

New Features in Version 1.2

The following new features are added in version 1.2 of Professional Air Traffic Controller Simulator (refer to the attached sheet for the new format of the parameter files):

1. A file containing machine language libraries has been included in the PATCS disk. This file, named "atclib", must be present in order for the simulator to run. You may rename the simulator application to a name other than "Professional ATC Simulator" if you wish. However, do not rename the files "actlib" or "MacinTalk".
2. The simulator will now run on a Macintosh II computer as well as any Macintosh with a large screen monitor. The second record in the parameter file specifies the size of the screen, in pixels. The format is: width,height. The standard Mac screen is 512,342. If you use the values 0,0 then PATCS will get your screen size from parameters stored in your system file. All of the parameter files are shipped with the values 0,0, so PATCS should work on all Macintoshes without any parameter file modification.
3. The first record in the parameter file is a "scenario number." If you use a value of 0, then you will get a completely random pattern of planes, and the pattern will change each time you run PATCS. If you use a value of 1-32767, then a specific pattern of planes will be created, and the scenario will be repeatable; that is, each time you run with the same value for scenario number, you will get the same pattern of planes (and new planes, change requests, runway closings, and so on). Thus, scenario number 1 will represent a certain pattern of events, scenario number 2 a different pattern, up to scenario number 32767. This feature is most useful if you want to be able to run the same scenario time after time.
4. There is now a little "arrow" next to each plane's black dot. This arrow points in the direction of the plane's requested heading, so you can always determine the requested heading by looking at the radar screen only. For planes requesting vectors to airways or runways, the arrow will point in a direction consistent with the requested airway or runway. For instance, if a plane is requesting vectors to J18, the arrow will point straight down. If a plane requests vectors to land on R27, the arrow will point to the left, and so on.
5. The first line of a data block will no longer contain a "T" flag for a plane on a "temporary" heading, since the little arrow points in the direction of the requested heading and the short line points in the direction of the current heading (as it always did). Thus, airway-bound planes will always have a "J" on the first line of their data blocks, just like runway-bound planes will always have a "R" in their data blocks.
6. You can now reposition the two airports. You can move them wherever you'd like on the screen. You can even cause them to overlap, or have the runways intersect if you'd like. The location of the airports is controlled by a new record in the parameter file. Look at record number 26 of the parameter file "ATC params" with the editor; it contains 420,75,150,240. These values cause the airports to be positioned in their original place. The first two numbers are the X/Y coordinates of the airport with runways R36/18. The last two numbers are the X/Y coordinates of the other airport with runways R27/09. When you move the runways, the VOR stations and the control zone boundaries are automatically repositioned as well. The X/Y coordinates are for the upper left hand corner of the runway. If you change the parameter file to 200,100,200,100, then the two runways will form an "L" shape. Experiment with different runway placements. Note that you cannot change airport locations from the Options screen; you can only change them via editing the parameter file.
7. You can now reposition the airways as well. Record number 27 in the parameter file controls where the airways will be positioned. This record contains 4 numbers. The first number defines how far to the right (in pixels) you want airway J36/18 to be; the second number defines how far down the screen you want airway J09/27 to be; the third number defines how far down the screen you want airway J04/22 to start; and the fourth number defines how far to the right you want airway J13/31 to start. Airways always correspond to headings of 0, 180, 90, 270, 45, 225, 135, and 315 degrees; J04/22 must start on the left side of the screen and end at the top or right side of the screen; and J13/31 must start at the top of the screen and end at the bottom or right side of the screen. The best way to understand the airway coordinates is to look at the parameter file and compare it with the airways you see on the screen. You will always have one vertical,

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one horizontal, and two diagonal airways, but by positioning them where you want, you can configure PATCS to correspond (hopefully) to your favorite geographic area.

8. A "conflict advisory" service is now available. This service will give you advance warnings of conflict alerts that will occur in the future unless you take a control action with one of the planes involved. When this service is enabled (via a new field on the Options screen), the simulation figures out where each plane will be for up to 100 cycles in the future. If it foresees any conflict alerts, you will get a conflict advisory message for the planes involved and you should then issue an altitude, speed, or heading command so that a conflict will not occur between the two planes. No points are deducted from your score when a conflict advisory occurs. By using this feature, you will get advance warnings of most conflict alerts (note: this service does not check unidentified aircraft, so you will not get advance notice of conflict alerts involving them). You can enable or disable this service via a new field on the Options screen, and you can also specify how many cycles into the future you would like to "look ahead". Initially, the simulation will look ahead 10 cycles, which is adequate most of the time. Do not look ahead for more than 100 cycles since that is the maximum value allowed in this field. Also, the larger you make this number, the longer the check will take during each cycle, so you should keep this number reasonable. Related to the conflict advisory service, record 28 of the parameter file contains the number of cycles to look ahead (10, as shipped), and the 5th number in record 20 determines whether this service is on (1) or off (0) when you first start out. Note: excessive dependence on this feature will tend to make you a lazy controller!
9. Related to the new conflict advisory service, there is a new command you can issue to a plane: "X", which means disable conflict advisories for this plane. When you enter this command, the data block for that plane is underlined, to remind you that no conflict advisories will be issued for that plane. This command is provided so that you can eliminate "nuisance" conflict advisories. For instance, consider two planes, one on final approach for runway R27, and the other on final for R09. Since their headings are causing them to fly right at one another, and their altitudes are (presumably) around 1000 feet, the conflict advisory service will project their future path and determine that they will be in conflict at some point in the future. The conflict advisory service is not smart enough to know that they will land before they come into actual conflict, but you, of course, are that smart! So, all you have to do is give one of the planes the "X" command and that will prevent any further conflict advisories for that plane. When you give the X command to a plane, his data block is underlined to remind you that he will not be checked for future conflicts. Note, however, that actual conflict alerts--unlike conflict advisories--cannot be overridden.
10. It is now much easier to reposition the data blocks. You can do it without even giving a command to a plane. Here's how: just click on the data block and drag it to where you want it. It will then be repositioned at the new location. You can drag it to any location that corresponds to the 1-9 or +-* commands. You can still use these commands to reposition the data block, if you want. If you try to drag it to an invalid location (too far away or not on a diagonal), it will beep at you.
11. A new command has been added to make it easier to land planes. The command is "C", which means "cleared for the approach." This command may only be given to planes requesting to land. When you issue this command, you are clearing the plane to fly to the appropriate VOR, continually adjusting speed and altitude as he gets nearer to the VOR. When he arrives at the VOR, he will hold until his altitude and speed are at or below 25 (2,500 feet altitude, 250 knots), then he will announce that he is "on final for runway R27" (or whatever runway he is requesting), and he will proceed to land. Thus, you can issue this command to any runway-bound plane and never have to command him again. Any plane cleared for the approach, via this command, will have a "C" in his data block, reminding you that he is cleared. In demonstration mode, also, all runway bound planes are cleared for the approach as soon as they appear on the screen. The "C" command is a toggle; issue it again and you will "unclear" him for the approach (the message will be "United 766, cancel clearance"). The obvious use for this command is to land planes with a minimum of commands. Be careful about clearing too many planes for the same approach at the same time, because they may be involved in conflict alerts if they get too close.

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12. Handoffs have been completely redesigned to make the simulation more realistic. When a new plane is "with you," he will have an "X" in his data block, which signifies that he needs to be accepted by you. You do this via a new command, "0" (zero). When you give a new plane the zero command, the "X" will go away and the message will be "radar contact." This means that you have officially accepted him from the previous controller. You must accept new planes that are with you, and likewise you must initiate a handoff to planes that are about to leave you. When an outbound plane gets near the edge of the screen, you need to hand him off to the next sector. You accomplish this with the zero command again. When you issue him this command, a "H" will appear in his data block, to show you that you have handed him off, and the message will be "contact Oakland center on 135.7," for instance. The handoff zone is shown on the radar screen by a dotted line rectangle, a few miles from the edge of your screen. You may not handoff a plane before he enters the handoff zone. If you fail to hand him off before he leaves the screen, he will have "exited without a proper handoff." By the way, handoffs to the north, south, east, and west may still be suspended, as always; you must not let planes exit in the direction for which handoffs are suspended. If a plane is bound for J27 and handoffs to the west are suspended, and he has just entered the handoff zone, the zero command will be rejected, since handoffs in his intended direction are suspended. You must hold him and wait for handoffs to be reenabled, and then hand him off and let him exit. This method of dealing with handoffs--of taking a positive action to accept a new plane and handoff an outbound plane--is much more realistic than the previous version of PATCS.
13. There are some new entries in the parameter file to support the new handoff philosophy. Look at the 29th record in the file; it has 4 numbers (30,2,5,3). These numbers let you customize exactly where the handoff zone will appear on the radar screen. The first number (30) represents the distance (in pixels) from the edge of the screen that you would like the handoff zone to appear. 30 seems to be a nice distance. If you make it smaller, your job will be tougher because you will have a smaller timeframe in which to handoff outbound flights. If you make it bigger, you will have more time to handoff flights. The second number (2) is the length (in pixels) of the dash in the handoff zone boundary. 2 results in small dashes; you may want to make this number 5 or 10 for larger dashes. The third number (5) is the number of dashes you want going across the screen (x axis), and the last number (3) is the number of dashes you want going up the screen (y axis). Incidentally, the more dashes you have in the handoff zone boundary, the longer it takes to update the screen during each cycle. Records number 30, 31, 32 and 33 let you enter the name and radio frequency of the adjacent sectors (order is north, east, south, and west). When you handoff a plane and the message is "contact Seattle Center on 133 point 4," the center name and radio frequency comes from the entries on these four parameter cards.
14. A new menu has been added to give you control over exactly what is displayed on the radar screen. The new menu is called "Radar," and it contains the following entries: full data block, airways, runways, VORs, control zones, handoff zones, geography, runway barricades, and handoff barricades. If there is a check mark beside the item, then it will be displayed on the radar screen; if it is not checked, it will not be shown (although it will still exist, you just won't see it on the radar screen). The obvious use for this menu is to only show those things of interest to you. For instance, if you are running in ARTCC mode, you would probably want to get rid of the runways, VORs, and control zones, since no planes will want to land. You may want to keep the control zones to make sure you don't have any control zone violations. If you are running in approach mode, you would probably want to get rid of airways and the handoff zones, since they really support enroute mode only. "Full data block" means the standard 2 line data block; if this is not checked, you will get a "partial data block," which consists of only the first line (that is, the plane identification and status flag only, no altitude or speed). Running with partial data blocks is just one step above running in computer failure mode, since you don't see altitude, but it does make the screen update faster. Incidentally, the initial settings of what features are displayed is controlled by the 34th record in the parameter file. This record contains 9 values, 0 or 1, corresponding to the 8 features listed under the "Radar" menu. A 0 means do not display the item, and a 1 means do show it. If, from the Options screen, you choose "Save all options," the current settings of these 9 features are saved as well in the parameter file.
15. You can now run with a different parameter file other than "ATC params." When you start out now, you get a standard Macintosh file dialog box. Choose the parameter file you want to run with. If you click

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"cancel," the simulator will end. Thus, you can build several custom parameter files for different areas of the country or different airports. I have included several examples (like Boston, Seattle, Los Angeles, etc.) using appropriate airports, airport locations, center names, and adjacent centers. I encourage you to use the various options in the parameter file to build your own custom parameter files for your own area of the country. Keep in mind that you can reposition the airports and airways. When you choose "Save all options," they are saved in the same parameter file you ran from.

16. I added a new option to the "Control" menu, called "Start all over." If you choose this, the simulator will start again from the very beginning, prompting you for which parameter file you want to run with. This feature will let you do the following: Suppose you set the parameter file to move the location of the airports, then run the simulation and find that you would like to adjust their locations and run again until you get them positioned exactly where you want them. What you can do is use a desk accessory editor (like MockWrite or MiniEdit) to edit the parameter file from within PATCS, then choose "Start all over" and you can see the immediate results of your parameter file edit changes without having to rerun PATCS from the Finder.
17. Did you notice the entry "geography" under the new "Radar" menu? When this option is checked, the simulation will display user-defined geographic features and user-defined text on the radar screen. The geographic features and text are defined in the parameter file. Record number 35 in the parameter file contains one value: the number of geographic features that you are defining. If record number 35 contains a 5, for example, then records 36-40 will contain the definitions of the 5 features. If record 35 contained a 9, then records 36-44 will define the 9 geographic features. If you don't want any geographic features, record 35 must contain a zero. Here is how features are defined:

#points,x coord pt 1, y coord pt 1, x coord pt 2, y coord pt 2,.....x coord pt n, y coord pt n

Each feature may have up to 10 points that define it. You may have up to 20 features. Here is an example:

<u>record#</u>	<u>contents</u>
35	4
36	3,121,69,147,78,215,304
37	2,27,109,138,200
38	2,189,210,304,215
39	5,100,200,100,300,200,300,200,200,100,200

In this example, 4 features are defined. The first feature consists of 3 points, which define a line with 2 segments. The second feature consists of a single line. The third feature is also a single line. The fourth feature is actually a square. All features must be defined via an editor like Edit or MacWrite (or MockWrite or MiniEdit while running PATCS!). Do not attempt to include more than 10 points in a feature, or more than 20 features; if you do, the program will probably crash. What kinds of things would be considered geographic features? Possibilities include: coastlines, mountain ranges, highways, lakes, landmarks (buildings, etc.), other airways (controller-defined), restricted areas (controller-defined), controller preferred transition routes, city boundaries, small airports, holding zones or points, state borders, etc., etc. This is an area to let your imagination run wild. With this option, you can really tailor the radar screen to your own desires.

18. Related to the geographic features just mentioned, you now have the capability to add text to the radar screen wherever you want. You can display up to 20 text strings. Whenever the "geography" option is checked, your text will be displayed as well. You define your text strings in a similar fashion as the geographic features, in the parameter file. After your last geographic feature record, you should have a record that has one value on it, the number of text strings that you want to define (from 0 to 20). After this line, you will have a separate line for each text string, in the following format:

x coord, y coord, text string you want displayed

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Here is an example:

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4
106,92,R-1001
255,87,my hold zone
167,50,my house
300,59,old folks home
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Do not include any commas in your text string. If you don't want any text strings, don't forget to include a record with a zero. If you do not want any geographic features or text strings, then records 35 and 36 must both contain a zero. The parameter files "ATC demo" and "ATC params" have an example or two of geographic features and text strings. Refer to these 2 files to see how to use these new features. I included these two features so that you could really customize your radar screen in a way that makes sense to you. If you create a screen you really like, please send me a copy of the parameter file.

19. I have enhanced the use of the numeric keypad for issuing commands. If your Macintosh has a numeric keypad with a "clear" key on it, you may use this key for the "cleared for the approach" command. The "c" command will still work as well. In addition, the "5" key can be used to assign one of the eight standard degree headings to a plane (this is useful on the numeric keypad only, really). To use the 5 key to assign a heading, use the keypad numbers as a directional guide. Thus, to assign a heading of 315 degrees, the command is "57"; to assign a heading of 180 degrees, the command is "52". The "5" heading command can be used to assign any of the 8 standard headings (0, 45, 90, 135, 180, 225, 270, and 315). This is most useful in vectoring planes to intercept airways. This makes the four most common commands (dot, 0, heading, and cleared for approach) accessible from the numeric keypad, so you can issue most commands just using the keypad itself.
20. When giving a command to a plane, you now have a limited amount of time in which to enter the command. This amount of time is specified in the third record of the parameter file. As shipped, this value is 60, which means that you have 60 seconds to enter a command for an aircraft. At the end of 60 seconds, the simulation will beep and continue if you do not press the RETURN or ENTER keys. If you have typed in part of a command and wish to just cancel it, just press the space bar and your command will be cancelled and the simulation will continue. You can adjust this value to a larger setting to allow more time for novice controllers to enter commands, or you can make it smaller for more experienced controllers. If you make this value zero, then you will not be able to enter any commands at all! This feature, of course, removes the ability to "freeze" the simulation and let the controller assess the situation and plan his or her next move. While this may seem like a drawback, it effectively makes the simulation much more realistic, because now you cannot "stop the action" for as long as you want, as you could previously.
21. The "flashing" of data blocks has been adjusted. In the following situations, the data block will be "inverted" (that is, white bits become black, and vice versa) briefly, and a message will be spoken:
 - new plane - "Delta 111 is with you requesting vectors to"
 - conflict alert - "conflict alert - Delta 111 and Piedmont 444...."
 - conflict advisory - "conflict advisory - Delta 111 and Piedmont 444"
 - control zone violation - "Delta 111 has violated the control zone"
 - crash - "Delta 111 has crashed - call NTSB at once"

The flashing of data blocks will stop when the situation requiring action is resolved.

22. I changed the data block symbol for a climbing aircraft from "+" to "†", and the symbol for a descending aircraft from "-" to "¬". This is a more graphic representation of what the plane is doing.
23. When you are asked to choose a parameter file, either at the beginning or after the "start all over" menu command, if you choose "cancel" from the file dialog box, the program will end.

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24. If you choose "save all options" from the options screen, you will be asked for the filename to save to. The name of the current parameter file will appear above a small window where you should enter the name of the desired file to save to. You can save to a new file or an old file. You can cancel the save operation by clicking the "cancel" button.

PATCS Parameter File Documentation, Version 1.2

Record #	Description
1*	scenario number (0=random, 1-32767 = repeatable scenarios)
2*	Mac screen size (width,height): 512,342 for standard Mac; 0,0 to use the screen size stored in your system file
3	ARTCC center name
4	airport name for runways 36/18
5	airport name for runways 09/27
6-18	carrier info: big(1)/small(0), ID, carrier name
19	on(1)/off(0) indicators: demo mode, turn at airways, failure mode, voice, conflict advisory
20	levels: skill(1-5), position(1=mix, 2=ARTCC, 3=approach), voice level (1=low, 2=medium, 3=high), voice speed (1-5)
21	start with, random flag, # in shift, random flag, secs in update cycle
22*	MacinTalk low, medium, and high voice settings
23*	MacinTalk voice speed settings (5)
24*	maximum planes to handle at one time
25*	airport locations (36/18 and 9/27): x,y,x,y
26*	airway locations (36/18, 09/27, 04/22, 13/31): x1,y1,x2,y2, ... (repeat for other 3)
27	look ahead cycles for conflict advisory
28*	handoff params: inset pixels, dash length, horizontal dashes, vertical dashes
29-32*	north/east/south/west: adjacent center name, radio frequency
33	on(1)/off(0) feature display for radar screen: full data blocks, airways, runways, VORs, control zones, handoff zones, geography, runway barricades, handoff barricades
34*	number of geographic features (0-20)
(35-n)*	geographic feature definitions: # points (2-10), x1,y1,x2,y2, ... (up to 20 records)
35*	number of text strings (0-20)
(36-n)*	text string definitions: x,y, text string (up to 20 records)

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* = only changeable via editing the parameter file (that is, not on the Options screen)