ATF2 Flight Simulator Updates

- Overview of FS goals and requirements
- Summary of updates since Dec meeting
  - Core software
  - Client applications

Glen White, SLAC
8th ATF2 Project Meeting
June 2009

Flight Simulator Goals

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- Provide simple to use, beam dynamics oriented, portable control access framework for ATF2 tuning tasks.

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- Provide simple to use, beam dynamics oriented, portable control access framework for ATF2 tuning tasks.
- Simple and reversible transition from beam dynamics simulation to accelerator ready code.
- Ability for international collaborators to develop beam tuning tools without need for expert level knowledge of control systems.
- Flight simulator operates in simulation mode at external location in the same way as the production system deployed at ATF2.

ATF2 Implementation

FS Client

- Test apps
- External code interface
  - SAD/MAD/PLACET/BMAD

tcp/ip

tcp/ip

...

FS Server

- Trusted apps
- Utility apps
- Access Control
- Lucretia <-> Control system sync (EPICS CA)

EPICS CA

QBPM IOC (EPICS)

HAPS IOC (EPICS)

Mover IOC (EPICS)

ATF IOC (EPICS)

ATF EPICS

VSYSTEM

Socket Server Interface

Simulation Mode

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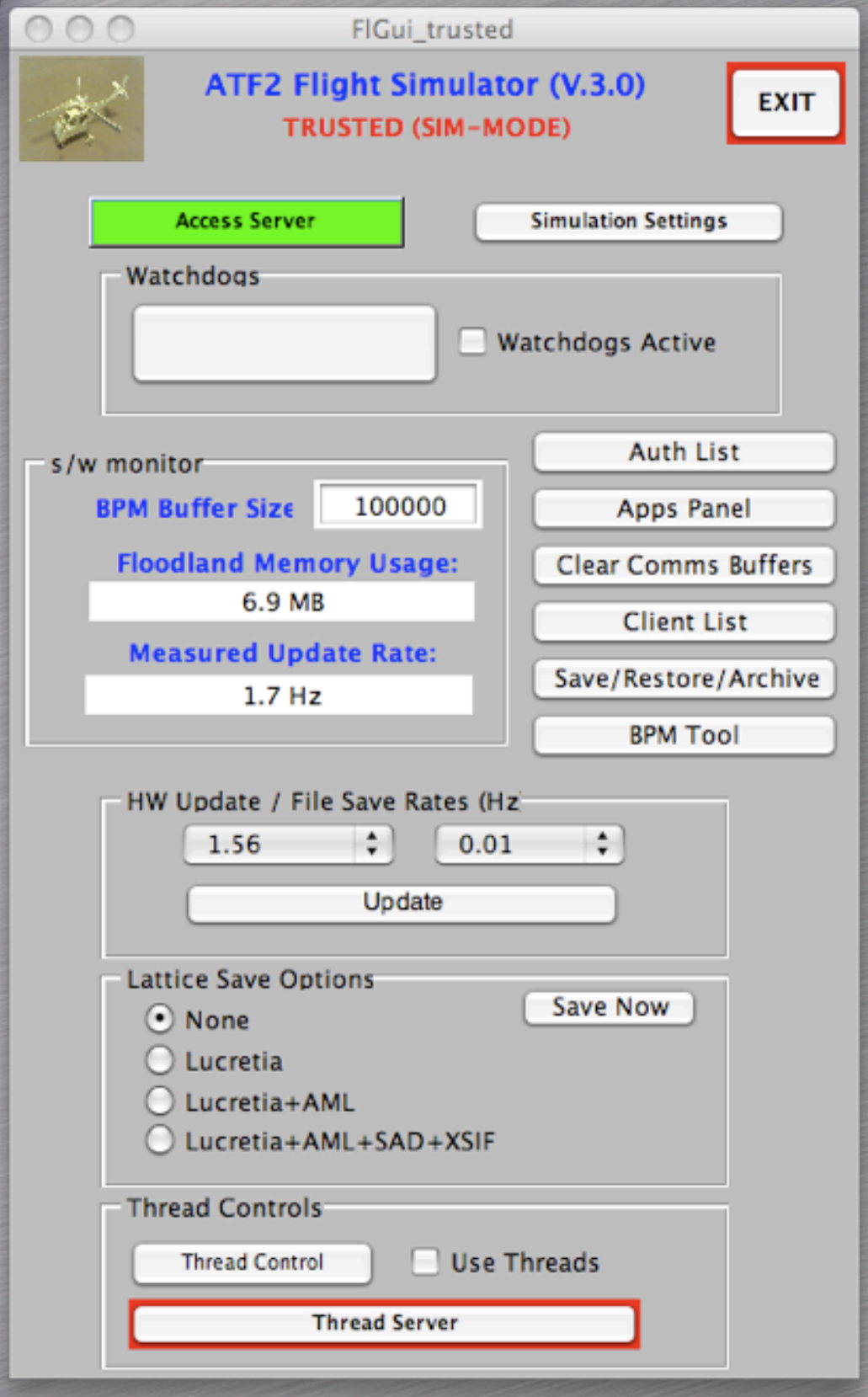
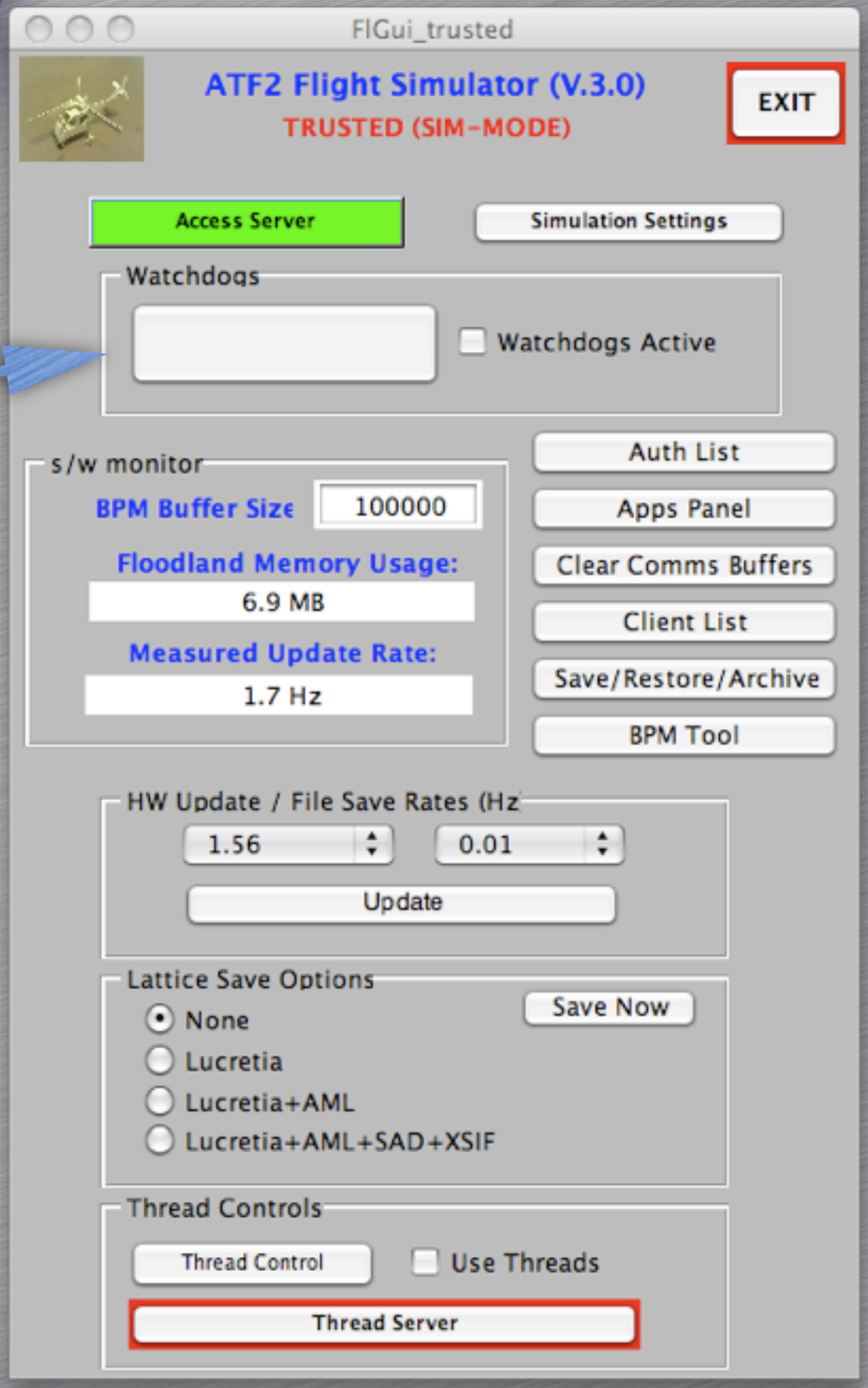
Server Development



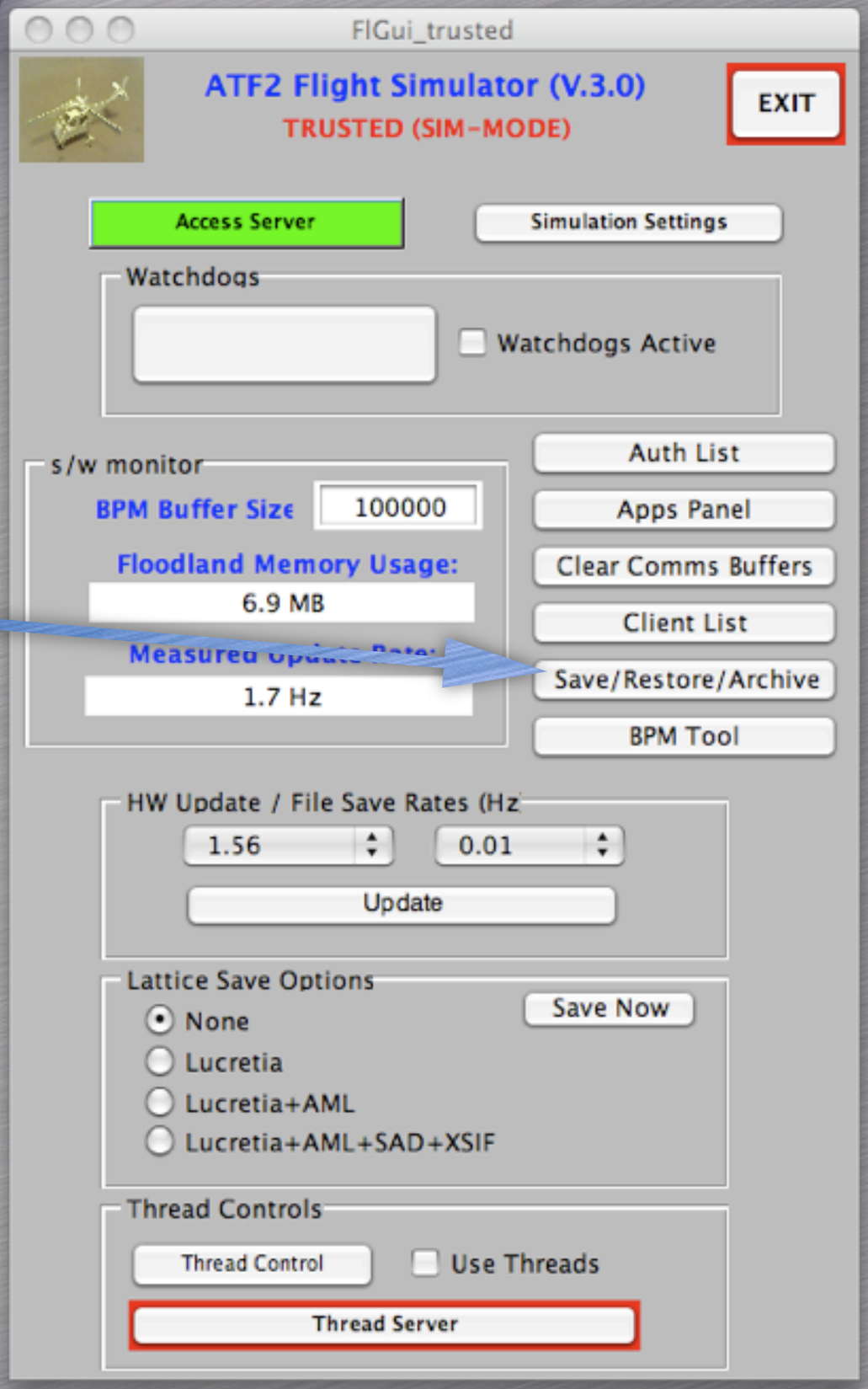
Server Development

- Watchdog apps



Server Development

- Watchdog apps
- Improved Archiver tool



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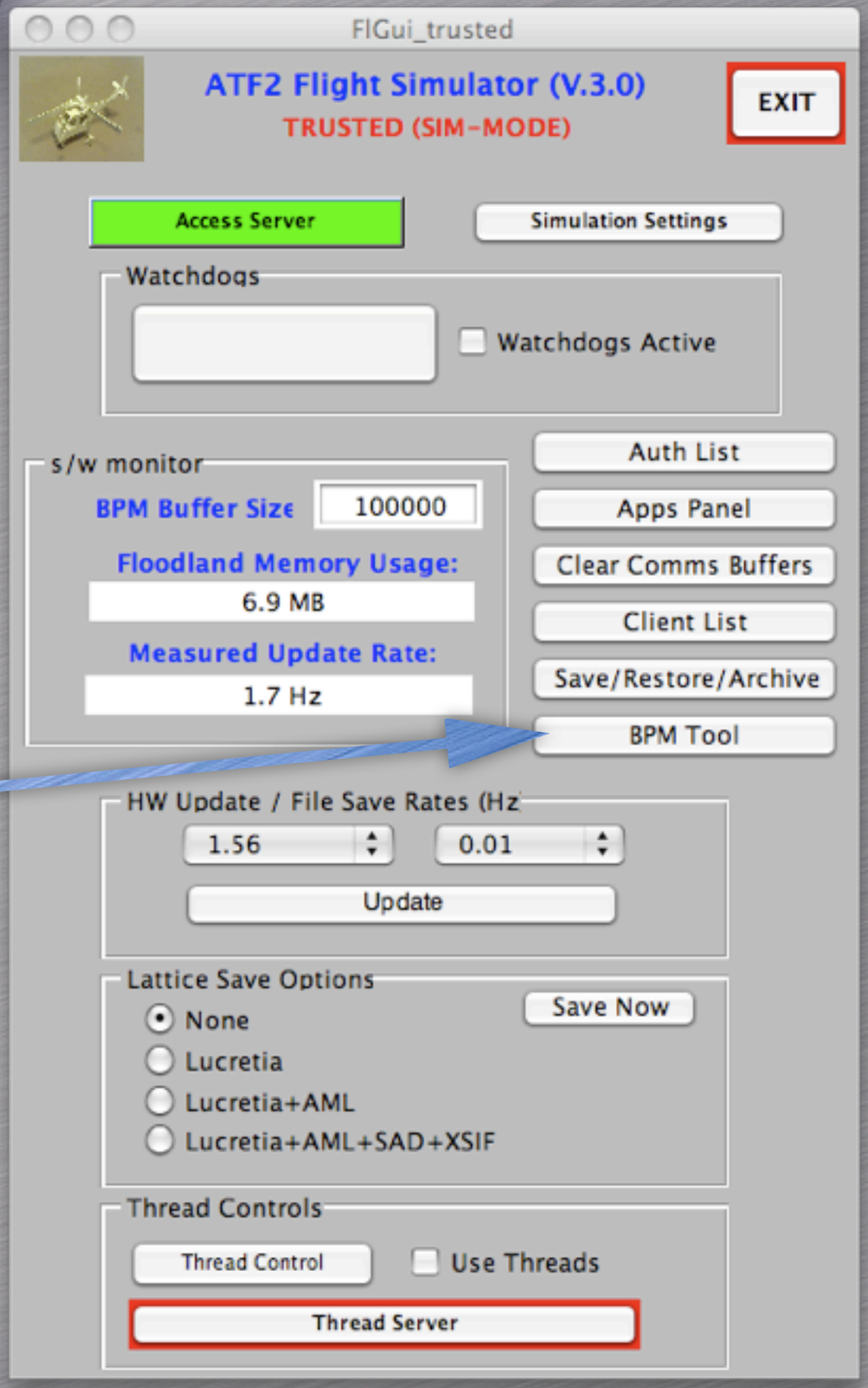
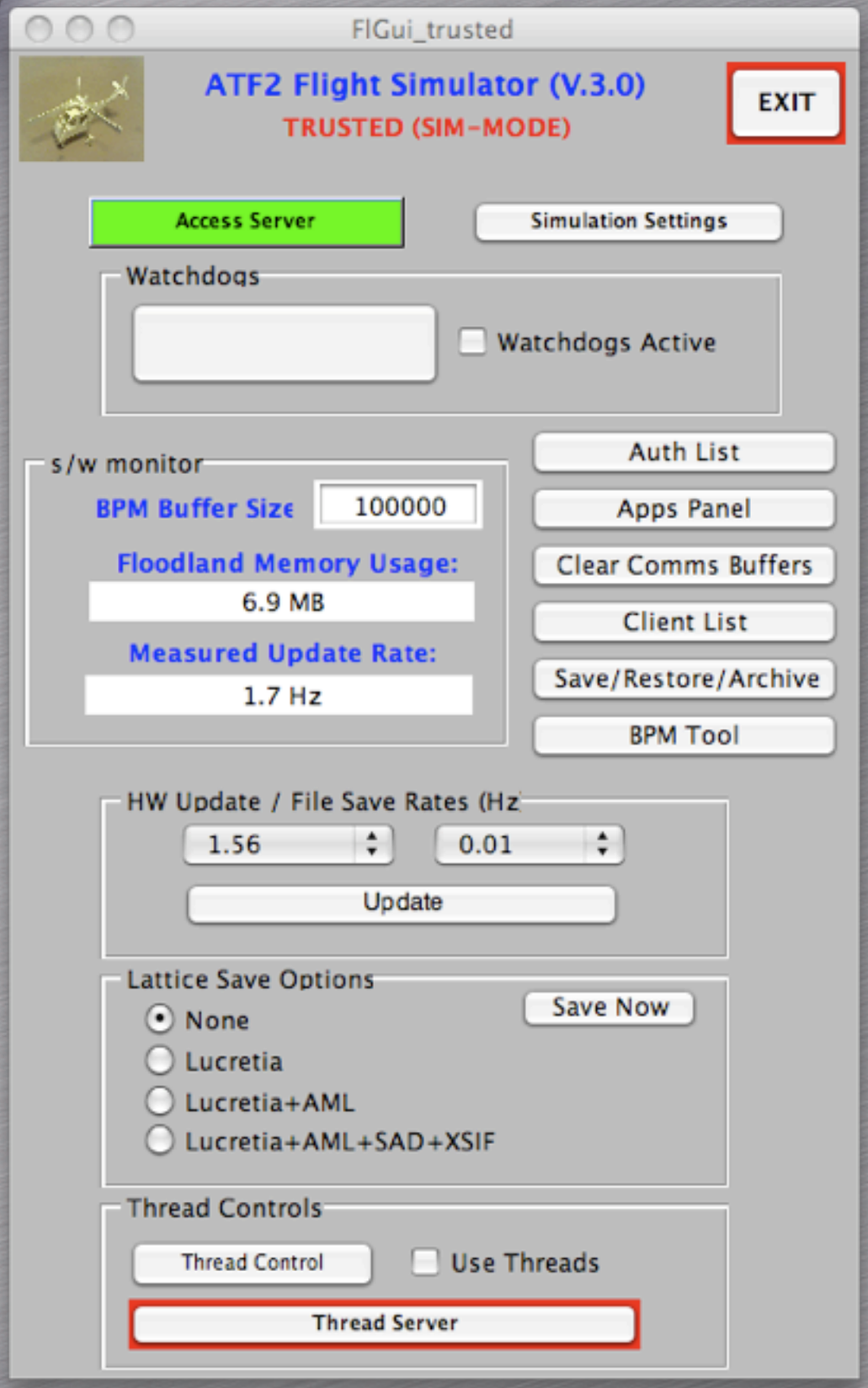
- Watchdog apps
- Improved Archiver tool
- BPM tool



Server Development

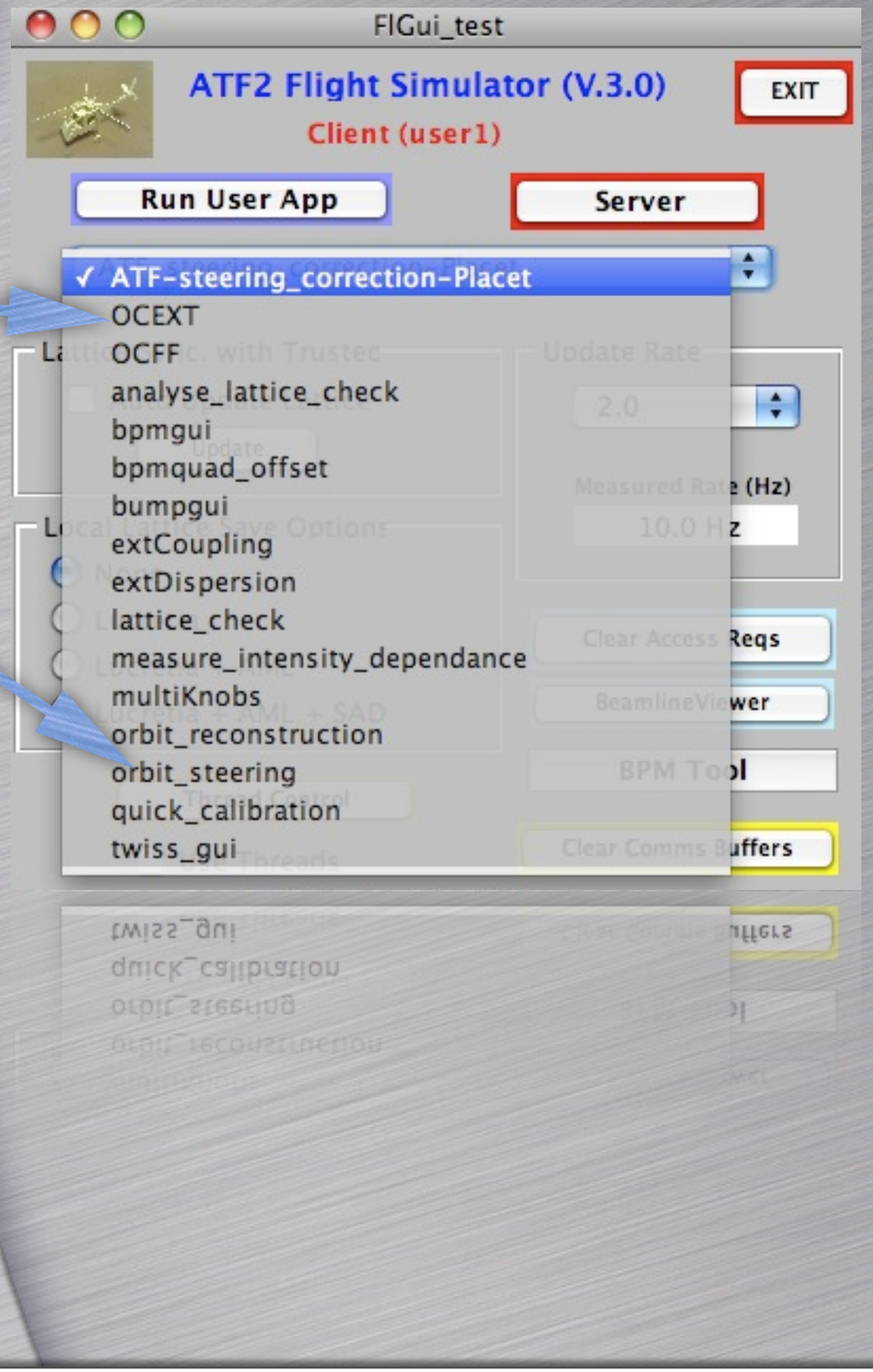
- Watchdog apps
- Improved Archiver tool
- BPM tool
- Server available through VNC on controls subnet.



Client Apps Development

Client Apps Development

- EXT Steering



Client Apps Development

- EXT Steering
- FFS Steering

Client Apps Development

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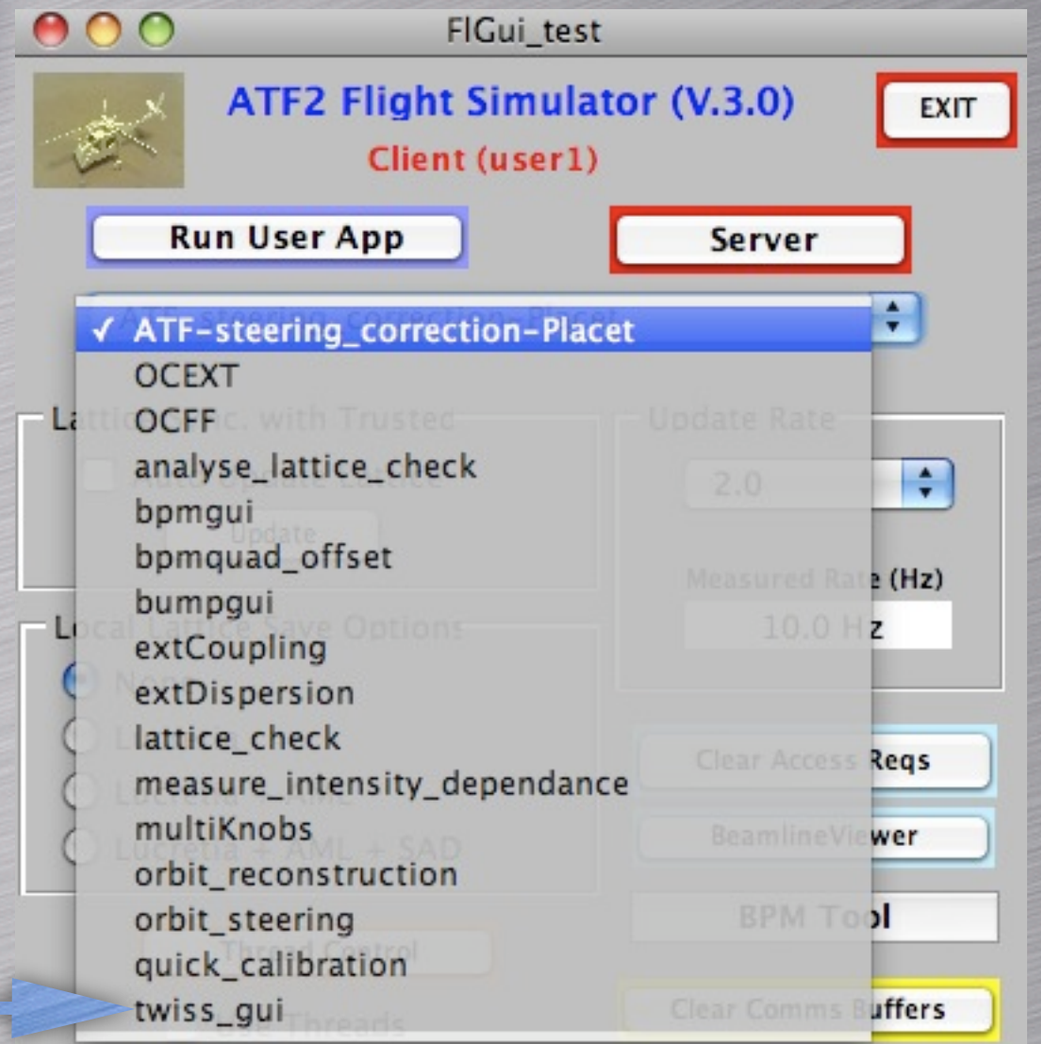
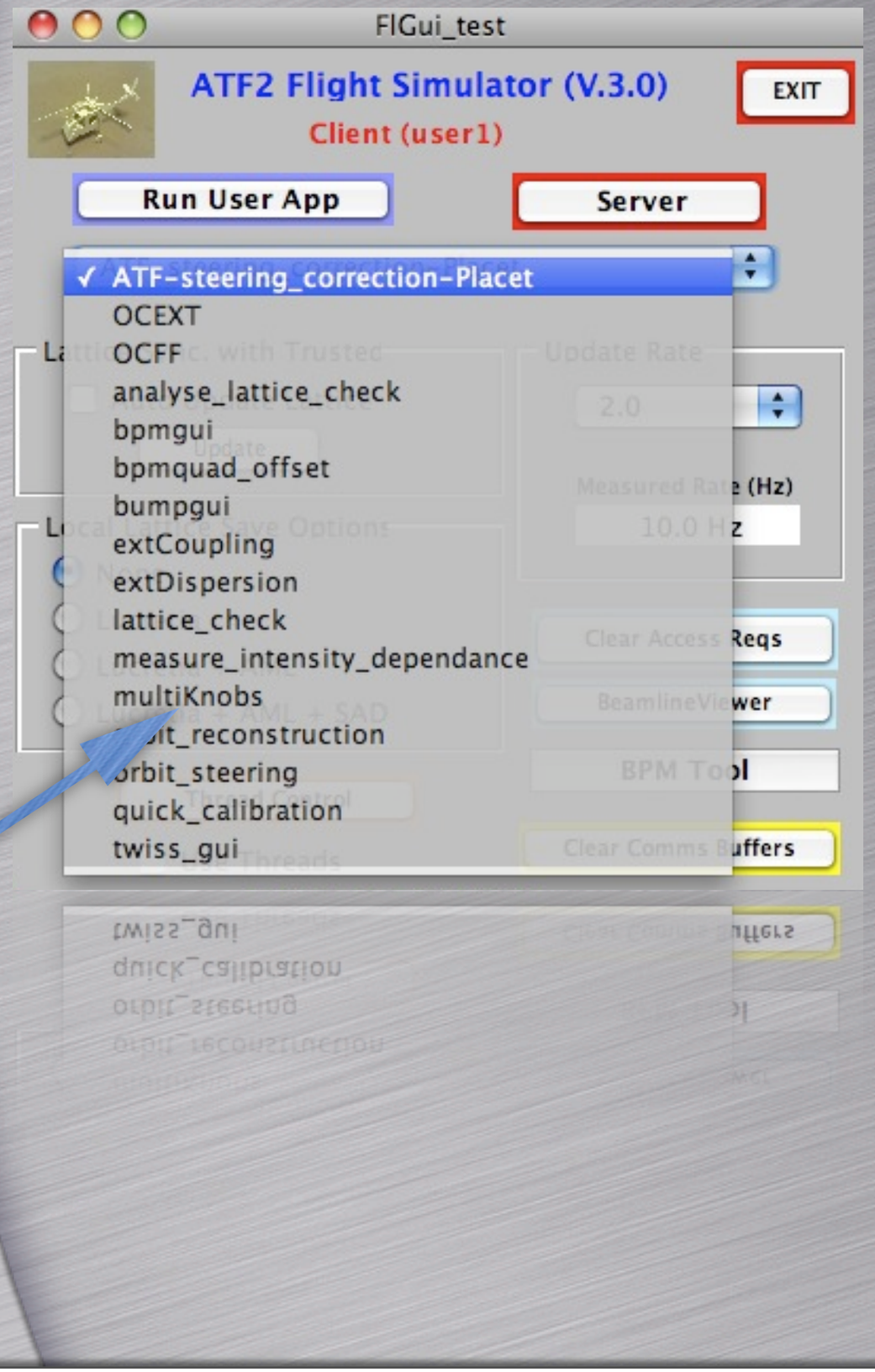
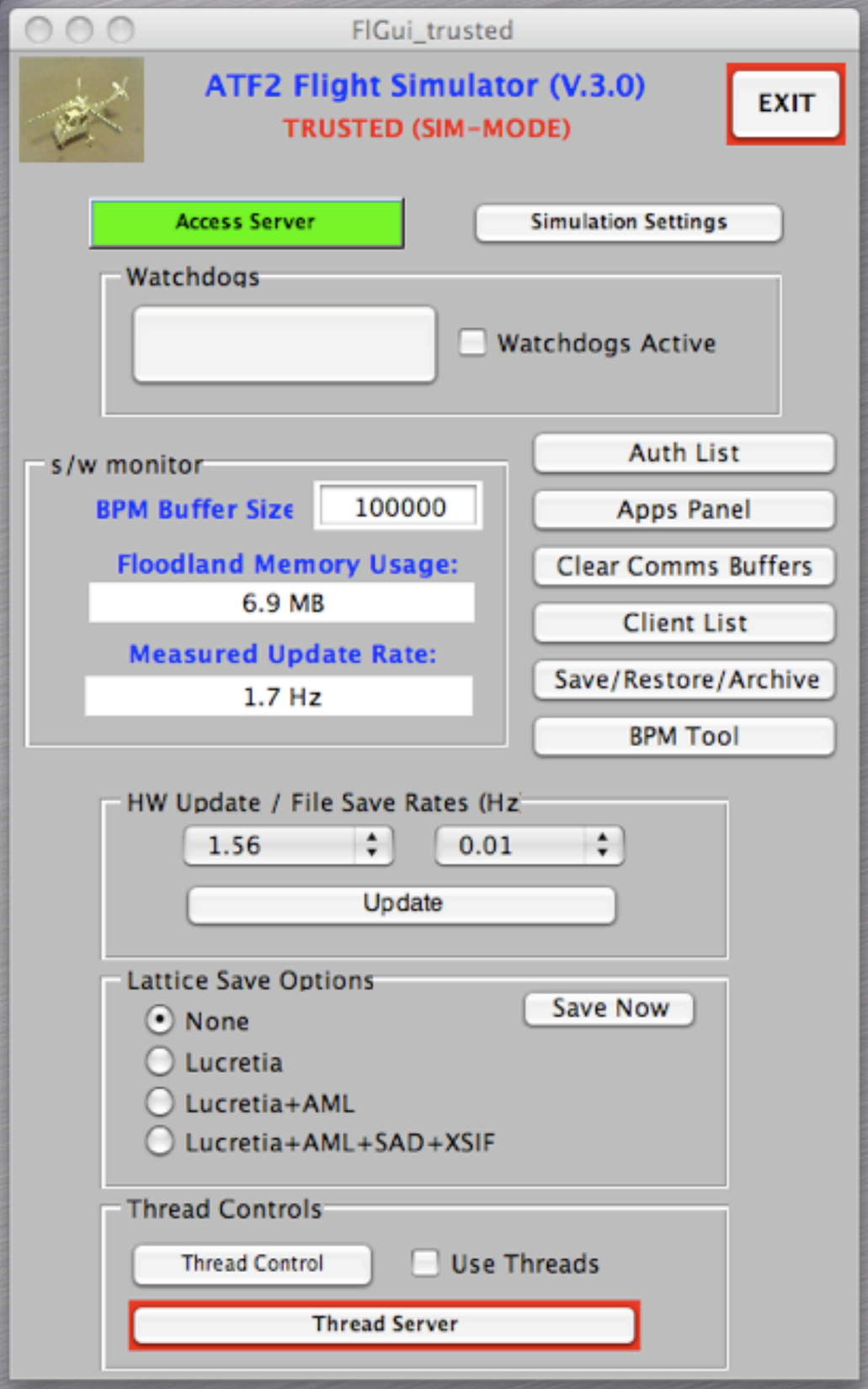


Client Apps Development

- EXT Steering
- FFS Steering
- Improved EXT dispersion tool
- Improved Twiss Tool with MAD interface
- IP multiknobs (functional interface only)



FFS Matching Quad Polarities



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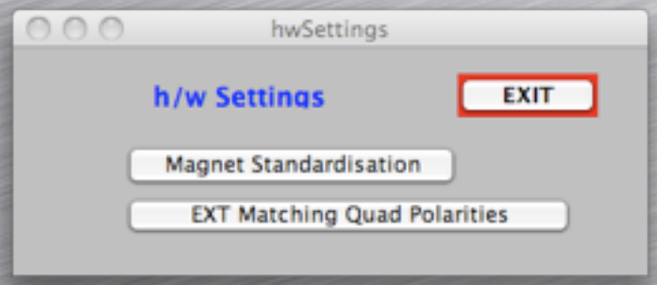

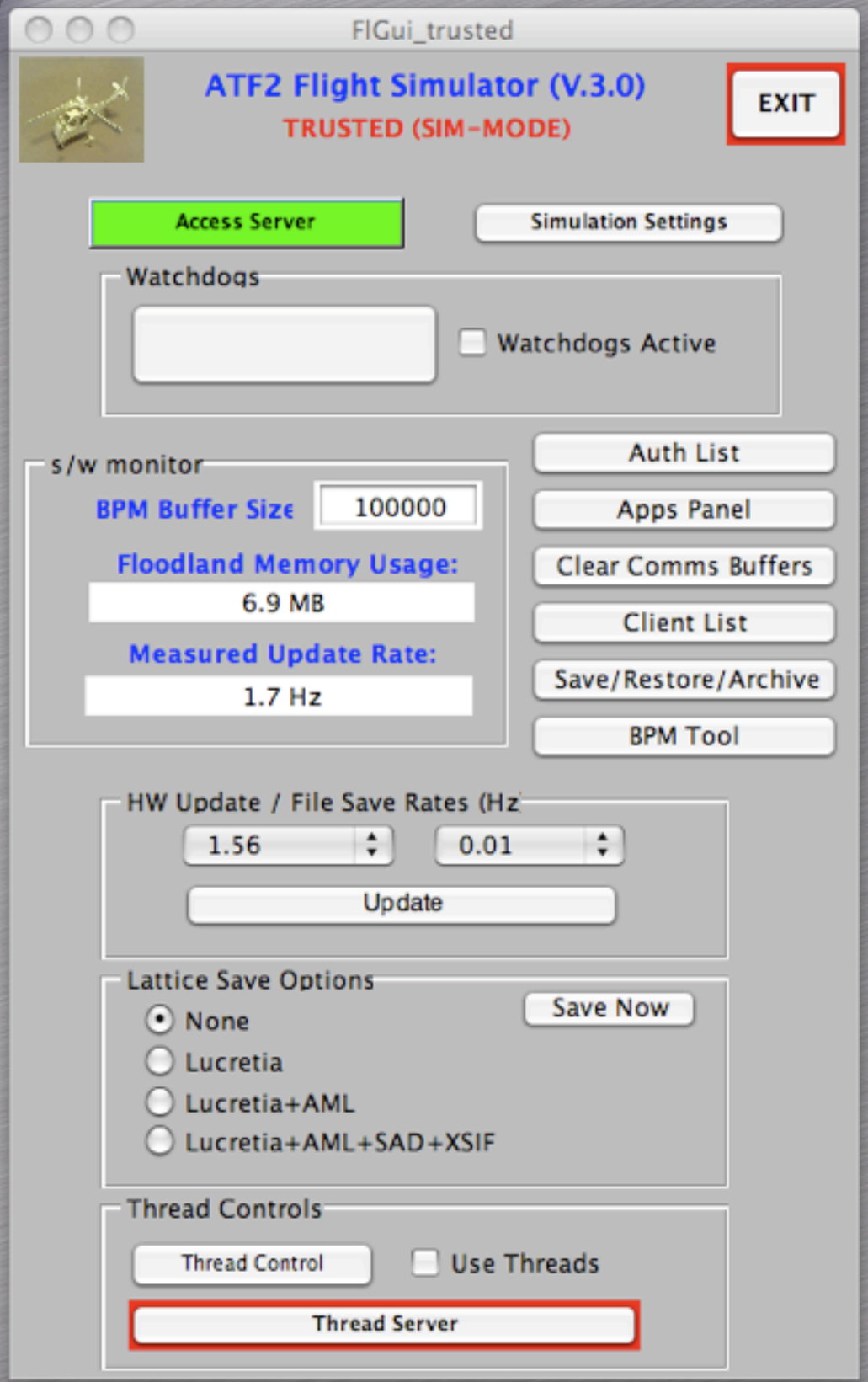

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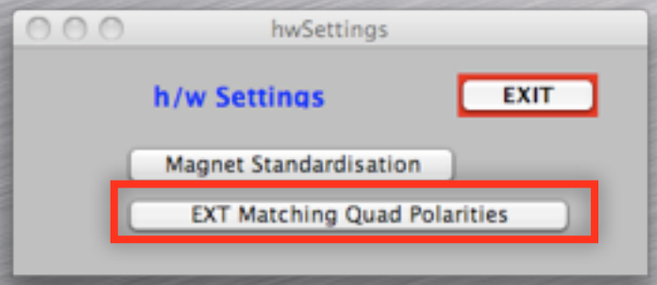
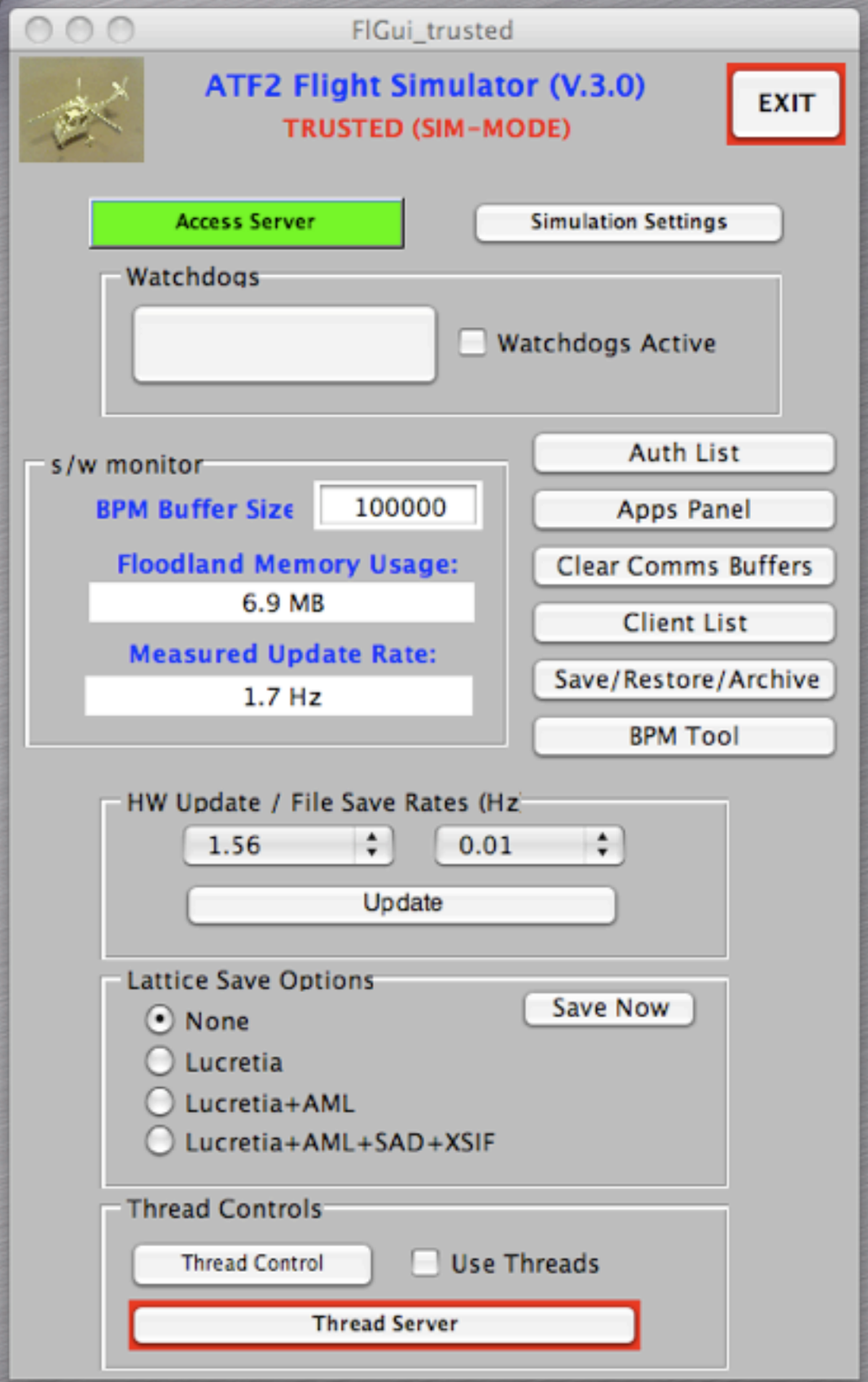




FFS Matching Quad Polarities

setQMffPolarities

Set FFS Matching Quad Polarities

EXIT

QM16FF ◉ QF(N) ○ QD(R)

QM15FF ○ QF(R) ◉ QD(N)

QM14FF ○ QF(R) ◉ QD(N)

QM13FF ◉ QF(N) ○ QD(R)

QM12FF ◉ QF(N) ○ QD(R)

QM11FF ○ QF(R) ◉ QD(N)

Write To Database

Refresh

FlGui_trusted

ATF2 Flight Simulator (V.3.0)

TRUSTED (SIM-MODE)

EXIT

Access Server

Simulation Settings

Watchdogs

Watchdogs Active

s/w monitor

BPM Buffer Size 100000

Floodland Memory Usage:

6.9 MB

Measured Update Rate:

1.7 Hz

Auth List

Apps Panel

Clear Comms Buffers

Client List

Save/Restore/Archive

BPM Tool

HW Update / File Save Rates (Hz

1.56 0.01

Update

Lattice Save Options

Save Now

◉ None

○ Lucretia

○ Lucretia+AML

○ Lucretia+AML+SAD+XSIF

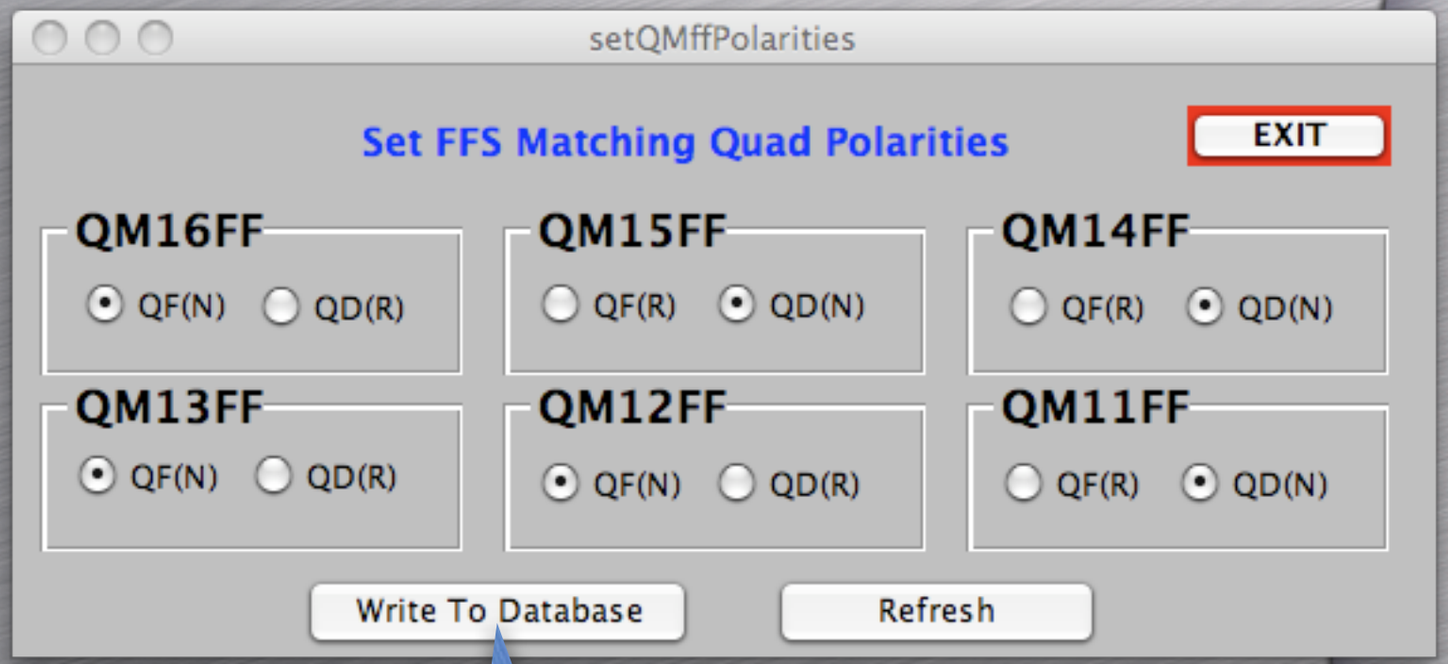
Thread Controls

Thread Control

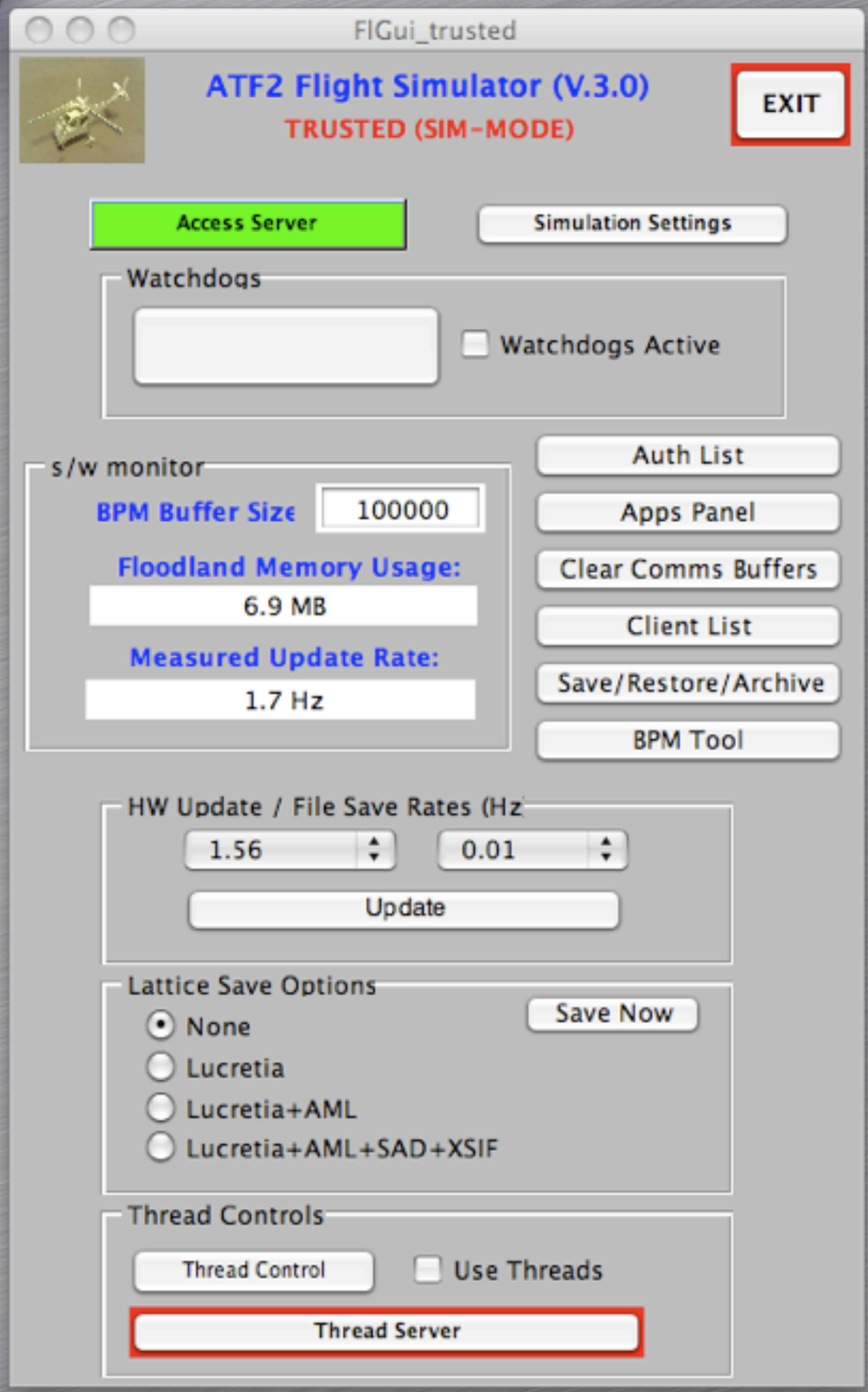
Use Threads

Thread Server

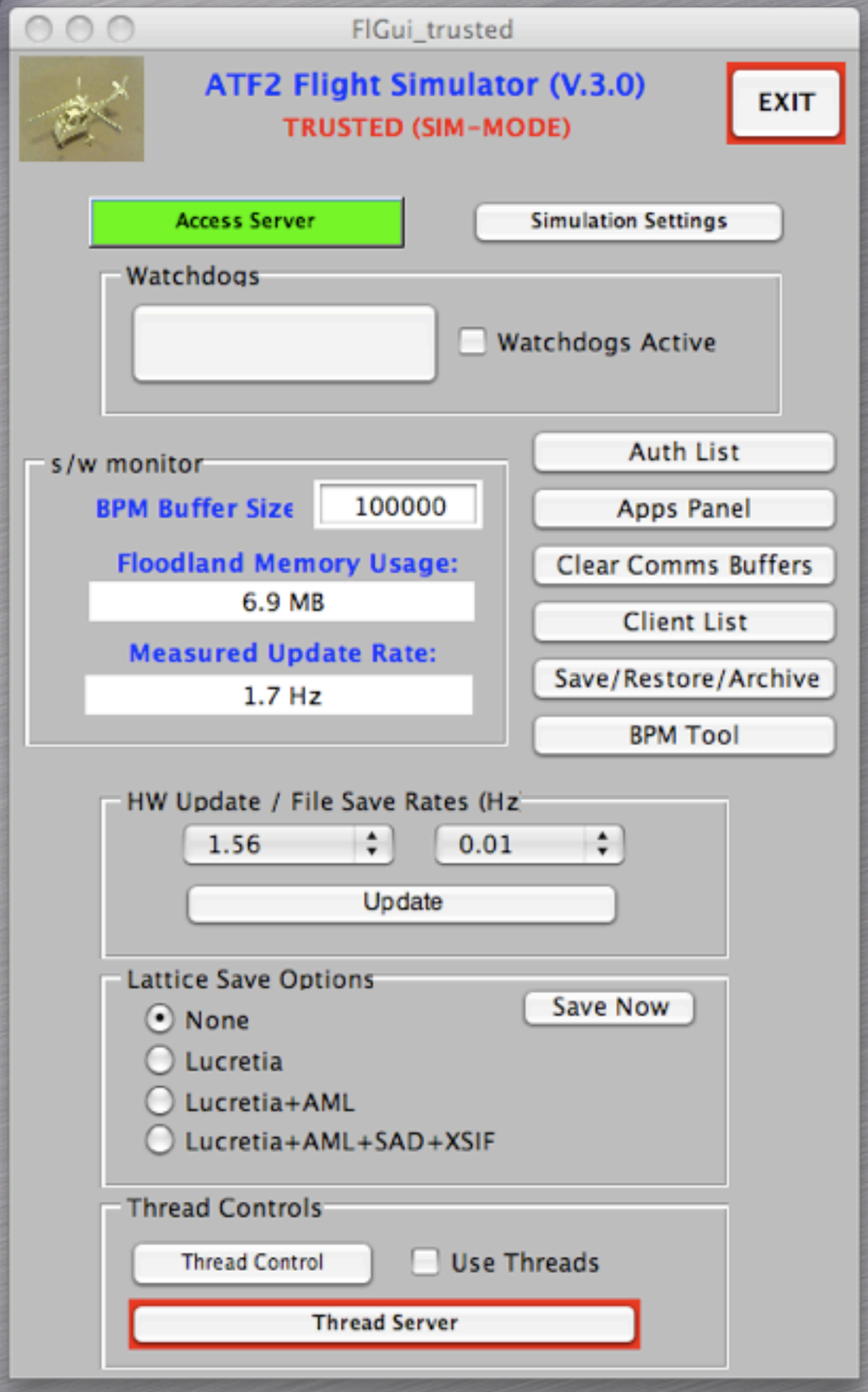
FFS Matching Quad Polarities



- Panel writes polarities (QF=1, QD=-1) to EPICS on pressing button



BPM Tool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ATF2 Flight Simulator (V.3.0)
TRUSTED (SIM-MODE)
EXIT
Access Server
Simulation Settings
Watchdogs
Watchdogs Active
s/w monitor
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Floodland Memory Usage:
6.9 MB
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Auth List
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Save/Restore/Archive
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HW Update / File Save Rates (Hz
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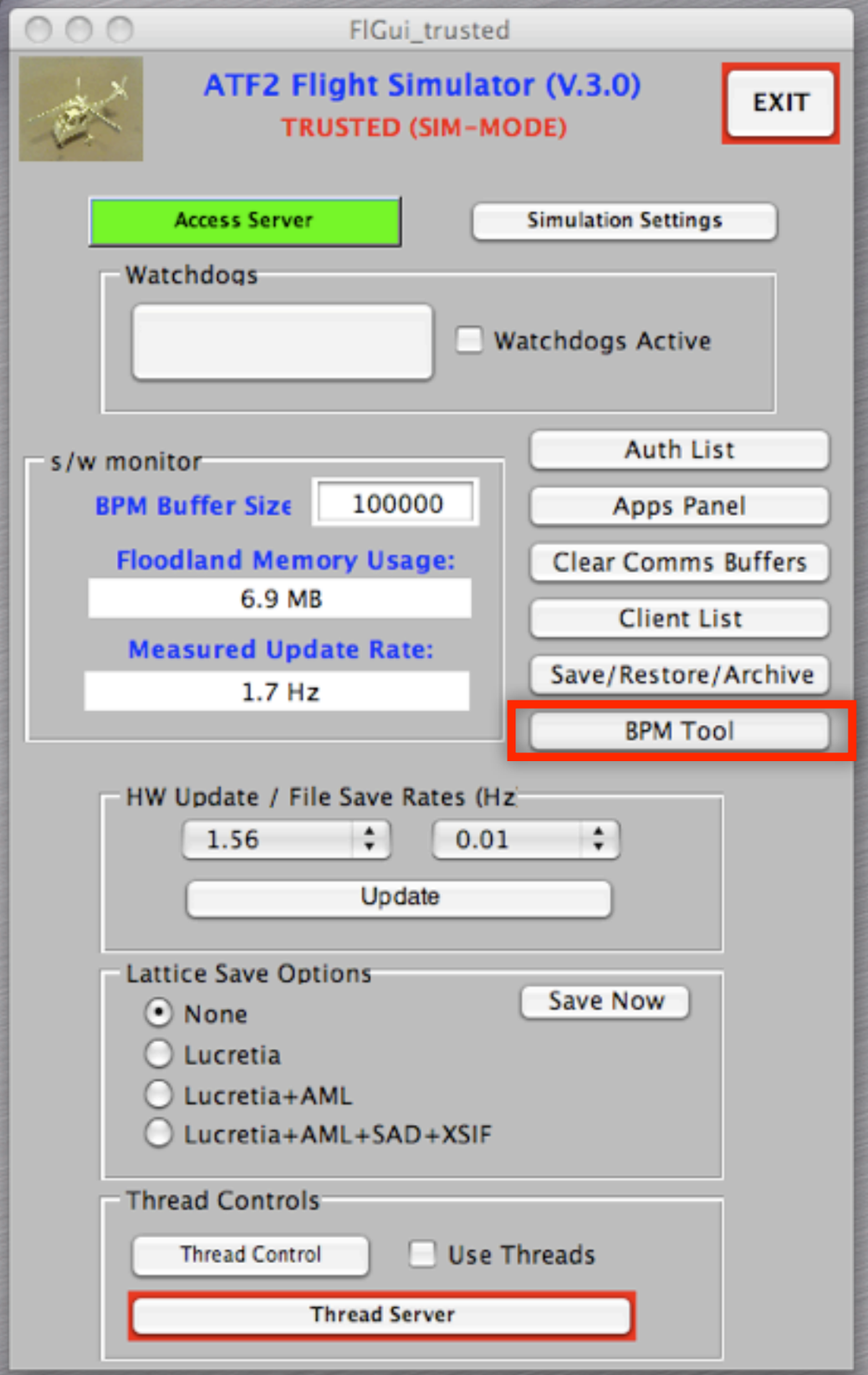
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BPM Tool

FlBpmTool

BPM Tool

EXIT

Status Selection

- h/w
- Calibration
- Use Bpm
- Use Cal

Sel. True | Sel. False | All True | All False

Use Tag

global

Make New | newname | Delete

Region Select

All

Ref Orbit

Save to Memory
Restore from Memory
Save to File
Restore from File
Save Default
Restore Default
Save to Server
Restore from Server
Take New

BPM Info

1 MB20R : True
2 MB21R : True
3 MB22R : True
4 MB23R : True
5 MB24R : True
6 MB25R : True
7 MB26R : True
8 MB27R : True
9 MB28R : True
10 MB29R : True
11 MB30R : True
12 MB31R : True
13 MB32R : True
14 MB33R : True
15 MB34R : True
16 MB35R : True
17 MB36R : True
18 MB37R : True
19 MB38R : True
20 MB39R : True
21 MB40R : True
22 MB41R : True
23 MB42R : True
24 MB43R : True

Orbit Plotting

Plot
Main Orbit
Ref. Orbit
Diff. Orbit

☑ ave+cuts?
☑ error bars?

RMS Orbit (um):

RMS Diff. (um):

Current Reference Orbit In Use

Memory: 05-Jun-2009 11:35:31

Reference Orbit Parameters

ave: 10 Q Cut: 0.9

BBA Tasks

☐ Auto Subract Offsets?

Edit BPM Offsets: 0 0

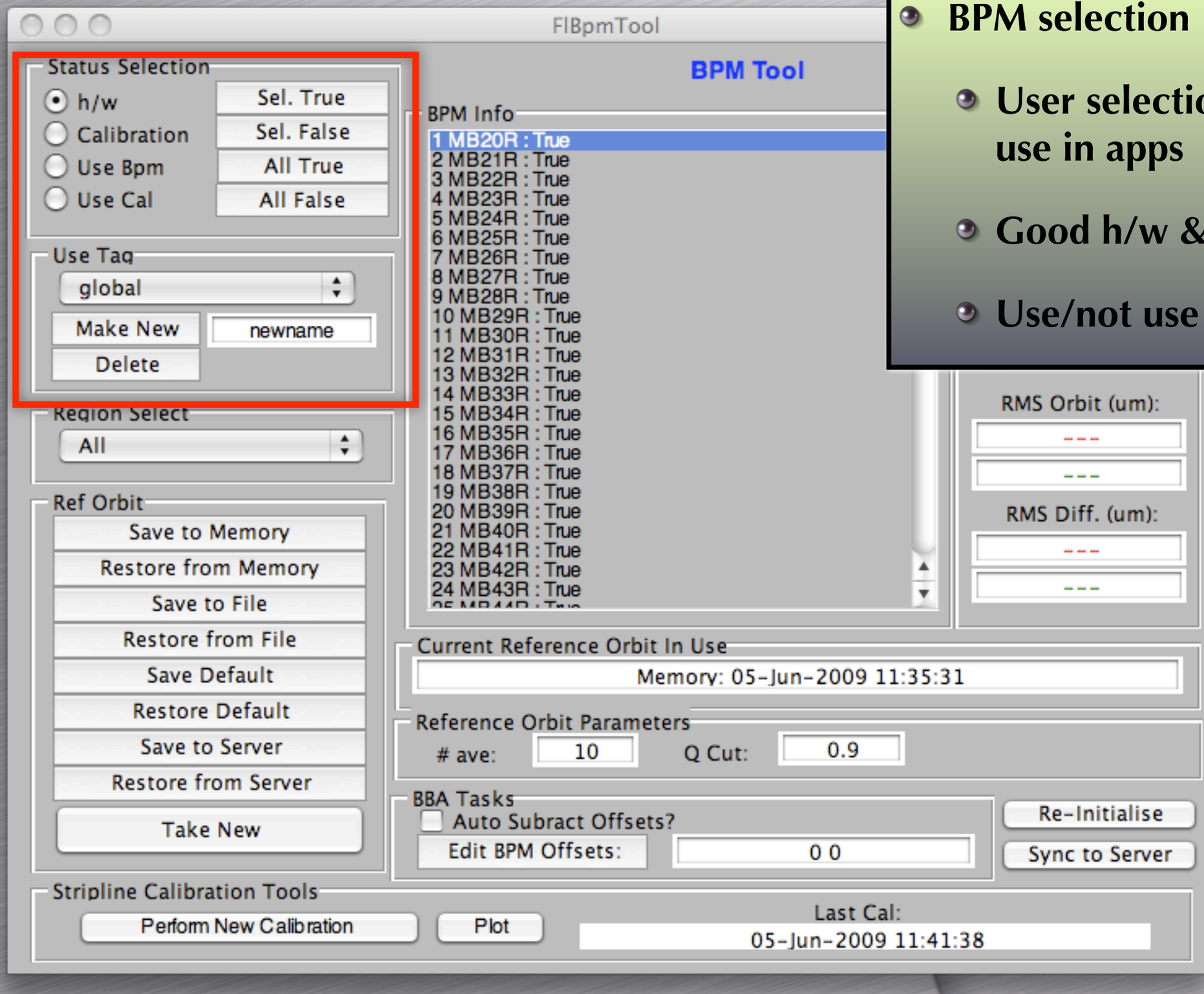
Re-Initialise
Sync to Server

Stripline Calibration Tools

Perform New Calibration | Plot

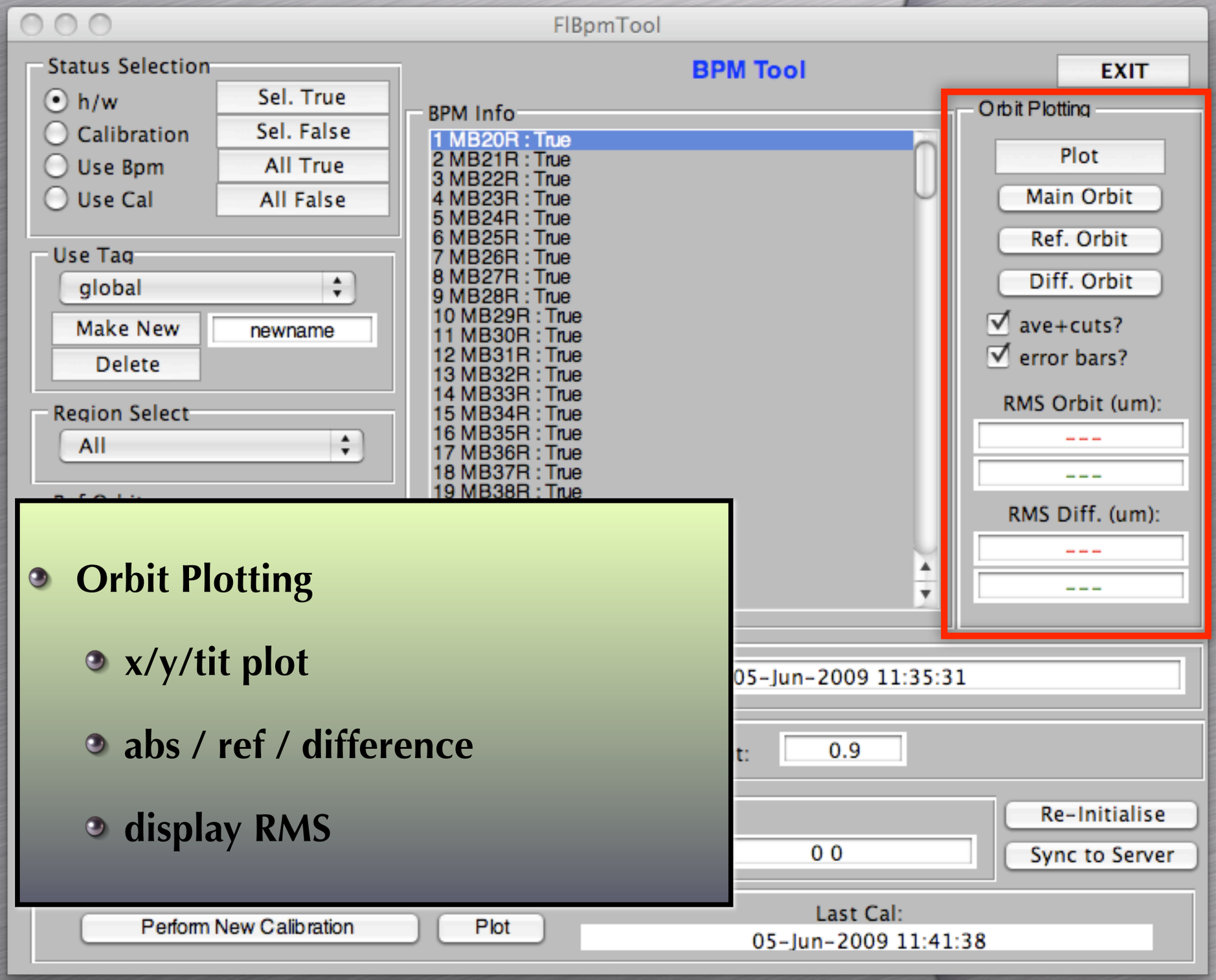
Last Cal:
05-Jun-2009 11:41:38

BPM Tool



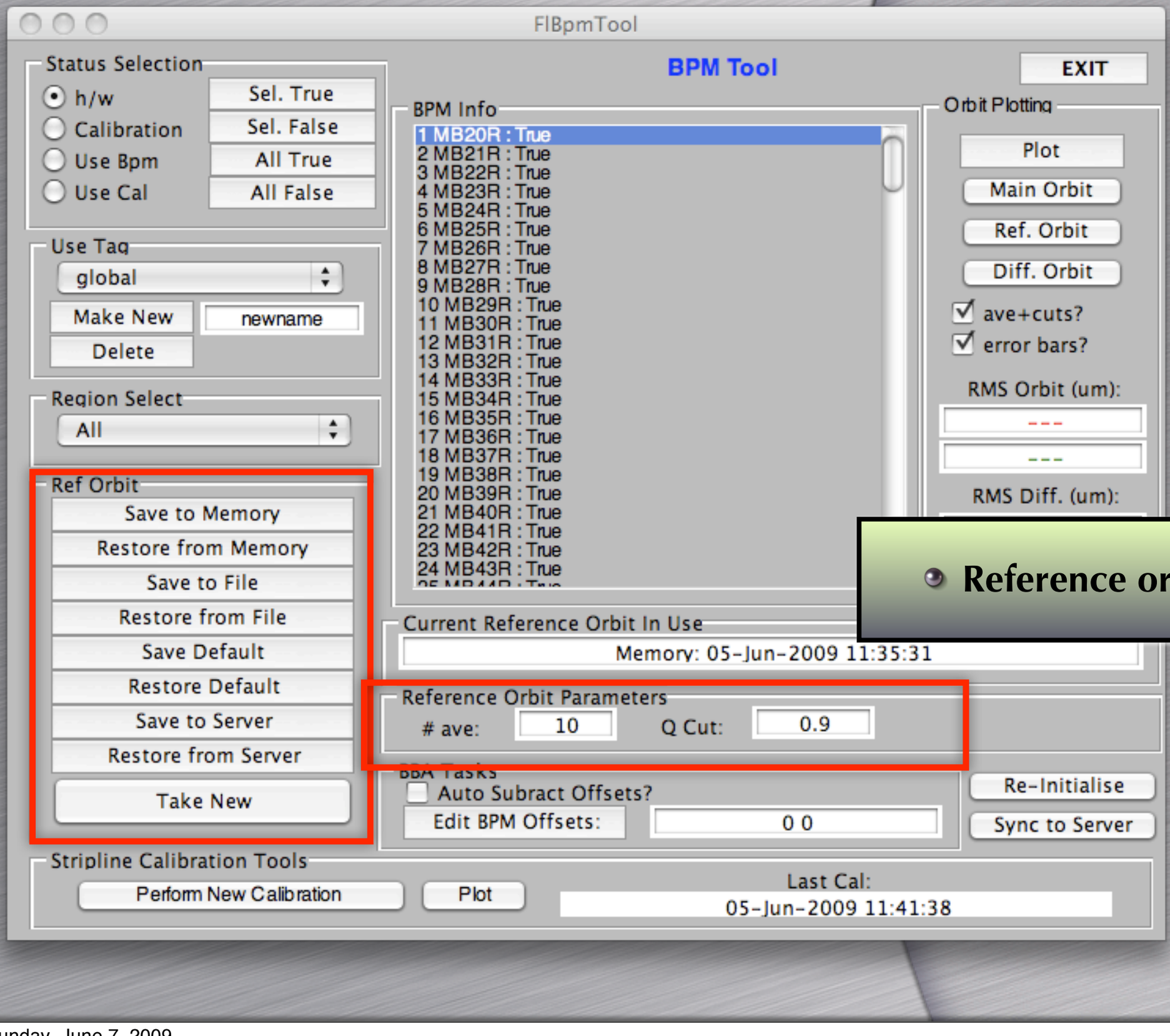
- **BPM selection**
  - **User selection of which BPMs to use in apps**
  - **Good h/w & cal status**
  - **Use/not use FS cal constants**

BPM Tool



- **Orbit Plotting**
  - **x/y/tit plot**
  - **abs / ref / difference**
  - **display RMS**

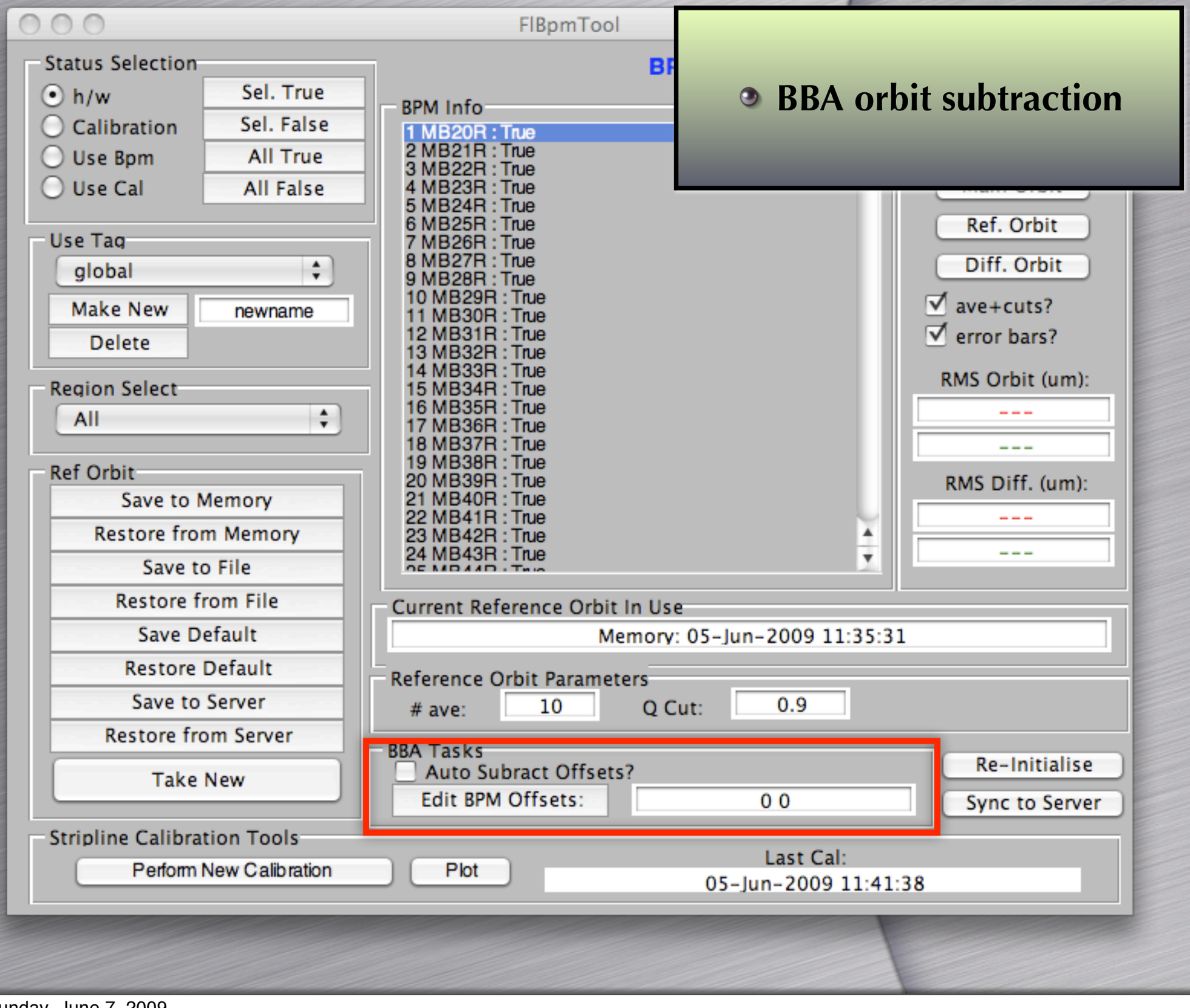
BPM Tool



- Reference orbit taking

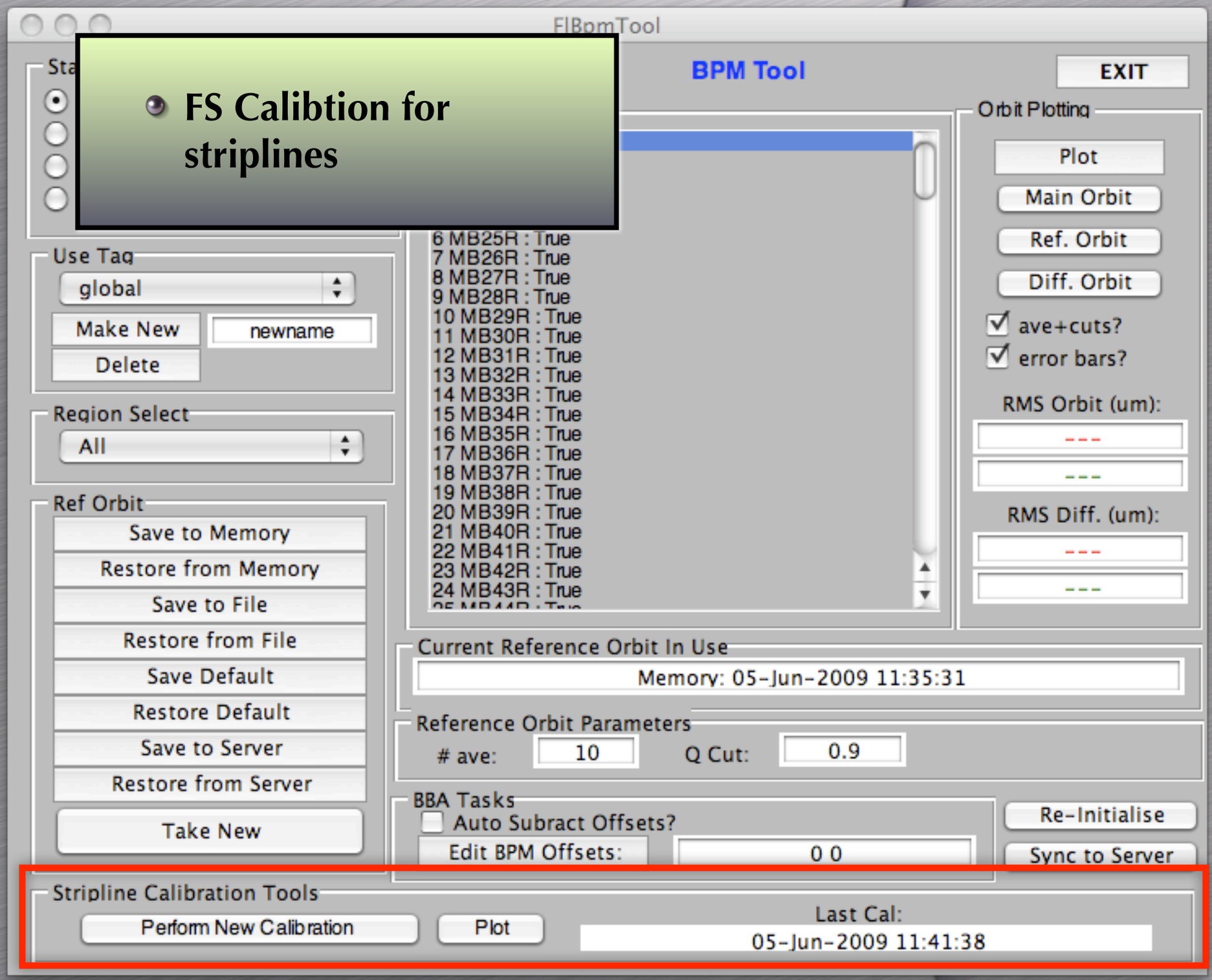
BPM Tool

- BBA orbit subtraction



BPM Tool

- FS Calibtion for striplines



BPM Tool

FlBpmTool

BPM Tool

EXIT

Status Selection

- h/w
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Sel. True | Sel. False | All True | All False

Use Tag

global

Make New | newname | Delete

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All

Ref Orbit

Save to Memory
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BPM Info

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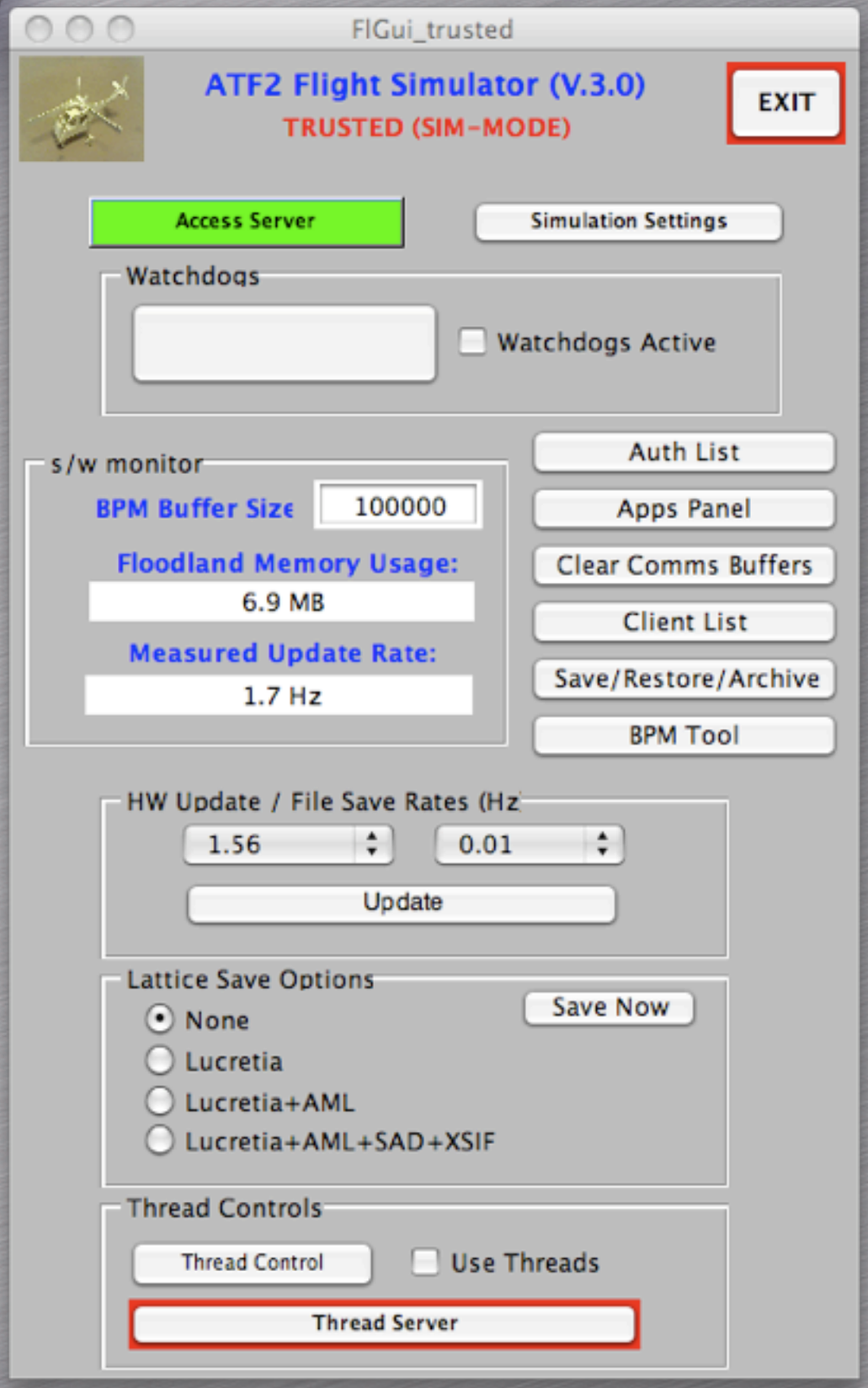

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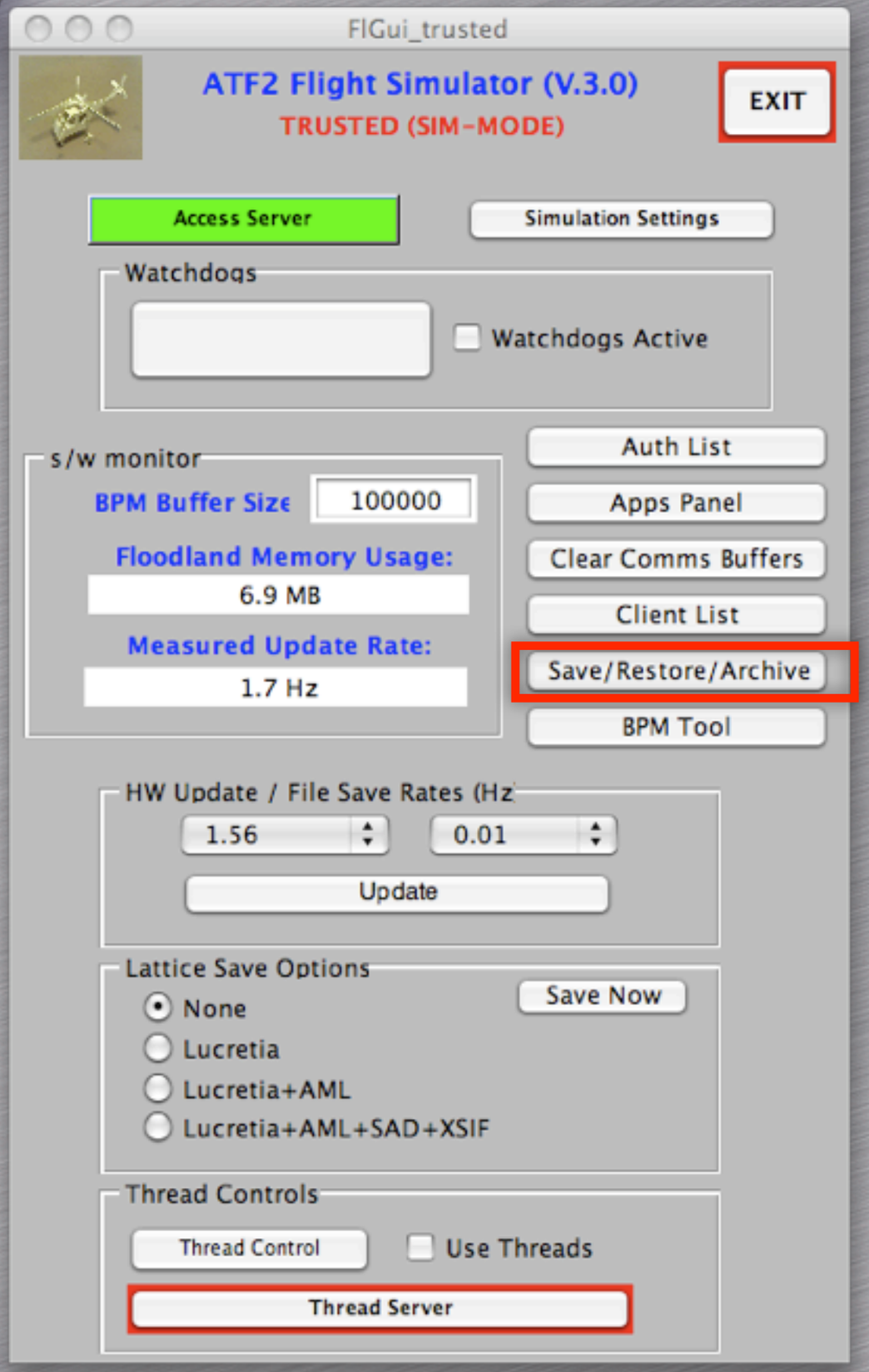

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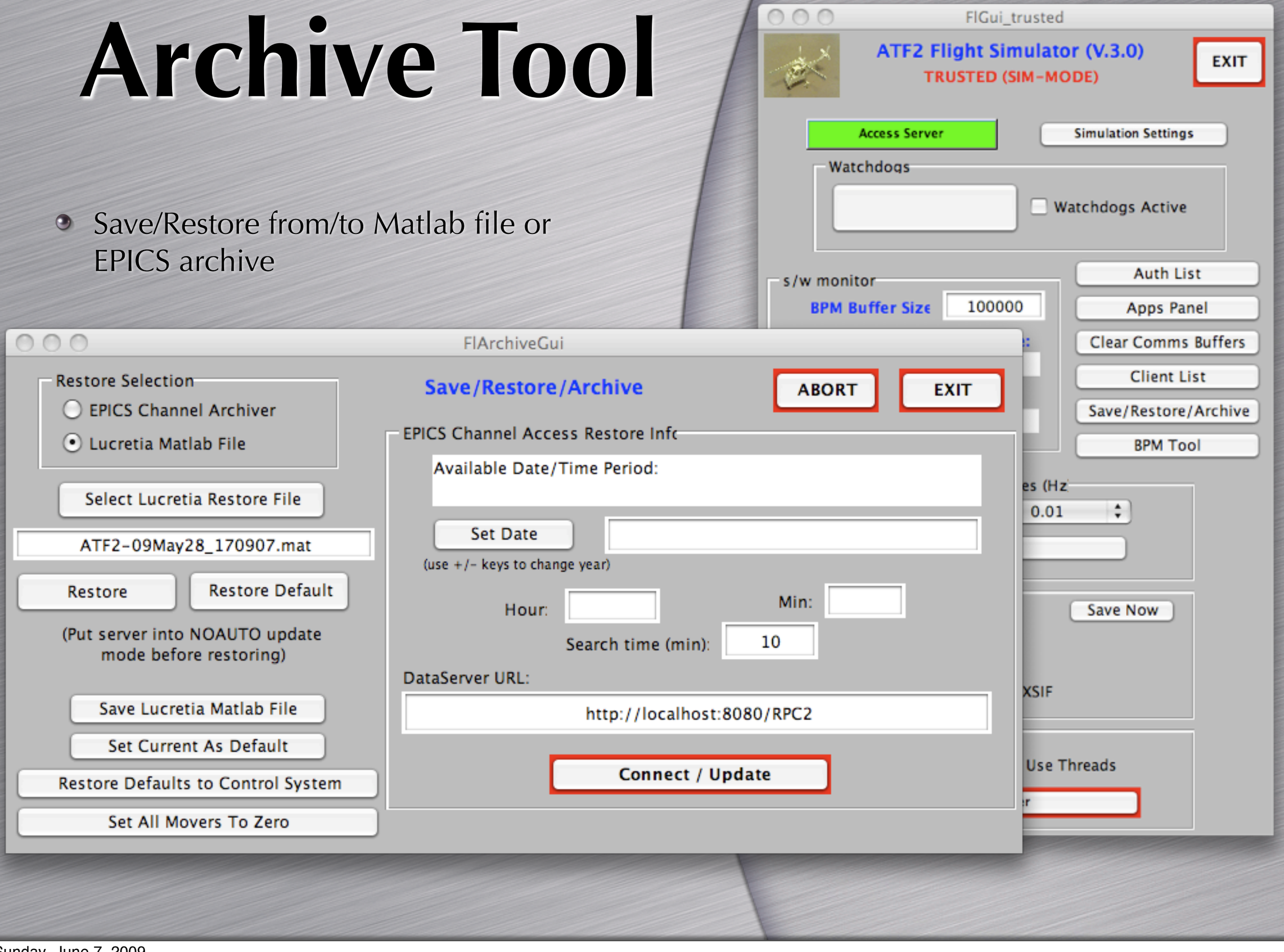

Archive Tool

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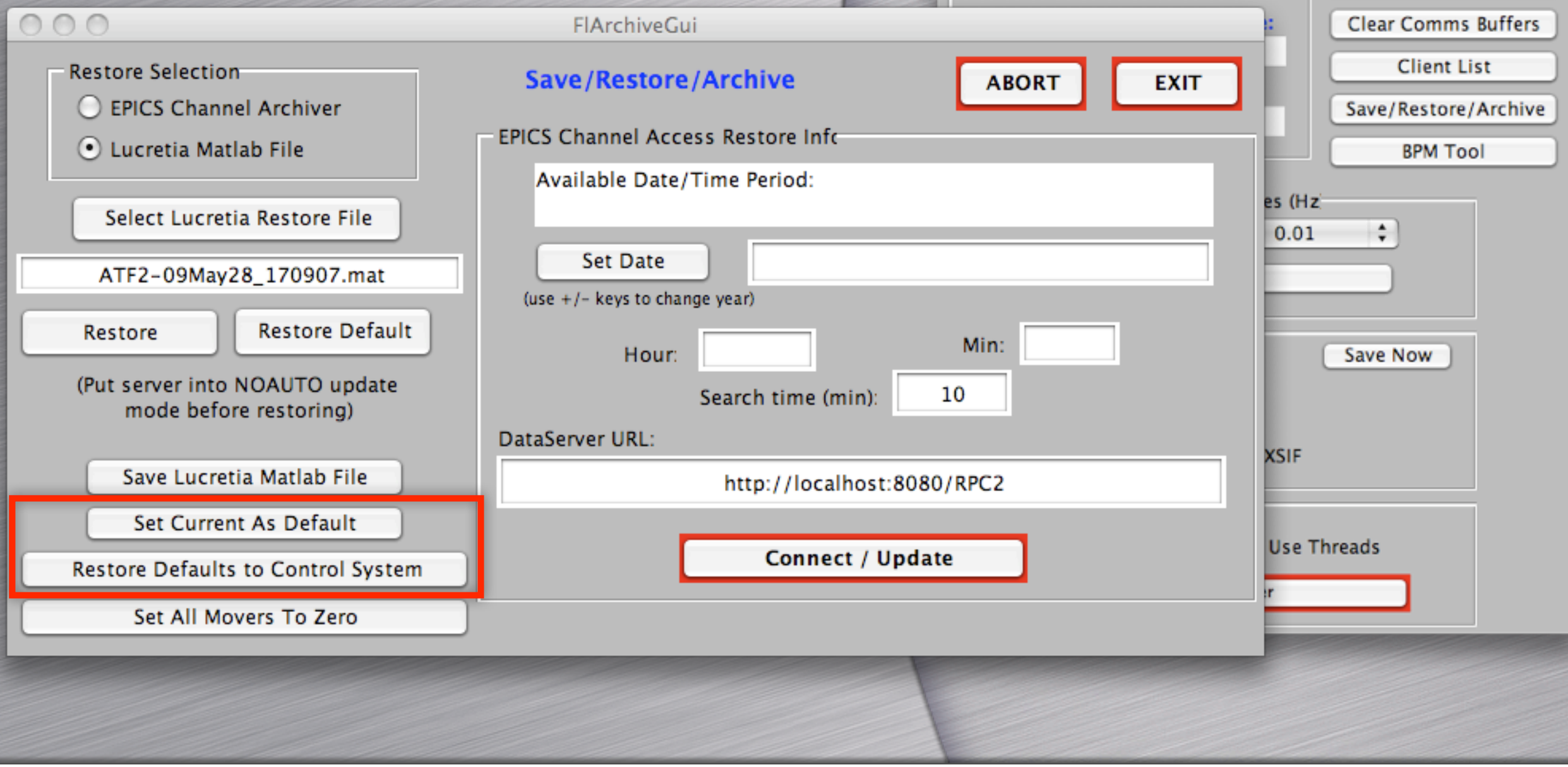
- **After restoring a known good file**
- **Set as default optics file**
- **Then option to restore some or all settings to control system.**



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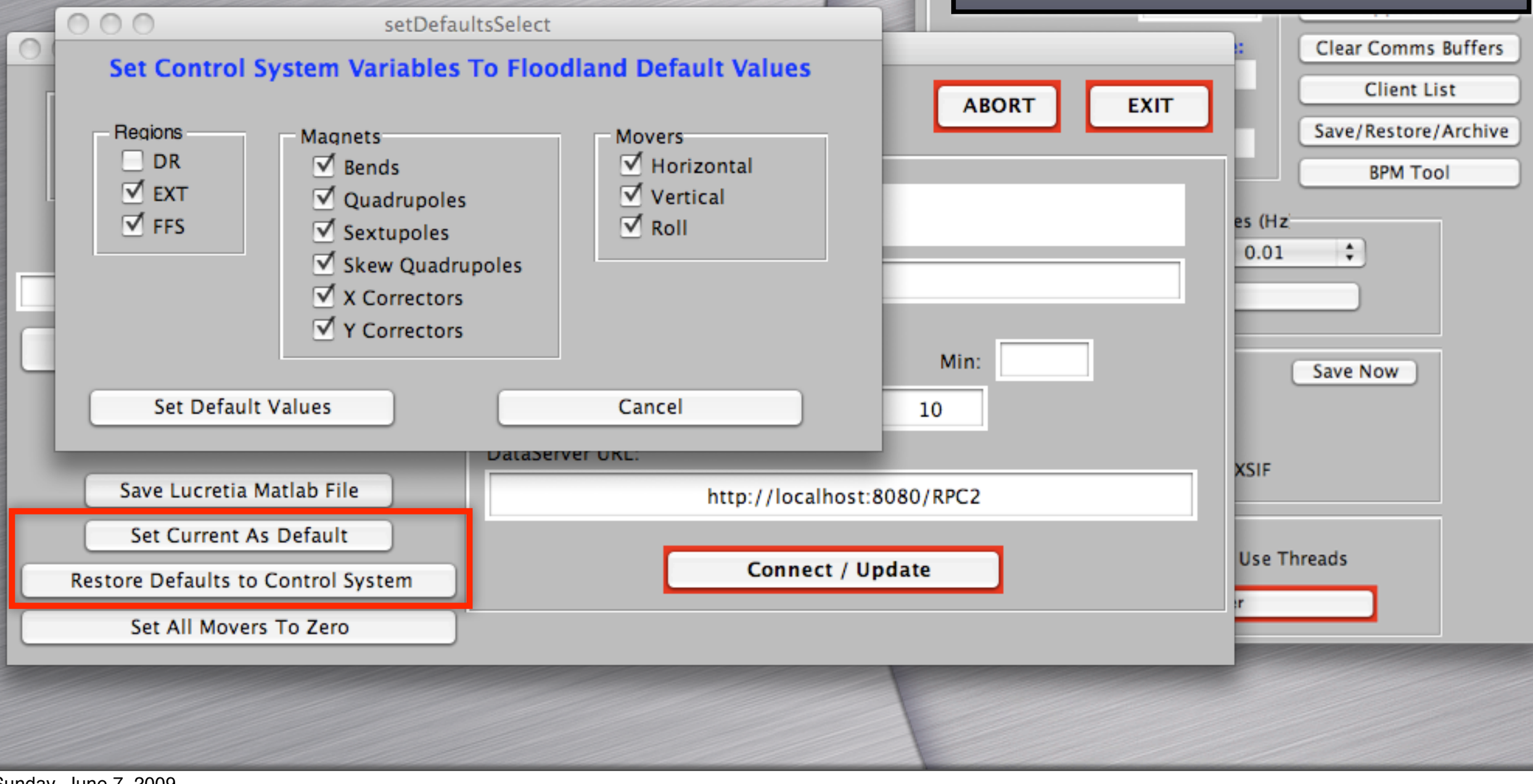

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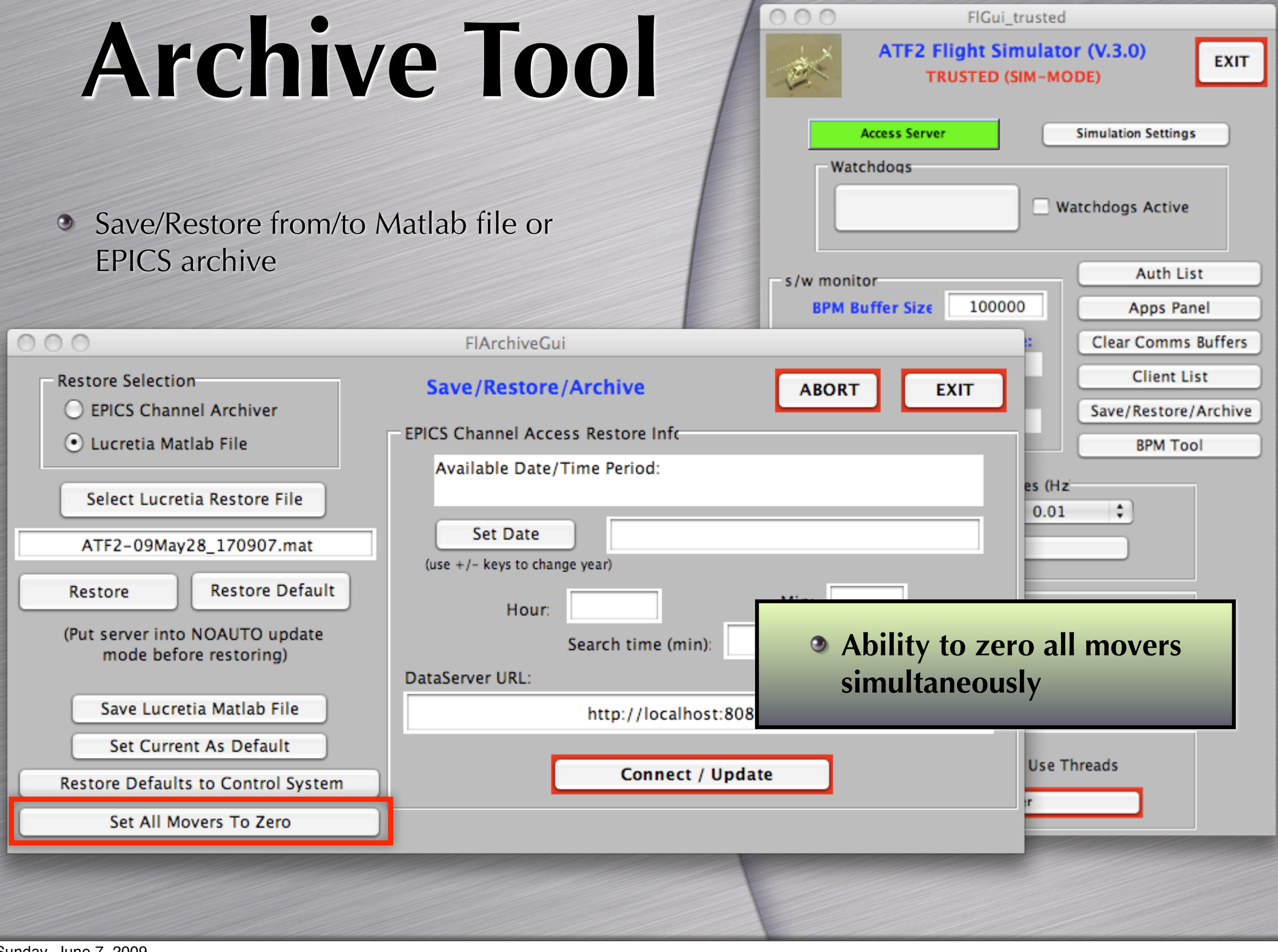

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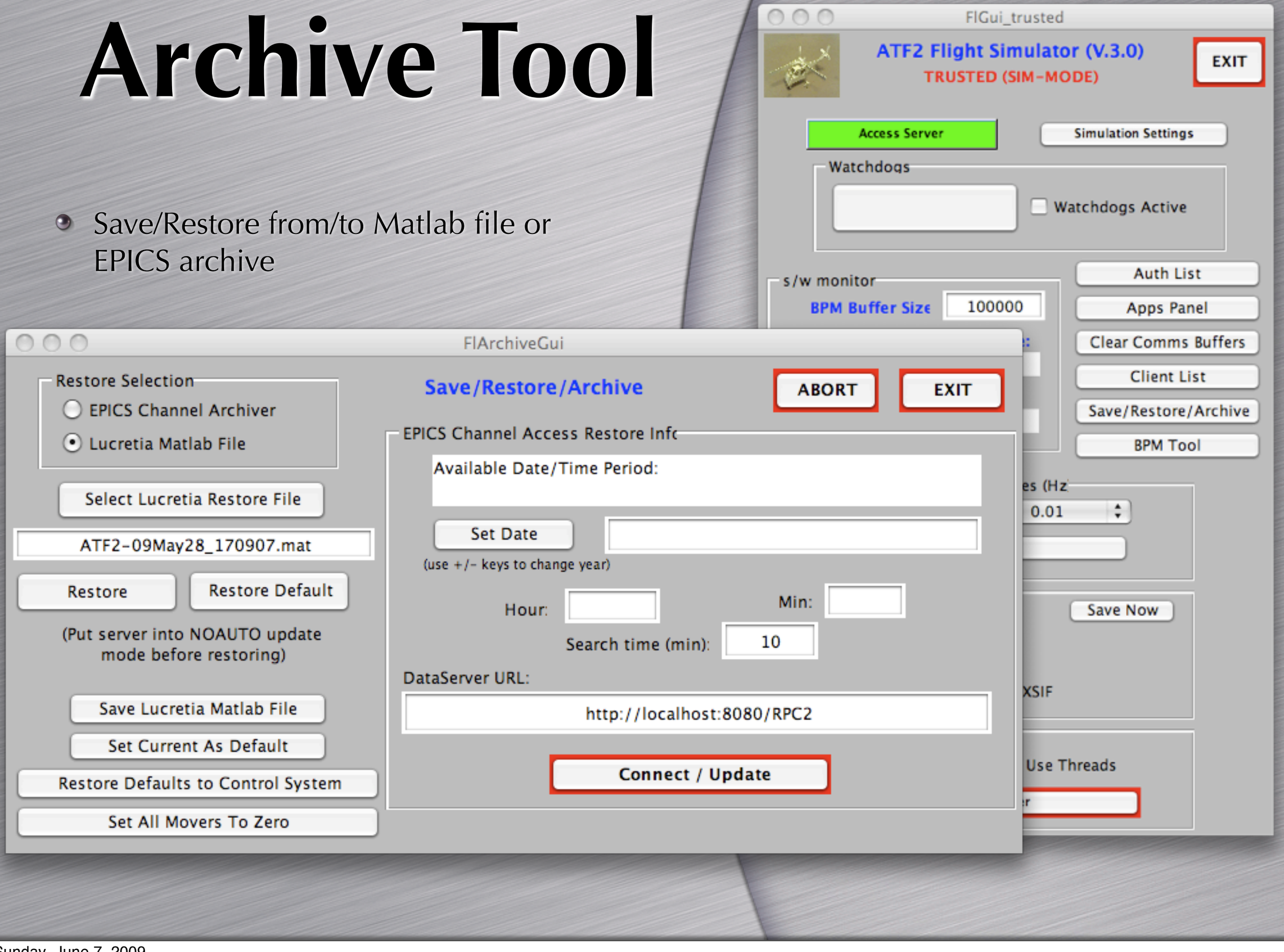
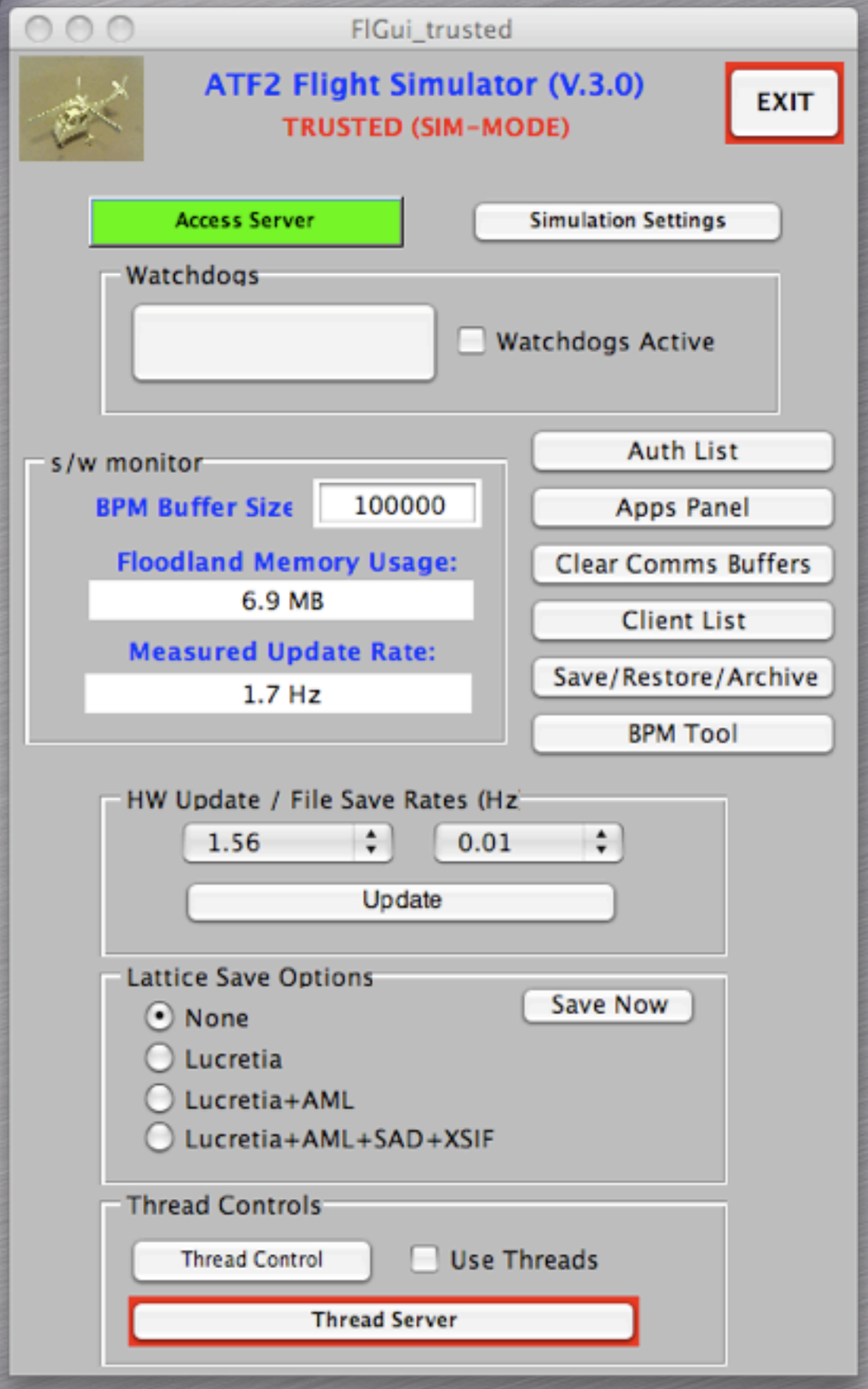


Watchdogs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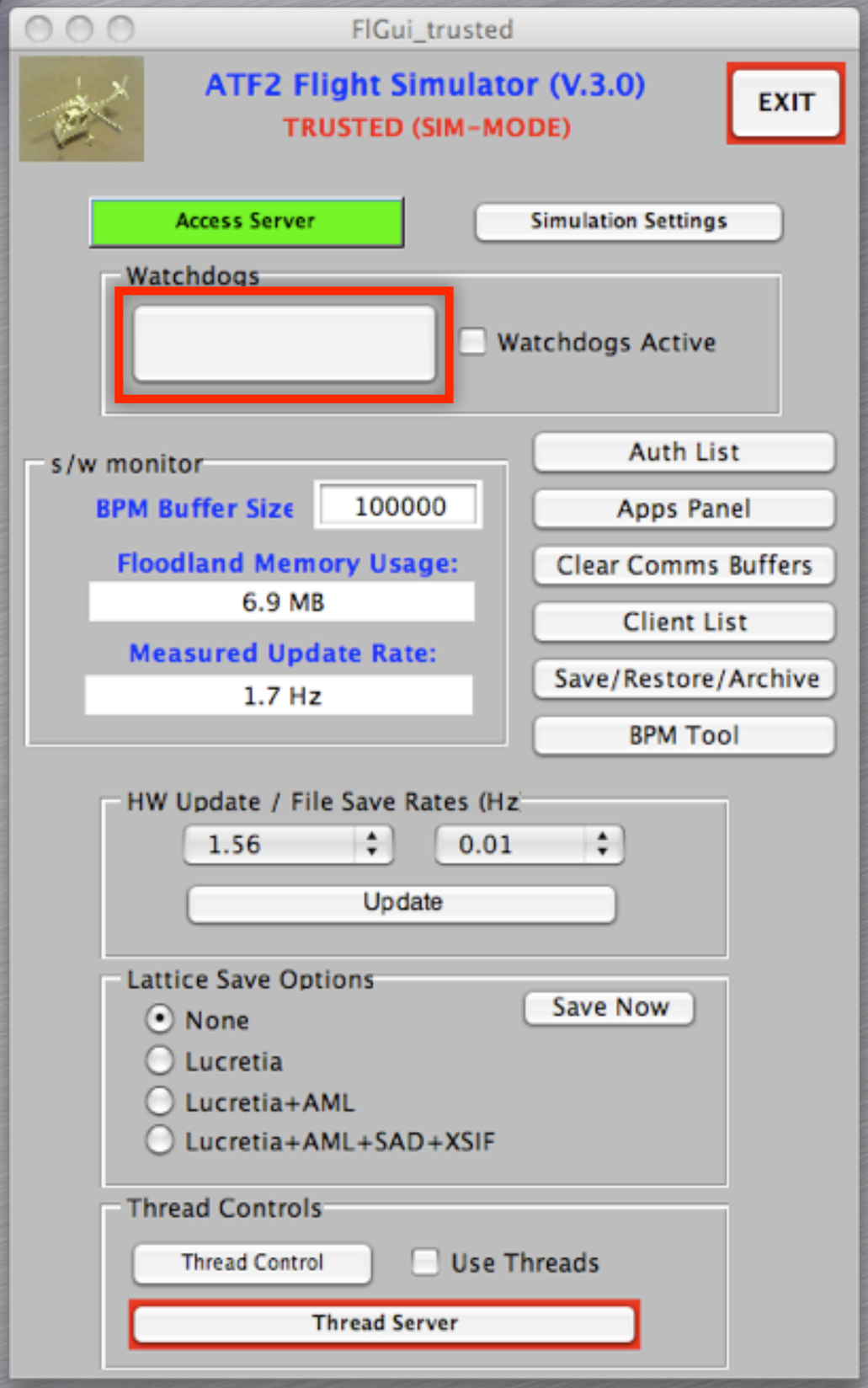
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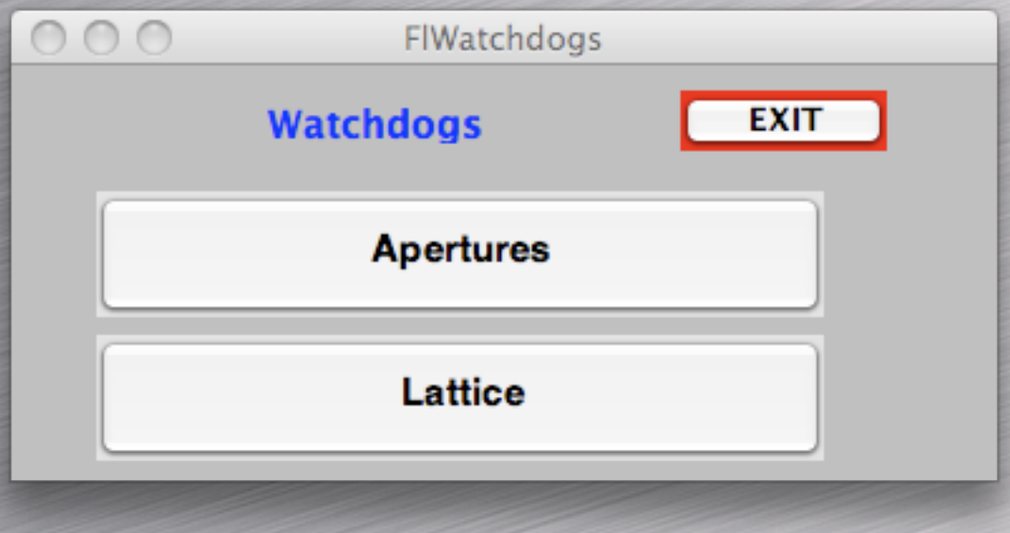
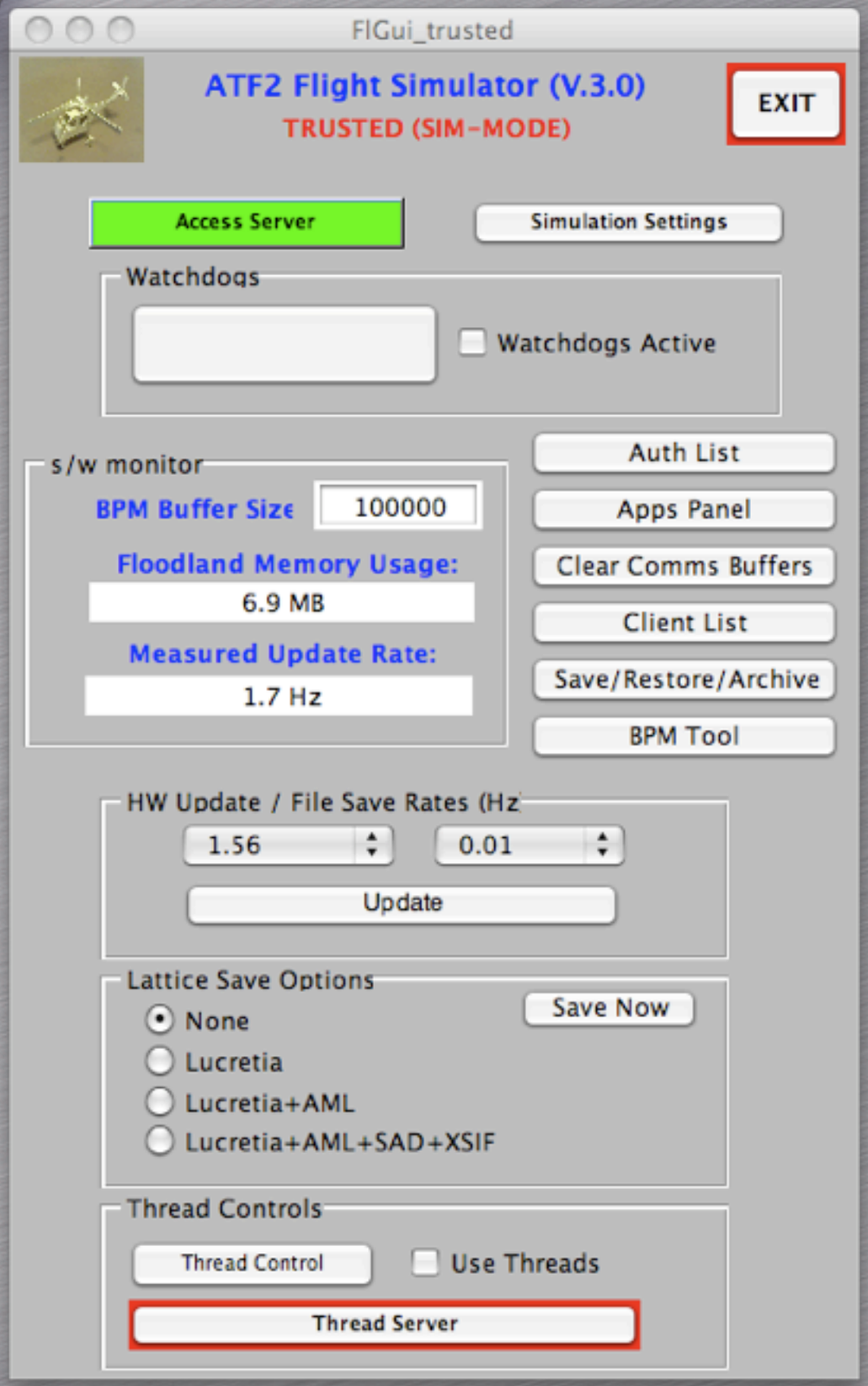
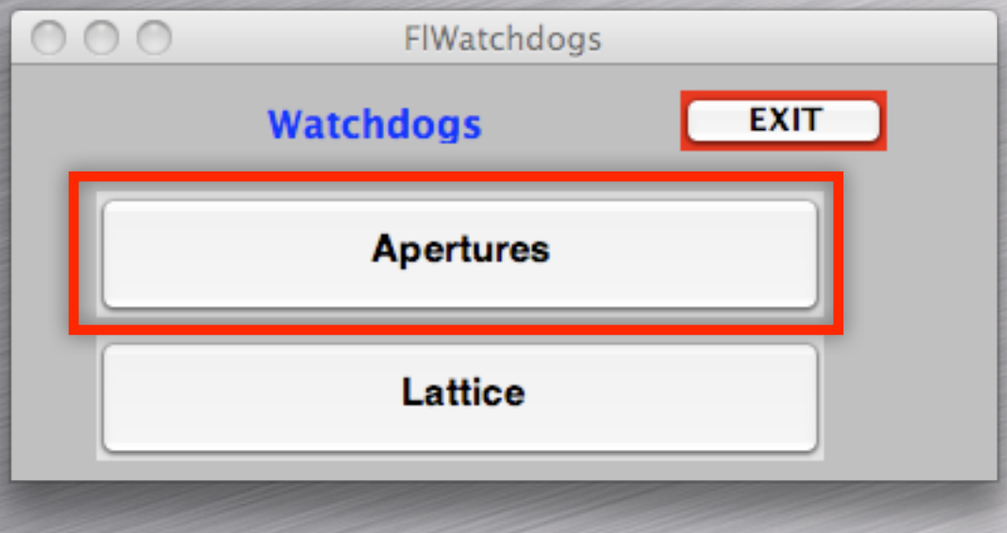
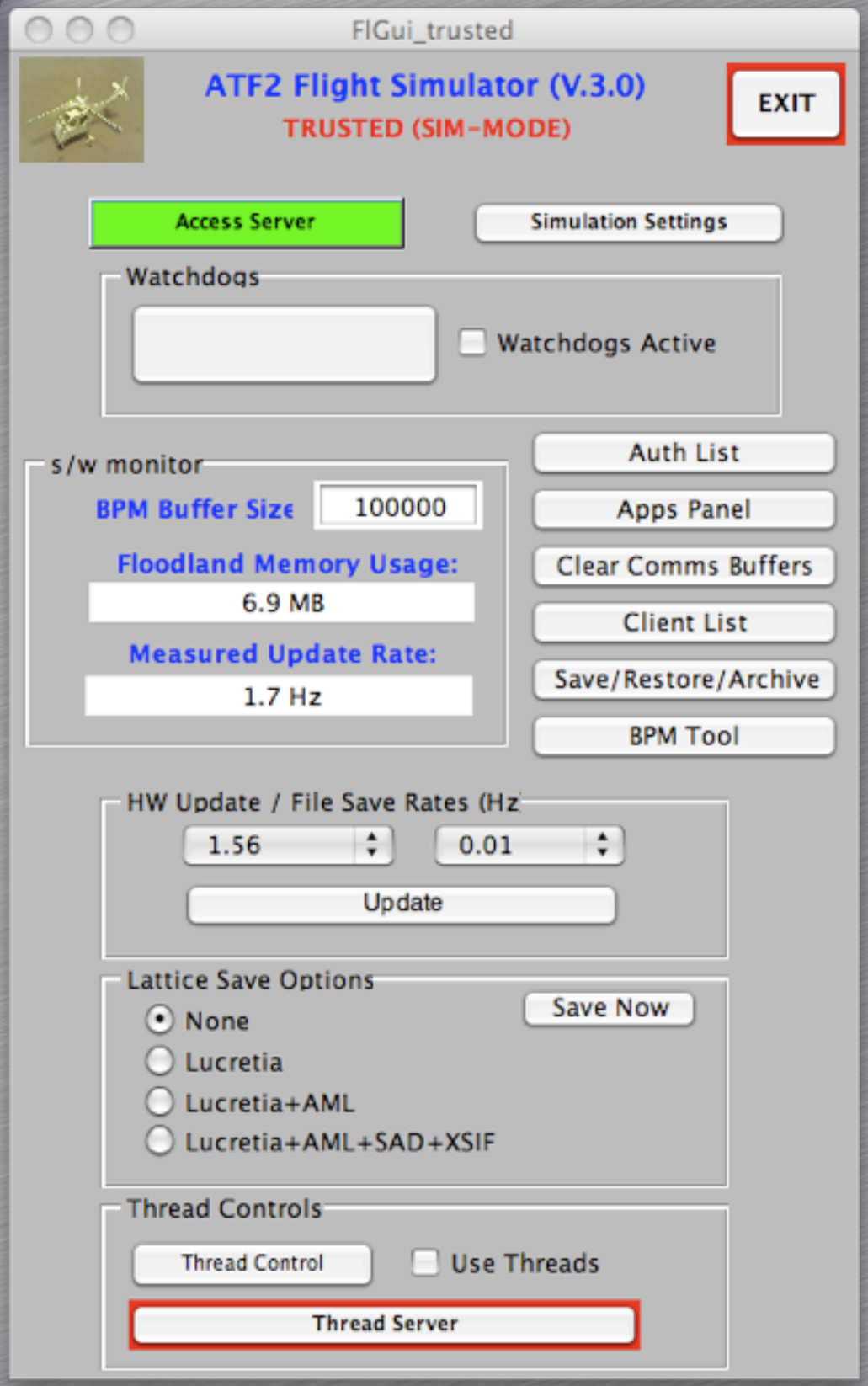

FlWatchdogs
Watchdogs
EXIT
Apertures
Lattice


FlGui_trusted
ATF2 Flight Simulator (V.3.0)
TRUSTED (SIM-MODE)
EXIT
Access Server
Simulation Settings
Watchdogs
Watchdogs Active
s/w monitor
BPM Buffer Size
100000
Floodland Memory Usage:
6.9 MB
Measured Update Rate:
1.7 Hz
Auth List
Apps Panel
Clear Comms Buffers
Client List
Save/Restore/Archive
BPM Tool
HW Update / File Save Rates (Hz
1.56
0.01
Update
Lattice Save Options
Save Now
None
Lucretia
Lucretia+AML
Lucretia+AML+SAD+XSIF
Thread Controls
Thread Control
Use Threads
Thread Server

Watchdogs


FlWatchdogs
Watchdogs
EXIT
Apertures
Lattice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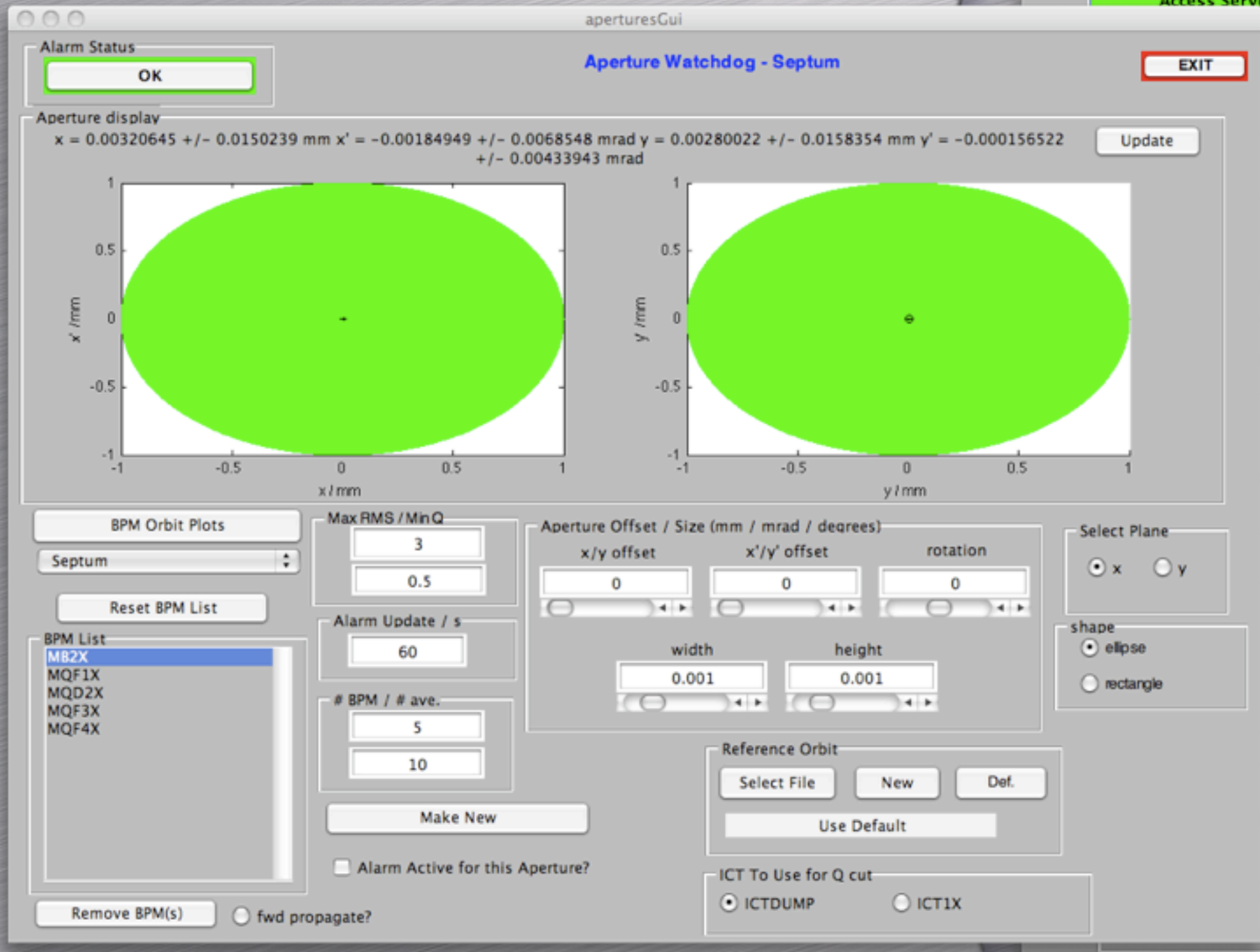
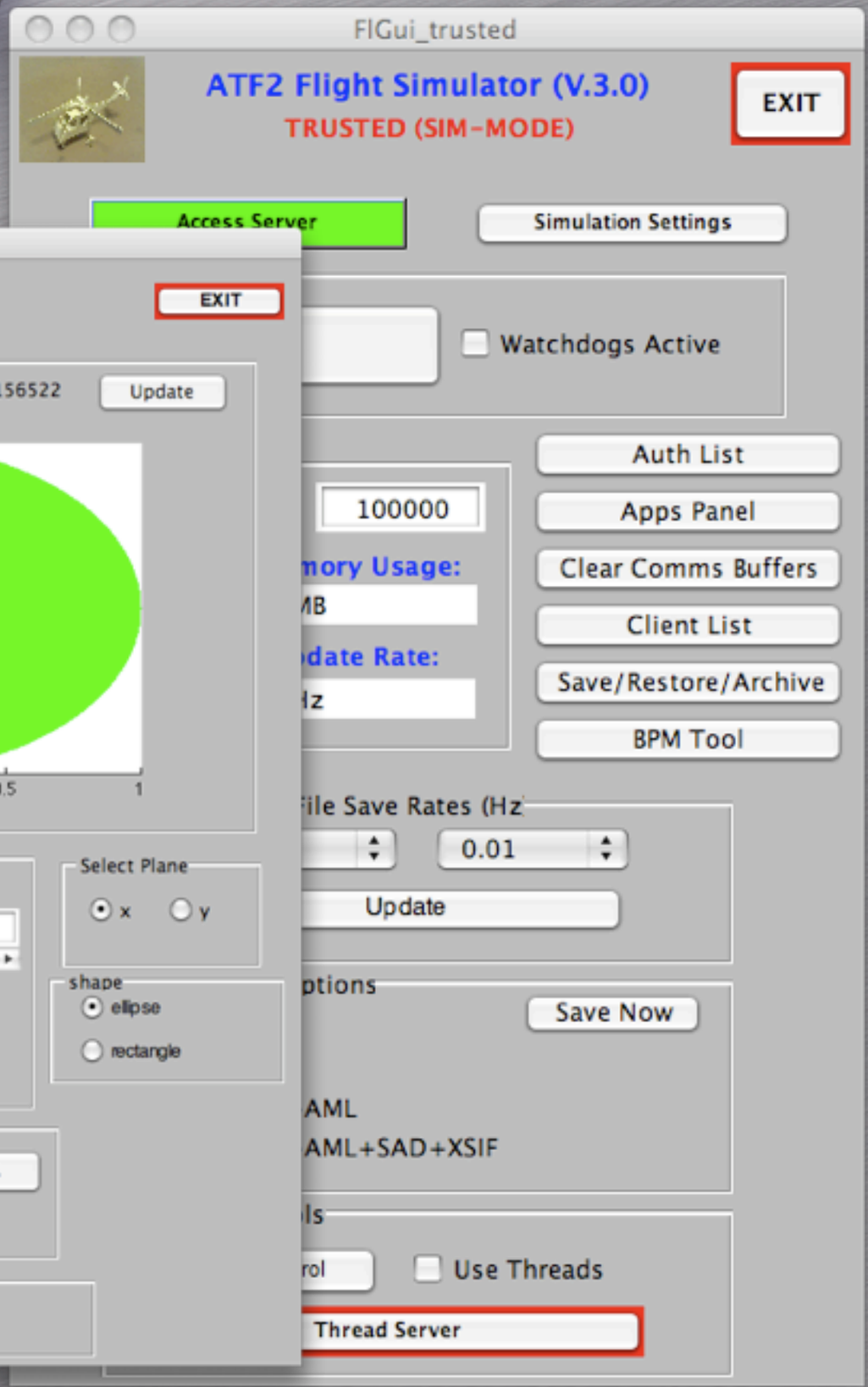

aperturesGui
Alarm Status
OK
Aperture Watchdog - Septum
EXIT
Aperture display
x = 0.00320645 +/- 0.0150239 mm x' = -0.00184949 +/- 0.0068548 mrad y = 0.00280022 +/- 0.0158354 mm y' = -0.000156522 +/- 0.00433943 mrad
Update
x' /mm
x /mm
y /mm
y /mm
BPM Orbit Plots
Septum
Reset BPM List
BPM List
MB2X
MQF1X
MQD2X
MQF3X
MQF4X
Remove BPM(s)
fwd propagate?
Max RMS / Min Q
3
0.5
Alarm Update / s
60
BPM / # ave.
5
10
Make New
Alarm Active for this Aperture?
Aperture Offset / Size (mm / mrad / degrees)
x/y offset
x'/y' offset
rotation
0
0
0
width
height
0.001
0.001
Reference Orbit
Select File
New
Def.
Use Default
ICT To Use for Q cut
ICTDUMP
ICT1X
Select Plane
x
y
shape
ellipse
rectangle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0.01
Update
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Save Now
AML
AML+SAD+XSIF
ls
rol
Use Threads
Thread Server

Summary

- FS in use during 2009 run periods.
- Most debug issues now resolved
  - Connections to correct PSs / Movers / BPMs
  - Consistent co-ordinate system
  - FS stability
- Compiled list of core and test apps tweaks to do over summer shutdown period.
  - Also work on documentation.
- Planned more major developments to be reported on in next talk.