

## SORTING THE SIMULATORS

***It's an alphabet soup of ground trainers out there. Here's what they are, what they do and how you can use them under the regs to stay IFR current.***

by Fred Simonds

In an earlier, but not necessarily simpler time, there was only one simulator, the Link Trainer. Patented by Edwin A. Link in 1929, "Blue Boxes" were sold to the Army Air Corps and Navy to train military and air mail pilots in instrument flying.

Today there are a plethora of choices. As GA instrument pilots, our desire is to zero in on the ones most useful to us; that fly well and on which we can legally log initial and recurrent training. In all cases, an authorized instructor must administer and endorse the training to satisfy any regulatory requirements.

### Simulator

First, let's distinguish between simula-

tors and training devices. Simulators are FAA-defined as full-size replicas of a specific type or make, model and series aircraft cockpit. They offer at least three degrees of motion, ground and flight modes, full visual systems and more. Found at the likes of FlightSafety and airlines, only simulators offer type-specific and type-rating training.

### Training Devices

Training devices (TD) are scaled for GA; none require motion. Edwin Link was adamant that any simulation device include motion, but later research showed that motion is not necessary to provide effective training, hence its omission from FAA TD specifications.

There are five TD flavors: GTDs/FTDs, PCATDs, BATDs and AATDs. Let's sort them out and decrypt the acronyms.

In the 1970s, Ground Training Devices (GTDs) were approved informally by the FAA to do up to four things: duplicate maneuvers

and/or procedures for airman training; meet airman currency requirements; do competency checks and conduct a portion of the practical test for an instrument rating.

The analog Frasca 121/342 models and the ATC-510/610 desktop devices are examples. Some remain at work today. GTDs were grandfathered into Advisory Circular 120-45A as Level 1 Flight Training Devices (FTDs) meeting the criteria of Part 61.4, Qualification and approval of simulators and flight training devices.

### PCATDs

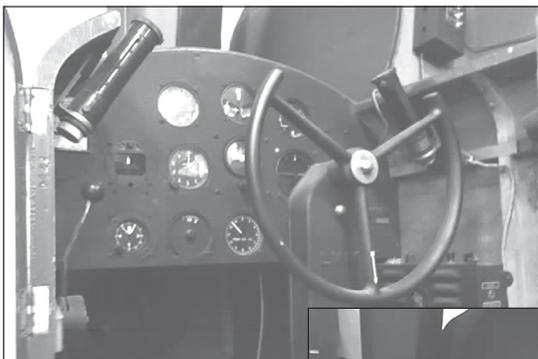
Personal Computer-based Aviation Training Devices are notable because their specifications also typify the basic and advanced training devices of today: A complete IFR panel is required. Instruments must not be out of focus, jump or step to a distracting degree or have jagged lines or edges.

PCATDs must include ADF (ADF is optional in newer training devices). The navigation database must cover at least the local area and IFR procedures must meet Part 97, Standard Instrument Procedures.

Realistic controls are also mandatory – no keyboard or mouse allowed. For instance, yoke and throttle controls should be physical and controllable solely by their appearance. The delay from control input to response must be 0.3 second or less.

The keyboard and mouse are for the instructor to set aircraft type, location, wind, program pause or "freeze", heading, airspeed, altitude, and engine power. It must be possible to disable instruments without stopping or freezing. The PCATD must record horizontal and vertical track for playback and review.

The device must "fly" like an airplane or helicopter and offer flight dynamics comparable to that of a training aircraft's performance and handling, e.g., changes in pitch with flap setting and the decrease in vertical lift component as the aircraft banks.



*Have we progressed? It all started with this; the "Blue Box" Link Trainer mounted on a pedestal to allow a range of motion (right), and its blind flying panel (above).*

# DIGITAL PILOT



*The display of a Redbird AATD, an example of level of sophistication available in training devices that can be purchased and operated by FBOs and flying clubs.*

There is no need to replicate control force changes, or to replicate a particular aircraft. Functionally, the PCATD must be able to perform all the expected instrument maneuvers; flight by reference to instruments, abnormal and emergency procedures, radio navigation including GPS, communications and cross-country. It must suffice as a training platform for at least the proce-

dural aspects of instrument training.

Qualified PCATDs, as those from AST or Elite, can be used to log up to ten hours in lieu of flight time, whether under Part 61 or 141. Like all training devices, if used under Part 141, it must be approved by the local Flight Standards office.

PCATDs may be used for training only, not for testing or checking

## A DISTINCTION WITH A DIFFERENCE

The FAA makes a sharp regulatory distinction between simulators and FTDs versus Aviation Training Devices (ATDs). Nowhere is that more true than in the matter of currency.

FAR 61.57(c)(2) permits us to use a flight simulator or an FTD to stay current. As in the aircraft, six approaches, holds and course interception and tracking are required within the last six calendar months. *ATDs are excluded.*

The next section, 61.57(c)(3), opens up ATDs for maintaining currency, but we only get a two-month currency window. In addition, we must log at least three hours of instrument experience and four unusual attitude recoveries - two descending at Vne and two in an ascending stall.

You could get trapped if you didn't do these additional things in an ATD, and/or went beyond the two-month window. Even though the currency requirements in an aircraft, simulator or FTD are less strin-

gent than in an ATD, you get an additional four month's currency.

If you use a combination of aircraft, simulator or FTD and ATD, you get six-month currency. An unspecified number of approaches are required in the aircraft, sim and FTD. Six approaches are mandated in the ATD. All require holds and tracking. There is no three-hour minimum or unusual attitude recovery required.

If you skip the aircraft, you must do six approaches each in a combination of simulator or FTD and ATD along with holds and tracking. The ATD tasks again require three hours logged plus unusual attitude recoveries. Your reward is six month's currency.

You can log all the above yourself, without an instructor, because none are Instrument Proficiency Checks. An IPC is done with an instructor in any of the aforementioned devices if so approved, with the specific exception of a PCATD.

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as toward an Instrument Proficiency Check.

## Basic Aviation Training Devices

When AC 61-136 was published in July, 2008, it again grandfathered FTDs and PCATDs and created the newest models: basic and advanced training devices. So what are these and what's the difference?

Functionally, there is no meaningful difference between earlier devices and a BATD. The specifications are nearly identical. Being newer however, BATDs can offer either round dials or an electronic primary flight display. No mention is made of a multifunction display. A BATD is expected to support LNAV GPS approaches.

Options include WAAS approaches with vertical navigation, autopilots and flight directors, and ADF/NDB approaches.

Perhaps the most important thing you can do in a BATD is an Instrument Proficiency Check under 61.57(c)(1). This can be a big savings in money and

time. With the ability to stop, go back, and review, the learning experience for the pilot can be greatly enhanced.

## AATDs

Advanced Aviation Training Devices include the capabilities of a BATD but specifically mandate a "digital avionics panel" (we're not sure what that is), a GPS navigator, three-axis autopilot and "as appropriate", a flight director. The visual system must support both day and night VFR and IFR.

There must be a separate instructor station that allows interaction and monitoring of the flight without interrupting it. The station includes features such as watching altitudes and tracks along airways, holding entries and patterns and localizer and glide slope alignment or GPS equivalents. An instructor must be able to invoke failures and function as ATC.

AATD specifications include three recommended features. The first is automated ATC, perhaps using programmed scenarios that allow the

instructor to better assess pilot performance without having to play controller. The other two recommendations suggest adjustable cockpit seating and floor-mounted rudder pedals.

## Time Toward the Rating

Time in an FTD, BATD, AATD or flight simulator toward earning an instrument rating may be combined but cannot exceed 20 hours under §61.65 or 50 percent of the required training under Part 141, Appendix C, paragraph 4(b)(4).

Then as now, it can be hard to sell the value of ground trainers to students. They become believers when their palms turn moist on a simulated circling approach at night in weather.

Special thanks to Tom Gilmore whose book, *Teaching Confidence in the Clouds*, inspired this article.

*Fred Simonds is a Gold Seal CFII and factory-certified G1000 instructor. See his web page at [www.fredonflying.com](http://www.fredonflying.com).*

## AUTHORIZED USES OF A BATD

- Completing an Instrument Proficiency Check with an instructor under FAR 61.57(c)(1). Circle to land is not authorized.
- Up to ten hours toward instrument rating flight instruction time under Part 61.65(e)(2) and 61.65(h)(3) or Part 141 Appendix C.
- Up to 2.5 hours of training permitted under Part 61.109(k)(1) in the introduction to the operation of flight instruments, except as limited by Part 141 Appendices.
- Meeting instrument recency of experience requirements of Part 61.57(c)(1).

## AUTHORIZED USES OF AN AATD

- All BATD authorized uses as above.
- On an Instrument rating practical test in accordance with FAA-S-8081-4E (the current Practical Test Standard); although circle to land is not authorized.
- Up to 2.5 hours toward a Private Pilot certificate.
- Up to 50 hours toward a Commercial Pilot certificate.
- On a Commercial Pilot practical test per the Practical Test Standard.
- Up to 25 hours toward an Airline Transport Pilot certificate.
- Under Part 141 as limited by its applicable appendices, or under a special curriculum approved under Part 141.57.