the instrument approach scenarios used in the lessons, but without the built-in instruction. The Free Flight scenarios also include the Scan Manager option.



Getting to Free Flight Fly Anywhere

To get to Free Flight, click the **Free Flight** button  located on the upper right corner of the lesson menu, then click the Fly Anywhere button, followed by the Briefing button. You can select any airport you desire; the default airport/runway will be BFI, runway 31L.

The Free Flight Fly Anywhere Cockpit

The Free Flight cockpit looks just like the cockpit used in the lesson modes, until you click the **Menu** button.



The Free Flight Fly Anywhere Menu

As in lesson modes, there are two areas to the Free Flight **Menu**. **Free Flight**, where you set up the parameters of your upcoming flight, and **Control** in which you may go to a **NEW LESSON**, view the **MAP**, **CALIBRATE** your flight controls or **QUIT** the program.

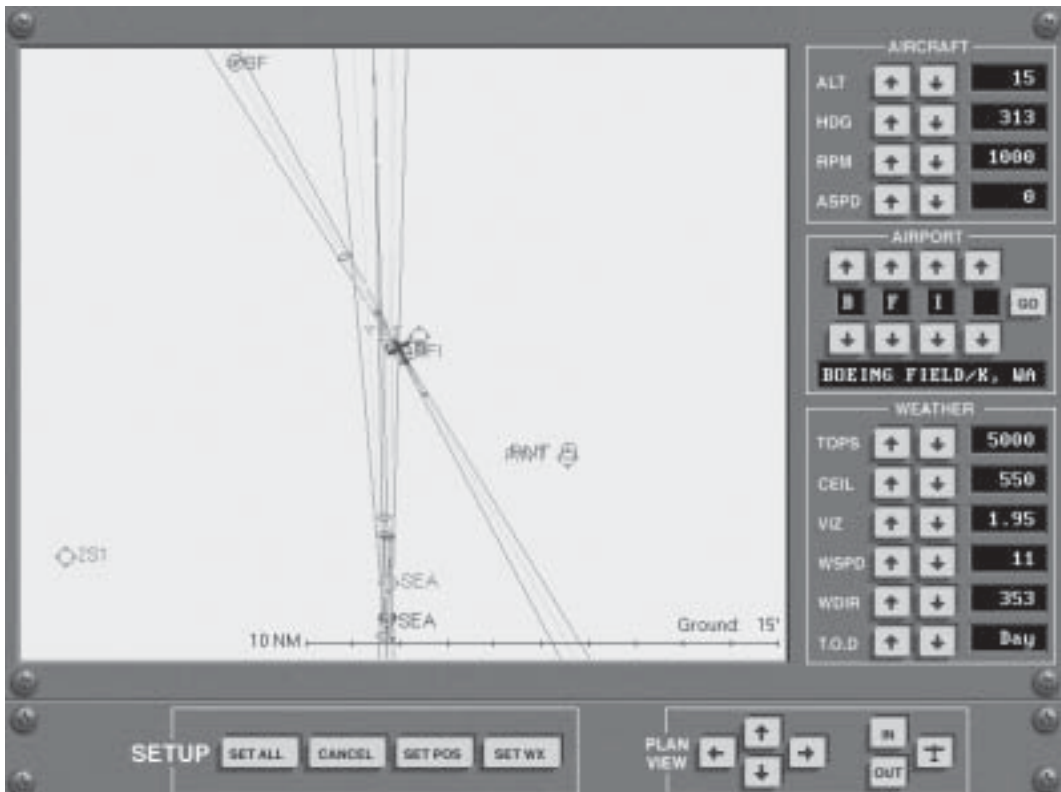
Setting Up “Fly Anywhere”

Every Free Flight excursion should begin at the Setup Screen. Here, you tell IPC Simulator where you want to start off, at what altitude, heading and airspeed, and what the weather conditions will be like. In the Free Flight Menu, click the Setup button.

The **Reset** button allows you to cancel any changes you’ve made and return to the cockpit in your original configuration.

Select Your Airport Area

Using the controls in the box marked **Airport**, insert the 3-letter identifier for your starting point (for international airports, precede the 3-letter identifier with the country code). The up/down arrows will cycle through numbers zero through nine, as well as the alphabet, allowing you to input the starting airport identifier. Click **Go** to move the IPC Simulator aircraft to your selected airport.

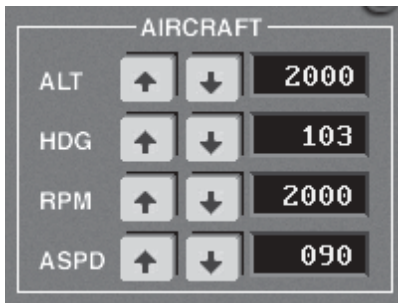


Position Your Aircraft

After clicking **Go**, the aircraft is positioned at the geographic center of the selected airport, and you need to refine your position. Click and hold the aircraft symbol and drag it to the place you want it to be. This can be on the numbers ready for takeoff, or far outside the airport area, in preparation for an approach. If you can't see enough of the area outside the airport, use the **Plan View** controls in the lower right corner of the screen. The **Arrows** will move the map view in any direction, and **In** or **Out** will zoom the overall view scale. Clicking the **Airplane** symbol will center your map view on your aircraft.

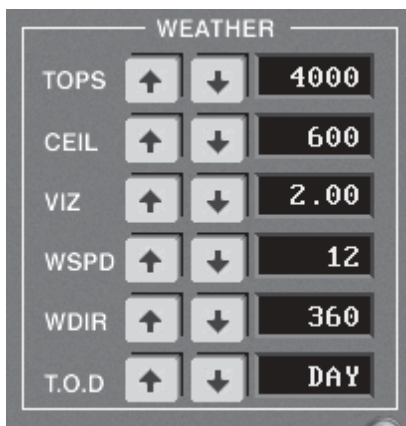


Now use the **Aircraft** controls to fine-tune that position. As you used the up/down arrows for dialing in your airport ID, use the up/down arrows under **Aircraft** to preset heading, altitude, RPM setting and airspeed. These values can include the airport elevation, for starting off on the ground, or anything up to the maximum limits of the aircraft.



Setting the Weather

In the **Weather** box, use the up/down arrows to preset conditions for your flight.



Setting Your Selections

Once your airport, position and weather have been set, you need to click in the Setup box to start flying. **Set All** will set position and weather for your flight. **Set Pos** will set your airport and aircraft position but leave the weather as it was previously set up. **Set Wx** will allow you to change the weather parameters of a setup without changing your position. **Cancel** will take you back to the cockpit without changes.



Reviewing Your Flight

Review your flight by using the **Map** button on the Free Flight control menu.



Flight Review acts like a VCR, letting you Play, Fast Forward, or Rewind your flight.



Plan View adjusts your overhead view, by moving North, South, East or West with the **Arrows**, or zooming **In** or **Out** to increase or decrease the area the map review covers. Clicking the **Airplane** symbol centers your map on the IPC Simulator aircraft.



Profile View. Turn on or off the vertical view of your flight with the **Select** button, and use the **Arrows** and **In** or **Out** just as you do in the Plan View.



Click **Back** to return to the IPC Simulator cockpit.

Exiting Free Flight

In the lower right of your screen is Free Flight's **Control Menu**, with options to return to the lesson menu through **New Lesson**, or **Calibrate**. Clicking **New Lesson** will take you out of Free Flight. Clicking **Quit** will take you back to your desktop.



Free Flight Lesson Scenarios

Free Flight includes nine preset scenarios, which situate the simulated aircraft in the same positions as when starting the Instrument Approaches lessons. In Free Flight, you may fly the approaches without guidance, stopping or evaluation. In this way, you have the opportunity to quickly practice the canned approaches on your own.

Scan Manager is built into the Free Flight Lesson Scenarios, and can be used to help train the eye to focus on the primary instruments during each phase of flight. By lighting the bezel ring around each primary instrument in a sequential pattern, Scan Manager helps instrument pilots refresh and sharpen their scan. (See Page 37 for details on how to activate and use Scan Manager.)

Instrument Refresher

An IPC Simulator

CHOOSE
TOPIC

Radio
Navigation

Airwork

Enroute
Procedures

Instrument
Approaches

IPC
Flight

Free
Flight

CHOOSE
LESSON

Fly Anywhere

HFD LDA Rwy 2

HYA VOR Rwy 24

FRG LOC-BC Rwy 32

BOS VOR/DME 27

ISP ILS Rwy 6

ORH NDB Rwy 29

MHT ILS Rwy 35

PVC NDB/DME Rwy 25

BDR VOR Rwy 6 (No Gryos)

CHOOSE LESSON

BRIEFING

BACK



EVALUATE

Appendix 1: Lesson Tips

Meet the Instrument Refresher Instructor: Stan the CFI Man

I want to thank you for agreeing to fly with me. I am known as a tough instructor, but I just teach the way I was taught. I have been teaching for 35 years with great success. It might sound rigid, but I have a system, like the military, and each student follows that system. Some have said, "it is Stan's way or the skyway." Probably a lot of truth there, but I get consistently good results.

ASA asked me to guide this Instrument Refresher, and I agreed. ASA asked me to make it easier so students could feel better about their skills and accomplishments. I said, "I don't think so!" I teach the way I teach and make no excuses about it; I get results. I turn out quality students, good sticks.

At ASA, we want to make the simulation experience as effective as possible for our program users. Bear in mind there are many acceptable methods to comply with FAA regulations and procedures. Stan teaches one perfectly acceptable method, which may vary from what you were taught or how you currently fly. If you are completely comfortable with the procedural aspect of flying IFR, and you don't need a "refresher" so much as a platform to practice, you might just watch the Explain mode. Refresh your memory on a holding pattern, perhaps, then go into Free Flight and perform the maneuver without restriction or guidance. Only you can be the judge of what is acceptable to you and your instructor.

However, if you do need a reminder of the procedural aspects used in instrument flight, performed in the privacy of your home, this program was designed for you. Stan is a strict instructor—we have no qualms about that. If you find yourself fighting "the system" and consistently failing a lesson, reference this "cheat sheet" to help you get the most out of your virtual flying experience. Use these tips to understand what Stan is looking for. We hope these refined skills will translate well to the cockpit when it comes time to take your real IPC.

General Tips

Stan has some general pet peeves that recur throughout the program. We will discuss some general methodologies, and then go through the course lesson by lesson to review the procedural aspects specific to the lesson.

Tools: The nice thing about a simulator is that you can stop, take a breath and see where you are. Press the "Menu" button to stop the action or program the "Map" function as one of your flight control commands. Then, every time you want to pause and think about the lesson (or review these Tips), you can check your position on the map. Press the Menu button a second time to start the lesson back up again, continuing from where you paused. Another helpful tool included in the program is the Scan Manager. The built-in scan patterns can help you stay ahead of the aircraft in turns, climbs, descents, and straight-and-level flight by suggesting a

route for your eyes to follow in viewing the primary flight instruments. The scan patterns may be found at the bottom of every lesson briefing as well as by pressing the CFII Tips button during a lesson. In addition, a full explanation of Scan Manager is included in this POH.

Turns: One of Stan's most consistent gripes is making standard-rate turns at a stabilized rate and rolling the wings level at the completion of the turn. He insists on standard-rate turns within a needle width or so of the turn coordinator bars, and no rocking of the wings in the turn. When rolling out of the turn, there should be no evidence of turning prior to taking the next action. If you are within five degrees of the desired heading when you initially roll out, keep the wings level for a moment before taking the next action—which might be to start the panel timer or fine-tune the heading.

Airspeed: Another issue concerns airspeed control. Stan is adamant about maintaining airspeed on approach between 80 and 100 knots, ideally about 90 knots indicated. This means if you are at approach level at about 2,000 RPM, you need to add some power in the turn to keep your airspeed from decaying below 80.

Sequence: If there is a sequence of events, that sequence must be followed precisely. While it may be perfectly acceptable to perform the tasks in a different sequence, Stan believes that if you practice the same sequence over and over, the chance of missing a step is decreased. So, while you are flying with him, he wants you to do it as he prescribes.

An example of following Stan's sequence would include the five T's: Turn, Time, Twist, Throttle, Talk. So, in a procedure, you would make the turn to the specified heading, roll the wings level, stabilize, start the panel timer, twist to adjust the radios and NAVAIDs, adjust the throttle to the proper setting for the configuration and talk to ATC. Stan expects you to perform the events in that sequence, every time.

Note that in the Explain and Easy modes, Stan will explain what you are to do every step of the way. Wait until you are prompted and note the routine he expects you to follow when you try the Moderate and Difficult modes.

Communications: Differentiate between ATC and CFII voice commands. When Stan is speaking to you, the banner across the top of the screen will indicate, "IPT-CFII." You need to respond to ATC by pressing the "XMIT" button.

Configuration: As in any IFR scenario, it is important the pilot be aware of the proper aircraft configuration settings for approach level, precision and nonprecision descents, etc. Stan wants to see the configuration settings by the book. For example, when a nonprecision descent is called for, Stan expects a 2–3 degree pitch down, power to 1,200 RPM and a descent rate of 1,000 FPM. Refer to the chart at the bottom center of the instrument panel view for details on each configuration.

Approach Altitudes: When demonstrating an approach in Explain, Stan likes to go right down to the MDA or DH. When he learned, it was acceptable to have a bit of a plus or minus on the approach minimums. However, today, the PTS states “-0 feet descent below the minimums.” You may want to add a cushion of 20–40 feet to your minimum descent altitude when flying the simulator yourself, so that you will never bust minimums in actual flight. Your instructor will appreciate your understanding of the regulations and procedure on the IPC ride.

Failures: If you are confident in the procedure and don’t want to repeat that portion of the lesson, hit the “Continue” button if stopped. You still need to correct the situation, but this option will let you continue with the lesson without backing up and repeating any portion of it. Remember, this is a program designed to help you sharpen your skills. If you over-bank to capture a VOR radial, but are within safe limits, don’t fret if the program says you didn’t do a standard-rate turn properly. But be certain you are not making a procedural error in doing so. The important aspect is that you are competently performing the procedure. If you stay “ahead” of the computer, you will likely be ahead of the aircraft the next time you fly. If so, your IPC flight will be effortless—which is what this program is really all about.

Lesson by Lesson Tips

Part of instrument flying is the ability to remember and handle many tasks simultaneously. When everything is working as it should, flying instruments is quite easy. But it is when things start going south that it becomes more challenging. Emergencies, distractions, etc. make the routine much more difficult. If you can follow, remember, and think ahead of the situation in the simulator, it will be of immense help in actual flying. The great benefit of the simulator is to push you up to and beyond your capability, so you can improve your actual flying performance. Do your best and realize that by out-thinking the simulator, you will be well ahead of the aircraft.

Radio Navigation

VOR Tracking

- If you keep the CDI needle within a dot of the course by correcting for the wind component and maintain the specified altitude, you will have no trouble.

Intercept VOR Radial

- In this exercise, note that you must tune the radial precisely. This may be verified by checking the CDI numeric indicator window.
- As usual, maintain altitude, make smooth standard-rate turns and roll wings level even if you are a degree or two off.

Intercept NDB Bearing

- To intercept the NDB bearing you will double the angle of correction. Also, for all the NDB work, Stan expects you to be within 5 degrees of your bearing to be considered on course.
- Maintain altitude, make smooth standard-rate turns and roll wings level even if you are a degree or two off.

NDB Tracking

- Remember to set the panel timer when flying outbound from the station.

VOR Hold with Crosswind

- This is a direct entry holding pattern procedure to practice wind correction in the hold. When ATC talks to you, respond by pressing the "XMIT" button.
- After cleared for the hold, maintain approach level (no need to waste gas).
- If you overshoot the inbound course, he may require a 30-degree intercept angle.
- He goes around the patch many times. Generally, if you are in Moderate or Difficult mode, and you fly the procedure well, Stan will not stop you.

NDB Hold with Crosswind

- Remember to copy the clearance and read back.
- Transition to approach level.
- For a crosswind of 10 knots, he expects a 10-degree outbound correction.
- Standard rate turns, stabilize turn and level the wings.
- After leveling the wings, start the timer when the ADF needle is 90 degrees or more with respect to the aircraft nose.
- Report hold entry.
- When you roll out on the bearing inbound, note the number of degrees off. If, for example, you are 9 degrees off, double it (18), add to the WCA (e.g., 10) and round (in this example, 30 degrees).

VOR/NDB Holds with Wind

- Remember to copy the clearance and read back.
- Transition to approach level.
- Make initial wind correction.
- Turn outbound and start timer after wings level. (If message appears that you did not start the timer, press Continue and start timer again.)
- Report hold entry.
- Stan exaggerates the correction wind correction to illustrate how to best compensate for wind.

Teardrop Hold Entry

- Remember to copy the clearance and read back.
- Transition to approach level.
- Approximate wind correction as you fly to the NAVAID.
- For VOR hold, start panel timer when flag reads off or TO.
- After turning outbound and starting the timer, report the entry.
- Intercept the inbound course with a 30-degree intercept angle if you are overshooting the course.

Parallel Hold Entry

- Remember to copy the clearance and read back.
- Transition to approach level.
- When flying to the NAVAID, notice the wind correction angle necessary to hold your course. You can use this information to approximate the wind correction in the hold.
- After turning outbound and starting the timer, report the entry.
- 45 degrees is about the maximum intercept angle you should use.

Airwork

Unusual Attitudes

- **Nose High:** Full throttle, pitch down to level, level the wings, once airspeed is above 90 kts throttle to 2,400 RPM (remember as airspeed increases, so does engine speed with a fixed pitch propeller, so you must continue to fine-tune power setting).
- **Nose Low:** Retard throttle, level the wings (so wing is not overloaded), pitch up to level, reverse the VSI (there is a lag, but a good indication of trend), once airspeed is below 110 kts (remember fixed pitch response), throttle to 2,400 RPM.

Steep Turns

- Just like a real steep turn under the hood, a challenging procedure. Full power, establish bank, maintain altitude, begin roll out 30 degrees before heading, power to 2,400 (remember fixed pitch tendency to increase RPM with airspeed).

No-Gyro Unusual Attitudes

- Same procedure as regular Unusual Attitudes, but instead of focusing primarily on the AI, use the ASI, TC, ALT, VSI and TACH for guidance to proceed as before.

Enroute Procedures

Tower Clearance

- Stan expects you to set up the radios and NAVAIDs in the proper order, his order. So, when he explains, set them up the way he does.
- Dial up ATIS 126.45, call ground on 121.6 for your clearance.
- To intercept V419 with vectors, initially tune Bradley VOR on 109.0, OBS1 to 060 for initial intercept of WITNY intersection (see chart), transponder to 4047.
- Contact ground for taxi, tune tower on 119.6 and request departure.
- Advance the throttle, pick up speed to about 60 kts, rotate and start your climb out.

Non-Tower Clearance

- Tune Burlington FSS RCO on 122.5, get your IFR clearance.
- Tune ADF to 265 SXD NDB
- Tune NAV1 to 109.4 EEN VOR and OBS1 to 170
- Transponder to 6642
- Springfield CTAF 122.8
- Announce and depart within the void time.

Airborne Clearance

- Oxford CTAF 122.7, announce, takeoff and level off at 3,000 feet.
- Heading about 005 and maximum rate climb to 2,000, followed by a 500 FPM rate to 3,000.
- Level at 3,000 feet and 2,400 RPM, tune NY approach on 135.1 and request and read back IFR clearance.
- Tune and IDENT NAV1 to HFD VOR on 114.9 and OBS1 direct TO HFD.
- Transponder to 1002.
- SR turn to approximately 095 for direct to HFD.

Instrument Approaches

HYA VOR Rwy 24

- Starting location, 3 mi. SE of HYA VOR at 2,500 feet, wind 330 at 10.
- NAV1 should be tuned, press IDENT.
- ATC clears for the approach, respond to ATC.
- Pass HYA (IAF), SR turn outbound to 061, level wings and start timer for two minutes, set OBS1 to 061.
- Intercept R-061 with a 30-degree intercept angle.
- Once established on R-061, nonprecision descent (1,200 RPM and 1,000 FPM) to 1,700 feet.

- After 2 minutes and approach level at 1,700, procedure turn outbound to 106, level wings and start timer for 1 minute leg, set OBS1 to 241 inbound course, report procedure turn outbound.
- After 1 minute has elapsed, turn inbound to 286 and intercept the 241 inbound course.
- When established on the inbound course, nonprecision descent to 1,200 feet.
- Hyannis Tower on 119.5 when directed by ATC.
- Passing the VOR and FAF, start the timer for 2:08 to the MAP, nonprecision descent to 500 foot MDA, report HYA FAF inbound.
- After 2:08 has elapsed, begin maximum MA climb (full power and about 75 kts.).
- When above the circling minimums of 560 feet, enter a SR turn to the left and report the missed approach to ATC.

BOS VOR/DME Rwy 27

- Starting location, 13 mi. E of BOS VOR on R-100 at 4,000, wind 180 at 10.
- NAV1 should be tuned, press IDENT.
- ATC clears for the approach, initiate a turn to 350 as directed and respond to Boston approach, then set OBS1 to BOS 260 final approach course.
- Boston ATC clears you for the approach, comply with the directions and turn to 290 and nonprecision descent to 3,000.
- Maintain approach level at 3,000 until established on the inbound course.
- After passing SWAYS IAF at 10.4 DME, nonprecision descent to 2,300.
- Passing DEARS intersection at 7.9 DME, nonprecision descent to 1,500.
- Boston Tower on 119.1 when directed by ATC and note to report BLEAK.
- Passing BLEAK at 4.6 DME, start timing 2:56, nonprecision descent to 460 MDA and report BLEAK.
- You will break out but continue at the MDA until reaching .2 DME to perform a low approach.
- At the MAP, begin maximum MA climb (full power and about 75 kts.).
- When above the circling minimums of 620 feet, enter a SR turn to the left and report the missed approach to ATC.

ORH NDB Rwy 29

- Starting location, 3 mi. NW of Crow Hill (CLY) at 3,000 and approach level, wind 360 at 10.
- ADF should be tuned, press IDENT.
- ATC clears for the approach, respond to ATC, and fly direct to CLY.
- After passing beacon (IAF), turn to 138, level wings and start timer for 1 minute, initiate nonprecision descent to 2,500 feet and report CLY to ATC.

- After 1 minute outbound, turn left to 288, level wings to correlate position, then intercept the 288 course inbound.
- When directed, contact tower on 120.5 and report CLY as directed.
- After passing CLY inbound (FAF), start the timer for 2:32, initiate nonprecision descent to 1380 MDA, and report CLY inbound.
- ATC clears for low approach and directs the missed approach procedure.
- After time elapses, initiate missed approach climb, maintain 288 heading, tune ADF to DUNCA LOM (RS) on 279, proceed direct RS and report MA to ATC.

PVC NDB/DME Rwy 25

- Starting location, 13 mi. E of race point (RZP) NDB on a heading of 080, at 4,000 feet, wind 360 at 10.
- Set up radios: ADF to RZP 232 and IDENT, NAV1 to I-VQO 111.1 and IDENT, and confirm DME set to NAV1.
- ATC directs turn to 350 and nonprecision descent to 2,300.
- Cleared for the approach and directed by ATC to turn to 300, intercept 256 bearing inbound and maintain 2,300 feet. Remember to reply.
- Follow ATC directions for low approach and change to CTAF on 122.8 and announce intentions.
- After crossing BATIE intersection 7.3 DME, track 256 inbound to SOWND intersection at 1.5 DME and descend to 480 feet.
- Crossing SOWND, make a short descent to 420 (i.e., maintain about 1,700 to 2,000 RPM and 100 to 200 FPM descent rate).
- At .1 DME, the MAP, begin maximum climb, tune Cape approach on 118.2 and report missed approach.

HFD LDA Rwy 2

- Starting location, 5 mi. N of Lomis (HF) LOM, 170 heading at 3,000 feet, wind at 360 at 10.
- ADF should be tuned, press IDENT.
- ATC clears for the approach, respond to ATC, and nonprecision descent to 2,400 feet.
- After leveling off at 2,400, tune NAV1 to I-HFD on 109.7, set OBS1 to 001 and turn marker beacon receiver ON.
- Passing HF, teardrop entry, left turn to 151 degrees, roll wings level and start timer for 1 minute, report HF to ATC.
- After 1 minute, turn right to intercept the localizer, roll wings level if you are within one CDI dot of the localizer, and start a short-descent to 2,200 (1,700–2,000 RPMs and 200–300 FPM rate), then fine tune your on-course heading.

- Passing HF inbound, start timer for 3:56 (3:36 at 90 kts ground speed plus 20 seconds for 10 knots of wind on the nose).
- Non-precision descent to 580 MDA.
- Tune and contact Brainard Tower on 119.6.
- Continue at the MDA to the MAP.
- After 3:56, begin missed approach climb, SR right turn and report missed approach.

FRG LOC-BC Rwy 32

- Starting location, 1.5 mi. S of DPK VOR, tracking DPK R-198 S on NAV2 at 3,000, wind 060 at 10.
- Confirm NAV2 tuned to DPK on 117.7, press IDENT, continue to FISLA intersection.
- Confirm NAV1 tuned to I-FRG on 111.9 and IDENT.
- ATC clears for the approach, respond to ATC, and nonprecision descent to 1,600 feet.
- After crossing FISLA intersection, turn to 144 outbound leg and correct for wind, time 1 minute outbound and report procedure turn outbound.
- ATC directs to contact Republic Tower on 118.8.
- After 1 minute, turn left inbound to about 300 to capture the localizer; remember this is a BC, so reverse sensing will apply.
- Passing FISLA inbound, start timer for 2:40, nonprecision descent to 400 MDA, report FISLA inbound.
- Comply with ATC for missed approach instructions.
- If you break out, continue for low approach to the MAP.
- After the 2:40 has elapsed, begin missed approach climb, when above 540 SR right turn, report missed approach to ATC.

ISP ILS Rwy 6

- Starting location, 3 mi. N of LOKKS (IS) LOM, heading 180 to IS, level at 3,000 feet, wind 360 at 10.
- Set up radios for approach: confirm 366 on ADF and IDENT, tune NAV1 to I-ISP on 108.3 and IDENT, set OBS1 to the outbound course of 238, and turn on MB receiver.
- ATC clears for the approach, respond to ATC.
- After passing IS, turn outbound to 238, level wings and start timer for 2 minutes, nonprecision descent to 1,900 feet and capture outbound course.
- After 2 minutes, turn left to 193, level wings and start timer, set OBS1 to 058, and report procedure turn outbound.
- After 1 minute, right turn to 013 to intercept localizer.

- Capture localizer and maintain 1,900 to intercept GS for precision descent (1,500 RPM, 450–500 FPM).
- ATC directs to Long Island Tower on 119.3 and to report LOKKS inbound.
- Passing LOKKS inbound, start timer for 3:48 in case you lose the GS (to account for headwind, add 20 seconds) and report LOKKS.
- ATC issues low approach/missed approach instructions, reply.
- At DH, initiate missed approach climb and report missed.

MHT ILS Rwy 35

- Starting location, 12 mi. SW of MHT VOR, heading 073 and tracking MHT R-253 inbound on NAV2, 3,000 feet, wind 045 at 10.
- Confirm MHT on NAV2 and IDENT.
- ATC clears for the approach, using the DME arc.
- Nonprecision descent to 2,000 feet, tune NAV1 to I-MHT on 109.1 and IDENT, set OBS1 to 353, tune ADF to Derry (DRY) on 338 and IDENT, confirm DME set to NAV2.
- Intercept the 7 DME arc and start your right turn about a half-mile out to 163 degrees and level the wings.
- Once on the arc, tune OBS2 to R-253 to track the arc. If past the radial (it should be on the left side if you haven't reached it yet), tune to 243 and turn in 10 degrees to maintain a 90-degree arc to the station, after it passes by 2 or 3 dots, tune to 233 and turn another 10 degrees.
- Continue the procedure until you are about 15–20 degrees from the lead radial, then tune the OBS to LR-205 and turn to 115 degrees.
- When the lead radial is captured, turn inbound to 035 to intercept the localizer, level the wings, and turn the MB receiver on.
- You are directed to contact the tower on 121.3.
- After intercepting the localizer, make a short descent (200 to 300 FPM) to 1,800 for GS intercept.
- Capture the GS, pass the OM, start timing and report GRENI.
- At DH 434, begin MA climb to 840 feet, short turn to 340, and report missed approach.

No-Gyro BDR VOR Rwy 6

- Starting location, 15 W of BDR VOR, vector heading of 090 without an AI or HI, calm winds, level at 3,000 feet.
- Set up radios: NAV1 BDR VOR 108.8 and IDENT, OBS1 to 061, NAV2 to CMK VOR on 116.6 and IDENT, OBS2 to 135 degrees to identify STANE intersection.
- ATC vectors to a heading of 150, do a timed SR turn using the panel timer.
- ATC clears you for the approach, reply.

- When established on final approach course, commence nonprecision descent to 1,800.
- ATC hands you off to Bridgeport Tower on 120.9.
- Bridgeport Tower, report STANE intersection.
- Nonprecision descent to 380 feet and report STANE inbound.
- Cleared for low approach, report missed approach.
- After passing BDR VOR on the field, begin missed approach climb, turn to 054, OBS1 to 054 and track, report missed approach.

IPC Flight

- Starting location, over Westchester airport (HPN), at 2,000 feet.
- ATC clears direct to HESTR (HP) for the NDB Rwy 16 approach.
- IDENT HESTR on 281 and proceed direct.
- You will be heading about 355 degrees, which will require a parallel entry for the holding pattern procedure turn.
- You will be prompted to contact Westchester Tower on 119.7.
- After passing HP, turn to 342, level the wings and time for 1 minute outbound.
- Tower will request you report HESTR inbound.
- After 1 minute, left SR turn to 162 inbound heading, level the wings and correlate the position, then turn for a 45 degree intercept to the NDB.
- At 45 degrees, turn to 162 to check on course.
- Passing HP inbound, start the timer, nonprecision descent and report.
- Cleared for the approach with missed approach instructions, note and read back.
- At 3:12 and 1,120, missed approach climb to 3,000, turn left to 090 and declare missed.
- Contact New York approach on 126.4, as directed.
- Approach clears for a block altitude and heading.
- CFII directs climb to 3,000 and maintain 090.
- CFII directs turn to a heading 120 accelerate to cruise level (2,400 RPM and 105 kts), and set up for the BDR VOR Rwy 6 approach (108.8 on VOR1, OBS1 061, 166.6 on VOR2, OBS2 135).
- CFII covers the gyro instruments for partial panel.
- ATC clears for the approach, and when established on the final approach course, nonprecision descent to 1,800 and approach level.
- ATC hands you off to Bridgeport Tower on 120.9.
- Contact Bridgeport Tower.
- At STANE, initiate nonprecision descent to 380 and report STANE.

- Missed approach instructions are turn to 034 and climb to 2,300 feet.
- CFII restores gyros.
- Passing the VOR, missed approach climb to 2,300 and declare missed approach.
- Tower directs you to contact New York approach on 135.1.
- New York approach directs fly a heading of 034 and maintain 2,300 until established on the Oxford localizer (as depicted on the approach plate), and clears for the OXC ILS Rwy 36 approach.
- Tune NAV2 to 108.8 and IDENT, OBS2 to 034, 109.55 on NAV1 and IDENT, OBS1 to 004, ADF to 362 and IDENT.
- Intercept the localizer and maintain 2,300 until reaching the GS intercept at approach level.
- ATC directs to contact Oxford traffic on 122.7 and hands off.
- Announce intentions to Oxford traffic.
- Capture GS and precision descent to 971.
- Passing OM, start the timer.

A final word from Stan the CFI Man:

Congratulations! If you got this far, you should have completed the course and be well on your way to having a great IPC flight with your instructor. Thanks for flying with me. I hope I have improved your instrument flying and provided you with the confidence you need to maintain proficiency in the FAA-mandated instrument currency procedures.

Appendix 2: Terminal Procedures

INOP COMPONENTS

INOPERATIVE COMPONENTS OR VISUAL AIDS TABLE

Landing minimums published on instrument approach procedure charts are based upon full operation of all components and visual aids associated with the particular instrument approach chart being used. Higher minimums are required with inoperative components or visual aids as indicated below. If more than one component is inoperative, each minimum is raised to the highest minimum required by any single component that is inoperative. ILS glide slope inoperative minimums are published on the instrument approach charts as localizer minimums. This table may be amended by notes on the approach chart. Such notes apply only to the particular approach category(ies) as stated. See legend page for description of components indicated below.

(1) ILS, MLS, and PAR

Inoperative Component or Aid	Approach Category	Increase Visibility
ALSF 1 & 2, MALSR, & SSALR	ABCD	1/4 mile

(2) ILS with visibility minimum of 1,800 RVR

ALSF 1 & 2, MALSR, & SSALR	ABCD	To 4000 RVR
TDZL RCLS RVR	ABCD ABCD	To 2400 RVR To 1/2 mile

(3) VOR, VOR/DME, VORTAC, VOR (TAC), VOR/DME (TAC), LOC, LOC/DME, LDA, LDA/DME, SDF, SDF/DME, GPS, RNAV, and ASR

Inoperative Visual Aid	Approach Category	Increase Visibility
ALSF 1 & 2, MALSR, & SSALR	ABCD	1/2 mile
SSALS, MALS, & ODALS	ABC	1/4 mile

(4) NDB

ALSF 1 & 2, MALSR, & SSALR	C	1/2 mile
MALS, SSALS, ODALS	ABD ABC	1/4 mile 1/4 mile

CORRECTIONS, COMMENTS AND/OR PROCUREMENT

FOR CHARTING ERRORS CONTACT:

National Aeronautical Charting Office, FAA
N/AACC1, SSMC-4, Ste. #2335
1305 East-West Highway
Silver Spring, MD 20910-3281
Telephone Toll-Free (800) 626-3677
Internet/E-Mail: Aerochart@NOAA.GOV

FOR CHANGES, ADDITIONS, OR RECOMMENDATIONS ON PROCEDURAL ASPECTS:

Contact Federal Aviation Administration, ATA 110
800 Independence Avenue, SW
Washington, DC 20591
Telephone Toll Free (800) 457-6656

TO PURCHASE CHARTS CONTACT:

National Aeronautical Charting Office
FAA, N/AACC3
Distribution Division
Rivardale, MD 20737
Telephone Toll Free (800) 638-8972

Requests for the creation or revisions to Airport Diagrams should be in accordance with FAA Order 7910.4B.

TERMS/LANDING MINIMA DATA

IFR LANDING MINIMA

The United States Standard for Terminal Instrument Procedures (TERPS) is the approved criteria for formulating instrument approach procedures. Landing minima are established for six aircraft approach categories (ABCDE and COPTER). In the absence of COPTER MINIMA, helicopters may use the CAT A minimums of other procedures. The standard format for RNAV minima and landing minima portrayal follows:

RNAV MINIMA

CATEGORY	A	B	C	D
GLS PA DA	1382/24 200 (200-1/2)			
RNAV/ DA VNAV	1500/24	318 (400-1/2)		1500/40 318 (400-1/2)
RNAV MDA	1700/24 518 (600-1/2)		1700/50 518 (600-1)	1700/60 518 (600-1 1/2)
CIRCLING	1760-1 578 (600-1)		1760-1 1/2 578 (600-1 1/2)	1760-2 578 (600-2)

RNAV minimums are dependent on navigation equipment capability, as stated in the applicable AFM or AFMS and as outlined below.

GLS (Global Navigation System (GNSS) Landing System)

Must have WAAS (Wide Area Augmentation System) equipment approved for precision approach.

Note: "PA" indicates that the runway environment, i.e., runway markings, runway lights, parallel taxiway, etc., meets precision approach requirements. If the GLS minimums line does not contain "PA", then the runway environment does not support precision requirements.

RNAV/VNAV (Lateral Navigation/Vertical Navigation)

Must have WAAS equipment approved for precision approach, or RNP-0.3 system based on GPS or DME/DME, with an IFR approach approved Baro-VNAV system. Other RNAV approach systems require special approval. Use of Baro-VNAV systems is limited by temperature, i.e., "Baro-VNAV NA below -20 C[-4 F]".

(Not applicable if chart is annotated "Baro-VNAV NA".)

NOTE: DME/DME based RNP-0.3 systems may be used only when a chart note indicates DME/DME availability, for example, "DME/DME RNP-0.3 Authorized." Specific DME facilities may be required, for example: "DME/DME RNP-0.3 Authorized. ABC, XYZ required."

RNAV (Lateral Navigation)

Must have IFR approach approved WAAS, GPS, GPS based FMS systems, or RNP-0.3 systems based on GPS or DME/DME. Other RNAV approach systems require special approval.

NOTE: DME/DME based RNP-0.3 systems may be used only when a chart note indicates DME/DME availability, for example, "DME/DME RNP-0.3 Authorized." Specific DME facilities may be required, for example: "DME/DME RNP-0.3 Authorized. ABC, XYZ required."

LANDING MINIMA FORMAT

In this example airport elevation is 1179, and runway touchdown zone elevation is 1152.

	Category	A	B	C	D
S-ILS 27		1352/24		200 (200-1/2)	
S-LOC 27		1440/24	288	(300-1/2)	1440/50 288 (300-1)
CIRCLING		1540-1 361 (400-1)	1640-1 461 (500-1)	1640-1 1/2 461 (500-1 1/2)	1740-2 561 (600-2)

CH: Visibility (RVR 100's of feet)
 HAT: Aircraft Approach Category
 MDA: Minimum Descent Altitude
 HAA: Height Above Airfield
 Visibility in Statute Miles

Straight-in ILS to Runway 27
 Straight-in with Glide Slope Inoperative or not used to Runway 27

All minimums in parentheses not applicable to Civil Pilots. Military Pilots refer to appropriate regulations.

TERMS/LANDING MINIMA DATA

TERMS/LANDING MINIMA DATA

COPTER MINIMA ONLY

CATEGORY	COPTER		
H-176°	680-½	363	(400-½)

Copter Approach Direction

Height of MDA/DH Above Landing Area (HAL)

No circling minima are provided

RADAR MINIMA

								Visibility (RVR 100's of feet)
PAR (c)	10	2.5°/42/1000	ABCDE	195/16	100	(100-¼)		
(d)	28	2.5°/48/1048	ABCDE	187/16	100	(100-¼)		
ASR	10		ABC	560/40	463	(500-¼)	D	560/50 463 (500-1)
			E	580/60	463	(500-1¼)		
	28		AB	600/50	513	(600-1)	C	600/60 513 (600-1¼)
			DE	600-1½	513	(600-1½)		
CR (b)	10		AB	560-1¼	463	(500-1¼)	C	560-1½ 463 (500-1½)
	28		AB	600-1¼	503	(600-1¼)	C	600-1½ 503 (600-1½)
	10, 28		DE	600-2	563	(600-2)		

Visibility in Statute Miles

All minima in parentheses not applicable to Civil Pilots. Military Pilots refer to appropriate regulations.

Radar Minima:

1. Minima shown are the lowest permitted by established criteria. Pilots should consult applicable directives for their category of aircraft.
2. The circling MDA and weather minima to be used are those for the runway to which the final approach is flown - not the landing runway. In the above RADAR MINIMA example, a category C aircraft flying a radar approach to runway 10, circling to land on runway 28, must use an MDA of 560 feet with weather minima of 500-1½.

▲ Alternate Minima not standard. Civil users refer to tabulation, USA/USN/USAF pilots refer to appropriate regulations.

▲ NA Alternate minima are Not Authorized due to unmonitored facility or absence of weather reporting service.

▼ Take-off Minima not standard and/or Departure Procedures are published. Refer to tabulation.

AIRCRAFT APPROACH CATEGORIES

Speeds are based on 1.3 times the stall speed in the landing configuration of maximum gross landing weight. An aircraft shall fit in only one category. If it is necessary to maneuver at speeds in excess of the upper limit of a speed range for a category, the minima for the next higher category should be used. For example, an aircraft which falls in Category A, but is circling to land at a speed in excess of 91 knots, should use the approach Category B minima when circling to land. See following category limits:

MANEUVERING TABLE

Approach Category	A	B	C	D	E
Speed (Knots)	0-90	91-120	121-140	141-165	Abv 165

RVR/ Meteorological Visibility Comparable Values

The following table shall be used for converting RVR to meteorological visibility when RVR is not reported for the runway of intended operation. Adjustments of landing minima may be required - see Inoperative Components Table.

RVR (feet)	Visibility (statute miles)	RVR (feet)	Visibility (statute miles)
1600.....	¾	4000.....	¾
2000.....	¾	4500.....	¾
2400.....	¾	5000.....	1
3200.....	¾	6000.....	1¼

TERMS/LANDING MINIMA DATA

GENERAL INFO

GENERAL INFORMATION

This publication includes Instrument Approach Procedures (IAPs), Departure Procedures (DPs), and Standard Terminal Arrivals (STARs) for use by both civil and military aviation and is issued every 56 days.

STANDARD TERMINAL ARRIVALS AND DEPARTURE PROCEDURES

The use of the associated coded STAR/DP and transition identifiers are requested of users when filing flight plans via teletype and are required for users filing flight plans via computer interface. It must be noted that when filing a STAR/DP with a transition, the first three coded characters of the STAR and the last three coded characters of the DP are replaced by the transition code. Examples: ACTON SIX ARRIVAL, file (AQN.AQN6); ACTON SIX ARRIVAL, EDNAS TRANSITION, file (EDNAS.AQN6). FREEHOLD THREE DEPARTURE, file (FREH3.RBV), FREEHOLD THREE DEPARTURE, ELWOOD CITY TRANSITION, file (FREH3.EWC).

PILOT CONTROLLED AIRPORT LIGHTING SYSTEMS

Available pilot controlled lighting (PCL) systems are indicated as follows:

1. Approach lighting systems that bear a system identification are symbolized using negative symbology, e.g.,
 2. Approach lighting systems that do not bear a system identification are indicated with a negative "0" besides the name. A star (*) indicates non-standard PCL, consult Directory/Supplement, e.g.,
- To activate lights use frequency indicated in the communication section of the chart with a or the appropriate lighting system identification e.g., UNICOM 122.8

<u>KEY MIKE</u>	<u>FUNCTION</u>
7 times within 5 seconds	Highest intensity available
5 times within 5 seconds	Medium or lower intensity (Lower REIL or REIL-off)
3 times within 5 seconds	Lowest intensity available (Lower REIL or REIL-off)

CHART CURRENCY INFORMATION



The Chart Date identifies the Julian date the chart was added to the volume or last revised for any reason. The first two digits indicate the year, the last three digits indicate the day of the year (001 to 365/6) in which the latest addition or change was first published.

The Procedure Amendment Number precedes the Chart Date, and changes any time instrument information (e.g., DH, MDA, approach routing, etc.) changes. Procedure changes also cause the Chart Date to change.

MISCELLANEOUS

- * Indicates a non-continuously operating facility, see A/FD or flight supplement.
 - # Indicates control tower temporarily closed UFN.
- "Radar required" on the chart indicates that radar vectoring is required for the approach.
- Distances in nautical miles (except visibility in statute miles and Runway Visual Range in hundreds of feet). Runway Dimensions in feet. Elevations in feet. Mean Sea Level (MSL). Ceilings in feet above airport elevation. Radials/bearings/headings/courses are magnetic. Horizontal Datum: Unless otherwise noted on the chart, all coordinates are referenced to North American Datum 1983 (NAD 83), which for charting purposes is considered equivalent to World Geodetic System 1984 (WGS 84).

GENERAL INFO

GENERAL INFO

ABBREVIATIONS

ADF.....	Automatic Direction Finder	MALS.....	Medium Intensity Approach Light System with RAIL
ALS.....	Approach Light System	MAP.....	Missed Approach Point
ALSF.....	Approach Light System with Sequenced Flashing Lights	MDA.....	Minimum Descent Altitude
APP CON.....	Approach Control	MRL.....	Medium Intensity Runway Lights
ARR.....	Arrival	MLS.....	Microwave Landing System
ASOS.....	Automated Surface Observing System	MM.....	Middle Marker
ASR/PAR.....	Published Radar Minimums at this Airport	N/A.....	Not Applicable
ATIS.....	Automatic Terminal Information Service	NA.....	Not Authorized
AWOS.....	Automated Weather Observing System	NDB.....	Non-directional Radio Beacon
AZ.....	Azimuth	NM.....	Nautical Mile
BC.....	Back Course	NoPT.....	No Procedure Turn Required (Procedure Turn shall not be executed without ATC clearance)
C.....	Clrding	ODALS.....	Omnidirectional Approach Light System
CAT.....	Category	OM.....	Outer Marker
CCW.....	Counter Clockwise	R.....	Radial
Chan.....	Channel	RA.....	Radio Altimeter setting height
CLNC DEL.....	Clearance Delivery	RAIL.....	Runway Alignment Indicator Lights
CNF.....	Computer Navigation Fix	RBn.....	Radio Beacon
CTAF.....	Common Traffic Advisory Frequency	RCLS.....	Runway Centerline Light System
CW.....	Clockwise	REIL.....	Runway End Identifier Lights
DH.....	Decision Height	RNAV.....	Area Navigation
DME.....	Distance Measuring Equipment	RNP.....	Required Navigation Performance
DR.....	Dead Reckoning	RPI.....	Runway Point of Intercept(ion)
ELEV.....	Elevation	RRL.....	Runway Remaining Lights
FAF.....	Final Approach Fix	Rwy.....	Runway
FM.....	Fan Marker	RVR.....	Runway Visual Range
FMS.....	Flight Management System	S.....	Straight-in
GCO.....	Ground Communications Outlet	SALS.....	Short Approach Light System
GPI.....	Ground Point of Interception	SSALR.....	Simplified Short Approach Light System with RAIL
GPS.....	Global Positioning System	SDF.....	Simplified Directional Facility
GS.....	Glide Slope	TA.....	Transition Altitude
HAA.....	Height above Airport	TAA.....	Terminal Arrival Area
HAL.....	Height above Landing	TAC.....	TACAN
HAT.....	Height above Touchdown	TOH.....	Threshold Crossing Height (height in feet Above Ground level)
HRL.....	High Intensity Runway Lights	TDZ.....	Touchdown Zone
IAF.....	Initial Approach Fix	TDZE.....	Touchdown Zone Elevation
ICAO.....	International Civil Aviation Organization	TDZ/CL.....	Touchdown Zone and Runway Centerline Lighting
IM.....	Inner Marker	TDZL.....	Touchdown Zone Lights
Intcp.....	Intercept	TLv.....	Transition Level
INT.....	Intersection	VASI.....	Visual Approach Slope Indicator
LDA.....	Localizer Type Directional Aid	VDP.....	Visual Descent Point
Ldg.....	Landing	VGSI.....	Visual Glide Slope Indicator
LDIN.....	Lead in Light System	WP/WPT.....	Waypoint (RNAV)
LRL.....	Low Intensity Runway Lights	X.....	Radar Only Frequency
LOC.....	Localizer		
LR.....	Lead Radial. Provides at least 2 NM (Copter 1 NM) of lead to assist in turning onto the intermediate/final course.		
MALS.....	Medium Intensity Approach Light System		

GENERAL INFO

LEGEND

INSTRUMENT APPROACH PROCEDURES (CHARTS)

PLANVIEW SYMBOLS

TERMINAL ROUTES

3100 NoPT 5.6 NM to GS Intcpt
045°
(1.4.2 to LOM)
Minimum Altitude 2000
Feeder Route Mileage (115.1)
Penetrates Special Use Airspace

HOLDING PATTERNS

In lieu of Procedure Turn 270° 090°
Missed Approach 360° 180°
Arrival 360° 180°

Holding pattern with max. restricted airspace:
175K applies to all altitudes.
210K applies to altitudes above 6000' to and including 14000'.
Limits will only be specified when they deviate from the standard. DME fixes may be shown.

REPORTING POINT/FIXES

Reporting Point
▲ Name (Compulsory) X Fix or intersection
△ Name (Non-Compulsory)

COMPUTER NAVIGATION FIX (CNF)

15 (NAME) (*" omitted when it conflicts with runway pattern)

DME Distance	ARC/DME/RNAV Fix
8-198	Radial line and value
18-198	Lead Radial
18-198	Lead Bearing

MINIMUM SAFE ALTITUDE (MSA)

Facility Identifier
MSA CRW 2.5 NM
13000 22000
23000 23000
(arrows on distance circle identify sectors)

OBSTACLES

• Spot Elevation	● Highest Spot Elevation
▲ Obstacle	▲ Group of Obstacles
△ Highest Obstacle	± Doubtful accuracy

SPECIAL USE AIRSPACE

R-Restricted	W-Warning
P-Prohibited	A-Alert

RADIO AIDS TO NAVIGATION

110.1 Underline indicates No Voice transmitted on this frequency

VOR	VOR/DME	TACAN	VORTAC
NDB	NDB/DME	WAYPOINT	WAYPOINT COLLOCATED WITH NAVAID
MAP WP	FLYOVER WAYPOINT		

LOM/LMM (Compass locator or Outer Marker/Middle Marker)
 Marker Beacon

Localizer (LOC/LDA) Course
Right side shading: Front course; Left side shading: Back Course
 SDF Course

180° MLS Approach Azimuth

MLS Identifier

MICROWAVE Chan 514
M-YDZ
Glidepath 6.20°
DME 111.5 Chan 4B(Y)

(Y) TACAN must be in "Y" mode to receive distance information.

LOC/DME
 LOC/LDA/SDF/MLS Transmitter (shown when installation is offset from its normal position off the end of the runway.)

Waypoint Data

Coordinates	PRAYS	Waypoint Name
Frequency	NDB° 58.30' WB9° 51.50'	
Identifier	112.7 CAP 187.1° 56.2	Radial-Distance (Facility to Waypoint)
	590	Reference Facility Elevation

Primary Navaid with Coordinate Values	Secondary Navaid
LIMA 114.5 LM Chan 92 512° 00.80' W77° 07.00'	LMM LIMA 248 NT

MISCELLANEOUS

VOR Changeover Point

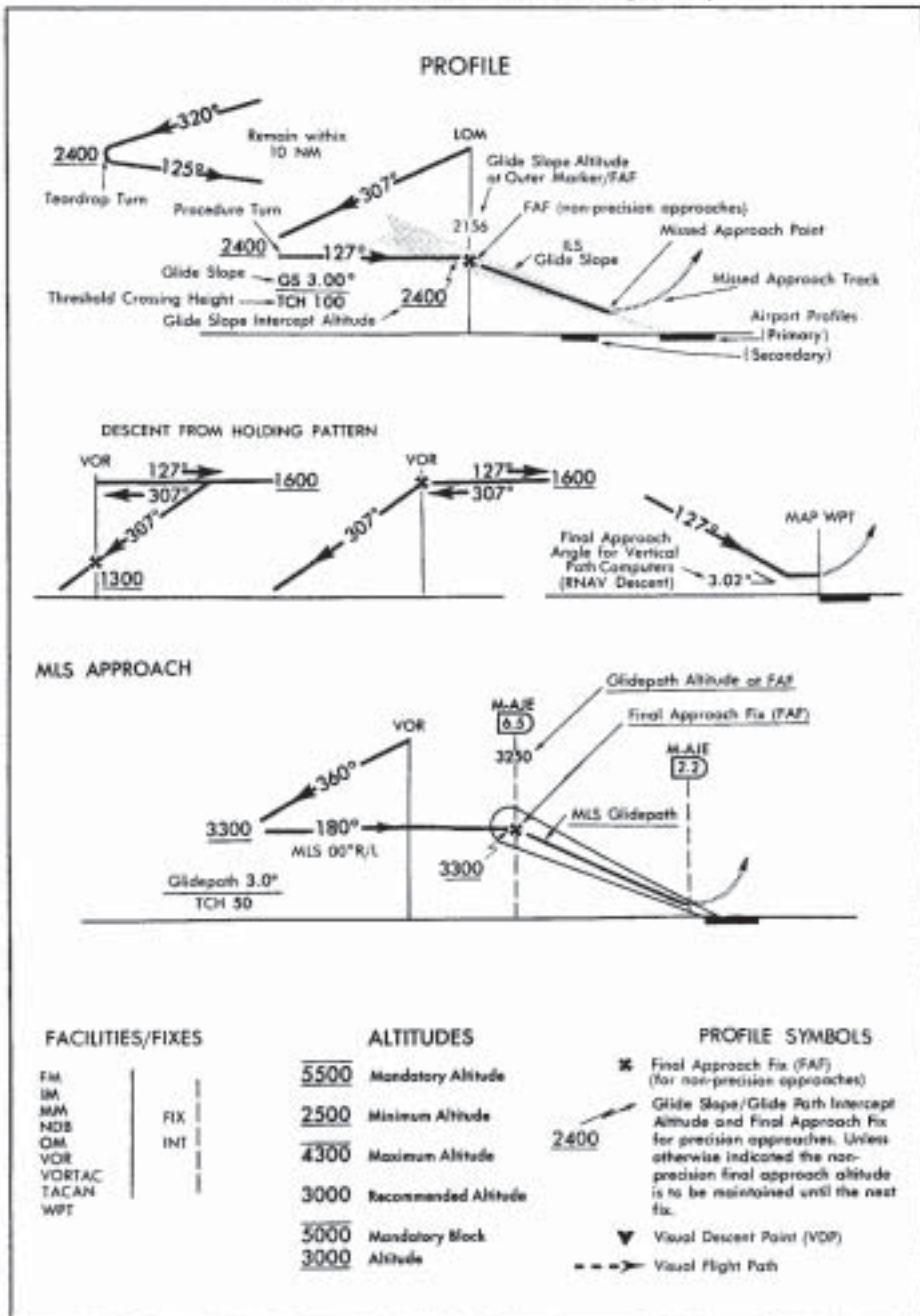
RWY 15 512° 00.52' End of Rwy Coordinates (OOD only)
W77° 06.91'

Distance not to scale
 International Boundary

LEGEND

LEGEND

INSTRUMENT APPROACH PROCEDURES (CHARTS)



LEGEND

LEGEND

LEGEND

STANDARD TERMINAL ARRIVAL (STAR) CHARTS DEPARTURE PROCEDURE (DP) CHARTS

RADIO AIDS TO NAVIGATION

	VOR		TACAN
	VOR/DME		NDB/DME
	VORTAC		LOC/DME
	WAYPOINT		LOC
	FLYOVER WAYPOINT		
	NDB (Non-directional Radio Beacon)		
	LMM, LOM (Compass locator)		
	Marker Beacon		
	Localizer Course		
	SDF Course		

(I) indicates frequency protection range
 (Y) TACAN must be placed in "Y" mode to receive distance information

Frequency: 112.25 (I) ORL Chan 59 (Y) N28°32.56' W81°20.10'

Underline indicates no voice transmitted on this frequency

Geographic Position: L-19, H-5 DME or TACAN Channel Reference

Coordinates: N38°58.30' W89°51.50' Waypoint None

Frequency: 112.7 CAF 590 187.1°-56.2'

Identifier: Reference Facility Elevation Radial-Distance (Facility to Waypoint)

Reporting Points: N00° 00.00' W00° 00.00'

▲ Name (Compulsory)
 △ Name (Non-Compulsory)

→ DME fix

X Mileage Breakdown/
 Computer Navigation Fix (CNF)
 N00° 00.00'
 W00° 00.00'

ROUTES

4500 MEA-Minimum Enroute Altitude
 *3500 MOCA-Minimum Obstruction Clearance Altitude
 ← 270° → Departure Route - Arrival Route
 (65) Mileage between Radio Aids, Reporting Points, and Route Breaks

→ Transition Route
 — R-275 — Radial line and value
 - - - - - Last Communications Track

[V12] [J80] Airway/Jet Route Identification

Holding Pattern Changeover Point

Holding pattern with max. restricted airspeed 175K applies to all altitudes
 210K applies to altitudes above 6000' to and including 14000'

SPECIAL USE AIRSPACE

R-Restricted W-Warning
 P-Prohibited A-Alert

ALTITUDES

<u>5500</u>	<u>2300</u>	<u>4800</u>	2200
Mandatory Altitude	Minimum Altitude	Maximum Altitude	Recommended Altitude

MCA (Minimum Crossing Altitude)
 → Altitude change at other than Radio Aids

AIRPORTS

Civil Military Joint Civil-Military

NOTES

All mileages are nautical.
 * Indicates control tower temporarily closed LHM
 # Indicates a non-continuously operating facility, see A/FD or flight supplement.
 All radials, bearings are magnetic.
 All altitudes/elevations are in feet-MSL.
 MRA - Minimum Reception Altitude.
 MAA - Maximum Authorized Altitude.
 (NAME1? NAME2) - Example of DP flight plan Computer Code.
 (NAME NAME2) - Example of STAR flight plan Computer Code.
 SL-0000 (FAA) - Example of a chart reference number
 ▼ Take-Off Minimums not standard and/or Departure Procedures are published.

LEGEND

LEGEND

INSTRUMENT APPROACH PROCEDURES (CHARTS)

AIRPORT DIAGRAM/AIRPORT SKETCH

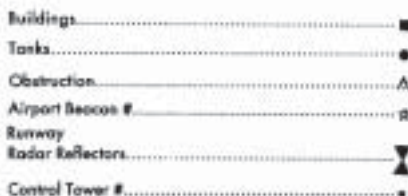
Runways



ARRESTING GEAR: Specific arresting gear systems; e.g., BAK-12, MA-1A etc., shown on airport diagrams, not applicable to Civil Pilots. Military Pilots Refer to Appropriate DOD Publications.



REFERENCE FEATURES



• When Control Tower and Rotating Beacon are co-located, Beacon symbol will be used and further identified as TWR.

Runway length depicted is the physical length of the runway (end-to-end, including displaced thresholds if any) but excluding areas designated as stopways. Where a displaced threshold is shown and/or part of the runway is otherwise not available for landing, an annotation is added to indicate the landing length of the runway; e.g., RWY 13 ldg 5000'.

Runway Weight Bearing Capacity/FCN Pavement Classification Number is shown as a coded expression. Refer to the appropriate Supplement/Directory for applicable codes, e.g., RWY 14-32 5/5, T185, ST175, TT325 FCN 80 F/D/X/U



Runway TDZ elevation.....TDZE 123
 — 0.3% DOWN
 Runway Slope.....0.8% UP—
 (shown when runway slope exceeds 0.3%)

NOTE:
 Runway Slope measured to midpoint on runways 8000 feet or longer.

• U.S. Navy Optical Landing System (OLS) *OLS* location is shown because of its height of approximately 7 feet and proximity to edge of runway may create an obstruction for some types of aircraft.

Approach light symbols are shown in the Flight Information Handbook.

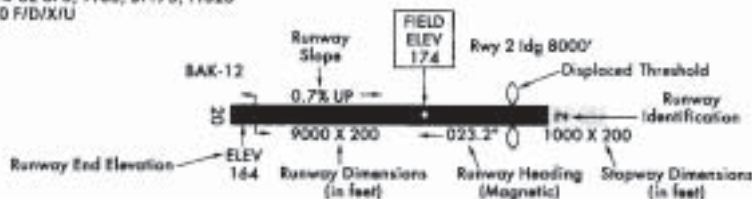
Airport diagram scales are variable.

True/magnetic North orientation may vary from diagram to diagram.

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.

Positional accuracy within ±600 feet unless otherwise noted on the chart.

NOTE:
 All new and revised airport diagrams are shown referenced to the World Geodetic System (WGS) (noted on appropriate diagram), and may not be compatible with local coordinates published in FUP. (Foreign Only)



SCOPE

Airport diagrams are specifically designed to assist in the movement of ground traffic at locations with complex runway/taxiway configurations and 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. For revisions to Airport Diagrams: Consult FAA Order 7910.4B.

LEGEND

LEGEND

INSTRUMENT APPROACH PROCEDURES (CHARTS) APPROACH LIGHTING SYSTEM — UNITED STATES

Each approach lighting system indicated on Airport Diagrams will bear a system identification indicated in legend.

A dot "•" portrayed with approach lighting letter identifier indicates sequenced flashing lights (F) installed with the approach lighting system e.g., (A) •. Negative symbology, e.g., (B) • indicates Pilot Controlled Lighting (PCL).

<p>RUNWAY TOUCHDOWN ZONE AND CENTERLINE LIGHTING SYSTEMS</p> <p>TDZL CL TDZL RUNWAY CENTERLINE LIGHTING</p> <p>AVAILABILITY of TDZ/CL will be shown by NOTE in SKETCH e.g. "TDZ/CL Ray 15"</p>	<p>SHORT APPROACH LIGHTING SYSTEM</p> <p>(A) •</p> <p>SALS/SALSF (High Intensity)</p> <p>SAME AS INNER 1500' OF ALSF-1</p>	<p>OMNIDIRECTIONAL APPROACH LIGHTING SYSTEM</p> <p>(A) •</p> <p>OMALS</p> <p>THRESHOLD SEQUENCED FLASHING LIGHTS LENGTH 1500 FEET</p>
<p>APPROACH LIGHTING SYSTEM</p> <p>(A) •</p> <p>ALSF-2</p> <p>GREEN WHITE RED WHITE SEQUENCED FLASHING LIGHTS</p> <p>NOTE: CIVIL ALSF-2 MAY BE OPERATED AS SSALR DURING FAVORABLE WEATHER CONDITIONS</p> <p>(High Intensity) LENGTH 2400/3000 FEET</p>	<p>SIMPLIFIED SHORT APPROACH LIGHTING SYSTEM with Runway Alignment Indicator Lights</p> <p>(A) •</p> <p>SSALR</p> <p>GREEN WHITE SEQUENCED FLASHING LIGHTS</p> <p>(High Intensity) LENGTH 2400/3000 FEET</p>	<p>(1) VISUAL APPROACH SLOPE INDICATOR VASI</p> <p>VISUAL APPROACH SLOPE INDICATOR WITH STANDARD THRESHOLD CLEARANCE PROVIDED.</p> <p>ALL LIGHTS WHITE — TOO HIGH FAR LIGHTS RED — ON GLEDE SLOPE NEAR LIGHTS WHITE ALL LIGHTS RED — TOO LOW</p> <p>VASI 2 VASI 4 VASI 12</p> <p>THRESHOLD</p>
<p>APPROACH LIGHTING SYSTEM</p> <p>(A) •</p> <p>ALSF-1</p> <p>GREEN RED WHITE SEQUENCED FLASHING LIGHTS</p> <p>(High Intensity) LENGTH 2400/3000 FEET</p>	<p>MEDIUM INTENSITY (MALS and MALSF) OR SIMPLIFIED SHORT (SSALS and SSALF) APPROACH LIGHTING SYSTEMS</p> <p>(A) •</p> <p>GREEN WHITE SEQUENCED FLASHING LIGHTS FOR MALS/SSALF ONLY</p> <p>LENGTH 1400 FEET</p>	<p>(3) VISUAL APPROACH SLOPE INDICATOR VASI</p> <p>VISUAL APPROACH SLOPE INDICATOR WITH A THRESHOLD CROSSING HEIGHT TO ACCOMMODATE LONG BODIED OR JUMBO AIRCRAFT.</p> <p>VASI 6 VASI 16</p> <p>THRESHOLD</p>
<p>MEDIUM INTENSITY APPROACH LIGHTING SYSTEM with Runway Alignment Indicator Lights</p> <p>(A) •</p> <p>MALS</p> <p>SAME LIGHT CONFIGURATION AS SSALR.</p>		

LEGEND

LEGEND

INSTRUMENT APPROACH PROCEDURES (CHARTS) APPROACH LIGHTING SYSTEM — UNITED STATES

Each approach lighting system indicated on Airport Diagrams will bear a system identification indicated in legend.

A dot "•" portrayed with approach lighting letter identifier indicates sequenced flashing lights (F) installed with the approach lighting system e.g., (A) Negative symbology, e.g., (B) indicates Pilot Controlled Lighting (PCL).

(P) **PRECISION APPROACH PATH INDICATOR**
PAPI

Too low Slightly low

On correct approach path

Slightly high Too high

Legend: □ White ■ Red

(V) **PULSATING VISUAL APPROACH SLOPE INDICATOR**
PVASI

Above Glide Path Pulsating White
On Glide Path Slowly White or Alternating Red/White
Below Glide Path Pulsating Red

Threshold

CAUTION: When viewing the pulsating visual approach slope indicators in the pulsating white or pulsating red section, it is possible to mistake this lighting aid for another aircraft or a ground vehicle. Pilots should exercise caution when using this type of system.

(V) **"T"-VISUAL APPROACH SLOPE INDICATOR**
"T"-VASI

"T" ON BOTH SIDES OF RWY
ALL LIGHTS VARIABLE WHITE
CORRECT APPROACH SLOPE:
ONLY CROSS BAR VISIBLE
UPRIGHT "T" - FLY UP
INVERTED "T" - FLY DOWN
RED "T" - CROSS
UNDERSHOOT.

(V) **TRI-COLOR VISUAL APPROACH SLOPE INDICATOR**
TRCV

Above Glide Path Amber
On Glide Path Green
Below Glide Path Amber Red

CAUTION: When the aircraft descends from green to red, the pilot may see a dark amber color during the transition from green to red.

(V) **ALIGNMENT OF ELEMENTS SYSTEMS**
APAP

Above Glide Path On Glide Path Below Glide Path

Painted panels which may be lighted at night.
To use the system the pilot positions the aircraft
so the elements are in alignment.

LEGEND

TAKE-OFF MINS**INSTRUMENT APPROACH PROCEDURE CHARTS**
IFR TAKE-OFF MINIMUMS AND DEPARTURE PROCEDURES**BRIDGEPORT, CT**

IGOR SIKORSKY MEMORIAL

TAKE-OFF MINIMUMS: **Rwy 11**, 300-1. **Rwy 28**, 500-1**BOSTON, MA**

GENERAL EDWARD LAWRENCE LOGAN INTL.

TAKE-OFF MINIMUMS: **Rwy 4L**, 300-1 or std. with min. climb of 340' per NM to 300'. **Rwy 4R**, 300-1 or std. with min. climb of 320' per NM to 300'. **Rwy 9**, 300-1 or std. with min. climb of 290' per NM to 500'. **Rwy 22L**, 300-1 or std. when tower reports no tall vessels in departure area. **Rwy 22R**, 300-1 or std. with min. climb of 220' per NM to 300'. **Rwy 27**, 500-1. **Rwy 38L**, 500-1 or std. with min. climb of 250' per NM to 500'.**DANBURY, CT**

DANBURY MUNI

TAKE-OFF MINIMUMS: **All Rws**, 700-11/2**FARMINGDALE, NY**

REPUBLIC

TAKE-OFF MINIMUMS: **Rwy 1**, 300-1DEPARTURE PROCEDURE: **Rwy 1**, climb runway heading to 600 before proceeding on course.**Rwy 32**, climb runway heading to 600 before proceeding on course.**GLENS FALLS, NY**

WARREN COUNTY

TAKE-OFF MINIMUMS: **Rws 1, 12, 18, 36**, 300-1. DEPARTURE PROCEDURE: **Rws 1, 12, 36**, right turn. **Rwy 18**, left turn and climb to 1300 in GFL VOR holding pattern, 027 inbound prior to departing north or west bound.**GREAT BARRINGTON, MA**

GREAT BARRINGTON

TAKE-OFF MINIMUMS: **Rwy 11**, 1100-2. **Rwy 28**, 800-2 or std. with a min. climb of 280' per NM to 1900'.**GROTON (NEW LONDON), CT**

GROTON-NEW LONDON

TAKE-OFF MINIMUMS: **Rwy 15**, 300-1. **Rwy 5**, 300-2 or std. with min. climb of 240' per NM to 400'. **Rwy 28**, 1500-3 or std. with min. climb of 260' per NM to 1900'.**HARTFORD, CT**

HARTFORD-BRAINARD

TAKE-OFF MINIMUMS: **Rws 2, 11, 20**, 300-1. DEPARTURE PROCEDURE: **Rwy 2**, climb to 600 via runway heading before turning westbound. **Rwy 20**, climb to 1500 via runway heading before turning westbound. **Rwy 11**, climb to 600 via runway heading before proceeding westbound. **Rwy 29**, climbing left turn to 2100 direct HFD VORTAC before proceeding west or northwest bound.**HYANNIS, MA**BARNSTABLE MUNI-BOARDMAN/
POLANDO FIELDTAKE-OFF MINIMUMS: **Rwy 33**, 300-1 or std. with min. climb of 240' per NM to 300'.**KEENE, NH**

DILLANT-HOPKINS

TAKE-OFF MINIMUMS: **Rwy 2**, 700-2 or std. with min. climb of 500' per NM to 1300'. **Rwy 32**, 700-3 or std. with min. climb of 380' per NM to 1300'. **Rwy 14**, 800-3 or std. with min. climb of 640' per NM to 1400'. **Rwy 20**, 300-1 or std. with min. climb of 300' per NM to 800'.DEPARTURE PROCEDURE: **Rws 2, 32**, climb on heading 350 to 2100. **Rws 14, 20**, climb to 2000 direct EEN VOR before proceeding on course.**ISLIP, NY**

LONG ISLAND MACARTHUR

TAKE-OFF MINIMUMS: **Rwy 30R**, 300-1DEPARTURE PROCEDURE: **Rwy 33L**, climb runway heading to 500 feet before turning.**LAWRENCE, MA**

LAWRENCE MUNI

TAKE-OFF MINIMUMS: **Rwy 14**, 300-1. **Rwy 5**, 900-1 or std. with min. climb of 260' per NM to 600'. DEPARTURE PROCEDURE: **Rwy 5**, climb runway heading to 900 before turning left.**MANCHESTER, NH**

MANCHESTER

TAKE-OFF MINIMUMS: **Rwy 6**, 300-1. **Rwy 17**, 300-1 or std. with a min. climb of 255' per NM to 500'. **Rwy 24**, 400-1 or std. with a min. climb of 300' per NM to 600'. **Rwy 35**, 300-1 or std. with min. climb of 225' per NM to 600'.DEPARTURE PROCEDURE: **Rwy 35**, climb to 1000 on runway heading before turning westbound.**MARSHFIELD, MA**

MARSHFIELD

TAKE-OFF MINIMUMS: **Rws 6, 24**, 500-1 or std. with min. climb of 300' per NM to 500'.**NEW BEDFORD, MA**

NEW BEDFORD MUNI

DEPARTURE PROCEDURE: **Rwy 14**, climb runway heading to 600 before turning southbound.**NEW YORK, NY**

JOHN F. KENNEDY INTL.

TAKE-OFF MINIMUMS: **Rwy 13R**, 300-1 or std. with min. climb of 230' per NM to 300'.



TAKE-OFF MINS



NORWOOD, MA

NORWOOD MEMORIAL

TAKE-OFF MINIMUMS: **Rwy 17**, 900-1 or std. with min. climb of 350' per NM to 900. **Rwy 10**, 900-1. **Rwy 28**, 900-1. **Rwy 26**, 1400-1 or std. with min. climb of 270' per NM to 1400.

OXFORD, CT

WATERBURY-OXFORD

TAKE-OFF MINIMUMS: **Rwy 18**, 900-1. **Rwy 26**, 900-1 or std. with min. climb of 300' per NM to 1000. DEPARTURE PROCEDURE: **Rwy 18**, climb runway heading to 1400 before turning eastbound.

PAWTUCKET, RI

NORTH CENTRAL STATE

TAKE-OFF MINIMUMS: **Rwys 15, 28**, 900-1.

PITTSFIELD, MA

PITTSFIELD MUNI

TAKE-OFF MINIMUMS: **Rwys 8, 14, 26, 32**, 700-1. DEPARTURE PROCEDURE: Climb visually over airport to 1500 then direct OXT NDB to cross at 3000 or above before proceeding on course. CAUTION: 2204 terrain 1.5 NM SSW of airport.

PLYMOUTH, MA

PLYMOUTH MUNI

DEPARTURE PROCEDURE: **Rwy 6**, climb runway heading to 800 before turning northbound.

POUGHKEEPSIE, NY

DUTCHESS COUNTY

TAKE-OFF MINIMUMS: **Rwy 6**, 500-1. **Rwys 15, 23**, 400-1. DEPARTURE PROCEDURE: **Rwy 6**, climb direct IGN VORTAC, then via IGN R-570 to 2000 before proceeding on course. **Rwy 15**, climb to 600 then climbing left turn to 1000 direct IGN VORTAC before proceeding on course. **Rwy 26**, climb to 2000 via IGN R-250 before proceeding on course. **Rwy 32**, climb to 600 then climbing right turn to 1000 direct IGN VORTAC before proceeding on course.

PROVIDENCE, RI

THEODORE FRANCIS GREEN STATE

TAKE-OFF MINIMUMS: **Rwys 5L, 34**, 900-1 or std. with min. climb of 400' per NM to 900.

SCHENECTADY, NY

SCHENECTADY COUNTY

TAKE-OFF MINIMUMS: **Rwy 4**, 900-1 or std. with min. climb of 250' per NM to 900. **Rwy 28**, 1200-2 or std. with min. climb of 250' per NM to 1500.

SPRINGFIELD, VT

HARTNESS STATE (SPRINGFIELD)

TAKE-OFF MINIMUMS: **Rwys 5, 11, 29**, Categories A, B aircraft 800-1, Categories C, D aircraft 1000-2. **Rwy 23**, Categories A, B aircraft, 800-1, Categories C, D 1000-2 or all Categories std. with 325' per NM climb to 1500. DEPARTURE PROCEDURE: **Rwys 5, 11, 23, 29**, climb visually over airport to 1300, then climb direct to SXD NDB, crossing the NDB at 2200 or above, continue climb in holding pattern to MEA. **Rwy 23 only**: With min. climb of 325' per NM to 1500 climb direct to SXD NDB, cross the NDB at 2200 or above and climb in holding pattern to MEA.

TETERBORO, NJ

TETERBORO

TAKE-OFF MINIMUMS: **Rwy 6**, 900-1 or std. with min. climb of 200' per NM to 1300. **Rwy 24**, 900-1. **Rwy 1**, 700-1. **Rwy 19**, 500-1. DEPARTURE PROCEDURE: **Rwy 1**, turn right. **Rwy 6**, turn left. Climb on 040 heading to 1500 then climbing left turn heading 300 before proceeding as directed. **Rwy 19**, climb runway heading to 300 then climbing right turn heading 300 before proceeding as directed. **Rwy 24**, climb runway heading to 1300 before proceeding on course.

WHITE PLAINS, NY

WESTCHESTER COUNTY

TAKE-OFF MINIMUMS: **Rwys 11, 29**, 900-1. **Rwy 16**, 900-1 or std. with min. climb of 270' per NM to 900.

WILLIMANTIC, CT

WINDHAM

TAKE-OFF MINIMUMS: **Rwys 18, 27, 35**, 900-1. **Rwy 9**, 700-1. DEPARTURE PROCEDURE: **Rwy 18**, climb runway heading to 1000 before turning westbound. **Rwy 27**, climb runway heading to 1000 before turning southbound.

WINDSOR LOCKS, CT

BRADLEY INTL

TAKE-OFF MINIMUMS: **Rwy 15**, 900-1 or std. with a min. climb of 350' per NM to 900. **Rwy 33**, 700-1 or std. with a min. climb of 300' per NM to 1000. DEPARTURE PROCEDURE: **Rwy 1**, climb to 1000 via runway heading before turning westbound.

WORCESTER, MA

WORCESTER MUNI

TAKE-OFF MINIMUMS: **Rwy 29**, 900-1 or std. with min. climb of 240' per NM to 1400. **Rwy 33**, 700-1. DEPARTURE PROCEDURE: **Rwy 29**, climb runway heading to 1400 before turning.



TAKE-OFF MINS



CLIMB TABLE

RATE OF CLIMB TABLE

A rate of climb table is provided for use in planning and executing takeoff procedures under known or approximate ground speed conditions.

(ft. per min.)

REQUIRED CLIMB RATE (ft. per NM)	GROUND SPEED (KNOTS)						
	30	60	80	90	100	120	140
200	100	200	267	300	333	400	467
250	125	250	333	375	417	500	583
300	150	300	400	450	500	600	700
350	175	350	467	525	583	700	816
400	200	400	533	600	667	800	933
450	225	450	600	675	750	900	1050
500	250	500	667	750	833	1000	1167
550	275	550	733	825	917	1100	1283
600	300	600	800	900	1000	1200	1400
650	325	650	867	975	1083	1300	1516
700	350	700	933	1050	1167	1400	1633

REQUIRED CLIMB RATE (ft. per NM)	GROUND SPEED (KNOTS)					
	150	180	210	240	270	300
200	500	600	700	800	900	1000
250	625	750	875	1000	1125	1250
300	750	900	1050	1200	1350	1500
350	875	1050	1225	1400	1575	1750
400	1000	1200	1400	1600	1700	2000
450	1125	1350	1575	1800	2025	2250
500	1250	1500	1750	2000	2250	2500
550	1375	1650	1925	2200	2475	2750
600	1500	1800	2100	2400	2700	3000
650	1625	1950	2275	2600	2925	3250
700	1750	2100	2450	2800	3150	3500

CLIMB TABLE

DESCENT TABLE

RATE OF DESCENT TABLE

A rate of descent table is provided for use in planning and executing precision descents under known or approximate ground speed conditions. It will be especially useful for approaches when the localizer only is used for course guidance. A best speed, power, altitude combination can be programmed which will result in a stable glide rate and altitude favorable for executing a landing if minimums exist upon breakout. Care should always be exercised so that the minimum descent altitude and missed approach point are not exceeded.

(ft. per min.)

ANGLE OF DESCENT (degrees and tenths)	GROUND SPEED (knots)										
	30	45	60	75	90	105	120	135	150	165	180
2.0	105	160	210	265	320	370	425	475	530	585	635
2.5	130	200	265	330	395	465	530	595	665	730	795
3.0	160	240	320	395	480	555	635	715	795	875	955
3.5	185	280	370	465	555	650	740	835	925	1020	1110
4.0	210	315	425	530	635	740	845	955	1060	1165	1270
4.5	240	355	475	595	715	835	955	1075	1190	1310	1430
5.0	265	395	530	660	795	925	1060	1190	1325	1455	1590
5.5	290	435	580	730	875	1020	1165	1310	1455	1600	1745
6.0	315	475	635	795	955	1110	1270	1430	1590	1745	1950
6.5	345	515	690	860	1030	1205	1375	1550	1720	1890	2065
7.0	370	555	740	925	1110	1295	1480	1665	1850	2035	2220
7.5	395	595	795	990	1190	1390	1585	1785	1985	2180	2380
8.0	425	635	845	1055	1270	1480	1690	1905	2115	2325	2540
8.5	450	675	900	1120	1345	1570	1795	2020	2245	2470	2695
9.0	475	715	950	1190	1425	1665	1900	2140	2375	2615	2855
9.5	500	750	1005	1255	1505	1755	2005	2255	2510	2760	3010
10.0	530	790	1055	1320	1585	1845	2110	2375	2640	2900	3165
10.5	555	830	1105	1385	1660	1940	2215	2490	2770	3045	3320
11.0	580	870	1160	1450	1740	2030	2320	2610	2900	3190	3480
11.5	605	910	1210	1515	1820	2120	2425	2725	3030	3335	3635
12.0	630	945	1260	1575	1890	2205	2520	2835	3150	3465	3780

DESCENT TABLE

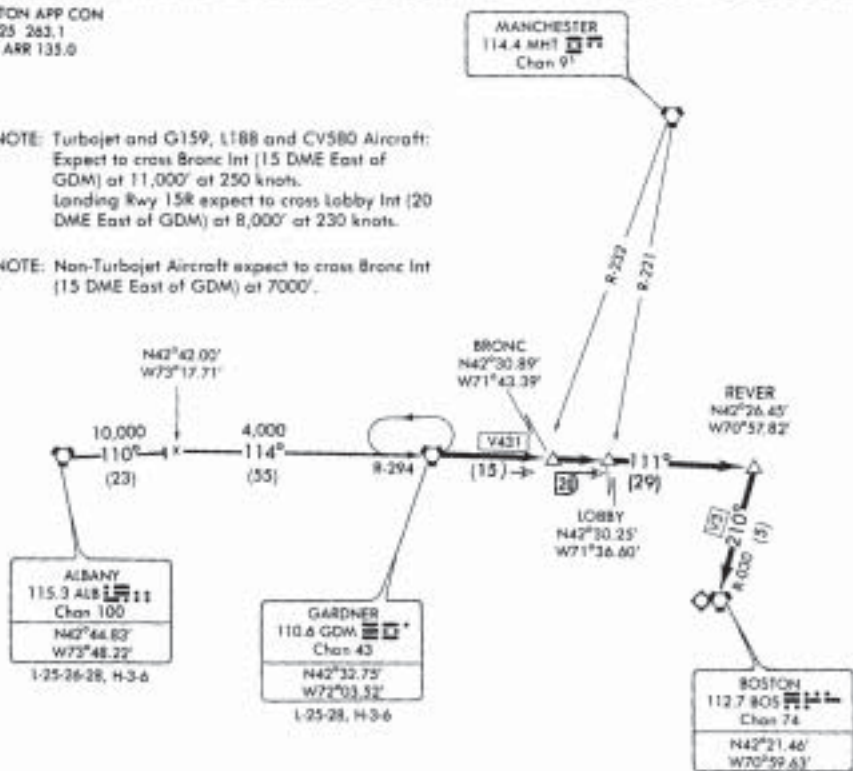
GARDNER TWO ARRIVAL (GDM.GDM2)

GENERAL EDWARD LAWRENCE LOGAN INTL
BOSTON, MASSACHUSETTS

BOSTON APP CON
118.25 283.1
ATIS ARR 133.0

NOTE: Turbojet and G159, L188 and CV580 Aircraft:
Expect to cross Bronc Int (15 DME East of
GDM) at 11,000' at 250 knots.
Landing Rwy 15R expect to cross Lobby Int (20
DME East of GDM) at 8,000' at 230 knots.

NOTE: Non-Turbojet Aircraft expect to cross Bronc Int
(15 DME East of GDM) at 7000'.



NOTE: Chart not to scale.

ALBANY TRANSITION (ALB.GDM2): From over ALB VORTAC via ALB R-110 and
GDM R-294 to GDM VORTAC. Thence
. . . . From over GDM VORTAC via GDM R-111 (V431) to BOS R-030 (V3) to BOS
VORTAC. Expect vectors to the final approach course.

NOT FOR USE IN NAVIGATION

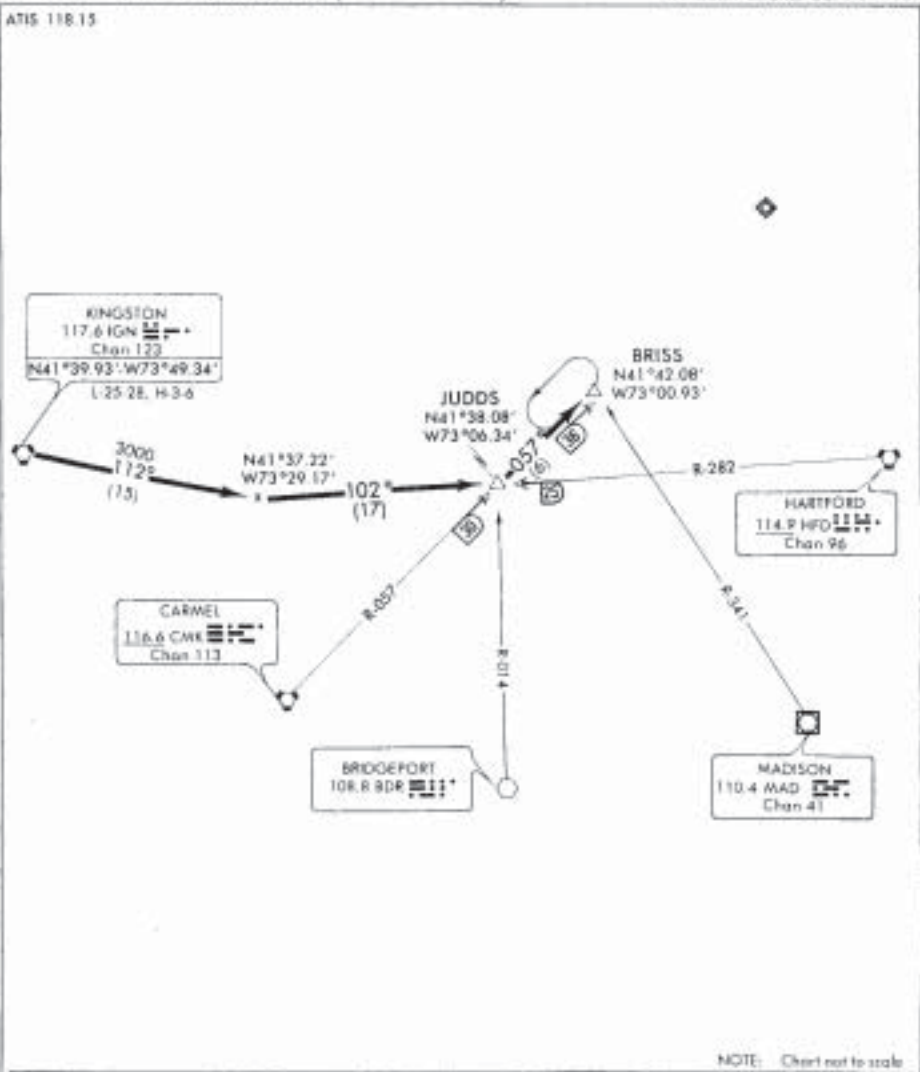
GARDNER TWO ARRIVAL (GDM.GDM2)

BOSTON, MASSACHUSETTS
GENERAL EDWARD LAWRENCE LOGAN INTL

JUDDS TWO ARRIVAL (IGN.JUDDS2)

BRADLEY INTERNATIONAL
WINDSOR LOCKS, CONNECTICUT

ATIS 118.15



From over IGN VORTAC via R-112 and HFD R-282 to JUDDS INT; then via CMK R-057 to BRISS INT. Expect radar vectors to final approach course.

JUDDS TWO ARRIVAL (IGN.JUDDS2)

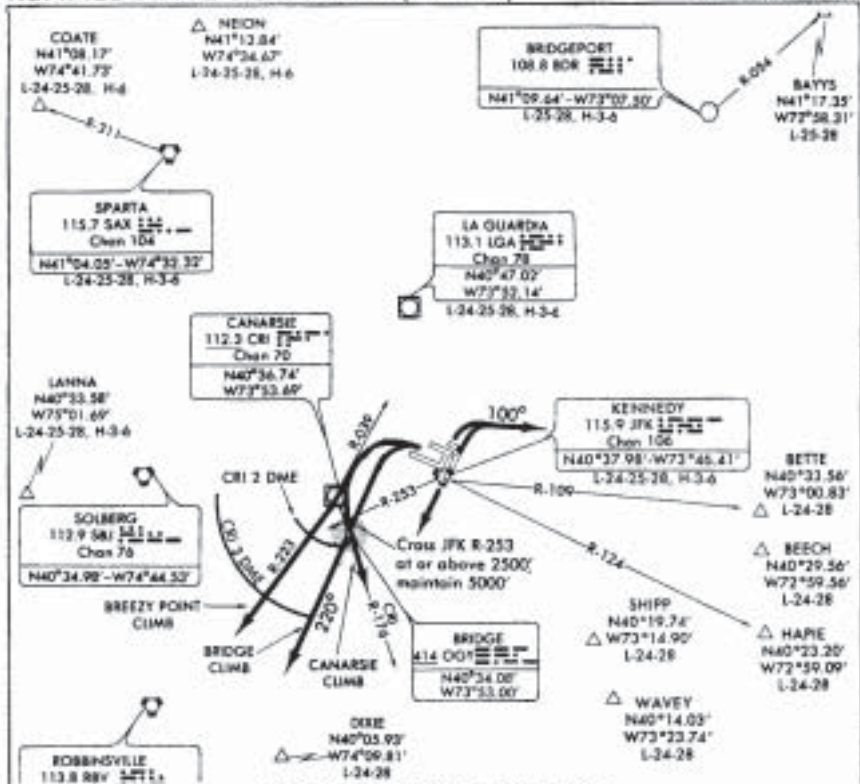
WINDSOR LOCKS, CONNECTICUT
BRADLEY INTERNATIONAL

NOT FOR USE IN NAVIGATION

NOT FOR USE IN NAVIGATION

KENNEDY FIVE DEPARTURE (VECTOR)

NEW YORK/JOHN F. KENNEDY INTL
NEW YORK, NEW YORK



DEPARTURE ROUTE DESCRIPTION (Continued)

TAKE-OFF RUNWAYS 4L/R: Turn right climb on heading 100°, maintain 5,000 feet. Thence

TAKE-OFF RUNWAYS 13L/R: Climb on assigned departure heading, maintain 5,000 feet. Thence

TAKE-OFF RUNWAYS 22L/R: Climb on runway heading, maintain 5,000 feet. Thence

TAKE-OFF RUNWAYS 31L/R:

BREEZY POINT CLIMB: Turn left proceed direct CRI VOR/DME. Make turn east of CRI R-039 then via CRI R-223. Cross CRI 3 NM DME or JFK R-253 at or above 2,500 feet, maintain 5,000 feet. Thence

BRIDGE CLIMB: Turn left proceed direct OGY NDB, then fly heading 220° after OGY NDB. Make turn east of CRI R-039. Cross JFK R-253 at or above 2,500 feet, maintain 5,000 feet. Thence

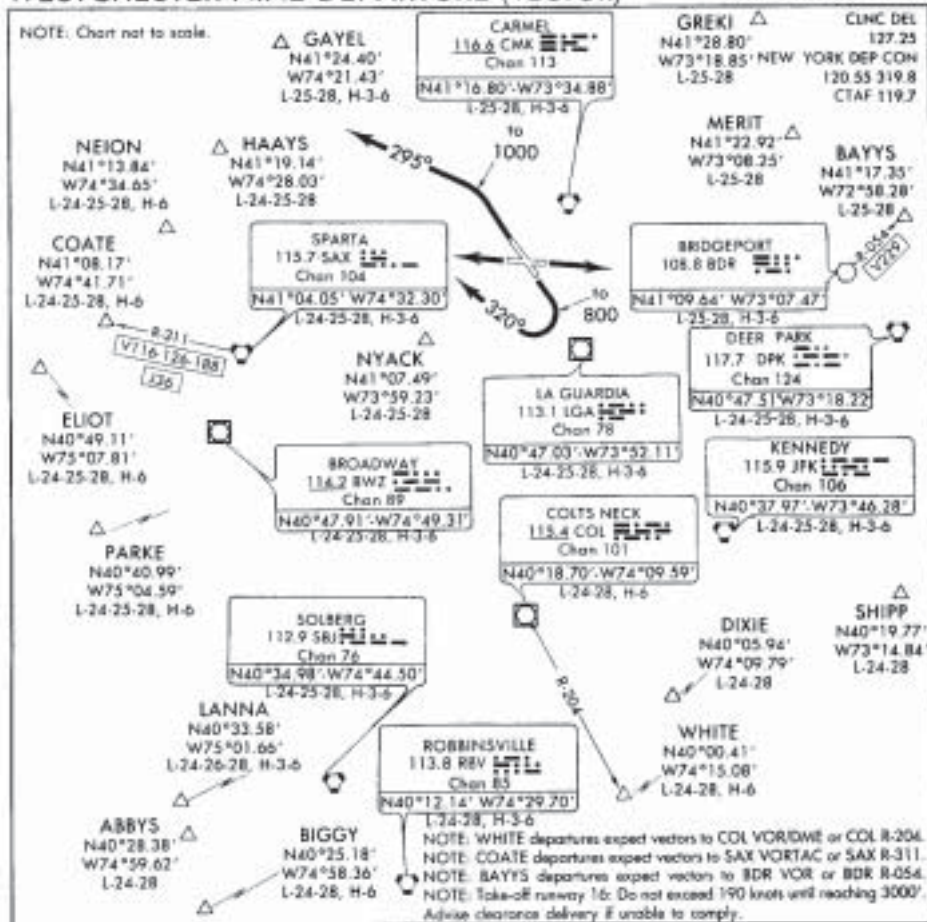
CANARSIE CLIMB: Turn left proceed direct CRI VOR/DME. Make turn east of CRI R-039, then via CRI R-176. Cross CRI 2 NM DME or JFK R-253 at or above 2,500 feet, maintain 5,000 feet. Thence

. . . . Via vectors to assigned route/fix. Expect clearance to filed altitude/flight level ten minutes after departure.

KENNEDY FIVE DEPARTURE (VECTOR)

NEW YORK, NEW YORK
NEW YORK/JOHN F. KENNEDY INTL

WESTCHESTER NINE DEPARTURE (VECTOR)

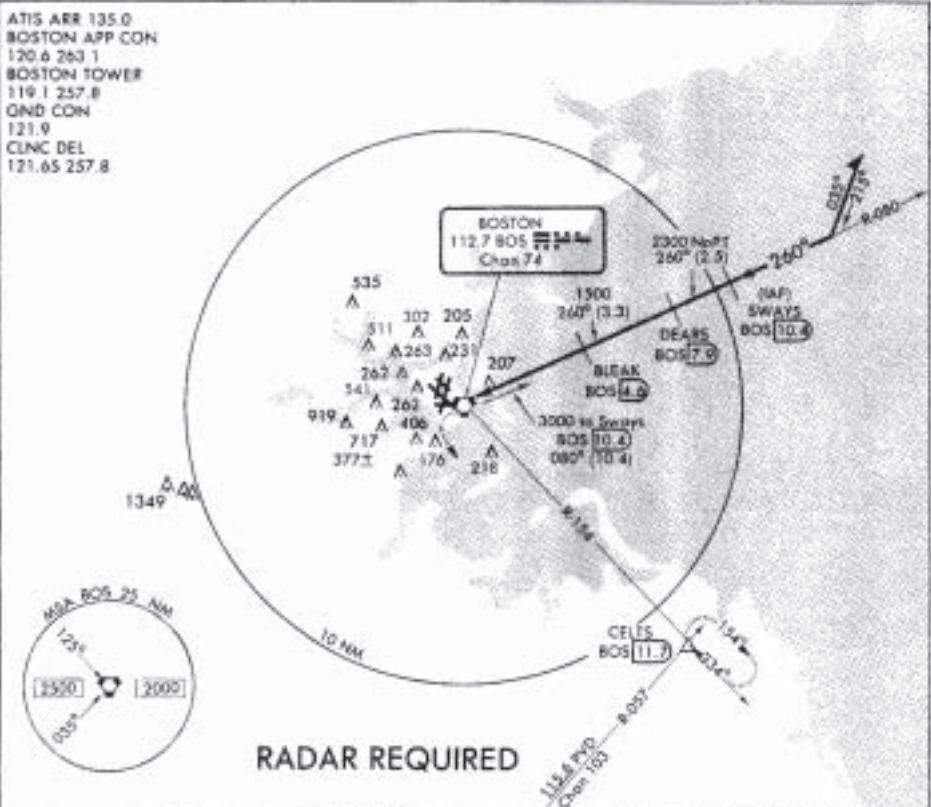


NOT FOR USE IN NAVIGATION

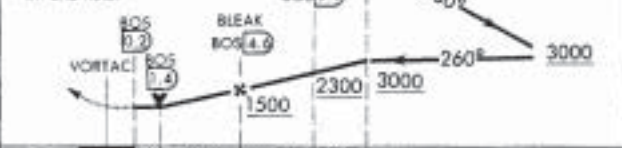
NOT FOR USE IN NAVIGATION

VOR/DME RWY 27

BOSTON/GENERAL EDWARD LAWRENCE LOGAN INTL (BOS)
BOSTON, MASSACHUSETTS



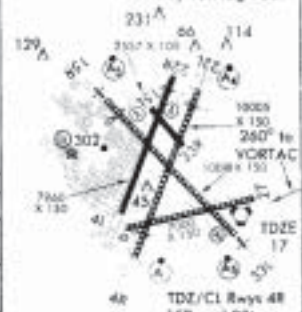
MISSED APPROACH
Climbing left turn to 3000 via BOS R-154 to CELTS fix and hold.



CATEGORY	A	B	C	D
S-27	460/50 443 (500-1)		460/60 443 (500-1 1/2)	460/1 1/2 443 (500-1 1/2)
CIRCLING	620-1 600 (600-1)		620-1 1/2 600 (600-1 1/2)	620-2 600 (600-2)

Cat C and D circling not authorized Rwy 4L clockwise to Rwy 13R.

ELEV 20
Rwy 22R ldg 7045
Rwy 4R ldg 8850
Rwy 15R ldg 9201



360° A FEL Rws 4L and 27
MRL Rwy 15L-33R
MRL Rws 4L-22R, 4R-22L, 15R-33L and 9-27

FAF to MAP 4.6 NM

Knob	60	90	120	150	180
Min.Sec	4:24	2:56	2:12	1:45	1:28

VOR/DME RWY 27

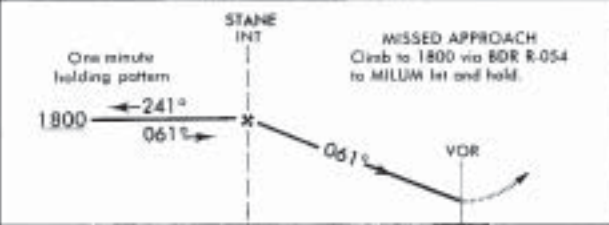
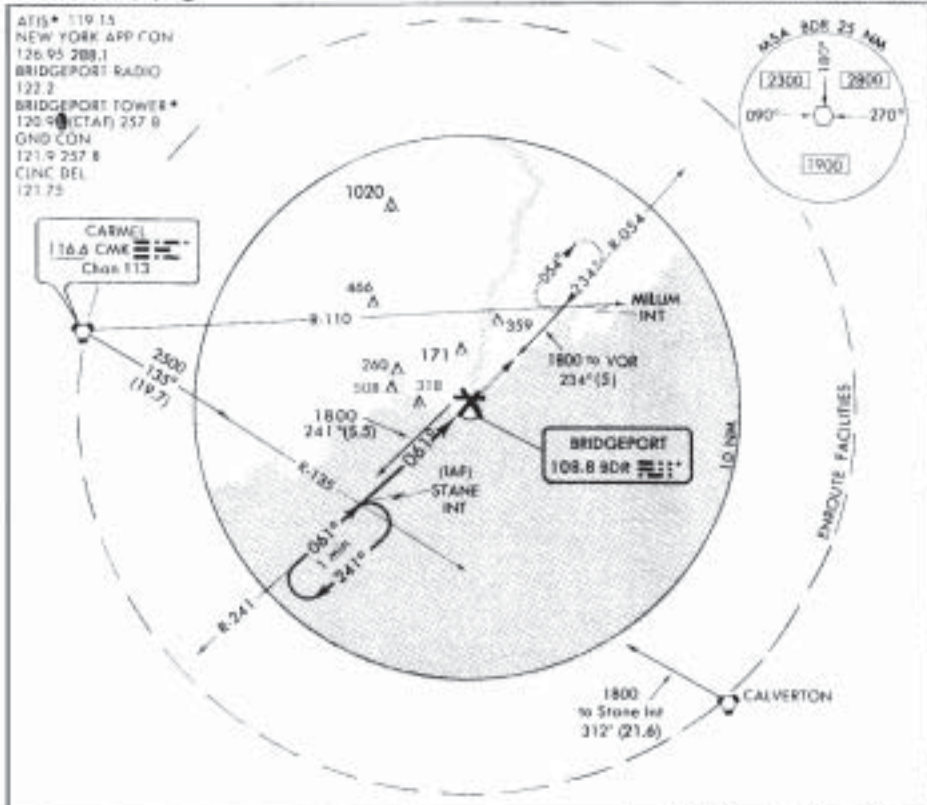
42°22'N-71°00'W
BOSTON, MASSACHUSETTS
BOSTON/GENERAL EDWARD LAWRENCE LOGAN INTL (BOS)

VOR RWY 6

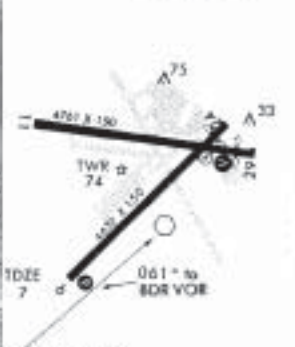
BRIDGEPORT/IGOR I. SIKORSKY MEMORIAL (BDR)
BRIDGEPORT, CONNECTICUT

ATIS* 119.13
NEW YORK APP CON
126.95 288.1
BRIDGEPORT RADIO
122.2
BRIDGEPORT TOWER*
120.9 (CTAF) 257.8
GND CON
121.9 257.8
CINC DEL
121.75

CAROL
116.6 CME
Class 113



ELEV 10
Rwy 24 ldg 4357
Rwy 29 ldg 4397



CATEGORY	A	B	C	D
S-6	380-1 373 (400-1)			380-1 373 (400-1)
CIRCUING	480-1 470 (500-1)	620-1 610 (700-1)	620-1 3/4 610 (700-1 3/4)	820-2 1/2 810 (900-2 1/2)

When control zone not in effect: 1. Use MSL altimeter setting. 2. Increase all MDA's 80 feet.
▽
Δ

Knots	60	90	120	150	180
Min/Sec					

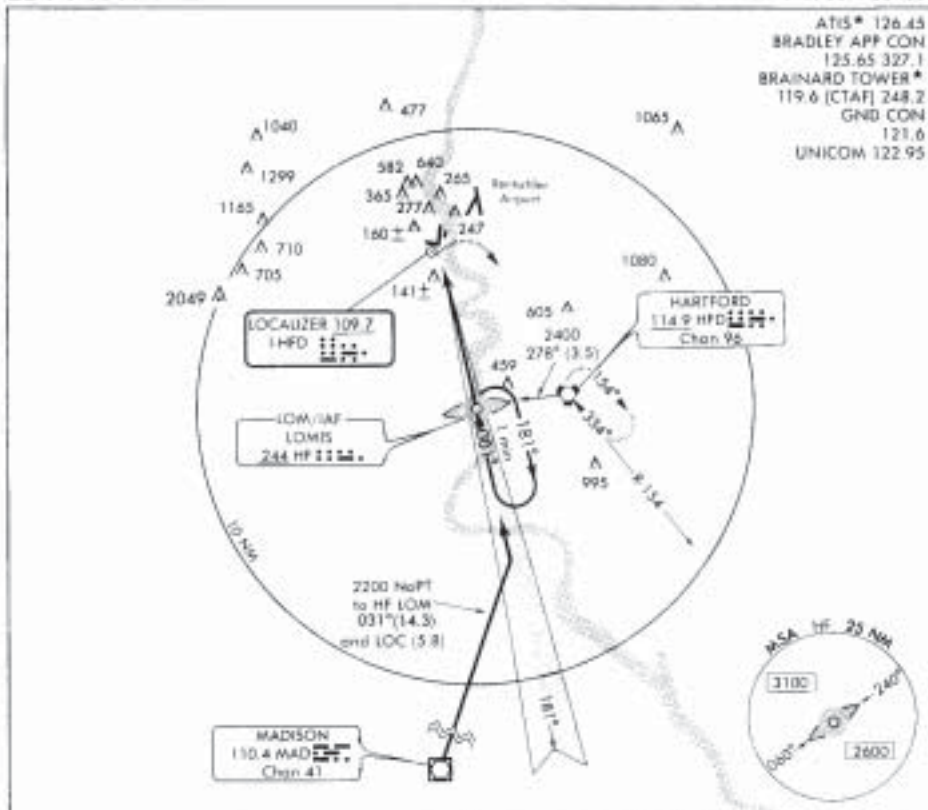
VOR RWY 6

41° 10' N 73° 08' W
BRIDGEPORT, CONNECTICUT
BRIDGEPORT/IGOR I. SIKORSKY MEMORIAL (BDR)

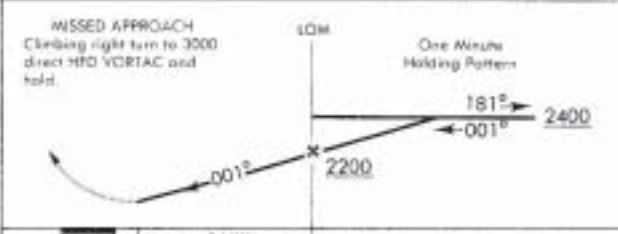
NOT FOR USE IN NAVIGATION

LDA RWY 2

HARTFORD-BRAINARD (HF'D)
HARTFORD, CONNECTICUT



NOT FOR USE IN NAVIGATION

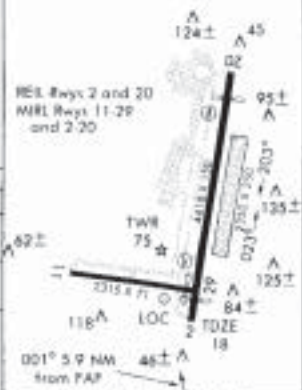


CATEGORY	A	B	C	D
S-2	580-1 562 (600-1)		580-1 1/2 562 (600-1 1/2)	580-1 1/4 562 (600-1 1/4)
CIRCLING	580-1 561 (600-1)		900-2 1/4 881 (900-2 1/4)	1000-3 981 (1000-3)

Use local altimeter setting; when not available, use Windsor Locks altimeter setting and increase all MDA's 40 feet.

▲ NA

ELEV 19'
Rwy 2 ldg 4000
Rwy 20 ldg 3850
Rwy 29 ldg 2058



FAF to MAP 5.4 NM

Knots	60	90	120	150	180
Min/Sec	5:24	3:36	2:42	2:10	1:48

LDA RWY 2

41°44'N-72°29'W

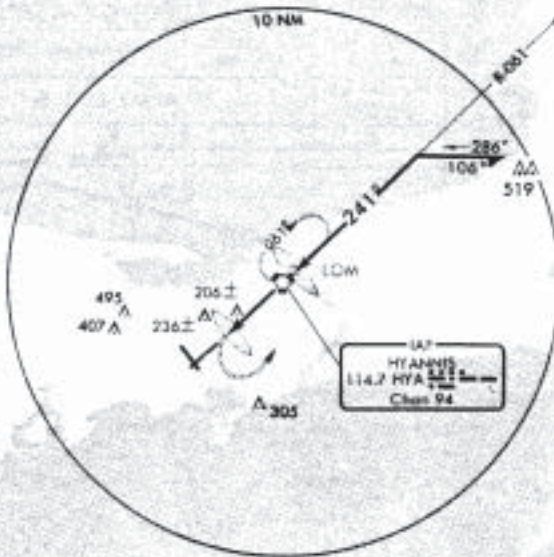
HARTFORD, CONNECTICUT
HARTFORD-BRAINARD (HF'D)

NOT FOR USE IN NAVIGATION

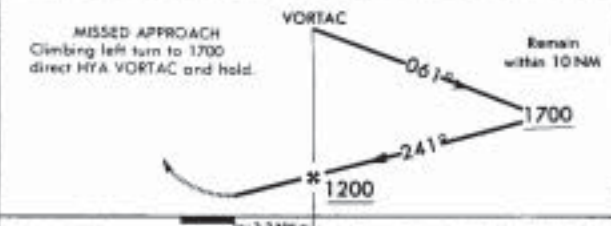
VOR RWY 24

HYANNIS/BARNSTABLE MUNI-BOARDMAN/POLANDO FIELD (HYA)
HYANNIS, MASSACHUSETTS

ATIS* 123.8
 CAPE APP COM
 118.2 284.6
 HYANNIS TOWER*
 119.5 (CTAF) 0 257.8
 GND COM
 121.9
 CLNC DEL
 125.15
 UNICOM 122.95

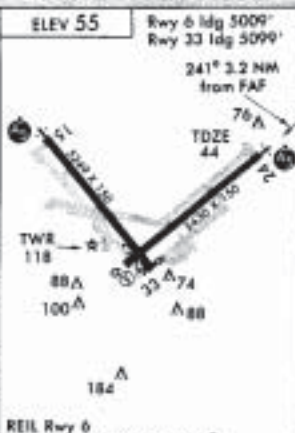


Inoperative table does not apply; increase S-24 visibility CAT C to RVR 6000, CAT D to 1 h for inoperative MALSR.



CATEGORY	A	B	C	D
S-24	500/50 456 (500-1)			
CIRCLING	560-1 508 (600-1)		560-1 1/2 508 (600-1 1/2)	620-2 568 (600-2)
OTIS ANGB ALTIMETER SETTING MINIMUMS				
S-24	540-1 496 (500-1)			
CIRCLING	600-1 548 (600-1)		600-1 1/2 548 (600-1 1/2)	620-2 568 (600-2)

When Control Zone not in effect: 1. Use Otis ANGB altimeter setting minimums.
2. Inoperative table does not apply; increase S-24 visibility CAT C to 1 h, CAT D to 1 h for inoperative MALSR. $\nabla\Delta$



FAF to MAP 3.2 NM					
Knots	60	90	120	150	180
Min-Sec	3:12	2:08	1:36	1:17	1:04

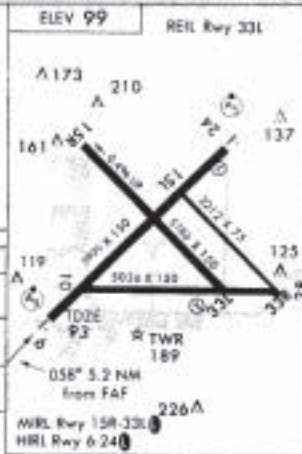
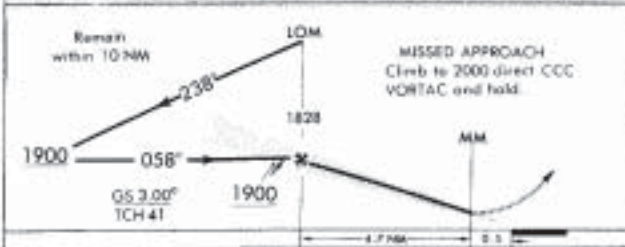
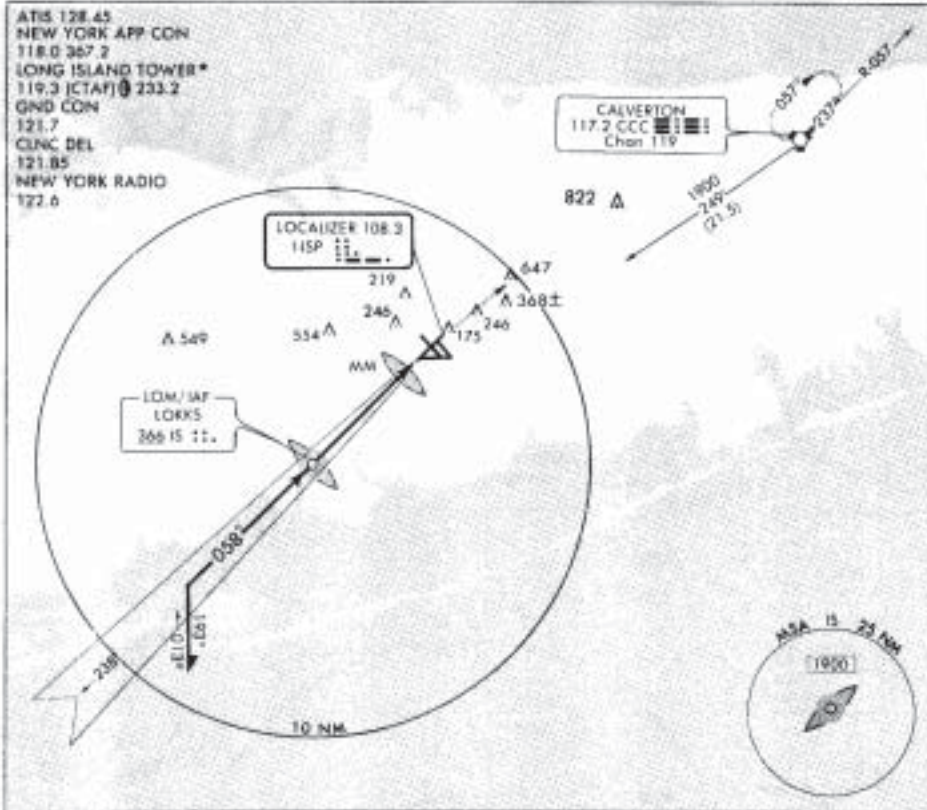
VOR RWY24

41°40'N 70°17'W
HYANNIS/BARNSTABLE MUNI-BOARDMAN/POLANDO FIELD (HYA)
HYANNIS, MASSACHUSETTS

ILS RWY 6

ISLIP/LONG ISLAND MAC ARTHUR (ISP)
ISLIP, NEW YORK

ATIS 128.45
NEW YORK APP CON
118.0 367.2
LONG ISLAND TOWER*
119.3 (CTAF) 233.2
GND CON
121.7
CLNC DEL
121.85
NEW YORK RADIO
122.6



CATEGORY	A	B	C	D
S-ILS 6	293-1/2 200 (200-1/2)			
S-LOC 6	420-1/2	327 (400-1/2)	420-3/4 327 (400-3/4)	
CIRCLING	580-1 481 (500-1)		580-1 1/2 481 (500-1 1/2)	660-2 561 (600-2)

Cat. D S-LOC 6 visibility increased 1/4 mile for inspersive MA/ISR

FAF to MAP 5.2 NM					
Knots	60	90	120	150	180
Min:Sec	5:12	3:28	2:36	2:05	1:44

ILS RWY 6

40°48'N-73°06'W

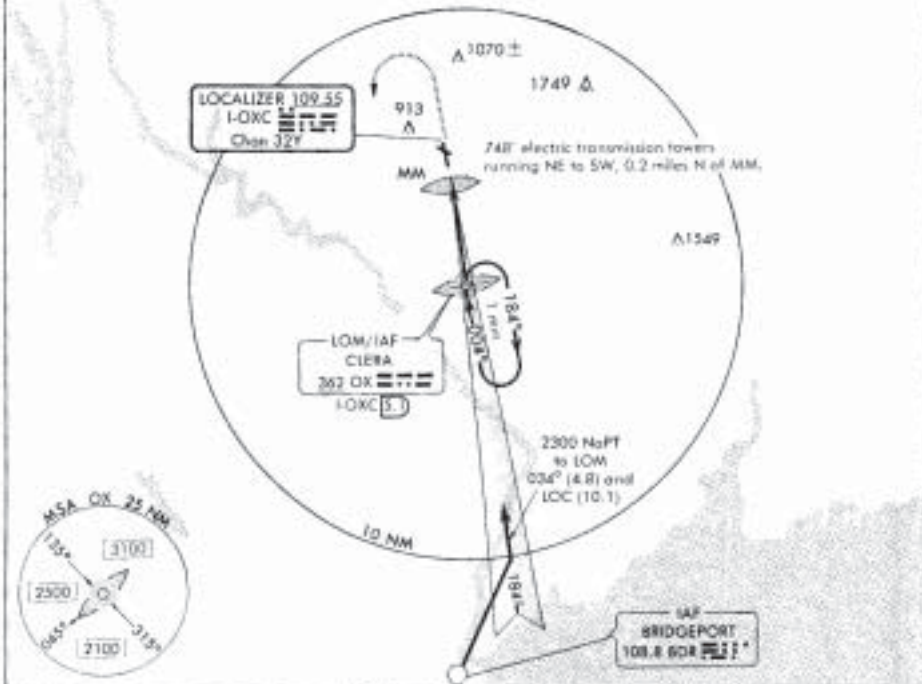
ISLIP, NEW YORK
ISLIP/LONG ISLAND MAC ARTHUR (ISP)

NOT FOR USE IN NAVIGATION

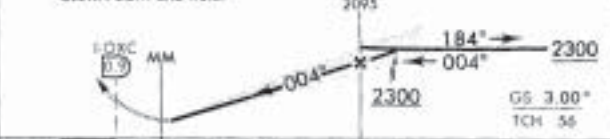
ILS RWY 36

OXFORD/WATERBURY-OXFORD (0XC)
OXFORD, CONNECTICUT

NEW YORK APP CON
135.1 288.1
CLNC DEL
135.1
UNICOM 122.7 (CTAF)
AWOS-3 128.175



MISSED APPROACH
Climb to 1300 then climbing left turn to 2300 direct CLERA LOM and hold.

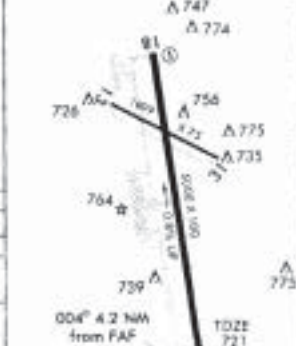


CATEGORY	A	B	C	D
5-ILS 36	971-1		250 (200-1)	
5-LOC 36	1100-1		379 (400-1)	
			1100-1 1/2	
			379 (400-1 1/2)	
CIRCLING	1300-1		573 (600-1)	
			1300-1 1/2	
			573 (600-1 1/2)	
			1320-2	
			593 (600-2)	

When local altimeter not received, use White Faces altimeter setting and increase all DME/DMEs 160 feet.
Inoperative table does not apply to MM.
ADF required.

NA

ELEV 727



REL RWY 36
MRL RWY 13-31
MRL RWY 18-35

FAF to MAP 4.2 NM

Knots	60	90	120	150	180
Min. Sec	4-12	2-48	2-06	1-41	1-24

ILS RWY 36

41°29'N - 73°08'W

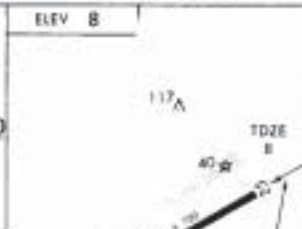
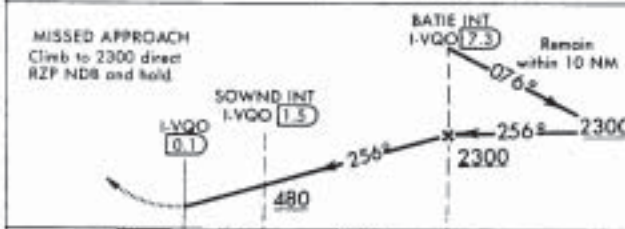
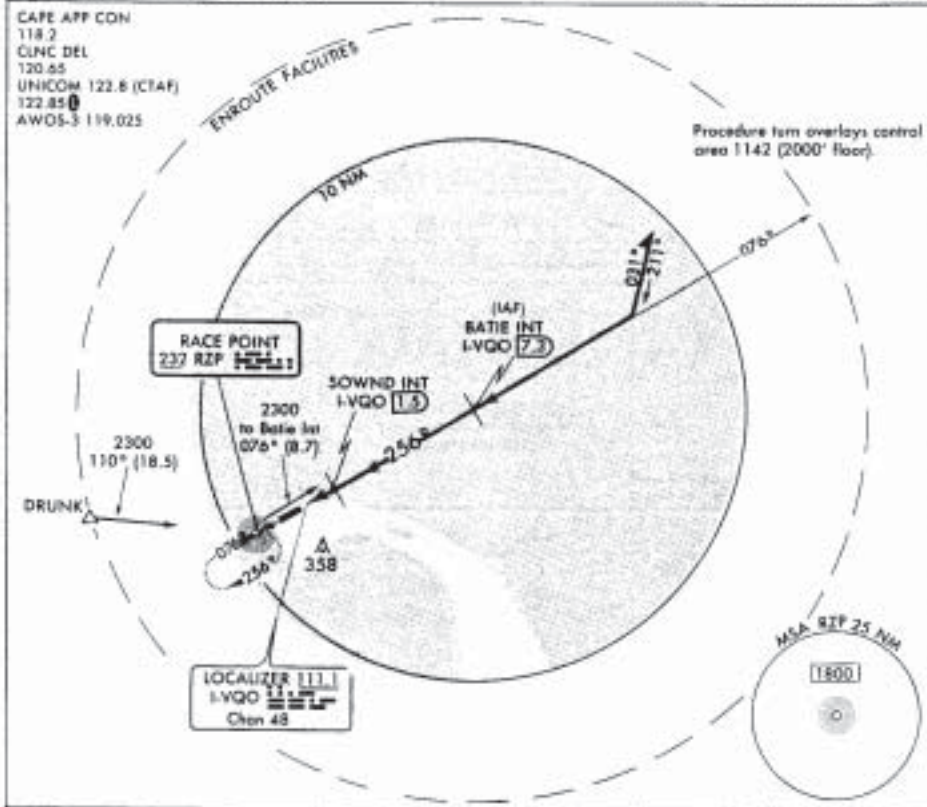
OXFORD, CONNECTICUT
OXFORD/WATERBURY-OXFORD (0XC)

NOT FOR USE IN NAVIGATION

NOT FOR USE IN NAVIGATION

NDB/DME RWY 25

PROVINCETOWN MUNI (PVC)
PROVINCETOWN, MASSACHUSETTS



CATEGORY	A	B	C	D
5-25	420-1	412 (500-1)		NA
CIRCLING	420-1	460-1		NA
	412 (500-1)	452 (500-1)		

If local altimeter setting not received, use Ots ANGB altimeter setting and increase all MDA's 120 feet.
DME from I-VQO ILS. Simultaneous reception of RZP and I-VQO DME required.
DME required.
△NA

REIL Rwy 25
MRL Rwy 7-25

Knots	60	90	120	150	180
Min. Sec					

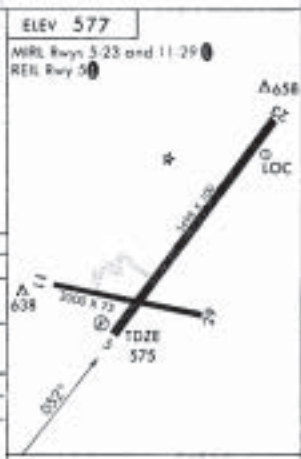
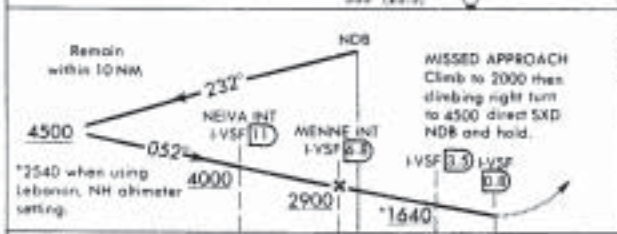
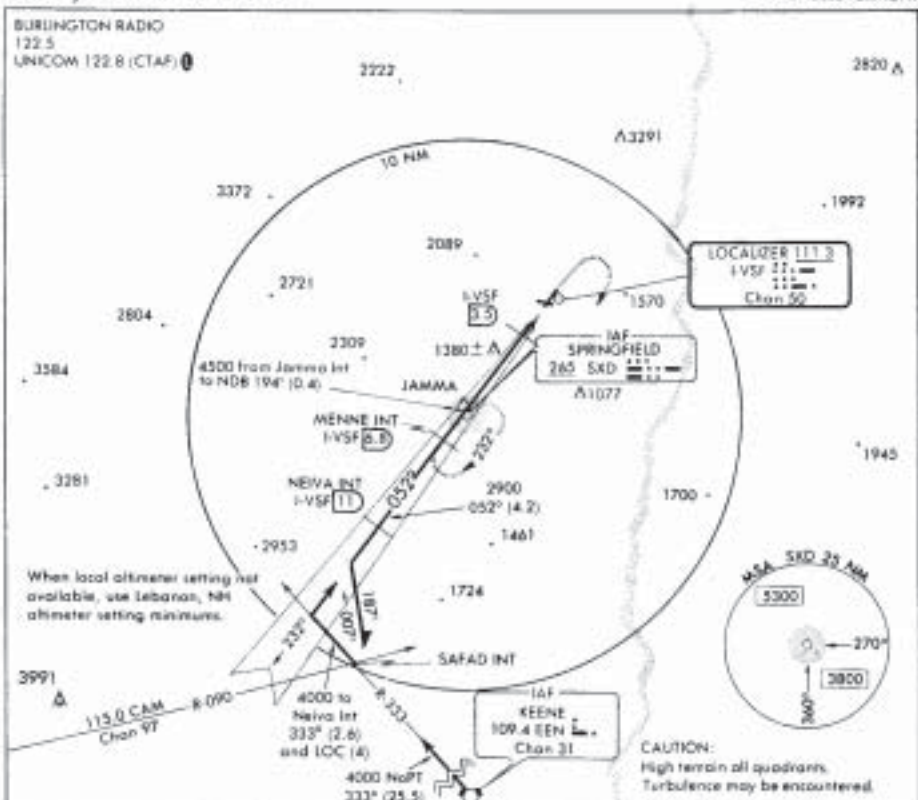
NDB/DME RWY 25

42°04'N 70°13'W

PROVINCETOWN, MASSACHUSETTS
PROVINCETOWN MUNI (PVC)

LOC/DME RWY 5

SPRINGFIELD/HARTNESS STATE (SPRINGFIELD) (VSF)
 SPRINGFIELD, VERMONT



CATEGORY	A	B	C	D
5-3	1540-1 1/4 965 (1000-1 1/4)	1540-1 1/2 965 (1000-1 1/2)	1540-3 965 (1000-3)	
CIRCLING	1620-1 1/4 1043 (1100-1 1/4)	1680-1 1/2 1103 (1200-1 1/2)	1680-3 1103 (1200-3)	2380-3 1803 (1900-3)
LEBANON, NH ALTIMETER SETTING MINIMUMS				
5-5	NA			
CIRCLING	2080-3 1503 (1600-3)			2540-3 1963 (2000-3)

ACTIVATE MRL Rwy 5 23, 5-23-UNICOM.
 ADF required. ∇ NA

Knph	60	90	120	150	180
Min. Sec					

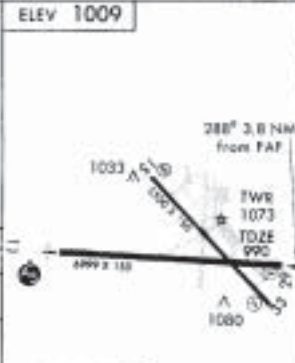
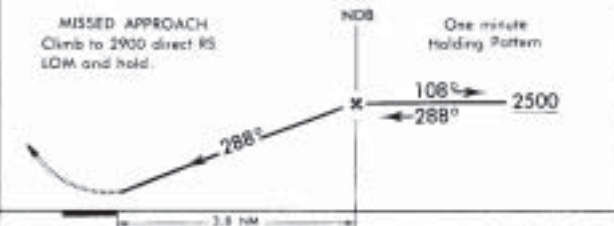
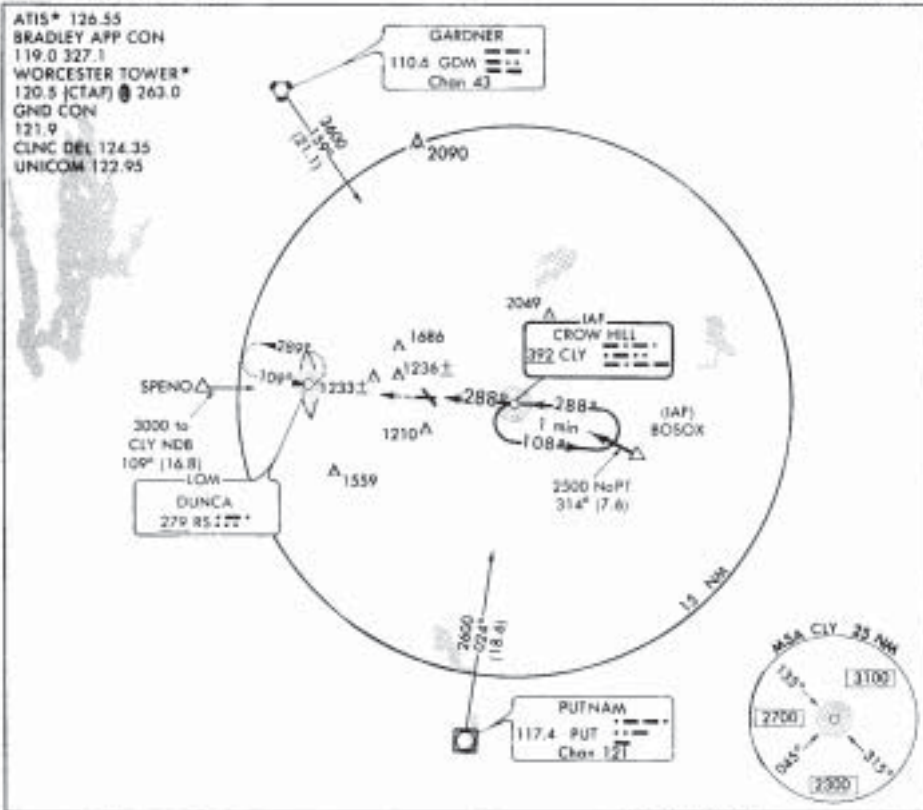
LOC/DME RWY 5
 43°20'N-72°31'W
 SPRINGFIELD/HARTNESS STATE (SPRINGFIELD) (VSF)

NOT FOR USE IN NAVIGATION

NDB RWY 29

WORCESTER MUNI (ORH)
WORCESTER, MASSACHUSETTS

ATIS* 126.55
BRADLEY APP CON
119.0 327.1
WORCESTER TOWER*
120.5 (CTAF) @ 263.0
GNID CON
121.9
CLNC DEL 124.35
UNICOM 122.95



CATEGORY	A	B	C	D
S-29	1380-1	390 (400-1)		1380-1 1/4 390 (400-1 1/4)
CIRCLING	1540-1 532 (600-1)	1640-1 632 (700-1)	1700-2 692 (700-2)	2000-3 992 (1000-3)

FAF to MAP 3.8 NM					
Knob	60	90	120	150	180
Min/Sec	3:48	2:32	1:54	1:31	1:16

HRI Ray 11-29
REL Ray 29
REL Rays 15 and 33
HRI Ray 15-33

NDB RWY 29

42°16'N - 71°53'W

WORCESTER, MASSACHUSETTS
WORCESTER MUNI (ORH)

NOT FOR USE IN NAVIGATION

Appendix 3: Troubleshooting IPC Simulator

The controls are too sensitive.

The controls are meant to be sensitive and exacting in order to help you to become a better pilot by forcing you to concentrate on the instruments. With a little time you will find that you have a high degree of control over the program's movements.

The cockpit display doesn't fit on the screen.

Adjust the screen size on your monitor's controls to get the display to fit your screen. In most cases, Windows will automatically re-size your screen to accept IPC Simulator's 800x600 graphics mode.

Appendix 4: IPC Simulator Frequently Asked Questions

Can I log time using this program?

No, the program is not a PCATD (Personal Computer Aviation Training Device). Moreover, desktop flight simulators are not currently allowed for use to meet the required instrument currency requirements. However, the program will allow you to refresh yourself on the procedures outlined in 14 CFR Part 61.57, and obtain proficiency before demonstrating competency in the airplane.

Why can't I use rudder pedals during my lessons?

The simple answer is that most of the commercially available rudder controllers on the market aren't precise enough to allow a pilot to use them and continually pass the lesson tests. In lab tests where different rudders were used with the software, a very low pass rate was experienced. It was decided that it would be better to have IPC Simulator auto-coordinate the turns by always keeping the ball centered, and allow pilots to concentrate on pitch and bank. The rudder option is available in Free Flight mode, where no lesson or completion parameters exist.

Why aren't flaps included in the IPC Simulator aircraft model?

As with rudders, testing revealed that too many pilots had a hard time coordinating power settings, pitch attitude and airspeed when dealing with the added pressure of flap extension and retraction. IPC Simulator assumes that anyone using the program has already obtained—or is about to obtain—his or her Private Pilot certificate, and knows how to use the flaps on his or her aircraft.

Why is IPC Simulator so demanding?

Simply put, IPC Simulator is demanding because the Instrument Practical Test Standards are demanding. If you find yourself getting frustrated because IPC Simulator fails you for seemingly slight deviations in airspeed, altitude, timing or procedure, remember that it's much less frustrating to have IPC Simulator fail you—and make you more consistent while doing so—than it is to have your instructor requiring you to fly more before he will sign you off for a proficiency check.

We're always looking for more input from users of our software. If you have a question that we can add to the FAQ section in future versions of this IPC Simulator manual, please give us a call:

Aviation Supplies & Academics, Inc.
(800) ASA-2-FLY

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