



# **Addendum**

# **IP Trainer**

## **Pilot's Operating Handbook**

**Addendum: Calibrating Your Flight Controls  
With IP V6.5**

# Introduction

This booklet is an addendum to the IP Trainer POH. The instructions in this manual addendum are written for IP Trainer Version 6.5 and above.

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# Calibrating Your Flight Controls

When starting IP Trainer for the first time, you are automatically taken to the Calibration menu. This is where IP Trainer 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 IP Trainer 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 IP Trainer cockpit, click menu and then CALIBRATE at the bottom right corner of the cockpit screen.

The Calibration menu consists of several different screens:

1. **FLIGHT CONTROLS**, where you identify the flight controls you wish to use with IP Trainer.
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 IP Trainer 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 first entering the Calibration screen, you find 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 IP Trainer 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

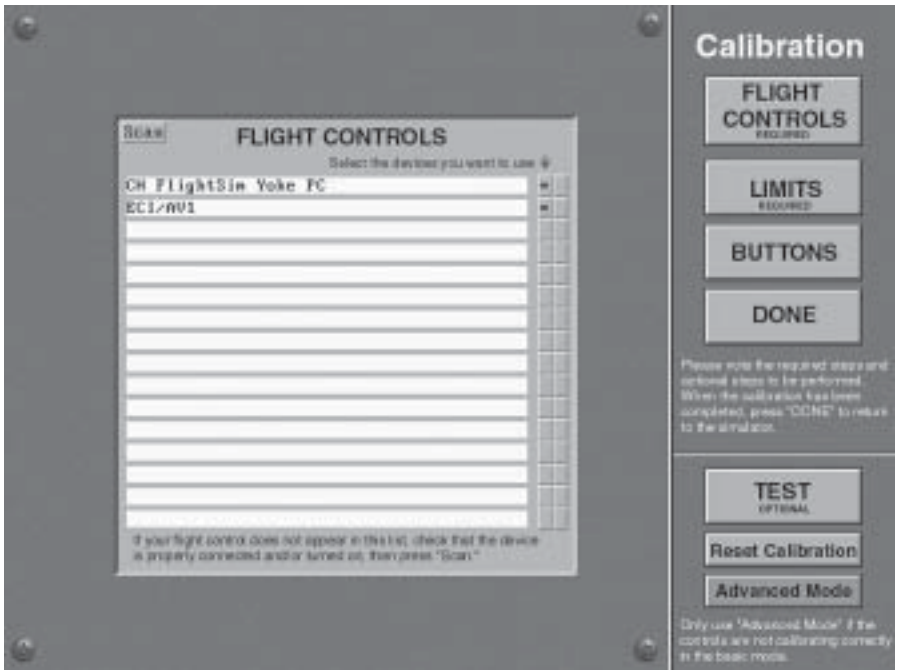


Figure 1

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 IP Trainer that the switches are multiplexed, so they may be correctly programmed. To select the multiplexed option in IP Trainer, 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.) Now select the leftmost box and configure as explained below.

## Limits

After selecting the flight controls to be used with IP Trainer, click the LIMITS button to proceed with the calibration process. On this screen you will need to 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 IP Trainer to know how much travel is available in the physical

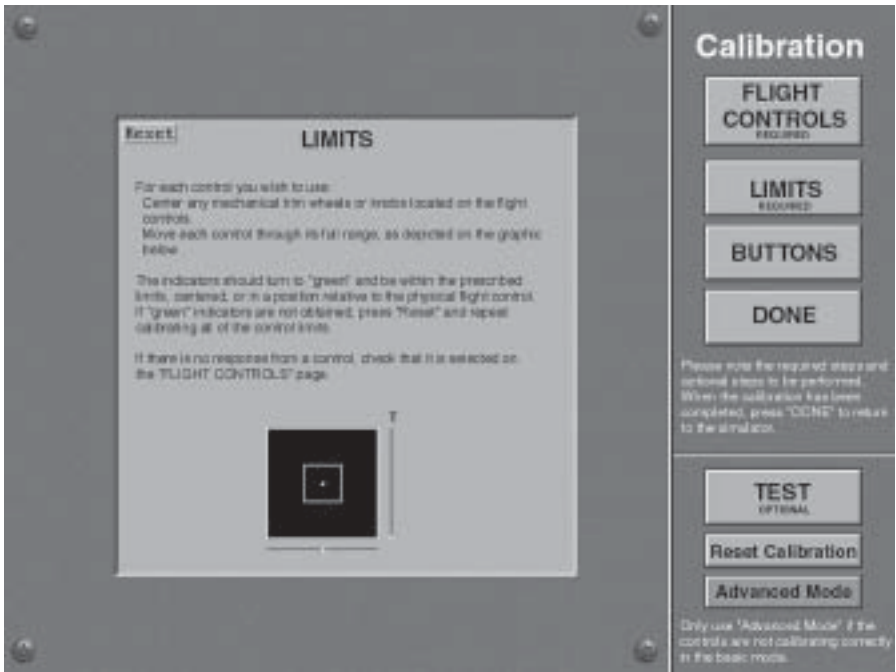


Figure 2

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. Should 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, thereby leaving 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. Should you own this unit, it will function in a limited manner with IP Trainer. For example, the leftmost throttle and mixture levers will control the Cessna 172 in IPT. 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

IP Trainer 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.

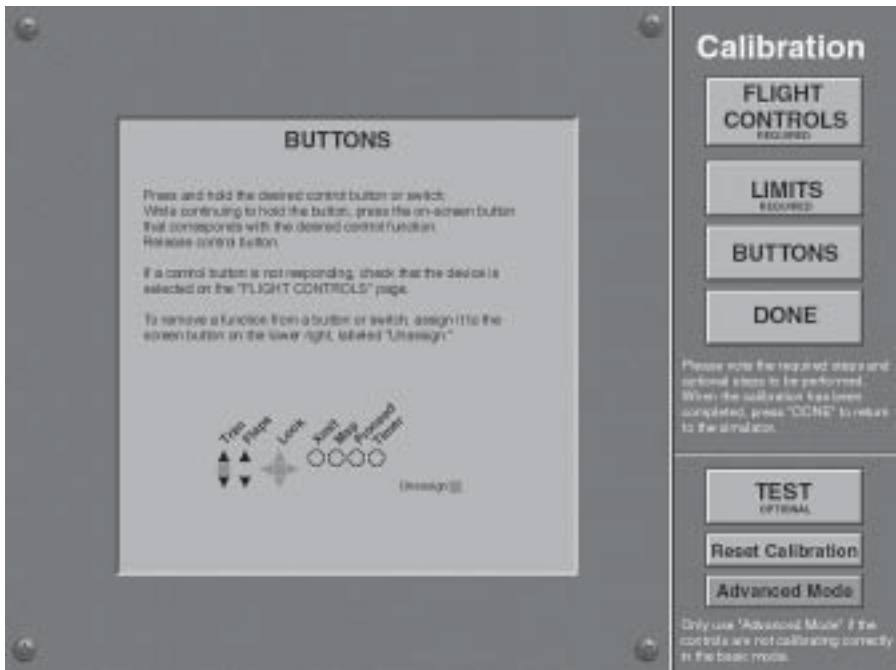


Figure 3

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 listed on Page 3 and Page 10 of this manual.

## Done

When you are satisfied with the button assignments, press the DONE button and return to the IP Trainer 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.

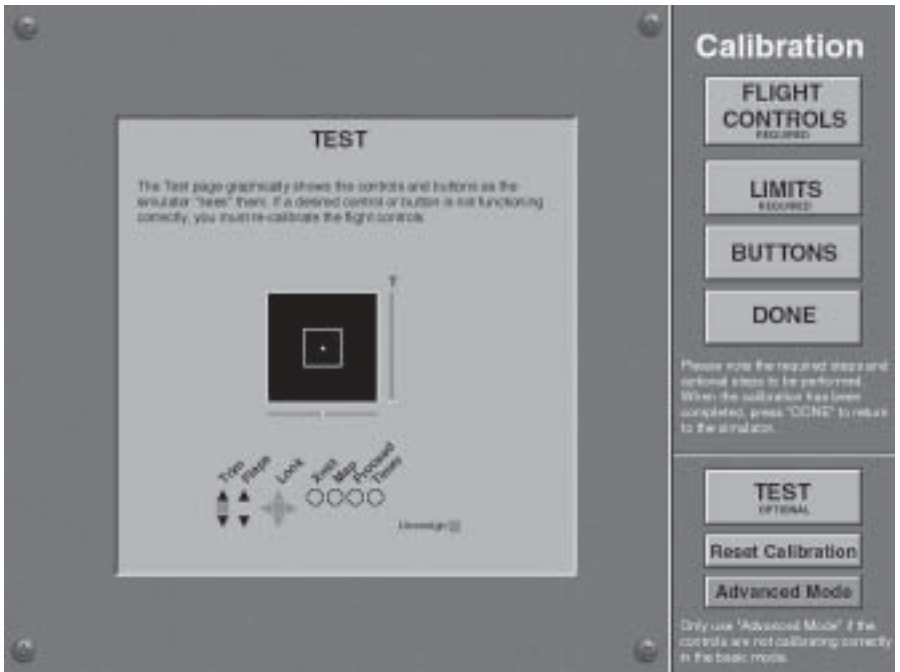


Figure 4

## 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 use the Advanced Mode. The Advanced Mode is more powerful, and therefore, requires a more detailed understanding of the calibration process. Please check to ensure 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](http://www.asa2fly.com).

The calibration interface model has been developed to permit new flight control devices to work in conjunction with IP Trainer. 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 IP Trainer 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 IP Trainer 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 IP Trainer (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

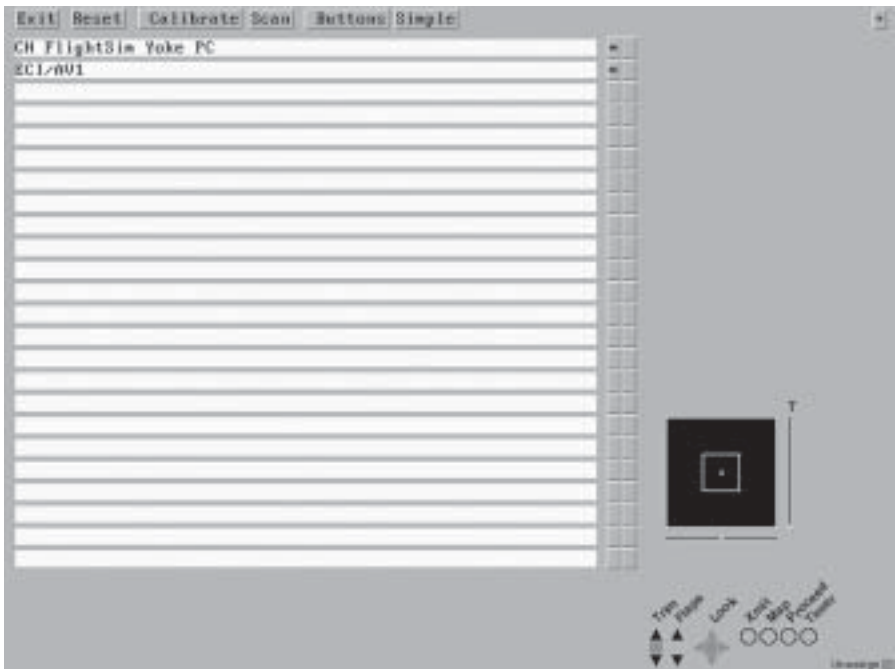


Figure 5

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 left-most 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

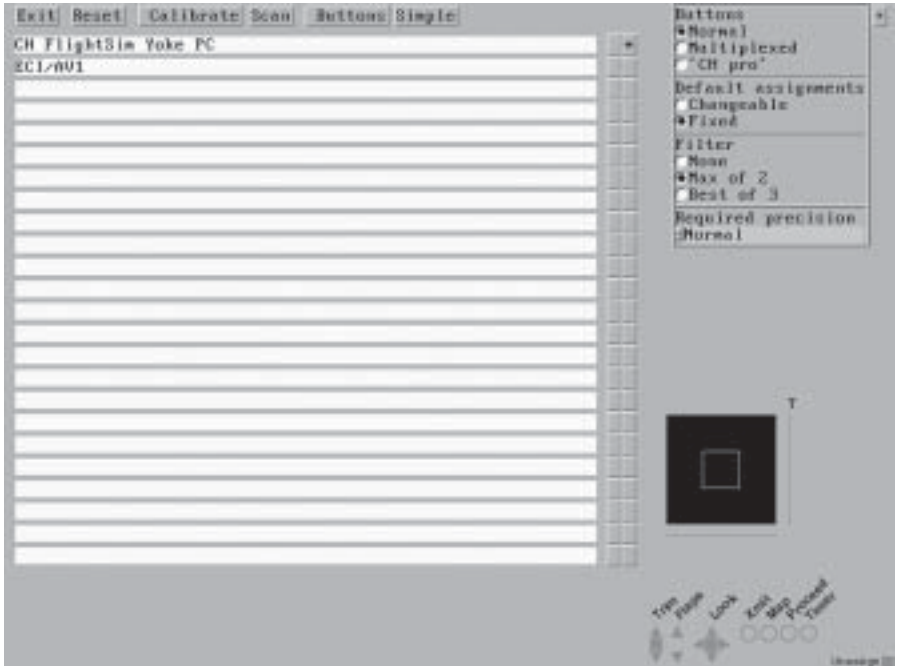


Figure 6

appear to be pressed on the screen. By selecting Multiplexed, IP Trainer 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 IP Trainer 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 that future development in flight controls may be adopted to make the simulation more realistic.

With both boxes 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

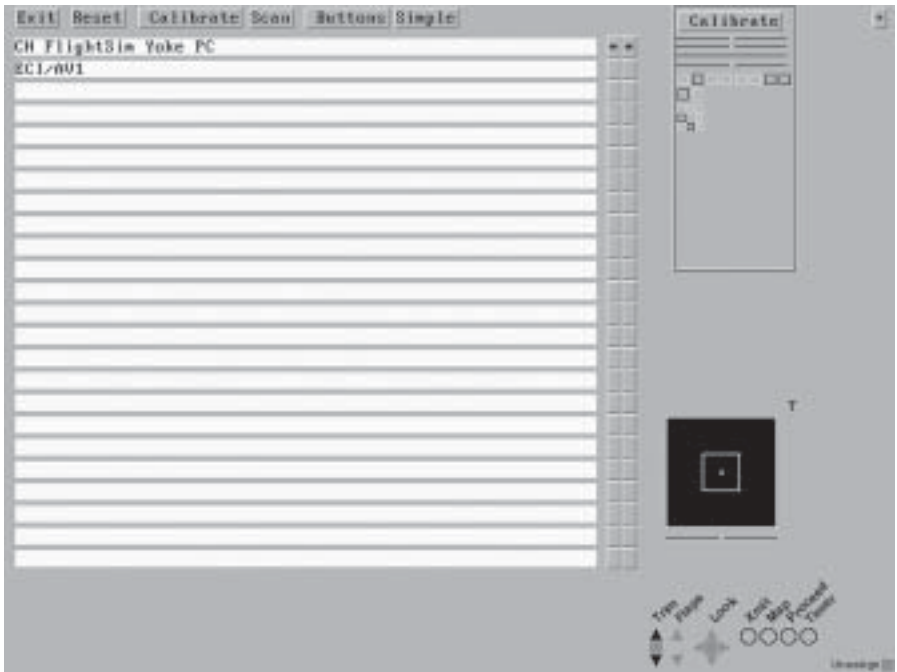


Figure 7

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 would be indicated and the input would not be 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 IP Trainer to function correctly, one of the assignments would have to 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 would 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.

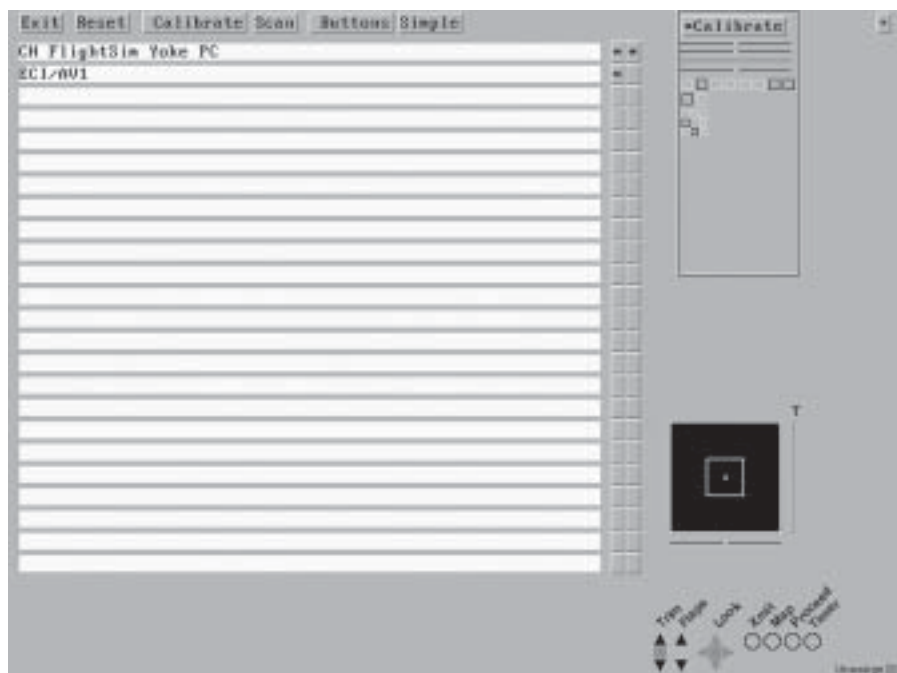


Figure 8

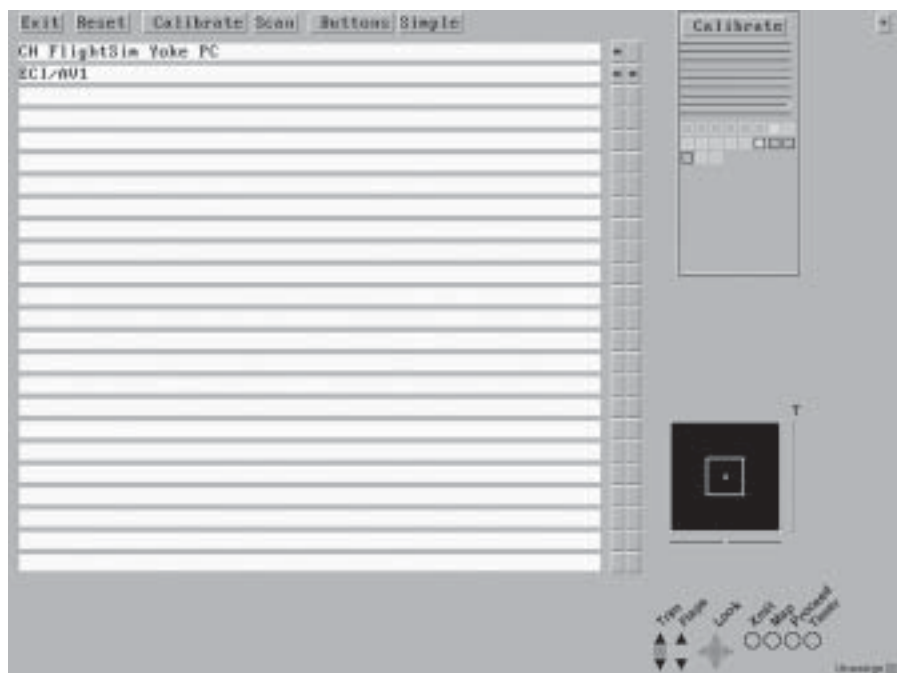


Figure 9

## Calibration Data Files

IP Trainer 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 IPT 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 ([asa2fly.com](http://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.

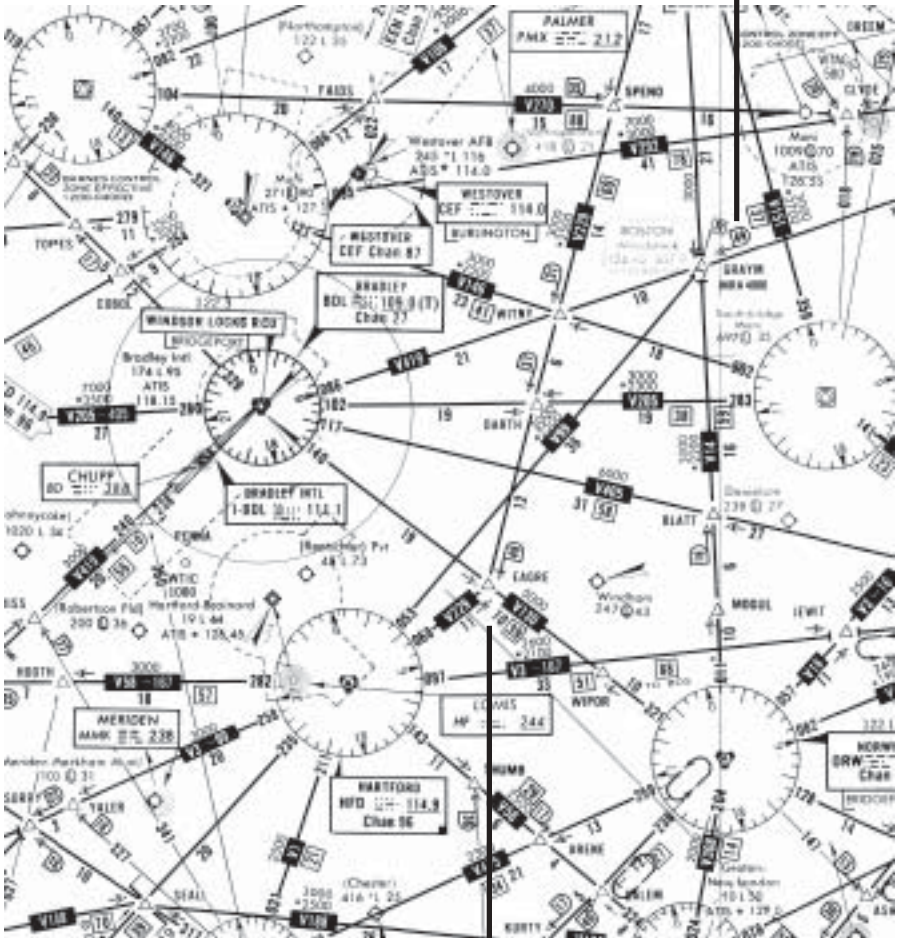
# Chart Correction for IP Trainer Lessons

There are two IP Trainer lessons with chart references that do not concur with the low altitude enroute chart (L25-26) that shipped with the original manual. For those lessons, please refer to the corresponding numbers on the chart excerpt below, which point out the areas of the chart that have changed:

1. Block: **Enroute Procedures**, Topic: **Enroute**, Lesson: **Airway Changeover Points**
2. Block: **Enroute Procedures**, Topic: **Enroute**, Lesson: **MRA**

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